JOINT TECHNICAL DOCUMENT
FOR REVISION OF SWFP AND WDRS

Land D Landfill
8635 Fruitridge Road
Sacramento, CA 95826

Prepared By
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2. Report of Disposal Site Information for L and D Landfill, amended June, 2018
3. Hydrologic Analysis and Proposed Modifications to Corrective Action Program, Applied Science and Engineering, April 1, 1999
4. Responses to Regional Board Letter of 20 May 1999 Concerning Corrective Action Plan, Applied Science and Engineering, June 30,1999
5. Amended Corrective Action Plan for L and D Landfill, Applied Science and Engineering, February 15, 2000
6. First Semi-Annual 2018 Monitoring Report, SCS Engineering, August 1, 2018
7. Design Report for L and D Landfill Expansion Module 1, Morton & Pitalo, October-November, 1996
8. Design Report for L and D Landfill Expansion Module 2, Morton & Pitalo, June, 1997
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11. Construction Quality Assurance Report for Expansion Module 1 at the L and D Landfill, Vector Engineering, October 1996
12. Final Construction Quality Assurance Report for Expansion Module 2 at the L and D Landfill, Vector Engineering, January 1998
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17. Landfill Gas Monitoring Evaluation Report and Compliance Work Plan, SCS Engineering, November 25, 2009. Gas Monitoring Plan (See Attached)
18. Preliminary/Partial Final Closure and Post-Closure Maintenance Plan, SCS Engineering, Revised May 3, 2018; Volumes 1 and 2
19. Amendment to Report of Disposal Site Information for the L and D Landfill Facility Number 34AA-0020 letter from County of Sacramento, Environmental Management Department to the discharger, dated July 14,1999
20. Amendment to Report of Disposal Site Information for the L and D Landfill Facility Number 34AA-0020. County of Sacramento, Environmental Management Department, October 25, 1999
21. Final Cover QAQC Plans, Applied Science and Engineering, June 18, 2001
22. Use of Leachate for Dust Control, Waste Discharge Requirements Order No. 96-177, L and D Landfill, Sacramento Co., CVRWQCB, May 26, 1998

23. Wastewater Discharge Permit: TDP-17044 Sacramento Regional County Sanitation District, November 6, 2017
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35. Final Construction Quality Assurance Report for Expansion Module 5 at the L and D Landfill, Vector Engineering, July 2002
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38. Phase 1 Gas Design - Evaluation of Landfill Gas Migration and Recommendations for Corrective Action, L and D Landfill, SCS Engineers, July 28, 2004
39. Landfill Gas Control System, Phase 2 Design Basis, L and D Landfill, SCS Engineers, August 14, 2007
40. Phase 1 Gas Construction Completion, Report and As-Built Drawings for the LFG Migration Control System, L and D Landfill, SCS Engineers, August 31, 2005
41. Construction Report for the LFG Control System, Phase 2, L and D Landfill, SCS Engineers, January 8, 2008
42. Waste Discharge Requirements, RS-2012-0107, October 4, 2012
43. Final Water Quality Protection Standard Report, SCS Engineers, February 27, 2012
44. Well Installation and Evaluation Monitoring Program Findings Report, L and D Landfill, SCS Engineers, March 14, 2017.

INTRODUCTION

LISTING AND INCORPORATION OF SUPPORTING DOCUMENTS

This Joint Technical Document (JTD) is structured to comply with requirements of the Department of Resources, Recycling and Recovery (CALRECYCLE) and the California State Water Resources Control Board (SWRCB). It consists largely of references to previously submitted documents. All documents referenced in this report are attached to it and are part of this report. A list of these attachments is presented on Page xi. Indices, showing where in the JTD specific requirements of various sections of legislation are met, are provided below as Index to CALRECYCLE Requirements and Index to SWRCB Requirements.

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REPORT OF DISPOSAL SITE INFORMATION

I. FACILITY OVERVIEW

A. INTRODUCTION

Site Name: L and D Landfill

Address: 8635 Fruitridge Road, Sacramento, CA 95826

SWF Permit: 34-AA-0020

Owner: Fruitridge Road Land Co.
3500 American River Drive, Sacramento, CA 95864

Operator: L and D Landfill Limited Partnership
P.O. Box 255009, Sacramento, CA 95865-5009

L and D Landfill (L and D) is a Limited Class III Facility as defined in Title 27, Division 2, CCR.

B. SITE LOCATION

L and D is located in the City of Sacramento at 8635 Fruitridge Road. The landfill is located in Township 8N, Ranges 5E and 6E, Mount Diablo Base and Meridian, and appears on the U. S. Geological Survey 7.5 minute maps titled Sacramento East and Carmichael. The site latitude and longitude are 38°32'N and 121°22'30'W. Access to the site is off of the north side of Fruitridge Road between South Watt Avenue and Florin-Perkins Road. The site location and primary access roads are shown in Figure 1, Area Map.

C. SITE PLAN DESCRIPTION

1. SURROUNDING LAND USE

Present land uses and land use zoning are shown in Figure 2, Land Use Zoning for Surrounding Properties - City of Sacramento, and Figure 3, Land Use Zoning for Surrounding Properties - Sacramento County.

The landfill is compatible with surrounding land use and zoning. The landfill site, as well as all adjacent property within the City Limits, are zoned M-2S, industrial. Land within 1,000 feet located outside the City Limits is primarily zoned M-2(SM) or IR, both industrial uses. Within a 1,000-foot radius of the landfill, the following types of structures, land uses, buildings, and other features are found:

- Industrial warehouses north of the landfill on Warehouse Way, south of the landfill on Fruitridge Road, and east of the landfill on South Watt Avenue.
- Transmission lines along railroad right-of-way, along Fruitridge Road, and diagonally across the northeast corner of the property.

- Farming north of the landfill on adjacent Fruitridge Road Land Co. property, with plans for future Aspen 1 residential/commercial development and urban farm.
- Railroad tracks for the Central California Traction Company Railroad.
- Well serving a commercial operation.
- PG&E headquarters.

Nearest structures - The perimeter clearance from any neighboring structure is 50 feet minimum, except north of the west pit where the clearance from the easterly building is approximately 24 feet. This building is a concrete warehouse. Figure 4, Site Map Showing Ancillary Facilities, shows the location of the off-site structures nearest to buried waste.

2. FACILITY BOUNDARIES

Legal boundaries - The legal boundaries of the landfill are described and illustrated in Figure 5. The landfill occupies Assessor's Parcel number 061-0180-049, the area of which is 176.41 acres.

All the land is leased from the Fruitridge Road Land Co. Appendix A contains facsimiles of legal documents demonstrating the owner's concurrence with the operation of a landfill on this property.

Buffer zones - Buffer zones between the refuse and property boundaries are configured in various ways. The perimeter is entirely fenced. Along the southern boundary, which faces Fruitridge Road, a tree-lined berm approximately 8 feet tall rises at a 2:1 slope from 10 feet inside the fence. A road occupies the top of the berm, and the waste is inside of the road. The distance from fence to waste on this portion of the boundary is approximately 36 feet. Along the eastern boundary the closest approach of the waste to the fence is 15 feet. The northern boundary of the north pit is 60 feet from the waste. The western boundary of the north pit is approximately 15 feet from the nearest waste. The northern and western boundaries of the west pit vary from 15 feet away to contiguous with the waste.

The storm water retention/infiltration pond has been constructed at the northeast corner of the parcel.

D. WASTE SOURCE, TYPE, AND VOLUME

1. WASTE TYPES

a. General - The Facility classifies waste received in 9 categories: demolition and construction debris; paper; concrete, dirt and asphalt (CDA); greenwaste; wood; tires; plastic; non-friable asbestos; and miscellaneous. Approximately 10% of accepted waste is classified as miscellaneous. This classification includes such things as furniture, carpeting, and similar non-putrescible material from commercial refuse collectors, building contractors, and others with acceptable loads. Since mid - 1999, the landfill has accepted small mixed loads from noncommercial customers using pick-up trucks, passenger vans, and light trailers. Currently, this material represents about 90% of the miscellaneous category. Less than 1% of accepted waste is non-friable asbestos, plastic, or wood. Since mid-January of 2005, our inert categories of concrete, dirt and

asphalt have accounted for 48%, by weight, of the Facility's waste stream, whereas historically these materials have accounted for approximately 21% of the waste stream.

b. High Liquid Content Wastes
High liquid content wastes are not accepted.

c. Designated Wastes
Designated wastes are not accepted.

d. Hazardous Wastes
Hazardous wastes are not accepted.

e. Other Wastes Requiring Special Handling
No other wastes requiring special handling are accepted.

2. WASTE QUANTITIES

Annual average loading.
Table 1 lists, by type category, the quantities of waste disposed of at L and D from 1977 - 2017.

3. CURRENT DAILY AVERAGE WASTE LOAD

The Solid Waste Facility Permit allows a maximum daily waste load of 4,125 tons per day. The average daily waste load in 2017 was 1,644 tons. This is well below the permit limit due.

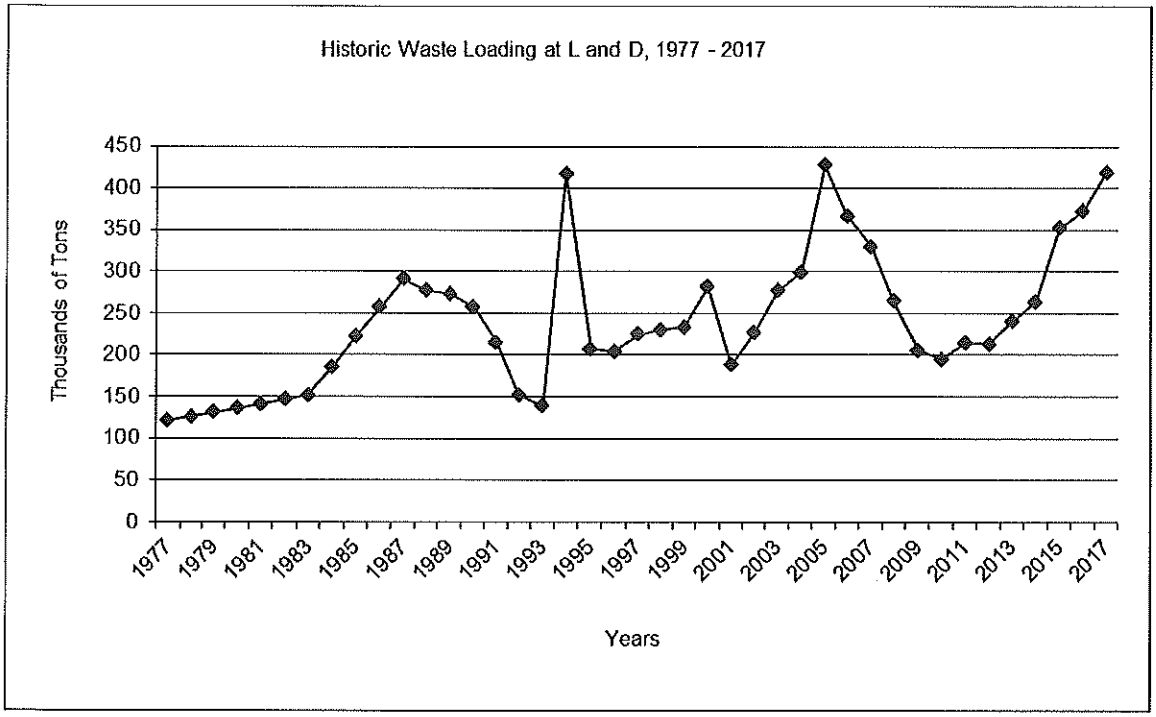
4. PEAK DAILY WASTE LOAD

The peak daily waste load in 2017 was 3,090 tons. Under routine circumstances there should be no danger of exceeding the permitted limit of 4125 tons per day.

Green waste for on-site processing, which may include curbside collected green waste (CCGW), has a permitted monthly average limit of 250 tons per day, and is allowed a peak daily limit of 400 tons per day to account for seasonal and delivery fluctuations. It is not the operators intention to receive the peak tonnage on a daily basis, but rather, to allow flexibility for those jurisdictions that collect curbside green waste on a three or four-day weekly schedule. Green waste tonnage limitations are not additional but are included in the facility permitted tonnage of 4125 tons per day.

Table 1.
Waste Disposed in L and D Landfill, 1977 - 2017 (thousands of tons)
(Includes material diverted for cover and beneficial reuse)

Year	Demolition and Construction	Paper	Concrete Dirt & Asphalt	Green-waste	Wood	Tires	Plastic	Non-Friable Asbestos	Misc.	Annual Total
1977	96	4	21	0	0	0	0	0	0	121
1978	100	5	21	0	0	0	0	0	0	126
1979	103	5	22	0	0	0	0	0	0	131
1980	106	6	24	0	0	0	0	0	0	136
1981	109	7	25	1	0	0	0	0	0	141
1982	113	8	26	1	0	0	0	0	0	147
1983	115	8	27	1	0	0	0	0	0	152
1984	133	9	42	2	0	0	0	0	0	186
1985	153	9	58	2	0	0	0	0	0	222
1986	172	9	73	3	0	0	0	0	0	257
1987	189	10	88	3	0	0	0	0	2	291
1988	208	8	55	4	0	0	0	0	2	277
1989	198	6	64	4	0	0	0	0	2	273
1990	205	4	43	4	0	0	0	0	2	258
1991	179	3	28	3	0	0	0	0	2	215
1992	127	2	19	3	0	0	0	0	1	152
1993	111	3	19	5	0	0	0	0	1	139
1994	322	20	60	6	0	0	0	0	9	417
1995	150	6	44	2	0	0	0	0	5	207
1996	151	5	34	1	0	0	0	0	11	204
1997	162	7	48	3	0	0	0	0	5	225
1998	161	5	40	1	0	0	0	0	22	230
1999	108	5	61	4	2	9	4	0	39	233
2000	95	5	97	2	3	34	7	1	38	282
2001	92	3	38	4	4	16	2	0	29	188
2002	118	4	57	3	5	16	2	0	22	227
2003	149	3	80	3	4	10	1	0	27	277
2004	156	4	79	3	6	12	3	1	35	299
2005	166	4	197	4	4	11	3	2	36	427
2006	145	3	165	3	1	11	3	3	33	367
2007	133	4	148	3	1	4	2	2	33	330
2008	108	2	110	4	1	6	2	4	28	265
2009	62	1	110	1	1	6	2	3	20	206
2010	69	2	95	7	1	9	2	2	8	195
2011	66	1	94	31	1	5	2	2	13	215
2012	55	1	103	28	1	7	3	2	13	213
2013	68	1	122	21	1	10	3	2	12	240
2014	65	1	150	21	1	11	1	3	11	264
2015	210	1	91	25	2	10	1	4	8	352
2016	222	1	100	23	2	14	1	2	8	373
2017	273	1	75	42	3	13	2	4	6	419



5. PROJECTED WASTE FLOW

Year to year variations in total loads accepted by the landfill are not predictable, as can be seen in the accompanying graph of the 1977 through 2017 historic data. Based on current conditions and available data, the best projection for waste intake is presented in Table 2. Unforeseeable events in the construction industry could invalidate this projection.

Table 2
Projected Waste Stream

Year	Cubic Yards	Tonnage
2018	400,000	352,000
2019	400,000	352,000
2020	350,000	308,000
2021	350,000	308,000
2022	300,000	264,000
2023	300,000	264,000
2024	300,000	264,000
2025	300,000	264,000
2026	250,000	220,000
2027	250,000	220,000
2028	250,000	220,000
Total	3,597,000	3,165,400

Current projections are based on one more year of increased volume, based on expectations that construction will continue to expand in the area; followed by a gradual decrease in volumes as recycling increases (creating diversion away from landfilling), and interest rates rise, slowing construction. Yearly inflow is historically seasonal, with the second and third quarters typically accounting for 60% to 70% of the annual waste; although any specific year can be different.

As the facility approaches the end of its life, gate volume will be reserved for specific customers and MRF operations, resulting in a more rapid reduction in the waste stream. When this metering begins will depend on business conditions between now and closure, and operational issues as the unclosed portion of the site becomes smaller and impacts daily operations.

6. SITE CAPACITY

a. Gross Capacity

Total volumetric capacity - The gross volumetric capacity (gross airspace capacity) of the entire facility is calculated as the volume enclosed between the elevation of the deepest buried waste and the proposed final landfill surface elevation. The elevation contours of the deepest buried waste are illustrated in Figure 16, Base Grade Contours. The elevation contours of the final surface of the landfill are illustrated in Figure 8, Site Topography at Closure. The drawings were produced as AutoCAD files and the volume was calculated with the software. The total gross airspace capacity of the facility is 20,500,000 cubic yards.

Remaining volumetric capacity - The remaining gross volumetric capacity of the entire facility is also calculated as the volume enclosed between two surfaces. The upper surface is the proposed final topography over the landfill, which is illustrated in Figure 8. The lower surface is the existing topography over the landfill (Figure 6, Site Topography December 2017), corrected for any stockpiled materials.

The remaining gross volumetric capacity of the facility as of December 27, 2017 was approximately 4,136,000 cubic yards.

b. Daily Cover Requirements

The nominal ratio of daily cover depth to waste lift thickness is 1 foot: 5 feet. Approximately one sixth of remaining gross airspace capacity or 689,000 cubic yards will be occupied by daily cover. Due to the difference in bulk densities between the daily cover materials and the disposed waste, the ratio of cover to waste is expected to be between 24% and 55% as reported by weight (see Appendix M).

c. Interim Cover Requirements

The use of some Alternative Daily Cover (ADC) materials necessitates the use of additional soil to cover ADC's which cannot be exposed indefinitely; in the case of greenwaste ADC, the limit is 21 days. This is expected to result in the use of 100,000 cubic yards of soil that is characterized as intermediate cover material for reporting purposes.

d. Intermediate Cover Requirements

All areas of the landfill which are not closed and have not been active within the past 180 days require a requisite one foot of intermediate cover soil, per regulations. This is expected to result in the use of 120,000 cubic yards of soil.

e. Final Cover Requirement

Two engineered alternative final cover designs have been developed according to the provisions of CCR Title 14, §17773(c) and (d), and have been submitted to and approved by Regional Board staff. The thickness of the proposed final cover will vary from one area of the landfill to another. The volume to be occupied by the final cover over the entire facility is 584,000 cubic yards. The volume to be occupied by the final cover over the remaining unclosed portion of the facility is estimated at 539,000 cubic yards.

f. Liner Material Volume

An engineered alternative base liner design was developed according to the provisions of CCR Title 15, Chapter 15, §2510(b) and (c). The proposed engineered alternative meets or exceeds the performance (maximum permeability) standards set by both 23 CCR Chapter 15 and Federal Subtitle D. The lower (earthen) component of the composite liner is a geotextile encased geosynthetic clay liner (GCL). The upper component is a sheet of 60-mil high-density polyethylene flexible membrane liner (FML). A gravel blanket leachate collection and removal system (LCRS) six inches thick is placed over the FML. The total gross airspace capacity referenced above does not include the space occupied by the expansion area base liner and LCRS.

g. Net Waste Capacity

Total Waste Capacity - The net volumetric capacity of the entire facility (total waste capacity) is calculated as the gross airspace capacity of the entire facility, less the volume occupied by final cover over the entire facility. (This presumes that the daily, interim, and intermediate cover materials are received as part of the waste stream.) The total waste capacity of the facility is (20,500,000-584,000=) 19,916,000 cubic yards.

Remaining waste capacity - The remaining net volumetric capacity (remaining waste capacity) is calculated as the remaining volumetric capacity of the entire facility, less the volume to be occupied by final cover over the entire facility. (This assumes that daily, interim, and intermediate cover materials come from the inbound waste stream). The remaining waste capacity of the facility is (4,136,000 - 539,000=) 3,597,000 cubic yards. See Table 2 above.

