# SOLID WASTE FACILITY PERMIT

**Facility Number:** 26-AA-0006

| 1. Name and Street Address of Facility: | 2. Name and Mailing Address of Operator: | 3. Name and Mailing Address of Owner: |
|---|---|---|
| Benton Landfill<br>400 Christie Lane<br>Benton, CA 93512 | County of Mono Dept. of Public Works<br>P.O. Box 457<br>Bridgeport, CA 93517 | County of Mono Dept. of Public Works<br>P.O. Box 457<br>Bridgeport, CA 93517 |

**4. Specifications:** **a.** Operation: Closed Solid Waste Disposal Site

**b.** Permitted Area (in acres) Total: 10.0 ac Disposal: 4.6 ac

The attached permit findings and conditions are integral parts of this permit and supersede the conditions of any previously issued solid waste facility permit.

**5. Approval: Jill Kearney, REHS**

Approving Officer Signature

**6. Enforcement Agency Name and Address:**

Mono County Environmental Health
P.O. Box 476
Bridgeport, CA 93517

**7. Permit Issued Date:** 6-13-2018

**8. Permit Review Due Date:** 6-13-2023

**9. Legal Description of Facility:** The legal description of this facility is contained in the final closure plan and includes Assessor's Parcel Number(s) NW 1/4, NW 1/4, SE 1/4, sec. 32, T.1S, R.32E., MDB&M. APN 24-100-22.

**10. Findings:**

**a.** This permit is consistent with the standards adopted by the California Integrated Waste Management Board..

**b.** The closure and postclosure maintenance of the disposal site is consistent with the State Minimum Standards for Solid Waste Handling and Disposal as determined by the Enforcement Agency.

**c.** A (type of MND) was filed with the State Clearinghouse (SCH #2000012053) and certified by the (Mono County Community Development Department) on (April 18, 2000). A Notice of Determination was filed with the State Clearinghouse on (April 18, 2000).

**11. Prohibitions:** Disposal of solid waste at this site is prohibited.

**12. The following documents describe and/or restrict the closure and postclosure maintenance of this site:**

| | | | |
|---|---|---|---|
| Waste Discharge Requirements Order No. 6-01-57 | 3-12-2008 | APCD Permit to Operate # | N/A |
| Land Use and/or Conditional Use Permit | N/A | | |

**13. Self Monitoring:** The owner/operator shall submit the results of all self-monitoring programs to the Enforcement Agency in accordance with the most recently approved postclosure maintenance plan.

**14. Enforcement Agency (EA) Conditions:**

**a.** The owner/operator shall comply with all applicable standards as specified in Title 27, California Code of Regulations (27 CCR) including all appropriate financial assurance requirements.

**b.** Additional information concerning the disposal site shall be furnished upon request within the time frame specified by the EA.

**c.** The owner/operator shall comply with the most recently approved Closure Plan and the most recently approved Postclosure Maintenance Plan.

**d.** All proposed changes, including postclosure land uses, that would cause the design or maintenance of the disposal site to be modified shall be documented in revised closure and/or postclosure maintenance plans and may be implemented only upon approval of the revised plan(s).

**e.** The EA shall be notified of a change in ownership during closure or postclosure maintenance in accordance with 27 CCR 21200.

**f.**

MONO COUNTY
DEPARTMENT OF PUBLIC WORKS

# FINAL CLOSURE AND POSTCLOSURE MAINTENANCE PLAN

## *BENTON LANDFILL*
## *SWIS# 26-AA-0006*
## *WDID# 6B260300001*

## *Mono County, California*


Prepared by:

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Draft Submitted July 21, 2006
Final Issued December 1, 2006
Revised Final Issued March 2, 2007

# ENGINEER'S CERTIFICATION

This Final Closure and Postclosure Maintenance Plan was prepared pursuant to Title 27 of the California Code of Regulations under the direct supervision of the undersigned civil engineer and in accordance with generally-accepted engineering principles and practices applicable at the time of its preparation. I certify that the information contained in this report is, to the best of my knowledge, true and correct.

R. Breese Burnley, R.C.E. No. C60507
Senior Engineer
SRK Consulting

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# 1.0 INTRODUCTION

On behalf of the Mono County Department of Public Works (County), SRK Consulting has prepared this Final Closure and Postclosure Maintenance Plan (FCPMP) for the Benton Landfill for review and approval by the California Integrated Waste Management Board (CIWMB). This plan has been prepared in accordance with California Code of Regulations (CCR) Sections 21769(c), 21780, 21800 and 21830.

As stipulated in California Code of Regulations (CCR) Sections 21769(c)(1), 21770 and 21800(a), the purpose of an FCPMP is to:

- Ensure the landfill is closed in a manner that protects public health, safety, and the environment;
- Provide a detailed list of the actions necessary to carry out closure and postclosure maintenance;
- Provide a basis for establishing a reasonable and accurate cost estimate for carrying out closure and postclosure maintenance for the first 30 years; and
- Provide an enforceable list and schedule of actions necessary for providing water quality protection at the unit for closure and postclosure maintenance.

This FCPMP addresses the final closure and postclosure requirements for the Benton Landfill and satisfies the combined requirements of the California Integrated Waste Management Board (CIWMB) and the State Water Resources Control Board (SWRCB), as defined in Title 27, CCR.

Mono County submitted a Preliminary Closure and Postclosure Maintenance Plan (PCPMP) in October 1995 with several subsequent revisions. The latest CIWMB-approved PCPMP was prepared in 1998 by Vector Engineering, Inc. Selected sections were subsequently revised in September 2000 by Mono County. In April 2005, Mono County requested approval of an alternative final cover for the Benton Landfill in the document titled “Alternative Final Cover Demonstration – Benton Landfill” (SRK, 2005). The Lahontan Regional Water Quality Control Board (LRWQCB) approved the alternative final cover design in correspondence dated August 6, 2005.

This Final Closure and Postclosure Maintenance Plan presents updated versions of relevant sections of the preliminary plans, together with revised design drawings and accompanying calculations. Design drawings are included in reduced format in Appendix A for ease of reference, while full-sized drawings are include in Appendix L. The following sections describe the Benton Landfill and its closure in accordance with applicable regulations.

# 2.0 FACILITY AND SITE DESCRIPTION

## 2.1 Facility Description

The Benton Landfill is a Class III municipal solid waste landfill operated by the Mono County Department of Public Works and located in the community of Benton in southeastern Mono County, California. The site is situated at latitude 37°48'N and longitude 118°28'W, approximately 0.4 miles east of the intersection of U.S. Route 6 and State Highway 120, as shown on Drawing 1 in Appendices A and L. Access to the site is east off of U.S. Route 6 via Christie Lane. The landfill property, as described by the Public Land Survey System, occupies 10 acres in the northwest quarter of the northwest quarter of the southeast quarter (NW¼, NW¼, SE¼) of Section 32, Township 1 South, Range 32 East, Mount Diablo Baseline and Meridian. The property boundaries are shown on Drawing 2 in Appendices A and L.

The Benton Landfill was established in 1973 to replace an open dump at the site. Landfill operations have historically utilized the trench method of disposal, which means disposal in small, relatively shallow trenches on the order of 15 feet deep. Since 1998, Mono County has operated the site as a combined transfer station and Class III landfill. The site was subsequently granted Very Small Landfill status by LRWQCB based on a demonstration by the Mono County.

Most of the waste received at the site is transferred to the County's regional landfill, Benton Crossing Landfill, while only a small portion of the total service area waste stream, limited to construction and demolition waste, has been buried on-site since 1998. Based on available data, it is estimated that only approximately 17,500 cubic yards of waste and cover soil are actually buried at the site. Once the remaining disposal trench reached capacity in September, 2003, Mono County ceased accepting all waste for on-site burial.

