STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF DECEMBER 4-5, 2008
Prepared on November 10, 2008

ITEM NUMBER: **15**

SUBJECT: **Landfill Program Update**

SUMMARY:

This status report provides a Land Disposal program update including a program overview, staffing, priorities, fiscal year 2007-2008 achievements, proposed work for fiscal year 2008-2009, and brief summaries for selected landfills throughout the Central Coast region.

DISCUSSION:

Program Overview: Land Disposal program staff oversee approximately 100 landfills throughout the region, of which 58 are covered by either individual (35 sites) or general (23 sites) waste discharge requirements (WDRs). Of the 35 facilities covered under individual WDRs, there are 15 active landfill sites. Disposal sites in the region range in size from active, hundred acre, multi-cell, state-of-the-art facilities (e.g., Monterey Peninsula and Cold Canyon) to small, unpermitted one- to two-acre closed sites (e.g., Creston and Van Gordon).

The overall trend in landfilling during the last fifteen years has been towards larger, regional facilities (Tajiguas, Monterey Peninsula, Johnson Canyon, Las Flores, etc.) and away from smaller landfills. As such, a number of smaller sites have moved through closure/final cover installation and are now in the post-closure, maintenance and monitoring phase. Examples of these smaller site closures include landfills at Foxen Canyon, Pacheco Pass, New Cuyama, and Jolon Road. In mid 2009, the Crazy Horse Landfill in Prunedale will close at which time, the Salinas Valley Solid Waste Authority (SVSWA) plans to divert its waste stream to Johnson Canyon Landfill in Gonzales.

This shift to larger regional sites reflects promulgation of revised regulations at the state (Chapter 15 of Title 23, pre-Title 27) and federal (Subtitle D) level in the early 1990s. New state and federal landfill regulations required low-permeability liner and leachate collection systems for all new landfill cells. These more protective landfill regulations were borne out of studies, including California's Solid Waste Assessment Test (SWAT) program, which indicated a very high correlation between unlined landfills and groundwater impacts. As evidence, greater than 90 percent of the unlined landfills in this region have impacted groundwater, and as a result are in some form of corrective action to address these discharges.

Program Staffing: Funding for program staff comes from two sources. Active landfills pay a portion of their tipping fees into an account administered by the Integrated Waste Management Board. The State and Regional Water Boards receive a portion of these fees to oversee regulatory compliance at active landfill sites. Annual fees, associated with WDRs, pay for oversight of Closed landfills.

The State Water Board provides funding for approximately 2.6 staff to oversee the land disposal program in this region. In contrast, the State Water Board provided funding for approximately 5.0 staff for this region in 2000. This reduction in resources reflects declining tipping fees from active landfills, although this region received a disproportionately large reduction in personnel authority relative to other regions.

The Land Disposal unit consists of Dean Thomas and Martin Fletcher, who work exclusively on landfill issues, and Dan Niles who dedicates approximately 30 percent of his time to landfill sites. Thea Tryon is the Land Disposal program manager (accounting for about 30 percent of her time), and John Robertson is the Groundwater Section manager who oversees the Landfill program in addition to the Site Cleanup, Underground Storage Tank, Department of Defense and Perchlorate programs.

Program Priorities: The primary focus of the Land Disposal program is to protect and restore beneficial uses of surface and groundwater and minimize public health impacts from waste. The Land Disposal team's work consists of developing WDRs based on individual siting conditions and proposed liner designs, compliance inspections, evaluations of groundwater monitoring data and proposed liner and cover designs, enforcement tasks for active and closed land disposal sites, proper geologic siting of future landfills, and implementation of best management practices for stormwater runoff. The Land Disposal program prioritizes our work based on sites that pose the greatest threat to water quality and those landfills that are undergoing expansions that require oversight to ensure protective liner designs. Groundwater impacts generally result from landfill gas and leachate dissolving into groundwater. The sites posing the greatest risk to groundwater are older, unlined landfills with poor underlying geologic conditions (e.g., high permeability soils). As an example of priorities in action, since 2001, the Central Coast Water Board has required closure at two sites, Santa Maria (in 2002) and Crazy Horse (pending in 2009) through the adoption of revised WDRs. These are both large facilities with a high proportion of unlined acreage. In this sense, closure means that these sites will no longer receive municipal solid waste, and will construct final cover systems over the existing refuse. Consistent with the impacts associated with unlined landfilling discussed in the Program Overview section above, we will continue to direct facilities toward landfilling on liner systems appropriate for the geologic conditions beneath their sites.

