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# Use of Municipal Biosolids for Revegetation at Hanford

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**Bechtel Hanford, Inc.**  
Richland, Washington

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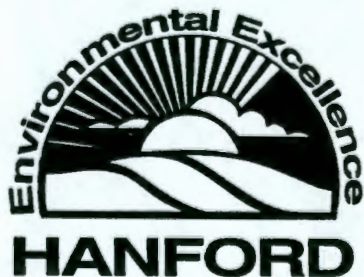
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## 1.0 INTRODUCTION

The U.S. Department of Energy (DOE) owns the 145,040 hectare (560 square miles) Hanford Site, located in Central Washington. Remediation and maintenance activities at Hanford have disturbed large areas of land, including borrow areas and interim stabilized waste sites. Due to several factors, revegetation of disturbed areas is difficult at Hanford. Revegetation failure leads to wind erosion and deep-rooted plant establishment, neither of which is desirable on interim stabilized waste sites. Biosolids have been shown to significantly aid in establishing vegetation in arid climates. The use of biosolids at Hanford has the potential to improve waste site maintenance.

This document is intended to outline a broad program for biosolids use at Hanford and to obtain concurrence from the DOE, the Washington Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA) to proceed with the selection of a biosolids source, preparation of application plans and procedures, and actual application.

## 2.0 GENERAL PROJECT DESCRIPTION

The Radiation Area Remedial Action (RARA) project is responsible for the maintenance of the majority of the inactive waste sites at Hanford until final remediation alternatives are implemented. These sites include burial grounds, cribs, ponds, ditches, vaults, unplanned release sites and tanks. The elimination of radioactive surface contamination is an integral part of waste site maintenance activities. Over the past 14 years, RARA has eliminated surface contamination from approximately 567 hectares (1400 acres) mainly by standard excavation and backfill practices. Disturbed ground is ideally suited to the establishment of deep-rooted vegetation, namely *Salsola kali* (Russian thistle). This is problematic because of the tendency for Russian thistle to transport radionuclides to the surface, where it becomes susceptible to migration. A secondary problem is that these disturbed areas are also susceptible to severe wind erosion.

The establishment of shallow-rooted perennial grasses on interim stabilized waste sites and other disturbed areas minimizes both of these problems. However, the arid climate and nutrient poor soils make perennial establishment difficult. The use of biosolids is an accepted and proven method for revegetation of arid and/or drastically disturbed sites (Brandt and Hendrickson 1990). Biosolids improve soil qualities that aid plant development.

It is proposed that municipal biosolids be used to aid in the establishment of desirable grass on interim stabilized waste sites and associated borrow areas managed by the RARA project that are located in the 200 East, 200 West and immediately adjacent 600 Area. Biosolids could also be used for the revegetation of other disturbed areas resulting from remediation activities or construction.



### 3.0 PERMITTING HISTORY

The use of biosolids on inactive waste sites presents one major problem. These sites have yet to be remediated, or even fully characterized. Biosolids contain material that is regulated under various state and federal laws. Potentially, the application of biosolids to an unremediated site could complicate, and therefore increase the cost, of final remediation. However, if biosolids are used judiciously and in accordance with accepted reclamation or agronomic practices, the potential for complicating future remediation is minimal (Jansen 1992). Biosolids application in accordance with site specific application plans, described below, will minimize the potential to complicate future remediation.

The jurisdictional health department (in this case the Benton County Department of Health) is the permitting authority for biosolids application programs in Benton County. Because this proposal involves Hanford, the Benton County Department of Health deferred permitting authority to Ecology. The EPA will be the lead regulatory agency on a number of sites where biosolids may be used. The DOE is the landowner of sites where biosolids may be applied. Based on input from all involved agencies, a course of action that would allow biosolids use at Hanford has been established. It was decided that the following three steps had to be completed prior to beginning biosolids application. Step one was a recommendation from Westinghouse Hanford Company (WHC) to the DOE stating that biosolids application is technically sound (Hughes 1993). The second step was that a short synopsis about the proposed biosolids application be prepared and issued in a public document (Ecology 1993). The final step is a program plan that would be reviewed by the EPA, Ecology, and the DOE that would establish the framework for a biosolids application program. This document fulfills the final step.

### 4.0 INDIVIDUAL SITE APPLICATION PLANS

Because of the large number of inactive waste sites, borrow areas, or other disturbed sites that are potential biosolids application sites, no one plan could be written that would apply to all sites. Site specific application plans are necessary to ensure that all environmental and regulatory constraints are addressed.