The limits of final waste placement encompass approximately 4.6 acres of the 10-acre site. Remaining site areas are occupied by site access roads, drainage facilities, environmental monitoring systems, and transfer station operations, including stockpiling and/or storage of recyclable materials (in the transfer operations area north of the existing transfer enclosure, refer to Drawing 2). Since the location and extent of former disposal trenches could not be definitively determined from site records, the Mono County Department of Public Works conducted an extensive test-pit investigation throughout the site in January 2004 to identify the limits of waste placement.

Although the waste footprint originally established at the site in 1995 did not identify any waste extending beyond property boundaries, the site investigation conducted by the Department of Public Works in January 2004 revealed that an approximate 200-foot long tapered portion of the southernmost disposal trench was constructed off-site by as much as 15 feet. The former trench was constructed at a time when the land was leased from the BLM and property boundaries were not defined by a perimeter fence. As part of site preparation conducted by the Department of Public Works in anticipation

of final closure, waste from that cell was excavated in the fall of 2006 and hauled to the County's regional landfill for disposal. The disposal trench excursion was excavated to a line 10 feet inside the property boundary, then backfilled, compacted, and brought up to surrounding grade with clean fill material.

## 2.2 Facility Ownership and Address

The facility is owned and operated by the Mono County Department of Public Works. The address for the Benton Landfill is 400 Christie Lane, Benton, California 93512. The following person can be contacted for information about the landfill during the closure and postclosure period:

Mr. Evan Nikirk, Director
Mono County Department of Public Works
P. O. Box 457
Bridgeport, California 93517
(760) 932-5440

In the event of a change of ownership, Mono County Department of Public Works will notify the Local Enforcement Agency (LEA) within 30 days in accordance with Title 27 CCR Section 21200.

## 2.3 Permits and Approvals for Closure and Postclosure Maintenance

Existing permits maintained for the operation of the Benton Landfill include the following:

- Solid Waste Facility Permit No. 26-AA-0006; and
- Waste Discharge Requirements No. 6-01-57.
- Two reports regarding closure and postclosure maintenance have been approved by CIWMB and LRWQCB, including:
  - Preliminary Closure and Postclosure Maintenance Plan for the Benton Landfill (Vector, 1998); and
  - Alternative Final Cover Demonstration (SRK, 2005).

Copies of the landfill permit and Waste Discharge Requirements are included in Appendix B. A copy of the approved Alternative Final Cover Demonstration (SRK, 2005) and related correspondence from LRWQCB are included in Appendix C.

## 2.4 Climate, Geologic, and Hydrogeologic Conditions

The Benton Landfill is situated at approximately 5,450 feet above mean sea level (amsl) on the gently-sloping eastern side of Benton Valley, west of the western edge of the White Mountains. Surface grades surrounding the site range from 5 to 6 percent to the west. Two relatively large ephemeral drainages pass within 800 feet north and 1,200 feet south of the site. There are no significant drainages that cross the site. Native vegetation in the area consists of typical high-desert sagebrush with grass understory.

The descriptions below of the climate, geology and hydrogeology of the Benton Landfill vicinity are excerpted from the Alternative Final Cover Demonstration (SRK, 2005), a copy of which is included in Appendix C.

### 2.4.1 Climate

An interagency remote automated weather station (RAWS) has been maintained in Benton since May 1994 to monitor climatic conditions, primarily for use in the event of rangeland or forest fires. Data from this remotely-monitored station is sent via satellite to the National Interagency Fire Center in Boise, Idaho, and distributed from there to several other agencies for use. Data for the Benton RAWS station was obtained from the Western Regional Climate Center website (www.wrcc.dri.edu) for the period of record from 1994 through 2005.

A NOAA cooperative meteorological station was operated at the Benton Inspection Station from October 1964 through March 2003. During that time, only precipitation data were recorded. Based on that 39-year period of record, the average annual precipitation at Benton was approximately 7.5 inches. The maximum annual precipitation recorded at Benton during the period of record was 21.5 inches in 1969, while the minimum annual precipitation was 1.98 inches recorded in 1968.

According to figures reported in the Waste Discharge Requirements, average annual evaporation in the area is approximately 69 inches. This agrees with monthly evaporation data obtained from the Topaz Lake meteorological station as the closest and most representative site. Measured average annual pan evaporation at the Topaz Lake station is 69 inches for the period of record from 1957 to 2002. The Topaz Lake station is situated at an elevation of approximately 5,200 feet amsl, very similar to the elevation at the Benton Landfill (~5,450 feet amsl).

Average monthly climatic data are summarized in Table 2.1.

**TABLE 2.1. Summary of Climatic Conditions in Benton Valley**

| Month | Temperature (degrees F)[1] | | | Precipitation[2] (inches) | Evaporation[3] (inches) |
|---|---|---|---|---|---|
| | Avg. | Max. | Min. | | |
| January | 35.4 | 50.4 | 22.9 | 1.08 | 0.0 |
| February | 37.2 | 51.8 | 24.2 | 1.22 | 0.0 |
| March | 44.5 | 60.9 | 27.9 | 0.89 | 0.0 |
| April | 48.9 | 64.4 | 31.7 | 0.35 | 7.2 |
| May | 59.7 | 75.5 | 40.3 | 0.42 | 9.1 |
| June | 69.4 | 86.2 | 47.9 | 0.39 | 10.9 |
| July | 75.3 | 92.9 | 53.4 | 0.47 | 12.7 |
| August | 73.4 | 92.1 | 51.0 | 0.44 | 11.6 |
| September | 64.9 | 83.5 | 44.1 | 0.31 | 8.8 |
| October | 52.2 | 71.3 | 34.3 | 0.30 | 6.0 |
| November | 40.5 | 57.2 | 25.5 | 0.66 | 2.8 |
| December | 34.5 | 50.3 | 21.0 | 0.98 | 0.0 |
| TOTAL | | | | **7.51** | **69.0** |
| Period of Record | 1994-2005 | | | 1964-2003 | 1957-2002 |
| NOTES | [1] Temperature data from RAWS station in Benton.<br>[2] Precipitation data from Benton Inspection Station, NOAA Co-op Site.<br>[3] Evaporation data from Topaz Lake at elev. 5200 ft amsl. | | | | |

### 2.4.2 Geology

The Benton Landfill is situated within Benton Valley near the common border of the Sierra Nevada and Basin and Range Geomorphic Provinces. The site lies along the eastern edge of a series of volcanic provinces that includes the Mono Craters Caldera to the northwest and the Long Valley Caldera to the southwest. Benton Valley is underlain by coalescing Quaternary alluvial fan deposits originating in the Sierra Nevada mountain range to the west and the White Mountains to the east. These alluvial deposits extend to more than 200 feet below ground surface (bgs) and converge along the valley low point approximately one mile west of the landfill.

The region is seismically very active. The White Mountain Fault Zone forms the border between Benton Valley and the White Mountains to the east. The White Mountain Fault is designated as an Alquist-Priolo Earthquake Fault Zone, indicating the fault is currently active.

Two ground water monitoring wells [MW-1 (BL-1) and MW-2 (BL-2A)] were installed at the facility in 1989 and 1990 as part of the Solid Waste Assessment Test (SWAT). A third monitoring well (MW-3) was installed in October 1995. Based on drill hole logs from these well installations, sediments beneath the landfill site consist of poorly-graded

sandy gravel with boulders to approximately 40 feet bgs, underlain by interbedded layers of sandy gravel and silty sand to 165 feet bgs in MW-1 (BL-1), 230 feet bgs in MW-2 (BL-2A), and 168 feet bgs in MW-3. Monitoring well locations are illustrated on Figure 2 of Alternative Final Cover Demonstration for Benton Landfill (SRK Consulting, 2005). Copies of drilling and well installation logs are included in Appendix B of the *Alternative Final Cover Demonstration for Benton Landfill* (SRK Consulting, 2005), included herein in Appendix C.

