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BEFORE THE HEARING BOARD OF THE

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

3448-14

In the Matter of SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, Petitioner, vs. BROWNING-FERRIS INDUSTRIES OF CALIFORNIA, INC., a California Corporation and wholly-owned subsidiary of REPUBLIC SERVICES, INC., a California Corporation, dba SUNSHINE CANYON LANDFILL, [Facility ID No. 49111] Respondents.	CASE NO. ~~5000-5~~ **PETITION FOR AN ORDER FOR ABATEMENT** Health and Safety Code § 41700 and District Rule 402 Hearing Date: TBD Time: 9:00 a.m. Place: TBD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (hereinafter referred to as "District" or "Petitioner"), petitions the South Coast Air Quality Management District Hearing Board to issue an Order for Abatement regarding Browning-Ferris Industries of California, Inc. ("BFI"), a wholly-owned subsidiary of Republic Service, Inc. ("REPUBLIC"), both corporations

authorized to do business in the State of California (collectively hereinafter referred to as "Respondents").

1. Petitioner is a body corporate and politic established and existing pursuant to Health and Safety Code §40000, *et seq*. and §40400, *et seq*., and is the sole and exclusive local agency with the responsibility for comprehensive air pollution control in the South Coast Basin.

2. Respondent BFI, doing business as "Sunshine Canyon Landfill," owns and operates a landfill/solid waste disposal site located at 14747 San Fernando Road, Sylmar, California 91342 (hereinafter referred to as "Sunshine Canyon Landfill" or the "Facility"), SCAQMD Facility ID #49111, subject to the District's jurisdiction and District Rules.

3. District Rule 402 and California Health and Safety Code ("H&S Code") Section 41700 prohibit the discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

4. Sunshine Canyon Landfill operates under a Solid Waste Facility Permit issued by the California Department of Resources Recycling and Recovery ("CalRecycle") and handles approximately a third of the daily waste of all of Los Angeles County. Sunshine Canyon Landfill receives almost 9,000 tons of municipal solid waste per day.

5. The municipal solid waste disposed of in Sunshine Canyon Landfill generates landfill gas consisting mainly of methane (50%) and carbon dioxide (50%). Landfill gas, unless adequately collected, may escape from the landfill into the atmosphere.

6. Landfill gas collected from Sunshine Canyon Landfill is flared at multiple flare stations. The flares at Sunshine Canyon Landfill are able to operate at a maximum combined total flow rate of 18,000 standard cubic feet per minute (scfm). The collected landfill gas is also sold to a third party who operates a gas-to-energy facility and produces electricity from combustion of landfill gas in turbines.

7. The District alleges Respondents are insufficiently collecting the amount of landfill gas currently generated at Sunshine Canyon Landfill, which can contribute to emissions of landfill gas from the surface of the landfill and causes odors. The District further alleges Respondents are failing to adequately treat fresh trash odors generated at the Facility, which can cause odor emissions from the landfill during morning hours.

8. The District has received over three thousand odor complaints beginning in October 2013 through the present, from the public and elementary school staff working and living near Sunshine Canyon Landfill alleging the Facility as the source of the odor. The District has traced the odors back to Sunshine Canyon Landfill on numerous occasions.

9. The District alleges the odors are the result of insufficient gas collection, inadequate treatment of incoming daily waste, and inadequate daily and intermediate cover procedures.

10. Pursuant to District Rule 1150.1(e)(3), Respondents must conduct instantaneous and integrated monitoring of the landfill's surface. Monitoring conducted by Respondents demonstrates that Respondents are not controlling surface emissions sufficiently at the Facility based on the frequency of high surface emissions reported in Sunshine Canyon Landfill's District Rule 1150.1 monitoring reports.

11. As a result of the odors emanating from Sunshine Canyon Landfill, a considerable number of persons living in the community and elementary school staff and students near the Facility have been forced to remain indoors.

12. From October 25, 2013, through present, the District has issued over ninety Notices of Violation ("NOVs") against the Respondents for violating District Rule 402 and H&S Code § 41700.

13. Respondents have implemented numerous odor control measures through several previous Stipulated Order for Abatement proceedings with this Board. However, despite these measures, Respondents have been unable to conduct operations at the Sunshine Canyon Landfill without being in violation of state law and SCAQMD Rules and Regulations regarding odor nuisance.

14. The City of Los Angeles City Council and the County of Los Angeles Board of Supervisors designated the Sunshine Canyon Landfill Local Enforcement Agency (SCL-LEA) to be the primary local agency that provides the regulatory permitting, enforcement, and operational compliance oversight at Sunshine Canyon Landfill on behalf of the California Environmental Protection Agency's Cal Recycle.[1]

15. Numerous regulatory agencies, including the South Coast Air Quality Management District, SCL-LEA, Los Angeles County Department of Public Works, City of Los Angeles Bureau of Sanitation, the Los Angeles Regional Water Quality Control Board, the California Department of Toxics Substances Control, and other state or local agencies, have jurisdiction over Respondents and/or Respondents' affiliates' transfer stations.

16. Given the number of regulatory agencies involved and potential for events beyond the control of Respondents, the SCAQMD recognizes that the necessity to modify this Order may arise. In the event that a petition for modification of the requested Order is filed that asks this Hearing Board to make a finding that delay in performance or non-performance of any requirement of this Order was the result of a Force Majeure, the SCAQMD proposes the following definition: Force Majeure includes any act of God, war, fire, earthquake, flood, or natural catastrophe; civil disturbance, vandalism, sabotage, or terrorism; restraint by court order or public authority or agency; or the inability, despite Respondents' demonstration that it exercised due diligence and best efforts, to obtain a consent, permit or approval necessary for Respondents' performance of any of the requirements of this Order. Force Majeure shall not include normal inclement weather, economic hardship, or inability to pay.

17. On April 2, 2015, the SCL-LEA Board of Directors passed a motion directing the SCL-LEA Program Manager, "upon completion of the review of both SCAQMD consultants' reports, to provide the Board members with a report of the SCL-LEA recommendations along with the technical backup, documentation and reasoning for those recommendations."

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[1] An LEA is an entity designated by the governing body of a county or city and is empowered to implement delegated California Environmental Protection Agency's Cal Recycle programs and locally designated activities.

18. In response to the direction provided by its governing board, the SCL-LEA produced a report entitled "SUNSHINE CANYON LANDFILL LOCAL ENFORCEMENT AGENCY COMPILATION OF POTENTIAL MITIGATION PRACTICES AND PROGRAMS," dated September 2015. (A true and correct copy of Section 3 of the report, titled "Sunshine Canyon Landfill Local Enforcement Agency Compilation of Potential Mitigation Practices and Programs" is attached hereto as Exhibit A.) The report in its entirety is available at http://docs.google.com/viewer?a=v&pid=sites&srcid=c2NsbGVhLm9yZ3xzY2xsZWF3ZWJzaXRlfGd4OjNlMmIyYjQ1ZWNmNjAxMDE.

19. The two (2) reports prepared at the direction of the District by experts in the field of trash odor and landfill gas collection, concluded that Sunshine Canyon Landfill required improvements in: intermediate cover, daily cover, use of alternative daily cover, additional baropneumatic field testing, enhance drainage of leachate, investigation of landfill gas migration and surface leakage on sideslopes, and landfill gas quality monitoring. The District is relying on these recommendations in the reports for the proposed conditions in this Order for Abatement.

20. Respondents are in violation and have been in violation of District Rule 402 and H&S Code Section 41700 since October of 2013.

21. The District, by this petition, seeks an Order for Abatement to require Respondents to cease violating District rules, or comply with such other relief as the Board deems appropriate.

22. The issuance of an Order for Abatement upon a fully noticed hearing would not constitute a taking of property without due process of law.

23. This Order for Abatement is not intended to be nor does it act as a variance. Respondents agree it does not need a variance from District rules.

24. The issuance of the prayed for Order for Abatement is not expected to result in the closing or elimination of an otherwise lawful business, but if it does result in such closure or elimination, it would not be without a corresponding benefit in reducing air contaminants.

25. It is the District's intention to file a proposed Findings and Decision a few days in advance of the hearing.

WHEREFORE, the District prays for an Order for Abatement as follows:

1. That this Hearing Board issue an Order for Abatement requiring Respondents to take action to abate emissions from the Facility resulting in offensive odors, including:

a. Respondents shall within ten (10) business days of the issuance of this Order modify the operating hours at the landfill in order to minimize the impact of fresh trash odors resulting from the unloading/dumping of all trucks. The District, in consultation with other regulatory agencies, will work with Respondents' operations staff to evaluate the efficacy of this mitigation measure and determine whether there are significant impacts associated with this measure that cannot reasonably be avoided.

i. Respondents shall, upon commencement of modified operating hours, provide for independent third party odor monitoring at or near Van Gogh Charter School during the hours of 6:00 am through 10:00 am. Respondents shall require the Odor Monitors to take measures to prevent odor fatigue and to keep records. Such records shall include an odor ranking taken every twenty (20) minute that includes location, wind condition, and an odor assessment using a consistent scale.

ii. Respondents shall submit to the District, the SCL-LEA and the Los Angeles County Department of Public Works within ten (10 business days of the issuance of this Order, a Traffic Mitigation Program approved by the Los Angeles City Bureau of Street Lighting that establishes a program to address unnecessary truck trips and reduce queuing of trucks outside the Facility potentially resulting from the change in operational hours. The program shall address, at minimum, the following: (1) a schedule for regular landfill users (such as commercial and municipal haulers as well as transfer trucks/trailers) that minimizes queuing along San Fernando Boulevard and diversions to other landfills, and (2) and a plan to reserve landfill capacity for small commercial and private users.

b. Respondents shall submit to the Hearing Board and District, within thirty (30) business days of the issuance of this Order, a report assessing the feasibility of curtailing incoming daily tonnage. Respondents' analysis shall assess a reduction in tonnage to a maximum daily limit of 6,000 tons per day and may consider a phased-in approach to curtailing the daily tonnage. The District, in consultation with other regulatory agencies, will work with Respondents' operations staff to evaluate the impact of this curtailment to determine whether there are significant impacts that cannot reasonably be mitigated.

i. Respondents shall appear before the Hearing Board at a status hearing within forty-five (45) business from the issuance of this Order to evaluate the feasibility of implementing curtailment of incoming daily tonnage at the landfill.

ii. Respondents shall implement the curtailment of incoming daily tonnage at the landfill within seven (7) business days following the status hearing, unless otherwise ordered by the Hearing Board.

c. Respondents shall continue the use of an Alternative Daily Cover (ADC), in lieu of using a nine inch daily compacted soil cover, throughout the duration of the approved one-year pilot demonstration project that began in October 2015, in order to promote horizontal permeability in the landfill mass for the purposes of improving collection of landfill gas and improving the leachate collection system's ability to drain properly.

i. Respondents shall provide to the District copies of all data provided to the SCL-LEA generated as a result of the pilot demonstration project and such other information as reasonably requested by the District. Respondents shall also provide any analysis used to determine the success or obstacles of the pilot demonstration project within ten (10) business days of finalizing the information.

ii. Respondents shall submit to the District within ten (10) business days of the conclusion of the pilot program, all reports generated from the pilot program and evidence demonstrating that it has satisfied the Los Angeles County Departments of Public Works and Regional Planning requirements. Respondents shall also submit to the District within ten (10) business days of the conclusion of the pilot program written confirmation from the SCL-LEA that Respondents have duly completed the pilot program.

d. Respondents shall implement the intermediate cover enhancement pilot program as directed by the SCL-LEA.

i. Respondents shall provide District staff with copies of all reports on the status and/or results of the program submitted by Respondents to the SCL-LEA and such other information as reasonably requested by the District.

e. Respondents shall conduct the intermediate cover program in a manner consistent with Los Angeles County's Conditional Use Permit ("CUP"), section 44A, and the landfill Implementation and Monitoring Plan, as pertains to application of temporary hydroseed vegetation cover on any inactive slope or other landfill area projected to be inactive for a period greater than 180 days.

f. Respondents shall submit monthly District Rule 1150.1 surface monitoring results (instantaneous and integrated readings) to the District for the enhanced monitoring grids that are involved in the SCL-LEA intermediate cover enhancement pilot program and for the baseline comparative reference control grid (Grid L11) within fourteen (14) business days after completion of the physical landfill monitoring activities. This condition does not relieve Respondents from performing Quarterly District Rule 1150.1 surface emission reports on the overall landfill.

g. Respondents shall submit to the District for review and approval, within ninety (90) days of issuance of this order, a proposal for additional methods/procedures for

upgrading and improving the additional areas of the landfill that have intermediate landfill cover, including appropriate methodologies, metrics, and protocols for evaluating the performance.

i. Respondents' proposal shall consider and evaluate, at a minimum, the following options (or combination of options): increased thickness of intermediate cover, use of lower permeability intermediate/final cover materials, utilization of higher durability plastic intermediate cover film material, higher compaction to increase density of the intermediate cover, use of cured/mature compost to improve vegetative growth (and potential biofilter affect), use of less steep intermediate slopes or other methods to provide for better compaction of the side slopes, use of alternative spray on sealants, (formulated for increased durability, wet weather, and odor control) to reduce permeability of existing intermediate covered areas, and utilization of ClosureTurf® (or product equivalent designed for intermediate cover usage).

h. Respondents shall expand the application of the SCL-LEA/District approved intermediate cover upgrades to additional SCL-LEA designated District Rule 1150.1 surface emissions monitoring grids if the data or other performance metrics demonstrate cover performance improvements (as determined by the District and the SCL-LEA).

i. Respondents shall expeditiously dewater wells being impacted by liquids.

i. Respondents shall provide monthly reports to the District and the SCL LEA on all landfill gas collection wells which have more than 30% of their overall length or more than 30% of their perforated area below grade filled with leachate or water. Respondents shall provide a graphic map showing the location of each liquid "impacted well" every other month. For the monthly reports, Respondents shall provide a description of the remedial measure(s) taken to address the landfill gas collection wells that are impacted by liquids.

ii. Respondents shall, within sixty (60) days of the issuance of this order, provide proposed methodologies and monitoring procedures to the District that determine the level of dewatering within each impacted well. Methods may include the measurement of the gas flow at each landfill gas collection well impacted by liquids.

j. Respondents shall submit to the District for review and approval (which will be conducted in consultation with other regulatory agencies) within ninety (90) days of issuance of this Order, a plan to evaluate and perform integrity tests on the landfill's existing gas collection wells. Upon approval of the plan by the District, Respondents shall correct any well identified as ineffective or inefficient or impacted for any reason, within fourteen (14) days of such identification. The plan shall require at a minimum that no ineffective and inefficient well remain impacted for more than thirty (30) days without being decommissioned and/or replaced.

k. Respondents shall submit to the District for review and approval (which will be conducted in consultation with other regulatory agencies), within sixty (60) days of the issuance of this Order, a proposal for additional best management practices to supplement Respondents' existing practices intended control and treat the fresh trash odors (the "Revised Best Management Practices Plan").

i. Such proposal shall consider and evaluate, at a minimum, the following options: use of trash truck and transfer trailer unloading practices that minimize creation of odors, use of additional misting fan units (Dust Boss or equivalent) to treat odors onsite, use of alternative working faces located in more advantageous locations for early morning loading, consideration of special procedures (e.g., immediate covering/burying of odorous loads at the working face) and other practices to mitigate fresh trash odors.

ii. Such proposal shall also consider, for use during the initial three hours of the opening of the landfill at a minimum, applications of Odor-Shell®

(or equivalent product) designed for odor control for odorous loads identified during unloading and on exposed portions of the working face.

iii. Such proposal shall also consider and evaluate options to control, treat, and minimize the impact of the odors that leave the site, including a methodology to identify meteorological conditions before the start of operations to determine best procedures/practices taken to minimize odor transport into the neighborhood. The proposal shall also consider the utilization of innovative technologies such as dry (waterless) vapor-phase (gas) for treatment of fresh trash and landfill gas odors, which can be employed along potential odor pathways.

iv. Such proposal shall also consider and evaluate utilization, for use during the initial three hours at a minimum of the opening of the landfill, of backpack sprayer and/or other portable spray system (with odor neutralizer or equivalent product) for directed use on identified odorous loads during unloading.

v. Such proposal shall also consider and evaluate utilization of stockpiled "odor buffering/adsorbing material" (e.g., compost, ground greenwaste, soil) at the working face. Respondents' evaluation shall also consider and analyze the potential for enhancing adsorbent material with odor adsorbents or other odor neutralizers to increase effectiveness.

vi. Respondents shall, within ten (10) business days of receiving written approval from the District, implement the Revised Best Management Practices Plan. If a "conditional approval" is granted, Respondents shall implement those conditionally approved elements of the plan.

l. Respondents shall submit to the District for its review and approval (which will be conducted in consultation with other regulatory agencies), within thirty (30) days of Respondents' receipt of the SCL-LEA findings and recommendations of programs for best management practices for odor mitigation at transfer stations, an updated Odorous Load

Management Plan (the "Revised Odorous Load Management Plan"). This plan shall identify additional measures to supplement Respondents' existing best management practices to reduce odors at the source, at transfer stations owned and/or operated by Respondents, and at the Facility. The plan shall also consider periodic site assessments of each transfer station that sends waste to the Facility for additional measures intended to abate odors.

i. Respondents shall, within ten (10) business days of receiving written approval from the District, implement the Revised Odorous Load Management Plan. If a "conditional approval" is granted, Respondents shall implement those conditionally approved elements of the plan.

m. Respondents shall submit to the District, within ninety (90) days of the issuance of this Order, an assessment on the feasibility of installing physical barriers and or dust/odor containment structures. The assessment shall include an estimated timetable for improvements at the entrance road, including consideration of a large physical visual berm lined with trees along the final realigned access road along with other physical barriers (or containment systems) that can serve as a physical barrier to mitigate odors (e.g., controlled air movement, creating additional air turbulence or dispersion along odor travel pathways, additional odor adsorption).

n. Respondents shall immediately contact the District (via email at nsanchez@aqmd.gov), should the District's review of any of Respondents' submissions required hereunder cause the District to conclude in writing that additional measures are necessary at the landfill to control odors and Respondents are unable to agree to such measures. Such notice shall describe the reasons for the infeasibility of the provisions or other concerns with the provision. Respondents shall endeavor to resolve the infeasibility with the Executive Officer of his designee. If the feasibility of the provision cannot be resolved, Respondents shall petition the Hearing Board for further proceedings. Such proceeding shall be limited to a hearing on the imposition of the measure(s) described in the notice to the District as infeasible or otherwise problematic.

2. Any notices, reports, or other information required by this Order shall be provided to the District via email (Attn: Laki Tisopulos, ltisopulos@aqmd.gov).

3. Respondents shall submit a timely petition to modify this Order if Respondents anticipates it is unable to meet any increment of progress ordered herein, or may otherwise not comply with the terms of this Order. Respondents shall notify the District via email (Attn: Nicholas Sanchez, nsanchez@aqmd.gov) upon learning of any such anticipated delay or need to request changes in conditions or the final compliance deadline.

4. For such other and further relief that this Board deems just and proper.

Dated: July 12, 2016

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
OFFICE OF THE DISTRICT COUNSEL
Nicholas A. Sanchez, Senior Deputy District Counsel

By: _____
Nicholas A. Sanchez
Attorney for Petitioner

EXHIBIT A

SECTION 3: SCL LEA RECOMMENDED ODOR MITIGATION MEASURES:

The following describe the SCL LEA recommended potential actions and requirements, which could be implemented as a stand-alone option or in combination, which would significantly mitigate the generation of landfill odors and their impact to the local neighborhood. The SCL LEA takes an engineering systems (holistic) approach that focuses mitigation measures that can be implemented on all aspects of the landfill design, operations, future closure, and including addressing the actual waste stream that it receives. The SCL LEA believes that the single most important aspect of odor mitigation is the overall efficiency and effectiveness of the landfill gas collection system. While focusing on the landfill gas collection system, the SCL LEA also address potential mitigation measures directed at the unavoidable emissions that the landfill gas collection system is unable to capture.