Other Land Disposal team priorities include:

- Emphasis on a field inspection presence during liner and final cover construction projects at any facility in the region. These construction projects provide the means for containment of wastes, leachate, and landfill gas. We also evaluate liner design, liner component selections, slope stability, and construction specifications associated with each landfill expansion or final cover project – on average we receive about six joint technical documents with expansion/cover plans per year.
- Requirements that all bottom liner systems are designed to accommodate anticipated settlement and displacement in the subgrade. This is usually achieved through an engineered alternative design that includes a compacted clay component (typically one-foot thick or more).
- Wet weather preparedness for all sites in advance of each rainy season. Most landfill problems associated with water quality manifest during the rainy season (e.g., leachate generation, ponding on the cover, runoff, erosion, etc.). We send out an annual letter to all

of our sites prior to the rainy season, addressing areas of concern we will focus on during ensuing pre-wet weather inspections, usually conducted in October.

- Groundwater trend evaluation for organic and inorganic compounds. We evaluate monitoring data to determine if impacts from lined or unlined landfill cells exist. As we determine a facility has a discharge to groundwater, we initiate the evaluation and corrective action processes, consistent with Title 27 requirements.

Our work products far exceed this short list of priorities, and as such, we will continue to evaluate and redefine, as needed; the most important work we do in the Land Disposal unit.

Fiscal Year 2007-2008 Achievements: In the 2007-2008 fiscal year, the Landfill unit completed updates for three WDRs (Santa Maria, Johnson Canyon, and Foxen Canyon landfills).

Consistent with the priorities listed above, during the preceding fiscal year, we monitored liner or final cover construction projects at Santa Maria, Jolon Road, Foxen Canyon, Tajiguas, Buena Vista, Crazy Horse, John Smith Road, Monterey Peninsula, and Rancho Los Lobos. This field presence helps assure that construction adheres to design, waste discharge, and regulatory requirements.

Proposed Work for Fiscal Year 2008-2009: Complete four WDR updates for active landfill sites (Paso Robles, Chicago Grade, Camp Roberts, and John Smith Road landfills). Each of these active landfills has one or more proposed expansions beyond the permitted footprint defined in the current WDR. Updating WDRs for each of these sites affords us the opportunity to put in place the appropriately protective liner design requirements, specific to each individual site's geologic and hydrogeologic setting, for these expansion areas. The updated requirements will also comply with current regulations and we will include requirements that protect water quality and mitigate existing groundwater impacts, as appropriate.

SUMMARIES FOR SELECTED LANDFILLS:

Santa Maria Landfill, City of Santa Maria, Santa Barbara County

Acreage:	290 acres
Life Span:	10 years with optional Cell No. 2; 6 years without Cell No. 2
Corrective Actions:	Enhanced landfill gas extraction; forced closure

The 290-acre site is located along the southern margin of the Santa Maria River, directly behind a Corps of Engineer-built levee that bounds the river's margin. The landfill is divided into three basic areas: the Inactive Area, Closed Active Area, and the Lined Active Area. The 68-acre Inactive Area was a burn dump until it was closed in the 1960s and currently has a soil cover ranging in thickness from 3 to 10 feet. The 118-acre Closed Active Area was landfilled using trench and fill followed by area fill methods. There is no bottom liner or leachate collection system between municipal solid waste (MSW) and underlying river sediments. Groundwater periodically contacts the waste during high recharge years (last such occurrence in 1998). The area received waste from the late 1960s until late 2002. Approximately 70 acres of the northwest portion of this area have received a final cover, with the remaining 48 acres awaiting foundation layer soil to bring the landfill slopes to final grade. Nonhazardous hydrocarbon impacted soils (NHIS) are used as foundation layer for the final cover, and provide proper crowning and drainage. The Lined Area consists of two cells totaling 61 acres. Cell No. 1 has been active since December 2002 and covers 36 acres; unconstructed Cell No. 2 covers 25 acres. The design of the cells in the Lined Area includes a double-liner system, complete with an under drain for shallow groundwater, a leak detection system, and geocomposite clay liner at

the base of the leachate collection and removal system. The City plans to move MSW operations to a new location (the proposed Las Flores Landfill) before capacity in Cell No. 1 is exhausted. The draft Environmental Impact Report and Report of Waste Discharge for the proposed Las Flores Landfill are scheduled for submittal in Winter 2008/2009.

As discussed in the October 19, 2007 Water Board meeting, the Army Corps of Engineer's (COE) levee was designed to contain a 500-year flood event; however, in early 2007, the COE downgraded the protection provided by the levee to below 100-year flood event. As a result, the preliminary revised flood map from the Federal Emergency Management Agency (FEMA) places the landfill area within the 100-year flood zone. This potentially places the landfill in conflict with state and federal landfill regulations, which require that the landfill is protected from inundation and washout from a 100-year flood event. However, FEMA retracted the preliminary revised flood maps. FEMA plans to reissue the revised flood maps in fall 2008, with the maps projected for finalization following a year-long review and appeal process. The City is working with Santa Barbara County to improve drainage in the river and stockpile rip rap in preparation for the 2008/2009 wet season. When FEMA's maps become effective, the City will report on the susceptibility of the landfill to flooding, along with proposed protection measures, if necessary.