### 2.4.3 Hydrogeology

The Benton Landfill is situated in the northeastern branch of the Owens Valley Ground Water Basin, which is in turn part of the larger Lahontan Drainage Province. The Owens Valley Ground Water Basin is bounded by nonwater-bearing rocks of the Benton Range on the north, the Coso Range on the south, the Sierra Nevada on the west, and the White and Inyo Mountains on the east (Jennings 1958; DWR 1964; Matthews and Burnett 1965; Strand 1967; Danskin 1998). Ground water within the basin occurs in sediments that fill the valley and reach more than 1,200 feet thick (DWR 1964). These water-bearing Quaternary sediments were divided by Danskin (1998) into three units: upper, middle and lower. The upper unit is comprised of more than 100 feet of alluvial sediments. Regional ground water flow is south along the axis of the Benton Valley. Ground water within the valley is typically unconfined and occurs in unconsolidated alluvial sediments (Vector, 1995).

Ground water beneath the site occurs in unconfined conditions within unconsolidated sandy gravel and gravelly sands. Based on ground water monitoring data collected in accordance with Revised Waste Discharge Requirements for the facility (Board Order No. 6-01-57, WDID No. 6B260300001), static ground water has been measured between 117 feet bgs in MW-1 and 168 feet bgs in MW-2. These static water levels correspond to approximate elevations of 5303 feet amsl in MW-1 and 5313 feet amsl in MW-2). Measured static water levels have varied only two to three feet since 1991. From these measurements, ground water beneath the site flows just south of west (S83ºW) at a gradient between 0.009 and 0.01 feet per feet (Mono County, 2004).

Since 1990, ground water has been monitored at the site for indicator parameters and volatile organic compounds (VOCs). The results of this detection monitoring program have not indicated the presence of contaminants in ground water beneath the site resulting from landfill operation (Mono County, 2004).

## 2.5 Control and Monitoring Systems

The Benton Landfill currently operates monitoring and control systems at the site which must be maintained throughout closure and the postclosure maintenance period. The following sections describe each of the monitoring and control systems in effect at the landfill site at the time this plan was prepared.

### 2.5.1 Drainage Control

Drainage control features at the site currently consists of various diversion berms and drainage channels installed to protect filled and active areas of the site. The closure design presented in the Final Closure Plan in Section 3.0 calls for the construction of an upgradient run-on diversion channel and internal run-off control channels designed to collect and control run-off resulting from a 100-year, 24-hour storm event. A detailed description of the system design is included in Section 3.4.6, with supporting design documentation in Appendix D.

### 2.5.2 Landfill Gas Monitoring

Subsurface landfill gas monitoring is not currently performed at the Benton Landfill. Quarterly landfill gas monitoring conducted during the operational life of the facility consists of ambient air sampling along the perimeter of the site and in on-site structures associated with the transfer station. A proposed landfill gas monitoring system will be installed as part of closure construction and will consist of five perimeter gas monitoring wells. Proposed gas monitoring well locations are illustrated on Drawing 3 and a typical gas well construction detail is provided on Drawing 5 in Appendices A and L. The design of the gas monitoring system is discussed in further detail in Section 3.8.2 and procedures for the postclosure landfill gas monitoring program are discussed in detail in Section 4.3.2.

### 2.5.3 Ground Water Monitoring Program

The Benton Landfill currently has three wells for monitoring ground water quality (wells MW-1, MW-2, and MW-3). The up-gradient well (MW-2) monitors ground water that flows into the landfill area from the hydraulically higher portion of the drainage basin, and therefore provides background chemistry for constituents of concern. The down-gradient wells (MW-1 and MW-3) monitor ground water that has passed beneath the refuse area and exited the landfill site, providing an early warning in the event of a contaminant release from the landfill. A fourth ground water monitoring well (MW-4) is proposed to improve the capability of the system to detect potential impacts to underlying ground water. Well locations are illustrated on Drawing 2 in Appendices A and L. Consistent with Waste Discharge Requirements issued for the site, ground water monitoring is performed on a semi-annual basis.

### 2.5.4 Leachate Monitoring Program

Landfill design and construction did not incorporate a leachate collection and recovery system. As a result, leachate monitoring is not possible and will not be performed as part of postclosure monitoring of the facility.

## 2.6 Land Use

Mono County owns the Benton Landfill property, which has a land use designation of PF, for public or quasi-public facilities. This designation allows development for a

number of public uses, including landfill disposal. The land use designations in the vicinity of the landfill are illustrated on the land use zoning map presented as Figure 105 in the Land Use Element of the Mono County General Plan. A copy of the map is included in Appendix E.

The majority of the land in the vicinity of the disposal site is publicly owned and administered by United States Department of the Interior, Bureau of Land Management (BLM). BLM lands in the region are zoned as RM, or resource management, and are used predominately for recreation and livestock grazing. The adjacent property immediately southwest of the landfill is zoned ER for “estate residential”. There are no residences located within 1,000 feet of the landfill boundary.

Although there is no development within one mile directly to the north, east, and south of the landfill, there are a variety of land uses in the community of Benton to the west of the site. Development within one mile currently consists of public facilities (community center, community park, elementary school, senior center, fire department, and road maintenance shop), commercial enterprises (a market / gas station and a café / market / gas station), a church, and residences.

Postclosure use of the landfill property is anticipated to include the continued operation of the transfer station in its current location, in addition to the use of the area immediately north of the transfer enclosure for temporary stockpiling and management of diverted waste. Postclosure land use is not proposed over any filled areas.

# 3.0 FINAL CLOSURE PLAN

## 3.1 General

This Final Closure Plan for the Benton Landfill has been prepared to address federal and state design standards and Final Closure Plan requirements for Class III Landfills. Design requirements are stipulated in Section 258.60 of Federal Subtitle D and Sections 20950 through 21200 of Title 27 CCR. Final Closure Plan requirements are stipulated in Section 258.61 of Federal Subtitle D and Sections 21769 and 21800 of Title 27 CCR.

Sections 1 and 2 provided a description of the Benton Landfill and presented some of the requirements of a Final Closure Plan. Specific closure issues addressed in this section include the following:

- The maximum extent of the landfill requiring closure;
- Closure activities and schedule;
- Closure design;
- Monitoring systems; and
- Closure cost estimate.

## 3.2 Maximum Extent Requiring Closure

The existing 4.6-acre waste footprint is the maximum extent of the landfill that will require closure construction. This footprint was revised down from earlier footprint delineations (7.4 acres) through the implementation of an extensive test pitting program completed at the site in January 2004. The horizontal limits of waste fill are illustrated on Drawings 2 and 3 in Appendices A and L. Final proposed site grades are presented on Drawing 3.

## 3.3 Closure Activities and Schedule

Current plans call for the completion of closure construction at the Benton Landfill by the summer of 2007. Gas monitoring well installation is anticipated to be completed in the late spring of 2007. During and after closure construction, waste will continue to be accepted at the site via the transfer station. Landfill customers have been previously notified of the County's intention to cease landfill operations and permanently close the landfill portion of the facility. In anticipation of this, Mono County stopped accepting was for on-site burial as of October, 2003. Regardless, a notification sign has been posted at the site entrance consistent with regulatory requirements. The sign, which states the date of landfill closure and the alternate waste disposal point (the transfer station), will remain in place for the duration of closure construction. A notification of site closure has been advertised in the local newspaper in anticipation of the initiation of final closure activities. Notices have also been mailed to solid waste account-holders who use the facility, and handed out to customers at the gatehouse.

Site closure activities will include the following:

- Installation of fencing or other barriers to prevent public access to areas of the landfill property that will be closed;
- Posting a sign providing a phone number to call in case of an emergency and stating the location where a copy of the closure and postclosure maintenance plan may be reviewed and/or obtained;
- Removal of all structures, stockpiles, and appurtenances that will not be used as part of the transfer station operation;
- Construction of the landfill gas monitoring well network;
- Installation of one additional down-gradient ground water monitoring well;
- Construction of an upgradient run-on diversion channel;
- Regrading the existing covered landfill surface, including moisture conditioning and compaction to specifications;
- Placement of the final cover system to the minimum final cover layer thickness and specifications;
- Installation of internal runoff control drainage channels;
- Verification of final cover thickness;
- Installation of survey monuments;
- Placement of wood chips over the final surface to provide erosion protection; and
- Completion of a final as-built topographic survey of the landfill.