7. SITE LIFE ESTIMATE

The total volumetric capacity of the landfill is 20,500,000 cubic yards. The remaining airspace is 4,136,000 cubic yards. The remaining waste capacity is 3,597,000 cubic yards. Figure 6 is a topographic map of the site made on December 27, 2017. An in place density of 0.88 tons per cubic yard has been derived using the historic inbound weight of all material deposited in the landfill (including all cover and beneficial reuse materials) and dividing it by the known quantity of airspace used. Table 2 shows the projected future waste stream. The remaining air space will be used by June, 2029.

E. TYPES AND NUMBERS OF VEHICLES EXPECTED TO ENTER FACILITY

The types of vehicles used by commercial customers include flatbeds, dump trucks, and trucks with roll-off boxes. Since mid-1999, pickup trucks and passenger vehicles with and without small trailers have also been allowed to enter. Commercial traffic volume varies throughout the year, being related to the pace of construction and demolition within the Sacramento Region. Weather also affects the number of vehicles entering the site daily. Commercial traffic now varies from a low of 100 vehicles per day in winter, to a high of approximately 250 vehicles per day in summer. The small-vehicle traffic is less seasonal, consistently about 120 vehicles per day with two thirds of them being pickup trucks. The current permitted capacity is 480 vehicles per day.

F. END USE OF SITE

The post-closure land use for the facility will be non-irrigated open space. The area surrounding the site will probably continue to be used for office and warehouse buildings and associated parking lots, as presently occupy neighboring properties. Stonebridge Properties has a proposed tentative map before the City of Sacramento for a mixed-use development to the North of the North pit WMU.

No irrigation facilities or other permanent features are to be placed over the final cover with the exception of roads for inspection and maintenance of the final cover, monitoring systems, solar collection system, and leachate collection sump.

II. REGULATORY REQUIREMENTS

A. PERMITS AND APPROVALS

L and D is operated according to the conditions, requirements, and criteria set forth in the following permits and approvals:

1. Sacramento County Environmental Management Department (EMD).

The Facility is currently operating under Solid Waste Facility (SWF) Permit Number 34-AA-0020 and is presently in compliance with all requirements of the Permit. An application to revise the Permit has been submitted and accepted by the LEA. An updated Preliminary Closure and Post-Closure Maintenance Plan has also been submitted as a part of the permit revision. (See attachment 18)

2. Central Valley Regional Water Quality Control Board (CVRWQCB).

L and D was granted waste discharge permits from CVRWQCB in 1976, 1982 (82-075), 1983 (83-120), 1992 (92-215), 1996 (96-177), 2002 (R5-2002-0082), and 2012 (R5-2012-0107). The 1976 permit was for the 43.0-acre western portion of the site known as the "west pit" (now referred to as the west pit waste management unit or west pit WMU). The 1982, 1983, and 1992 permits were for an expanded area including the original "west pit" plus a 49.3-acre "east pit" expansion (hence, east pit WMU). The 1992 permit was amended in effect by Order 93-200, adopted 17 September 1993 to incorporate provisions pursuant to federal Subtitle D regulations pertaining to municipal solid waste landfills. L and D is presently operating under Waste Discharge Order R5-2012-0107 which covers the original east pit and west pit plus a 64.3-acre expansion (57-acre base liner) into the north pit (north pit WMU).

VOC contamination in the shallow aquifer beneath the facility was noted in the 1991 RDSI. A corrective action plan (CAP) to collect and treat ground water along the southern (downgradient) perimeter of the landfill became operational in the third quarter of 1993. The CAP was amended in 2000. The site is currently operating under a continuing Notice of Violation pending development of an updated CAP that meets CVRWQCB approval. Recently completed Well Installations and Evaluation Monitoring Program Findings are included in Attachment 44.

3. Sacramento County Department of Public Works (DPW), Solid Waste Management Division (SWMD).

L and D is an integral part of the City and County of Sacramento's plans for meeting the existing and proposed solid waste disposal needs of the area. L and D has been cooperating closely with DPW to ensure that the proposed design and operating procedures are in conformance with the current solid waste management and flow control plans being administered by DPW, as well as with the general plans of the City of Sacramento and the County of Sacramento. Correspondence from DPW regarding this ongoing cooperation is included in Appendix B, Correspondence Documenting Conformance/Cooperation with Sacramento County Department of Public Works Waste Management Plans. Appendix B, Exhibit One is a letter from DPW confirming that L and D is documented and approved in the County Solid Waste Management Plan. Appendix B, Exhibit Two is a memo authored by Sacramento Cities and County in conjunction with the County Solid Waste Advisory Committee acting as the AB 939 Local Task

Force (LTF), stating support for the proposed landfill expansion. Appendix B, Exhibit Three, is a letter to Norman Lien from H. D. Kerton, the Director of the Sacramento Department of Solid Waste, which states in part: "The L and D Landfill operation has enjoyed the long-term support of the County Solid Waste Management [Department] as a major partner in the provision of solid waste services to the community. The SWMD has supported the proposed expansion of the L and D Landfill that will create new capacity [while] meeting Subtitle D requirements." The SWMD views the continued operation of L and D as a major asset to the community.

4. California Environmental Quality Act (CEQA).

A mitigated negative declaration was prepared for the landfill expansion and circulated through the state-clearing house. The mitigated negative declaration was unanimously ratified by the City of Sacramento Planning Commission on April 25, 1996. A negative declaration was prepared by the Sacramento County Department of Environmental Review and Assessment (DERA) as a part of the 2012 SWF Permit revision, which included a vertical expansion and permitted boundary reduction. A negative declaration was prepared by the Sacramento County Planning and Environmental Review Division as a part of the 2015 permit revision to allow for the processing of green waste on-site. A Negative Declaration was prepared for the City of Sacramento by Raney Planning and Management as a part of the 2018 permit revision to allow for vertical expansion of the landfill. (See attachment 29)

5. City of Sacramento, Planning Department (SPD).

The Land Use Permit, P94-52, for the proposed landfill expansion was unanimously approved by the City of Sacramento Planning Commission on April 25, 1996. As part of the 2012 SWF Permit revision process, the City of Sacramento Planning Department deemed the proposed vertical expansion to be a minor modification of the Use Permit. An additional conditional use permit, P13-054, for the processing of green waste on the landfill site, was unanimously approved by the City of Sacramento Planning and Design Commission on April 24, 2014. This CUP was modified in November 2015, to clarify the green waste processing tonnage limitation. (See attachment 26)

III. DISPOSAL SITE DESIGN

A. DESIGN PLANS

The facility was designed to meet all state standards by a registered Professional Engineer.

1. TITLE SHEET

For identification, see Section I.A., Introduction. For vicinity and location map, see Figure 1, Area Map. For a list of drawings, see List of Figures.

2. SITE PLAN

Figure 4, Site Map Showing Ancillary Facilities, illustrates the location of all structures and ancillary facilities. Figure 4 shows the location of the site entrance, the administration building, sanitary facilities, the maintenance buildings, the surface water runoff infiltration pond, and power transmission lines. Legal property limits are shown in Figure 5, Facility Boundaries.

3. FILL SEQUENCING PLANS

Figure 7 shows the proposed closure phases of the landfill. Fill sequencing will follow the closure phasing. Further detail on closure sequencing can be found in the Preliminary Closure Plan.

4. GRADING PLAN

Figure 8 shows the topography of the completed landfill. Excavated finished grades for the North Area WMU liner are shown in the certified as-built drawings for modules 1 through 7, submitted in the Joint Technical Document (JTD).

5. LEACHATE COLLECTION AND REMOVAL SYSTEM

The north pit WMU has a gravel blanket leachate collection and removal system (LCRS) installed on top of the composite liner. Perforated leachate collection pipes are located within the drainage layer of washed gravel. The leachate collection pipes convey the collected leachate to a sump at the west end of the WMU. An inclined 24-inch diameter leachate withdrawal riser pipe extends from the sump, up the west side of the WMU, inside the liner, to the ground surface.

Leachate collected and pumped from the sumps is tested for general parameters, total dissolved solids (TDS), chemical oxygen demand (COD), potentially toxic metals, and volatile organic compounds (VOCs), as specified in 14CCR Article 7.8 Appendix C. From May through October the leachate is returned to the lined landfill surface for dust control. From November through April any excess leachate is disposed of through the County of Sacramento sanitary sewer system.

The layout of the LCRS and leak detection system is shown in Figure 9, Layout of LCRS in North Pit WMU. Construction details for the leachate collection sump are shown in Figure 10, Leachate Collection Sump. Details of the vadose zone monitoring/leak detection station are also shown in Figure 10. A detailed discussion of the design of the LCRS is included in Section VI.A.1.c., Leachate Collection and Removal System.

6. SURFACE DRAINAGE PLANS

Storm water runoff is prevented from leaving the site by a perimeter drainage system that conducts all runoff to an infiltration pond at the northeast corner of the site. Roads and ditches are maintained and graded as needed to minimize erosion and retain all on-site drainage water within the facility boundaries. A long-term final drainage plan has been developed. The basis of the plan is the collection of all-surface runoff in perimeter storm sewers and channels that encircle the entire site and convey the water to an infiltration pond at the northeast corner of the site. Design assumptions and calculation of peak storm runoff quantities are presented in Section III.B.5., Drainage System Capacity Requirements. The design of the provisions for controlling on and offsite drainage and erosion is presented in Section VI.G., Drainage and Erosion Control. The locations of the storm water infiltration pond and perimeter channels are discussed in Appendix C, Drainage Plan.

7. SITE ACCESS PLAN

Site access - The details of the entrance to the landfill are shown in Figure 11, Details of Entrance to Site. The only access for trucks bringing in waste is through the gate on Fruitridge Road approximately 100 feet east of the Central California Traction Railroad tracks. Trucks reach this gate from either direction, but the majority come from the west. The roadway is 30 feet wide in front of the gate. Traffic rarely accumulates outside of the gate waiting to enter the facility.

Traffic volume - Estimated traffic volume and types of vehicles admitted are discussed in Section I.E., Types and Number of Vehicles Anticipated to Enter the Facility.

A complete Traffic Control Plan is included in Section VI.K., Traffic Control.

8. GAS MANAGEMENT PLAN

Perimeter Methane Detection Wells

Perimeter methane detection wells have been in use since March 1990. Pursuant to Title 27 updates, L and D filed a "Landfill Gas Monitoring Evaluation Report and Compliance Work Plan" on November 25, 2009, which was approved by the EMD on November 30, 2009 (JTD Attachment 17). This construction was completed in May of 2010 and the site now has 20 methane detection wells installed around the landfill perimeter; 15 are on-site and 5 are off-site. The location of the monitoring probes is shown in Figure 12, Landfill Gas Control System.

Methane Monitoring Schedule

Methane monitoring occurs on a quarterly schedule.

LFG Migration Control System

In 1990, methane was found at concentrations above 5% at several locations on the landfill perimeter. The landfill operator responded to this condition by building a perimeter methane migration control system. The system consisted of 28 vertical gas extraction wells installed at approximately 200-foot intervals along sections of the landfill perimeter where there are occupied buildings on adjacent parcels. In 2005, the perimeter extraction wells were supplemented with Phase 1 of the LFG migration control system, which placed 11 wells, 9 multi-completion, within the landfill mass. In

2007, Phase 2 of the LFG migration control system was completed, adding 13 additional extraction wells, 5 of which are multi-completion.

The Phase 1 and Phase 2 gas extraction wells are connected through a gas collection leader to a 1,000 cfm blower, which exhausts the landfill gas through a 2,000# carbon absorption unit prior to venting the gas to the atmosphere. The Gas collection system is operated under SMAQMD permit number 20515. The carbon absorption unit is operated under SMAQMD permit number 20516. The location of the vertical gas extraction wells and condensate collection points is shown in Figure 12, Landfill Gas Control System. The location of gas and condensate collection headers, including the direction of flow, is shown in Figure 13, Gas Transfer Pipe System and Figure 14, Condensate Transfer Pipe System.

The LFG migration control system has effectively eliminated methane from the perimeter methane detection wells. The original perimeter extraction wells continue to be connected to the gas header, but are operated at very low vacuum and function primarily as monitoring points. Methane presently is not detectable at any point on the landfill perimeter.

In May 2010, the carbon absorption unit was replaced by a landfill gas flare, with a new 2,000 cfm vfd blower system. Currently the flare operates under SMAQMD permit number 22277. The carbon absorption unit now serves as a back-up system to the flare.

The gas control system is described in detail in Section VI.B, Gas Control and Monitoring.

9. GROUND WATER MONITORING PLAN

The landfill has a ground water monitoring system consisting of background monitoring wells for each WMU, detection monitoring wells for each WMU, corrective action monitoring wells for the east and west pits, off site corrective action monitoring wells, and second aquifer background and detection monitoring wells. All wells were built to the specifications of the Regional Water Quality Control Board. The well locations and construction details are designed to comply with all applicable portions of Title 27. The locations of the wells are shown in Figure 15, Ground Water Monitoring System.

A pan lysimeter is located beneath the deepest portion of the leachate collection and removal system of the north pit. It is described in detail in Section VI.A.2., Vadose Zone Monitoring.

The existing and proposed ground water monitoring controls and procedures are described in detail in Section VI.A.3., Ground Water Monitoring.

10. SOLAR COLLECTION

The landfill has an active solar collection system, consisting of six pods located throughout the southern part of the landfill. (See Figure 31, Solar Collection As-built Drawings). The pods are set on pads that sit on the landfill surface and are adjustable to account for settlement. Pins anchor the pads to the interim cover to prevent shifting and are not deep enough to penetrate into waste. Upon closure in the area of each pod, the pod will be removed and reset after closure, in compliance with Title 27 CCR, §21190(e).

11. DESIGN DETAILS

Design details for various landfill features such as liner systems, surface drainage, final cover, and leachate collection and removal, are included in the appropriate section of this RDSI.

B. DESIGN CALCULATIONS

1. SOIL AVAILABILITY

The mining of the north pit removed between 40 and 50 vertical feet of earth (from an initial grade of approximately 27 feet CSD to an average base grade of approximately -14 feet CSD) over 57 of its 65 acres. Approximately 3.8 million cubic yards (in the compacted state) of clean fill was obtained through this excavation.

The volume of soil which will be required for intermediate cover and interim cover of ADC's between December 2017 and closure will be approximately 220,000 cubic yards, in the compacted state. This estimate is calculated as 3/4 foot of soil over the unclosed portion of the site. Daily cover material is expected to come from the inbound waste stream in the form of ADC's.

The volume of soil required for the vegetative layer will be 330,000 cubic yards. This estimate is calculated by assuming one foot of vegetation cover over the entire landfill, with two feet in some areas. All volumes are in the compacted state. Additionally, the foundation layer will require 250,000 cubic yards, some of which will be supplied by the intermediate cover.

The quantity of soil currently stockpiled on site may not be sufficient to provide for all closure needs and we will continue to divert and stockpile soil from the inbound waste stream to provide for cover and closure activities.

2. SEISMIC STABILITY

The proposed final topography (Figure 8, Site Topography At Closure) includes no slope steeper than 3H:1V. The site is not subject to liquefaction, nor is it an unstable area with poor foundation conditions. Seismic stability and analysis is contained in Appendix B of the Preliminary Closure Plan (Attachment 18).

3. SETTLEMENT ANALYSIS

It is not possible to accurately model the long-term consolidation of a heterogeneous waste mass, but certain subjective observations may be made. Settlement in landfills is due primarily to 2 phenomena; consolidation due to overburden weight, and volume loss due to decomposition. The relatively inert nature of the waste received at L and D (approximately 71% construction and demolition, and 21% concrete, dirt and asphalt, see Table 1) suggests that settlement due to decomposition will be minimal. The projected increase in the density of the waste at the landfill, with inert expected to account for 50% by weight of the landfill mass, will make the issue of settlement even less of a concern. While a certain degree of settlement will occur, the relative isolation and projected end use (open green space) of the site suggest that settlement will not lead to future environmental problems.

4. LEACHATE GENERATION

This section presents the assumptions and calculations used to derive the capacity requirements for the leachate collection and removal system. The design and operation of the LCRS is described in Section VI.A.1.c., Leachate Collection and Removal System.

The leachate collection system is designed to collect twice the maximum anticipated daily leachate volume. It is believed that the highest daily leachate volume will be produced during the active life of the WMU, prior to placement of the final cover, when precipitation could potentially enter the waste in significant quantities. The appearance of precipitation in the leachate collection system will be delayed by the moisture storage capacity of the waste, estimated at 2.5 inches per foot of waste (Bagchi, 1990). Because the waste in place will attenuate the rate of leachate percolation, a monthly water balance approach is appropriate for estimating the maximum anticipated daily leachate volume.

The maximum anticipated daily leachate volume, while the landfill is active, is based on an analysis of the average monthly precipitation and evaporation for the period of record at the Sacramento City NWS. The maximum average monthly precipitation of 3.58 inches occurs in January, along with 0.9 inches of evaporation. Assuming that no run-on from neighboring land occurs, that 35% of the total precipitation is runoff, and 0.9 inches evaporate, 1.427 inches infiltrates the WMU. Equating all this to leachate production, the average January precipitation and evaporation cycle results in a leachate production of 0.1189 feet. This rate is equivalent to 1,250 gallons per day per acre (gpd/ac), or 0.868 gallon per minute per acre (gpm/ac). 23 CCR, Chapter 15 §2543(b) stipulates the leachate system must be designed to collect twice the maximum anticipated daily leachate volume. The design presented in Section VI.A.I.c, Leachate Collection and Removal System is designed to collect and remove 1.74 gpm/ac, or 2,500 gpd/ac. Over the entire 53-acre liner, the design leachate flux as per §2543(b) is 92 gallons per minute.

Leachate production has been recorded ever since completion of Phase 2 of the construction of the north pit WMU in September 1997. Given the pace of landfilling, the water storage capacity of the waste pile is growing faster than the rate of delivery of rainwater. The water storage capacity of the waste at completion of landfilling will be on the order of 200 inches (80 feet x 2.5 inches/foot). By that time the waste pile will have been presented with 18 years of rainfall, or about 324 inches. Up to a third of that rainfall will run off overland and up to a third of the remainder will evaporate. The waste pile may never reach "field capacity" during the active life of the landfill.

After closure and placement of the final cover, the infiltration rate will be significantly less than when landfilling is occurring. The design leachate production rate will never be approached.

5. DRAINAGE SYSTEM CAPACITY REQUIREMENTS

The drainage system components were designed to convey the 24-hour, 100-year storm in accordance with Title 27, §20365. This design storm is 4.10 inches according to the County of Sacramento, Hydrology Standards. The assumptions and methods utilized in the design process are given in Appendix C.

The storm water retention/infiltration pond is located in the northeast corner of the site behind the SMUD towers (see Figure 4, Site Map Showing Ancillary Facilities).

The pond is at the discharge ends of the perimeter drainage channels. A geotechnical engineering report (Wallace-Kuhl Associates, 1991) investigated the stability of the pond slopes. The investigation recommended pond side-slopes no steeper than two to one (2:1), horizontal to vertical. That is how the pond was built. The pond current footprint is 3.5 acres, the minimum depth is 27 feet, the bottom area is 1.9 acres, and the wetted surface area is 3.7 acres. It has a capacity of 65 acre-feet. Future plans will enlarge the pond footprint to 4.93 acres. Its design is based on short-term 100-year recurrent precipitation events, and long-term precipitation equal to twice the monthly average over an annual cycle. The drainage area of the landfill is approximately 160 acres. An additional 30 acres north of the landfill also drains into the pond. The pond is designed to accommodate the entire tributary area.

Short-Term Event. The short-term performance of the drainage pond was initially evaluated by considering the 24-hour, 100-year precipitation event for Sacramento of 4.10 inches, or 0.34 feet. Conservatively assuming that 30% of this short-term precipitation ends up as run-off from the 190 acres of land, approximately 20.2 acre-feet of water reaches the pond. This volume of water would fill the pond to a depth of 9 feet.

