CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

DRAFT TECHNICAL REPORT

TENTATIVE ADDENDUM NO. 1 TO ORDER NO. 2000-54: AMENDMENT OF WASTE DISCHARGE REQUIREMENTS

FOR

UNITED STATES MARINE CORPS

LAS PULGAS LANDFILL
MARINE CORPS BASE CAMP PENDLETON
SAN DIEGO COUNTY

May 9, 2007

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To request copies of Tentative Addendum No. 1 to Order No. 2000-54, for Waste Discharge Requirements for the U.S. Marine Corps, Marine Corps Base Camp Pendleton Las Pulgas Landfill, San Diego County, please contact Mrs. Amy Grove, Engineering Geologist, at (858) 637-7136, agrove@waterboards.ca.gov.

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TENTATIVE ADDENDUM NO. 1 TO ORDER NO. 2000-54

FOR

REVISION OF WASTE DISCHARGE REQUIREMENTS LAS PULGAS LANDFILL MARINE CORPS BASE CAMP PENDLETON SAN DIEGO COUNTY

Draft Technical Report

Adopted by the
California Regional Water Quality Control Board
San Diego Region
On May 9, 2007

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INTRODUCTION

This Technical Report provides the rationale and factual information supporting the findings and directives of tentative Addendum No. 1 to Order No. 2000-54. The text of each finding is presented first, followed by a summary of the rationale and factual evidence supporting the finding.

1. FINDING NO. 1 STATES:

WASTE DISCHARGE REQUIREMENTS Except as contradicted or superseded by the findings and directives set forth in this Waste Discharge Requirement (WDR) Addendum (Addendum No.1), all of the previous findings and directives of Order No. 2000-54: "*Waste Discharge Requirements for the U.S. Marine Corps, Marine Corps Base Camp Pendleton, Las Pulgas Landfill, San Diego County."* remain in full force and effect.

BASIS FOR FINDING NO. 1

The Las Pulgas Landfill is a municipal solid waste landfill owned and operated by the United States Marine Corps (USMC). The USMC has operated the landfill since 1980, accepting municipal solid waste generated within the boundaries of Marine Corps Base (MCB) Camp Pendleton, pursuant to waste discharge requirements prescribed by the San Diego Water Board (hereinafter Regional Board). The Las Pulgas Landfill is currently regulated under the Regional Board's Order No. 2000-54, "*Waste Discharge Requirements for the U.S. Marine Corps, Marine Corps Base Camp Pendleton, Las Pulgas Landfill, San Diego County*."

2. FINDING NO. 2 STATES:

ALTERNATIVE LINER CONSTRUCTION: PHASE 1 EXPANSION UNIT. Waste Discharge Requirements issued as Order No. 2000-54 include an engineered alternative composite liner design for the Phase 1 expansion Unit at the Las Pulgas Landfill, as provided in Code of Federal Regulations, Title 40 (40 CFR), §258.40(a)(1) and (c), California Code of Regulations (CCR) Title 27, §20080(b), and State Water Resources Control Board (SWRCB) Resolution 93-62. Construction of the Phase 1 Expansion Unit was completed on May 24, 1999 and the Unit began receiving wastes thereafter. The liner was not properly constructed in accordance with the requirements and performance specification in Order No. 2000-54: "*Waste Discharge Requirements for the U.S. Marine Corps, Marine Corps Base Camp Pendleton, Las Pulgas Landfill, San Diego County*."

BASIS FOR FINDING NO. 2

On March 5, 1998 the USMC submitted a Joint Technical Document (JTD), including a Report of Waste Discharge (ROWD), as part of in application for the horizontal and vertical expansion of the Las Pulgas Landfill. The JTD proposed additional phased increases in the acreage of the landfill, resulting in an increase in the total acreage from 39.4 to 88.7 acres, with Phase 1 incorporating approximately 17 acres. Subsequent revisions of the JTD were submitted through September 1998.

As part of the JTD (EMCON, 1998), the USMC provided the San Diego Regional Water Board with a proposed liner and leachate collection and removal system (LCRS) design specifications in a report entitled, "*Liner, Leachate Collection and Removal System (LCRS) at the Marine Corps Base Camp Pendleton, San Diego, CA*." This JTD proposed the design of an engineered alternative liner and LCRS, as well as the construction protocols to be followed during the construction and installation of the Phase 1 Unit. Construction specifications for the engineered alternative design for the Phase 1 expansion Unit can be found in the Technical Report for Cleanup and Abatement Order R9-2006-0016 at http://www.waterboards.ca.gov/sandiego/orders/orders-06.html.

By letter dated September 15, 1998, the San Diego Regional Water Board notified the USMC that pursuant to California Water Code (CWC) §13264, construction of the landfill could legally commence, following a 150-day waiting period which began on the date of submittal of the JTD, unless the San Diego Regional Water Board provided comments deeming the JTD deficient. The 150-day waiting period expired on January 29, 1999, and subsequently, the USMC began construction of the Phase 1 Unit.