At the conclusion of closure construction, an as-built report will be prepared and submitted to CIWMB and LRWQCB to certify that the construction was completed in accordance with the approved closure plan.

## 3.4 Closure Design

The primary design components of closure construction for the Benton Landfill include final grading and cover placement, runon and runoff control system construction, the installation of a network of perimeter landfill gas monitoring wells, and the installation of an additional ground water monitoring well. The following sections address specific design considerations for each of these components.

### 3.4.1 Final Grading Plan

The final grading plan of the landfill is designed to accommodate the predicted future settlement of the landfill and to minimize flow velocities over the final surface of the landfill and in the run-off control channels. The closure design is illustrated on Drawings 3, 4 and 5 in Appendices A and L. The existing site topography depicted on Drawing 2 will be smoothed and regraded as shown on Drawing 3. Regrading will extend beyond the existing waste footprint to blend with surrounding topography while maintaining a minimum grade of three percent on all slopes. Low-lying areas will be filled and the existing interim cover layer will be scarified, moisture conditioned, and recompacted according to the specifications. As illustrated on Drawing 3, the design incorporates smooth slopes without angular slope transitions, gently sloping internal drainage control channels, an upgradient run-on diversion channel and perimeter access roads to

facilitate postclosure access to all areas of the final cover and environmental monitoring systems.

The final regraded landfill surface will generally grade from northeast to southwest at approximately 4 percent, with steeper internal slopes of approximately 16 percent. Because the final landfill is primarily a below-grade fill, does not have sideslopes, and the top surface slopes do not exceed 16 percent, the final landfill configuration does not present any concerns for slope stability and a slope stability analysis has not been prepared.

### 3.4.2 Final Cover System

Mono County requested approval of a soil monolayer alternative final cover in the *Alternative Final Cover Demonstration* (SRK, 2005), submitted to LRWQCB and CIWMB in April 2005. Approval of the proposed alternative final cover layer was received in October 2005 from LRWQCB. The technical justification presented in the alternative final cover document (SRK, 2005) demonstrates the effectiveness of the proposed 36-inch-thick monolayer cover in limiting the infiltration of meteoric waters into the waste mass. Copies of both documents are included in Appendix C for reference. The proposed final cover design is illustrated on Drawing 5 in Appendices A and L and on Figure 3 in Appendix C. Drawing 5 shows a slight modification from Figure 3 in Appendix C in that Mono County is proposing to use a protective wood chip layer over the final cover surface rather than attempt direct revegetation in the relatively arid landfill environment.

The landfill is currently covered by an interim cover consisting of a minimum of 24 inches of native soil. Test pitting completed at the site in January 2004 indicated some areas of the landfill have as much as 5 or 6 feet of soil cover. In areas where the interim cover layer requires only minimal regrading, Mono County will conduct *in situ* density testing using a nuclear density gage. Areas that do not meet the minimum compaction specification will be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted to meet specifications. A minimum of 12 inches of additional soil will be placed and nominally compacted over the interim cover to reach a minimum cumulative total of 36 inches of native soil cover. Minimum cover thickness will be verified by observation during regrading and covering and by random test pitting in the final cover layer. Areas that are deficient will receive additional compacted cover material.

Following final cover placement and finish grading, the cover layer will be lightly scarified and seeded with a BLM-approved seed mixture of native plant species. The final cover and all disturbed areas not proposed for use in future operations will then be covered by three to six inches of wood chips generated and stockpiled through on-site waste diversion activities performed at the Benton Landfill and other County Landfills.

The wood chip layer will serve to protect the final cover from the effects of wind and water erosion and rain drop impact. Mono County has successfully used wood chips for erosion protection at several of their existing landfill and transfer station sites. In all

cases, the feedstock for wood chips to be used in final cover construction will be clean green material generated through shredding trees, tree limbs, brush, or clean unpainted, untreated lumber. In no case will painted, treated or any wood products that contain glues or adhesives be used as feedstock during wood chip processing. The effectiveness of wood chips in this application will be routinely evaluated and documented during the postclosure maintenance period to ensure the requirements of 27 CCR 21090(a)(3) are satisfied. Should this method prove to be ineffective in preventing erosion, an alternative approach will be developed and submitted for regulatory approval.

### 3.4.3 Erosion

Erosion analyses were completed in 1998 for the PCPMP (Vector, 1998) to evaluate the suitability of the proposed final cover layer. While the exact configuration of the final cover layer has changed since the preparation of that PCPMP, the final surface soil considered then and now are the same. Based on the results of the 1998 erosion analysis, however, and the relatively arid climate making revegetation success questionable, Mono County has elected to place 3 to 6 inches of wood chips over the proposed alternative final cover layer to minimize surface erosion caused by wind and water until revegetation efforts can be established (as described above in Section 3.4.2). It is anticipated that the use of the wood chip layer will reduce surface erosion to only a fraction of the 1998 estimates. The original soil erosion calculations then serve as a conservative baseline for surface erosion and are included in Appendix F for reference and described briefly below.

The 1998 estimate of potential soil loss during the closure construction phase and the postclosure maintenance period was computed using the Universal Soil Loss Equation (USLE) to determine soil loss due to rainfall. Wind erosion was estimated using a calculation developed by the USDA. Both analyses considered a native soil cover as the final landfill surface. Soil loss due to rainfall and surface water sheet flow is relatively insignificant, but wind erosion is anticipated to be the primary concern. The results of the analysis projected a total soil loss from the combined effects of wind and rain of 27 tons per acre from the top surface and 29 tons per acre of sideslope area in the initial year of construction. Following establishment of vegetation on landfill surfaces, it was estimated that erosion would result in a loss of 13.2 tons per acre from the top deck and 14.6 tons per acre of sideslope area during each subsequent year. These estimates translate to the erosion of 0.4 inches of soil from the landfill surface during the first five years of postclosure, and potentially as much as 2.1 inches during the entire 30-year maintenance period.

As described above, the final landfill surface will be constructed to minimize erosion and protect the integrity of the final cover using 3 to 6 inches of bark as the final surface layer. On-going diversion and processing of clean green waste throughout the postclosure period will provide a steady supply of wood chips for annual replenishment of the wood chip layer.

### 3.4.4 Settlement

A prediction of the total waste settlement was performed for preparation of the original PCPMP and was based on a study by Edil et. al. (1990), entitled "Settlement of Municipal Refuse". The study was initially presented at Geotechnics of Waste Fills-Theory and Practice (ASTM Special Technical Publication 1070, 1990) in Philadelphia, Pennsylvania in 1990. A copy of this article has been included with the revised settlement predictions presented in Appendix G. The study analyzed two mathematical models for determination of settlement within four municipal solid waste landfills located in Wisconsin, Michigan, and Connecticut. The Power Creep Law, used extensively in modeling the transient creep behavior of engineering materials, was found to effectively represent actual waste settlement in the field and was utilized for this analysis. Waste input parameters for the model were taken from average data for the four sites examined in the study. Because the Benton Landfill is located in an arid climate and would therefore be less susceptible to biological and chemical decay processes than the landfills examined by Edil et. al. (1990), it can be expected that the input parameters used in the settlement prediction will yield conservative results, and that the actual settlement may be considerably less than the predicted.

The original settlement calculations [Appendix G of the *Preliminary Closure and Postclosure Maintenance Plan* (Vector, 1998)] indicated that the proposed vertical expansion would settle an estimated 1.6 feet during the 30-year postclosure period. Revised calculations were completed based on the revised site closure design without a vertical expansion. New settlement estimates are on the order of 1.0 foot for a maximum waste height of 20 feet. Revised settlement calculations are included in Appendix G.