Groundwater impacts associated with the Closed Active Area include low-level volatile organic compounds (VOCs) and inorganic constituents such as manganese. As part of groundwater corrective action, the Water Board forced cessation of municipal solid waste disposal in this area in 2002, and the City implemented an incremental (rolling) cover program. The City also continues to enhance the landfill gas extraction system. These actions have been effective in reducing the VOC impacts to below maximum contaminant levels (MCLs), although cleaning up inorganic impacts is progressing more slowly. The City evaluated the source and fate and transport mechanisms for the inorganic constituents in early 2008. The report indicates that the inorganic concentrations improve in monitoring wells adjacent to areas that received final cover. Also, laboratory results from samples collected from surrounding supply wells (agricultural) indicate manganese levels below Water Quality Objectives. In winter 2007, the City finished placing the plastic bottom liner for the NHIS foundation layer over the remainder of the Closed Active Area and improved the landfill gas collection system. Staff expects significant reductions in inorganic concentrations as a result.

Chicago Grade Landfill, Atascadero, San Luis Obispo County

Acreage:	188 acres
Life Span:	10 years as permitted; 34 years with approval of proposed expansion
Corrective Actions:	Landfill gas extraction

The existing waste footprint (Modules 1-3) occupies an area of about 34 acres within the 188-acre Waste Management Facility. Module 1 encompasses 24.5 acres and is the only unlined portion; however, approximately 2.5-acres of Module 1 adjacent to Module 2 were lined with a flexible membrane liner (over existing MSW) before expanding vertically in the area. The 3.5-acre Module 2 and 6-acre Module 3 include prescriptive (Subtitle D) bottom liner systems. A recycling area covers about four and one-half acres, located in the northeast corner of the facility, where 10-15 percent of incoming waste is recycled. Module 4 covers a portion of Modules 3 and 1 and results in approximately 8 additional acres of waste footprint. The Discharger is currently excavating Module 4 and using the soil for daily landfill operations. The proposed expansion (Modules 6 and 7 [No Module 5 proposed]) would add about 38 acres to the disposal area. Water Board staff plans to present an updated WDR for Chicago Grade at the February 2009 Board Meeting.

With the exception of sporadic detections of dichlorodifluoromethane (Freon), the owner has not reported detections of VOCs in the landfill groundwater monitoring wells (VOCs are typically associated with landfill gas and leachate). The owner employs 27 landfill gas extraction wells to control migration of landfill gas.

Because of the steep slopes at the site, the landfill has had problems in the past with controlling leachate seeps. In addition, management of stormwater run-off and run-on has been challenging during wetter years. Pursuant to National Pollutant Discharge Elimination system (NPDES) stormwater requirements, the Discharger continues to modify best management practices, including modifying sediment retention basins, to improve stormwater effluent concentrations of inorganic constituents.

Paso Robles Landfill, City of Paso Robles, San Luis Obispo County

Acreage: 80 acres
Life Span: 43 years assuming current waste disposal rates
Corrective Actions: Landfill gas extraction

The 80-acre municipal solid waste facility currently has a waste footprint of 31 acres, but is permitted for 65 acres at full build-out. Two portions of the landfill are unlined: the north existing refuse fill area (4.7 acres), and the south existing refuse fill area (14.8 acres) each with an interim cover. The south area has reached final grade but landfilling continues over the north area and in lined modules 1, 2A, 2B, and 3A (each 2.1 - 3.2-acres in size). Water Board staff includes a proposed updated WDR the Paso Robles Landfill for consideration at the December 4-5, 2008 Board Meeting.

Historically, the City has detected volatile organic compounds (VOCs) in vadose (unsaturated) zone monitoring probes (lysimeters) located in the southwest corner of the south existing refuse fill area. The City responded to these detections by enhancing landfill gas extraction in the area. The improved landfill gas extraction appears to be an effective remedy as the lysimeters have generally been dry, and for the lysimeters with water, VOC concentrations are decreasing. No consistent detections of VOCs have occurred in perched groundwater or the underlying aquifer at the landfill. In the future, declining groundwater levels may result in replacement of some monitoring wells in order to continue monitoring the decreasing trends in VOC concentrations.

In 2003, Water Board staff issued the landfill an NOV in response to excessive erosion and offsite discharge of sediment. The City has since implemented stormwater best management practices that appear to have solved the problem because Water Board staff has not observed significant erosion since that time.