As stated before, it is important to re-emphasize that the SCL LEA recommendations targets the various sources and types of the odors, and that the odors can arise from various conditions. The SCL LEA recommended odor mitigation measures are focused on steady state emission (e.g., surface emissions not collected by the landfill gas collection system), and non-steady state conditions. These following recommendations address odor mitigation on the closed parts of the landfill, the current parts of the landfill with intermediate cover, the current parts of the landfill that are operating (without intermediate cover), and future development of the landfill. It should be noted that “remedial” actions need to be taken in the areas that are detrimentally impacted by the use of the 9” of daily soil cover.

The SCL LEA also believes that there is another mechanism that produces emissions which ends up in the neighborhoods where they experience highly intense and odorous smells which last for only a short while. The SCL LEA believes that in certain locations within the landfill (particularly where the 9” of daily soil cover was utilized, and resulting in pneumatic isolation) that there are “pockets of landfill gas” which remain trapped and continually build pressure till

a point where there is a relatively quick, short term, not quite an instantaneous burst emissions (e.g., like a landfill "burp"). The equilibrium operational parameters of the landfill collection system is not designed to handle this type of localized quick high volume gas migration and release through the landfill surface, and no daily soil cover can contain this. This type of landfill gas emissions would explain the kind of odors that the local neighborhood describe as very intense, sickening, but short lived.

The SCL LEA recommendations, therefore, addresses all aspects of odor mitigation:

- Prevention of Odors
- Control of Odors
- Capture / Containment of Odors
- Treatment / Destruction of Odors

The SCL LEA recommends the following programs/practices to be considered:

1) Implementation of Biodegradable Plastic Alternative Daily Cover (ADC)

The SCL LEA has approved the use of a biodegradable plastic ADC which had previously been tested, proven, and was in use at Puente Hills as an ADC. Republic has submitted a request to the County of Los Angeles Department of Public Works seeking approval to implement this practice instead of the 9-inch daily compacted soil cover.

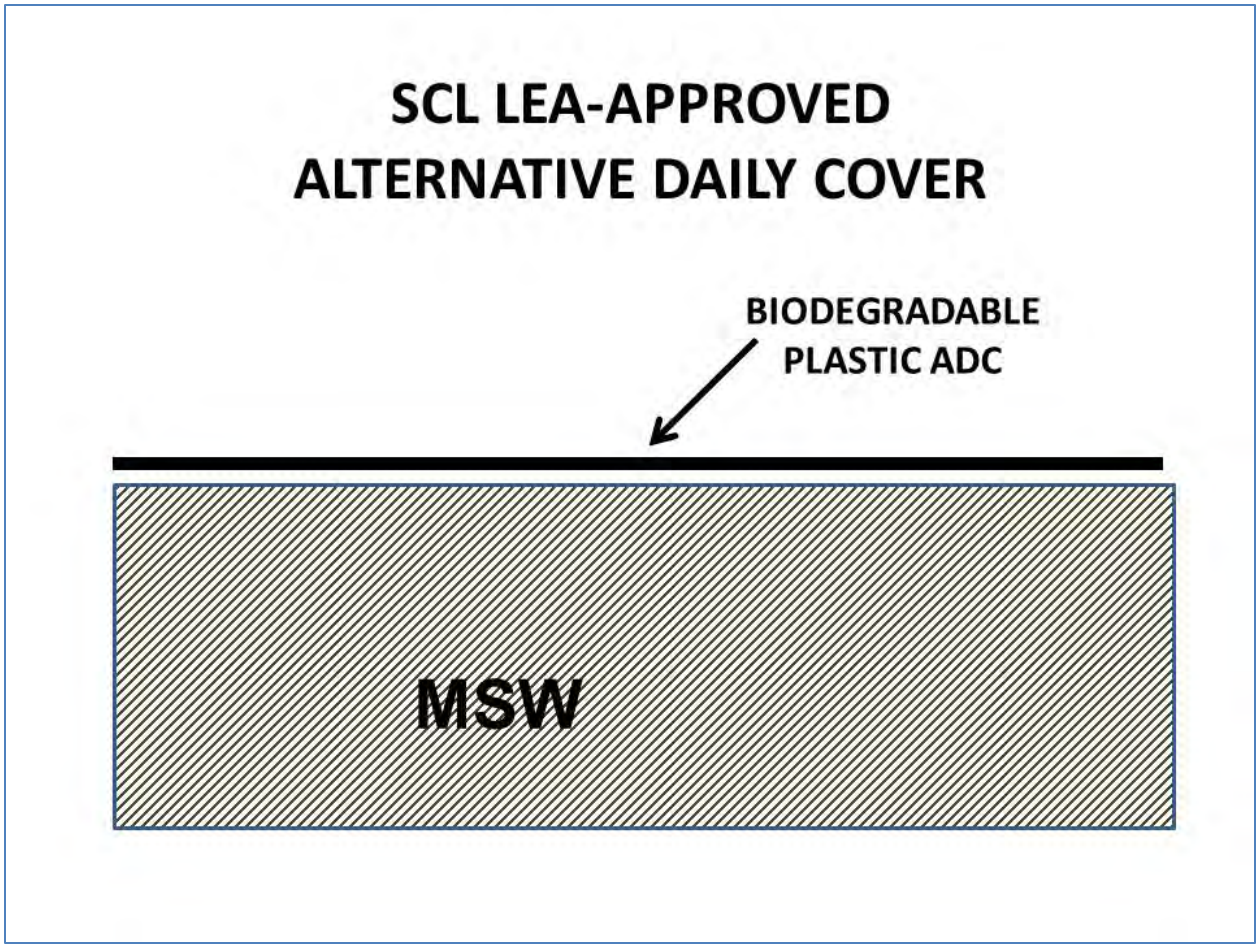


Figure 20: SCL LEA Approved Alternative Daily Cover

This has been successfully implemented at Puente Hills Landfill, and has also been recommended by the SCAQMD's consultant. The use of a biodegradable plastic ADC will promote permeability in the landfill mass to improve the collection of the landfill gas, and would promote vertical permeability so that leachate can properly drain vertically downwards to be collected by the leachate collection system.

2) Daily Peel-Back of 9" Daily Soil Cover

Republic submitted a proposal to allow for "peel back" of the 9" daily soil cover in a phase manner which would remove the majority of the soil place as daily cover the night before, leaving a thin layer and putting new trash on top, and then followed each evening with a full 9"

of soil cover. At the end of every week (Saturday), the full 9" would remain and would be left in place for Monday's operation.

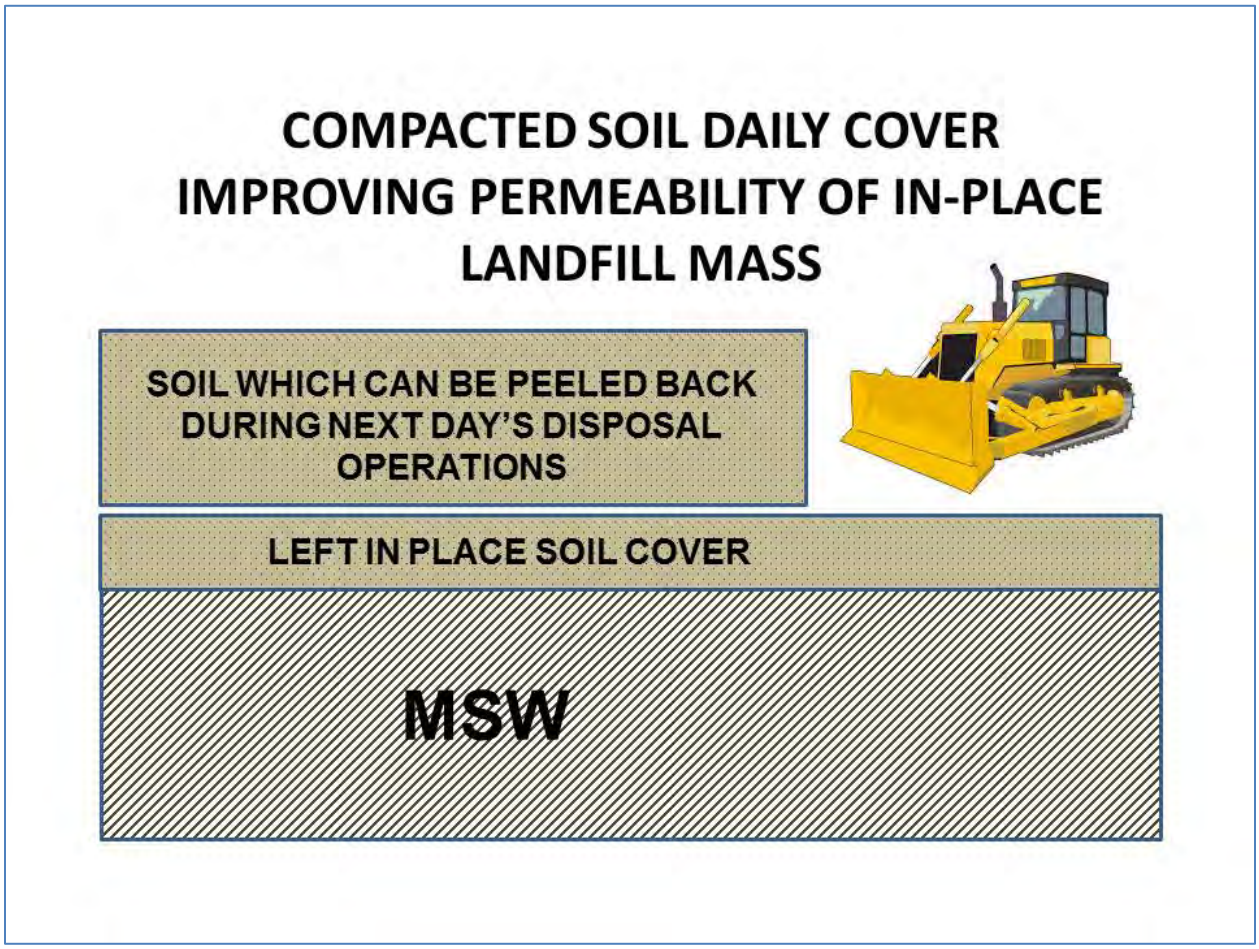


Figure 2119: Compacted Soil Daily Cover Improving Permeability of in-place landfill mass

The SCL LEA is also supportive of this proposal as the reduced thickness of the daily cover would improve the flow of the landfill gas and improve drainage of the leachate to the collection system.

The SCL LEA will also require the use of a compacted nine inch of daily soil cover on top of biodegradable plastic alternative daily cover in the areas that will be filled in at a later time more than one month but less than six months, but allowing peel back of the majority of the soil upon commencement of disposal activities in the area.

3) Upgrading Intermediate Landfill Cover Requirements

The SCL LEA recommends upgrading/improving the current intermediate landfill cover. The suggested options include the following:

- Increased thickness of intermediate cover
- Requirement of lower permeability intermediate cover materials
- Higher compaction to increase density of the intermediate cover
- Use cured/mature compost to improve vegetative growth (and potential biofilter affect)
- Use of less steep intermediate slopes (to allow for better compaction of the side slopes
- Use "spray on sealant and/or ADC foam" to reduce permeability of existing intermediate covered areas.

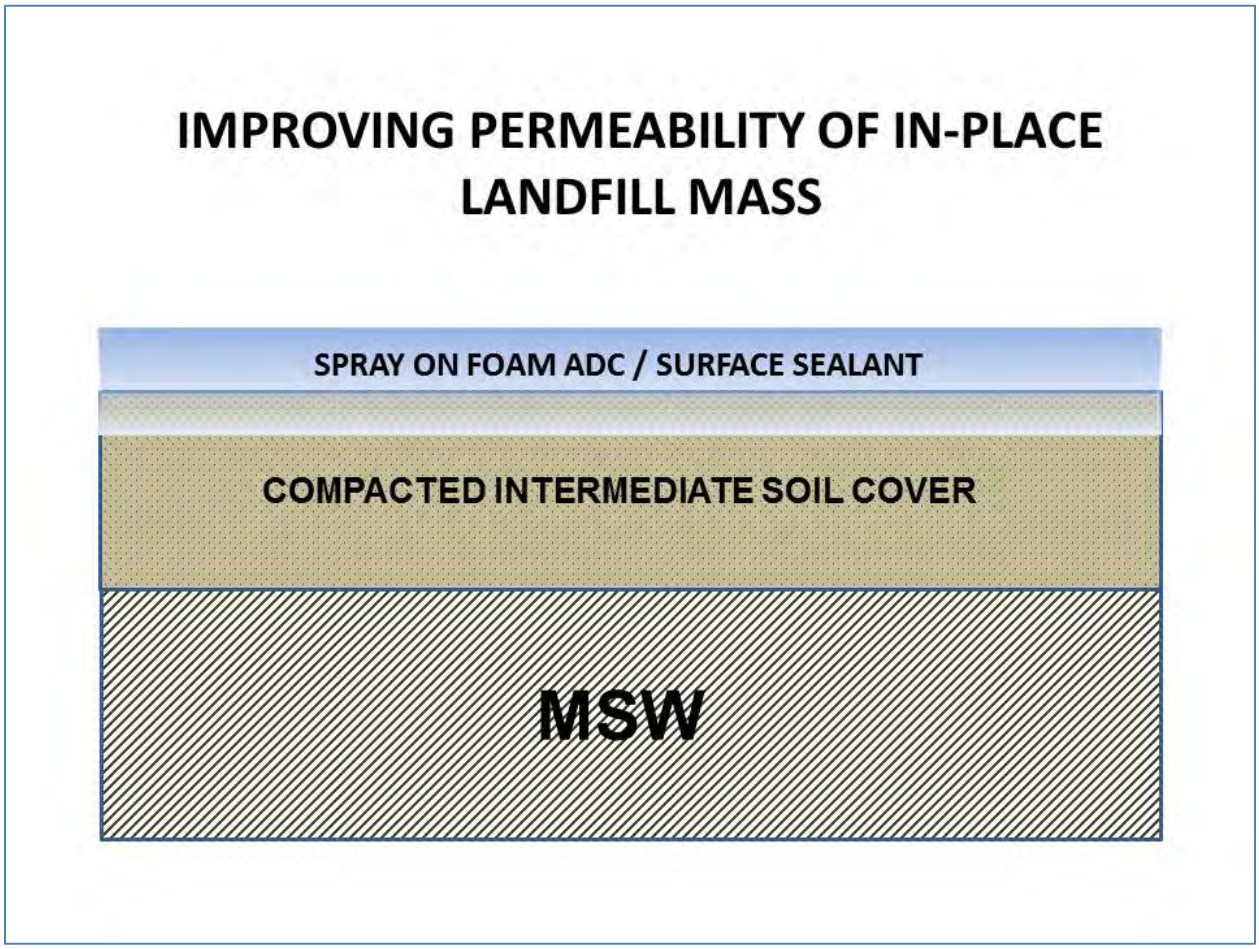


Figure 22: Improving Permability of in-place Landfill Mass

- Use of the biodegradable plastic ADC in combination with the statutory soil intermediate cover (put in place in a manner that preserves the integrity of the biodegradable cover for as long as possible when no additional trash is being disposed, but will be degraded and made permeable (e.g., punctured by trash), when trash is being disposed of over the same area. For example, have the biodegradable plastic ADC be sandwiched (layered) by soil, … 4 inches of soil, put on biodegradable plastic ADC, additional soil layer on top of the ADC. This would create a temporary impermeable layer on the slideslope. Note that the landfill gas system will have to be designed to deal with this gas that may be accumulating along the side slope liner.

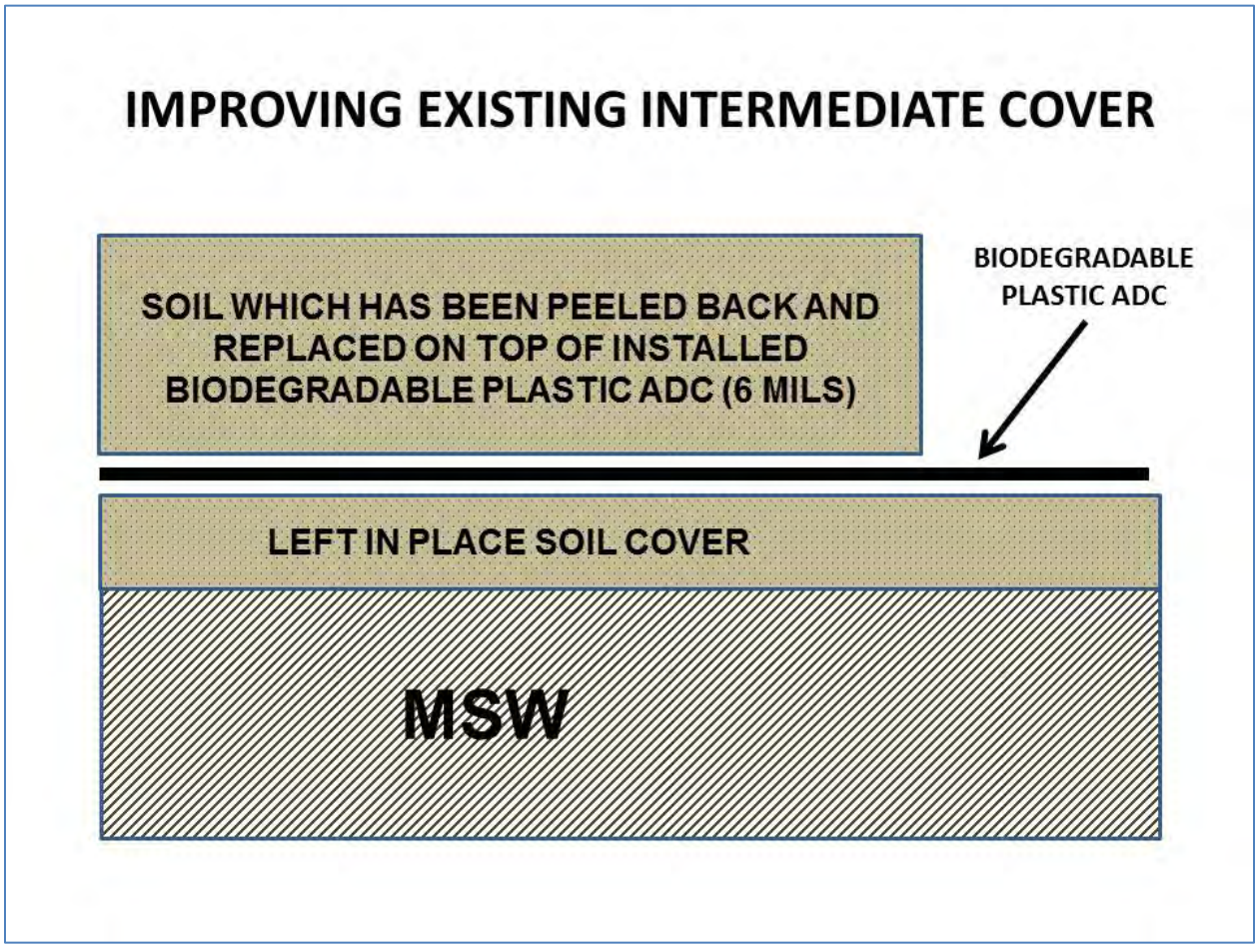


Figure 23: Improving Existing Intermediate Cover

This same approach can be done for the future intermediate cover that will be installed.