On May 10, 2000 the San Diego Regional Water Board adopted waste discharge requirements (WDR) Order No. 2000-54, "*Waste Discharge Requirements for the U.S. Marine Corps Base Camp Pendleton, Las Pulgas Landfill, San Diego County.*" The WDRs included specifications for the construction of the proposed engineered alternative liner design. From technical reports (Brown and Caldwell, 2003 and ERRG, 2004a) provided to the San Diego Regional Water Board, it is likely that various elements of the constructed subgrade/ liner/operations soil layer system departed significantly from the engineering specifications developed for the construction of the engineered alternative composite liner system at the Phase 1 expansion Unit.

3. **FINDING NO. 3 STATES:**

PHASE 1 UNIT LINER FAILURE AND ENFORCEMENT ACTIONS.
From 2004 to 2006, the San Diego Regional Water Board issued several enforcement actions to the USMC, related to deficiencies in the construction of the engineered alternative liner system in the Phase 1 expansion Unit at the Las Pulgas Landfill. On February 24, 2006, the San Diego Regional Water Board issued Cleanup and Abatement Order R9-2006-0016 requiring the USMC to develop a Corrective Action Plan (CAP) to correct construction deficiencies in the engineered alternative liner for the Phase 1 expansion Unit at the Las Pulgas Landfill

BASIS FOR FINDING NO. 3

Construction related deficiencies in the existing engineered alternative composite liner system are well documented in the Findings of CAO R9-2006-0016, the associated Technical Staff Report for CAO R9-2006-0016, and technical references cited therein (Brown and Caldwell, 2003, ERRG, 2004a and 2004b, and Tetratech 2006). The existing single composite liner system in the Phase 1 Unit fails to meet the minimum State and federal criteria for containment of municipal solid waste landfills to ensure the long-term protection of human health and the environment.

Solid waste landfills[1] in California are subject to both the Porter-Cologne Water Quality Control Act[2] and various policies and regulations promulgated by the State Water Resources Control Board (SWRCB) including Title 27, California Code of Regulations – CCR Title 27 and the federal Resource Conservation and Recovery Act (RCRA), including regulations implementing RCRA's Subtitle D found in 40 CFR, Part 258. In 1993, the SWRCB adopted Resolution No. 93-62, *Policy for Regulation of Discharge of Municipal Solid Waste*, requiring each Regional Water Quality Control Board to incorporate both the requirements of CCR Title 23, Chapter 15 (now CCR Title 27, as of 1997) and the subtitle D regulations in waste discharge requirements (WDRs) for landfills. *Regulation of Waste Discharges to Land prior to 1997.* After November 27, 1984, discharges of non-hazardous and hazardous wastes to land were regulated by the Regional Water Boards pursuant to California Code of Regulations (CCR) Division 3, Chapter 15 (a.k.a. "*Chapter 15*"). The regulatory requirements of Chapter 15 were implemented by the Regional Water Boards through adoption of waste discharge requirements (WDRs)

[1] "Landfill" means a waste management unit at which waste is discharged in or on land for disposal. It does not include surface impoundment, waste pile, land treatment unit, injection well, or soil amendments. *[Note: see also the definition of "waste management unit" Title 27 §20164 and §§20090(c&f).]*

[2] Division 7 of the California Water Code, commencing with section 13000.

pursuant to California Water Code §13263 *et. seq*. Subsequent to the implementation of Chapter 15 by the State/Regional Water Boards, the State Legislature created additional State agencies that promulgated additional regulations to control disposal of wastes to land:

- California Code of Regulations Title 14, Division 7 for discharges of non-hazardous solid wastes to land (administered by the California Integrated Waste Management Board).

- California Code of Regulations Title 22, Division 4.5 for discharges of hazardous wastes to land (administered by the Department of Toxic Substances Control).

Federal Requirements for Non-hazardous wastes. On October 9, 1991, the United States Environmental Protection Agency (USEPA) promulgated regulations that apply, in California, to dischargers who own or operate landfills which accept municipal solid waste on or after October 9, 1991, (MSW landfills), regardless of whether or not a permit is issued (Code of Federal Regulations [CFR], Title 40, Parts 257 and 258). The majority of the federal MSW regulations became effective on October 9, 1993 [40 CFR §258.1(e)].

Municipal solid waste landfills accepting wastes after October 9, 1991 are subject to the federal regulations found in the Code of Federal Regulations (CFR), Title 40 Part 258. These Federal regulations implement the statutory requirements of the Resource Conservation and Recovery Act (RCRA) – Subtitle D. The Federal regulations contain applicable requirements for siting, construction, operation, closure, and water quality monitoring of municipal solid waste (MSW) landfills.