Crazy Horse Class III Sanitary Landfill, Prunedale, Monterey County

Acreage:	160 acres
Life Span:	Less than one year
Corrective Actions:	Groundwater pump and treat, enhanced bioremediation (southern area; landfill gas extraction (eastern area)

The landfill site is a 160-acre parcel, with 72 acres of the site permitted for municipal solid waste disposal. Salinas Valley Solid Waste Authority (SVSWA) own and operates this site. The

landfill began operation in 1934 and operated as a burn dump until 1966. In 1966, the Discharger changed the burn dump operations to sanitary landfill operations, with Closed Module I now covering that area. Disposal operations continued in the six-acre Module I area until about 1972. The current active disposal area has been in operation since 1972 and covers approximately 66 acres. SVSWA is developing the active landfill in phases over 15 acres of lined and 51 acres of unlined area (pre-Subtitle D requiring bottom liner systems).

There are three groundwater plumes, one south, west, and east of the landfill. In 1988, SVSWA installed and began operating a groundwater extraction and treatment system to mitigate groundwater impacts from Module I (Module I plume, located south of the landfill). In 1988, as a further remediation measure, the SVSWA installed a final cover on Module I. Based on the groundwater impacts from Module I, the U.S. Environmental Protection Agency placed Module I on the National Priorities List (NPL) and the landfill became a Superfund site in 1990. SVSWA determined the Module I plume remains stable without operation of the groundwater extraction system, and recommends in-situ bioremediation, possibly coupled with targeted groundwater extraction, as the preferred remedial alternative for this plume. A pilot study, scheduled for completion in winter 2009, will evaluate the effectiveness of in-situ bioremediation. SVSWA also restarted the groundwater extraction system along the property boundary to ensure VOCs do not migrate to domestic wells nearby.

SVSWA recently characterized the nature and extent of the eastern and western groundwater plumes; and identified enhanced landfill gas recovery and final closure as the best remedial strategies for controlling these plumes.

Revised Waste Discharge Requirements (WDR) Order No. R3-2007-0003 requires that the landfill close by April 2009. After closure, SVSWA plans to maintain a transfer station at Crazy Horse to divert municipal solid waste to the Johnson Canyon Landfill, located in Gonzales. The landfill's final cover system will provide a critical component of the groundwater corrective action by preventing percolation of water into the waste, which is the primary driving mechanism for forming landfill gas and leachate, which then dissolves into groundwater.

Johnson Canyon Landfill, Gonzales, Monterey County

Acreage: 163 acres
Life Span: 31 years with Module 456B expansion
Corrective Actions: Landfill gas extraction

This Salinas Valley Solid Waste Authority (SVSWA)-owned, 163-acre landfill is currently permitted for a waste footprint of 80 acres; SVSWA proposes an expansion to 96.3 acres. The Water Board adopted an updated WDR in March 2008. During the summer-fall of 2008, the executive officer approved a 12.2-acre landfill expansion. Following closure of the Crazy Horse Landfill in early 2009 the Johnson Canyon Landfill will effectively serve most of the northern Salinas Valley (formerly also served by Lewis Road Landfill [closed in 2002], and Jolon Road Landfill [closed in 1997]). The landfill's fill sequencing will cover 96 acres, divided into one 6.3-acre unlined module and nine lined (existing and proposed) modules, comprised of sequentially excavated and lined rectangles that are approximately 30-feet (ft) deep by approximately 1200-ft long by 200-ft wide. Two modules, covering 6.8 acres are lined with one-foot of compacted clay and include leachate collection systems (pre-Subtitle D).

Landfill monitoring wells contain VOCs at less than 5 µg/L, at approximately half of applicable MCLs. Based on the chemical signature and low concentrations in groundwater, SVSWA

identified landfill gas as the source for the VOCs in groundwater. In 2000, SVSWA installed a gas extraction system and upgraded it in 2005 to include six downgradient gas extraction wells. VOC concentrations have stabilized since the upgrade.

All stormwater from the site drains to a series of sediment retention basins. To date, no stormwater has left the site because of the basins' large holding capacity and because SVSWA re-uses the collected stormwater for dust control at the landfill.

John Smith Road Class I and Class III Landfill; City of Hollister, San Benito County

Acreage:	65.3
Life Span:	19 years for municipal solid waste
Corrective Actions:	Groundwater pump and treat; landfill gas collection, stormwater runoff controls

There are two main components to the facility: the 8.3-acre hazardous waste (Class I) cell and the active 29-acre municipal solid waste (Class III) area. The Class I cell is closed. The 29-acre Class III portion includes lined and unlined areas. The owner, San Benito County, estimates 19 years of remaining capacity.

In March 2009, San Benito County completed construction of Module 2, a 13-acre disposal area expansion. The Water Board-approved liner design consists of (from bottom top) prepared subgrade, one foot of low permeability clay, a geosynthetic clay liner, an 80-mil high density plastic liner, and a leachate collection and removal system. This design was an alternative to the prescriptive standards, and will be more protective than the minimum regulatory requirements. San Benito County will place a protective soil/operations layer over the liner system prior to waste disposal.