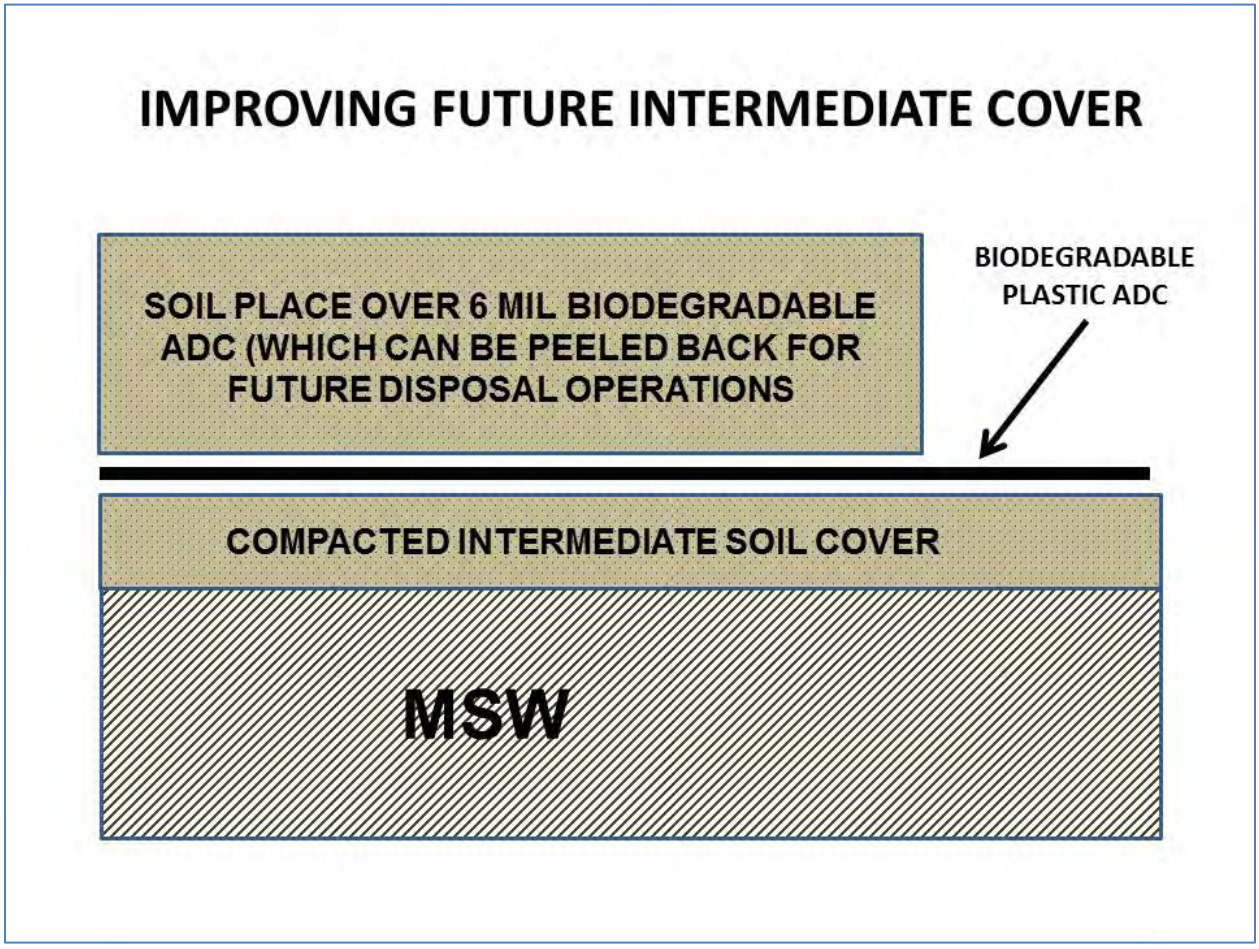


Figure 24: Improving Future Intermediate Cover

- Use of permeable layer to be installed under a less permeable intermediate daily cover and is designed to channel and control the movement of landfill gas and improve the efficiency of the landfill gas collection system. Permeable layer can include crushed C & D (concrete, etc.), shredded tires in combination with other granular materials, etc.)

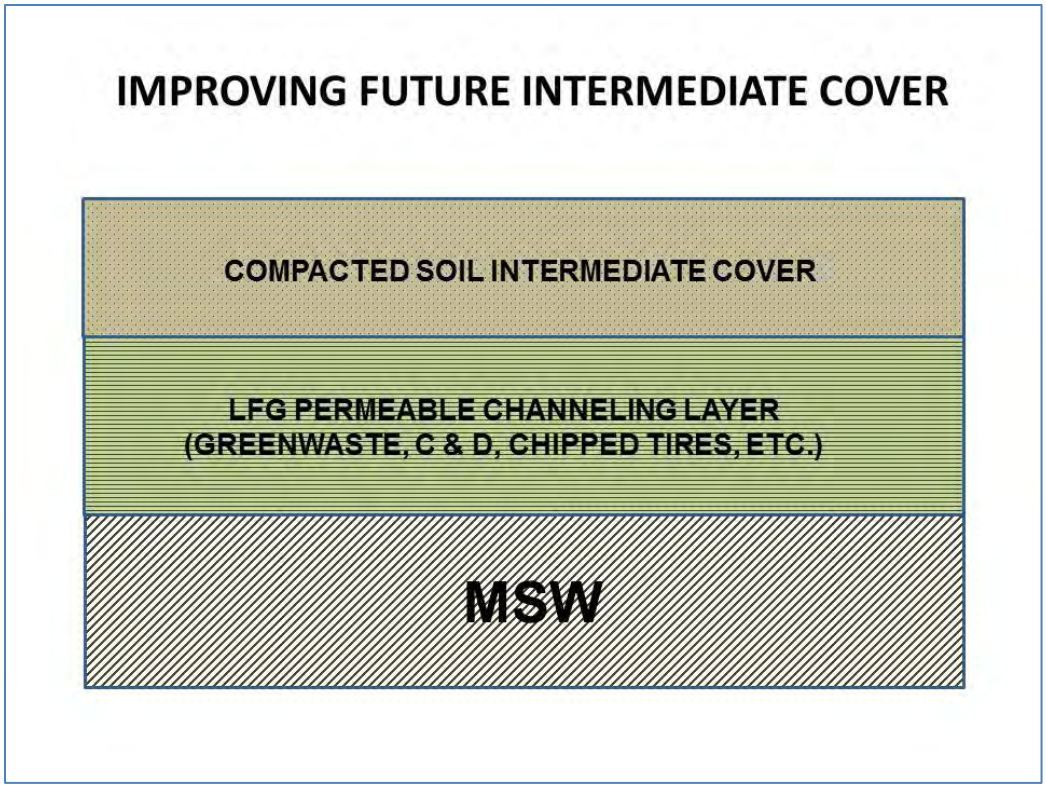


Figure 25: Improving Future Intermediate Cover 2

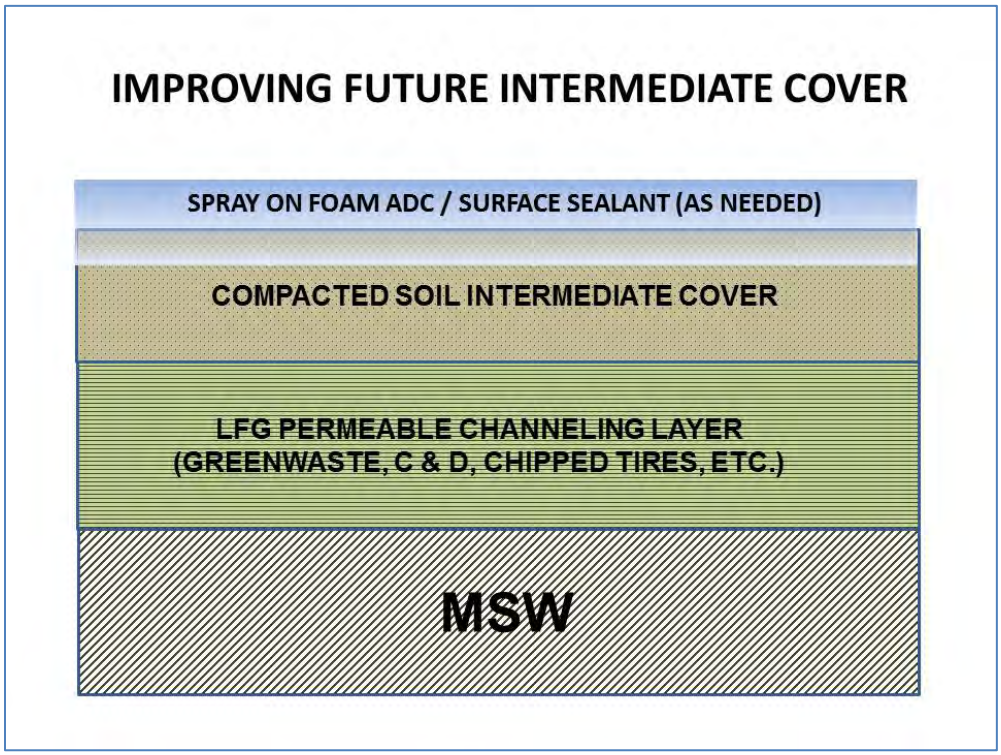


Figure 26: Improving Future Intermediate Cover 3

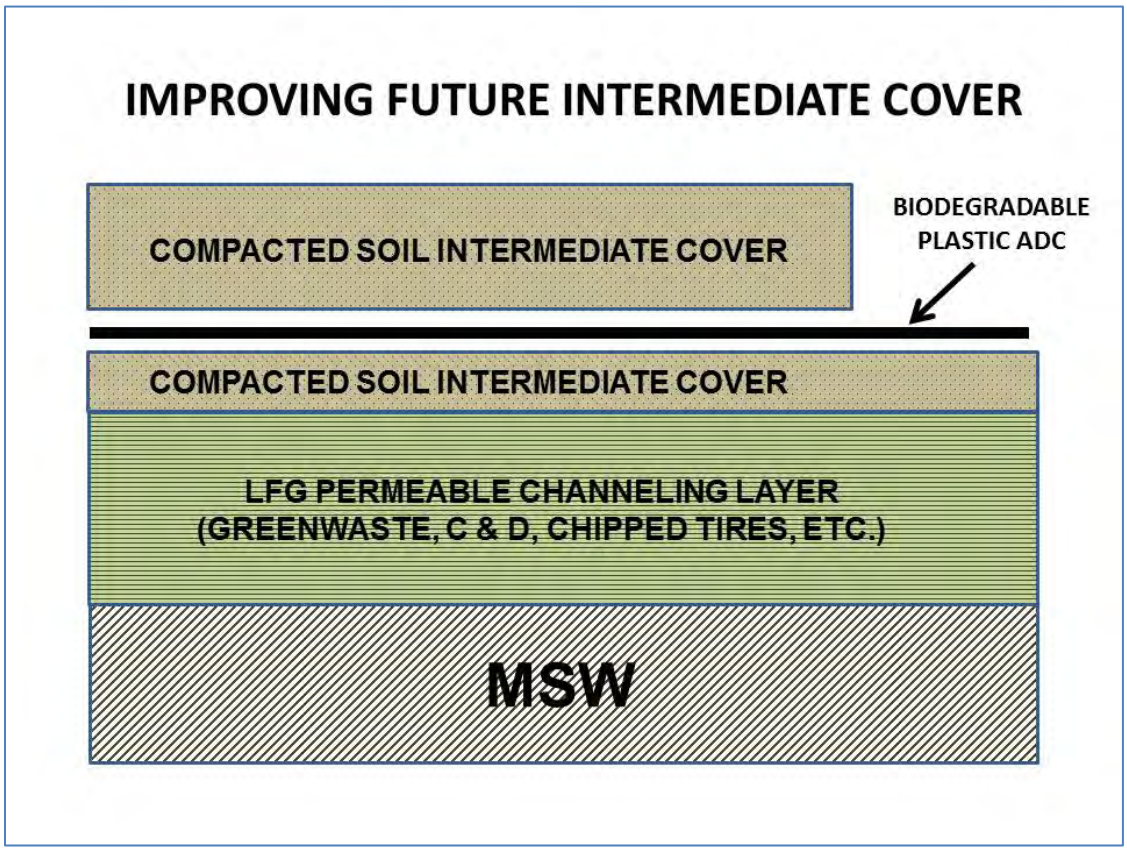


Figure 20: Improving Future Intermediate Cover 4

- Use of "Closure Turf" (or equivalent impermeable geosynthetic) on intermediate slopes with hookup to gas collection system (and/or biofilter) for odor control/destruction). This option should be implemented if the above options still result in surface emissions escaping through the slide slopes. (Can also be done in conjunction with other practices to improve the performance of the intermediate compacted daily soil cover).

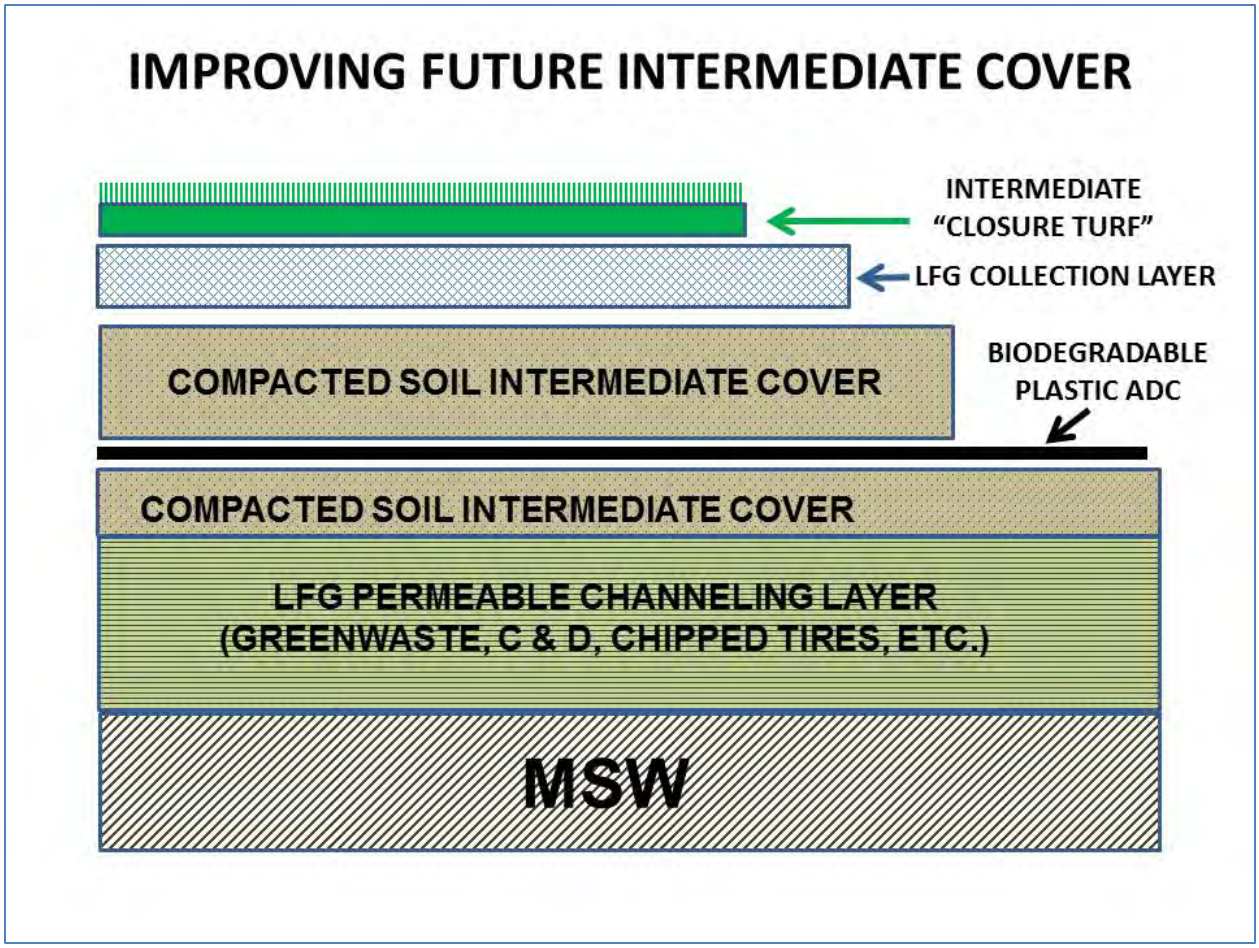


Figure 218: Improving Future Intermediate Cover 5

The SCL LEA can initiate a pilot testing program with Republic Services of various options to upgrade the current intermediate cover in the areas that have the most surface emissions.

4) Upgrade Landfill Gas Collection System

The SCL LEA has previously provided detailed analysis on the radius of influence related to specific issues regarding in-place trash density, moisture content, waste composition, and well density. The SCL LEA recommends that updated information be utilized to better model landfill gas generation and to develop an overall more effective landfill gas collection system which would include these following landfill gas collection/control practices:

- Higher density of wells (wells per acre, in conjunction with other practices) with an optimum mix of shallow and deep extraction wells (to take into account the spherical

nature of the zone of influence (and accounting for the needed overlap to address the falloff of vacuum vs. distance) (Note: less vacuum for prevention of short circuiting, e.g., drawing atmosphere into landfill)

- Installation of additional “shallow wells” near the intermediate slopes
- Utilize larger diameter vertical extraction wells (and greater slotted pipe length) for deeper parts of the landfill (larger bore diameter)
- Utilize differential (variable) well spacing, e.g., more closely together (with less vacuum) near the edges (and as the landfill is being built out), and further apart and operated at a higher vacuum with the interior extraction wells.
- Installation of additional “shallow wells” between deep extraction wells in areas that show surface emissions exceedances (on an as needed basis)

These should all be implemented in conjunction to removal of the compacted 9” daily soil cover so that both the horizontal and vertical permeability can be increased to increase the effective radius of influence and eliminate zones of saturation and formation of lenses. Also note that well density must be balanced with the health and safety of operational personnel, and the risks posed by having too many well in close proximity (e.g., hard to maneuver large mobile equipment).

The following graph displays the results from the BMP analysis of the two samples each waste source:

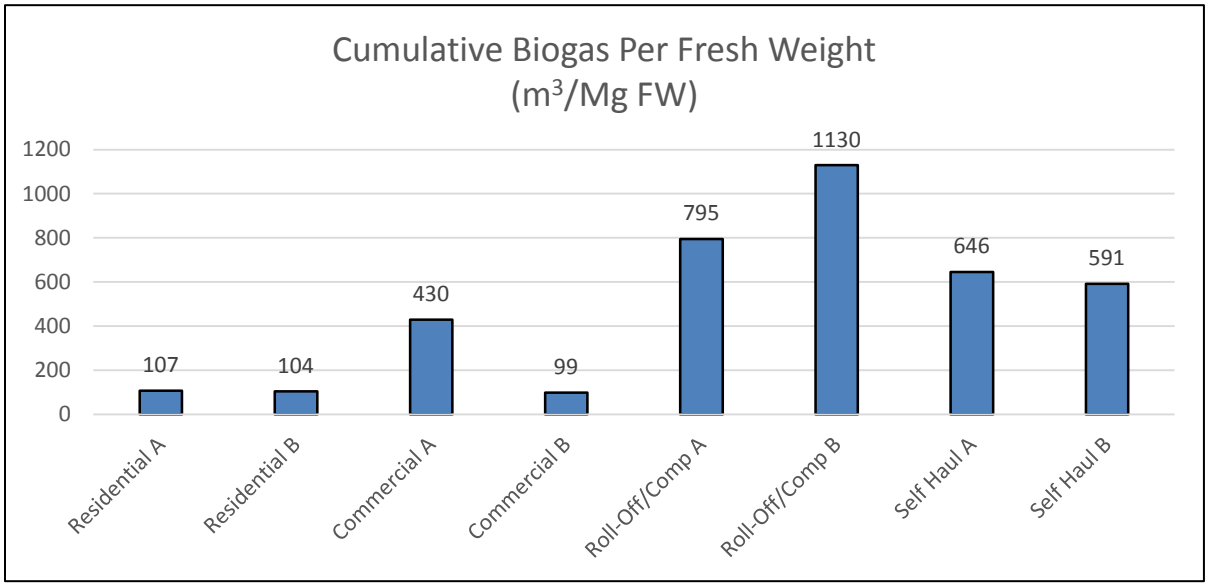


Figure 22: Biological Methane Potential of different MSW sources

Biological Methane Potential - Biogas

Both the Residential and Self-Haul sources were consistent in the amount of produced biogas. However there are notable outliers of biogas production from the Commercial and Roll-Off/Compactor samples. The important point is that the cubic meters of landfill gas generation potential is greater than the "default value" (100 cubic meters per metric ton) typically utilized by the US EPA LandGEM model (which is based upon the LFG generation factors from older composition studies).

In assessing how to improve the landfill gas collection system, the SCL LEA recommends using the most updated waste characterization study data (and conduct more detailed characterization studies) to properly size the LFG collection system.

5) Revision of Landfill Cell Development and Filling Sequencing

The SCL LEA will work with Republic and the Water Board on revising the landfill operations and the sequence of the individual cell development. The goal would be to revise the operations so as to minimize the areas of the exposed side slopes (where the SCL LEA believes have more potential emissions due to the difficulty of compaction on the steeper sideslopes). Cells would be designed to sequence in a manner to butt up against the existing sideslopes and to use a less steep side-slope. This would also be in conjunction with the implementation of the biodegradable plastic ADC.