Each state must "...adopt and implement a permit program or other system of prior approval and conditions to assure that each...[MSW landfill]...within such state...will comply with the...[federal MSW landfill regulations]." State regulations promulgated to satisfy this requirement are subject to approval by USEPA (Solid Waste Disposal Act §4003 and §4005; Title 42 US Code §6943 and §6945). The cited Federal regulations may be accessed on-line at: The applicable Federal regulations may be accessed on-line at http://www.gpoaccess.gov/cfr/index.html.

The State Water Resources Control Board's (SWRCB) Chapter 15 regulations were comparable to the federal MSW regulations. Nevertheless, the USEPA identified several areas of Land Disposal which are not adequate to ensure compliance with certain provisions of the federal MSW regulations, as summarized in Attachment I to SWRCB

Resolution No. 93-62 (Attachment 4 to this Agenda Item).

On June 17, 1993, the SWRCB adopted Resolution No. 93-62:"*Policy for Regulation of Discharges of Municipal Solid Wastes.*" SWRCB Resolution No. 93-62 amended CCR Title 23, Chapter 15 regulations to be consistent with the applicable Federal requirements found in Code of Federal Regulations (CFR) Title 40, Part 258. Resolution No. 93-62 requires the Regional Water Boards to take a number of actions, including:

- Regional Water Boards shall implement in waste discharge requirements for discharges at MSW landfills, both the Chapter 15 regulations and those applicable provisions of the Federal MSW regulations that are necessary to protect water quality, particularly the containment provisions stipulated in Section III of Resolution No. 93-62, and the provisions identified in Attachment I to that Policy;

- Regional Water Boards shall revise existing waste discharge requirements to accomplish this according to the schedule provided in Section II of Resolution No. 93-62; and

- Regional Water Boards shall not rely upon any exemption or alternative allowed by Chapter 15 if such an exemption or alternative would not be allowed under the federal MSW regulations, nor shall the Regional Water Board waive waste discharge requirements for the discharge of municipal solid waste at landfills.

To comply with Resolution No. 93-62, the San Diego Regional Water Quality Control Board (San Diego Regional Water Board) adopted General Order 93-86: "*Waste Discharge Requirement Amendment for all MSW Landfills in this Region, to implement State Water Board Resolution No. 93-62, Adopted June 17, 1993, As State Policy for Water Quality Control under Section 13140 of the Water Code*." All existing active MSW landfills located within the San Diego Region, including the Las Pulgas Landfill, were enrolled in Order 93-86. In May 2000, the Regional Board terminated enrollment of the Las Pulgas Landfill under Order 93-86 upon adoption of revised WDRs (issued to the USMC for Las Pulgas Landfill as Order 2000-54) as their WDRs were updated in compliance with Resolution No. 93-62.

Regulation of Waste Discharges to Land after 1997. In 1993, the legislature passed AB 1220 *"The Solid Waste Disposal Regulatory Reform Act of 1993."* That act amended the California Public Resources Code (PRC §43100 and §43101) requiring the SWRCB and the California Integrated Waste Management Board (CIWMB) to jointly develop a plan for implementing reform of the existing State requirements [previously

included separately under CCR Title 14, Division 7 (CIWMB) and CCR Title 23, Division 3, Chapter 15 (SWRCB)] regulating discharges of "non-hazardous solid wastes" to land.

Implementation of the statutory requirements of PRC §43101 resulted in the SWRCB and CIWMB promulgating California Code of Regulations – Combined SWRCB/CIWMB Regulations Divisions 2, Title 27 (CCR Title 27). After July 18, 1997, the regulatory requirements of CCR Title 27 became the applicable requirements for regulating discharges of non-hazardous wastes to land. CCR Title 27 contains applicable prescriptive regulatory requirements for the design, operation, and environmental monitoring at the Las Pulgas Landfill. Water Code §13243 gives the Regional Boards authority to implement the referenced requirements in Waste Discharge Requirements (WDRs).The cited/applicable State regulations may be accessed on-line at: http://www.calregs.com/linkedslice/default.asp?SP=CCR-1000&Action=Welcome

Joint Technical Document/Report of Waste Discharge. After July 18, 1997, CCR Title 27, §21585(a) requires that applicants submit a "*Joint Technical Document*" or "*JTD*", which includes the required information previously provided to the Regional Boards as a Report of Waste Discharge (ROWD) required under Water Code §13260 *et seq*. The information provided in the JTD is used to develop waste discharge requirements or "WDRs" for nonhazardous waste management units (pursuant to CCR Title 27, §21585(a) and §21710 *et seq*.).

In March 1998, the Department of the Navy provided the Regional Board with a JTD proposing an engineered alternative to the prescriptive composite liner system, pursuant to Federal (CFR Title 4, Part 258) and State (State Board Resolution No. 93-62 and CCR Title 27) requirements. The final amendment to the JTD was submitted to the Regional Board on August 20, 1998.