It will be necessary to prepare individual application plans for each site, or group of sites. These individual plans would constitute the permit, and will be approved by DOE and Ecology. These plans would be prepared by the municipality that wants to apply biosolids, or by Bechtel Hanford, Inc., or by a combination of both the municipality and Bechtel Hanford, Inc. Plans would be written in a format similar to *The Performance Standards for Land Application Projects* (Municipality of Metropolitan Seattle Biosolids Management Program 1993), and would be in accordance with 40 Code of Federal Regulations (CFR) Part 503 "Standards for the Use and Disposal of Sewage Sludge".



Individual site application plans would also allow flexibility to adapt to changing environmental regulations.

## **5.0 SPECIFIC BIOSOLIDS MONITORING DATA**

Biosolids applied to uncharacterized and unremediated waste sites will require a documented history detailing levels of contaminants found in the biosolids. Documentation requirements will vary depending on the municipality providing the biosolids. Site specific application plans will detail biosolids quality data as necessary.

## **6.0 APPLICATION RATES**

All biosolids applications at Hanford would be for reclamation purposes rather than agronomic purposes. Application rates for land reclamation are typically higher than agronomic application rates. However, due to the possibility that excessively high application rates on unremediated or characterized waste sites could increase levels of regulated material beyond regulatory limits, application rates may have to be minimized.

Application rates will be based on levels of contaminants found in the biosolids. Specific rates will be set for individual sites on a case by case basis. In all cases, application at a particular site will be a one time only operation. This minimizes the possibility that contaminants found in the biosolids would accumulate to regulated levels.

## **7.0 ENVIRONMENTAL PARAMETERS**

Soil fertility parameters will be measured as required prior to biosolids application to insure proper soil nutrient balance. Analysis for total metals (cadmium, copper, chromium, nickel, lead, zinc, arsenic, mercury, and selenium) found in the soils where biosolids are to be applied may be required on a site specific basis. Alternately, existing site background data (DOE-RL 1994) may be used to establish metal concentrations prior to biosolids application. The use of new characterization information or existing site background data will be dependent on the levels of contaminants found in biosolids and proposed application rates.

No groundwater monitoring is required to support biosolids application. Groundwater below Hanford is already extensively monitored.

## **8.0 RECORDKEEPING**

A site specific plan will be prepared for each site to receive biosolids. The Waste Inventory Data System (WIDS) will be updated to reflect that biosolids application occurred. Application rates and biosolids analysis data will be included. Additional monitoring requirements may be specified in the site specific biosolids application plan.

## **9.0 RESPONSIBILITIES OF INVOLVED PARTIES**

### **9.1 U.S. DEPARTMENT OF ENERGY**

As the landowner where biosolids are applied, the DOE must approve biosolids application at Hanford. DOE approval of this plan is considered an endorsement for the beneficial use of biosolids for revegetation of inactive waste sites and other disturbed areas at Hanford.

### **9.2 WASHINGTON DEPARTMENT OF ECOLOGY**

Approve site specific biosolids application plans, and this general application plan. Ecology approval of this plan is considered an endorsement for the beneficial use of biosolids for revegetation of inactive waste sites and other disturbed areas at Hanford.

### **9.3 U.S. ENVIRONMENTAL PROTECTION AGENCY**

Approve this general biosolids application plan. EPA approval of this plan is considered an endorsement for the beneficial use of biosolids for revegetation of inactive waste sites and other disturbed areas at Hanford.

## **10.0 REFERENCES**

Brandt, C.A. and P.L. Hendrickson, 1990, *Review of Municipal Sludge Use as a Soil Amendment on Disturbed Lands*, PNL-7425, Pacific Northwest Laboratory, Richland, Washington.

DOE-RL, 1994, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24. Volume 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.



Ecology, 1993, Municipal Sewage Sludge May Stabilize Soils at Hanford in Hanford Update, Volume 4 No. 3, April 1993, Page 2, Washington Department of Ecology Newsletter.

Jansen, D. B., (Ecology), to R. D. Izatt, "Utilization of Municipal Sludge for Soil Amendment," letter 9300223B, dated December 29, 1992.

Hughes, M. C. to R. D. Freeburg, "Utilization of Municipal Sludge for Soil Amendment," letter 9300223B R1, dated February 2, 1993.

Municipality of Metropolitan Seattle Biosolids Management Program, 1993, *Performance Standards for Land Application Projects (draft)*, April 1993.