Sequencing can also be used to create a landfill footprint that minimizes the surface area (by filling the deeper areas to the final elevations as soon as possible, this way the ratio of the surface area to the exposed vs. the tonnage is minimized. Less area for surface emissions (need to have coordinated installation of horizontal and vertical landfill gas extraction wells, and have improved slide slope cover construction (lower permeability and or temporary geosynthetic coverage).

Sequencing should also be considered for creating "longer" consistent lifts, which would increase the effectiveness of horizontal collectors, and decrease vertical layering.

Re-sequencing can also include completing the filling of certain areas to allow for immediate closure of areas that can be filled to the final grade and immediately putting on final cover as you go, allowing for implementation of a monolithic evapotranspirative (ET) soil cover. Should emissions continue to be emitted through the ET cover, a geosynthetic final cover (e.g., Closure Turf or equivalent, with surface gas collection) will be required. Note that this recommendation attempts to address the parts of the landfill which has been detrimentally impacted by the application of the 9" of compacted daily soil cover. The following recommendation will describe additional measures that can be implemented to address the landfill mass that contains the excessive soil.

6) Improving Existing Waste Mass Permeability

As confirmed by the Hydro Geo Chem study, in the areas where the 9" of daily compacted soil cover is utilized, leachate/liquid drainage and landfill gas movement is impaired. Remedial actions can be done to improve permeability to promote movement of gas and liquid in these areas. Vertical borings lined with porous geosynthetic fabric blankets and filled with gravel can be installed to promote movement of landfill gases between the layering. The objective would be to create pathways for least resistance to prevent the buildup of landfill gases in addition to creating pathways between cell lifts for movement towards the extraction wells.

When building new cells, the horizontal collectors should be "angled" at a greater slope to provide better drainage. When building new cells that adjoin current areas with the 9" compacted daily soil cover, partially remove (or "thin out") the existing intermediate cover in a manner to allow horizontal movement of landfill gas into the new adjoining cells (creating another pathway to prevent pressure buildup).

Another practice that can be implemented is to create more permeable pathways within the waste mass to help create a systematic network of channels (e.g., comprised of connected "windrow piles" of granular materials) to promote movement of landfill gas, and would also prevent the buildup on internal pressure (which would lead to the short term near instantaneous release of landfill gases).

The SCL LEA will work with Republic Services to conduct a pilot program to determine the feasibility of increasing the overall permeability of the waste mass being disposed by creating a horizontal and vertical system of higher permeability "channels" within the disposed of waste mass by implementing planned placement of higher permeability materials, construction and demolition waste, green waste, or combination of granular materials that have higher in-place interstitial pore capacity.

7) Transfer Station Odor Reduction / Mitigation Program

The SCL LEA can conduct a site assessment of each of the transfer stations that is sending waste to the landfill. Republic has implemented a Transfer Station Odor Reduction/Mitigation Program. The SCL LEA can assess the adequacy of the current practices implemented by Republic, and also request that other transfer stations which are not Republic-owned/operated to implement similar odor reduction/mitigation practices as part of the condition to bring waste to the landfill. At the same time, the SCL LEA can initiate a research project to determine the best management practices at transfer stations conduct site visits and compile examples for use by the various transfer stations.

Practices to be researched and evaluated will include addition of chemical odor neutralizers and/or masking agents, addition of biological agents to control and/or to mitigate odors at the source. Requiring transfer stations to notify and work with the trash haulers to identify generators of odiferous loads to require more frequent pickup and/or to add chemical or biological agents to reduce the odor at the generating source, and/or to reroute to exclude specific generators from disposing of waste at Sunshine Canyon Landfill.

This measure would be directed at reducing the "fresh trash" odors that are prevalent in the mornings as trash is being unloaded on to the working face.

8) Organic Reduction in the Incoming Waste Stream

Reducing the level or putrescible organics in the incoming wastestream will reduce not only "fresh trash" odors, but will also reduce the amount of landfill gas generated (and slow the rate of generation due to reduction in moisture).

This requirement can be imposed in various ways:

a) City of Los Angeles Bureau of Sanitation's residential sector source separation recycling can be expanded with the mandatory separation of food waste in the residential sector to include food waste in "Green Bin".

b) A requirement and/or condition for waste coming from transfer stations (starting with Republic-owned facilities) can be imposed to reduce the amount of putrescible organics. Most transfer stations have some basic form of MRF recovery. Require "Processing of mixed waste" to reduce/remove putrescible organics (e.g. food waste) before sending to landfill. E.g., Transfer station to remove minus 4" materials to the landfill, requiring screening of MRF residuals.

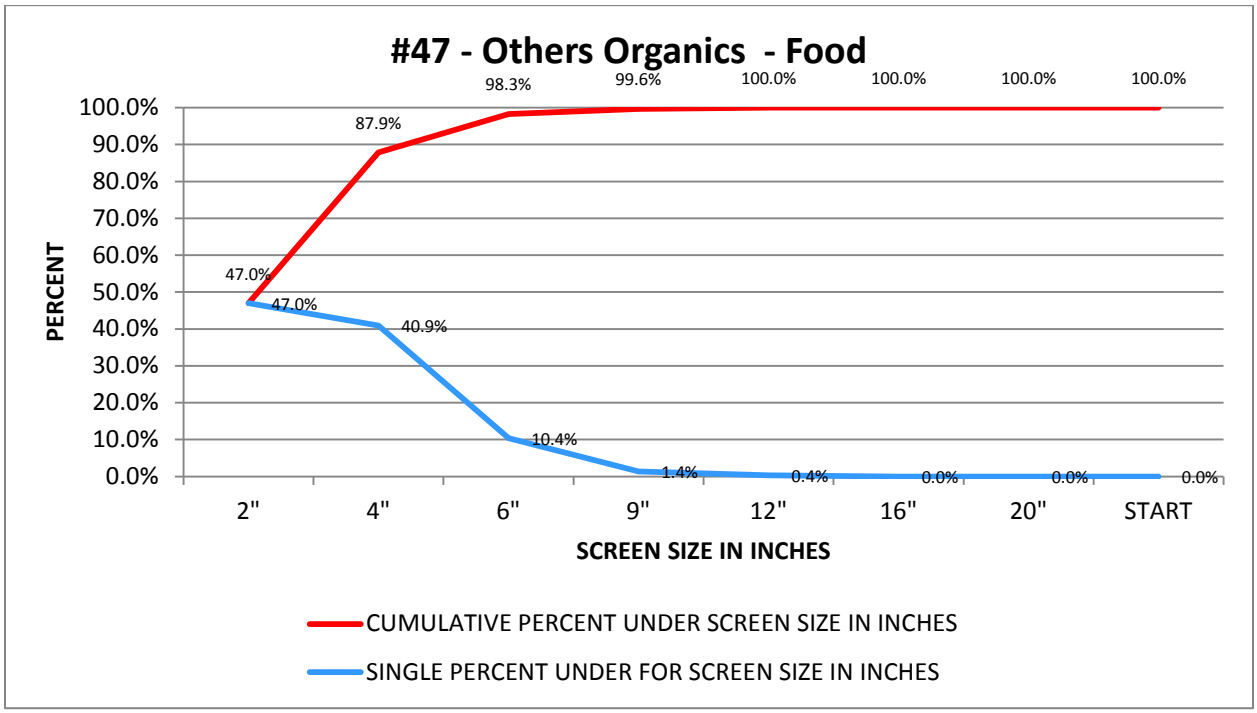


Figure 30: Cumulative sizing graph

Data courtesy of the City of Oxnard, Environmental Resources Division (Waste Characterization Study 2014)

The above cumulative sizing graph indicates that almost 90% of the food waste is in the 4" undersize. A single screen would remove these materials. (can also add additional processing to isolate and remove the food and wet waste, use of OREX press or equivalent, etc.).

Eventually this requirement can be expanded for all transfer stations that are sending waste to the landfill. Note that removal of organics will also reduce the amount of elemental sulfur in the chemical makeup of the wastestream.

Removing the organics from the disposal stream is consistent with new legislative requirements. The passage of AB 1826 (September 28, 2014) requires recycling of 50% of the "organics" for diversion from the landfill (for the purpose of greenhouse gas reduction).

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826

The SCL LEA recognizes that many of the above options will require cooperation from other regulatory agencies and also from various jurisdictions.

The Sunshine Canyon Landfill Community Advisory Committee and the SCL LEA have recently completed a limited waste characterization study, and Sunshine Canyon Landfill specific wastestream data on cumulative sizing will become available shortly (data and lab analysis being compiled, due in April 2015).

Figure 23: Cumulative sizing analysis of commercial sector food waste at City of Los Angeles CLARTS facility

9) Reducing Sources of Sulfur (and other Chemical Compounds)

Targeting organics (e.g., food waste) for diversion from landfill achieves several benefits, e.g., reduces high moisture content waste materials, and reduces a waste stream that has high volatile matter content. The SCL LEA is also recommending considering an approach based on chemistry of waste materials.

The SCL LEA recently also looked at the chemical constituents for the general classifications of materials in municipal solid waste that is being disposed of at the landfill (from the CLARTS facility). The SCL LEA is potentially targeting materials that may be high in sulfur content, and can be practically be prohibited or at least the amount minimized for disposal at the landfill.

Reducing or eliminating the waste stream that contains higher levels of sulfur can be considered a potential approach to reduce the amount of sulfur that can be converted to hydrogen sulfide. This has already been implemented indirectly, mandatory recycling of C & D waste, and reducing/prohibiting the disposal of gypsum drywall (calcium sulfate).

The SCL LEA has recently (February 2015) completed a waste characterization study at the Central Los Angeles Recycling and Transfer Station (CLARTS) in which chemical analysis (proximate/ultimate analysis) of various material types were analyzed. Chemical analysis is being reviewed in context with other data, e.g., moisture content as it relates to leaching.
For example, it is well known that there is sulfur in soil, typically sulfur compounds are in the organic matter and are concentrated in the topsoil (which is now being used for the cover).

Sulfate is somewhat mobile in soils and therefore subject to leaching, and with "wetter garbage" (more food waste, more organics and retained water (from increased density and lower permeability of the trash mass), it would make sense that the sulfur in the soil can be one of the sources of the problem. Sulfur content of soil at Sunshine may have potentially higher levels of sulfur, given that it is next to a working oil field, and that there are also naturally

occurring sulfur springs nearby (O'Melveny Park). This also provides a technical argument against utilizing the 9" of compacted soil as daily cover.

Other than drywall (which is calcium sulfate and is already being diverted from disposal via construction and demolition recycling mandates), the SCL LEA will be looking to target materials to minimize the type of waste that have the highest potential for creating odors, e.g., high sulfur content waste materials, high moisture content / high organic content waste materials.

The Yazdani report referenced the chemical properties of landfill soil(by AMEC in 2011), and noted that sulfate was being added to the landfill each year in the daily soil cover that has been applied (based on the average soil sulfate content of 1434 mg/kg or 0.143% of soil is sulfate). The report is saying that the very soil cover that is utilized "to mitigate odor" is actually part of the very source of sulfur that could increase the potential for odors. The approximate volume of soil being utilized in the landfill in a 12-month period (from 3/12/13 to 3/12/14) was over one million cubic yards.

Table 3: Sunshine Canyon Landfill Airspace Consumption Calculation

SUNSHINE CANYON LANDFILL AIRSPACE CONSUMPTION CALCULATION					
Dates Between Survey From	Dates Between Survey To	Airspace Consumed by Clean Soil for Daily and Intermediate Cover Between Surveys	Airspace Consumed by Clean Soil for Infrastructure Within Lined Footprint.	Airspace Consumed Between Surveys	Airspace Consumed by Clean Soil for Daily and Intermediate Cover as a Percent of Total Airspace Consumed
03/12/13	03/12/14	1,053,099	42,394	3,055,321	**35.0%**
02/10/12	03/12/13	901,770	43,626	3,313,606	**27.6%**
02/28/11	02/10/12	853,833	23,474	3,064,309	**28.1%**
03/04/10	02/28/11	543,054	11,394	3,043,622	**17.9%**

Assuming 105 pounds per cubic foot for the density of the soil (Republic's e-mail 10/17/2012), that is approximately 2134 tons of sulfate that was added during the 12-month period from March 2013 to March 2014.

Note that the City of Los Angeles is rolling out its “organics diversion” recycling requirements as part of the City’s move to franchised the commercial hauling, so many of the problematic materials that is currently being disposed of at the landfill is targeted for diversion by AB 1826 will be reduced in volume when the franchise takes effect.

The following are the preliminary results (on the sulfur content) from the Sunshine Canyon Landfill Community Advisory Committee’s Supplemental Waste Characterization Study.

ALS Environmental

March 19, 2015

Client: Tetra Tech, Inc.
3475 E. Foothill Boulevard
Pasadena, CA 91107

Attn: Charng Ching Lin
Project: Sunshine Canyon Landfill Waste Comp.
100- PAS- T33748

Date Received: 2/25/15

Certificate of Analysis

Sample ID:	Sample Date & Time:	Lab #:	Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur		
				D5373		Calculated	D4239		
			Moist. Free wt%	Moist. Free wt%	Moist. Free wt%	Moist. Free wt%	Moist. Free wt%		
1. Carboard & Kraft	2/24/15 n/a	T1500336-001	44.81	5.66	0.30	42.25	0.146		
2. Newspaper	2/24/15 n/a	T1500336-002	38.88	4.99	0.19	36.62	0.043		
3. Office Paper	2/24/15 n/a	T1500336-003	44.18	5.99	0.16	39.08	0.048		
4. Mixed Paper	2/24/15 n/a	T1500336-004	40.71	5.06	0.31	41.39	0.125		
5. Compostable Paper	2/24/15 n/a	T1500336-005	47.96	5.89	0.45	42.34	0.075		
6. R/C Paper	2/24/15 n/a	T1500336-006	47.56	6.11	0.44	40.46	0.121		
7. PET Bottles/Containers	2/24/15 n/a	T1500336-007	63.18	5.10	0.05	30.82	0.036		
8. HDPE Bottles/Containers	2/24/15 n/a	T1500336-008	81.35	12.80	<0.05	5.16	0.011		
9. Other Bottles/Containers	2/24/15 n/a	T1500336-009	80.11	11.62	0.11	6.56	0.026		
10. Plastic Film/Wrap	2/24/15 n/a	T1500336-010	73.01	11.47	1.49	7.92	0.107		
11. Plastic Products	2/24/15 n/a	T1500336-011	58.87	7.42	0.17	29.51	0.036		
12. R/C Plastics	2/24/15 n/a	T1500336-012	74.41	8.85	0.41	11.45	0.237		
25. Green/Yard Waste	2/24/15 n/a	T1500336-013	42.56	3.79	1.54	30.34	0.415		
26/27. Branches/Twigs/Stumps	2/24/15 n/a	T1500336-014	47.66	5.23	0.88	40.85	0.253		
28. Untreated/Clean Wood	2/24/15 n/a	T1500336-015	48.54	5.30	0.10	39.89	0.054		

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

Page 3 of 6

Rpt-T1500336 Tetra Tech Lin, 3/19/2015

Figure 32: Moisture Content from Waste Character Study @ CLARTS 3

ALS Environmental

March 19, 2015

Client: Tetra Tech, Inc.
3475 E. Foothill Boulevard
Pasadena, CA 91107

Attn: Charng Ching Lin
Project: Sunshine Canyon Landfill Waste Comp.
100- PAS- T33748

Date Received: 2/25/15

Certificate of Analysis

Sample ID:	Sample Date & Time:	Lab #:	Carbon D5373 Moist. Free wt%	Hydrogen D5373 Moist. Free wt%	Nitrogen D5373 Moist. Free wt%	Oxygen Calculated Moist. Free wt%	Sulfur D4239 Moist. Free wt%		
31. Food	2/24/15 n/a	T1500336-016	50.91	6.23	4.19	26.80	0.335		
32. Textiles & Leathers	2/24/15 n/a	T1500336-017	52.79	5.36	0.99	28.11	0.461		
33. Rubber	2/24/15 n/a	T1500336-018	61.25	7.53	0.54	11.90	0.826		
34. Carpet/Padding	2/24/15 n/a	T1500336-019	50.87	6.34	0.11	37.26	0.039		
35. R/C Misc. Organics	2/24/15 n/a	T1500336-020	25.95	2.35	1.87	19.84	0.340		
45. Mixed Residue	2/24/15 n/a	T1500336-021	23.95	3.16	1.38	10.67	0.436		

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

Figure 33: Moisture Content from Waste Character Study @ CLARTS 4

Note that the high sulfur content materials are rubber and other organic materials. The sulfur containing components in the soil is in the organic matter of the soil. Targeting organics for removal (AB 1826) reduces the greenhouse gas emissions from landfills, but also reduces the amount of elemental sulfur and sulfate compounds from being disposed.

The SCL LEA notes that the landfill operations are next to an oil field and that there are naturally occurring sulfur springs in nearby canyons, e.g., O'Melveny Park. The SCL LEA supports the additional testing of the soil to determine sulfur content. Below is a picture from Google Earth (April 2015) that shows the overhead view of the location of the oil field and the nearby areas that may have naturally occurring sulfur springs.

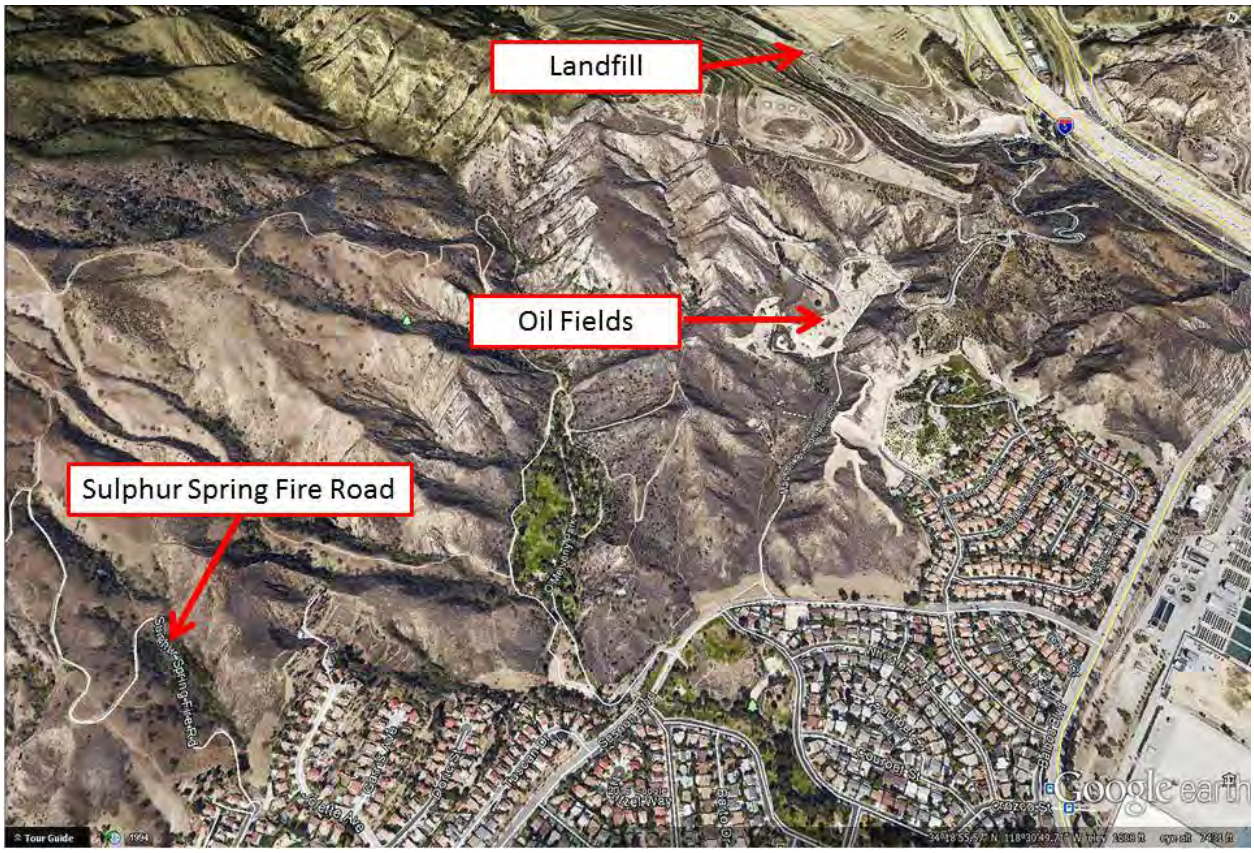


Figure 34: Aero view of SCL, Oil Fields, and Sulphur Spring Fire Road

Note on sulfur content of "rubber", the Yazdani report recommends using shredded rubber tires as a material that could be utilized to create permeable pathways for landfill gas

movement; the SCL LEA recommends against using shredded tires (as a single material for creating a permeable layer) as they are higher in sulfur content, and the additional risk of underground oxidation events (e.g., fires) associated with the use of concentrated volumes of in-place rubber. The SCL LEA recommends the use of other materials, e.g., such as crushed concrete and other coarse granular materials to create these pathways.