Increasingly longer duration 100-year precipitation events were considered in subsequent design of the drainage pond. In each case, it was assumed that the run-off coefficient is 0.30 over the entire 190 acres. Thus, the 2-day, 100-year precipitation event of 6.05 inches results in a total volume of 28.7 acre-feet, which would fill the pond to 13 feet. The 8.92 inches generated by the 8-day, 100-year storm results in 42.4 acre-feet of run-off, which would fill the pond to 17 feet. Based on the analysis of long-term precipitation presented below, it is apparent that significant percolation will occur during an 8-day period. Thus, the short-term analysis was modified to include this percolation using the model of percolation described in the long-term analysis. Assuming that the head in the pond is equal to one-half the depth predicted for the 8-day, 100-year event, or about 8.5 feet, a total of 5.1 acre-feet of water will percolate over the 8-day period, reducing the short-term storage requirement to a total volume of about 37.3 acre-feet. This amount of water would fill the pond to about 16 feet.

Long-Term Input. The long-term performance of the pond was evaluated by a spreadsheet water balance model. Sources of water to the pond were the runoff derived from precipitation on the 190 acres tributary to the pond, direct precipitation on the pond, and the water delivered to the pond from the CAP extraction wells. Losses of water from the pond were direct evaporation from the pond, on-site water usage, and seepage into the aquifer. Details of the model and the conclusions drawn from it appear in Attachment 5 to the JTD: Amended Corrective Action Plan for L and D Landfill, Applied Science and Engineering, February 15, 2000.

6. GAS GENERATION AND AIR EMISSION CALCULATIONS

The estimate of the landfill gas generation rate is calculated using the Scholl Canyon model, a first order single stage kinetic model which assumes gas production peaks shortly after waste placement and declines exponentially as the biodegradable fraction of the waste is consumed. Assuming that the landfill gas is 50% methane, that the waste acceptance rate is constant from year to year, and that the rate of gas production peaks at the time of placement, the Scholl Canyon equation takes the following form:

$$Q = 2\,Lo\,R\,(e^{-kc} - e^{-kt})$$

where
- Q = landfill gas production rate [m^3 – m^3/yr^t]
- L_o = ultimate methane generation potential of the waste [m^3/metric ton] (m^3/Mg)
- R = average annual waste acceptance rate, excluding non-biodegradable refuse [Mg/yr]
- k = methane generation rate constant [1/yr]
- c = time since landfill closure [years]
- t = time since initial waste placement [years]

For landfills which are still open, the value of c is zero, and the Scholl Canyon equation takes the following form:

$$Q = 2\,Lo\,R(1 - e^{-kt})$$

The ultimate methane generation potential (L_o) of the waste is estimated to be 94 cubic meters of methane per metric ton of refuse (3,000 cubic feet per US ton of refuse) (California Air Resources Board, 1990). The average biodegradable waste acceptance rate (R) is estimated to be 7,855 metric tons (8,640 US tons) per year, which represents 4% of the mean average annual waste acceptance rate for the period January 1991 through December 2000 (216,000 US Tons). The methane generation rate constant (k) is estimated to be 0.05. The time since initial waste placement (t) is 23 years. Under the foregoing assumptions, the gas generation rate at this facility will be 67 cubic feet per minute (35 million cubic feet per year).

Presently, the landfill gas extraction system collects approximately 530 standard cubic feet per minute, which is routed through an enclosed flare. For more detail on the landfill gas system, see Section VI.B.

7. SOIL EROSION ANALYSIS

The resistance to erosion of the final cover was analyzed using the Universal Soil Loss Equation (USDA, 1978). For Sacramento, the rainfall and runoff factor (R) was calculated to be 41. The soil erodibility factor (K) was estimated to be 0.53, assuming that the final cover is comprised of 40% sand, 30% silt and very fine sand, 1% organic matter, fine granular structure, and a moderate permeability. The topographic factor (LS) was estimated at 17.35 for the 3% final cover slopes. Assuming a ground cover over 25% of the surface area yields an estimated cover management factor (C) of 0.003. Finally, the support practice factor was estimated to be 1.0 for the 3% slopes. Using these values in the Universal Soil Loss Equation results in an estimated erosion of 1.13 tons per acre per year from the 3% slopes. A loss of 1.13 tons per acre is below the soil tolerance value of 2 tons per acre per year (USDA, 1978). Based on the foregoing assumptions, erosion of the final cover sections sloped at 3% will be manageable.

IV. DISPOSAL SITE IMPROVEMENTS

The landfill office, workers rest rooms, and maintenance facilities are all in temporary buildings near the site entry gate at the southwest corner of the site. A 10,000-gallon water storage tank is also in this area. A water hydrant connected to City water is located at the entrance gate. A sign identifying the facility is posted at the entry gate. The carbon absorption unit is housed in a building to the west of the gate. The landfill gas flare is located Northwest of the carbon storage building in a fenced enclosure. The C&D Recycling Facility is located in the West Pit WMU. The site is enclosed within a chain link fence with barbed wire on top extensions. See Figure 4, Site Map Showing Ancillary Facilities.

A paved two-lane road leads from the entrance gate to the dual truck scale system located on the west pit, and from there to a cul-de-sac turnaround at the south western corner of the north pit. Additional internal roads are maintained to the active area. During the winter an all-weather road is maintained from the cul-de-sac to the disposal area and to the C&D Recycling area.

After closure, a perimeter road will provide for inspection and maintenance of the perimeter drainage channel. L and D's office building, which is adjacent to the landfill, will house supplies and equipment for inspection and maintenance of the fence and environmental monitoring systems. The LFG extraction system and flare will continue to operate as long as sufficient landfill gas is being generated. The solar collection system will continue to operate to provide electricity for LFG extraction and the groundwater pump and treat system.

V. DISPOSAL SITE OPERATIONS

A. HOURS OF OPERATION

The landfill is open to accept waste Monday through Friday, 6:30 AM to 4:30 PM and Saturday, 8:00 AM to 1:00 PM. Site operations begin at 6:00 AM and conclude by 6:00 PM.

L and D Landfill is undergoing phased closure, pursuant to its approved Preliminary/Partial Final Closure and Post-Closure Maintenance Plan. As part of closure activities, the approved cover liner system must be installed under certain temperature constraints, which may necessitate that some installation activities take place outside of the SWFP-specified operating hours, most likely very early morning. Such activities would require the use of lighting, which is likely to be visible from locations outside the landfill, primarily nearby roads and businesses. Other effects associated with such closure activities are not anticipated. Off-hour activities would be strictly limited to closure-associated liner installation and soil covering and would not include any solid waste handling or non-closure ancillary activities. The Landfill operators will notify the LEA in advance of such activities and of any complaints received concerning the activities.

B. PERSONNEL

1. MINIMUM NUMBERS AND QUALIFICATIONS

Table 3 below lists the numbers and types of personnel required to operate the facility.

Table 3
Personnel Qualifications and Minimum Numbers

Facility Staff	Minimum Number	Qualified to perform the cited function
Landfill Superintendent	1	Responsible for overall site supervision and personnel management.
Mechanical Superintendent	1	Lead mechanic. Supervises and coordinates maintenance of all on-site equipment.
Weighmaster	1	Runs scale house computer system. Weighs vehicle in and out of site.
Small Load Gatekeeper	1	Assesses small loads and collects tipping fees with manual ticket system.
Spotters	2	One on commercial lift; one on C&D Recycling Pad. Control and direct traffic at the dump areas. Check loads for improper materials.
Heavy Equipment Operators	2	Operate large equipment on site including bulldozers, excavators, compactors, loaders, blade and earthmoving equipment.

Mechanics	1	Repair and maintain all on-site equipment.
Maintenance	1	Fuel, lubricate and change filters on all equipment.
Laborers	8	Hand recycle materials from waste streams, man picking station, collect litter, erosion control, other jobs as directed by landfill superintendent.
Water Truck Driver	1	Drive water trucks for dust control in summer, mud control in winter.

2. TRAINING

Training of the operation staff is conducted by supervisory personnel every 30 working days and covers health and safety instruction, environmental controls, emergency procedures, site operation, and maintenance procedures. The Landfill Superintendent is briefed at least weekly on pertinent safety issues and information.

All staff are trained to recognize hazardous waste and how to respond if it is encountered. Retraining in hazardous waste awareness is conducted regularly by a hazardous waste specialist employed by the company. Details of these sessions are available to the EMD upon request.

3. SUPERVISION

Mr. Michael Lien is the General Manager of L and D, and is responsible for supervision of all landfill staff and oversight of equipment purchased, resource recovery operations and customer relations.

Mr. Jeffrey Mills is the Manager of L and D, and is responsible for the overall operation of the landfill, expansion planning and environmental management.

Ms. Deborah Boersma is the Personnel and Safety Manager of L and D, and is responsible for the management of these areas.

Mr. Michael Stumpe is the Operations Manager of L and D, and is responsible for daily operations and management of supervisory personnel.

Mr. Milton Mastin is the Landfill Superintendent of L and D, and is responsible for the on-site supervision of landfilling and recycling activities.

4. EMERGENCY CONTACT LIST

The names, and phone numbers of persons to be noticed in case of emergency are given below.

Contacts	Site Phone #	Office Phone #
Michael Lien	916-383-9420	916-737-8640
Jeffrey Mills	916-383-9420	916-737-8640
Deborah Boersma	916-383-9420	916-737-8640
Michael Stumpe	916-383-9420	916-737-8640
Milton Mastin	916-383-9420	916-737-8640

The Site address is 8635 Fruitridge Road, Sacramento, CA 95826
The Office address is 5370 South Watt Avenue, Suite 100, Sacramento, CA 95826

C. EQUIPMENT

1. MINIMUM EQUIPMENT REQUIREMENTS

The following equipment is available on site to ensure ongoing compliance with operating standards.

Item	Number
Track Laying Bulldozers	2
Track Laying Tractor	1
633 Scrapers	2
Trash Compactors	4
Motor Grader	1
Water Truck (3,500 gallon)	1
Waterpulls (8,000 and 10,000 gallon)	2
Backhoe	1
Loaders	3
Service Truck	1
Utility Truck	1
Street Sweeper	1
Fuel Truck with Pump	1
Water Tower (10,000 gallons each)	2
Water Pumps	4
Communication System	1
Picking Station	1
Excavator	1
Incline Screen	1
Miscellaneous Mechanical Equipment for Maintenance	8

2. STANDBY EQUIPMENT

Several pieces of equipment are designated as back-up equipment for use in the event of breakdown or extraordinary traffic. The typical daily requirement is for 1-bulldozer, 1-compactor, 1-waterpull, 1-scraper, 1-grader and 1-loader. That leaves 2-compactors, 1-waterpull, 1-scraper, and 2-loaders available as stand-by equipment. When a piece of equipment is out of service during a heavy disposal day and backup equipment is not available, the crew works overtime to ensure that all waste received during the day is properly disposed of the same day.

3. EQUIPMENT PREVENTATIVE MAINTENANCE

When equipment breaks down repairs are started immediately. Two full-time mechanics and two full-time maintenance men at the site are responsible for maintaining and repairing the equipment. Major repair work may be done off site or specialized services may be hired to come on site as needed. If several critical pieces of equipment were to require repair at the same time, additional equipment can be obtained on an emergency basis from the adjacent facilities of A. Teichert and Sons, Inc.

D. MATERIALS HANDLING ACTIVITIES

1. C&D RECYCLING UNLOADING

Loads are placed on the C&D Recycling pad. Material placed on the recycling pad is subject to removal within 48 hours. An alternative frequency of 96 hours was granted by the LEA on July 15, 2011, and extended to 120 hours on May 22, 2013. A detailed description of the recycling operation is provided in Section V.E.7.

2. LIFT UNLOADING

Most loads are placed at the top of the lift. Loads with hard-to handle material are deposited at the bottom of the lift. Also, during peak hours, loads may be placed at the bottom of the active disposal face.

3. SPREADING AND COMPACTING

At the active disposal face, the waste is deposited into a cell approximately 100 feet long by 100 feet wide by 5 feet deep and is spread and compacted with one of the compactors. During peak periods a D-8 bulldozer assists by pushing waste from the unloading area to the disposal face.

4. SPECIAL HANDLING PROCEDURES

Loads with hard-to handle material are deposited at the bottom of the lift. Also, during peak volumes, loads are placed at the bottom of the active disposal face. All other loads are placed at the top of the lift. Loads with a high proportion of recyclable material are redirected to the C&D Recycling Facility. Some hand recycling is done at the lift.

Shredded tires too large to be used for alternative daily cover are periodically stockpiled adjacent to the active disposal face when large quantities are received near the end of the business day. These tires are left uncovered overnight until the next working day when the quantity of other trash is sufficient to cover and compact the tires into the fill. The longest period in which these tires are stockpiled is 48 hours, as in the case of a Saturday receipt to a Monday compaction and cover.

When encountered, hazardous waste is segregated from the other waste at the location of discovery to avoid incidental contact with the material. The duration of storage depends upon the direction of the regulatory agencies contacted. Because of the close screening of the wastes, the responsible party should be readily determined and that company will be charged with the cost of disposal.

Specific hazardous wastes encountered are Freon gas and oil from refrigerators and air conditioners, which are removed from the units on-site by a licensed hazmat contractor. The motors and compressors are then loaded into a metal bin for removal from the property and the remaining refrigerator and air conditioner shells are compacted and removed from the site as scrap metal. Television and computer monitors are removed from the waste stream, stored in a bin on site, then sent to an e-waste recycler. Waste oils, antifreeze, and solvents are separated and stored in enclosed containers on site until removed by a certified hazardous waste hauler. Truck and car batteries are also separated from the waste, stored on site and periodically removed from the landfill. Paint is stockpiled for use on-site, or transported to a hazardous material facility. Florescent light bulbs and other U-waste are stored on site

in an enclosed container and periodically removed by an approved processor.

Greenwaste delivered for processing, which may include CCGW, will be placed near the lift for convenient placement as Alternative Daily Cover (ADC) after processing. Incoming material will be inspected for compliance with the Solid Waste Facility Permit and material that is visually, or by smell, deemed to be too wet, contaminated, or rotten/odorous, will be rejected. Rejected material will either be removed from the site as quickly as possible, but no later than within 24 hours, or preferably landfilled on-site (immediately upon detection, if odorous). Rejected material, which is removed from the site, will go only to permitted off-site disposal destinations which are pre-arranged with the customer. A list of these customers, and copies of the agreements specifying the permitted disposal destinations, will be renewed annually, maintained on-site, and kept available for LEA review. Customers will be encouraged to use best management practices during transport of rejected material to minimize nuisances. Accepted material will be processed within 48 hours, as described in Recycling and Volume Reduction, section V.E.10.

5. PERIODIC COVER

At the end of each day the active cell is covered with a nominal half to one foot of native soil or alternative daily cover (ADC) using a D-8 bulldozer and/or a compactor. Stockpiled cover material or newly excavated dirt is brought to the cell area by one of the 633 scrapers. In addition to onsite native soil, acceptable materials received from landfill customers are set aside and incorporated with native soil cover at the end of the day. The current increase in inert materials (acceptable for cover) received in the waste stream has reduced the need for using onsite native soil for daily cover purposes. The EMD has accepted the following materials for use as ADC at L and D: imported recycled soils, construction and demolition inert wastes, shredded tires, material recycling facility unders, processed green material, geosynthetic fabric, compost materials, and water treatment plant residuals. The specific handling and use of each ADC type material is discussed below.

As described in I.D.6.b., daily cover is applied in a nominal ratio of 1-foot : 5 feet. Applied and compacted thicknesses vary for soil and different alternative daily covers ADC) and are described below for each specific material. Translation of this ratio into daily tonnage received is difficult due to the varying bulk densities of both the waste and the daily cover material, plus the propensity of the daily cover material to migrate down into the waste during compaction. By tonnage, 24% to 55% of the daily waste stream is required for daily cover, due to the difference in bulk density between the cover material and the waste material (see Appendix M). Additional soil tonnage is required for intermediate cover and for covering those ADC's which cannot be exposed indefinitely.

Imported Recycled Soils –Inbound dirt loads are diverted to a stockpile near the lift where cleaning is done using hand labor, or grizzlied with a loader or backhoe. Once cleaned, this stockpiled dirt is typically used as intermediate cover on areas that are scheduled to be unused for more than 180 days. In these areas the dirt is deposited in 12 inch lifts and compacted in place. The in place density of this material is estimated to be 3,400 lbs/cy with a range of use estimated to be between 200 and 350 tons/day combined, in the lift or in the stockpile. Stockpiled dirt may also be used as interim

cover to cover ADCs that cannot be left exposed indefinitely

Construction and Demolition Inert Wastes – Construction and demolition (inert) wastes are basically true inert loads including concrete, asphalt, bricks, sand, soil, etc. These loads can be lightly contaminated with wood and metal products and are generally used for beneficial purposes on site, such as road construction and winter working pad areas. They can also be used for daily cover and, as such, are pulverized using heavy equipment where the road or winter pad areas are located, then hauled to the active disposal area and placed in lifts of a minimum of 6 inches and a maximum of 18 inches, free of open voids. When used as daily cover the inerts are processed without being incorporated into the road or pad areas, and as such are not stockpiled on site more than 48 hours. The product in place will consist of 95% (by volume) of material less than 12 inches in any dimension and 50% less than 6 inches. The in-place density of this material is estimated to be 3,800 lbs/cy, with a range of use between 75 and 100 tons/day for roads and pads. The estimated range of use for cover is minimal, less than 5 tons/day.

Shredded Tires – The facility uses 2 types of tire shreds in the landfill operations. The primary shred, derived from passenger and light truck tires, has a single size limitation of a maximum 24 inches in length, and is used in the operations layer of each newly constructed lined module. The shreds are placed by a loader to a depth of 24 inches on top of filter fabric, which covers the LCRS gravel lens. The other use of shredded tires is for ADC. The ADC shred is reduced in size more than the primary shred. 50% or more of the volume of ADC shreds is less than 6 inches in length, with no individual piece greater than 12 inches in length. The ADC shreds are placed on the face of the lift, 6 inches to 18 inches in depth, with a loader, and on any side slopes that may be contained in the cell on any given day. Care is taken to not have contiguous slopes of tire shreds above the existing cells when new cells are constructed on top of other cells. Shredded ADC tires, without a sufficient quantity of admixed soil to yield a maximum void of 1.5 inches (for resistance to rainfall infiltration), are not applied or allowed to remain exposed if the weather forecast is for rain within 8 hours. The in-place density of this material is estimated to be 750 lbs/cy with a range of use between zero and 40 tons/day as ADC. Shreds used in the operations layer, when required, are placed at an average rate of 1,200 tons/acre.

Material Recycling Facility Unders – Unders are generated by the L and D Construction and Demolition Material Recovery Facility (MRF). Imported material, if it is substantially the same as what is produced by the L and D MRF, may be used upon approval by the LEA. The unders are deposited over the lift in a 6-inch to 12-inch layer, resulting in a total minimum compacted thickness of 6 inches. The storage and use of this material and the method of application were approved through two demonstration projects. A copy of the final report for the second project (which contains the final report from the first project) is attached as Appendix J. Unders material will be stored, typically near the lift, according to the protocols developed in the first demonstration project. Landfill personnel will monitor stockpiled material for odors. In the event the material is found to produce odors strong enough to be detected offsite, it will be used as ADC, aerated as necessary, tarped, or buried to mitigate the odor. Once used as cover, the

material can remain exposed for up to 21 days, after which it must be watered and recompacted, or covered with soil. Recompaction activities will be documented and records kept in the scalehouse. The nature and frequency of the recordkeeping may change at the discretion of the LEA, based on field conditions and long-term observation of the material. The in-place density of this material is estimated to be 1,500 lbs/cy with a range of use between zero and 300 tons per day as ADC.

Processed Green Material - L and D will procure processed green material, which may include CCGW, that complies with the grain size specification of 95% less than 6 inches by volume. Processed green material will be delivered on the day of use and deposited near the active face for use as cover. The material will be applied as ADC in compliance with 27CCR §20690(a)(2), and (b)(3) and will be stockpiled for a maximum of one day. Stockpiles will be placed to ensure that they don't interfere with landfill operations or traffic and limited to pile sizes that allow for accurate monitoring of interior temperatures with minimum 20 foot spacing between piles. The green material will be applied to the unlined face for cover and compacted to a minimum thickness of 6 inches and an average thickness of less than 12 inches. Green material will only be applied in areas that will subsequently be covered with trash or soil and will not be used as daily cover over disposed green material that is greater than incidental in the lift. In no case will the green material be exposed for more than 21 days. Should odor, litter or other nuisance problems associated with the greenwaste ADC become evident anytime during storage or use, the material will be covered immediately upon identification with soil or other LEA approved cover. Vendors providing this material to L and D will be required to call daily before delivery so that L and D can control the amount received. The in-place density of this material is estimated to be 1,500 lbs/cy with a range of use between zero and 300 tons per day as ADC.