Pursuant to CFR Title 40 §258.40, all new and lateral expansions of municipal solid waste landfills must be constructed with a composite liner and leachate collection and removal system (LCRS). The minimum prescriptive composite liner system, required by the Federal regulations and SWRCB Resolution No. 92-62, is a system of two major components. The upper component must consist of a minimum 30-mil flexible membrane liner (FML). FML components consisting of a high-density polyethylene (HDPE) layer must be at least 60-mil thick. The second component must consist of a minimum two-foot layer of compacted soil with a hydraulic conductivity no greater than 1×10^{-7} cm/sec. The Discharger proposed an engineered alternative to the prescriptive standard liner system

contained in CCR Title 27 and 40 CFR 258, for the Phase 1 expansion Unit at the Las Pulgas Landfill.

4. The JTD contains a proposed engineered alternative to the prescriptive standard liner design outlined in CCR Title 27 and CFR Title 40, Part 258. The Discharger proposed to construct the following engineered alternative composite liner system, as described in Discharge Specifications B.32 to B.39 of Order 2000-54:

> "32. The engineered alternative liner for the expanded areas shall consist of an upper and lower component. The upper component shall consist of: 1) two feet of protective cover soil (effective saturated hydraulic conductivity of 7.2×10^{-4} cm/sec); 2) a geotextile; 3) one foot drainage layer of gravel (effective saturated hydraulic conductivity of 1×10^{-3} cm/sec); and 4) non-woven geotextile for cushioning the underlying membrane. The lower component shall consist of: a 60-mil thick high density polyethylene (HDPE) geomembrane liner; and 2) a geosynthetic clay liner (GCL) with a permeability of 5×10^{-9} cm/sec installed in direct and uniform contact with the underlying materials.
>
> 33. The engineered alternative liner for the sideslopes shall consist of: 1) two feet of protective soil; 2) 60-mil HDPE geomembrane; and 3) geosynthetic clay liner installed in direct and uniform contact with the underlying materials.
>
> 34. A Construction Quality Assurance (CQA) report including a summary of the CQA program and all test results, analyses and copies of the inspector's original field notes, along with a certification as described in CCR Title 27 Section 20324, shall be submitted to the Regional Board upon completion of each phase of construction, and prior to the discharge of waste into the constructed phase.
>
> **Leachate Collection and Removal System**
>
> 35. All containment systems shall include a leachate collection and removal system (LCRS) which shall convey all leachate which reaches the liner to an appropriately lined sump or other appropriately lined collection area. The LCRS shall not rely upon unlined or clay-lined areas or such conveyance.
>
> 36. Materials used to construct leachate collection and removal systems (LCRS) shall have appropriate physical and

chemical properties to ensure the required transmission of leachate over the life of the WMU and the post-closure maintenance period.

37. LCRS shall be designed, constructed, and maintained to collect twice the anticipated daily volume of leachate generated by the WMU and to prevent the buildup of hydraulic head on the underlying liner at any time. The depth of fluid in any LCRS sump shall be kept at or below six inches, the minimum needed to ensure efficient pump operation.

38. The LCRS shall function without clogging throughout the active life of the waste management unit and during the post-closure maintenance period.

39. Leachate generation by a landfill unit LCRS shall not exceed 85% of the design capacity of the LCRS or the sump pump. If leachate generation exceeds this value and/or if the depth of fluid in the LCRS sump exceed 24 inches, then the discharger shall immediately cease the discharge of sludge and other high-moisture wastes to the landfill unit and shall notify the Regional Board in writing within seven days. Notification shall include a timetable for a corrective action necessary to reduce leachate production. "

As discussed and described in Technical Staff Report for CAO R9-2006-0016), the existing engineered alternative composite liner system constructed for the Phase 1 WMU does not currently meet the requirements of Order 2000-54, the applicable Federal or State requirements for municipal solid waste/ Class III landfills.

4. **FINDING NO. 4 STATES:**

REVISION OF COMPOSITE LINER DESIGN. Because of construction related defects, the engineered alternative composite liner system constructed for the Phase 1 expansion Unit fails to meet the performance standards set forth in CCR Title 27, 40 CFR Part 258, and waste discharge requirements in Order No. 2000-54.

BASIS FOR FINDING NO. 4

The field evidence reported by the Discharger indicates that the engineered alternative to the prescriptive composite liner design, as

originally included in Order 2000-54, was not properly constructed for the Phase 1 expansion Unit at the Las Pulgas Landfill. Construction quality problems were a significant factor in causing the failure of the composite liner system in the Phase 1 Unit (see Technical Staff Report for CAO Order R9-2006-0016. Order No. 2000-54 currently stipulates that the Discharger may use the Phase I composite liner design in future planned expansions of the landfill. In order to avoid repeated failures of the composite liner design in future planned expansions of the landfill the San Diego Regional Water Board is rescinding language form Order No. 2000-54 recognizing the existing engineered alternative composite liner design and re-establish the requirements to construct a composite liner system design that is consistent with the prescriptive standard design required by relevant sections of State Water Board Resolution No. 93-62 and 40 CFR, Part 258.