10) Fresh Trash Odors at the Working Face

The SCL LEA recommends the utilization of a spray foam that can cover, contain, and treat the working face during the tipping, spreading, and compacting process at the working face. This practice will further reduce the surface area of the "exposed" fresh trash.

Figure 35: Working Face Fresh Trash Odor Mitigation

ADDITIONAL STUDIES:

11) Waste Characterization Studies

Boardmember Englander made a motion which directed the SCL LEA to develop "more extensive" data by conducting supplemental waste characterization on the physical and chemical properties of the entire wastestrean being disposed at Sunshine Canyon Landfill (The study is to meet the full statistical requirements utilized by the City of Los Angeles and by CalRecycle, as requested by Republic).

On April 2, 2015, the Sunshine Canyon Landfill Board of Directors passed a motion by Board member Englander that stated the following:

> ***I FURTHER MOVE*** *that as previously directed by the SCL LEA Board of Directors, SCL LEA staff is to immediately plan and conduct additional comprehensive waste characterization studies of the* ***overall*** *SCL wastestream which can be utilized as a baseline (and to determine future changes) of the materials types, physical and chemical characteristics, and any other data that can be utilized to develop additional odor mitigation measures;*

The SCL LEA completed the physical characterization activities at the end of August 2015 and the lab samples delivered for the analytical chemistry work. The SCL LEA expects the final report to be completed by November 2015.

The more extensive characterization study can also be conducted at various transfer stations. Studies at transfer stations will include assessing the source of odiferous loads from specific truck routes and generators, and assessing odor mitigation procedures currently utilized by Republic at their transfer stations, and will assess odor control measures at non-Republic controlled transfer stations

The data would be specifically for addressing the properties that determine the generation of landfill gas and generation of landfill odors, including data that would provide information on landfill diversion programs. The study is to supplement the existing studies being conducted on identifying the material types being disposed.

Detailed composition studies and chemical analysis (e.g., proximate/ultimate analysis, etc.) by material types will also identify materials that are most likely to generate odors, high organic content materials, or sulfur containing materials (e.g., drywall, textiles, rubber/leather, etc.). The chemical analysis can also be performed on the other materials that are typically incorporated into the landfill, for example, specific ADC materials, e.g., biodegradable plastic, C & D fines, etc.), and even traditional cover materials such as daily cover soil.

SCL LEA will be sharing the results with the CalRecycle, Water Board and the SCAQMD. This work was approved in a prior Board of Directors' meeting, as the Sunshine Canyon Landfill Local Enforcement Agency (SCL LEA) Board of Director's approved of a "research budget" for projects focused on the mitigation of landfill odors.

The more extensive waste characterization study can also be expanded to include specific analysis to determine the site-specific landfill gas generation factors utilized in the EPA's AP-42 and LandGEM models.

The enhanced waste characterization studies are consistent with the goals/objectives of the previously approved motion and directive to develop landfill odor mitigation programs.

12) Visqueen Sheeting Field Study

SCL LEA completed a pilot field study also previously approved by the Board of Directors. A selected area of the landfill was covered with visqueen (plastic sheeting) and the edges sealed with soil/sandbags. The objective is to "visually" determine the amount of possible landfill gas emissions released over a short period of time. This field study was requested by Board

member Bambard, and would be conducted in addition to the ongoing instantaneous and integrated surface monitoring. The latest quarterly reports will be utilized to determine the areas in which to conduct these tests. SCL LEA will develop the technical details of this study.

Visqueen rolls are available in many sizes, typically in 20 foot by 100 foot rolls. The size of the actual sheet(s) to be installed in the field tests will depend upon the locations selected. The SCL LEA recommends that if a "bubble" is formed during the field testing (physical indication of landfill gas emissions), that a sample of the "bubble" be extracted and analyzed for its constituents.

During the field testing, meteorological data, e.g., barometric pressure, etc., will be also collected. Methodologies (e.g., time-lapse cameras, etc.) must include monitoring to observe the formation of the physical "bubble" (continuous emissions vs relatively instantaneous emissions), but also to take into account the possibility of the "bubble" being absorbed and reduced/removed due to the vacuum of the LFG collection system. The actual pilot field test was completed in June 2015. The findings and recommendations from the pilot field testing were utilized for the next phase of the visqueen field test. The following is of the located area of the visqueen test:

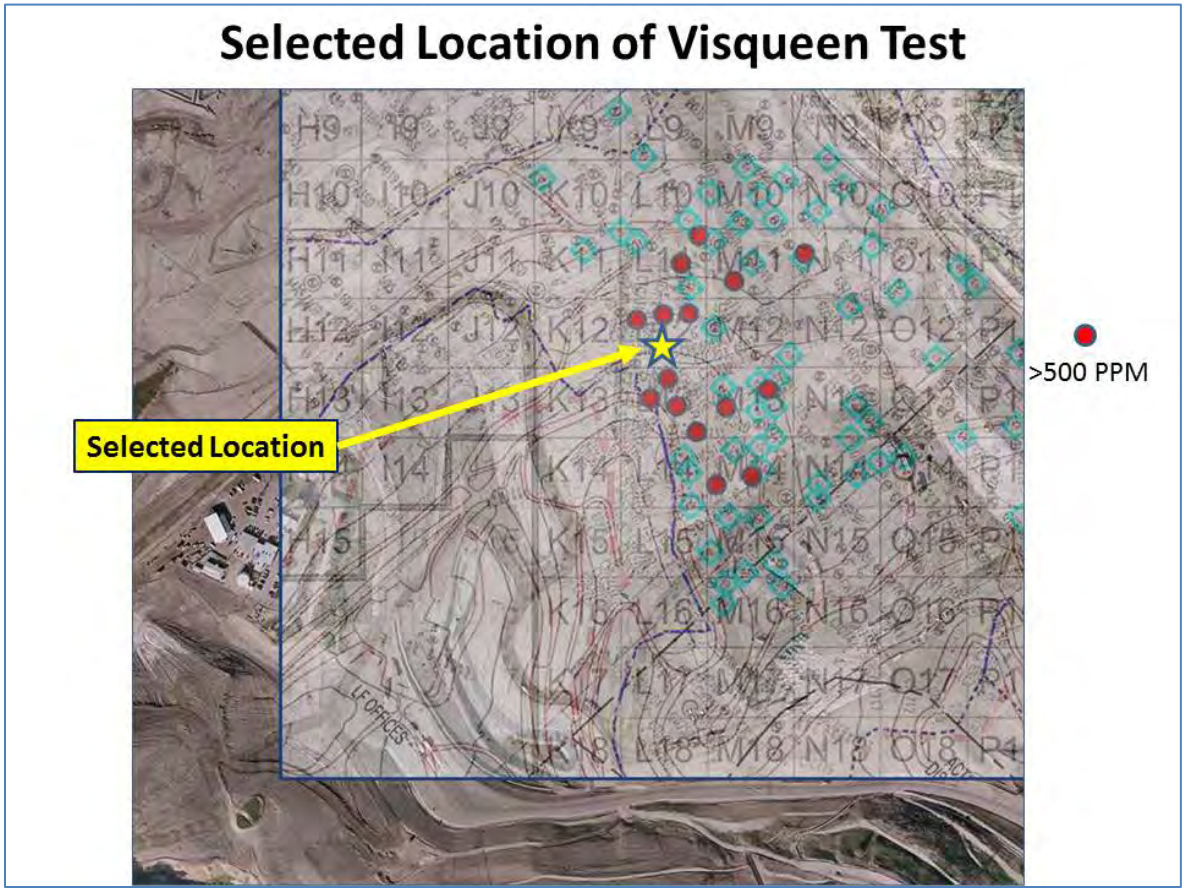


Figure 36: Selected location of the visqueen test

13) Air Flow Modeling (Tracer Studies)

The SCL LEA also recommends the use of tracer gas studies to determine the movement of landfill emissions from various parts of the landfill (or from the landfill as a whole). These studies would also determine what physical characteristics of the landfill (e.g., contours, tree lines, use of orchard fans, etc.) have on the dispersion. The tracer gas can also conduct these tests in various meteorological conditions to determine which combination of conditions creates the potential for odors ending up in the local community.

A limited scaled-down version can be done in lieu of a full blown "tracer study". The LEA can have a three dimensional contour model of the landfill and surrounding areas built and utilize "smoke test" to see the airflow pathways in which odors can potentially move into the neighborhood, and what "contour changes" can be made to redirect and/or disperse the flow.

14) Development of Performance Metrics

There is an absolute need to develop performance metrics that can be used to determine success/progress of actions taken to reduce odors from the landfill; the SCL LEA will start on developing performance measures to determine the effectiveness of supplement SCAQMD odor complaints. Developing performance metrics include:

- Develop quantifiable methods of determining LFG collection efficiency e.g., use of LACSD use of flux box to measure performance by calculating generation based on actual measurement rather than LandGEM based values.
- Develop method to determine/calculate LFG volume under visqueen (based on shape) to provide cubic feet per unit time measure to determine if release is "short term / instantaneous or long-term continuous" mode (or both).
- When researching best management practices in transfer station odor mitigation measures, including waste screening processing, addition of odor control adsorbents, load rejection, etc. and evaluate methods to minimize odiferous loads from being delivered to SCL, ET and SCL LEA staff to develop performance evaluation metrics

For the Republic Services proposed EnviroCover ADC, the SCL LEA and the SCAQMD have jointly developed evaluation methods for assessing the performance of the ADC. The document titled "*Republic Services Alternative Daily Cover Pilot Program Evaluation Protocols and Performance Metrics (V1.04)"* was developed to provide definitive protocols for evaluating the ADC performance. These protocols also provide a safeguard for the local community, and also provides a basis for the SCL LEA to determine and document the effectiveness of the proposed ADC.

Note: The SCL LEA should directly conduct these studies, as the SCL LEA would have much better control over the way the study is actually done (e.g., technical protocols, etc.) , and the SCL LEA could contract specialty tasks out via the SCL LEA's existing E. Tseng's contract and pre-approved subcontractors. These studies and research projects are already covered by the current CalRecycle approved "Enforcement Program Plan", The SCL LEA Board of Directors has previously approved of a research budget for the SCL LEA.

ATTACHMENTS

1. **April 2015 Board of Director Motion**

2. **Interagency Task Force Sunshine Canyon Landfill Odor Mitigation Program Recommendations**

3. **DPW Letter of February 26, 2015, to Rob Sherman, Sunshine Canyon City/County Landfill Conditional Use Permit No. 00-194-(5), Response to Republic Services' Letter of November 18, 2014, Regarding Odor Mitigation Measures**

4. **Calculation Methodology LFG Wells per Acre (with percent overlap)**

5. **Republic Services' Technical Consultant Opinion Letters**

6. **Visqueen Study Protocols**

7. **SCL LEA Procedures and Protocols for the Evaluation for Odor Mitigation Programs at Republic Services Owned/Operated Transfer Stations**

MOTION

As City Councilmember for the District in which this landfill is located, and as a member of the SCL LEA Board of Directors, we have been working continuously with City Planning Department, our SCL LEA Program Manager and other regulatory agencies to look at the various options to solve this unacceptable problem with landfill odors in the community.

This Board of Directors recognizes that there are multiple regulatory agencies that are involved in the oversight the operations of the landfill, and that there has been an extensive interagency effort led by the SCAQMD to address this problem. In addition to this working group, the SCAQMD has hired two independent consultants to study the landfill and provide independent recommendations. Upon completion of review of both SCAQMD consultants' reports, this Board will expect a report from the SCL LEA with recommendations along with the technical backup documentation and reasoning for those recommendations.

As the SCL LEA Board, we have to look at all of the potential solutions, irrespective of jurisdictional issues, to solve this problem, and because only immediate direct actions that impact the wastestream and the landfill's operations will result in odor mitigation; I propose to direct the SCL LEA to do the following actions based on what the SCL LEA already knows:

I THEREFORE MOVE to Direct the SCL LEA Program manager, upon completion of the review of both SCAQMD consultants' reports, to provide the Board members with a report of the SCL LEA recommendations along with the technical backup, documentation and reasoning for those recommendations; and

I FURTHER MOVE to direct the SCL LEA to work with SCAQMD and Republic to take the steps needed to immediately improve the LFG collection performance by implementing the optimal combination programs that will result in improved LFG system design and operations (e.g. increased well density and/or improved extraction well design, etc.); and

I FURTHER MOVE, based upon: a) the findings and recommendations and of the SCAQMD consultant's (Hydro Geo Chem) report titled "Pneumatic Testing and Recommended Changes at the Sunshine Canyon Landfill, Sylmar, California, March 11, 2015; b) CalRecycle's published report on best management practices reference for design of landfill gas collection systems titled "Technologies and Management Options for Reducing Greenhouse Gas Emissions From Landfills" (2008)"; and c) recommendations provided in the White Paper: "Assessment of Alternative Daily Cover Related to Origin and Control of Landfill Odor" prepared by Blue Ridge Services; and d) the SCL LEA's own independent analysis, to direct the SCL LEA to work with SCAQMD and Republic to modify landfilling operational practices that promote better landfill gas movement throughout the landfill and optimal leachate drainage that will improve the overall LFG collection by discontinuing the use of the 9" of daily soil cover, or allowing the peeling back of daily cover, or use of ADC (e.g., biodegradable plastic ADC) to promote drainage, reduce saturation and increase permeability to promote movement of LFG, and at the same time develop methods to create a quantifiable reference performance baseline and other methods to determine measurable progress (e.g., use of visqueen field test procedures, etc.); and

I FURTHER MOVE to direct the SCL LEA staff to implement the pilot visqueen field test, as soon as possible, to develop a reference baseline performance of the effectiveness of the daily and/or

intermediate covers in a manner that provides physical and "visual" measurements of landfill gas emissions over a short period of time; and

I FURTHER MOVE to direct the SCL LEA staff to work with Republic to improve of the performance of the intermediate cover, e.g., increasing thickness of intermediate cover, utilization of lower permeability intermediate cover materials, utilization of higher compaction to increase density of the intermediate cover, utilizing cured/mature compost to improve vegetative growth (and potential biofilter affect), utilization of less steep intermediate slopes, and/or utilization of biodegradable plastic ADC in combination with the statutory soil intermediate cover; and

I FURTHER MOVE to direct the SCL LEA staff to work with the respective local enforcement agencies to evaluate Republic's Transfer Station Odor Reduction/Mitigation Program at their own transfer stations as to its effectiveness. SCL LEA shall independently determine the best management practices for transfer stations, and develop any additional recommendations for improving their performance; and

I FURTHER MOVE to direct the SCL LEA staff to work with the respective local enforcement agencies to conduct site assessments of transfer stations (which are not Republic-owned/operated) to determine the potential to implement similar odor reduction/mitigation practices as part of the conditions to bring waste to the landfill; and

I FURTHER MOVE to direct the SCL LEA to report back within 45 days on the results and analysis of the SCL CAC waste characterization study that was done on the wastestream from the City of Los Angeles' transfer station; and

I FURTHER MOVE that as previously directed by the SCL LEA Board of Directors, SCL LEA staff is to immediately plan and conduct additional comprehensive waste characterization studies of the **overall** SCL wastestream which can be utilized as a baseline (and to determine future changes) of the materials types, physical and chemical characteristics, and any other data that can be utilized to develop additional odor mitigation measures; and

I FURTHER MOVE to direct the SCL LEA to report back within 45 days on the status of each of the above directives, and any support/assistance that the SCL LEA will require from the Board of Directors.

PRESENTED BY: _____

MITCHELL ENGLANDER
SCL LEA BOARD MEMBER

SECONDED BY: _____

SUNSHINE CANYON LANDFILL

SCL - LEA

LOCAL ENFORCEMENT AGENCY

14747 San Fernando Road
Sylmar, California 91324

Date: June 27, 2013

To: Sunshine Canyon Landfill Board of Directors

From: Wayne Tsuda, SCL LEA Program Manager

Subject: Report Transmittal – Interagency Task Force Sunshine Canyon Landfill Odor Mitigation Program Recommendations

The Interagency Task Force has completed its recommendations for odor mitigation and I have attached a copy for your review. The primary agencies involved on the Task Force included:

The South Coast Air Quality Management District (Chair)

The Sunshine Canyon Landfill Local Enforcement Agency

The Los Angeles County Department of Public Works

The Los Angeles County Public Health Department, Environmental Services Solid Waste Program

The Los Angeles County Department of Regional Planning

The Los Angeles City Planning Department

Attendees also included legal counsel for the agencies above and the SCL LEA Environmental Consultant, Eugene Tseng and Associates.

The recommendations are intended to provide agencies with recommendations for odor mitigation that may be used in each agency's respective areas of expertise for seeking compliance and enforcement, if applicable.

Attachment

Wayne Tsuda
SCL – LEA Program Manager
Office: (213) 252-3932 Cell: (213) 359-4568
Email: wayne.tsuda@lacity.org
For reply: 3550 Wilshire Blvd. 18th Floor, Los Angeles, CA 90010

Date: June 24, 2013

To: Sunshine Canyon Landfill Interagency Task Force on Community Odor Mitigation

Mr. Mohsen Nazemi, Deputy Executive Officer
South Coast Air Quality Management District

Ms. Cindy Chen, LEA Program Manager
Chief, Solid Waste Management Program
Los Angeles County Public Health Department, Environmental Services Solid Waste Program

Ms. Ly Lam, Senior Management Analyst,
Mr. Nick Hendricks, City Planner
Los Angeles City Planning Department

Ms. Maria Masis, Supervising Regional Planner
Los Angeles County Department of Regional Planning

Ms. Emiko Thompson, Senior Civil Engineer
Los Angeles County Department of Public Works

From: Wayne Tsuda, Program Manager
Sunshine Canyon Landfill Local Enforcement Agency

Subject: Sunshine Canyon Landfill Odor Mitigation Program Recommendations

The Sunshine Canyon Landfill Interagency Task Force (Task Force) has been researching and evaluating best management practices to mitigate odors at the Landfill. This has resulted in a compilation of additional operational and programmatic recommendations to supplement the ongoing odor reduction efforts currently in place at the Landfill.

The recommended measures would be implemented in phases by the respective agencies within their areas of purview and authority, as they determine appropriate. Upon their implementation, monitoring of the measures would also be the responsibilities of the respective agencies. If odors persist, further mitigation measures are to be implemented until the odor problem is fully mitigated.

These recommendations have been developed collectively by the members of the Interagency Task Force comprised of the following agencies:

- South Coast Air Quality Management District, Task Force Chair
- Sunshine Canyon Landfill Local Enforcement Agency
- Los Angeles County Department of Public Works
- Los Angeles City Planning Department
- Los Angeles County Department of Regional Planning
- Los Angeles County Department of Public Health
- E. Tseng and Associates, Consultant to SCL LEA

Sources and Types of Odors

There are two identifiable types of odors: 1) fresh trash smells, and 2) odors associated with landfill gas generated from older decomposing trash. Landfill gas is the carrier mechanism of the odiferous compounds generated by the decomposition of the solid waste. Odor types can generally be characterized as fresh trash smells, landfill gas odors, and/or a combination of the above. Sources of fresh trash odors and odors associated with landfill gas may be attributable to any one or combination of the following potential sources:

1. Odors from vehicles delivering trash for disposal;
2. Odors associated with any litter and/or liquids that may fall from the vehicles delivering trash for disposal;
3. Odors from vehicles that are waiting in queue to dump;
4. Odors from the trash truck unloading process at the tipping face area;
5. Odors from fresh trash on the working face before it is covered;
6. Odors from the trash/litter carried into the neighborhood by winds;
7. Trash odors carried by landfill gas which pass through the fresh trash that has been disposed and/or placed upon the working face during operational hours;
8. Fresh trash odors carried by landfill gas through the daily cover; the odor that passes, during closed hours, through the fresh trash that has been disposed and/or placed upon the working face and daily cover;
9. Odors may be carried into the neighborhood via the water spray used to mitigate the odors as odorous compounds attaching themselves to heavier droplets of water as opposed to odorous compounds that otherwise may be dispersed;
10. Odors from "older" decomposing trash that are not captured by the landfill gas collection system;

11. Odors which result from operational activities associated with landfill repair and maintenance such as landfill gas (LFG) collection well installation, trenching, well repair, equipment breakdowns, and shutdowns, etc.;

12. Other odors are occasionally present and may contribute to complaints reported from the community. These include sources such as leachate collection and treatment system, portable toilets, naturally occurring sources associated with the adjacent oil field and from decomposition of plants that are part of the natural habitat areas and/or from plants that have not taken root on the intermediate (and other) cover areas, or odor sources in the community such as manure from horse properties and curbside trash collection.