Water Board staff required San Benito County to propose corrective actions for the new waste management unit in response to potentially high groundwater conditions. Title 27 of the California Code of Regulations requires a five-foot separation between groundwater and waste. Corrective actions include reduced infiltration in groundwater recharge areas adjacent to the new waste management unit, expanded groundwater monitoring near the lowest portion of the waste management unit and adjacent to locations with historic high groundwater elevations, and expanded leachate collection and removal system performance monitoring. In the event groundwater rises within five feet of the waste management unit, Water Board staff will require San Benito County to implement measures to maintain the required five feet of separation. The County's actions, including re-grading over groundwater recharge areas to reduce infiltration by directing stormwater flows away from the waste management, appear to adequately maintain separation between groundwater and wastes, although the San Benito County will continue to monitor this separation.

The unlined portion of the landfill continues to receive waste. San Benito County addresses associated groundwater contamination through corrective actions including enhanced landfill gas collection and modifications to the groundwater pump and treat system. These actions have successfully reduced VOC concentrations of in groundwater.

Monterey Peninsula Class III Landfill (also known as the "Marina Landfill"); Marina, Monterey County

Acreage:	475
Life Span:	99 years
Corrective Actions:	Groundwater natural attenuation; liquids controls; landfill gas collection

The landfill covers 475 acres, comprised of unlined and lined disposal areas. The landfill serves as a regional disposal facility operated by the Monterey Regional Waste Management District (District) and has an anticipated life of 99 years according to the District. The District also operates extensive materials recovery, recycling, and green waste programs. Overall, the District has a positive compliance record and is proactive in implementing changes to ensure water quality protection. A recent positive change was the District's improved management of non-hazardous liquids wastes. In compliance with revised waste discharge requirements and a revised waste acceptance plan, the District handles liquid wastes prior to disposal by mixing with processed green wastes (chipped yard and landscape material) to absorb free liquids. The District performs this operation periodically in an area (approximately 250 square feet) on top of a lined waste management unit known as Module 3.

The District detected minor groundwater contamination in an area where historic automotive operations occurred. Declining VOC concentrations in groundwater indicate that ending the automotive operations and natural attenuation are resulting in improved water quality. Groundwater monitoring indicates wastes are currently contained and landfill gas collection has provided effective controls.

Pacheco Pass Class III and Inert Waste Landfill; Santa Clara County

Acreage:	170
Life Span:	no longer accepting municipal solid waste (final closure for 2009)
Corrective Actions:	Surface water controls; landfill gas collection; groundwater evaluation monitoring

The 170 acre landfill consists of a 31-acre lined and unlined area for municipal solid waste disposal and a 35 acre area for inert waste disposal. Norcal Waste Systems, Inc. (Norcal) owns and operates the landfill. Norcal also operates a green waste compost facility and a construction/demolition debris recycling facility within the landfill boundary. The green waste compost is comprised of food and yard wastes.

Monitoring data indicate low level, but increasing trends in VOCs in groundwater. Norcal stopped accepting municipal solid waste in September 2008 and plans to install a final cover in 2009. Norcal will also expand the landfill gas collection system. Control of landfill gas and installation of a final cover is a key measure for protection of groundwater. Sometimes landfill gas-derived groundwater impacts increase with the installation of low-permeability final cover but by improving the landfill gas recovery system, Norcal will mitigate this potential impact.

Water Board staff will review groundwater monitoring data and contaminant trends to evaluate the efficacy of the expanded gas collection system and the final cover (once the final cover is installed). In the future, Water Board staff may require Norcal to implement additional corrective action measures if groundwater impacts are not mitigated.

Santa Cruz Class III Landfill; Santa Cruz County

Acreage:	100
Life Span:	33 years
Corrective Actions:	Leachate collection and disposal, expanding landfill gas collection system

The landfill comprises 40 acres of unlined disposal area, 6.0 acres of lined disposal area, of which 4.5 acres is designated for wet weather disposal operations; and 26.3 acres designated for future disposal over liners. The facility is owned and operated by the City of Santa Cruz (the City) and includes green waste operations, a recycling center, a "gas to energy" plant (through subcontract), and a hazardous materials collection program for temporary storage of waste destined for offsite disposal at a Class I landfill.

The City recently re-delineated the extent of waste disposal in an unlined cell. The effort was to better define a small portion of the future construction boundary for Cell 3, which will be a lined waste management unit. Cell 3 will be the third in a series of expansions of lined disposal units, each cell having leachate collection and removal systems. The City anticipates construction of Cell 3 will commence in 2009. Landfill operations will continue within unlined and lined areas until the City meets its projected disposal capacity.