5. **FINDING NO. 5 STATES:**

APPLICABILITY. All subsequent expansions/modifications of existing facilities or new phases of solid waste management Unit(s) at the Las Pulgas Landfill must comply with the Discharge Specifications of Order No. 2000-54, as modified by Addendum No. 1. However, the Discharger may propose an alternative to the prescriptive design for a composite liner system. The Regional Board is authorized to consider an alternative design to the prescriptive composite liner design under the conditions specified in California Code of Regulations (CCR), Title 27 §20080(b) and §20080(c), and CFR Title 40, Part 258, § 258.40(a)(1).

BASIS FOR FINDING NO. 5

Alternative design criteria are allowed pursuant to Federal requirements found in CFR Title 40, Part 258, §258.40(a)(1). The Regional Water Boards may allow alternatives to the prescriptive composite liner system requirements pursuant to CCR Title 27, §20080, under the following conditions:

> "(*b) '**Engineered Alternatives Allowed'.** Unless otherwise specified, alternatives to construction or prescriptive standards contained in the SWRCB-promulgated regulations of this subdivision may be considered." Alternatives shall only be approved where the discharger demonstrates that the specific engineered alternative:*
>
> *1. is consistent with the performance goal addressed by the particular construction or prescriptive standard; and*

2. affords equivalent protection against water quality impairment.

*(c) **Demonstration** [for §20080 (b)]—To establish that compliance with prescriptive standards in this subdivision is not feasible for the purposes of §20080(b), the discharger shall demonstrate that compliance with a prescriptive standard either:*

1. is unreasonably and unnecessarily burdensome and will cost substantially more than alternatives which meet the criteria in §20080(b); or

2. is impractical and will not promote attainment of applicable performance standards.

The Regional Board shall consider all relevant technical and economic factors including, but not limited to, present and projected costs of compliance, potential costs for remedial action in the event that waste or leachate is released to the environment, and the extent to which ground water resources could be affected."

The Federal and State Requirements allow the Regional Water Boards to consider a Discharger proposed engineered alternative to the prescriptive composite liner system specified in the applicable Federal (CFR Title 40, Part 258) and State (State Board Resolution No. 93-62 and CCR Title 27) requirements. However, the Discharger must make the technical demonstrations, that are acceptable to the Regional Water Board, as required by the State regulations cited above.

6. FINDING NO. 6 STATES:

ENHANCED CQA - LEAK DETECTION. The construction quality assurance (CQA) plan for the Las Pulgas Landfill should be revised to include geophysical methods to significantly improve the detection of landfill liner defects during the construction process. There are two main ways of detecting leaks using electrical methods: the two electrode method and the electrode grid method. Both leak detection techniques utilize the insulative properties of geomembrane liners. Electrical methods for leak detection have been successfully employed during landfill expansions in other areas of California.

BASIS FOR FINDING NO. 6

The following summary of electrical methods is taken from Hix, (1998 or http://www.epa.gov/tio/download/remed/leaklnfl.pdf). There are two main

ways of detecting leaks using electrical methods: the two electrode method and the electrode grid method. Both leak detection techniques utilize the insulative properties of geomembrane liners. The first method detects the flow of current from one electrode to another through a hole in the insulative liner. The second method depends upon the liner to insulate the containment area so that only leachate which has escaped into the soil will be detected.

Two electrode method

The first method requires installing one electrode inside the landfill, and another in the ground outside the containment area. Electrical current is introduced into the containment area by the electrode inside the landfill. Because of the electrical resistance of the liner, the current will not flow to the electrode in the ground if there are no holes in the liner. Flow of current from one electrode to the other indicates a leak, as shown in Figure 2 (White et al., 1997).