Source Materials

The primary "source materials" of the odors are from non-hazardous municipal solid waste (MSW), particularly components that are readily decomposable and putrescible materials, such as food waste from homes and restaurants, etc. and from materials that decompose over time to form odiferous compounds within the landfill. Greenwaste (e.g., cut grass) can be odiferous if the grass has been decomposing for a week prior to pickup and disposal at the landfill. Regulated wastes which have been treated (e.g., autoclaved regulated medical waste) are defined as non-hazardous MSW and can be particularly odiferous. The sources of MSW are from residences, businesses, government, schools, industry, and institutions.

Analysis of Odor Complaints and Violations

Since 2008, complaints received by SCAQMD alleging odors from the landfill have substantially increased. These complaints are investigated by SCAQMD field staff and those verified resulted in notices of violation. Other actions taken by the SCAQMD include citations for permit conditions and surface emission exceedances.

The "fresh trash" odor complaints generally occurred during daytime hours (6 AM to 6 PM) and account for approximately a quarter of all verified odor complaints for which the Landfill has been alleged as the source of those odors. Based on SCAQMD's data, potential sources of "fresh trash" odors include:

- transportation of odorous trash through the community;
- the queuing of trucks near or at the landfill and;
- the depositing of odorous trash at the working face during landfill operations. On Mondays or after holidays there may be higher numbers of odor complaints due to the decomposition of trash that has been collected and kept for longer periods prior to disposal.

Calls to SCAQMD during the evening hours (6 PM to 6 PM) were primarily attributable to landfill gas odors which accounted for approximately two-thirds of the verified complaints, based on AQMD's 2012 data. Odors from landfill gas can be caused by the release of gas from the landfill that is not captured by the existing landfill gas collection system. A significant number of complaints attributed to landfill gas releases is suspected to be associated with the following sources:

- a landfill gas collection and flare system that is undersized for the amount of gas being produced and that has experienced frequent shutdowns due to new equipment installation, equipment breakdowns, and equipment maintenance activities;
- landfill gas collection well installation procedures which allow the release of significant amounts of landfill gases;
- soil surfaces that have fissures, crevices or where erosion has occurred creating pathways for landfill gas to escape; and
- local weather patterns affecting wind direction and intensity

Holistic Approach to Odor Mitigation Options

The Task Force has determined that the optimal approach to mitigate odors emanating from Sunshine Canyon Landfill would require the implementation of measures to manage the sources of both fresh trash odors and landfill gas odors through best available technology and best management practices.

The optimal approach requires focusing on the best combination of practical preventative programs, facility design features, operational practices, maintenance protocol, and odor mitigation programs that provide the optimal operating conditions of the landfill gas collection system.

Based on this approach, the Task Force has determined that the highest priority for reducing complaints related to landfill gas is to:

- optimize the operation of the landfill gas collection system for maximum effectiveness based on accurate information on existing conditions;
- to assure that the landfill gas collection system is properly constructed and operated at the design criteria; and
- the landfill gas collection system be properly maintained and capable of sustaining temporary emergencies, such as power outages or extreme weather conditions.

Recommendations:

The Task Force has reviewed the various listed odor mitigation measures and recommends the following steps be taken immediately:

Operational Changes

- Require odor control operators with portable mobile sprayers containing odor neutralizer to apply the neutralizers on the waste for specific loads at the working face on a specific load-by-load basis. For loads that are identified as odiferous loads such as treated medical waste or putrefied food, the portable/mobile sprayer and operator must be situated at the tipping location so that the odor neutralizer can be used during the truck unloading operation.

- Require treated medical wastes to be prioritized for immediate burial at the working face.

- All areas of intermediate cover (minimum of 12 inches of compacted soil) must be maintained to prevent the emission of landfill gas through the cover surface.

- Require that an additional vegetative layer (with plants and soil with compost mix) be placed on top of intermediate cover areas, which would also act as a biofilter layer for emissions that may be venting through the cover. Surface emissions must be continually monitored, including areas with established vegetative covers to ensure that the underlying intermediate cover does not develop cracks and seeps.

- Intermediate cover areas with surface emissions beyond regulatory limits must be repaired within regulatory time limits or sooner if possible. Should surface emissions of LFG continue to be released in quantities above the allowable SCAQMD thresholds from intermediate cover areas after completing the landfill gas collection system upgrades, the following may be required:
    a. Install new landfill gas collection wells as directed by SCAQMD. Other methodologies may be employed such as, but not limited to:
    b. A thicker intermediate soil cover or the use of a more impermeable material such as clay may be specified;
    c. The use of a synthetic impermeable removable non-porous geosynthetic liner on top of the intermediate soil cover (e.g., Closure Turf or equivalent) that is anchored and connected to the landfill gas collection system
    d. Should intermediate cover methodologies fail or prove to be infeasible, intermediate covers shall be upgraded to meet final closure standards if surface emissions on intermediate cover areas persist.

- Require the Landfill Operator to maintain an ongoing program of identification, monitoring, upgrading/repairing and replacing non-performing wells, and provide monthly reports to the SCAQMD for distribution to the Task Force.

- Consider allowing the peeling back of the daily soil cover that was applied the previous day under prescribed conditions which may include:

a. to be in conjunction with the proper design, construction, and maintenance of the landfill gas collection system
b. to be allowed only Tuesday through Friday;
c. approximately three to six inches of soil cover to remain in place;
d. soil to be removed in stages to match the need for tipping, disposal and compaction; and
e. after ceasing filling operations on Saturday, a full 9-inch cover is to be placed and remain in place on Mondays.

- Landfill Operator shall submit and implement a plan for using a negative air pressure system to prevent landfill gas from escaping into the atmosphere during gas collection well installations and trenching activities, and from the excavated refuse material.

- Require the Landfill Operator to continuously evaluate the effectiveness of current maintenance procedures including the adequacy of gas well tuning and balancing frequencies, and the efficiencies of the flares and gas wells. The Landfill Operator must also routinely fine tune, maintain, and repair gas wells.

- Shutting down flares and taking the gas collection system off-line for maintenance purposes during adverse wind conditions should be prohibited.

- Monitor the progress of the Landfill Operator to expedite the installation of back-up generators to ensure the continuous operation of all flares in the event of a power failure at the site.

- Consider a pilot project for the Landfill Operator to demonstrate the effective use of a biodegradable or thermodegradable plastic approved as Alternative Daily Cover (ADC) or combinations of ADCs which meets the statutory performance standards that apply.

<u>Actions Related to Overall Facility Design</u>

- Require the Landfill Operator to determine the actual in-place waste density and revise the vertical and horizontal landfill gas well spacing to reflect actual conditions at the site, including cover requirements. The Operator must also reevaluate the existing landfill gas collection system design and expedite installation of new and replacement wells to achieve desired "well density" according to the findings. Additional field analysis such as horizontal and vertical gas permeability analysis (and resulting permeability ratio data) should be used to evaluate the actual radius of influence which should be used to determine the overall landfill gas collection efficiency. The Information used in calculating the radius of influence and designing the landfill gas system shall be shared with Task Force members for their review and concurrence.

- Require the Landfill Operator to plant trees for the purpose of creating a vertical physical barrier. A planted wall shall also be used to mount a misting system to control odors in appropriate locations. Strategically placed orchard fans should be incorporated to create as much dispersion of the funneled air flow out of the entrance of the landfill.

- Require the Landfill Operator to review and revise cell design, sequencing, and fill operations and apply the revised design in all new cell construction in order to minimize the slope angle of daily and the steeper intermediate slopes, which will allow for better compaction of the daily and intermediate soil cover. Cell design, sequencing, and fill operations should consider minimizing the surface area of steeper intermediate slopes in future cell development of the landfill.

- Require the Landfill Operator to explore new industry standards, best management practices and emerging technologies to supplement odor reduction efforts at the landfill and cooperate with Task Force member agencies to implement pilot projects where feasible such as electronically reporting the monitoring and corrective actions on a monthly basis.

Verification of the Effectiveness of Various Odor Mitigation Measures

- Require the Landfill Operator to recalculate the LFG collection system efficiency each at the beginning of each calendar year to take into account the additional landfill gas being generated by the increase in the overall in-place disposal tonnage of the preceding calendar year. The data and the methodology utilized in the calculation of the LFG collection system efficiency shall be provided to the SCAQMD for distribution and review by the Task Force members.

- Require the Landfill Operator to measure the in-place density of trash in the areas with the 9 inch daily soil cover with a Gamma Density Logger for the purpose of calculating the radius of influence. Both the density of the refuse at different depths and the density of the daily cover shall be measured. If the radius of influence is determined to be less than ideal, additional landfill gas extraction wells should be required (unless increasing the vacuum can increase the radius of influence without intrusion of atmospheric oxygen).

- As a supplement to the required ongoing surface emissions monitoring, the Landfill Operator may be required to conduct a research project as part of which a large sheet of synthetic, impermeable material is to be installed on selected locations of intermediate cover to determine any landfill gas emissions through intermediate cover.

As these proposed measures, through its collective implementation, are intended to mitigate odors at the Sunshine Canyon Landfill, agencies should monitor the effectiveness of these measures within their respective areas of purview. Based on the

findings of such monitoring the mitigation measures may be modified, added, or discontinued accordingly, until the odors at the landfill are mitigated.

Documents reviewed include studies and other documents prepared by Republic, its consultants, South Coast Air Quality Management District and related correspondence. Technical references and documents that were reviewed are available in electronic format upon request from the SCL LEA. Other documents that were utilized are posted on the SCL LEA web site www.scllea.org in the "Special Projects" page and can be downloaded from the "Attachments" section at the bottom of the Special Projects page.

Attachment

ATTACHMENT 1
Technical Comments

The following notes are provided as background for the recommendations provided. Please note that the Task Force will continue its research into best management practices for odor mitigation at Sunshine Canyon Landfill (Landfill).

Improving LFG Collection Efficiency

The Task Force recognizes that proper design, operation, and maintenance of a LFG collection system is needed in achieving a high collection efficiency of the LFG gas and thus controlling odors associated with landfill gases. Landfill gas collection systems for operating landfills do not operate at 100% collection efficiency for the total amount of landfill gas that is generated. The danger of oxygen intrusion and the potential for subsurface oxidation (underground fires) have to be avoided therefore, the landfill gas collection system design and operations is a constant balance of trying to collect the largest volume of landfill gas generated without creating overdraw in which atmospheric oxygen is drawn through the surface or other potential paths into the collection system.

While LFG control systems do not operate at 100% collection efficiency, the Task Force recommends that the design capacity for the LFG collection system should be sized for 100% collection efficiency for the maximum rate of LFG generation volume that is anticipated to be produced during the life cycle of the landfill, rather than a default 75% average value, or even the upper end, 85% of the range value. The Task Force believes it would be prudent to have a safety factor to accommodate periods in which the rate of landfill gas generation may be increased beyond the "average" rate of generation.

Methodologies for Calculating Landfill Gas Collection Efficiency

There are many methods of computing "collection efficiency" depending upon how the method is utilized for the calculation of the total volume of landfill gas generated. For this report we have reviewed the US EPA's AP-42 (Federal Emissions Standards) as referenced by the Landfill operator in their evaluation of their landfill gas collection system.

The United States Environmental Protection Agency (US EPA) document, AP- 42, states that a 75% LFG collection efficiency as a "typical value", but typically reported a range of values from 60% to 85%. Puente Hills, one of the Los Angeles County Sanitation District's (LACSD) active landfills, is currently achieving 95%+ LFG collection efficiency. The LACSD utilizes a different methodology from the US EPA called the Integrated Surface Methane (ISM) Industrial Source Complex (ISC) air dispersion model to estimate LFG collection efficiencies of their landfills.

In the Integrated Surface Methane/Industrial Source Complex method, LACSD defines collection efficiency as:

Collection Efficiency = Collection / (Collection + Emission)

Whereas, US EPA AP-42, the LandGEM model utilized by both the Landfill operator and SCAQMD, defined collection efficiency as:

Collection Efficiency = Collection / Generation

where generation is simulated using the LandGEM model. In an ideal situation, the collection efficiencies would be the same under both methods.

The Task Force cautions those looking at landfill gas collection efficiency to be aware of the two methodologies and possible differences in stated results.

Current Status of Landfill Gas Collection System Efficiency

Whatever the potential strengths and weaknesses and/or differences in the calculated "collection efficiency", since the initial Task Force meeting of regulatory agencies in the summer of 2011, the Task Force has maintained that most of the reported landfill odors (occurring during closed hours) are resulting from an inadequate landfill gas system (overall capacity and the associated gas collection well / piping system). The Task Force has reviewed documents received from the Landfill operator regarding the evaluation of the landfill gas collection system ("Evaluation of the Existing Landfill Gas Collection and Control System, Sunshine Canyon Landfill", prepared by Bryan A. Stirrat, dated November 29, 2011).

The Task Force notes that as of January 2013, significant improvements have been made by the Landfill operator to the landfill gas collection system as the result of the SCAQMD' Stipulated Orders of Abatement and by the Landfill operator voluntarily, and that the collection capacity is much more capable than it was in 2011 or 2012.

Landfill operations have significantly changed over the years and so has the solid waste composition. With the passage of AB 939 (Sher - Integrated Waste Management Act of 1989), the composition of municipal solid waste has changed significantly. In the past when the in-place landfill trash densities were much lower in value than those achievable in today's operating practices (1,900+ pounds per cubic yard), a six inch daily soil cover, although a discrete layer when applied, would eventually be indistinguishable with the solid waste because the soil would disperse and move into the interstitial volume and just become part of the overall solid waste mass. This can be observed in borings taken from old landfill; no distinct "daily soil cover" layer is observable.

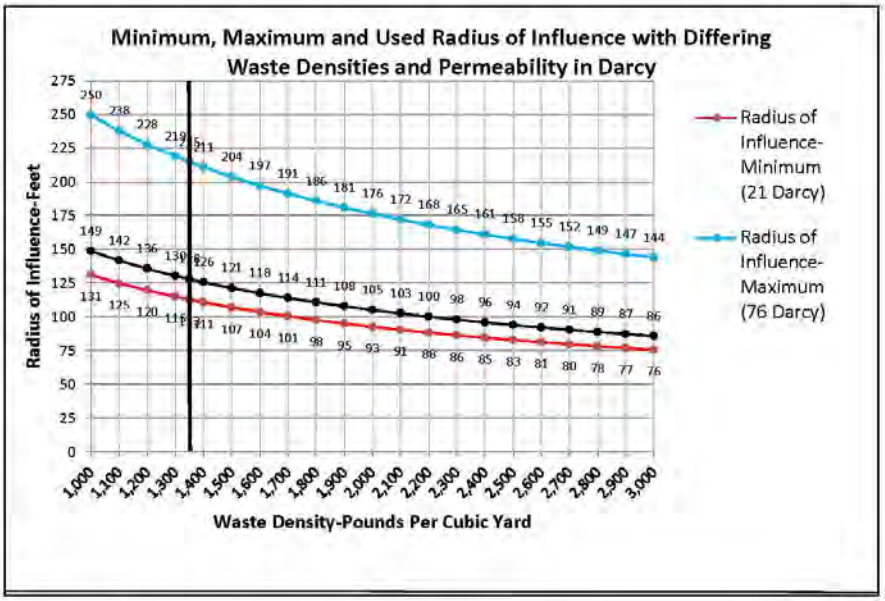
The Task Force believes that using the concept of intrinsic permeability, one can generally correlate flows of water to flows of landfill gas and therefore to the flow of odors (e.g., odorous compounds carried by landfill gases). Intrinsic permeability is a characteristic of any porous medium and entirely independent of the nature of the fluid – whether gas or liquid. Simplifying from Darcy's Law for water and gas flow through a permeable medium and solving for the intrinsic permeability coefficient in common, and thus one can calculate volumetric flow of landfill (higher density, less permeability, more soil, higher density, equals less permeability).

Radius of Influence of Gas Collection Wells

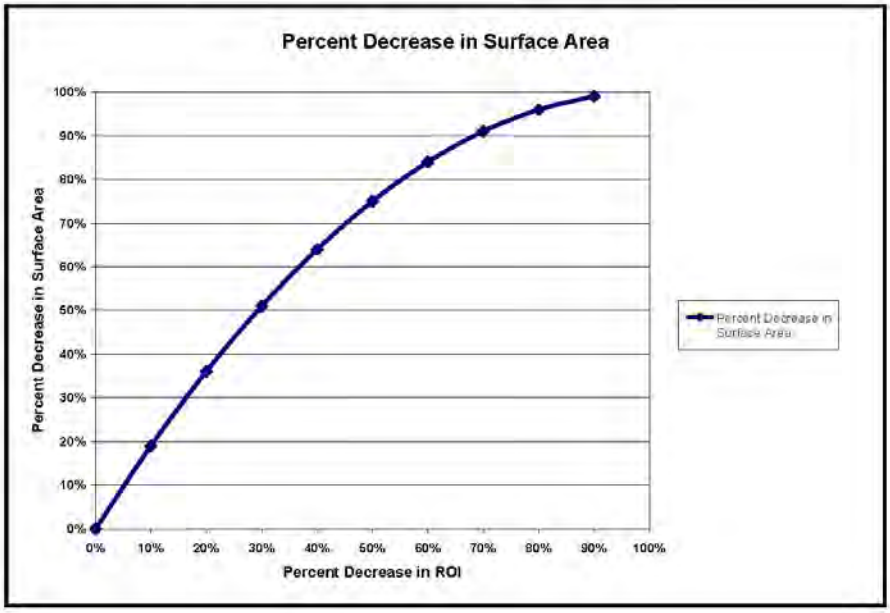
A primary issue discussed between the Task Force members dealt with the radius of influence needed for effective collection of the generated landfill gases and the overall collection efficiency needed for the control of odors. One of the key factors in the design of a landfill gas collection system is the determination of the needed well spacing. One of most important factors is the density of the in-place mass. The initial density used by the Landfill operator's consultant, Bryan A. Stirrat (BAS) for the calculation of the radius of influence was 1,350 pounds per cubic yard (assumption used in calculation). The SCL LEA's opinion is that this value is too low, which would result in a radius of influence that this greater and thus a less dense well location density needed for achieving a specific landfill gas collection efficiency.

The radius of influence is important due to the volume of gas being collected; if using the volume of a cylinder as the theoretical volume of the effective vacuum, the volume is proportional to the square of the radius, so that a 10% decrease in the radius of influence results in an impact of 20% of the volume (or surface area of the circle) from which the landfill gas collection well draws from.

Below are several graphs that illustrate the relationship between density and radius of influence. The SCL LEA's consultant calculated the approximate radius of influence as a function of density, with a range (minimum / maximum) with different permeability values.



Source: E.Tseng and Associates, Feb. 2013



Source: E.Tseng and Associates, Feb. 2013

The estimated in place density of trash (in the areas where the 9 inch daily soil has been a requirement) by doing a rough calculation based on data supplied by the Landfill operator.