Unprocessed Green Material – L and D will procure unprocessed greenwaste, which may include CCGW, as described in V.D.4., for processing on-site for use as ADC (as described in Recycling and Volume Reduction, section V.E.10), as well as to be marketed for possible off-site uses at other appropriately permitted facilities. Once processed, it will be stockpiled and applied as ADC as discussed in the preceding paragraph, Processed Green Material, or sold and transported off-site. The in-place density of this material is estimated to be 1,500 lbs/cy with a range of use between zero and 400 tons per day as ADC.

Geosynthetic Fabric - L and D will use panels of high density polythylene (HDPE) geo-membrane with a minimum thickness of 60 mils. The HDPE panels will be configured on each end so that they can be moved in the field with a bulldozer or landfill compactor. The panels will be moved to cover the waste at the end of the day and removed the following day to expose the active lift. Multiple panels may be used to facilitate full coverage of the waste. Tires or some other inert objects will be used to weight down the edges of the panels to prevent movement. Panels will not be left in place for more than 24 hours and will not be used if high wind conditions are present or forecast.

Water Treatment Plant Residuals – L and D will use water treatment plant (WTP) residuals (contaminated sediment), pursuant to CCR §20690(b)(7), either alone or

blended with soil, to form a compacted material which can be placed as cover without forming open voids or causing material to be tracked off the working face area. The material shall be restricted to a minimum compacted thickness of six inches and an average compacted thickness of less than or equal to twelve inches. Prior to delivery, WTP residual material must pass L and D's Hazardous and Designated Waste Prescreening protocol (Protocol), as described in section VI.M. to prevent acceptance of any hazardous or designated waste. Pursuant to the Protocol, testing based upon composite sampling (per best management practices) will be required for each batch of WTP residuals generated. WTP residuals are not intended for use as alternative intermediate cover. The in-place density of this material is estimated to be 2,000 lbs/cy with a range of use between zero and 30 tons per day as ADC.

Other types of ADC that have been approved for use, but are not currently being utilized, are compost materials and sediment and dredge spoils. Prior to using any of these materials for ADC, the EMD will be notified, and an RFI Amendment outlining the intended use will be submitted in accordance with the current regulations.

6. INTERMEDIATE COVER PLACEMENT

Areas which are not scheduled to receive waste for more than 180 days are covered with a nominal 1-foot of cover soil using a scraper for material transport, a bulldozer for placement, and a compactor for compaction.

7. FINAL COVER PLACEMENT

The final cover systems for LF-1 and LF-2 are similar but differ with the addition of a geosynthetic clay (GCL) in the LF-2 cover system. A number of considerations have been included in the final cover system including the geometry of the existing landfill, proposed fill sequencing and tie-ins to existing grades, climatic conditions, potential settlement, available cover materials, erosion protection, vegetative growth, and end use at closure. It is proposed that an alternate final cover that surpasses the minimum state and federal requirements (prescriptive standard) will be the most appropriate design for LF-1 and LF-2.

Different cover systems are proposed for LF-1 and LF-2.
The final cover system profile for LF-1 (Figure 17, LF-1 Final Cover Sections) will consist of, from top to bottom:

- A minimum12-inch thick soil vegetative layer;
- Geocomposite drainage layer (only on slopes of 4:1 and steeper);
- A 40-mil Linear Low Density Polyethylene (LLDPE) barrier;
- A 12-inch thick foundation layer.

The final cover system profile for LF-2 (Figure 18, LF-2 Final Cover Sections) will consist of, from top to bottom:

- A minimum 12-inch thick soil vegetative layer;

- Geocomposite drainage layer (only on slopes of 4:1 and steeper);
- A 40-mil Linear Low Density Polyethylene (LLDPE) barrier;
- A geosynthetic clay (GCL) barrier;
- A 12-inch thick foundation layer.

The proposed final cover systems of LF-1 and LF-2 are modeled after the approved final cover system of the Yolo Central Landfill, located in Central Valley region of RWQCB. The proposed cover system provides equivalent protection for infiltration and LFG emissions compared to the regulatory prescribed cover system.
Detailed information regarding final cover and closure can be found in Attachment 18 of the JTD, Preliminary/Partial Final Closure and Post Closure Maintenance Plan.

8. COVER AVAILABILITY

Daily cover material typically comes from the inbound waste stream. The quantity of fill produced by mining the expansion area may not be sufficient to provide for all expected final cover needs. Soils continue to be recycled from the inbound waste stream to provide interim and intermediate cover material and to insure that sufficient soil will be available for closure activities A complete discussion of sources and availability of cover material is included in Section III.B.1.

E. RECYCLING AND VOLUME REDUCTION

With increased regulatory pressure to promote recycling, the transfer/processing and recycling operations have become an important component of site design and operation. The facility is permitted as a large volume transfer/processing facility (as well as a disposal facility) under the terms of the current SWFP. Most of the activities described in this section fall under the transfer/processing regulations. In the aggregate, 63 acres of space, collocated over waste, are available for transfer/processing, recycling, and storage of materials. The different storage areas move around to accommodate landfill operations. The acreage has a design capacity to store 300,000 cubic yards of material. The breakdown of the site capacity by type of material is provided below with the description of each process.

1. HAND RECYCLABLES

At present, cardboard, metal (tin, iron, and aluminum), wood, tires, inerts, white goods (appliances), electronic waste, sheetrock and greenwaste are being salvaged by hand for recycling. Trucks containing partial loads of these materials are discharged at the active face of the commercial and small load lifts. Labor crews then pick through the loads by hand, recover whatever can be salvaged, and stockpile the material to the side of the lift. There are two acres available for storage, which can accommodate 2,500 cubic yards. Salvaged material is then loaded into bins of similar material type and hauled off site to various recycling facilities. The residual is left on the lift and compacted in place. Trucks containing uncontaminated loads of salvageable materials are directed to the C&D Recycling Facility (See 7 below).

Cardboard, metal, and wood are recycled into bins that are continually moved

around the site depending on the location of the lift. These materials are deposited into bins within 48 hours of being extracted from the waste stream and are hauled offsite as the bins reach capacity. The onsite storage time varies but is generally between 5 and 30 days. Whole tires are collected and placed in bins, one located adjacent to the lift and one located at the C&D recycling pad. When these bins fill, the tires are weighed and deposited in a larger bin located adjacent to the small load gatehouse. This bin is removed offsite when it reaches capacity. If the vendor does not remove the bin in a timely fashion, tires are stockpiled next to it. All tires are covered during wet weather to prevent accumulation of water in the tires. The onsite storage time varies but is generally between 30 and 90 days. Inerts (concrete/asphalt) are stockpiled in the northwest corner of the LF-1 West Pit, where they are periodically crushed and processed into Class 2 aggregate base and sold. The processed material leaves the site within 13 months of receipt as an inert waste. White goods (appliances) are collected and stockpiled for hazardous material removal in an area north of the small load gatehouse and at the C&D recycling pad. Stockpiles of various appliances, e-waste, u-waste, and plastics can consume as much as 3 acres and amount to 2,500 cubic yards of storage. After the hazardous waste removal, which occurs weekly, the goods are crushed and loaded into scrap metal bins, then hauled offsite as the bins reach capacity. The onsite storage time varies but is generally between 5 and 30 days. Electronic waste is collected and stored in onsite bins, one in the West Pit of LF-1, and one near the C&D recycling pad. When either bin reaches capacity, it is hauled offsite to a certified recycler. The onsite storage time varies but is generally between 30 and 90 days. Sheetrock is stockpiled in the southwest corner of LF-2 on an all-weather pad and is periodically processed by a third party into gypsum and hauled offsite. The onsite storage time varies but is generally between 180 and 360 days (See 8 below). Greenwaste transfer occurs at the C&D Processing/Transfer area, shown in Figure 27. The greenwaste is stockpiled and removed from the site within 72 hours of arrival.

2. CONCRETE/ASPHALT RECYCLABLES

Concrete and asphalt loads arriving at the landfill are assessed by a laborer for the degree of included contaminants in the load. He either allows the load to dump in a stockpile area near the terminus of the paved road, directs the load to a working pad construction area, or, if there's too much foreign material, sends the load to the lift for burial. The stockpiled concrete and asphalt are periodically ground and screened into a 3/4-inch aggregate base product for sale to outside buyers. The base is stockpiled on site until sold. Loads dumped in the working pad area are reduced in size by a bulldozer and then compacted in place to form a disposal site base for the commercial and small load trucks to use during the winter. The stockpiles of clean, unground material and ground material may consume up to 15 acres and reach 75,000 cubic yards.

3. CONCRETE ROOFING TILE RECYCLABLES

North of the scalehouse there is a separate stockpile of concrete roofing tiles. Loads containing this material are directed to the stockpile and dumped. They are picked over by hand to remove paper, wood, and metal, then they are reduced in size by track walking a bulldozer over the pile. Most of the finished product is used on-site for road maintenance. Occasionally some is sold for off-site use. The stockpiles may contain 5,000 cubic yards and use one acre of space.

4. NON-RECYCLABLE ITEMS

Non-recyclable items are buried in the working lift.

5. VOLUME REDUCTION AND ENERGY RECOVERY

The intermittent concrete grinding operation is the only volume reduction activity at the landfill. Grinding is conducted by an outside contractor, away from landfill operations in a manner that prevents health, safety, or environmental problems. No activities such as bailing, shredding, or burning, or energy recovery programs are contemplated at this time.

6. GREENWASTE TRANSFER STATION

In March of 2005, an asphalt pad was constructed on site to facilitate the transfer of greenwaste to and from L and D Landfill. The operation consists of bringing in unprocessed greenwaste, dumping this material on the pad, then reloading it into trucks and hauling it to an offsite recycling facility. Greenwaste separated as part of the lift or C&D recycling is also dumped here. The pad area was expanded in August 2008 to include C&D recycling. The greenwaste transfer area is now a part of the C&D Recycling facility as shown in Figure 27. For all transfer and recycling operations the greenwaste is weighed in and out over the facility's scales and remains on site less than 72 hours. The greenwaste stockpile may reach 1,000 cubic yards and consume one-half acre of space.

7. C&D PROCESSING/TRANSFER

In August 2008, an asphalt pad was constructed on site to facilitate an automated C&D recycling operation. This operation augments the hand recycling that is done at the lift. A new pad was built directly east of an existing greenwaste pad, which combined to create the C&D recycling operation. This pad was relocated to the West Pit WMU in May of 2017 to make way for phased closure of the North pit WMU. The site location is shown in Figure 27, Material Recovery Facility (MRF) Area.

The automated C&D recycling operation consists of bringing in identified recyclable loads; dumping this material on the pad; presorting some recyclable material into bins; consolidating and pushing the remaining material into position with a loader; continued sorting into bins and loading the remaining material onto an inclined screen with an excavator. The screen separates unders from the material and conveys the remaining material to a picking station, where laborers sort the recyclable material from the waste stream. Specific materials separated are metal, cardboard, sheetrock, inerts, some plastics, and non-treated wood. The additional equipment and personnel to operate the automated recycling operation have been included in Sections V.B.1. and V.C.1. The layout of the operation, both current and proposed, is shown in Figures 28 through 30. Material placed on the recycling pad is subject to removal within 48 hours. An alternative frequency of 96 hours was granted by the LEA on July 15, 2011, and extended to 120 hours on May 22, 2013. Ten acres are available for processing and storage, which can accommodate 10,000 cubic yards.

Recyclables are separated into bins underneath the picking station. Recycled materials are removed from the site as the bins fill. The remaining non-recyclable material is conveyed to a bin at the end of the picking station and removed to be buried at the active lift when the bin fills. Fines which are separated by the screen are conveyed to a

bin and removed as the bin fills. This material is used as alternative daily cover.

During the summer of 2015, an all-weather transfer pad and loading dock was constructed in the West Pit WMU, as a part of the C&D Processing/Transfer facility. The pad went into service in September, 2015. Inbound source separated commercial and residential recycled materials are tipped at this location and reloaded for transport to the California Waste Recovery MRF in Galt. Material placed in this area is subject to removal within 48 hours.

8. SHEETROCK PROCESSING

Inbound source separated sheetrock and sheetrock sorted from the C&D Recycling Facility are dumped on an all-weather pad in the Southwest corner of LF-2. The material is hand-picked to remove contaminates and then bulldozed into a stockpile of pre-processed sheetrock. Approximately once per year a third party processor screens the pre-processed material on site to separate the gypsum from the paper. The gypsum is hauled offsite and used in direct application for agriculture as a soil amendment. The paper is hauled offsite for use as paper for pulp or is reprocessed onsite and added to the pre-processed sheetrock pile. The all-weather pad and storage area totals 10 acres and can store as much as 50,000 cubic yards of gypsum, pre-processed sheetrock and sheetrock paper.

9. RECYCLABLE INERT MATERIALS

Concrete, asphalt, and dirt that are deemed to be recyclable are stockpiled for either further processing into clean material or for use as-is for beneficial purposes, such as road base or alternative daily cover. The multiple stockpiles of these materials, both prior to and after processing, may use up to 20 acres and the stockpile capacity could be as much as 150,000 cubic yards.

10. GREENWASTE PROCESSING

Inbound source separated greenwaste, which may include CCGW, will be dumped and stockpiled adjacent to the active landfill lift. The material will be inspected for compliance with the SWFP upon delivery, as described in Material Handling Procedures, section V.D.4. Within 48 hours, the material will be processed for use as ADC, and applied as described in Periodic Cover, section V.D.5., or sold and transported off-site. Processing will be done with a trommel screen, a portable grinder, or some combination of the two, to achieve material that is suitable for use as ADC and meets the grain size specified in 27CCR §20690(b)(3). Contaminates will be removed by hand prior to processing.

Both inbound and processed material will be stockpiled by day of receipt, or by day of processing, to ensure compliance with LEA time requirements, and documented in a manner that allows the LEA to confirm this. Stockpiles will be visually monitored for indicators of elevated temperatures and stockpile temperatures will be checked daily to ensure that they do not reach the combustible level of 160°F. Should stockpile temperatures reach 160°F, the stockpile will be spread out or turned over to reduce the internal temperature to a safe level and continue to be monitored. Stockpiles will be placed to ensure that they don't interfere with landfill operations or traffic, and limited to pile sizes that allow for accurate monitoring of interior temperatures with minimum 20 foot spacing between piles.

Equipment will be supplied by a third party and may be operated by the third party, or by landfill personnel. Greenwaste processing equipment will not be operated within 250 feet of the landfill boundary; this restriction does not apply to the use of the processed material for ADC. In the event of equipment failure, or inability to process the material within 48 hours for any other reason, including peak loading, the material will either be reloaded and transported to an appropriate, permitted facility, or landfilled on-site within a maximum of 72 hours of original receipt. Any rejected material which is removed from the site will go only to permitted off-site disposal destinations which are pre-agreed to with the customer, as discussed in section V.D.4. Haulers will be encouraged to use best management practices during transport of material to minimize nuisances. Any other greenwaste which is found to cause odors or other nuisance conditions, processed or unprocessed will be landfilled immediately upon detection and covered with soil or other LEA approved cover.

F. HEALTH AND SAFETY

1. SANITARY FACILITIES

Portable chemical toilets are located throughout the landfill and serviced regularly.

2. POTABLE WATER SUPPLY

Potable water is available in the vicinity of the main gate on Fruitridge Road through a connection to the City of Sacramento public water system. Filtered water for drinking is available in the landfill office building.

3. COMMUNICATIONS

The site superintendent, mechanical superintendent, and weighmaster have telephone communication with each other. The weighmaster, gatekeeper, and spotters are all in radio or cell phone contact with each other. This arrangement permits the rapid communication of emergency and operations information between landfill personnel.

4. LIGHTING

Security lighting in the area of the entry gate illuminates the area near the entry gate and office during hours of darkness. Portable light standards illuminate the working face and the C&D recycling pad as necessary early in the morning and at twilight when the days are short.

5. SAFETY EQUIPMENT

Operating and maintenance personnel are required to wear Personal Protective Equipment (PPE) pertinent to their job at all times. This may include ear plugs, safety glasses, gloves, safety vests, and hard hats. Training of the operation staff is conducted by supervisory personnel every 30 working days and covers health and safety instruction, environmental controls, emergency procedures, site operation and maintenance procedures, company policy, operating practices and procedures. The Landfill Superintendent is briefed at least weekly on pertinent safety issues and information.

VI. DISPOSAL SITE CONTROLS

A. LEACHATE MANAGEMENT PLAN

1. LEACHATE CONTROL AND MONITORING

a. Monitoring System

In the north pit waste management unit, a leachate monitoring and collection system is installed on top of the composite liner. The system utilizes a 6-inch thick layer of drainage material placed directly on top of the HDPE FML. The system is designed to conduct leachate to the collection laterals and maintain the hydraulic head on the liner at a depth of less than 6 inches. Perforated leachate collection laterals within the drainage layer conduct leachate to a central header that leads to a sump located at the west edge of the WMU. Leachate collection pipes and sump are constructed of SDR 11 HDPE pipe.

An access port to monitor the presence and depth of leachate on the liner exists at the leachate collection sump. Because the collection sump is the lowest part of the leachate monitoring and collection system anywhere in the WMU, the depth of leachate recorded at the sump represents the maximum depth of leachate anywhere in the WMU. In addition, all leachate collection pipes extend to the ground surface adjacent to the WMU, making it possible to inspect all pipes.

The leachate monitoring and collection system is described in detail in Section VI.A.1.c, Leachate Collection and Removal System.

b. Monitoring and Reporting

(1) Frequency of Monitoring

Leachate monitoring occurs quarterly. The volume of leachate pumped from the sump is recorded every time that pumping occurs.

The depth of leachate over the liner is monitored at the location of the leachate sump by lowering an electronic water level into a 2-inch diameter depth monitoring access pipe installed from the ground surface to the sump. Leachate depth is measured and recorded at least quarterly, more often in the rainy season.

(2) Sampling Procedures

After pumping a minimum of 100 gallons of leachate from the sump with the dedicated leachate pump, samples of leachate are collected from a split line off of the pump discharge. Water samples for determination of metals other than Ca, Mg, Na, and K are placed in a container containing an acidic preservative.

Every sample container is labeled with a unique number. The labels are preprinted and detached from counterfoils on which the sampler, sample location, sample time, field conditions, sample disposition, other relevant information, and chain of custody are recorded. The counterfoils make carbonless copies.

All samples are placed in an iced container as soon as they are labeled and delivered under chain of custody to a qualified laboratory within 24 hours.

The quarterly leachate samples are analyzed for the parameters specified in R5-2012-0107. When it is anticipated that leachate will be discharged to the sanitary sewer, additional samples are collected for determination of the following parameters:

- BOD
- TSS
- Cadmium
- Chromium
- Copper
- Lead
- Nickel
- Silver
- Zinc
- Arsenic
- Mercury
- Molybdenum
- Cyanide

(3) Reporting

All results of leachate analysis are reported in writing to the EMD, the CIWMB, and the CVRWQCB on a semi-annual basis.

c. Leachate Collection and Removal System

A dendritic leachate collection and removal system (LCRS) is installed on top of the liner in the north pit waste management unit. A 6-inch thick layer of drainage material was placed directly on top of the plastic liner. Perforated leachate collection laterals feeding a central header pipe are located within the drainage layer. The drainage layer is covered with a geotextile filter to prevent the migration of fines from the waste into the drainage layer.

