Golder Associates

CONSTRUCTION QUALITY ASSURANCE REPORT

DISPOSAL MODULE 5.2 LINER SYSTEM

NORCAL WASTE SYSTEMS
HAY ROAD LANDFILL

Prepared By:

Golder Associates Inc.
1009 Enterprise Way, Suite 350
Roseville, California 95678

Distribution:

3 Copies - Norcal Waste Systems Hay Road Landfill, Inc.
1 Copy - Golder Associates Inc.

September 2004

NORCAL WASTE SYSTEMS
HAY ROAD LANDFILL

Final Report
Construction Quality Assurance
Disposal Module 5.2 Liner System

September 2004

Golder Associates

043-7391

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Overview

Norcal Waste Systems Hay Road Landfill, Inc. (NWSHRLI), a subsidiary of Norcal Waste Systems, Inc. (Norcal), owns and operates the Norcal Waste Systems Hay Road Landfill (NWSHRL). Disposal Module (DM) 5.2 is a Class II waste management unit that was constructed in accordance with the project technical specifications, construction drawings, and construction quality assurance (CQA) plan. This construction was also completed in accordance with Waste Discharge Requirements (WDRs) Order No. R5-2003-0118, and the applicable requirements of federal Subtitle D regulations and Title 27 of the California Code of Regulations (CCR). The project site location is shown on Figure 1.

This report documents construction activities and CQA monitoring and testing for construction of the DM 5.2 base liner system. Golder Associates Inc. (Golder) provided CQA services for the construction of this base liner system.

1.2 Project Description

DM-5.2 measures approximately 8-acres in area and is located immediately west of DM-5.1. DM-5.2 drains to a single sump at the north end of the landfill. Figure 2 shows the site plan and relative location of DM-5.2. Figure 3 shows the grading plan for DM-5.2 liner system.

The DM-5.2 base grades slope at 2 percent toward leachate collection lines oriented in a north-south direction. These leachate collection lines slope at 1 percent toward the north perimeter berm. The north perimeter berm is inclined at 2H:1V (horizontal to vertical) along the interior slope and inclined at 3H:1V along the exterior slope. The eastern end of the DM-5.2 primary liner system ties into the existing DM-5.1 base liner system.

The base liner system is a double-composite liner system as described in the Liner Performance Demonstration Report prepared by Golder (April 15, 2003). The base liner containment system is comprised of the following components (from the bottom up):

- General Earthfill (the upper 6-inches comprise of fine-grained soils);
- Secondary 60-mil HPDE geomembrane (double-sided textured);
- Leak detection geocomposite;
- 2.5 feet of primary compacted clay liner ($k \leq 1 \times 10^{-7}$ cm/s, excluding the lower 6-inches);
- Primary 60-mil HPDE geomembrane (single or double-sided textured);
- 6-inch thick leachate collection and removal system (LCRS) gravel;
- 8-oz. geotextile filter layer; and
- 1-foot thick operations soil layer.

The side-slope liner system is a single-composite liner system. The side-slope liner containment system is comprised of the following components (from the bottom up):

- General Earthfill;

- Geosynthetic Clay Liner (GCL) with a minimum 40-mil thick geomembrane backing;
- Primary 60-mil HPDE geomembrane (double-sided textured);
- LCRS geocomposite; and
- 1.5-feet of operations soil.

The northern half of DM-5.2 is located in the former Land Treatment Unit area used to dry wastewater sludge. The LTU was clean-closed by over-excavating to remove any contaminated soils and then backfilling with general fill. Section 2 describes the clean closure.

1.3 Contractors

Construction of the DM-5.2 base liner was performed by BostonPacific Inc. (BPI) of Granite Bay, who acted as the general contractor. The installation subcontractor for the geosynthetic liner system was D&E Construction (D&E) of Visalia, California. The geomembrane and geocomposite were manufactured by PolyFlex out of Dallas, Texas. Skaps Industries manufactured the geotextile. The secondary GCL and HDPE geomembrane backing on the side-slope consisted of material remaining from a previous project as discussed further in Section 5.5. Surveying for the project was completed by Topographic Surveys under subcontract to BPI.