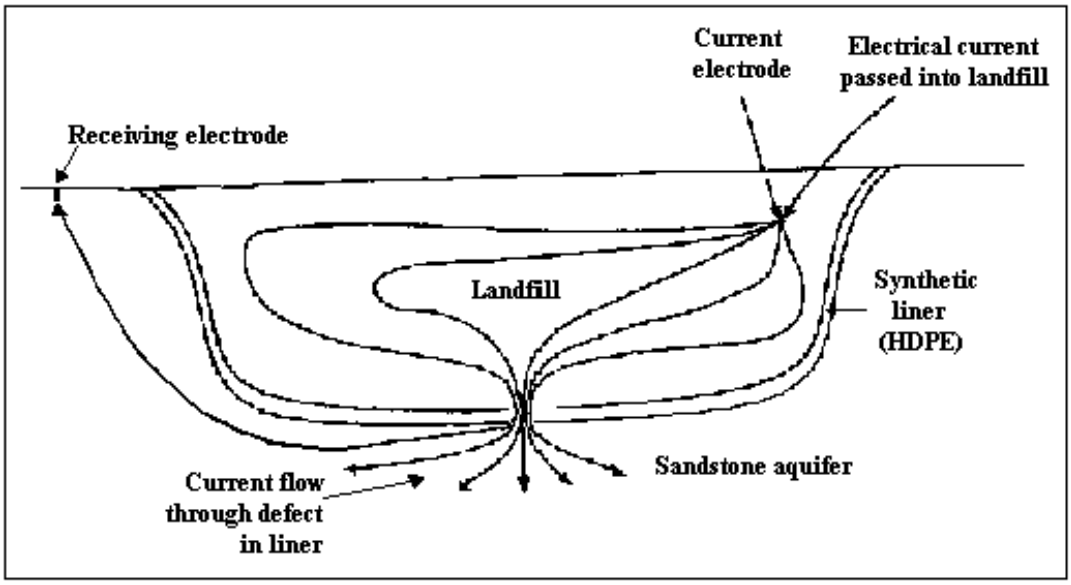

Figure 2: The flow of electrical current through a landfill with a defect in the synthetic liner. (Adapted from White et al, 1997)

a. Advantages

The two electrode method can be especially useful for detecting leaks in pre-existing landfills because this technique does not require the installation of any sensors below the liner.

b. Disadvantages

This method indicates only the existence of a leak, not the number, size or location. Current flow can be caused by one leak or several, and by large or small leaks. In order to determine the location of the leak, a map of the voltage distribution must be determined. This is achieved by passing voltmeters systematically over the liner within several inches of the surface. An area of high voltage indicates a leak. Because voltmeters cannot be passed directly over the liner if the landfill has begun accepting solid waste, the two electrode method is popular for use in liquid containment basins and on solid waste disposal cells which have not yet begun accepting waste (Laine et al., 1993).

Electrode grid method

The second method makes it possible to actually locate leaks in active and closed solid waste landfills. It requires installing a grid of electrodes beneath the primary liner during construction. The electrodes are used to energize the area around the liner and to measure the resulting voltage of the soil near each electrode. Because leachate has a higher electrical conductivity than soil or water, an area of a difference in voltage indicates that leachate has escaped from the liner at that location.

a. Advantages

This system involves simple, durable components that can last for several decades. It monitors the entire area below the liner, not just certain points. In addition to detecting leachate releases, the electrode grid can also detect holes in the liner before waste is placed in the cell in the manner described above. Current is introduced into the protective soil layer. If the current is detected by the electrodes, it has passed through a hole in the insulative geomembrane liner.

b. Disadvantages

This system is not applicable to existing landfills because the electrodes must be installed during the construction of the cell.

Summary

Electrical leak detection systems have been successfully installed in over 20 million square feet of containment facilities at ten sites in the western United States since its first installation in 1987. The largest installation of this technology has been operating at a gold mine in Elko, Nevada for eleven years. (Robison, 1996). Electrical leak detection systems are also

used to find defects in liner systems and to monitor landfills in Europe (VendorFACTS, 1997).

In California, two applications of electronic leak detection methods to improve construction quality assurance (CQA) plans through the early identification of liner defects in a composite liner system are:

Norcal Waste Systems, Ostrom Road Landfill (Order R5-2006-0068). See Region 5 – Central Valley Regional Board web site at: http://www.waterboards.ca.gov/rwqcb5/adopted_orders/Yuba/R5-2006-0068.pdf

Norcal Waste Systems, Hay Road Landfill, Class II and Class III Landfill, (Order R5-2003-0118). See Region 5 – Central Valley Regional Board web site at: http://www.waterboards.ca.gov/rwqcb5/adopted_orders/Solano/R5-2003-0118.pdf

7. FINDING NO. 7 STATES:

CEQA. The Las Pulgas Landfill is an existing facility and as such is exempt from the provisions of the California Environmental Quality Act (CEQA) in accordance with CCR Title 14, Chapter 3, Article 19, §15301.

BASIS FOR FINDING NO. 7

CCR Title 14, Chapter 3, Article 19, §15300 provides that certain classes of projects listed in Article 19 do not have a significant effect on the environment, and they are declared to be categorically exempt from the California Environmental Quality Act (CEQA) requirements for preparation of environmental documents. CCR Title 14, §15321(a) identifies certain actions by regulatory agencies involving enforcement of a law, general rule, standard, or objective, administered or adopted by the regulatory agency as being categorically exempt pursuant to CCR Title 14, §15300. The Regional Water Board's regulatory action of issuing an amendment to existing waste discharge requirements to require the Discharger to construct a prescriptive liner under CCR Title 27, §20080, and 40 CFR, Part 258, falls under the class of projects defined by CCR Title 14, §15321(a) and is therefore categorically exempt from the CEQA's requirement for the preparation of environmental documents.