Data used in the density calculation:

- Days between flyovers from 2/28/11 and 2/10/12 = 347
- Tonnage of waste received at the gate and buried between flyover dates is 2,301,010 tons
- Total weight of 9" soil cover approximated at 896,000 cubic yards at 105 pounds per cubic foot is 1,270,080 tons
- Volume of consumed airspace between flyover dates = 3,133,472 cubic yards
- Add 1,272,080 tons to 2,301,010 tons for total weight of materials in the 3,133,472 cubic yards volume

The actual density of the materials (combined solid waste and daily/intermediate cover) that should be used as the density factor for the calculation of the radius of influence is approximately 2,269 pounds per cubic yard. The density of the solid waste (by itself) at Sunshine is calculated to be approximately 2,056 pounds per cubic yard. According to the Los Angeles County Sanitation Districts (LACSD), the average density of the in-place trash only (called LF waste density) for PHLF is about 1,960 lbs/yd^3. Puente Hills Landfill uses a 50:50 mix of shredded greenwaste with clean soil as daily cover, and the average density of in-place trash and daily/intermediate covers (airspace utilization density) for Puente Hills Landfill is 1,405 lbs/yd^3.

Also, as previously stated, the waste composition has significantly changed compared to the development of the US EPA AP - 42 standards. Municipal solid waste has more moisture content, is denser, and the initial landfill gas generation will occur quicker and produce greater volumes that municipal waste from the pre-AB 939 implementation. In recognition of this change, the Landfill operator utilized a more recent composition of the municipal waste stream in its calculation of the landfill gas generation. As of December 2012, the Landfill operator's consultant BAS, is now utilizing approximately 1,700 pounds per cubic yard for calculating the radius of influence (ROI) of landfill gas wells. If the estimated density of 2,269 pounds per cubic yard is used for the ROI calculations, the ROI will decrease to less than 100 feet, and when combined with an "overlap" of 30% - 40%, the needed well spacing will be significantly lower than the approximate 200 feet being utilized in the current design.

The general design spacing of the vertical gas collection wells at the Puente Hills Landfill calls for 150 – 200 feet spacing, with 200 feet being typical. Note that at Puente Hills Landfill, the landfill gas well spacing is similar to the design standard of that of Sunshine Canyon Landfill. The big difference is that the density of the mixed greenwaste and soil combination daily cover is much lower than that of the solid waste being disposed, which creates the increased permeability needed for landfill gas movement needed for optimum gas extraction and to promote downward flow of leachate.

BAS has indicated that there are limited well depths to 120 ft. in their designs for cell CC2 and that the density for 0-120 ft. is less than the average for 0-250 ft. depth (the max depth of cell CC2 refuse). BAS notes that the gas of most significance is that within the slotted depth of gas extraction well. However, landfill gas is being generated at all depths including depths beyond the slotted collection pipes. If there is no extraction vacuum, landfill gas pressure will build and eventually migrate to the ground surface and be released, where it is not collected.

Note that even if a daily soil cover of six inches instead of the current nine inches were used, the estimated density would decrease to approximately 2,221 pounds per cubic yard, and the resultant change in the radius of influence is a decrease of approximately two feet. In the literature review, both the SWANA MOLO course materials and also the CalRecycle training materials on landfill gas and/or leachate management recommend using alternative daily covers to promote leachate movement downward and to promote landfill gas collection (in recognition of the soil layer's ability to become an impediment to landfill gas movement and leachate flow.

As previously noted, the landfill gas collection system should be designed for 100% collection efficiency with a safety factor to deal with extraordinary gas generation (e.g., increased generation after wet weather). Even with the implementation of the landfill gas-to-energy project, the collection capacity should still be based on the volume of 100% landfill gas generation.

Considerations with Regard to the Daily Soil Cover Requirement

The Los Angeles County Conditional Use Permit (No. 00-194-(5)) under Item 45(N) can require Republic to implement additional corrective measures, in this case 9 inches of daily soil cover, when such measures are deemed necessary. The Task Force has received information that the use of 9 inches of daily cover soil, while effective at reducing fresh trash odors at the working face of the landfill, may slow down the vertical movement of leachate and gases across the landfill cells. Peeling back a portion of the 9 inch daily soil cover under prescribed conditions is an option being considered in combination with other odor mitigation measures to potentially enhance the efficiency of the gas collection system.

Summary

To summarize the Task Force's analysis, the highest priority and the most significant impact to reducing the odors related to landfill gas is to ensure the continued implementation of a well-designed, operated, and maintained landfill gas collection system. The optimal approach would focus on the best combination of facility design features, operational practices, practical preventative programs, daily and intermediate cover requirements, and odor mitigation programs that provide the optimal operating conditions of the gas collection system, to effectively collect the landfill gas that is generated and minimize unintentional releases of landfill gas.

At the same time, programs should also be implemented to mitigate the offsite migration of fresh trash odors in addition to measuring, verifying and documenting quantifiable environmental metrics utilized to benchmark and measure progress in the mitigation of odors.

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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GAIL FARBER, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

February 26, 2015

IN REPLY PLEASE
REFER TO FILE: EP-5

Mr. Rob Sherman, General Manager
Sunshine Canyon Landfill
Republic Services, Inc.
14747 San Fernando Road
Sylmar, CA 91342-1021

Dear Mr. Sherman:

SUNSHINE CANYON CITY/COUNTY LANDFILL
CONDITIONAL USE PERMIT NO. 00-194-(5)
RESPONSE TO REPUBLIC SERVICES' LETTER OF NOVEMBER 18, 2014, REGARDING ODOR MITIGATION MEASURES

We reviewed your letter dated November 18, 2014, in which you commented on the additional corrective measures required in Public Works' letter dated October 22, 2014. The additional corrective measures were implemented pursuant to Condition No. 45.N of the Conditional Use Permit (CUP) No. 00-194-(5) to further mitigate the odor nuisance resulting from activities related to the operation of the Sunshine Canyon Landfill (Landfill). The additional corrective measures, among other things, pertain to the landfill gas management system, intermediate cover areas, odiferous load management, and reporting requirements.

We take this opportunity to address the assertions made in your letter in order to facilitate progress towards mitigating the odor nuisance at the Landfill.

AQMD Supplemental Environmental Project (SEP)

Your letter suggested "the result from the SEP will be the foundation for further discussions regarding potential additional mitigation measures specifically related to the landfill's gas collection and control system" and that Republic "expected the County to consider the results of the SEP before recommending significant changes in the landfill gas system design..."

Upon completion of the SEP study and receipt of a formal written request from Republic, Public Works will consider additional measures or modifications to the existing mitigation measures. In the meantime, Republic must comply with all the requirements set forth in

Public Works' letters dated October 22, 2014, and September 27, 2010. Failure to comply will constitute a violation of the CUP.

Public Health and Safety

Your letter also contained the statement, *"There is no evidence to suggest that the faint and fleeting odors that may potentially be generated on occasion by the landfill are adversely affecting public health and safety...Therefore, there is no basis under Condition 45 N of the County's CUP to require the landfill to take further actions for the ostensible purpose of protecting public health and safety."*

From January through December 2014, the South Coast Air Quality Management District (SCAQMD) received a total of 1,481 odor complaints in connection with the Landfill, many of which were verified by the SCAQMD inspectors. Furthermore, the verified odor complaints were described as being related to landfill gas, trash, or both. Consequently, 27 Notices of Violation were issued to the Landfill by the SCAQMD.

These confirmed odor complaints indicate that the community living near the Landfill is being subjected to offensive odors that are pervasive and continual and which are harmful to the health, comfort, and well-being of those residents. In addition, there are numerous reports of incidents whereby residents and nearby Van Gogh Elementary School students and teachers experienced adverse health effects resulting from landfill odors.

Republic attempts to discredit the residents' complaints on the basis that these individuals are currently involved in a nuisance lawsuit against Republic. Republic further alleges that these individuals are communicating with one another about these complaints via an Internet group. However, based upon the number of complaints, the number of residents making complaints and the nature of the complaints Public Works has concluded that the odor levels at the Landfill negatively impact the health, comfort, and well-being of the community, and that additional corrective measures are necessary to mitigate these odor impacts pursuant to Condition No. 45.N of the CUP.

Vertical Gas Extraction Well Spacing

Regarding Public Works' requirement to install a minimum of three vertical gas extraction wells per acre for newly completed cells, your letter contained the following statement, *"...the continued use of 9" of soil cover seriously affects the performance of a gas well and merely increasing the density of gas wells does not help improve the efficiency of the gas collection system."*

The requirement to install three vertical gas wells per acre in newly completed cells is consistent with the average number of wells per acre in many areas of the Landfill. In

previous meetings with Public Works, Republic stated that its current practice for newly completed cells was to install three vertical gas wells per acre. Nevertheless, Public Works will consider adjustments to this requirement when Republic submits the calculations of the in-place density of fill material taking into account the daily soil cover, and calculation of the radius of influence as well as spacing for vertical gas extraction wells and horizontal gas collectors based on that density. It is not uncommon to reduce the spacing of the vertical gas extraction wells in order to improve vacuum coverage.

Daily Soil Cover Requirement

Your letter contained the statement, *"In summary, despite our expert submittals, the Department has never sought to defend the 9-inches of daily cover soil requirement on the basis of sound landfill engineering practices. In fact, we have never been given any clear rationale at all for the requirement."*

The use of soil cover is well established on the basis of sound engineering practice. It is in fact a standard regulatory requirement under State and Federal regulations. Other types of cover are "alternatives" to this standard. Moreover, it is also standard practice to require additional soil cover as a means of controlling odor. Several reports/documents prepared for the Sunshine Canyon Landfill have approved the use of soil cover, the use of additional soil cover to control odor, and the use of 9 inches of soil cover. The following are some examples, supporting the soundness of the daily soil cover requirement:

1. **The soil cover requirement is in accordance with the California Code of Regulations (CCR), Title 27, Section 20680; and Code of Federal Regulations, Title 40, Part 258 (Subtitle D of the Resource Conservation and Recovery Act)** which states, *"... the owners or operators of all municipal solid waste landfill units shall cover disposed solid waste with **a minimum of six inches of compacted earthen material** at the end of each operating day, or **at more frequent intervals if necessary**, to control vectors, fires, odors, blowing litter, and scavenging."*

2. **Application of daily soil cover as an odor control measure is a requirement of the landfill's land use permits.**

   The land use permits for both the City and County of Los Angeles require the use of **additional soil cover material**, or **more frequent application** of the soil cover material to seal the landfill surface **when an odor problem develops** (Mitigation Measure No. 33 of *Mitigation Reporting and Monitoring Program, Sunshine Canyon Landfill-City of Los Angeles, Incorporated as Conditions of Approval Pursuant to [Q] Condition No. A.7; and* Mitigation Measure No. 7.06 of *Mitigation Monitoring and Reporting Summary, Conditional Use Permit 00-194-(5) and Oak Tree Permit 86-312-(5))*.

The daily soil cover required by Public Works in September 2010 as an additional corrective measure to address odor nuisance complaints at the landfill pursuant to Condition No. 45.N of Conditional Use Permit No. 00-194-(5) is consistent with the odor mitigation measures already established through the land use permitting process.

3. **Use of compacted daily soil cover at the Sunshine Canyon Landfill is well established and documented.**

   Compacted daily soil cover with a minimum of 6 inches and up to 9 inches was utilized at the landfill for many years prior to Republic obtaining the Local Enforcement Agency's (LEA's) approval for an alternative daily cover (ADC). Cited below are references from the certified California Environmental Quality Act documents for the Landfill and Report of Disposal Site Information approved by the LEA and CalRecycle:

   a) "All refuse deposited at this landfill will be covered on a daily basis with approximately nine (9) inches of clean on-site soil...Figure 10 presents a section view of a typical landfill after compaction and covering. This practice is in accord with operating procedures currently in effect at this and other sanitary landfills in the City and County of Los Angeles" (page 40 of *Draft Environmental Impact Report Volume I*, February 1989).

   b) "All solid waste deposited in the proposed landfill footprint would be compacted and then covered on a daily basis with approximately 9 inches (exceeding the State minimum requirement of 6 inches) of loose clean onsite soil that would be spread and applied over the top of each cell" (page 2-75 of *Subsequent Environmental Impact Report Volume I*, July 1997).

   c) "With respect to odors, the landfill must not be a source of odor nuisance per the requirements of CCR, Title 27, §20919...The program would ensure that odor levels within the facility are kept within baseline odor standards and that odors emanating from the facility would not exceed any odor detection thresholds at the property boundaries. **The best method for ensuring that there will be no odor generation is by proper compaction and coverage of all solid waste materials by the end of the working day**. Refuse received at the proposed landfill would be property [sic] disposed within 1 hour of receipt, compacted, and covered with a minimum layer of 6 inches (i.e., State standard) of compacted soil cover material or an approved alternative daily cover by the end of the working day; therefore, the potential for odors is substantially reduced" (page 3-27, *Final Subsequent Environmental Impact Report Volume I*, June 1998).

d) "Daily cover is placed periodically throughout the working day to minimize the area of the working face and control vectors, odors, and litter at the landfill. Except in areas where ADC is used, the working face is covered with a minimum of nine (9) inches of soil after the facility is closed to the public" (page 7-8, *Joint Technical Document Volume I*, amended December 2006).

e) "Daily cover in the form of soil material or an ADC is placed over all exposed refuse at the end of each working day. Except in areas where ADC is used, the working face is covered with a minimum of six (6) inches of compacted soil after the facility is closed to the public. The soil is placed and compacted with heavy equipment and sloped to minimize infiltration of precipitation and promote surface water runoff...Only soil will be used as daily cover on any operating day before a period when the landfill will be closed for more than 24 hours." (Page B.5-1 and B.5-2, *Joint Technical Document Volume I*, revised May 2008).

Alternative Daily Cover Pilot Project

We are aware Republic submitted a proposal to the Sunshine Canyon Landfill LEA to conduct an ADC pilot project at the Landfill using a geosynthetic panel product. The LEA, in its letter dated November 26, 2014, determined that the proposed ADC pilot project meets the ADC requirements pursuant to CCR, Title 27, Section 20690, the Landfill's Solid Waste Facility Permit, and CalRecycle's ADC Guidelines. Since the ADC pilot project would conflict with Public Works' current requirement to cover disposed solid waste with a minimum of nine inches of compacted soil at the end of every operating day, Public Works' approval of the project is necessary. Public Works will consider the feasibility of conducting an ADC pilot project at the Landfill upon receipt of a formal written request from Republic including details regarding the proposal for Public Works' review and approval.

Request for Additional Information

We believe that the primary source of landfill-gas-related odor complaints is due to the inadequacy of the landfill gas collection system. In your letter, you asserted that Public Works' 9-inch soil cover requirement "has adversely affected the landfill's ability to control potential odor emissions" and that this exacerbates the odor problems at the Landfill because it interferes with the gas collection system. In order to assist Public Works in evaluating this assertion, Republic is hereby directed to provide Public Works within 30 days of this letter, topographic maps of the Combined City/County Sunshine Canyon Landfill (in electronic format) **for each month** starting January 2010 forward, showing the following information separately:

1. Areas where the 9-inch soil cover requirement was applied.
2. Location of vertical gas wells and horizontal collectors installed.

3. Location of vertical gas wells and horizontal collectors affected by liquid build-up.
4. Location of vertical gas wells equipped with a pumping system.
5. Location of vertical gas wells and horizontal collectors that are no longer functioning or have been decommissioned.

(Note: For maps 2 to 5, show the 9-inch daily soil cover area over the refuse boundary.)

In addition, Republic shall provide the following information (in electronic format) within 30 days of this letter:

6. Approved cell design drawings with a detailed description of how the cells were designed to accommodate the 9-inch soil cover requirement.
7. Approved landfill gas collection design drawings with a detailed description of how the system was designed to accommodate the 9-inch cover requirement.
8. Approved action plan or preventive measures taken to address potential liquid build-up or other problems which may impede the effective functioning of the gas collection wells.
9. A report detailing the landfill's gas generation rate, flare capacity of each flare station, and their capture rate and efficiency, for each month during the same period.

Penalty Provision

Please note that failure to implement any of the corrective measures contained in the October 22, 2014, letter constitutes a violation of the CUP and is subject to the penalty provision described in Condition No. 11 of the CUP.

Public Works may, at its sole discretion, modify or apply additional corrective measures as deemed necessary, and in accordance with the provisions of the CUP.

As you requested, we are available to meet with you to discuss Public Works' requirements and work with you towards diminishing odors at the Landfill.

If you have any questions, please contact me at (626) 458-3553, Monday through Thursday, 7 a.m. to 5:30 p.m.

Very truly yours,

GAIL FARBER
Director of Public Works

MARTINS AIYETIWA
Senior Civil Engineer
Environmental Programs Division

DN:dy
P:\Sec\Public Works Letter to Republic

cc: South Coast Air Quality Management District (Mohsen Nazemi, Edwin Pupka)
Sunshine Canyon Landfill Local Enforcement Agency (Gerry Villalobos, David Thompson)
Department of Regional Planning (Maria Masis, Iris Chi)
Department of Public Health (Gerry Villalobos)
City of Los Angeles Department of City Planning (Ly Lam, Nicholas Hendricks)
Sunshine Canyon Landfill Technical Advisory Committee (Lisa Webber, Jon Sanabria)
Sunshine Canyon Landfill Community Advisory Committee (Becky Bendikson, Wayde Hunter)
Members of the Los Angeles County Solid Waste Management Committee/Integrated
Waste Management Task Force

Calculation Methodology

LFG is essentially saturated with water vapor when formed. However, if the gas collection pipes are vertical or sloped, some of the water vapor will condense on the pipes and drain back into the landfill. Most of the remaining moisture is removed in condensate traps located along the gas collection system line.

From Dalton's law, the total gas pressure within a landfill is the sum of the partial pressures of the component gases. Partial pressure is volumetrically weighted and can be found from the volumetric fraction, B, of the gas.

$$p_t = p_{CH_4} + p_{CO_2} + p_{H_2O} + p_{N_2} + p_{other} \quad 41.8$$

$$p_i = B_i p_t \quad 41.9$$

If uncontrolled, LFG will migrate to the surface. If the LFG accumulates, an explosion hazard results, since methane is highly explosive in concentrations of 5 to 15% by volume. Thus, methane will pass through the explosive concentration as it is being diluted. Other environmental problems, including objectionable odors, can also occur. Therefore, various methods are used to prevent gas from escaping or spreading laterally.

Landfill gases can be collected by either passive or active methods. *Passive collection* uses the pressure of the gas itself as the driving force. Passive collection is applicable for sites that generate low volumes of gas and where offsite migration of gas is not expected. This generally applies to small municipal landfills—those with volumes less than approximately 50,000 yd^3 (40 000 m^3). Common passive control methods include (a) isolated gas (pressure relief) vents in the landfill cover, with or without a common flare; (b) perimeter interceptor gravel trenches; (c) perimeter barrier trenches (e.g., slurry walls); (d) impermeable barriers within the landfill; and (e) sorptive barriers in the landfill.

Active gas collection draws the landfill gas out with a vacuum from *extraction wells*. Various types of horizontal and vertical wells can be used through the landfill to extract gas in vertical movement, while perimeter facilities are used to extract gases in lateral movement. Vertical wells are usually perforated PVC pipes packed in sleeves of gravel and bentonite clay. PVC pipe is resistant to the chlorine and sulfur compounds present in the landfill.

Determining the location of isolated vents is essentially heuristic—one vent per 10,000 yd^3 (7500 m^3) of landfill is probably sufficient. Regardless, extraction wells should be spaced with overlapping zones of influence. If the *radius of influence*, R, of each well and the desired fractional overlap, O, are known, the spacing between wells is given by Eq. 41.10. For example, if the extraction wells are placed on a square grid with spacing of $L = 1.4R$, the overlap will be 60%. For a 100% overlap, the spacing would equal the radius of influence.

$$\frac{L}{R} = 2 - O \quad 41.10$$

In many locations, the LFG is incinerated in flares. However, emissions from flaring are problematic. Alternatives to flaring include using the LFG to produce hot water or steam for heating or electricity generation. During the 1980s, reciprocating engines and combustion turbines powered by LFG were tried. However, such engines generated relatively high emissions of their own due to impurities and composition variations in the fuel. True Rankine-cycle power plants (generally without reheat) avoid this problem, since boilers are less sensitive to impurities.

One problem with using LFG commercially is that LFG is withdrawn from landfills at less than atmospheric pressure. Conventional furnace burners need approximately 5 psig at the boiler front. Low-pressure burners that require 2 psig are available, but they are expensive. Therefore, some of the plant power must be used to pressurize the LFG in blowers.