Similar to many active facilities, the City has expanded its landfill gas collection system to control gas migration and mitigate associated impacts of VOCs in groundwater. The City has an extensive groundwater monitoring well network and data indicate the extent of groundwater impact has stabilized immediately adjacent to the southern landfill boundary. The City has an excellent compliance record and is proactive in identifying and taking corrective actions for groundwater, surface water, leachate collection and removal system appurtenances, and landfill gas controls. Water Board staff and the City have worked successfully together to improve stormwater controls, including more basin retention time, redirection to temporary retention basins, additional monitoring points, regularly scheduled sweeping in the recycling materials processing area, and better separation from landfill recycling processing areas near waste disposal cells.

Vandenberg Air Force Base Class III Landfill: Santa Barbara County

Acreage:	172
Life Span:	81 years
Corrective Actions:	Slurry wall with interceptor trench at down-canyon toe of landfill for leachate collection and disposal, landfill gas collection system, stormwater controls

The landfill property comprises 172 acres with a 46-acre active, unlined disposal area. In addition, six small disposal areas exist outside this area, covering a total of ten acres; these six sites predate Title 27 requirements regulating waste discharges to land. The United States Air Force owns the landfill while the Environmental Compliance and Operations divisions of Vandenberg Air Force Base (the Base) manage disposal operations and compliance activities.

The Base increased waste diversion through reclamation, recycling, and reuse operations. These efforts have reduced waste disposal to a fraction of the Base's permitted volume. Structural improvements to drainage conveyance performed by Base personnel within the northern area of the landfill property (outside the waste footprint) have resulted in reduced localized infiltration/recharge to groundwater. Reduced infiltration in the northern area results in

further separation between groundwater and the bottom of the unlined waste disposal areas, and significantly reduces groundwater extraction volumes at the toe of the landfill where a slurry wall extraction system is located. These combined measures help ensure ongoing protection of groundwater quality.

The Base has an excellent compliance record for landfill operations. The Base conducts ongoing landfill maintenance, especially at the southern-most portion of the property, below the down-canyon edge of the landfill. The Base continues to manage erosion control from stormwater flows that sometimes result in sediment discharges to Oak Creek Canyon, a dry canyon drainage. Base personnel constructed various engineered runoff control systems to manage erosion within the landfill property and down drainage from the toe of the landfill. During the 2007/2008 wet season, the Base nearly completed structural controls along the southern boundary of the landfill property, however, a high intensity storm in December 2007 caused major damage to newly installed runoff control features. Base personnel took prompt interim control measures to stabilize the area and runoff structures for the remainder of the wet season. These controls were effective in mitigating further deterioration in the condition of stormwater structures. Water Board staff and Base personnel surveyed the offsite discharge area and determined no sediment discharges to surface water had occurred.

Base personnel are currently assessing how to achieve effective stormwater controls to reduce the volume of stormwater run-on from an 850-acre area that has historically flowed through the southern-most portion of the landfill property and down Oak Creek Canyon. Base personnel are evaluating how to re-route the run-on so it does not come through the landfill boundary. Part of the assessment covers ensuring erosion problems are not created elsewhere as a result of re-directed stormwater flows.

The Base also operates a groundwater extraction system at the toe of the landfill. Laboratory analytical data from extracted groundwater periodically indicate low concentrations of constituents characteristic of landfill leachate. Laboratory data from groundwater monitoring wells downgradient of the slurry wall extraction system indicate no groundwater impacts beyond the slurry wall. The Base stores extracted groundwater in two, recently installed 10,000-gallon tanks. After storage, Base staff pump the groundwater to the permitted industrial wastewater treatment plant for treatment and discharge.

City of Lompoc Landfill; Santa Barbara County

Acreage:	115
Life Span:	Approximately 40 years
Corrective Actions:	None

The City of Lompoc (Lompoc) owns and operates a 115-acre landfill facility located in a canyon on the south side of the Santa Ynez River valley, west of Lompoc. Waste disposal is permitted for approximately 40-acres of the site. Lompoc opened the landfill in 1961 and the Water Board has regulated the landfill since 1978. The landfill has approximately 40 years of capacity remaining. Water Board staff updated WDRs for this landfill in 2003.

The Lompoc Landfill is unlined; however, the geologic conditions underlying the landfill are favorable due to natural fine-grained silts and clays. The wet weather intermediate cover also consists of relatively low permeable soil found onsite, which is compacted and graded to promote runoff and reduce percolation of water into the landfill. Lompoc staff has prioritized operations and efforts to reduce the amount of water percolating into the landfill.

Lompoc installed a landfill gas collection system in 1986. However, very low volumes of methane were generated causing the removal of the gas system in 1992. The low volumes of methane generated and the limited presence of VOCs in groundwater suggest the waste mass is not generating significant amounts of leachate and/or landfill gas. Water Board staff evaluate groundwater monitoring results on a semiannual basis to determine if VOCs are present in groundwater.