8. DISCHARGE SPECIFICATION 1 STATES:

1. Discharge Specifications B.32 and B.33, in Order 2000-54, are deleted and replaced with the following specifications:

Composite Liner Design

32. Prescriptive Design:

a. **Upper component—**Has a Synthetic Liner at least 40-mils thick (or at least 60-mils thick if of high density polyethylene) that is installed in direct and uniform contact with the underlying compacted soil component described in Specification B. 32(b), and

b. **Lower component—**Has a layer of compacted soil that is at least two feet thick and that has a hydraulic conductivity of no more than 1×10^{-7} cm/sec (0.1 feet/year).

c. **Steep sideslopes:** Containment systems installed in those portions of the landfill where an engineering analysis shows, and the Regional Water Board finds, that sideslopes are too steep to permit construction of a stable composite liner that meets the prescriptive standards contained in Discharge Specification B.32, shall include an alternative liner that meets the performance criteria contained in 40 CFR §§258.40(a)(1) and (c) and that either:

1) Is a composite system and includes as its uppermost component a Synthetic Liner at least 60-mils thick (or at least 80-mils if high density polyethylene) that is installed in direct and uniform contact with the underlying materials; or

2) Is not a composite system, but includes a Synthetic Liner at least 60-mils thick (or at least 80-mils if of high density polyethylene) that is installed in direct and uniform contact with the underlying materials; and

3) Includes a leachate collection and removal system which conveys to a sump (or other appropriate collection area lined in accordance with Discharge Specification 32) all leachate which reaches the liner, and which does not rely upon unlined or clay-lined areas for such conveyance. 33.

d. **Engineered alternative composite liner.** The Discharger may propose an engineered alternative to the prescriptive composite

liner design[3], as specified in Discharge Specifications B.32(a), B.32(b) and/or B.32(c) of this Order, by submitting the required information specified in CCR Title 27 § 20080(b) to the Regional Board for consideration.

33. Electrical Leak Detection Survey of Synthetic Liner:

After completing installation of a synthetic liner (geosynthetic membrane) component, the Discharger shall:

1. Complete an electrical leak location survey (ELLS), using it to check the integrity of on all bottom and sideslope areas covered by the geosynthetic membrane component,

2. Take necessary steps to identify and repair all defects located in the geosynthetic membrane component, and

3. Include the results from the ELLS and any repairs to the geomembrane in the relevant construction quality assurance (CQA) report including: text discussions of field activities, daily logs of defect repairs, results from all testing performed to assess the integrity of patches/repairs made to the geosynthetic membrane, separate site plot plan indicating location(s) of all defects/repairs performed for each geosynthetic membrane layer – these site plot plans shall be made to the same scale to facilitate comparison between geosynthetic membrane layers, and supporting photographs- of all defective areas and repairs made to the geosynthetic membrane component.

BASIS FOR DISCHARGE SPECIFICATION NO. 1

On June 17, 1993, the SWRCB adopted Resolution No. 93-62:"*Policy for Regulation of Discharges of Municipal Solid Wastes.*" SWRCB Resolution No. 93-62 amended CCR Title 23, Chapter 15 regulations to be consistent with the applicable Federal requirements found in Code of Federal Regulations (CFR) Title 40, Part 258. Resolution No. 93-62 requires the Regional Water Boards to take a number of actions, as discussed in the Basis for **Finding 4** above. Resolution No. 93-62 also set the minimum prescriptive requirements for composite liner systems at municipal solid

[3] As indicated in Finding 2 of this Addendum to Order 2000-54, engineered alternatives to prescriptive composite liner design are allowed by Title 40 Code of Federal Regulations (40 CFR), § 258.40(a)(1) and (c).

waste (or Class III) landfills as (see Attachment 4, Resolution No. 93-62, Section III):

A. **Prescriptive Design for Bottom composite liner systems**:

i. **Upper component --** Has a Synthetic Liner at least 40-mils thick (or at least 60-mils thick if of high density polyethylene) that is installed in direct and uniform contact with the underlying compacted soil component described in paragraph III.A.1.a.ii.; and

ii. **Lower component --** Has a layer of compacted soil that is at least two feet thick and that has an hydraulic conductivity of no more than 1×10^{-7} cm/sec (0.1 feet/year); or

B. **Alternative design** satisfies the performance criteria contained in 40 CFR Sections 258.40(a)(1) and (c), and satisfies the criteria for an engineered alternative to the above Prescriptive Design [as provided by 23 CCR Section 2510(b) now 27 CCR Section 20080(b)], where the performance of the alternative composite liner's components, in combination, equal or exceed the waste containment capability of the Prescriptive Design;

C. **Liner Systems on steep sideslopes --** Containment systems installed in those portions of an MSW landfill where an engineering analysis shows, and the Regional Water Board finds, that sideslopes are too steep to permit construction of a stable composite liner that meets the prescriptive standards contained in Sections III.A.1 or 2. shall include an alternative liner that meets the performance criteria contained in 40 CFR Sections 258.40(a)(1) and (c) and that either:

a. Is a composite system and includes as its uppermost component a Synthetic Liner at least 40-mils thick (or at least 60-mils if high density polyethylene) that is installed in direct and uniform contact with the underlying materials; or

b. Is not a composite system, but includes a Synthetic Liner at least 60-mils thick (or at least 80-mils if of high density polyethylene) that is installed in direct and uniform contact with the underlying materials; and

D. **Standards for leachate collection --** Include a leachate collection and removal system which conveys to a sump (or other appropriate collection area lined in accordance with Section III.A.) all leachate

which reaches the liner, and which does not rely upon unlined or clay-lined areas for such conveyance.