1.4 Construction Quality Assurance

Golder provided CQA monitoring and testing services for the DM-5.2 base liner construction project according to the CQA Plan approved by the Regional Water Quality Control Board (RWQCB). The CQA services consisted of observing, testing, and documenting the construction activities to verify compliance with the construction drawings and specifications. The CQA services included, but were not limited to:

- Review of manufacturer's submittals and conformance testing of the geosynthetic products;
- Testing of the construction materials used for the general earthfill, low-permeability soil liner, LCRS gravel, and operations soil; and
- Observation of the geosynthetics installation and testing of the field seams for the HDPE geomembrane.

Golder provided on-site CQA technicians and CQA oversight from May 24, 2004 until August 19, 2004. Mr. Bill Cowan and Mr. Rusty Hicks provided the lead CQA observation and testing in the field. Mr. Glen Fox, Ms. Beth Mergener, and Ms. Amy Ha provided technician support throughout the project. Mr. Ken Haskell, P.E., provided project supervision and was the CQA Engineer-of-Record.

Photographs documenting key components and activities of the construction process were taken on a regular basis. Selected photographs are included in Appendix A.

Daily field monitoring reports were prepared throughout the construction to document the

construction and the CQA observation and testing. The field monitoring reports are included in Appendix B.

1.5 Project Documents

All work for the DM-5.2 base liner system was performed according to the construction drawings and specifications, which are listed below:

- "Construction Drawings, Norcal Waste Systems Hay Road Landfill, Base Liner System, Disposal Module 5.2, Solano County, California," prepared by Golder Associates, dated February 2004.
- "Construction Specifications, Disposal Module 5.2 Base Liner, Norcal Waste Systems Hay Road Landfill, Vacaville, California," prepared by Golder Associates, dated February 2004.
- "Construction Quality Assurance Plan, Disposal Module 5.2 Base Liner, Norcal Waste Systems Hay Road Landfill, Vacaville, California," prepared by Golder Associates, dated February 2004.

1.6 Design Changes and Clarifications

In order to facilitate the construction process, several specification and/or design changes were initiated during the project. These changes are described below:

- Following soil analytical testing completed by Conor-Pacific, an excavation plan was prepared for the clean closure of the LTU. The clean closure is discussed further in Section 2.
- Based on the results of the low-permeability test pad, the minimum dry density for the low-permeability soil liner was changed to include a minimum relative compaction of 90 percent or minimum dry density of 106 pcf, whichever is greater.
- The survey of the LCRS gravel was completed by Golder personnel using BPI surveying equipment. The thickness of the gravel was measured and recorded on an approximate 50-foot grid.
- The geometry of the low-permeability soil liner was modified in response to RWQCB comments to ensure that the minimum groundwater separation distance of 2.5 feet was maintained. This revision was incorporated in Detail 15, Sheet 7, Revision 1 to the construction drawings (dated April 5, 2004). For convenience, the revised sump geometry is shown in Figure 4 of this report.

1.7 Surveying and Preparation of Record Drawings

Topographic Surveys performed surveying for the project under the supervision of Robert A. Mello, registered land surveyor. Topographic Surveys established control points in the field for use by the contractor. Topographic Surveys completed surveys using a 50-foot grid system to

determine the as-built elevations of each layer. As-built surveys were completed for the following:

- Base of the LTU excavation;
- Top of general earthfill;
- Top of low-permeability soil liner;
- Top of the LCRS gravel;
- Vadose, leak detection, and LCRS pipes; and
- Top of operations soil.

The record drawings prepared by Topographic Surveys are presented in Appendix C and include the base of the LTU excavation, top of the low-permeability soil liner, and top of the operations soil layer. BPI personnel completed the survey of the vadose, leak detection, and LCRS pipes, which are included in Appendix C. Golder's on-site CQA personnel measured the final LCRS gravel thickness on a 50-foot grid to verify compliance with the project specifications.

The location of each HDPE geomembrane panel was determined in the field using a measuring wheel. The record drawings for the HDPE geomembrane panels (primary and secondary layers) were prepared by D&E and reviewed by Golder. These drawings are also presented in Appendix C.