The LCRS design concept is shown in Figure 9, Layout of LCRS in North Pit WMU. As-built drawings for modules 1 through 7 are included in the JTD. The base of the WMU is complex. First it is bi-planar, divided into a northeast-to-southwest sloping plane (north of the main collection pipe) and a southeast-to-northwest sloping plane (south of the main collection pipe). The six-inch main collection pipe slopes from east to west at a grade of 0.005 where the planes meet. Each of these planes is punctuated by a series of low north-south ridges 100 feet apart. The north-south ridges slope from the edges of the WMU toward the main collection pipe at a grade of 0.005. The 4-inch laterals run in between the ridges, from the edges of the WMU toward the main collection pipe, at a grade of 0.005. A particle of water moving through the gravel blanket toward the closest lateral follows a path with an average grade of 0.00707. The main collection pipe (east-west) is 6-inch diameter SDR 11 HDPE, and the lateral pipes (north-south) that flow into the main collection pipe are 4-inch diameter SDR 11 HDPE. The sump that receives the main collection pipe is located at the west end of the WMU.

The collection pipe spacing of 100 feet was analyzed with methodology presented in EPA/600/2-87/097 using a design flux of .00767 ft/day, an in-place permeability of 0.1 cm/sec, a surface slope of .00707, and a maximum head on the liner of 0.5 foot. The maximum area drained by a 700-foot collection pipe is approximately 70,000 square feet. At the design leachate flux rate of .00767 ft/day, the maximum flow in 700-foot (north to south) lateral collection pipes is 2.8 gal/min. In the 350-foot pipes flowing from south to north the maximum expected flow is 1.4 gal/min. The flow

capacity, calculated with Manning's equation, of each 4-inch collection pipe is 41 gal/min when installed on a .5% slope. The maximum flow at any point in the main collection header pipe, assuming each pair of laterals contributes 4.2 gal/min, is 109.2 gal/min. The flow capacity, calculated with Manning's equation, of a 6-inch pipe is 115 gal/min when installed on a .5% slope.

All LCRS pipes are perforated with two rows of 5/16-inch diameter holes spaced 6 inches apart at an angle of 120°. The pipes are laid on the liner prior to the placement of the washed gravel and covered with a windrow of drainage material which will assure a depth of cover of at least 1 foot over the top of the pipes, prior to the operation of heavy equipment over the top of the pipes. The lateral collection pipes have 4-inch diameter upsweeps at the north ends, to provide for testing of the leachate collection pipes by rodding.

The calculations for assessing the capacity of SDR 11 pipe to withstand the pressures of service at the base of the waste pile are included in Appendix D, Pipe Strength Calculations. Pipe strength calculations are based on the assumptions of a 110-foot thick overburden exerting a total prism load of 50 pounds per square inch, and a soil modulus (E) of 3,000 psi in the backfill supporting the pipe. The safety factors against wall crushing and wall buckling are 3.2 and 5.8 respectively. The ultimate ring deflection is calculated to be 53% of the total ring deflection allowed by the pipe manufacturer.

The fill material for the LCRS drainage layer is low carbonate, washed 1/2 x 3/8 inch pea gravel. The percent by weight passing a #200 sieve is less than or equal to 3%, and the minimum lab permeability is 1.0 cm/sec. The minimum permeability in the field after installation is expected to be 0.1 cm/sec. The drainage layer is covered with a lightweight needled non-woven geotextile with a minimum permeability of 0.1 cm/sec.

The main leachate collection header terminates at a leachate collection sump located at the west side of the WMU (Figure 10, LCRS Sump Construction Details). The leachate sump is a gravel filled depression, 2 feet deep, 12 feet wide, and 50 feet long. It contains a nominal 24-inch diameter SDR 11 HDPE perforated pipe 40 feet long to increase its storage capacity. Assuming porosity of 30% for the gravel fill and allowing for the open space within the 24-inch pipe, the storage capacity of the sump is 3,300 gallons. Leachate is removed from the sump through a leachate withdrawal riser pipe. The leachate withdrawal riser is a 75-foot length of nominal 24-inch diameter SDR 11 HDPE Pipe. The riser originates in the leachate collection sump at its north end and is nested in a V-shaped notch cut into the sidewall of the WMU. The sidewall and riser have a slope of 0.5H: 1V. The riser comes to ground surface immediately east of the perimeter drainage ditch. The leachate withdrawal pump has wheels that roll on the inside surface of the riser enabling it to be lowered into the sump and withdrawn for periodic service. Access to the sump for water surface elevation measurement is through a nominal 2-inch diameter SDR 11 HDPE pipe installed inside the leachate withdrawal riser.

Assumptions, methods, and calculations employed in the selection of the design leachate production rate are included in Section III.B.4, Leachate Generation.

d. Treatment and Disposal

(1) Treatment

Options for treatment and disposal are discussed under Disposal.

(2) Disposal

Leachate pumped from the LCRS sump is returned to the surface of the landfill for dust control in the months of May through October. If the water level in the sump indicates that leachate must be removed sometime during November through April, it is pumped to a storage tank. Annual testing results are provided to the Sacramento County Regional Sanitation District (see Section VI.A.1.b.(2)), which issues a temporary discharge permit each year (see Attachment 23). From the storage tanks, it is transferred to trucks and disposed of at an approved access point or at the Regional plant.

2. VADOSE ZONE MONITORING

a. Monitoring System

A leak detection/vadose zone-monitoring device is installed beneath the composite liner of the LCRS as indicated on Figure 10, LCRS Sump Construction Details. The device is a long pan fashioned from a 20-foot wide strip of 60 mil HDPE placed beneath the composite liner and aligned with the main collection pipe of the LCRS throughout its length. At the west end of the WMU, the HDPE membrane drops below the LCRS sump and is covered with 12 inches of washed pea gravel. A length of 3-inch SDR11 HDPE perforated pipe is installed in the pea gravel beneath the sump and is connected to a 2-inch ID riser to the surface.

b. Sampling Procedures

The leak detection monitor is checked quarterly for the presence of liquid. None has ever been detected. Should it be in the future, a sample of the liquid will be collected by introducing, through the 2-inch riser, a length of 20 mm polyethylene tubing fitted with a one-way valve at the distal end. Suction applied at the surface will fill about 7 meters of the tubing with liquid, or about 2 liters of sample. Sample handling protocols for these samples are described in Section VI.A.1.b.(2) of this RDSI, except that filtration of samples for dissolved metals analysis will be filtered at the laboratory, not in the field.

c. Reporting

Results of vadose fluid analysis will be reported to EMD and CVRWQCB in writing within 90 days of sampling.

3. GROUND WATER MONITORING

a. Monitoring Points

There are six categories of groundwater monitoring points at L and D. Borehole logs and well construction details of all the individual monitoring wells are provided in Figure 32, Water Monitoring Well Boring Logs.

1. North Area WMU Background Monitoring Wells

The wells in this category are numbers 12,13, and 29. Monitoring wells 12 and 13 both have long histories as background monitoring wells for the landfill as a whole. They each have 10 foot screened intervals within the apparently most permeable part of the first water bearing zone. In each well the top of the screened interval is about 15 feet below the static level of water in the well. Well 13 is no longer suitable as a concurrent

background water quality monitoring well because of hydrologic changes brought about by the infiltration pond. The historic water quality record from well 13 remains an important component of the data that show the value of certain parameters in groundwater that has not been affected by waste constituents or leachate. Monitoring well 29 (next to historic monitoring well 3) has a 10-foot screen in the apparently most permeable interval within the first water bearing zone.

2. North Area WMU Detection Monitoring Wells/East Pit WMU Background Monitoring Wells

Monitoring well 31R serves as a detection monitoring well for the North Area WMU. Monitoring well 30R serves as a corrective action well. These wells originally served as the East Pit WMU background monitoring wells. These 2 wells have 20-foot screens in the apparently most permeable interval within the first water bearing zone. The vertical surface aligned with these 2 wells and passing through the first water bearing zone is the compliance point for the North Area WMU.

3. East Pit WMU/West Pit WMU CAP Water Quality Monitoring Wells

Wells 18, 19, 20, 21, 22, 23, 24, and 33 make up this category. They are the corrective action extraction wells. The compliance point for these 2 WMU's is the vertical surface aligned with the wells and passing through the first water bearing zone. These wells show the quality of groundwater that would pass the compliance point if the wells were not actively extracting water. The wells in this category fully penetrate the first water bearing zone. Typically, the top of the screened interval is above the water table and the bottom of the screened interval is at the boundary with an underlying low permeability layer. This feature of the design assures that water samples recovered from the wells represent the condition of water in the most permeable interval within the first water bearing zone. Therefore, they provide the best assurance of the earliest possible detection of a change in the nature of the release from these units.

Four older wells (2A, 4, 7, and 10) intersect the same vertical plane as wells 18 through 24 and each one of them is within 30 feet of one of these extraction wells. These are still used to monitor water levels, but they are no longer suitable as water quality monitoring wells. Wells 7 and 10 are completed in the lower 10 feet of the first water bearing zone and thus they have no potential to provide information not already available from the adjacent extraction wells 20 and 24. Wells 2A and 4 are completed in the upper part of the first water bearing zone, as are the adjacent extraction wells 22 and 23. Since the extraction wells fully penetrate the first water bearing zone, they provide the shortest hydraulic path to the source of the contamination while still capturing any materials peculiar to the water table.

4. East Pit WMU/West Pit WMU CAP Off-Site Water Quality Monitoring Wells

Wells 5, 15S, 16S, 32S, 34, 35, and 36 are wells in this category. They all have 10-foot screened intervals in the apparently most permeable interval within the first water bearing zone. Groundwater in the vicinity of well 5 appears to be affected by a release in the West Pit WMU in that its sulfate concentration is elevated, and its nitrate concentration is depressed relative to the presumptive background concentrations for these parameters. Groundwater in the vicinity of well 16S appears to be affected by a release in the East Pit WMU in that it contains VOC combinations similar to those seen

in water extracted from the East Pit WMU. Groundwater in the vicinity of well 15S is unaffected by the landfill. Groundwater in the vicinity of well 32S is likely to be affected by the release in the East Pit WMU. Wells 34, 35, and 36 serve to demonstrate the limits of the hydraulic barrier imposed by the CAP.

5. Second Aquifer Detection Monitoring Wells

The wells in this category are numbers 8, 9,11, and 17. The historic records for wells 8, 9, 14, and 17 establish the background conditions for the monitored medium. Well 11 data shows evidence of a release from the West Pit WMU into the second aquifer. The particular indicators of release are presence of 1,1-dichloroethane, elevated concentrations of TDS, chloride, and sulfate and depressed concentrations of nitrate.

6. CAP Hydraulic Gradient Monitoring Wells

The current CAP implements a hydraulic barrier at the compliance point. Evidence to indicate the barrier is in place and functioning as intended is necessarily hydraulic. Synoptic water level elevations are measured in all wells at the site (numbers 2A, 3, 4, 5, 7 through 26, 28, 29, 30R, 31R, 32, 33, 34, 35, and 36, plus any wells added in the future) and are processed to provide a groundwater contour map. Well 28 may be lost due to construction within the next 5 years. This loss will not weaken the resolution of hydraulic conditions at the hydraulic barrier. Water well boring logs are shown in Figure 32.

b. Sampling and Analytical Procedures

Procedure for sample collection.

Depth to water. Measure the depth to water first. The reference point from which the depth to water is measured is the north side of the monitoring well casing (not the outer protective sleeve). Record all measurements to the nearest 0.01-foot.

Purge Volume. The general rule is to remove three times the resting well volume prior to sampling. Upon completion of sampling the same volume is removed again to assure that subsequent samples will be independent of the samples just taken.

Purge Device. Purge the well with a submersible electric pump placed in the well so that the pump intake is 2 feet below the static water level.

Sampling Devices. Water for determination of TDS, major constituents, and COD may be collected from the pump discharge line provided the line is flushed with distilled water between wells and an equipment blank is prepared at the beginning and end of each day's sampling.

Water for the EPA 8260 procedure is collected in a new disposable bailer fitted to the intake of the submersible pump so that all water pumped from the well first passes through the bailer. As the pump is withdrawn so is the full bailer and the sample is removed from the bailer using the fine-bore emptying device designed for VOC samples.

Water for determination of metals other than Ca, Mg, Na, and K is collected from the disposable bailer. The unfiltered sample is placed in a container containing an acidic preservative. Water for determination of dissolved metals is filtered under pressure directly from the disposable bailer by attaching a pressure bulb to the top and a 0.45-micron membrane filter to the outlet.

Field Parameters. All purged water is introduced to a flow-through cell in which temperature, pH, and specific conductance are measured. Measurements of the field parameters are recorded at least once for each casing-volume purged.

Sample documentation. Every sample container is labeled with a unique number. The labels are preprinted and detached from counterfoils on which the sampler, sample location, sample time, field conditions, sample disposition, other relevant information, and chain of custody are recorded. The counterfoils make carbonless copies.

Sample preservation and handling. Place all samples in an iced container as soon as they are labeled. Deliver samples and chain of custody documents to a qualified laboratory within 24 hours.

Trip blanks and equipment blanks. The laboratory will prepare appropriate trip blanks to accompany the samples. Prepare an equipment blank for each case of 24 disposable bailers using commercial bottled drinking water. Prepare an equipment blank for the submersible pump after pumping 10 gallons of distilled water through it at reduced speed (<1 gpm).

Parameters, methods, and monitoring frequency.

Detection Monitoring Program. In accordance with R5-2012-0107, all background-monitoring wells are sampled semi-annually, and all detection-monitoring wells are sampled quarterly. The samples are analyzed for the "monitoring parameters" described below.

Corrective Action Plan Monitoring. All wells in the first water bearing zone, which is undergoing corrective action, are sampled quarterly. The samples are analyzed for the "monitoring parameters" described below. Additionally, the volume of water delivered to the air stripper is recorded monthly and samples of water going into and coming out of the air stripper are analyzed monthly according to USEPA Method 601.

Constituents of Concern 5-Year Monitoring. Once every 5 years, beginning in 2001, all background wells and monitoring wells will be sampled for this program. The samples will be analyzed for the "constituents of concern" below.

Monitoring Parameters. Monitoring parameters are listed in R5-2012-0107, and Appendix F. Monitoring parameters according to R5-2012-0107 are: pH, total dissolved solids, specific conductivity, chloride, sulfate, nitrate-nitrogen, and volatile organic compounds measured by USEPA Method 8260. These parameters are measured at least semi-annually in all monitoring wells.

Constituents of Concern. R5-2012-0107, and Appendix G, defines the constituents of concern (COC).

A revised Water Quality Protection Standard was prepared on February 27, 2012 and is included as attachment 43 of the JTD.

B. GAS CONTROL AND MONITORING

1. PERIMETER MONITORING SYSTEM

The landfill gas monitoring system consists of 20 vertical wells around the perimeter of the landfill. Wells A, B, C, D, and E are triple completion wells located offsite along the north perimeter in the vicinity of Warehouse Way. Wells T and U are triple completion wells located onsite along the same area. Well F is a triple completion well located on the western boundary of LF-1. Wells G, H, I, J and K are single

completion wells located along the southern perimeter in the vicinity of Fruitridge Road. Well N is a single completion well located along the eastern perimeter, along with Wells M-1 and O, which are triple completion wells. Wells P and Q are triple completion wells located along the Northern Perimeter. Wells S and T are triple completion wells located on the western perimeter of LF-2, in the vicinity of Warehouse Way. The location of the gas monitoring wells is shown in Figure 12, Landfill Gas Control System.

The landfill gas monitoring system is designed to detect the presence of methane around all areas of the landfill perimeter. Gas monitoring wells are located outside of the buried waste. The spacing between gas monitoring wells ranges from 230 to 900 feet in all areas where off-site structures are located within 1,000 feet of buried waste. All single completion gas-monitoring wells have perforated intervals within an extensive layer of cobbles that surrounds the site. This highly permeable cobble layer, which is found between the approximate depths of 25 and 50 feet below ground surface (bgs), is the preferential pathway for gas migration in the vicinity of the landfill. All triple completion gas-monitoring wells are installed pursuant to CCR, Title 27, Section 20925.

2. GAS CONTROL SYSTEM

Subsurface gas migration is controlled by an active system consisting of 67 vertical extraction wells and 4 LCRS laterals. The original perimeter extraction wells, EW-1 through EW-28 and EW-5A are single completion wells screened across the regional cobble layer. The wells were installed in the early 1990's. Typical construction is illustrated in Figure 22, Gas Extraction Well Logs Phase 1 and Phase 2. While still connected to the extraction system, these wells are used primarily to monitor gas at the perimeter, with little, if any, vacuum applied to them.

In 2005 and 2007, construction of Phase 1 and Phase 2 of the gas extraction system was done in accordance with Appendix I, the Conditional Approval of Revised Gas Extraction Plan from the California Regional Water Quality Control Board, dated September 20, 2004. Phase 1 (NW-1 through NW-13) includes 20 wells (9 double completion and 2 single completion) and 2 LFG monitoring wells. Phase 2 (NW-14 through NW-26) includes 18 LFG extraction wells (5 double completion and 8 single completion as well as the LCRS connections.) All vertical wells were drilled inside the landfill mass of LF-1, the unlined portion of the landfill. The double completion wells (two extraction wells in a single borehole) are screened with one well drawing gas from the main body of refuse, and a deeper well drawing gas from the vadose zone under the landfill in order to control any gas that has escaped the refuse prism.

A new collection piping system was installed, along with a new blower and a carbon filtration system. The location of all the components of the gas extraction system are illustrated in Figure 12, Landfill Gas Control System. Well logs are illustrated in Figure 22, Gas Extraction Well Logs Phase 1 and Phase 2. Design and construction completion documents for Phase 1 and Phase 2 are included in the Joint Technical Document.

In 2010 an enclosed flare replaced the carbon filtration system. The carbon system remains in place as a backup in the event that the flare is off line for any extended period. The enclosed flare features a variable drive blower and a gas analysis control panel that monitors gas flow and combustion through the flare.

The well field is currently tuned to maximize the collection of landfill gas both from within the refuse (source control) as well as from the vadose zone outside and

under the landfill (migration control). Gas collection is designed not only for methane collection, but also for control of volatile organic compounds (VOCs) within the landfill gas. Monitoring wells are tested for both methane and VOCs, and both parameters are used for making adjustments to the system to optimize collection of gas. This results in an average flow of approximately 350 scfm through the flare at the present time, although gas flow and methane content of the gas will vary with time. Each active well in the field is tuned periodically for optimum gas extraction.

The enclosed flare and blower skid, or the carbon filtration unit and its blower, are connected to the extraction wells through PVC ductwork. The main header in the vicinity of the blowers is 8 inch PVC reducing to 6 inch and 4 inch as it traverses the landfill site to connect to the extraction wells. The layout of the header system is illustrated in Figure 13, Gas Transfer Pipe System.

Condensate generated through the extraction system is collected in sumps spotted throughout the system. The collected condensate is piped and treated through an air stripper located in the southeast corner of the landfill. Locations of the condensate collection points and the layout of the piping are depicted in Figure 14, Condensate Transfer Pipe System. Further detail of the condensate system is provided in Section VI.B.4.

3. MONITORING

a. Method and Frequency

Frequency - Methane monitoring occurs on a quarterly schedule.

Method - Equipment used includes:

- Natural gas indicator, dual range (0 - 5% and 0 -100%), GasTech Model NP-204
- Methane calibration kit
- Aspirator bottle, 2-liter, with 1-hole stopper
- Flexible tubing and Thermometer

The sampling procedure is:

1. Calibrate the instrument, following the manufacturer's instructions. Prepare the instrument to make measurements using the hand aspirator bulb and probe supplied with it.

2. Record the date, time, location, and air temperature.

3. Undo the bolts on the manhole cover and move the lid only enough to insert the probe into the cavity beneath it. Aspirate by hand and record the methane concentration.

4. Unlock the steel cover and move it only enough to insert the probe into the well head. Aspirate by hand and record the methane concentration.

5. Place 2 liters of water into the aspirator bottle and close the top of the bottle

with the 1-hole stopper.

6. Attach the 1-hole stopper to the exit port of the instrument with a length of flexible tubing. Attach the flexible tubing on the gas, sampling device to the inlet port of the instrument.