Evolution of composite liner systems -- Since the State Board adopted Resolution No. 93-62, and the California Water Quality Control Board (Regional Water Board) staffs have gained more experience with single composite liner systems at municipal solid waste (Class III) Landfills, the Regional Water Boards have generally moved in a direction requiring more robust composite liner systems to further reduce the risk of leakage. A number of examples of the more robust composite liner designs include:

1. Use of a synthetic membrane comprised of a minimum thickness of 80-mils for HDPE used in single composite liner systems on bottom and sideslopes of landfills (San Francisco Bay Regional Water Board and Santa Ana Regional Water Board):
   a. Lamb Canyon Landfill (Order 2001-18 adopted by the Santa Ana Regional Water Board) available at http://www.swrcb.ca.gov/santaana/pdf/01-18.pdf
   b. Guadalupe Rubbish Disposal Company, Inc., Class III Solid Waste Disposal Site (Order No. 2001-050 adopted by the San Francisco Bay Regional Water Board) available at http://www.swrcb.ca.gov/sanfranciscobay/OrderNum/01-050.doc

2. Adoption of double composite liner system designs comprised of at least two flexible membrane (synthetic) liners (e.g., synthetic membranes, on compacted clay liner and/or geocomposite clay liners, or some combination thereof). Examples of recently adopted double composite liners at MSW landfills can be found for:

   a. A double composite liner system at Sunshine Canyon Landfill (Order R4-2003-0155 adopted by the Los Angeles Regional Water Board) available at: http://www.waterboards.ca.gov/losangeles/html/permits/general_permits.html
   b. A double composite liner system including a “leak detection layer”, adopted by the Central Valley Regional Water Board for the Kiefer Class III Landfill (Order R5-2002-0187). The Order and Monitoring Program are available on-line at: http://www.waterboards.ca.gov/centralvalley/adopted_orders/Sacramento/R5-2002-0187.pdf.

c. A multiple composite liner system at the El Sobrante Landfill (Order 01-53, Santa Ana Regional Water Board) at: http://www.waterboards.ca.gov/santaana/html/adopted_orders.html).

3. Although not strictly applicable to facilities managing and disposing of nonhazardous municipal solid wastes (MSW) regulated pursuant to CFR Title 40, Part 258 and CCR Title 27; the regulatory requirements for construction and performance of secondary LCRS/leak detection system are found in CFR Title 40, Part 264, Subpart N, §264.301(c)(3) – Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities. Double composite liner systems offer an advantage by including a "secondary leachate collection" or "leak detection" layer for early detection of leaking liquid (leachate) or waste degradation products (e.g., landfill gas) from the Unit.

   In the San Diego Region, more recently a double composite design of landfill liner system is being proposed for the proposed Gregory Canyon Landfill (see proposed double composite liner system at: http://www.waterboards.ca.gov/sandiego/units/ldu/gregory_jtd.html).

The San Diego Regional Water Board's experience with construction problems with a less robust single composite liner design at the Las Pulgas Landfill, and a statewide move to more robust composite liner designs (see above), justifies establishing the more robust minimum composite liner requirements for future waste management Units at the Las Pulgas Landfill.

The revised composite liner design specification, in Discharge Specification 2 of tentative Addendum 1 to Order 2000-54, is an option for improving the performance of future landfill liner systems at the Las Pulgas Landfill. Other options exist, as exemplified by the composite liner designs recently adopted by the Santa Ana, Los Angeles and Central Valley Regional Water Boards (see above); and those composite liner systems recently proposed for consideration (for proposed Gregory Canyon Landfill) by the San Diego Regional Water Board.

Based on the forgoing the San Diego Regional Water Board concludes that the modification to Order 2000-54 should include the following elements:

a.) Establish the prescriptive composite liner design in SWRCB Resolution No. 93-62 as the minimum composite liner system requirements for the Las Pulgas Landfill.
b.) Require the Discharger to enhance their construction quality assurance (CQA) procedures to include completion of an electrical leak detection survey (see discussion in Basis for **Finding 6** of Addendum No. 1 above) after installation of the geosynthetic portion of the liner system and prior to construction of the primary LCRS.
c.) Order 2000-54 should provide that the Discharger (USMC) may propose an engineered alternative, in compliance with applicable State and Federal regulations, for further consideration by the San Diego Regional Water Board (as indicated by **Finding Nos. 2 and 5** of Addendum No. 1).

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