With proper maintenance, the predicted magnitude of settlement will not significantly affect the ability of the landfill slopes to promote stormwater from the surface of the landfill. In order to effectively monitor the settlement of the waste mass during the postclosure period, permanent settlement monuments will be installed on the final landfill surface following closure construction. The proposed settlement monument locations are depicted on Drawing 3 in Appendices A and L. The installation of settlement monuments is discussed in further detail later in this section.

### 3.4.5 Infiltration

One of the primary purposes of the alternative final cover system is to minimize infiltration into the underlying waste materials. The computer program HELP (Hydrologic Evaluation of Landfill Performance) version 3.07 was used to evaluate the relative infiltration performance of different thicknesses of the proposed soil monolayer cover. HELP computes the water balance of the cover system taking into account precipitation, run-off, evaporation, soil storage, and percolation. The analyses were completed for a 100-year simulation using average monthly precipitation data obtained for the Benton Inspection Station for the period of record from 1964 to 2003.

In addition, various final cover thicknesses were evaluated using version 5.2 of the SoilCover™ computer model to evaluate their relative abilities to minimize infiltration of meteoric water through the final cover layer and into the waste mass. SoilCover™ is a one-dimensional finite element model that approximates the inter-relationship between subsurface saturated and unsaturated soils and the atmosphere. The model predicts the flux of water between the soil surface and the atmosphere and within a defined soil column. In contrast to the HELP3 model, SoilCover™ incorporates an evaluation of the flux boundary condition imposed by the atmosphere. SoilCover™ models the three-component system of the soil-atmosphere interface, the near-surface unsaturated zone, and when applicable, the deeper saturated zone, and thus is more effective in evaluating water movement through unsaturated soil cover profiles.

The SoilCover™ model routine combines the principles of Darcy's Law and Fick's Law for water and water vapor flow together with Fourier's Law for conductive heat flow to model the movement of water and heat within a defined one-dimensional soil column. Evaporation calculations are based on the modified Penman equation. The SoilCover™ model was used strictly as a design tool with the primary objective of assessing the relative performance of several final cover thicknesses in limiting infiltration into the waste mass. The resulting information was then used to determine the most appropriate cover thickness based on the actual daily climatic data recorded in Benton during the period of record from June 1994 through May 1999.

The results of the *Alternative Final Cover Demonstration for the Benton Landfill* (SRK, 2005) indicate that the proposed alternative final cover will be effective in limiting the infiltration of incoming meteoric water into the waste mass. A copy of the *Alternative Final Cover Demonstration* (SRK, 2005) is included for reference in Appendix C.

### 3.4.6 Stormwater Control

Proposed drainage control features at the site include an up-gradient run-on diversion channel and internal run-off control channels. The drainage control systems for final site closure have been designed to accommodate the anticipated volume of precipitation and peak runon and runoff generated by the 100-year, 24-hour precipitation event falling within the landfill property and the upgradient catchment.

A hydrologic analysis was performed to estimate the peak flow rates for run-off from the closed landfill surface using the Natural Resource Conservation Service's WinTR-55 method (version 1.0.08, USDA, 2005). The predicted peak flows were then used in conjunction with the FlowMaster computer program (version 6.1, Haestad, 2000) to design and size a system of channels to route run-off from the site. Run-on flow will be diverted around the site in a new 24-inch-deep trapezoidal diversion channel and re-directed into a natural drainage channel west of the site. Drawings 3 and 5 in Appendices A and L show the individual channel alignments and configurations, while Figures D-1 and D-2 in Appendix D illustrate the on-site and off-site drainage sub-areas used in the hydraulic analyses. The output results of the WinTR-55 and FlowMaster modeling are described in the Drainage Control System Design Report in Appendix D.

All drainage channel segments and intersections with natural drainages will be lined with riprap as specified on Drawings 3 and 5.

Drainage facilities at the landfill will be installed using appropriate personnel and equipment by the Mono County Department of Public Works. As part of the closure construction, appropriate quality control procedures will be implemented to ensure that the final drainage system is constructed according to the approved closure plan. All drainage channels constructed to divert water from the landfill will be inspected and repaired quarterly during the first two years of the postclosure period, and then annually thereafter, to ensure that areas of surface water ponding do not develop. Sedimentation in the channels will be periodically removed and areas of erosion repaired to maintain the effectiveness of the drainage system.

## 3.5 Construction Documents and CQA

Technical Specifications and a Construction Quality Assurance Manual were prepared to guide closure in accordance with this plan. Both documents were prepared under the direct supervision of a California-registered civil engineer.

Closure construction for all elements of the closure design except for landfill gas monitoring well installation will be performed by personnel and equipment from the Road Division of the Mono County Department of Public Works. It is anticipated that the County will use wheel loaders, dump trucks, a sheepsfoot and/or vibrating roller compactor, water truck, and motor grader to complete closure activities. Except for the compactor(s), all equipment is currently available at the Road District 2 maintenance shop in Benton; the compactor(s) will be rented from vendors in Bishop, California or Gardnerville, Nevada. Alternatively, the County may contract for compactor and water truck operation to reduce the impact on overall road maintenance operations. All equipment will be operated by experienced personnel. Only areas which require grading will be disturbed and a water truck will be used at all times to aid in compaction and minimize the generation of fugitive dust. If necessary, chemical additives will be employed in the dust control operations.

During the construction of the final cover layer, a survey crew will verify that the cover has been constructed to the prescribed elevations and dimensions in accordance with the approved plans and specifications. Once the Department of Public Works has completed preliminary grading to smooth out the landfill surface and prepare the subgrade, the surveyor will establish grade stakes on a 100-foot by 100-foot grid throughout the site to be used for vertical control during cover construction.

Technical Specifications are included in Appendix H, while the Construction Quality Assurance Plan is presented in Appendix I. The CQA plan will be implemented by an independent third party or the Mono County Public Works Director during closure construction to verify that construction complies with approved construction drawings, specifications, and the CQA Plan. CQA activities will be completed under the supervision of a Registered Civil Engineer or Certified Engineering Geologist in the

State of California. All CQA documentation will be presented in the final As-Built Report for the site.

## 3.6 Recording

Upon completion of closure construction at the Benton Landfill, the Mono County Department of Public Works will file the following with the County Recorder's Office, the LEA, LRWQCB, and CIWMB in accordance with Section 21170 of Title 27 CCR:

- A description of the closed unit that includes the date closure was completed;
- The boundaries, height, and approximate depth of the Benton Landfill;
- A copy of the as-closed topographic map;
- The location where the FCPMP may be obtained; and
- A statement that future site use is restricted in accordance with the Final Postclosure Maintenance Plan.

## 3.7 Discharges of Liquids to the Cover System

No liquids will be discharged to the cover system following closure. The final surface of the landfill will be covered with 3 to 6 inches of wood chips to minimize erosion and will therefore not receive irrigation water.

## 3.8 Monitoring Systems

Monitoring systems to be employed at the Benton Landfill during the postclosure period will include individual networks of ground water monitoring and landfill gas monitoring wells. Ground water monitoring will continue in accordance with the approved Waste Discharge Requirements for the facility. Landfill gas monitoring in a newly-constructed landfill gas monitoring well network will be initiated upon completion of final closure construction activities and will continue through the postclosure period or until such time as Mono County can demonstrate the landfill has stabilized and no longer requires monitoring. The following sections describe the existing and proposed components of both monitoring systems.

### 3.8.1 Groundwater

The Benton Landfill currently has three wells for monitoring ground water quality (Wells MW-1, MW-2, and MW-3). The up-gradient well (MW-2) monitors ground water that flows into the landfill area from the hydraulically higher portion of the drainage basin, and therefore provides background chemistry for constituents of concern. The down-gradient wells (MW-1 and MW-3) monitor ground water that has passed beneath the refuse area and exited the landfill site, providing an early warning in the event of a contaminant release from the landfill. A fourth ground water monitoring well (MW-4) is proposed to provide full down-gradient coverage and improve the capability of the system to detect potential impacts to underlying ground water. Well locations are illustrated on Drawing 2 in Appendices A and L.