7. Open the valve on the gas sampling device and then open the valve on the aspirator bottle to let the water escape. When all the water has drained from the aspirator bottle, record the instrument reading.

8. Repeat steps 5 - 7 for other sampling devices in this well, if this is a multiple completion well.

b. Perimeter Gas Monitoring

In 1991, five triple-completion methane monitoring wells were installed, with the direction and approval of EMD, north of the landfill perimeter in the vicinity of Warehouse Way (wells A through E, see Figure 12, Landfill Gas Control System). The wells were completed to the depth of the deepest buried waste and were located approximately 50 feet north of the buried waste. The operator of the landfill installed 1 monitoring well on each parcel where access was granted, a total of 5 wells. The inter-well spacing ranged from 230 to 800 feet.

In 1992, 6 single-completion methane monitoring wells were installed, with the direction and approval of EMD, along the south and east perimeter of the landfill (wells G through L, see Figure 12). These wells were completed to the depth of the deepest buried waste, located approximately 40 feet south of the buried waste, and were spaced at approximate 900-foot intervals. The system was designed to detect the presence of methane around all areas of the landfill perimeter where off-site structures were located within 1,000 feet of the buried waste.

Wells A through E and G through L intercepted a layer of cobbles approximately 25 feet thick, generally between the approximate depths of 25 and 50 feet bgs. The high permeability of the cobble layer makes it the preferential pathway for subsurface gas migration in this area. The fact that the cobble layer is so locally extensive means that it is unlikely that there are any narrow preferential migration pathways that would require a closer spacing of monitoring wells.

In 1995, Probe L was converted to a gas extraction well 28L and Probes M and N were added. In 2007 the original Probe M was damaged by equipment during construction of the LF-2 liner and replaced with Probe M-1, which is a triple completion probe.

In 2010, in response to updated Title 27 regulations, the perimeter monitoring system was completed with addition of Probes F, and O through U. The 8 probes were all constructed as triple completion probes. The location of the methane monitoring wells is shown in Figure 12, Landfill Gas Control System.

c. Monitoring Well Logs

Gas monitoring records for each gas monitoring well are kept on file at the offices of L and D, 5370 South Watt Avenue, Suite 100 Sacramento. Construction details and Borehole Lithology of the methane monitoring wells are included in Appendix E.

d. Methane Monitoring Results

Since installation in 1992, the gas control system has been highly effective in controlling subsurface gas migration and the methane gas concentration is currently at non-detect at all 20 monitoring wells. The Second Quarter 2018 Probe and Structure report is included as Appendix H, Probe and Structure.

4. GAS CONDENSATE COLLECTION SYSTEM

Wherever practical, gas transfer pipes are constructed so that the slope of the pipe is downhill in the direction of gas flow, to facilitate the movement of condensed water through the pipe system to the nearest collection point. The condensate transfer pipe system conducts condensate from sumps at low points in the gas transfer path to an air stripper located at the southeast corner of the landfill. The layout of the condensate transfer pipe system, showing the location of the condensate collection points, the piping configuration, and the direction of water flow, is illustrated in Figure 14. Six sumps are located at low points in the gas transfer path, where condensate accumulates. The sumps are located at centralized locations to accumulate the condensate collected and transfer that condensate under pressure into the air stripper feed header. Liquid is transferred from the sumps into 1-1/2 inch HDPE liquid lines by a submerged pump located inside each sump. The pump is powered by compressed air, supplied through a 1-inch HDPE line from an air compressor located in the carbon filtration shack. The pump is activated by the condensate level in the sump.

The collected condensate is treated by an air stripper located at the southeast corner of the landfill. The air stripper effluent is conveyed through the perimeter drainage system to the infiltration/evaporation pond at the northeast corner of the landfill.

5. REPORTING

Methane Probe monitoring is reported quarterly to the EMD by the 30th day of the first month in the following quarter. Extraction system monitoring is reported to the CVRWQCB semi-annually.

C. NUISANCE CONTROL

The landfill is patrolled frequently, maintained in a secure and clean fashion, and generally operated in such a way as to minimize impacts on neighboring parcels and land uses. Landfill personnel will document and investigate any nuisance complaint received and notify the LEA. Upon confirmation that the nuisance is in fact related to landfill operations, best management practices would be implemented to mitigate the nuisance. Mitigation would be documented and assessed by landfill personnel and the LEA to assure success of the action and to minimize the potential for recurrence.

D. FIRE CONTROL

Water for fire protection is available from the water pulls and water trucks that have a combined capacity of approximately 30,000 gallons. Also, 30 fire extinguishers ranging in size from 5 to 25 pounds are spotted around the landfill, the recycle pad and on the equipment. Employees are trained in their use. Should a fire start in the refuse, all employees are trained to remove the burning materials from the pile, place the

burning materials on bare soil, and either cover with soil or put out the fire with a fire extinguisher or water. Operators are trained to use bulldozers in controlling small to medium size fires on the lift. The Sacramento City Fire Department will be alerted for any fire that could affect surrounding property.

E. DUST CONTROL

Two waterpulls, three water trucks, and 2-10,000 gallon drop tanks are used for dust control. The vehicles spray the roads continuously. The active fill area is also sprayed when dusty loads are deposited. The recycle pad is sprayed as necessary to control dust. Feedstock material is dampened as necessary to help with dust control. Processing of both C&D and greenwaste may be suspended during windy conditions. Conveyors in both operations are fitted with boots and/or cowlings as necessary to minimize dust during conveyance to bins or stockpiles.

F. VECTOR AND BIRD CONTROL

Insects, rodents, and birds have not been a problem at the landfill because the waste (largely construction debris) is mostly inert. Putrescible garbage, which could attract insects, birds, and vermin is specifically excluded from the site.

G. DRAINAGE AND EROSION CONTROL

The perimeter drainage control system is described in Drainage Diagram for L and D Landfill, prepared by SCS Engineers (Appendix C, Revised Drainage Control System for L and D Landfill).

At the 2 locations where the perimeter drainage system enters the storage pond, erosion-protected drop structures have been constructed.

Pond Construction - The depth of the pond is a minimum of 27 feet, providing sufficient capacity to store the 8-day, 100-year precipitation event, in addition to double the average annual monthly precipitation. The existing ground surface elevation at the proposed location of the pond is approximately 26 feet MSL, and the pond bottom is at an elevation of approximately -2 feet MSL. The areal extent of the pond includes a bottom area of 1.9 acres, 2H:1V side slopes, and a surface area of 3.5 acres. This will be expanded to 4.93 acres in the future.

The pond bottom is maintained to ensure that deposition of fine-grained sediment does not render the pond ineffective. Maintenance of the pond bottom includes bi-annual removal of accumulated sediment and ripping of the pond bottom. The effectiveness of the percolation pond depends on the presence of an unsaturated zone beneath the pond. Four piezometers have been installed near the pond to monitor the local response of the water table to the percolation from the pond. A staff gage within the pond provides pond water levels for use in determining the infiltration characteristics of the pond bottom through water balance analysis.

H. LITTER CONTROL

Litter is controlled at the active lift by careful placement of waste, prompt covering with earth, and a full-time litter control squad. Litter is contained at the recycle pad by timely processing of dumped loads and use of the litter control squad as necessary. Paper is not accepted at the site when the wind exceeds 25 mph. Under extreme wind conditions the landfill is closed until the wind abates. Following a

windstorm the crew is dispatched to pick up the wind-blown litter. Litter screens are deployed around all operational areas to prevent migration of litter away from the site.

I. NOISE CONTROL

Noise is not a problem requiring control at this site. The landfill is located in an industrial area where heavy truck traffic is common. Landfill noise, such as it is, is abated by the tree-lined berm along Fruitridge Road.

As the site fills and operations occur at higher elevations, noise standards adopted by the County will be met through noise attenuation devices (mufflers), and operations modifications to disperse and stagger the use of noisier equipment. Greenwaste processing equipment is not deployed within 250 feet of the landfill boundary to maintain compliance with City of Sacramento noise standards. (This limitation does not apply to the use of the processed greenwaste as ADC.) The north pit WMU and recycle pad area are more remote from potential noise receptors than the older parts of the landfill so no new concerns are anticipated there. Noise has not been measured at the site, however, there have been no noise complaints from the industrial neighbors reported to either regulatory agencies or to the landfill since it started in 1976.

J. ODOR CONTROL

Daily cover controls odor. Waste is covered daily with a nominal 6 inches of soil, or ADC in the appropriate thickness depending on the ADC material. The waste accepted at this landfill is primarily dry, inert material, which does not generate odors, with the possible exception of greenwaste material. Landfill staff will be trained to monitor for and respond to greenwaste related odors. Inbound greenwaste for processing and pre-processed greenwaste, which may contain CCGW, will be inspected by landfill personnel upon delivery as described in Materials Handling Activities, section V.D.4. Odor control during processing is described in Greenwaste for Processing, section V.E.10. Should greenwaste ADC be shown to cause nuisance odors, it will be promptly covered as described in Periodic Cover, section V.D.5.

The landfill maintains a "Good Neighbor Policy" to assist neighbors in communicating directly with landfill staff regarding nuisance issues, including odors. This includes maintaining a sign at the front gate providing a 24-hour telephone number for individuals with concerns about the landfill. Complaints and complaint resolutions are reported to the LEA as part of the quarterly monitoring report. See the OIMP (Appendix L) for further odor control information.

K. TRAFFIC CONTROL

Site access. The details of the entrance to the landfill are shown in Figure 11, Details of Entrance to Site. The only access for trucks bringing in waste is through the gate on Fruitridge Road approximately 100 feet east of the Central California Traction Railroad tracks. Trucks reach this gate from either direction, but most come from the west. The roadway is 30 feet wide in front of the gate. Traffic rarely accumulates outside of the gate waiting to get in.

Entering commercial trucks pass along the main paved road through the center of the landfill to the inbound scale. From there they are directed either to the main commercial lift, the recycle pad, or to the concrete stockpile area. Small vehicle loads are not weighed but are directed by signs to a gatehouse where their loads are

inspected and tipping fees are collected. From there they are directed to the small-loads lift area.

Trucks enter and leave the landfill throughout the day, with generally fewer than three trucks stacked or waiting at the inbound or outbound scale, or at the small-loads gatehouse.

Commercial vehicles directed to the active face or recycle pad, exit that area after dumping their load via the same road they entered on. At the outbound scale they stop for a computer generated invoice. After payment, the trucks exit either east or west onto Fruitridge Road.

During summer, roads on site, except for a one-third mile paved section of the main road, are dirt. During winter, the access roads past the paved section are improved all the way to the active dumping area and recycle pad by lining with recovered asphalt, concrete, and rock and topping with recycled concrete tile. All roads are signed with speed limits and directional arrows distinguishing between commercial, recycle, and small-load traffic.

A 6-foot chain link fence with barbed wire at the top borders the site. The gate at Fruitridge Road is locked whenever the landfill is closed.

Traffic Volume - Estimated traffic volume and types of vehicles admitted are discussed in Section I.E., Types and Number of Vehicles Anticipated to Enter the Facility.

L. SITE SECURITY

A chain link fence topped with barbed wire surrounds the landfill facility boundary. A single rolling front gate gives access to the landfill proper. The gate is padlocked outside of working business hours.

M. HAZARDOUS AND DESIGNATED WASTE PRESCREENING PROTOCOL

The classification of a waste as "hazardous" is made purely on waste specific factors. The classification of a waste as "designated" must be based on both waste and site specific factors. L and D's prescreening protocol is designed to help characterize waste prior to acceptance. For L and D's purposes, the waste must be non-hazardous before it can be designated. Identification of waste as designated can be a complicated process. Hazardous waste prescreening is more straightforward.

Evaluation begins upon request from the customer. This would typically be a phone call asking "Can you accept this material?" All calls will be directed to the L and D administrative office. If the phone call comes to the landfill, the inquiring person will be given the office phone number and the appropriate contact. L and D administrative personnel will begin the process by filling out the "Waste Prescreening Form", shown as Figure 23. The form is designed to provide the following information:

- Waste Generator source and contact information
- Waste Generator consultant information, if any
- Description of waste, including generation process and physical characteristics
- Estimated waste volume and frequency of delivery
- Initial or updated screening

- Test data used to characterize the waste
- Conditions or limitations on approval, including frequency of screening and any sampling plans required
- Prescreening acceptance or rejection.

Waste acceptance or rejection is based on comparison of applicable test results to ground water quality standards pursuant to L and D's waste discharge requirements. The generator will provide data as part of their certification for the waste characterization. There are various testing methods used and to the extent possible L and D will try to work with whatever data the generator provides. If the provided data is insufficient, L and D will require further testing. If further data is not provided, the material will be rejected. Waste Characterization testing will be done pursuant to L and D's Waste Characterization flow chart depicted in Figure 25. Figure 26 (Waste Acceptance Criteria) depicts the sampling analysis and laboratory methods used to construct the flow chart and the various dry and soluble levels used for acceptance.

Based on the test methods and results described above, L and D will accept or reject the material and the applicable test results will be referenced as the basis for the decision. Finally, if the waste stream has potential for its characteristics to vary from load to load or with different disposal events, L and D will place a condition or limitation on the approval based on periodic test results or an EPA certified averaging method of analysis. Sampling frequencies are shown in Figure 26, Waste Acceptance Criteria.

Upon acceptance of the material, L and D administrative personnel will complete the prescreening process by filling out the "Waste Acceptance Form", shown as Figure 24, Waste Acceptance Form. This form is designed to provide the following information:

- Waste generator source and contact, information
- Waste hauler contact information
- Description of waste
- Waste physical characteristics
- Estimated waste volume and delivery frequency
- Conditions or limitations of acceptance
- Whether or not manifests are required

The finalized waste acceptance form will be distributed to landfill personnel as appropriate and kept on file for 3 years with landfill ticket records. A copy will also be maintained on the landfill site for inspection by the EMD.

N. HAZARDOUS WASTE SCREENING PROGRAM

Waste is inspected several times before disposal. First, it is checked at the scales or small-loads gatehouse for inappropriate materials or unusual loads (i.e., hazardous waste, drums, garbage or other non-permitted wastes). Particular attention is given to loads from new or occasional customers. Equipment operators and spotters at the commercial disposal face, the small-load disposal area, and the C&D Recycling pad, whichever is the case, again check the load for inappropriate materials. Checking

is done visually, by smell, and possibly by feel. Spotters are recurrently trained on Hazardous Waste recognition. At each disposal area the designated spotter makes 2 random load checks per day, filling out a load check form documenting the time, vehicle and contents of the load. These forms are kept onsite at the scalehouse. A load check form is produced for any rejected load listing the same information. Inappropriate waste is isolated for subsequent removal by the disposing party or company or stored in the appropriate containers onsite until removed to a Hazmat handling facility. If any non-incidental hazardous waste is spotted, it will be left in place and the area isolated from further fill operation. Upon evaluation by the company's Hazmat specialist, the disposal company, the Department of Toxic Substances Control (DTSC), the EMD and/or the Regional Water Quality Control Board may be called to assist in proper identification, containment, cleanup and/or removal.

VII. DISPOSAL SITE RECORDS AND REPORTING PROCEDURES

A. WEIGHT/VOLUME RECORDS

A computer record of all commercial vehicles entering the premises with waste is maintained. It tracks date, time, customer, vehicle number and license, weight and volume of load, contents, origin, transaction type, and destination within the landfill. A separate record of all vehicles removing material from the premises is also maintained. It shows the same statistics.

All small loads are assigned to one of four weight categories (passenger cars, pickups, passenger vans/SUV's, or rental vans and trailers). Average load weights for each category are computed from weights of samples of vehicles collected periodically. Data on small loads are recorded by hand in a receipt book and consist of category of vehicle, volume of load, vehicle license number, tipping fee, and method of payment. The daily total for each vehicle category is entered into the computer database as a single record. Thus, if 60 pickups enter in a particular day and the average weight of a pickup load is 400 pounds; a record will be created in the database showing one vehicle with a load of 24,000 pounds. There will be an analogous record for passenger cars, passenger vans/SUV's and rental vans and trailers.

During busy periods, the weighmaster and key site personnel closely monitor the waste inflow to the landfill. This information is reviewed hourly and, in combination with disposal time histories, a judgment is made as to when to cut off the small load traffic and/or the commercial traffic to avoid exceeding the Facility traffic or tonnage limitations.

Records of the weight of waste received are kept on file at the offices of L and D Landfill, 5370 South Watt Avenue, Suite 100, Sacramento, and at the scalehouse.

B. SUBSURFACE RECORDS

Records of subsurface excavations, and quarterly records of the elevation of the ground water table in the vicinity of the site, are maintained at the offices of L and D Landfill, 5370 South Watt Avenue, Suite 100, Sacramento.

C. SPECIAL OCCURRENCES

A log of special occurrences, including fires, earth slides, unusual and sudden settlement, injuries and damage resulting from accidents, explosions, discharges of unprompted waste, flooding, and other unusual events, are maintained by the Site Manager. This log is available for review at the landfill office, located at 8635 Fruitridge Road, Sacramento.

D. INSPECTION OF RECORDS

The above-cited records are available for inspection by authorized personnel, and upon receipt of 24 hours notice, at the locations cited, Monday through Friday between the hours of 8:30 AM and 4:30 PM.

E. APPROVED PROCESSING FACILITIES

L and D transports some recycled materials off site for further processing; primarily wood waste and green waste. The following facilities receive these and other materials:

Elder Creek Transfer Station
8642 Elder Creek Road
Sacramento, CA 95828
Permit # 34-AA-0033

K & M Recycling
Recycle America Alliance
3562 Ramona Avenue
Sacramento, CA 95826
Permit # 34-AA-0191

Sacramento Recycling and Transfer Station
8491 Fruitridge Road
Sacramento, CA 95826
Permit # 34-AA-0195

Sierra Waste Wood Grinding Company
8260 Berry Avenue
Sacramento, CA 95828
Permit # 34-AA-0214

California Waste Recovery Systems MRF
175 Enterprise Ct., Bldg. C
Galt, CA 95632
Permit #34-AA-0231

Fair Deal Waste Recycling
8191 Elder Creek Road
Sacramento, CA 95824
Permit #34-AA-0236

Appendix K contains documents showing that the above facilities are permitted to accept the materials being sent to them.

21600(B)(4)(A) GENERAL DESIGN PARAMETERS

Figure 4 is a site plan including all ancillary facilities. The first location at which incoming loads are stopped, the scale house, is more than 200 yards inside the facility and is surrounded by parking space. This arrangement assures that trucks wanting to enter the facility will not be held up at the gate and interfere with traffic on Fruitridge Road. The final topography of the facility is designed to have a gentle south-facing slope toward Fruitridge Road.

The site is designed to drain towards a stormwater retention pond at the northeast corner. The final sequence of landfilling will proceed from the northeast comer back toward the entrance gate in the southwest comer. Facilities that will be required in the post-closure maintenance period have been built on sections of the landfill that are already at or near their final elevations.

The vegetative cover planned for the facility at closure is adapted to the local climate.

21750 WASTE MANAGEMENT UNIT CHARACTERISTICS AND ATTRIBUTES

a) *IDENTIFY POTENTIAL IMPAIRMENT*

This facility does not have and is not near to any surface water body (including any 100-year flood zones). Impairment of, or damage by, surface water is not an issue.

Groundwater occurs as close as 10 feet to the GCL underlying the waste management unit. A leak of leachate through the GCL would reach groundwater. The beneficial uses of groundwater beneath the site include domestic, industrial, and municipal supply and agriculture. The aquifer unit immediately below the waste management unit that would receive a leachate leak, if one occurred, is 30 feet thick and is semi-isolated from aquifer units occurring below it. If leachate reached the uppermost aquifer unit, it would be diluted by groundwater moving horizontally through that unit.

The uppermost aquifer unit is too thin to support industrial or municipal withdrawals. Ultimately, groundwater in the uppermost aquifer unit descends to other aquifer units that are exploited.