Tajiguas Landfill; Santa Barbara County

Acreage:	78
Life Span:	12 years
Corrective Actions:	Landfill gas collection, groundwater interceptor trench, groundwater management systems, leachate collection and removal from unlined area wells, and up-canyon groundwater extraction

The County of Santa Barbara (County) operates the Tajiguas Landfill which serves all of the south coast of Santa Barbara County, and the Santa Ynez and Cuyama valleys. The landfill is located west of the City of Santa Barbara in a coastal canyon watershed along the Gaviota Coast. The landfill facility covers approximately 412 acres and waste disposal occurs over 78 acres. The County originally sited the Landfill in 1967 and the Water Board has regulated the Landfill since 1970. Water Board staff updated WDRs for the Tajiguas Landfill in 2003 and Water Board staff plans to revise the current WDRs during 2009 as the County is proposing to change the landfill footprint, to achieve a more stable long-term (closure) configuration.

Waste disposal has historically occurred over unlined areas; however, all current waste disposal occurs over a composite liner consistent with current regulatory requirements. In November 2008, Water Board staff reviewed and approved a Construction Quality Assurance Report regarding the Phase IIA liner construction completed in October 2008. The County's recent projections indicate that the landfill will reach capacity in 2020.

The County has monitored groundwater continuously since 1988. Historically, the County has detected VOCs in several downgradient wells, with leachate and landfill gas being the likely source. Corrective action control measures include: landfill gas extraction, a groundwater interceptor trench, leachate collection and extraction from unlined area wells, and up-canyon groundwater extraction. In response to corrective actions, total VOC concentrations and the number of specific compounds detected have declined. The County continues to detect VOCs in a single monitoring well, immediately downgradient of the landfill, but VOC trends are declining and concentrations range between non-detectable to below maximum contaminant levels.

Camp Roberts Class III Landfill; San Luis Obispo County

Acreage:	14.3
Life Span:	38
Corrective Actions:	Final covers over inactive, pre-regulatory waste disposal units

Camp Roberts is a federal facility licensed to the State of California. The California Army National Guard (National Guard) operates the Camp Roberts Landfill, which consists of two separate unlined units covering 14.3 acres which the National Guard refers to as the North Unit and South Unit. The North Unit reached capacity in 2003. Since the North Unit reached

capacity, the National Guard disposes of solid waste generated at Camp Roberts offsite. Although the South Unit has significant airspace available for disposal, it is currently inactive while the National Guard proposes upgrades including a composite liner and a leachate collection and removal system. Water Board staff plans to bring revised WDRs for the Camp Roberts Class III Landfill to the Water Board for consideration in 2009.

Camp Roberts also has six inactive waste disposal units which the National Guard used prior to federal, state, or local landfill regulations. The inactive waste disposal units consist of a South Landfill (4 acres) and five disposal trenches collectively referred to as the Closed Landfills (6.5 acres). The National Guard completed final covers over the South Landfill and Closed Landfills in October 2006. Water Board staff expects to enroll the South Landfill and Closed Landfills in the General Waste Discharge Requirements for Post-Closure Maintenance of Closed, Abandoned or Inactive Nonhazardous Waste Landfills within the Central Coast Region, in conjunction with revised WDRs for the active Camp Roberts Landfill.

Cold Canyon Class III Landfill; San Luis Obispo County

Acreage:	121
Life Span:	2-3 years
Corrective Actions:	Final covers over formally closed area, landfill gas collection

Waste Connections, Inc. owns Corral de Piedra Land Company, Inc. owner of the Cold Canyon Class III Landfill, which is located eight miles south of San Luis Obispo along State Highway 227. Cold Canyon Landfill receives municipal and solid waste from Pismo Beach, San Luis Obispo, Arroyo Grande, Los Osos, Cayucos, Cambria, San Simeon, Morro Bay, and surrounding unincorporated areas. The Landfill began operation in 1965 and covers 121 acres including a 14-acre unlined closed landfill and a 74-acre active landfill. Water Board staff updated WDRs for Cold Canyon Landfill in 2006 and will likely revise the WDRs within two years to address expansion plans, which are currently in the local CEQA process.

The active area consists of both unlined and lined cells. The unlined cells are generally at final elevations and are part of the active area only because Waste Connections has not formally closed this area. The current waste disposal areas of the active landfill consist of Modules 6, 7, 8, and 9. Waste Connections filled Modules 6 and 7 to the desired interim elevations and is currently filling Module 8 to interim elevations such that Module 9 will consist of the vertical expansion above Modules 6, 7, and 8. Without further permitted expansion, Cold Canyon landfill will reach capacity in 2010 or 2011. Water Board staff will provide comment during the CEQA process on a proposed expansion of the Cold Canyon Landfill. Water Board staff anticipate a joint technical document submittal following approval of a CEQA document, as a revision of the WDRs will be necessary for landfill expansion.

