CSMRI Bagged Soil Disposal
Summary Report

Prepared for:

Colorado School of Mines
Golden, Colorado

Prepared by:

S.M. Stoller Corporation
Lafayette, Colorado

February 8, 2006

Table of Contents

List of Appendices

1. Introduction

Complete details of the bagged soil disposal procedures and justification for techniques used are provided in the CSMRI Creekside Site Contaminated Soil Disposal Work Plan (Stoller 2005b). The soil was loaded into trucks and shipped to BFI Foothills facility under the Stoller Radioactive Materials License No. 1094-01. This document serves to provide a summary of the disposal as well as summarize and contain all field-generated paperwork. Brief summaries of pertinent details are provided below followed by appendices containing the paperwork.

2. Soil History

In 2004, New Horizons was selected to identify, excavate, and dispose of contaminated soils at the Site. Fieldwork began in April 2004. This fieldwork constituted Phase II of the environmental assessment and response. By May 2004, it was apparent that excavated soil volumes exceeded previously estimated volumes. Work was halted and the Site was stabilized.

During the 2004 remediation work, approximately 1,870 cubic yards (cy) of radioactive/metals-contaminated soil were excavated, bagged, and staged on the Site by New Horizons. At the time of New Horizons contract termination in Fall 2004, an estimated 100 cy of the radioactive/ metals-contaminated soils had been shipped from the Site for disposal leaving an estimated 1,776 cy remaining for transport and disposal.

3. Soil Sampling

In December 2004, Stoller collected representative soil samples from a random subset of the 455 super-sack containers staged at the Site to generate a legitimate data set to evaluate potential disposal options of the containerized material. Results were submitted to the Colorado Department of Public Health and Environment (CDPHE) for review in the April 2005 report, *Dose Assessment for the Emplacement of the CSMRI Site Containerized and Remaining Subsurface Soil into a RCRA Subtitle D Solid Waste Landfill* (Stoller 2005a). After review of the dose assessment report, the CDPHE approved shipment of radioactive/metals-contaminated soils and similar soils to a solid waste landfill in a letter dated August 26, 2005.

4. Landfill Acceptance

In order for the landfill to accept this waste stream, analytical data demonstrating the nature of the material were supplied to BFI for review. BFI agreed the material was not hazardous waste and along with the CDPHE approval for them to accept the material, BFI agreed to accept the waste stream.

5. Soil Disposal

All bagged soils from the CSMRI Creekside Site were shipped to BFI Foothills Landfill during the period of December 12 through 15, 2005, in accordance with the approved CSMRI Creekside Site Contaminated Soil Disposal Work Plan and Materials Transportation Plan (Appendix A of the work plan) (Stoller 2005b). A total of 112 trucks containing bagged soil plus two trucks containing other debris from the site were shipped. None of these loads tripped the gate sensors that are set to detect activity greater than two times background. The total tonnage from the landfill weigh tickets was 2,110.65 tons.

Briefly, the procedure for bagged soil shipment was as follows:

- All truckers and site personnel were assembled for a morning safety meeting prior to starting any work on the site.
- Radiological survey equipment was calibrated.
- The trucks were surveyed for contamination and dose rate when they arrived at the site. The readings were recorded on an "incoming" survey form.
- Truckers were provided with a waste manifest, and if they were returning from a previous load, they submitted their weigh tickets.
- A plastic tailgate "diaper" was placed and secured in each truck.
- The trucks entered the exclusion area and were loaded with bagged contaminated soil. Most trucks held four bags, but one lighter gross weight truck was routinely loaded with five bags.
- The trucks exited the exclusion area and were surveyed for contamination and dose rate. The readings were recorded on an "outgoing" survey form.
- Each outgoing shipment was recorded on a Truck Departure Record Form.
- After their final load, trucks returned to the site to deliver their final weigh ticket and to obtain a final radiological survey for "free release."

A photo log of the waste loadout and disposal is included as Appendix A

Personnel records were maintained for all people on site. Signature sheets for morning safety meetings, visitor sign-in logs, and worker sign-in logs are included in Appendix B. Sign-in logs were maintained to provide data to allow the calculation of exposure dose for each person involved in the project. The low activity of the material combined with the establishment and enforcement of the exclusion zone effectively prevented exposure to site personnel. Therefore, no dose is being assigned to Stoller employees or subcontractors for this phase of the project.

Each day prior to the start of radiological survey work, each instrument was calibrated with respect to local background. Calibration record sheets are in Appendix C.

Appendix D contains a copy of the manifest, incoming survey, weigh ticket, and outgoing survey for each truck. Appendix E contains copies of the Truck Departure Record Forms.

Appendix F contains final radiological surveys for the trucks and heavy equipment (trackhoe, skid steer).

Each day, the global positioning system (GPS) coordinants of the disposal location at BFI were recorded. All bagged soil was deposited in the same area of the landfill; variation in the GPS readings is due to precision limitations in the GPS equipment. Appendix G contains the GPS coordinants.

Two supplemental ambient air monitors were run during work activities on December 12 through 15, 2005. The air monitor filters were counted for gross alpha and gross beta, and the results were below the Colorado air effluent standards. Raw data and results are provided in Appendix H.

Routine dose rate surveys were conducted in the exclusion area near the exposed front row of bags at the time. The purpose of these surveys was to document that personnel dosimetry was not required for this job. Measured dose rates in the general work area near the bags ranged from 22 to 28 microrem per hour, with background readings of 20 to 21 microrem per hour. Dose rate surveys are provided in Appendix I.

6. Deviations from Work Plan

In spite of Stoller's instructions otherwise, two trucks that were used on December 13 did not return the following day; therefore, they did not receive a final radiological survey. However, during more than 200 radiological surveys conducted on site equipment (including trucks), no removable contamination was detected on any equipment, and all other trucks met the free release survey criteria. Therefore, it is expected that the two trucks that were not surveyed were not radiologically contaminated.

7. Final Site Survey

At the completion of the removal action, a brief survey of the site was completed. Very few of the bags were ruptured during removal, making the likelihood of any contamination remaining where the bags had been located remote. The survey confirmed the removal action had removed all the material and no activity above background was recorded.

8. References

Stoller 2005a. Sampling Report, CSMRI Site Containerized Material, Appendix D, Dose Assessment for the Emplacement of the CSMRI Site Containerized and Remaining Subsurface Soil into a RCRA Subtitle D Sanitary Waste Landfill, prepared for Colorado School of Mines, April 1.

Stoller 2005b. CSMRI Creekside Site Contaminated Soil Disposal Work Plan, Revision 2, prepared for Colorado School of Mines Research Institute, November 3.

Appendix A
Site Photo Log

Appendix B
Site Personnel Documents

Appendix C
Radiological Instrumentation Calibration Records

Appendix D
Truck Manifests, Weigh Tickets, and Incoming/Outgoing Radiological Surveys

Appendix E
Truck Departure Record Forms

Appendix F
Final Radiological Surveys of Trucks and Equipment

Appendix G
Daily GPS Coordinants of Disposal Location at BFI Foothills Landfill

Appendix H
Ambient Air Monitor Results

Appendix I
Dose Rate Surveys of Work Area