The existing monitoring wells were installed in August, 1989 and October, 1995 under the supervision of Toxic Technology, Inc., and Vector Engineering, Inc., respectively. A detection monitoring program was initiated at the site by Toxic Technology, Inc., and Environmental Profiles Compliance Engineering, Inc., in 1989, beginning with the installation and development of the monitoring wells. Kleinfelder, Inc., took over the detection monitoring program until 1992 when they were replaced by Vector Engineering, Inc. Vector performed quarterly monitoring at the site through 1998, and was subsequently replaced by the current independent contractor.

The monitoring program is designed to monitor both background and down-gradient concentrations of indicator parameters and possible leachate constituents. The water samples obtained during the quarterly monitoring events are analyzed for concentrations of metals, minerals, volatile organics, and general indicator parameters. The sampling frequency and analysis of the wells is currently performed in accordance with 2001 Waste Discharge Requirements (6-01-57) established by the LRWQCB. Existing ground water monitoring activities will continue throughout the post-closure period, although on a semi-annual basis (instead of quarterly) for indicator parameters (pH, TDS, Cl, $NO_3$, $SO_4$, and VOCs), and once every five years for the existing suite of metals and Appendix II constituents. If the results of ground water monitoring indicate that the site has stabilized, Mono County may request approval of a reduced monitoring frequency or a shortened postclosure maintenance period.

### 3.8.2 Landfill Gas

To facilitate landfill gas monitoring during closure and postclosure of the Benton Landfill, a network of gas probes will be installed around the site perimeter as shown on Drawing 3. The wells will be spaced at an interval not to exceed one for every 1,000 feet laterally. The number and depth of probe completions per well will be consistent with 27 CCR 20925(c), and will depend on the lowest elevation of waste within 1,000 feet of the well, but will generally be as follows.

| Probe | Required Probe Depth |
|---|---|
| 1. | 5 to10 feet below ground surface (bgs) |
| 2. | ½ Total Depth of Waste within 1,000 feet |
| 3. | Total Depth of Waste within 1,000 feet |

A third probe is not required for total well depths of less than 30 feet. Typical gas monitoring well construction is illustrated on Detail B, Drawing 5. For the purposes of determining required well depths, and based on site disposal records, it was assumed that the maximum depth of buried waste at any location within the waste footprint is 15 feet below original ground surface, resulting in a minimum waste elevation of 5415 feet amsl. Because the site is relatively small, all of the proposed gas monitoring well locations are within 1,000 feet of each other. As a result, this minimum waste elevation represents the base elevation for each well. Probe completions at the five proposed monitoring locations will be as follows:

| Well No. | Location | Surface Elevation | No. Probes | Max. Probe Depth (bgs) |
|---|---|---|---|---|
| GW-1 | W (Site Entrance) | 5443’ | 2 | 28 ft. |
| GW-2 | N Boundary | 5460’ | 3 | 45 ft. |
| GW-3 | NE Corner | 5477’ | 3 | 62 ft. |
| GW-4 | SE Corner | 5459’ | 3 | 44 ft. |
| GW-5 | SW Corner | 5433’ | 2 | 18 ft. |

Gas well construction will be completed under the direct supervision of a California-registered professional engineer. Screened intervals will be located during drilling in the coarsest layers within the target depth of a given probe to ensure that the most transmissive layers are intercepted.

### 3.8.3 Settlement

Following the completion of closure construction, five permanent settlement monuments will be installed in the cover layer within the waste footprint to monitor settlement of the waste mass in accordance with Title 27, CCR, Section 21090(e). Two additional survey control monuments will be installed in native soil near the site entrance and in the northwestern corner of the site, and will provide horizontal and vertical control points during postclosure surveying. The approximate locations of survey and settlement monuments are illustrated on Drawing 3 in Appendices A and L. All monuments will be installed by or under the supervision of a licensed land surveyor or a registered civil engineer. The monuments will provide reference points from which the location and elevation of the waste and monitoring facilities can be determined by ground surveys throughout the postclosure maintenance period.

An aerial topographic survey of the final regraded and covered landfill surface will be completed following the completion of construction activities. The survey will also include a baseline survey of installed survey monuments. A ground survey of the settlement monuments will be performed every five years to evaluate the potential differential settlement of the waste mass. From this data, iso-settlement maps will be generated and compared to the baseline survey. Because the waste mass is relatively shallow (~15 feet deep) and contains a significant amount of soil (1:1 waste to soil ratio), total settlement is not anticipated to be significant.

## 3.9 Closure and Postclosure Costs and Financial Assurance

Title 27 CCR Section 21820 requires the development of a detailed cost estimate of the cost of hiring a third party contractor to perform closure construction in accordance with the closure plan. A detailed Eastin cost estimate was included in the PCPMP (Vector, 1998) and presented estimated closure construction costs for a 7.5-acre waste footprint with a prescriptive final cover layer at $432,000. Postclosure costs were estimated at

$26,300 per year or $789,000 for the 30-year postclosure maintenance period. Closure and postclosure costs have been revised to reflect the implementation of an alternative final cover and a reduction in the size of the closure area from 7.5 acres to 4.6 acres. Revised closure and postclosure cost estimates are included in Appendix J.

The revised estimated cost of closure construction with the approved alternative final cover is $246,400. The annual postclosure maintenance cost has been revised upward to $30,900. The total estimated cost for the 30-year postclosure period is then $927,000. Table 4.2 presents an estimated disbursement schedule for closure and postclosure funding, based on the completion of closure construction during the 2007 construction season.

Mono County has established financial assurance mechanisms for closure construction and postclosure maintenance as required by 27 CCR, sections 22205, 22207, 22210, and 22212. On August 14, 1990, the Mono County Board of Supervisors adopted Resolution No. 90-63, which pledged that revenues generated by various solid waste fees in effect at that time were to be deposited in the previously-established Solid Waste Enterprise Trust Fund to finance the requirements for closure and postclosure funding. Subsequent resolutions have amended the Enterprise Fund, the charges and fees for solid waste services within Mono County, and the administration of revenues generated by those charges and fees.

Currently, Mono County has established special revenue accounts within its Solid Waste Enterprise Fund to deposit annual closure funds for each of its landfills, consistent with 27 CCR 22241. Further, Mono County has a Pledge of Revenue fund agreement with the CIWMB for postclosure maintenance in accordance with 27 CCR Section 22245. To that end, the Mono County Board of Supervisors adopted Resolution No. 97-67 authorizing the agreement between Mono County and the CIWMB, and subsequently executed a pledge of revenue agreement for financial assurance. Copies of the resolution and agreement are included in Appendix J, together with an updated summary of the 2006 financial assurance contributions to Mono County's financial assurance fund for the Benton Landfill.

The anticipated disbursement schedule for closure funds will include one disbursement for closure work following the completion of closure construction, followed by annual disbursements during the postclosure period for postclosure monitoring and maintenance. An estimated schedule for disbursement of closure and postclosure funds is presented in Table 3.1.

**TABLE 3.1. Estimated Closure and Postclosure Fund Disbursements**

| Expense | Estimated Amount | Date |
|---|---|---|
| Closure Construction | $246,400 | Following closure construction – est. November 2007 |
| Postclosure Care | $30,900 | Annually through 2037 |

# 4.0 FINAL POSTCLOSURE MAINTENANCE PLAN

On the day the certification of closure is approved by the LEA, RWQCB, CIWMB, the approved Final Postclosure Maintenance Plan will become the enforcement document for the Benton Landfill. This section describes the postclosure maintenance program that will be implemented throughout the 30-years postclosure maintenance period.