The vertical movement of groundwater from the uppermost aquifer unit to deeper, exploited, aquifer units is accompanied by substantial attenuation of dissolved constituents. The evidence for this attenuation is found in the scheduled monitoring performed at the facility. Some of the monitoring wells are completed in the uppermost aquifer unit and some are completed in the second aquifer unit. The wells in the uppermost aquifer unit show the impacts of leachate passing from the old, unlined portion of the facility. Adjacent wells in the second aquifer unit are without these impacts and are considerably more dilute than the wells in the upper aquifer unit

b, c) SUPPORT PROPOSED CLASSIFICATION

These facts were presented in detail in Attachment 1 and made current with geologic cross-sections and chemical data, in Attachment 3*: Hydrologic Analysis and Proposed Modifications to Corrective Action Program,* Applied Science and Engineering, April 1, 1999; Attachment 4*: Responses to Regional Board Letter of 20 May 1999 Concerning Corrective Action Plan,* Applied Science and Engineering, June 30, 1999; and Attachment 5: *Amended Corrective Action Plan for L and D Landfill,*

Applied Science and Engineering, February 15, 2000. These reports are part of this document.

d) *TOPOGRAPHY*

TOPOGRAPHIC MAP

L and D Landfill is located in Township 8N, Ranges 5E and 6E, Mount Diablo Base and Meridian. It appears on the U.S. Geological Survey 7.5 minute maps titled *Sacramento East* and *Carmichael.* The site latitude and longitude are 38°32'N and 121°22'30"W.

The surrounding topography is flat, sloping generally to the west at 6 to 8 feet per thousand feet. Morrison Creek is the major topographic feature in the immediate vicinity of the landfill, located approximately 1/2 mile south of the landfill. Most topographic features in the area are anthropogenic; the most common of these are extensive, straight-sided depleted gravel extraction pits, usually 40 to 50 feet deep.

FLOODPLAIN

Figure 4 of Attachment 1 is a Floodplain Map, identifying the 100-year floodplain in the vicinity of the site. It shows that the landfill is not within the 100-year floodplain.

e) *CLIMATOLOGY*

ISOHYETAL MAP

Figure 6 of Attachment 1 is a 50-year average Isohyetal map for the region.

WIND ROSE

Figure 7 of Attachment 1 is a wind rose based on Executive Airport data showing conditions typical of the site.

PRECIPITATION AND EVAPORATION

Average annual precipitation at the landfill is 18.02 inches. The minimum-recorded annual precipitation was approximately 9.5 inches in 1984. The maximum-recorded annual precipitation was approximately 36 inches in 1997-98. Table 10 gives the average precipitation and evaporation for each month.

Table 4.
Average Precipitation and Potential Evaporation by Month
For the Vicinity of L and D Landfill

Month	Precipitation (inches)	Evaporation (inches)
October	.80	3.6
November	1.54	1.8
December	3.55	.9
January	3.58	.9
February	3.47	.9
March	2.46	3.1
April	1.62	3.7
May	.62	5.1
June	.12	7.4
July	.00	7.1
August	.04	6.4
September	.22	5.2
Annual	18.02	46.1

DESIGN STORM

The 24-hour storm having a 100-year return frequency is 4.09 inches (Sacramento City NWS).

RUNOFF VOLUME/PATTERN

The Precipitation and Drainage Control System is described in Attachment 30: *Revised Drainage Control System for L and D Landfill*, SCS Engineering, October 25, 2011. Those portions dealing with the Stormwater Retention/Infiltration Pond were updated in Attachment 5*: Amended Corrective Action Plan for L and D Landfill,* Applied Science and Engineering, February 15, 2000.

f) *GEOLOGY*

Regional geology, including a geologic map and cross-sections, is described in Attachment 1 on pages 8-10 and referenced appendices. The same section describes the site geology, including an analysis of subsurface materials and measurements of permeability of soil underlying waste as well as engineering properties. Holocene deposits were also described in Attachment 4: *Responses to Regional Board Letter of 20 May 1999 Concerning Corrective Action Plan,* Applied Science and Engineering, June 30,1999.

Stability of cut slopes and the landfill mass in the face of seismic stresses is described in Attachment 18, section 2.6.3 and referenced appendices.

g) *HYDROGEOLOGY*

GENERAL

A hydrogeologic assessment is presented in Attachment 18, section 1.5.

HYDRAULIC CONDUCTIVITY

Aquifer testing was completed on 7 new wells along the southern boundary of the site. The results of this testing are found in Attachment 3: *Hydrologic Analysis and Proposed Modifications to Corrective Action Program (CAP),* Applied Science and Engineering, April 1, 1999 and Attachment 5: *Amended Corrective Action Plan for L and D Landfill,* Applied Science and Engineering, February 15, 2000.

CAPILLARY RISE

The capillary rise above the highest free water surface is estimated to be 2 feet or less. This estimate is based on soil descriptions of the material lying between the waste and the free water surface. The most common description for this material is "SM", silty sand, and sand-silt mixtures. As a precautionary measure, when constructing modules one and two, a capillary break consisting of 0.5-foot of gravel (1/4 to 1 inch) was placed below the compacted soil foundation layer underlying the GCL. This feature prevents groundwater from rising by capillarity to the level of the foundation of the GCL.

SPRINGS

There are no springs within 1-mile of the site perimeter.

WATER QUALITY

Attachment 6: *First Semi-Annual 2018 Monitoring Report, SCS Engineering, August 1, 2018* presents current as well as historical groundwater quality data for all the monitoring wells at the landfill, including the background monitoring wells.

BACKGROUND WATER QUALITY

Background water quality is assessed with four background wells. Wells 12, 13, and 29 represent the uppermost aquifer and provide background for both LF-1 and LF-2. Well 14 represents the lower aquifer and provides background for LF-1 and LF-2.

Monitoring well locations are depicted in Figure 15. Wells 30 and 31 were destroyed and replaced with wells 30R and 31R, see Attachment 31; Monitoring Well Installation and Abandonment Report, L and D Landfill, October 25, 2010. A description of the Ground Water Monitoring system is also provided in Section VI.A.3., of this document.

h) *LAND AND WATER USE*

WELLS WITHIN ONE MILE

Figure 15 of Attachment 1 shows the limits of a one-mile radius around the landfill and gives locations of wells known to be within these limits. Appendix E of Attachment 1 is a key to the figure identifying, as far as possible, the owner, owner's address, well location in terms of section, township, and range, and type of usage. Attachment 6; First Semi-Annual 2018 Monitoring Report, L and D Landfill, August 1, 2018,, includes an up-to-date map of the facility which better represents the locations of on-site monitoring wells. Driller's logs for most of the wells identified within the one-mile radius are available; in many cases, the wells themselves no longer exist because of increased commercialization of the neighborhood. In October 2001, Department of Water Resources records were searched for new wells that might have been

constructed since Appendix E of Attachment 1 was compiled. Only one new well was identified, a monitoring well at the E.R. Bacon underground tank site. Further study of monitoring points in the vicinity of the site is presented in Attachment 44, Well Installation and Evaluation Monitoring Program Findings Report, dated March 14, 2017.

LAND USE WITHIN ONE MILE

This topic is presented in Section I.A.C of this document, and Attachment 18, Section 1.8.1.

GROUNDWATER USE WITHIN ONE MILE.

This topic is presented in Attachment 1, page 20.

21600(B)(4) DESIGN AND CONSTRUCTION STANDARDS

DESIGN RESPONSIBILITY

All design tasks at this landfill are performed by registered civil engineers and engineering geologists. Individual design engineers undertake tasks only in their areas of expertise.

GRADING PLAN

Figure 8 shows the topography of the completed landfill. Excavated finished grades for parts of the North Area WMU are shown in the certified as-built drawings for modules 1 through 7. (Attachment 11: *Construction Quality Assurance Report for Expansion Module One at the L and D Landfill*, Vector Engineering, October 1996; Attachment 12: *Final Construction Quality Assurance Report for Expansion Module Two at the L and D Landfill,* Vector Engineering, January 1998; Attachment 13: *Addendum to Construction Quality-Assurance Report for Expansion Module Two at the L and D Landfill,* Vector Engineering 29 October 1998; Attachment 14*: Construction Quality Assurance Report for First Phase of Expansion Module Three at the L and D Landfill. Vector Engineering, July 1999*; Attachment 15*: Construction Quality Assurance Report for Second Phase of Expansion Module Three at the L and D Landfill Vector Engineering,* July 1999; Attachment 16: *Construction Quality Assurance Report for Expansion Module Four at the L and D Landfill*, Vector Engineering, July 2000; Attachment 35: *Construction Quality Assurance Report for Module 5 at the L and D Landfill, Vector Engineering*, July 2002; Attachment 36*: Construction Quality Assurance Report for Module 6 at the L and D Landfill*, Vector Engineering, July 2003; Attachment 37: *Construction Quality Assurance Report for Module 7 at the L and D Landfill*, Vector Engineering, August 2007).

GAS MANAGEMENT PLAN

The landfill gas extraction system is currently operated under the "*Revised Landfill Gas Control System, Phase 2 Design Basis",* SCS Engineers dated August 24, 2007 and approved by CVRWQCB on September. 7, 2007 (Attachment 39). Perimeter monitoring probes are installed pursuant to "*Revised (Version 2) Landfill Gas Monitoring Evaluation Report and Compliance Work Plan, L and D Landfill*", by SCS Engineers dated November 25, 2009 (Attachment 17).

Attachment 6, Appendix E *First Semi-Annual 2018 Monitoring Report, LFG*

Migration Control System, L and D Landfill, by SCS Engineers, dated July 30, 2018, shows the most recently reported data on the extraction and monitoring system. Note that all perimeter monitoring probes are at, or very close to, non-detect for methane.

21600(B)(5)(B) OPERATING CRITERIA

SECURITY

A chain link fence topped with barbed wire surrounds the entire landfill. A single gate gives access to the landfill. The gate is locked outside of business hours.

21600(B)(6)(A) COVER MATERIALS

The amount of soil required for daily and intermediate cover is 220,000 cubic yards. Figure 4 shows an existing stockpile of approximately 700,000 cubic yards. Daily cover materials include ADC's, which are derived from the inbound waste stream.

21600(B)(8)(C) LEACHATE CONTROL

Leachate does not occur at the surface of the landfill where it could come into contact with the public.

21600(B)(9) COMPILATION OF APPROVALS

In addition to the approvals listed in Section II, L and D Landfill was granted Waste Discharge Permit R5-2012-0107 on October 12, 2012. (See attachment 42) L and D Landfill also operates a Corrective Action Plan approved by CVRWQCB on April 11, 2000. (See attachment 5)

21570(F)(6) PRELIMINARY CLOSURE PLAN, POST CLOSURE MAINTENANCE PLAN

Attachment 18: *Preliminary/ Partial Final Closure and Post-Closure Maintenance Plan,* SCS Engineering, Revised May 3, 2018, Volumes 1 and 2, are part of this document.

21570(F)(7,8) FINANCIAL ASSURANCE OPERATING LIABILITY INFORMATION

The discharger has adequate financial ability to compensate third parties for bodily injury and property damage caused by facility operation prior to closure. Such potential liability is assured by policy number ERADE5R17, issued by Aspen Specialty Insurance Company on November 1, 2017, Attachment 24

21790(B)(5) POST-CLOSURE LAND USE

The site will be landscaped with non-irrigated native vegetation and will remain as open space throughout the post-closure maintenance period

21790(B)(7) ESTIMATED CLOSURE DATE

The estimated closure date of L and D Landfill is October 2031.

20240 CLASSIFICATION AND SITING CRITERIA

The landfill is divided into 2 waste management units (WMU): LF-1, which consists of the West Pit and East Pit, and LF2, the North Area. Both WMUs have the

same classification: Class III, restricted. Of the 2, only LF-2 has a liner and leachate collection and recovery system (LCRS).

LF-2 was designed to ensure there is a greater than 5-foot separation between wastes and the highest anticipated elevation of underlying groundwater. The seismic stability of the landfill mass and the composite liner interfaces is discussed in Attachment 1: 11 and appendices referenced there.

20310 GENERAL CONSTRUCTION CRITERIA

The construction plan implemented in the construction of the LF-2 and presented in Attachment 1: 20-28 conforms to the requirements of Sections 20260 and 20310 as they apply to Class III landfills. Some elements of the design presented in Attachment 1 were amended as follows:

Stormwater Retention/Infiltration Pond: The dimensions of the pond were changed to give the pond a smaller footprint and a deeper cross-section. The volume of the redesigned and constructed pond is slightly larger than described in Attachment 1 (64 acre-feet versus 54 acre-feet). Dimensions and water balance calculations for the redesigned pond appears in Attachment 5*: Amended Corrective Action Plan for L and D Landfill,* Applied Science and Engineering, February 15, 2000.

Grading plan: Alteration of the pond dimensions necessarily altered the configuration of the excavation in the vicinity of the pond. Final construction reports for the North area WMU are included as attachments to this document.

Final Topography: Alteration of the pond dimensions necessarily altered the configuration of the final topography in the vicinity of the pond. Figure 8 of this document accurately represents the final topography, as it will be with the current pond design.

20320 GENERAL CRITERIA FOR CONTAINMENT STRUCTURES

MATERIAL PROPERTIES

Properties of materials used in building the existing containment structures were specified in the series of design reports issued for each phase of the construction of the North Area WMU, namely:

Design Report for L and D Landfill Expansion, Module One, Morton and Pitalo, October-November, 1996, Attachment 7

Design Report for L and D Landfill Expansion Module Two, Morton and Pitalo, June 3,1997, Attachment 8

Design Report for L and D Landfill Expansion, Module Three, Morton and Pitalo, January 25,1999, Attachment 9

Design Report for L and D Landfill Expansion, Module Four, Morton and Pitalo, January 27, 2000, Attachment 10

Design Report for L and D Landfill Expansion Module 5, Applied Science and Engineering, April 28, 2002, Attachment 32

Design Report for L and D Landfill Expansion Module 6, Applied Science and Engineering, January 6, 2003, Attachment 33

Design Report for L and D Landfill Expansion Module 7, Morton & Pitalo, January

19, 2007, Attachment 34

CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL

Quality Assurance/Quality Control procedures applied to the construction of these modules were specified in QA/QC documents included in the design reports just cited.

The quality control procedures specified in these documents included permeability testing of the GCL delivered to the site. Permeability testing in the field on the in-place GCL was not performed.

The final reports on construction QA/QC are Attachments 11-16 and 35-37 and were referenced under 21600(b)(4).

20330 LINERS

LF-2 has an engineered alternative liner system. The engineered alternative was described in Attachment 1. Construction of the liner system was completed in stages and each stage of the construction has an associated set of construction plans and as-built reports. Design plans and as-built reports for the stages are attached and are cited above.

20340 LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

The LCRS is a dendritic LCRS designed, constructed, operated, and maintained to collect and remove twice the maximum anticipated daily volume of leachate. *The maximum anticipated daily volume was estimated to be equivalent to 53 gpm. The design flow of the system is 150 gpm.* The design and operation allow no buildup of hydraulic head on the liner and no clogging of the system. The HDPE pipe components of the system are designed to admit inspection and cleaning equipment. Design drawings of the LCRS in LF-2 are found in the design documents referenced for Section 20320, Material Properties.

Leachate removed from the LCRS is applied to the LF-2 surface (May through October) or is delivered to Sacramento Regional Water Quality Treatment Plant (November through April). The land application use was approved by the CVRWQCB on May 26, 1998 (Attachment 22). Delivery of leachate to the regional treatment plant is in accordance with Wastewater Discharge Permit: TDP-17044.
(Attachment 23).

Volumes of leachate removed from the LCRS are recorded and reported to the LEA and CVRWQCB semi-annually.

20365 PRECIPITATION AND DRAINAGE CONTROLS

PERIMETER DRAINAGE SYSTEM.

The drainage system components were designed to convey the 24-hour, 100-year storm in accordance with Title 23, Chapter 15. This design storm is 4.25 inches according to the County of Sacramento, Hydrology Standards, published in 1994, The assumptions and methods utilized in the design process are given in "Revised Drainage Control System for L and D Landfill", SCS Engineers, May 16, 2012 (Appendix C). The drainage system was designed with a drainage divide located about midpoint along the southern edge of the landfill. This divide results in approximately 24 cubic feet per

second (cfs) reaching the storage pond from the west leg, and approximately 16.5 cfs reaching the storage pond from the east leg.

STORM WATER RETENTION/INFILTRATION POND

The storm water retention/infiltration pond is located in the northeast corner of the site behind the SMUD towers (see Figure 4, Site Plan showing ancillary facilities). The pond is at the discharge ends of the perimeter drainage channels. A geotechnical engineering report (Wallace-Kuhl Associates, 1991) investigated the stability of the pond slopes. The investigation recommended pond side-slopes no steeper than two to one (2:1), horizontal to vertical. That is how the pond was built. The pond current footprint is 3.5 acres, the maximum depth is 28 feet, the bottom area is 1.9 acres, and the wetted surface area is 3.7 acres. It has a capacity of 65 acre-feet. Future plans will enlarge the pond footprint to 4.93 acres. Its design is based on short-term 100-year recurrence precipitation events, and long-term precipitation equal to twice the monthly average over an annual cycle. The drainage area of the landfill is approximately 160 acres. An additional 30 acres north of the landfill also drains into the pond. The pond is designed to accommodate the entire tributary area.

SHORT-TERM EVENT

The short-term performance of the drainage pond was initially evaluated by considering the 24-hour, 100-year precipitation event for Sacramento of 4.25 inches, or 0.35 feet. Conservatively assuming that 30% of this short-term precipitation ends up as run-off from the 190 acres of land, approximately 20.2 acre-feet of water reaches the pond. This volume of water would fill the pond to a depth of 9 feet.

Increasingly longer duration 100-year precipitation events were considered in subsequent design of the drainage pond. In each case, it was assumed that the run-off coefficient is 0.30 over the entire 190 acres. Thus, the 2-day, 100-year precipitation event of 6.05 inches results in a total volume of 28.7 acre-feet, which would fill the pond to 13 feet. The 8.92 inches generated by the 8-day, 100-year storm results in 42.4 acre-feet of run-off, which would fill the pond to 17 feet. Based on the analysis of long-term precipitation presented below, it is apparent that significant percolation will occur during an 8-day period. Thus, the short-term analysis was modified to include this percolation using the model of percolation described in the long-term analysis. Assuming that the head in the pond is equal to one-half the depth predicted for the 8-day, 100-year event, or about 8.5 feet, a total of 5.1 acre-feet of water will percolate over the 8-day period, reducing the short-term storage requirement to a total volume of about 37.3 acre-feet. Thus amount of water would fill the pond to about 16 feet.

LONG-TERM INPUT

The long-term performance of the pond was evaluated by a spreadsheet water balance model. Sources of water to the pond were the runoff derived from precipitation on the 190 acres tributary to the pond, direct precipitation on the pond, and the water delivered to the pond from the CAP extraction wells. Losses of water from the pond were direct evaporation from the pond, on-site water usage, and seepage into the aquifer. Details of the model and the conclusions drawn from it appear in Attachment 5: Amended Corrective Action Plan for L and D Landfill, Applied Science and Engineering, February 15, 2000.

WATER QUALITY CONSIDERATIONS.

The infiltration pond receiving the stormwater runoff also receives the effluent of the air stripper operated as part of the CAP. The flow from the air stripper can be interrupted anytime it poses a threat to water quality. As this flow is a non-Title 27 discharge, it is the subject of a water-quality-monitoring project. Twice annually this discharge is sampled and analyzed. The inorganic constituents measured, along with two sets of results obtained from a split sample collected on Sep 5, 2001, are shown in Table 5. This discharge is also monitored for the VOC compounds detected by EPA method 8260.