Groundwater monitoring has historically documented minor VOC impacts to groundwater downgradient of unlined areas. These impacts are generally attributed to landfill gas. The landfill has extensive landfill gas extraction within the lined and unlined areas and it appears to be reducing and preventing further impacts to groundwater. Groundwater monitoring also documents increasing trends for inorganic constituents in several downgradient wells, although this may be indicative of a leachate release from the unlined areas, the groundwater beneath and around the site is highly variable and the increasing trends could be due to the landfill's operation/design effect on local recharge. Water Board staff will continue to evaluate the monitoring results and may require the Waste Connections to enact corrective actions,

potentially including installation of final cover for all unlined areas, as part of the expected future Cold Canyon expansion/WDR revision process.

City of Watsonville Class III Landfill; Santa Cruz County

Acreage: 103
Life Span: 22 years
Corrective Actions: Final covers over closed areas, leachate and landfill gas collection

The City of Watsonville (Watsonville) owns and operates a 103-acre landfill facility located in the coastal region of Santa Cruz County, less than one mile east from the ocean, and approximately 3.5 miles west of the City of Watsonville. The facility includes a 15.3-acre closed unlined cell (Phase I/II), a currently active 11.6-acre lined cell (Phase III), and two additional future modules of 6.9 acres (Phase IV) and 14.2 acres (Phase V). Watsonville estimates that the landfill will reach capacity in 2030. Water Board staff last revised WDRs for this landfill in 2006.

Groundwater monitoring has documented inorganic constituents and VOC impacts in the vicinity of the unlined Phase I/II landfill, which Watsonville closed in 1997 by installing a final cover. Watsonville extracts both leachate and gas from the closed landfill, and has removed significant volumes of leachate to date. Watsonville recently expanded gas extraction efforts and is evaluating further extraction system expansion, or possible alternatives to current leachate removal efforts, as actions to remedy groundwater impacts.

During 2006, Watsonville determined that the Phase III liner was leaking in or around its main leachate collection sump. To minimize the production of leachate within Phase III, Watsonville installed a posi-shell intermediate wet weather cover on all surfaces of Phase III except the active landfill face. Posi-shell is a spray-applied, thin layer of fibrous cement, which significantly promotes runoff and reduces the percolation of water into the waste. Watsonville continues removing leachate from the Phase III leachate collection and removal system as quickly as possible and only applying leachate for dust control at minimum levels. Watsonville transports excess leachate to its wastewater treatment plant for disposal, rather than applying it to the Phase III landfill. Watsonville also continues to remove leachate from the lysimeter located below the leachate sump and removal rates have dropped significantly since the city first detected the leak, indicating that the corrective actions are effective. Groundwater monitoring downgradient of Phase III indicates no landfill-related VOCs or significant increasing trends for inorganic constituents that would be indicative of a release. Due to the liner leak, Watsonville will propose an improved liner design for the future landfill modules, Phase IV and V.

Buena Vista Class III Landfill; Santa Cruz County

Acreage: 126
Life Span: 11 years
Corrective Actions: Final covers over closed areas, landfill gas collection

Santa Cruz County owns and operates the Buena Vista Landfill, located in the coastal region of Santa Cruz County, less than 2 miles east from the ocean and approximately 2.5 miles west of the city of Watsonville. The 126-acre site consists of a 31-acre cell closed in 1986, a 15-acre cell closed in 1995, and a 61-acre active lined cell. Water Board staff revised WDRs in 2006.

The active portion of the landfill consists of seven modules, 1, 2, 3, 4A, 4B, 5, and 6. Santa Cruz County has filled Modules 1, 2, 3, 4A, and 6 to interim elevations. Water Board staff

approved the Module 4B liner in June 2007 and this module is currently being filled to an interim elevation consistent with other modules. Santa Cruz County will submit a proposed Module 5 liner design report for Water Board approval. Once Module 5 is built, the County will expand vertically over all of the modules and fill to final elevations. The landfill will reach capacity in 2019 at present disposal rates.

Historical groundwater monitoring has documented low level VOC concentrations in groundwater near Module 2. Santa Cruz County believes these groundwater impacts are caused by landfill gas due to the presence of VOCs (typically associated with landfill gas impacts) and the lack of inorganics (typically associated with leachate impacts). To remove and prevent migration of landfill gas the County has added more than 30 gas extraction wells to Modules 1, 2, and 3 since 1997. Current groundwater monitoring indicates that landfill gas extraction is reducing landfill gas impacts to groundwater and that final covers and surface grading on the closed areas are also preventing the formation and migration of leachate and/or landfill gas to groundwater.

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