This Final Postclosure Maintenance Plan addresses the requirements of Sections 21090, 21769, 21770, and 21830 of Title 27 CCR. Specific elements addressed in this section include the following:

- Identify emergency response procedures and responsible people in charge of postclosure maintenance;
- Describe monitoring and control systems operating during the postclosure maintenance period;
- Describe and develop the inspection and maintenance procedures for the closed landfill;
- Report the results of monitoring and collection;
- Describe the postclosure land use; and
- Estimate postclosure maintenance costs.

Postclosure maintenance of the Benton Landfill will be performed in accordance with Title 27 CCR, Section 21180. Postclosure activities will consist of perimeter fence repair, access road repair, environmental control systems (landfill gas monitoring, groundwater monitoring, stormwater run-on diversion channel repairs and stormwater run-off collection system repairs), the inspection of the final cover system, cover repair, settlement monument survey, and final cover revegetation. Postclosure monitoring and maintenance will occur for a period of at least 30 years unless a reduced monitoring frequency is approved by all applicable regulatory agencies.

## 4.1 Responsibility and Emergency Response

The Mono County Department of Public Works will be responsible for implementing postclosure maintenance and monitoring activities. Relevant contact information is summarized below:

| | |
|---|---|
| Owner and Operator: | Mono County Department of Public Works |
| Address: | P.O. Box 457<br>Bridgeport, California 93517 |
| Telephone: | (760) 932-5440 |

A number of unforeseen or unpredictable events may occur during the landfill postclosure maintenance period. The Emergency Response Plan included in Appendix K describes emergency response procedures, coordination agreements, and reporting requirements. The plan address events such as vandalism, fires, earthquakes, hazardous substance discovery or spill, medical emergency, propane gas leak, slope failure, and vehicle or equipment accident.

The plan will be amended in the event that it does not provide an adequate response to a failure or release, or changes occur in the postclosure land use or on-site structures which are not addressed in the plan. A copy of any plan amendments will be submitted to the LEA.

## 4.2 Site Inspection and Maintenance

Postclosure maintenance of the Benton Landfill will be performed in accordance with Title 27 CCR, Section 21180. Postclosure inspection and maintenance activities will focus on perimeter fence and access road repair, environmental control systems (landfill gas monitoring, groundwater monitoring, stormwater run-on diversion channel repairs and stormwater run-off collection system repairs), inspection and repair of the final cover, and maintenance of the wood chip layer. Postclosure monitoring and maintenance will occur on a quarterly basis during the postclosure period unless a reduced monitoring frequency is subsequently approved by all applicable regulatory agencies. The Mono County Department of Public Works will be responsible for implementing postclosure inspection and maintenance activities.

Postclosure inspection and maintenance activities will include quarterly inspections of the final cover, the stormwater control system, environmental controls, and site security as described below.

### 4.2.1 Final Cover System

The final cover will be inspected quarterly to ensure that the final cover continues to function as a barrier to significant infiltration. Visual inspections will be performed for the following:

- **Final Cover Integrity**. Qualified personnel will inspect the final cover for signs of settlement and subsidence, erosion, cracking or other items that adversely affect the integrity and effectiveness of the final cover. Any item requiring corrective action will be repaired within two weeks of its identification.

- **Wood Chip Cover**. Qualified personnel will inspect the wood chip layer for exposed soil or areas where the wood chips are noticeably thin. Areas requiring corrective action will be addressed within two weeks of the inspection. Remediation will involve the application of additional wood chips to areas with inadequate coverage.

- **Leak Search**. In addition to the above-mentioned regular inspections of the final cover, Mono County will perform a leak search once per year during the post-closure period in accordance with 27 CCR Section 21090(a)(4)(A). The leak search will consist of walking the closed surface of the landfill in a regularly spaced grid pattern across the closed landfill surface while using the hand-held gas detection monitor (Heath Gasurveyor Model 442) to search for the presence of methane. The leak search will be performed at a time when winds are calm to maximize the possibility of methane detection. As with ambient air monitoring

around the landfill perimeter, the gas detection monitor will be held at waist height and remain in continuous measuring mode while the inspector slowly walks the landfill. Methane readings will be recorded and plotted on a map of the landfill using GPS coordinates, and areas of methane concentration, if present, will be closely inspected for evidence of damage to the final cover layer. The results of the leak inspection will be incorporated into the postclosure landfill gas monitoring reports. If the results of the leak search indicate an area of the final cover may require repair, the area will be repaired and the repair documented and test in accordance with the original Construction Quality Assurance Manual (Appendix I).

### 4.2.2 Drainage System

Stormwater drainage control channels will be inspected following each significant storm event and on a quarterly basis throughout the postclosure period for any evidence of damage, excessive erosion, settlement, and obstruction by debris. The effectiveness of the surface water drainage ditches will be maintained by keeping the ditches clear of debris, excess soils and vegetation. Repairs to the structures will be made as necessary to ensure the proper functioning of the system as designed.

### 4.2.3 Environmental Controls

During semi-annual (ground water) and quarterly (landfill gas) sampling events, groundwater and landfill gas monitoring wells will be inspected for damage. Locks, caps, sampling ports and or tubes that appear damaged will be identified and replaced.

### 4.2.4 Site Security

All locks, gates, signs, and fences for the Benton Landfill will be inspected on a quarterly basis throughout the postclosure period, unless a reduced schedule is subsequently approved by all applicable regulatory agencies. Any damage to the security system due to vandalism, trespassing, or natural wear and tear will be immediately repaired and/or replaced. Signs will be repainted or replaced on an as-needed basis in order to maintain their visibility and legibility.

## 4.3 Monitoring

Postclosure monitoring will include monitoring groundwater quality, monitoring for the presence of landfill gas, and monitoring landfill settlement via the settlement monuments to be installed in the final cover layer. Each of these is discussed below.

### 4.3.1 Groundwater Monitoring

The existing groundwater monitoring program is designed to monitor both background and down-gradient concentrations of indicator parameters and possible leachate constituents. The water samples obtained during the semi-annual monitoring events are

analyzed for concentrations of metals, minerals, volatile organics, and general indicator parameters. The sampling frequency and analysis of the wells is currently performed in accordance with 2001 Waste Discharge Requirements (6-01-57) established by the LRWQCB, and a reduced monitoring frequency (semi-annual) granted by LRWQCB in response to a petition from Mono County in the fall of 1999. Existing ground water monitoring activities will continue throughout the post-closure period on a semi-annual basis for indicator parameters (pH, TDS, Cl, $NO_3$, $SO_4$), annually for VOCs, biannually for total metals, and once every five years for total cyanide, total sulfide and Appendix II constituents. Monitoring parameters and schedules are summarized in Table 4.1 below. If the results of ground water monitoring indicate that the site has stabilized, Mono County may request approval of a reduced monitoring frequency or a shortened postclosure maintenance period.

**TABLE 4.1. Summary of Ground Water Monitoring Parameters and Schedule (All Wells)**

| Parameter | Frequency |
|---|---|
| Water Level | Semi-annual |
| pH - Indicator | Semi-annual |
| TDS – Indicator | Semi-annual |
| Chloride – Indicator | Semi-annual |
| Nitrate (as N) – Indicator | Semi-annual |
| Sulfate - Indicator | Semi-annual |
| Appendix II List (EPA 8260)[1] | Annually |
| Total Metals[2] | Bi-annually |
| Appendix II List (EPA 8270) | Every 5th Year[3] |
| Appendix II List (EPA 8140/8141) | Every 5th Year |
| Appendix II List (EPA 8150) | Every 5th Year |
| Appendix II List (EPA 8080) | Every 5th Year |
| EDB/DBCP (EPA 504) | Every 5th Year |
| Total CN and Sulfide (EPA 9010/9030) | Every 5th Year |

[1] Appendix II list per 40 CFR Part 258.
[2] Total Metals includes: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Selenium, Silver, Tin, Thallium, Vanadium and Zinc.
[3] Beginning with 2000-2001 fiscal year.