Table 5.
Laboratory Results for Inorganic Parameters
Split Sample from Air Stripper Outlet, 9/5/2001

Parameter	Duplicate 1	Duplicate 2	Parameter	Duplicate 1	Duplicate 2
Ph	7.8	7.8	Beryllium	ND	ND
Spec. Cond.	780	780	Cadmium	ND	ND
TDS	390	390	Chromium (t)	.022	.019
Calcium	72	61	Chromium (+6)	ND	ND
Magnesium	47	40	Copper	.022	.020
Sodium	20	18	Iron	.260	.180
Potassium	26.3	26.1	Lead	ND	ND
Bicarbonate	451	439	Manganese	.350	.350
Chloride	26	26	Mercury	ND	ND
Sulfate	42	39	Nickel	.014	.012
Nitrate-N	1.3	1.4	Selenium	ND	ND
Antimony	.17	.018	Silicon	.033	.033
Arsenic	ND	ND	Silver	ND	ND
Aluminum	.240	.120	Thallium	ND	ND
Barium	.170	.170	Zinc	.098	.140
Cations (meq)	9.00	7.79	Anions (meq)	9.10	8.85

20380(B) FINANCIAL ASSURANCE FOR CORRECTIVE ACTION

The facilities to execute the CAP at this site are already installed and paid for. Operation of the CAP was designed for completion during the active life of the landfill and it is being funded as a current operational expense. The existing corrective action facilities are adequate to control and correct a reasonably foreseeable release from the North Area WMU.

20380(C) DURATION OF APPLICABILITY

Each monitoring program will continue through the end of the Post-Closure Maintenance Period or until the CVRWQCB approves its discontinuance.

20380(E) LIMITATIONS ON ENGINEERED ATERNATIVES

The groundwater-monitoring plan is to follow the Monitoring and Reporting Plan issued by the CVRWQCB along with the Waste Discharge Permit. No alternatives are anticipated.

20385 REQUIRED MONITORING PROGRAMS

L and D Landfill conducts a Corrective Action Program (CAP) and a concurrent detection monitoring program in accordance with the Monitoring and Reporting Program specified in Order R5-2012-0107.

20390 WATER QUALITY PROTECTION STANDARD

An updated Water Quality Protection Standard (WQPS) is included as Attachment 43, "Revised Water Quality Protection Standard Report", SCS Engineers, February 27, 2012.

20395 CONSTITUENTS OF CONCERN

The Constituents of Concern have been and should remain the same for all waste management units and for all monitoring programs. The previous list of Constituents of Concern is part of WDR No. R5-2012-0107, and is included in this document as Appendix G.

In addition to the COCs, which have been tested for on a five-year cycle, there is another collection of monitoring parameters that have been measured quarterly. These include the volatile organic compounds measured by EPA Method 8260 (a somewhat shorter list of compounds than the list included in Attachment D) and a group of constituents previously referred to by the Board as "Surrogates for Metallic Constituents". All of these are listed in R5-2012-0107, and included in this document as Appendix F. Ionic parameters are included so the analytical reports can be evaluated for ionic balance. There is unacceptable noise in the historic data for ionic constituents. Ionic balance calculations will serve as a filter in the future.

20400 PROPOSAL OF CONCENTRATION LIMITS

Proposed Concentration Limits are listed in the Revised WQPS, Attachment 43.

20405 MONITORING POINTS AND THE POINT OF COMPLIANCE

There are 6 categories of groundwater monitoring points at L and D Landfill. All of these are shown on Figure 15.

1. *NORTH AREA WMU (LF-1) BACKGROUND MONITORING WELLS*

The wells in this category are numbers 12,13, and 29. Monitoring wells 12 and 13 both have long histories as background monitoring wells for the landfill as a whole. They each have 10-foot screened intervals within the apparently most permeable part of the first water bearing zone. In each well the top of the screened interval is about 15 feet below the static level of water in the well. Well 13 is no longer suitable as a concurrent background water quality monitoring well because of hydrologic changes brought about by the infiltration pond. The historic water quality record from well 13 remains an important component of the data that show the value of certain parameters in groundwater that has not been affected by waste constituents or leachate. Well 29 (next to historic monitoring well 3) has a 10-foot screen in the apparently most permeable interval within the first water bearing zone.

2. *NORTH AREA WMU (LF-2) DETECTION MONITORING WELLS/EAST PIT WMU BACKGROUND MONITORING WELLS*

Monitoring well 31R serves as a detection monitoring well for the North Area WMU. Monitoring well 30R serves as a corrective action well. These wells originally served as the East Pit WMU background monitoring wells. These two wells have 20-foot screens in the apparently most permeable interval within the first water bearing zone. The vertical surface aligned with these two wells and passing through the first water bearing zone is the compliance point for the North Area WMU. Wells 30R and 31R replace wells 30 and 31 which were damaged during landfill operations. (See attachment 31) Past Monitoring data from wells 30 and 31 remain an important component of historic data.

3. *EAST PIT WMU/WEST PIT WMU (LF-1) CAP WATER QUALITY MONITORING WELLS*

Wells 18, 19, 20, 21, 22, 23, 24, and 33 make up this category. They are the corrective action extraction wells. The compliance point for these two WMUs is the vertical surface aligned with the wells and passing through the first water bearing zone. These wells show the quality of groundwater that would pass the compliance point if the wells were not actively extracting water. The wells in this category fully penetrate the first water bearing zone. Typically, the top of the screened interval is above the water table and the bottom of the screened interval is at the boundary with an underlying low permeability layer. This feature of the design assures that water samples recovered from the wells represent the condition of water in the most permeable interval within the first water bearing zone. Therefore, they provide the best assurance of the earliest possible detection of a change in the nature of the release from these units.

Four older wells (2A, 4, 7, and 10) intersect the same vertical plane as wells 18 through 24 and each one of them is within 30 feet of one of these extraction wells. These are still used to monitor water levels but wells 7 and 10 have become redundant as water quality monitoring wells. Wells 7 and 10 are completed in the lower 10 feet of the first water bearing zone and thus have no potential to provide information not already available from the adjacent extraction wells 20 and 24. Wells 2A and 4 are completed only in the upper part of the first water bearing zone. The adjacent extraction wells, 22 and 23, fully penetrate this zone, so, if there are any qualitative differences between the upper and lower parts of the zone, they would not be revealed by the extraction wells. Wells 2A and 4 can remain in the water quality-monitoring network as corrective action plan water quality monitoring wells for the east pit

4. *EAST PIT WMU/WEST PIT WMU (LF-1) CAP OFF-SITE WATER QUALITY MONITORING WELLS*

Wells 5, 15S, 16S, 32S, 34, 35, and 36 are existing off-site wells in this category. They all have 10-foot screened intervals in the apparently most permeable interval within the first water bearing zone. Groundwater in the vicinity of well 5 appears to be affected by a release in the West Pit WMU in that its sulfate concentration is elevated and its nitrate concentration is depressed relative to the presumptive background concentrations for these parameters. Groundwater in the vicinity of well 16S appears to be affected by a release in the East Pit WMU in that it contains VOC combinations similar to those seen in water extracted from the East Pit WMU. Groundwater in the

vicinity of well 15S is unaffected by the landfill. Wells 34, 35, and 36 serve to demonstrate the limits of the hydraulic barrier imposed by the CAP.

5. *SECOND AQUIFER DETECTION MONITORING WELLS*

The wells in this category are numbers 8, 9, 11, and 17. The historic records for wells 8, 9, 14, and 17 establish the background conditions for the monitored medium. Well 11 data shows evidence of a release from the West Pit WMU into the second aquifer. The particular indicators of release are presence of 1,1dichloroethane, elevated concentrations of TDS, chloride, and sulfate and depressed concentrations of nitrate.

6. *CAP HYDRAULIC GRADIENT MONITORING WELLS*

The current CAP implements a hydraulic barrier at the compliance point. Evidence to indicate the barrier is in place and functioning, as intended is necessarily hydraulic. Synoptic water level elevations are measured in all wells at the site (numbers 2A, 3, 4, 5, 7 through 26, 28, 29, 30R, 31R, and 32 through 36, plus any wells added in the future) and are processed to provide a groundwater contour map. Well 28 may be lost to construction within the next five years. Their loss will not weaken the resolution of hydraulic conditions at the hydraulic barrier. Water well boring logs are shown in Figure 32.

20415 GROUND WATER MONITORING SYSTEM

Figure 15 is a site plan showing the locations of all groundwater monitoring wells at L and D Landfill. The logs and construction details of all monitoring wells are shown in Figure 32. The original monitoring well 1 was reconstructed as multiple completion wells 10 and 11. The original monitoring well 2 was destroyed in landfill construction and was replaced by monitoring well 2A, which is at nearly the same location but is not as deep as the original monitoring well 2. Monitoring well 6 is adjacent to monitoring well 7. It was too shallow to be used as a water quality monitoring well but is still used for water level measurements. Monitoring well 3 is no longer used for water quality monitoring but it is still used for water level measurements.

Monitoring wells 25, 26 and 28 are 1-inch piezometers arranged around the drainage pond. They are not used for water quality monitoring, only for water level measurements. They will eventually be lost to construction

Monitoring wells 18, 19, 20, 21, 22, 23, 24, and 33 are the CAP extraction wells. They all have permanent submersible pumps connected to a common manifold that feeds the air stripper. The water quality records of all monitoring wells are reproduced in Attachment 6: *First Semi-Annual 2018 Groundwater Monitoring Report*, SCS Engineering, August 1, 2018. The designated background water quality monitoring wells have been wells 12, 13, 30R and 31R for the uppermost aquifer and well 14 for the second aquifer. With the initiation of the CAP, wells 13 and 14 are no longer suitable for concurrent background monitoring because they are in the path of water infiltrated through the infiltration pond. Monitoring wells 5, 15S, 16S, 17, 32S, 34, 35, and 36 are located off site. Of these, 5, 15S, 16S, 32S, 34, 35, and 36, monitor the uppermost aquifer and 17 monitors the second aquifer.

The monitoring wells were logged by registered civil engineers in every case. The unified soil classification system was used as well as narrative description.

20415(E)(4) WATER QUALITY MONITORING QA/QC

SAMPLE COLLECTION

There are 3 categories of wells in the monitoring well network: 4-inch wells with dedicated pumps, 4-inch wells without pumps, and 2-inch wells without pumps. Sample collection is different for each category.

The CAP wells, 18 through 24, and 33 are the 4-inch wells with dedicated pumps. These wells run continuously. Each well has a sampling port on a "tee". The port is a 3/8-inch polyethylene valve with a removable piece of 1/4-inch polyethylene tubing. The sample is collected by attaching a new piece of polyethylene tubing and opening the valve. Standard practice is to open the valve completely and let the water discharge for two minutes before taking the sample. When filling the sample bottles, the valve is partially closed to reduce the flow rate to about 100 ml/minute. After filling the sample bottles, the flow is directed through a flow-through cell in which temperature, pH, and electrical conductivity are measured.

The 4-inch wells without pumps are 5, 14, 15S, 16S, 17, 29, 30R, 31R, 32S, 34, 35, and 36. These wells are purged (3 casing volumes) with a decontaminated portable submersible pump. During purging a portion of the water is directed through a flow-through cell in which temperature, ph and electrical conductivity are measured. After purging, the submersible pump is removed, and the sample is obtained with a proprietary sampler, The Voss EZ pump. This device is a virgin disposable polyethylene bailer with a 12-volt submersible pump installed in its upper end. The device is lowered to the screened interval of the well and the pump is activated for 10 minutes. When activated, the pump moves 300 ml/minute through the 1-liter bailer and discharges it in the well six feet above the top of the bailer. The contents of the bailer are isolated from the pump by a check valve. A new bailer is used for each well; the 12-volt pump is decontaminated between uses.

The 2-inch wells without pumps are 8, 9, 11, 12, and 13. These wells are purged (3 casing volumes) by bailing with a virgin disposable polyethylene bailer. After purging, the bailer is exchanged with a Voss EZ pump for sampling. Measurements of temperature, pH, and, electrical conductivity are made by inserting probes into the sample bottle.

Decontamination of the submersible pumps includes washing in a bath made from City of Sacramento tap water with Alconox and rinsing with distilled water. The distilled water rinse of the large submersible pump is accomplished in a vessel made from a length of 4-inch plastic pipe. The pump is submerged in the vessel and activated. The procedure is not intended to decontaminate the discharge hose beyond displacing its contents with distilled water. The discharge hose is not used to deliver samples for analysis.

SAMPLE PRESERVATION AND SHIPPING

The monitoring parameters of the current Monitoring and Reporting Program require three 40-ml VOA vials with HC1 preservative and 500 ml of unpreserved sample in a polyethylene bottle. The laboratory provides the VOA vials with the HC1 preservative already in them.

Immediately prior to filling the sample bottles they are labeled. Immediately after filling, the bottles are placed on ice in an insulated box. The samples are delivered to

the laboratory on the day of collection.

ANALYTICAL PROCEDURES

The analytical procedures are those specified in the monitoring and reporting program stipulated by the CVRWQCB.

CHAIN OF CUSTODY CONTROL

Proprietary labels are used. The label itself has only a preprinted number and the name and address of the consulting firm. The counterfoil to the label, which remains bound in the label book, also carries the number and has ample space to record particulars of the sample. The counterfoils are automatically duplicated through carbonless paper. The particulars routinely recorded on the counterfoils include date, time, sampler, details of purging and field measurements, laboratory to which sent, preservatives, sample container type/size, and analyses requested. A different label is used for each sample container even if they are from the same water source.

Laboratory chain-of-custody documents are filled out as the samples are collected. The only sample identification given to the laboratory is the unique number on each label.

20415(E)(6-15) DATA ANALYSIS

See WQPS, attachment 43.

20415(E)(12)(B) DATA COLLECTION AND ANALYSIS

At a minimum, sampling of monitoring wells is required to take place during the periods of highest and lowest elevations of the potentiometric surface. At L and D Landfill the appropriate times for sampling are the months of April and October. It is also required to collect enough independent samples from each monitoring point to support the data analysis technique being employed. At L and D Landfill the preferred procedure for meeting both these objectives is to sample each monitoring point two times during April and two times during October.

20430 CORRECTIVE ACTION PROGRAM

The currently implemented CAP is described in Attachment 5*: Amended Corrective Action Plan for L and D Landfill,* Applied Science and Engineering, February 15, 2000. The site is currently operating under a continuing Notice of Violation pending development of an updated CAP that meets CVRWQCB approval. Recently completed Well Installations and Evaluation Monitoring Program Findings are included in Attachment 44.

20705 STANDARDS FOR DAILY AND INTERMEDIATE COVER

Section V.D.5 of this document describes cover materials which have been approved for use at L and D Landfill.

21090(A)(5)(A) DISCHARGE OF LIQUID TO COVERS

Liquids, including leachate, condensate, and irrigation water, will not be applied to the final covers of the landfill.

21090(D) LANDFILL CLOSURE DEADLINE

The discharger understands that for landfill units subject to the CALRECYCLE promulgated provisions, any closure deadline extensions the discharger proposes to the LEA shall be effective only after concurrence by the CVRWQCB.

21090(E) FINAL COVER SURVEYS

INITIAL SURVEY AND MAP

Upon completion of all closure activities for the landfill, the discharger will conduct an aerial photographic survey of the landfill and the immediate surrounding area, including at least the surveying monuments. The data so obtained will be used to produce a topographic map of the site at 1:1200 scale with 2-foot contour lines to allow the early identification of any differential settlement. The map thus produced will act as the base line against which to measure the total settlement, through time, of all portions of the final cover since the date when the landfill was closed. Upon completion of this map, the discharger will submit a copy to the CVRWQCB, CALRECYCLE, and the LEA.

FIVE-YEARLY ISO-SETTLEMENT MAP

Every five years after completing closure of the landfill, the discharger will produce and submit to the CVRWQCB an iso-settlement map accurately depicting the estimated total change in elevation of each portion of the final cover's low-hydraulic conductivity layer. Therefore, for each portion of the landfill, this map will show the total lowering of the surface elevation of the final cover, relative to the baseline topographic map, and will indicate all areas where visually noticeable differential settlement may have been obscured by grading operations. The map will be drawn to the same scale and contour interval as the baseline topographic map but showing the current topography of the final cover and featuring overprinted isopleths indicating the total settlement to date.

TRACKING DIFFERENTIAL SETTLEMENT

Prior to conducting periodic grading operations on the closed landfill, the discharger will note on a map of the landfill the approximate location and outline of any areas where differential settlement is visually obvious. Each five-yearly iteration of the iso-settlement map will show all areas where differential settlement has been noted since the previous map submittal and will highlight areas of repeated or severe differential settlement. Map notations and delineations may not be surveyed, so long as all areas where differential settlement was visually identifiable prior to regrading can be relocated. Such notation and delineation will be made by, or under the supervision of, a registered civil engineer or registered geologist.

21400 CLOSURE OF SURFACE IMPOUNDMENT

The landfill does not have a surface impoundment receiving waste.

21720 WASTE DISCHARGE REQUIREMENTS

LOCAL AGENCIES

The discharger understands that any new waste discharge requirements issued

by the CVRWQCB will not be effective until all local agencies with jurisdiction to regulate land use, solid waste disposal, air pollution, and to protect public health have approved use of the site for discharges of waste to land.

CONSOLIDATION OF REQUIREMENTS

The discharger wishes the CVRWQCB to concur with the opinion that sharing of monitoring and drainage facilities for the three waste management units does not interfere with achieving the goal of the monitoring programs at each respective unit.

RECORDS

Disposal site records and reporting procedures appear in Section VII of this document. Delivery to the LEA of the Quarterly Monitoring Report and the Quarterly Report on Daily Tonnages is done at the end of the month following the subject quarter. Records of the volumes and weights received are kept on file at the offices of L and D Landfill, 5370 South Watt Avenue, Suite 100 Sacramento, California 95826. The waste receipt records categorize the waste received as: demolition/construction, paper, concrete, dirt, and asphalt (CDA), green waste, miscellaneous, wood, tires, plastic, or non-friable asbestos.

21760(B) OPERATION PLANS

TREATMENT, STORAGE, AND DISPOSAL METHODS

Wastes are neither treated nor stored on the facility. Wastes are disposed on the site in line with the following considerations. Lifts are typically five feet tall and are arranged in cells typically 100 feet square. Most loads are placed on top of the lift. Loads with hard-to-handle material are placed at the bottom of the lift. Also, during peak periods, loads are placed at the bottom of the active disposal face. After deposition in the active cell, the waste is spread and compacted with one of the three compactors. During peak periods a bulldozer assists by pushing waste from the unloading area to the disposal face.

Loads with a high proportion of recoverable material are left on the lift and hand-salvaged. The salvaged material is loaded into bins for shipment to permitted recycling facilities.

When a cell is full, or at the end of a working day, the cell is covered with a nominal 6-inch layer of compacted soil from the site or alternative daily cover using a bulldozer and/or compactor. Stockpiled cover material is brought to the cell area by a scraper.

Areas that are not scheduled to receive waste for more than 180 days are covered with 1-foot of soil and compacted.

REFERENCES

Bagchi, A. Design, Construction, and Monitoring of Sanitary Landfills. John Wiley & Sons, 1990.

California Air Resources Board, Stationary Source Division, The Landfill Testing Program: Data Analysis and Evaluation Guidelines, Lynton Baker, et al., September 1990.

Matrecon, Inc., Lining of Waste Containment and Other Impoundment Facilities, U.S. EPA/600/2-88/052, September 1988.

Pacey, J.G., Refuse Moisture Balance - Insights From the Mountain View Demonstration Project, Virginia Water Pollution Control Association, Richmond Virginia, December, 1982.

Sunada, D. K. Artificial Ground-Water Recharge. San Luis Valley. Colorado. Completion Report No. 123, Colorado Water Resources Research Institute, Colorado State University, Ft. Collins, CO., March 1983.

Tchobanoglous, George, Hilary Theisen, and Sam Vigil, Integrated Solid Waste Management, McGraw-Hill, Inc., 1993.

United States Department of Agriculture, Predicting Rainfall Erosion Losses, Agriculture Handbook Number 537,1978.

U. S. Environmental Protection Agency, Geosynthetic Design Guidance for Hazardous Waste Landfill Cells and Surface Impoundments, Gregory Richardson and Daniel Koerner, EPA Document #EPA/600/2-87/097,1987.

Wallace-Kuhl and Associates, Inc., Geotechnical Engineering Report Number 1736.01. L and D Landfill Expansion, July 24,1991