### 4.3.2 Landfill Gas Monitoring

Landfill gas monitoring is currently performed in on-site structures and in ambient air around the landfill perimeter. Ambient air monitoring will continue during the postclosure period, but will be augmented by subsurface monitoring through the installation of a network of perimeter landfill gas monitoring wells as described in Section 3.9.2. Postclosure ambient air and subsurface landfill gas well monitoring activities are described in the following sections.

AMBIENT AIR MONITORING - A Heath Gasurveyor Model 442 is currently used to monitor for the presence of methane in ambient air at the landfill perimeter and in site

structures, including the gatehouse, portable restroom, and two household hazardous waste storage lockers. All four structures are portable and constructed on skids, so the base of each is elevated above the surrounding grade to allow the free circulation of air between the floor frame and ground surface. The Gasurveyor samples air continuously and electronically records results in an internal memory that can be downloaded to a personal computer. The Gasurveyor Model 442 is capable of measuring methane concentrations from zero to 1,000 ppm and the lower explosive limit (LEL) for methane from zero to 100 percent. For structure monitoring, the Heath Gasurveyor sampling tube is slowly moved throughout the interior of each structure at both floor and ceiling height. Monitored locations include all areas where gas may potentially accumulate, including under the floor frame of the three portable structures at the transfer station.

During ambient air monitoring around the landfill perimeter, a technician holds the Gasurveyor sampling tube at waist height and walks the landfill perimeter. The results of structure and perimeter monitoring are reported as a percentage of the LEL for methane in quarterly reports to the Mono County Health Department. To date, methane has not been detected in ambient air at the Benton Landfill.

SUBSURFACE GAS MONITORING - A complete network of perimeter landfill gas monitoring wells to be installed prior to site closure will be monitored for methane concentrations using the Gasurveyor. Proposed gas monitoring well locations are illustrated on Drawing 3. The Gasurveyor's sampling pump inlet tube will be connected to a valve at the top of each gas probe and the sampling pump and monitor set to continuous monitoring mode. The variation of gas concentrations over time will be recorded until the concentrations of all gases (CO2, O2 and CH4) do not fluctuate more than 0.5 percent.

REPORTING - Results of gas monitoring, including the initial and steady state concentrations of methane, will be submitted to the Mono County Health Department within 90 days of sampling. Monitoring reports will include:

- the concentration of methane measured at each monitoring location;
- date, time, barometric pressure, atmospheric temperature, and weather conditions;
- the name(s) of sampling personnel, equipment utilized, and a brief description of the methods used; and,
- a numbering system to correlate monitoring results to a corresponding probe location.

If the concentration of methane exceeds the compliance levels described above, Mono County personnel will immediately take all steps necessary to protect public health and safety and the environment. The Mono County Health Department will be notified in writing within five working days of learning that compliance levels have been exceeded. Health Department notification will include a description of the actions taken or proposed to be taken to resolve the problem.

Within 10 working days, Mono County will submit correspondence to the Health Department describing the nature and extent of the problem, and any immediate corrective actions necessary to protect public health and safety and the environment. If the nature of the problem requires the development of a remediation plan and landfill gas control system, a plan and control system design will be prepared in accordance with 27 CCR Section 20937(b-g). Approval will be obtained from the Health Department prior to plan implementation. Following approval, Mono County will enter the plan in the facility's operating record, implement the plan, and notify the Health Department when the plan has been implemented.

### 4.3.3 Settlement Monitoring

A detailed aerial topographic survey of the final regraded and covered landfill surface will be performed following the completion of construction activities. The survey will also include a baseline survey of installed survey monuments. A ground survey of the settlement monuments will be performed every five years to evaluate the potential differential settlement of the waste mass. From this data, iso-settlement maps will be generated and compared to the baseline survey. Because the waste mass is relatively shallow (~15 feet deep) and contains a significant amount of soil (1:1 waste to soil ratio), total settlement is not anticipated to be significant.

The final cover will be repaired and maintained based on the visual inspections described in Section 4.2.1 and the information acquired during the settlement surveys. Continual maintenance will be performed to prevent ponding on, and promote drainage away from, the landfill surface. All topographic mapping and iso-settlement maps will be produced with a contour interval of not more than one foot. If only very small amounts of settlement are indicated from the first postclosure settlement survey (5 years after closure), additional iso-settlement maps may be discontinued pending regulatory approval.

## 4.4 Erosion and Cover System Repair

The soil monolayer final cover design with a surficial wood chip component should minimize erosion and the need for maintenance and repair. However, it is anticipated that occasional maintenance and repair will be required for surface erosion and areas of subsidence, as described below.

- Reseeding. It is anticipated that annual reseeding of at least 15 percent of the final cover surface will be required each year during postclosure to fully establish vegetation on the closed landfill surface.

- Wood Chip Layer. It is anticipated that the wood chip component of the final cover design will require annual maintenance. Mono County will inspect the wood chip layer each year and will identify and repair areas which show signs of erosion by wind or water If replenishment becomes necessary, wood chips will be available at the on-site transfer station, as clean wood waste received at the transfer station is stockpiled and periodically chipped.

- **Erosion Rills**. If erosion rills are identified, they will be filled, graded smooth, compacted to final cover layer specifications, and covered with a minimum of 3 inches of wood chips. This type of repair would be completed with a small backhoe or small, low ground-pressure dozer. Efforts will be made to identify and mitigate the cause of the erosion rills.

- **Subsidence**. Localized areas of differential settlement may result in ponding on the cover. Should settlement cause ponding on landfill surfaces, additional cover material will be added and the final surface reconstructed to provide positive grades. Construction procedures and CQA methods will follow the applicable requirements of the final closure documents.

Repairs to the cover system will be made promptly. It is anticipated that significant repairs requiring the use of heavy equipment will be made in the dry season during or following the inspection that noted the need for the repairs. If permanent repairs are delayed until the dry season, interim measures will be implemented to stabilize the area requiring repair.

## 4.5 Postclosure Land Use

The Benton Landfill property will be maintained under County control and ownership during the postclosure period and into the foreseeable future and will be used for the existing solid waste transfer station with peripheral areas used for materials storage, processing and sorting (in the Transfer Operations Area, see Drawings 2 and 3), as is currently the practice. No structures or other facilities will be constructed over the waste footprint.

The only structures anticipated to remain on-site during the postclosure maintenance period are those associated with transfer station operations, including the transfer station enclosure, gatehouse, toilet, and two household hazardous waste storage sheds. The latter four structures are portable and constructed on skids, so the base of each is elevated above the surrounding grade to allow the free circulation of air between the floor frame and ground surface. Additional facilities within the transfer station operating area will include three roll-off bins for temporary storage of old corrugated cardboard (OCC), recyclable beverage containers, and scrap metal and appliances. The only other function remaining on-site will be stockpiles of clean wood waste and the resulting wood chips. None of the preceding structures or functions will be located over the waste footprint.

In accordance with the requirements of Title 27, CCR, Section 21170, and prior to completion of closure activities, the Mono County Department of Public Works will place in the deed to the site, or some other instrument that is normally examined during a title search, information notifying potential purchasers of the property that the site has been used as a landfill. In addition, the deed will be modified to state that the use of the parcel is restricted in accordance with the postclosure land uses set forth in the Final Postclosure Maintenance Plan and Waste Discharge Requirements for the landfill, and that the property owner will be responsible for carrying out postclosure maintenance

and any corrective action necessary to address a release. The CIWMB, Local Enforcement Authority (LEA) and LRWQCB will be provided with a copy of the modified deed once it has been completed.

## 4.6 Postclosure Cost Estimates and Financial Assurance

Closure and postclosure costs, financial assurance, and disbursements are discussed in detail in Section 3.9 above.

# 5.0 REFERENCES

Edil, T. B., Ranguette, V. J., and Wuellner, W. W., 1990, "Settlement of Municipal Refuse," Geotechnics of Waste Fills – Theory and Practice, ASTM STP 1070, Arvid Landva and G. David Knowles, Eds., American Society for Testing and Materials, Philadelphia, 1990.

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