Although production is limited, LFG is produced for a long period after a landfill site is closed. Production slowly drops 3 to 5% annually to approximately 30% of its original value after about 20 to 25 yr, which is considered to be the economic life of a gas-reclamation system. The theoretical ultimate production of LFG has been estimated by other researchers as 15,000 ft^3 per ton (0.45 m^3/kg) of solid waste, with an estimated volumetric gas composition of 54% methane and 46% carbon dioxide. However, unfavorable and nonideal conditions in the landfill often reduce this yield to approximately 1000 to 3000 ft^3/ton (0.03 to 0.09 m^3/kg) or even lower.

Table 41.3 *Properties of Methane and Carbon Dioxide*

	CH_4	CO_2
color	none	none
odor	none	none
density, at STP		
(g/L)	0.717	1.977
(lbm/ft^3)	0.0447	0.123
specific gravity, at STP, ref. air	0.554	1.529
solubility (760 mm Hg, 20°C), volumes in one volume of water	0.33	0.88
solubility, qualitative	slight	moderate

12. LANDFILL LEACHATE

Leachates are liquid wastes containing dissolved and finely suspended solid matter and microbial waste produced in landfills. Leachate becomes more concentrated as the landfill ages. Leachate forms from liquids brought into the landfill, water run-on, and precipitation. Leachate in a natural attenuation landfill will contaminate the surrounding soil and groundwater. In a lined containment landfill, leachate will percolate downward through the refuse and collect at the first landfill liner.

to 3 inch depth between bedding plants but apply only about 1/2 inch around the collars of plants; excess mulch against the plants can increase disease problems. Many materials can be used as a mulch--bark nuggets, pine straw, bark chips, and composted leaf mold are all acceptable. If organic mulches are used, the effectiveness (efficacy) of preemergence herbicides can be greatly reduced. Many herbicides adhere to organic material and are deactivated.

"Dead Heading" Bedding Plants

"Dead heading" is the removal of dead or faded inflorescences from bedding plants. Dead heading increases the attractiveness of plants, reduces the chances for diseases such as *Botrytis*, and stimulates flowering in many species. Bedding plants that benefit from dead heading include celosia, coleus, dahlias, geraniums, gloriosa daisy, marigolds, salvia, and zinnias (varieties of *Z. elegans*). Beds should be checked at least every week for dead and faded inflorescences.

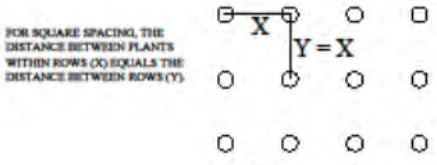
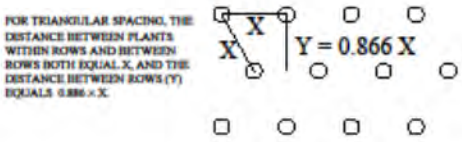
Table 1. Suggested spacing for bedding plants in the landscape.

Plant species	Inches between plants
African daisy, ageratum, browallia, dwarf celosia, dwarf hypoestes, lisianthus, lobelia, dwarf french marigolds, pansies, sweet alyssum, dwarf zinnias	6"
asters, begonias, candytuft, coleus, cornflower, dahlberg daisy, dianthus, dusty miller, gloriosa daisy, nicotiana, petunias, phlox, portulaca, medium-sized marigolds, dwarf salvia, sanvitalia, dwarf snapdragons, treasure flower, and upright vinca	8"
blanket flower, calendula, celosia, coreopsis, cosmos, dahlia, geraniums, gomphrena, hypoestes, impatiens, large marigolds, ornamental peppers, large petunias, large salvia, large snapdragons, verbena, trailing vinca, and large zinnias	10"
large geraniums	12"
melampodium, spiderflower	14"

Pruning

Some bedding plants such as hypoestes and impatiens may require pruning back for size control. Others such as gomphrena can be pruned or sheared into shapes. Pruning can also stimulate greater flowering, as with some varieties of petunias. Cut back plants as needed. Leave approximately 1/2 of the shoot length on shoots to be pruned. For petunias that require pruning, use "stagger pruning," to allow some color to remain while pruned plants grow out and begin to flower again. Stagger pruning consists of pruning 1/3 of a petunia bed (every third plant) each

Table 2. Estimated number of plants to fill 100 ft² of bed area for square (row) and triangular (equilateral) planting patterns using 4 to 14 inch spacing distances.

Planting pattern	Inches between rows of plants (Y)	Inches between plants (X) within rows	Estimated number of plants per 100 square feet
Square			
 FOR SQUARE SPACING, THE DISTANCE BETWEEN PLANTS WITHIN ROWS (X) EQUALS THE DISTANCE BETWEEN ROWS (Y).	4	4	900
	6	6	400
	8	8	225
	10	10	144
	12	12	100
	14	14	74
Triangular			
 FOR TRIANGULAR SPACING, THE DISTANCE BETWEEN PLANTS WITHIN ROWS AND BETWEEN ROWS BOTH EQUAL X, AND THE DISTANCE BETWEEN ROWS (Y) EQUALS 0.866 × X.	3.46	4	1039
	5.20	6	462
	6.93	8	260
	8.66	10	166
	10.39	12	115
	12.12	14	85

Brown AND Caldwell

Technical Memorandum

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Prepared for: Republic Services, Inc., Sunshine Canyon Landfill

Project Title: Independent Odor Monitoring, Sunshine Canyon Landfill

Project No: 142883.007.001

Technical Memorandum

Subject: August 26 – 28, 2012 Odor Incident Study

Date: September 24, 2012

To: Anthony Bertrand, Area Environmental Manager

From: Michael Yacyshyn, Chief Engineer, Brown and Caldwell

Copy to: Patti Costa, Republic Services, Inc.
Lisa Skutecki, Brown and Caldwell

Prepared by: _____

B. Michael Yacyshyn, P.E.

Reviewed by: _____

Steve Batiste

Limitations:

This document was prepared solely for Republic Services, Inc. in accordance with professional standards at the time the services were performed and in accordance with the contract between Republic Services, Inc. and Brown and Caldwell dated January 18, 2011. This document is governed by the specific scope of work authorized by Republic Services, Inc.; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Republic Services, Inc. and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness or accuracy of such information.

1. Introduction

Brown and Caldwell (BC) is under contract to Republic Services, Inc. (Republic) to provide independent environmental monitoring (IEM) for landfill-related odors at Sunshine Canyon Landfill (SCL). One of our responsibilities is to investigate odor complaints from the neighboring community. This technical memorandum (TM) describes Brown and Caldwell's evaluation of conditions at the SCL that appear to have contributed to off-site odors on August 26 through August 28, 2012.

2. Incident Study

2.1 Odor Complaints

Odor complaints from the neighboring community were received on August 26 through August 28, 2012:

- On the evening of Sunday, August 26 and early morning of Monday, August 27, between approximately 21:13 and 00:31 hours, the South Coast Air Quality Management District (District) Inspector verified five complaints from neighborhoods in the vicinity of the SCL. The odors were characterized as landfill gas (LFG).
- On Monday, August 27, the District Inspector verified three odor complaints between 21:35 and 21:53 hours, which were characterized as a LFG odor.
- On Tuesday, August 28, beginning at 06:10 hours to 08:13, the District Inspector verified 25 complaints characterized as trash. Seventeen of these complaints originated from the Van Gogh Elementary School. An additional nine complaints were verified by the District Inspector from 08:50 to 09:16 hours, which were characterized as a LFG odor. Note that the SCL odor patrol noted very faint to faint LFG odors during this time period.
- On Tuesday, August 28 extending to early Wednesday, August 29, the District Inspector verified nine odor complaints between 20:50 and 00:51 hours, which were characterized as a LFG odor.

2.2 SCL Conditions

There appear to be several contributing factors at SCL that may have contributed to the odors.

- Eight of 14 vertical LFG extraction wells in the CC-2 area were not functioning as designed due to high liquid levels in the wells covering perforations. This condition was discovered in mid August 2012 as SCL staff was evaluating their LFG extraction wells. The CC-2 area is where active disposal operations were occurring at this time. These wells were installed in June 2012. Due to an evaluation of the non-functional wells, SCL chose to add 10 new wells in the same general vicinity in early September 2012. The September 2012 wells will augment the other wells in this area.
- Flare shutdowns for flares 3 and 8 occurred during the time the odor complaints were received. Flare 3 shut down on Monday, August 27, between 12:50 and 14:55 hours for approximately 2 hours. Flare 8 shut down on Monday, August 27, at approximately 17:20 hours and was restarted at 08:00 hours on Tuesday, August 28.
- Winds from the north ranging from about 5 miles per hour (mph) to over 10 mph occurred at various times during the August 26 to August 28 period. Winds from the north are considered adverse as defined by the Third Amended Stipulated Order for Abatement (S/O), Case No. 3448-13, signed on December 3, 2011.

3. Discussion

The results of our study indicate there are several conditions that may have contributed to the off-site odors for the August 26 to August 28, 2012 period. Adverse wind conditions were clearly a factor. However, the winds cannot be controlled. The flare shutdowns probably had some impact on the observed off-site odors, but it is difficult to quantify that impact as when a flare goes down, the remaining operational flares compensate to some extent. The flares are part of a comprehensive gas collection and control system (GCCS) at SCL that operate in concert to control LFG. Republic is in the midst of a significant GCCS improvement program. The improvement program includes a new high-capacity flare (Flare 9), new large diameter header pipes, new vertical and horizontal LFG collection wells and new high-capacity blowers. Many of these improvements have been completed and adjustments and fine tuning of the GCCS continue.

Until recently, the CC-2 area was the most recently lined cell in SCL (construction of the CC-3 area was recently completed). Waste disposal operations began in the CC-2 area in July 2011. The non-functional LFG extraction wells were installed in June 2012, only a couple months before liquid blocked the perforations.

The fact that several of the LFG wells were not functioning as designed due to liquid inundation is unusual. Cell CC-2 is a relatively new cell and the waste deposited there is just over 1 year old. Also, SCL is considered a semi- arid site with annual rainfall of less than 22 inches. Both of these conditions typically result in relatively dry waste and limited landfill gas production for waste of this age.

We understand the CC-2 area is the only area in SCL where a 9-inch thick daily cover required by local regulators was used from its inception. (The California Code of Regulations, Title 27, (Title 27) Sections 20680 and 20705 requires a minimum of 6 inches of compacted earthen materials. Prior to the 9-inch thick requirement, SCL used re-useable tarps as an alternative daily cover (ADC).) In addition, the 9-inch thick daily cover is required to remain in place when the next lift of waste is placed, which is contrary to typical landfill operations and good operational practices. The 9-inch thick daily cover soil requirement results in discrete, isolated cells of waste, each surrounded by soil, that tends to inhibit proper LFG control and percolation of liquid in the cell to the underlying leachate collection and removal system. This requirement also consumes valuable airspace and results in higher operational costs.

4. Conclusions and Recommendations

4.1 Conclusions

It appears that the non-functional LFG extraction wells in the CC-2 area may have been the largest single factor contributing to the offsite odors during the subject period. The 10 new LFG extraction wells that Republic installed to augment the non-functional wells are screened at shallower depth intervals and are reported to be performing well at the time this TM was completed. The flare shutdowns most likely also contributed to the offsite odors, although we believe to a lesser extent than the non-functional wells.

The requirement to place a 9-inch thick daily cover soil and then leave the daily cover soil in place is unusual and counterproductive. This requirement:

- Hinders effective LFG control that can result in LFG migration issues and resulting odor issues
- Can result in perched liquid layers, as evidenced in the CC-2 area, that can render LFG extraction wells non-functional, produce leachate seeps and excess pore pressures potentially destabilizing the waste mass
- Increases operational costs through excavating, moisture conditioning and placing the soil every day instead of stripping and reusing the daily cover soil or using tarps or other approved ADC material

- Increases operational costs by having to replace or augment wells filled with liquids more frequently than typical
- Results in lost airspace with no discernable benefit

4.2 Recommendations

In order to manage conditions at SCL that can result in offsite odor complaints, we recommend:

- Working to rescind the requirement for a 9-inch thick daily cover and resume using tarps and/or another approved alternative daily cover material that is effective at meeting the requirements of Title 27, SCL's Odor Plan of Action dated June 15, 2012 and good landfill operational practices
- Continuing to diligently manage odiferous loads using the various methods described in the June 2012 Landfill Odor Plan of Action
- Continuing to work toward completing improvements and fine tuning the improved GCCS
- Continuing to use a combination of vertical LFG extraction wells for intermediate and deep LFG control and horizontal LFG extraction wells for early and shallow LFG control
- Characterizing liquid levels and possible zones of waste saturation in the CC-2 area
- Developing alternatives to reduce the liquid levels in the CC-2 area such as dewatering the wells
- Minimizing flare downtime
- Continuing routine and preventative GCCS maintenance

5. Closure

Brown and Caldwell appreciates to opportunity to provide services for this project. The findings and conclusions presented in this TM were prepared in accordance with generally accepted geoenvironmental engineering practices in the area at the time this report was completed. No other warranty, express or implied, is made.

Please call Michael Yacyshyn (916-853-5328) if you have any questions or comments.

CORNERSTONE
Environmental Group, LLC
7600 Dublin Boulevard, Suite 200 • Dublin, CA 94568 • (877) 633-5520 • Fax: (925) 560-9879

September 24, 2012

Anthony Bertrand, P.E.
12949 Telegraph Rd
Santa Fe Springs, CA 90670

Re: Sunshine Canyon Landfill – Cover Soils
Project Number 120495

Dear Mr. Bertrand:

Republic Services, Inc. (Republic) retained Cornerstone Environmental Group, LLC (Cornerstone) to conduct a review of the landfill gas (LFG) collection and control system (GCCS) at the Sunshine Canyon Landfill (Landfill) in Sylmar, California. Cornerstone provided Republic with a detailed GCCS review report (report) titled, *Landfill Gas Collection and Control System Evaluation Report*, dated September 24, 2012, summarizing the review and providing recommendations to improve the GCCS wellfield. Cornerstone's report notes approximately 207 wells which are currently not controlling LFG based on high methane readings in the wells. Of these 207 wells, 53 wells are impacted by liquids, with approximately 40 percent of those wells located in areas filled in the past two years (2010 through 2012). This is a much higher percentage than any other area within the landfill. In addition, all LFG extraction wells recently installed in the new Cell CC-2A, have been reported by Republic to be full of liquids.

Cornerstone understands that in 2010, site operations began using a nine-inch soil layer over daily compacted waste. This soil layer is <u>not</u> removed prior to additional waste placement. It is possible that these soil layers may not allow liquids within the landfill to drain through the waste mass to the underlying leachate collection and removal systems and could lead to "perched" liquids in the landfill waste mass. This is similar to "perched" liquids that often form when a barrier, such as an old road or compacted soil layer traps liquids at various elevations beneath the surface of the landfill. When perched liquids are encountered during drilling LFG wells, it is often observed that the liquids drain from the LFG well boring into the underlying waste mass upon penetration of a low permeable layer as evidenced in the drill cuttings.

Recent fill areas where the 9-inch daily cover soil layers were used show a much higher percentage of wells with negative liquids impacts. Additionally, wells in Cell CC-2A are reportedly full of liquids. Cornerstone believes that the daily 9-inch soil layers that are not

removed, and thus buried, may be the main cause of the liquid within the wells. It is Cornerstone's opinion that the removal of the daily soil lifts immediately prior to additional refuse placement would greatly improve the ability of the liquids in the landfill to drain to underlying leachate collection and removal systems. This in turn would likely result in landfill gas extraction wells installed in new fill areas to operate more efficiently, as perforated portions of the wells would not be covered by liquids.

If you have any questions regarding this issue please do not hesitate to contact us.

Sincerely,

Maura Dougherty, P.E.
Senior Project Manager

Paul Stout, P.E.
Senior Client Manager

Enclosure:
cc

A TETRA TECH COMPANY
BRYAN A. STIRRAT & ASSOCIATES
Civil & Environmental Engineers

September 12, 2012

Mr. Anthony Bertrand, P.E.
Area Environmental Manager
Republic Services, Inc.
12949 Telegraph Road
Santa Fe Springs, CA 90670

RE: DAILY COVER VS. PERCHED LIQUIDS AT THE SUNSHINE CANYON LANDFILL

Dear Mr. Bertrand:

Based on field observations, liquid is accumulating in many of the new landfill gas (LFG) wells installed in Cell CC-2 and blocking gas extraction. It is understood from discussions with Republic Services that in September, 2010 the Los Angeles County Department of Public Works (DPW) has required that Republic Services change its normal practice and NOT remove the 9 inches of daily cover soil prior to placing the next lift of refuse.

Native soil use for cover at Sunshine Canyon is generally classified as silty sand (SM), clayey sand (CS) or clay (CL), all of which are relatively impermeable. The material is substantially mixed by the placement process. The daily cover layers comprised of these materials would have a vertical permeability or hydraulic conductivity much lower than typical Municipal Solid Waste (MSW). This could result in liquids (leachate) being "perched" above each daily cover layer. Investigations at Southern California MSW landfills using pore pressure measurement techniques have documented the phenomena. Landfill gas wells screened in the zones of perched liquids would provide a path for the liquids to drain into the well, resulting in blockage of the gas extraction from the flooded portions of the screened well. Data from field measurements and down-hole camera work performed on August 27, 2012 in several of the recently installed LFG extraction wells show 25 to 32 feet of liquid in the wells and a video of Well CGW-674 clearly shows liquid flowing down the casing walls from intermediate depths in the casing. This data confirms that liquid is entering the LFG wells through slots at various depths.

In conclusion, the data suggests that the Los Angeles County DPW requirement to place 9 inches of daily cover soil at the end of each day and not remove it before commencing daily landfilling operations has created relatively impermeable lenses in the landfill that are likely causing leachate accumulation in the LFG wells, thereby interfering with the performance of the wells. This problem would likely be avoided by removing the 9 inches of soil before beginning landfilling operations.

1360 Valley Vista Drive • Diamond Bar, CA 91765 • (909) 860-7777 • FAX (909) 860-8017

A TETRA TECH COMPANY
BRYAN A. STIRRAT & ASSOCIATES
Civil & Environmental Engineers

Should you have any questions or require additional information, please advise.

Sincerely,

Michael L. Leonard, Sr., P.E.
Senior Project Manager
Methane Gas Group

c: G.E. Andraos
Gary Glasser
Sami Ayass
Cy Chidiac
Achaya Kelapanda

1360 Valley Vista Drive • Diamond Bar, CA 91765 • (909) 860-7777 • FAX (909) 860-8017

A-Mehr Inc.

Professional Engineers and Scientists Specializing in Landfills

23016 Mill Creek Drive
Laguna Hills, CA 92653

Phone (949) 206-0157
Fax (949) 206-9157

September 14, 2012

Anthony Bertrand, P.E.
Area Environmental Manager
Sunshine Canyon Landfill
1474 San Fernando Road
Sylmar, California 91342

RE: Sunshine Canyon Landfill
Modification of Odor Abatement Corrective Measures

Dear Mr. Bertrand:

In a letter dated September 27, 2010 the Department of Public Works (DPW) directed Sunshine Canyon Landfill to implement a series of corrective measures to mitigate odor conditions at the landfill. Since that time Sunshine Canyon has implemented the following measures specified in the DPW letter:

1. Terminate use of alternative daily cover:
2. Cover waste with a minimum of nine inches of compacted soil at the end of every operating day;
3. Discontinue the practice of removing compacted soil cover at the beginning of the operating day; and
4. Prepare and implement an Odor Mitigation Plan including:
    - Measures implemented pursuant to the AQMD's Order for Abatement dated March 24, 2010;
    - A program for managing odoriferous waste loads;
    - An odor patrol program; and
    - A landfill gas mitigation plan

We believe the measures 1, 2 and 3 listed above relative to daily cover are ineffective and counter-productive, and should be eliminated. The measures listed under (4) are proving to be effective, and should be continued and enhanced until odor complaints have been eliminated.

In a letter to DPW dated April 18, 2011 Sunshine Canyon requested relief from the requirement to cover waste with 9 inches of daily cover and the prohibitions of alternative daily cover and reclaiming of cover soil prior to placing additional refuse on the following day. A-Mehr, Inc. fully supports that request, and recommends that Sunshine Canyon and the DPW work together to modify the odor abatement program to improve its performance and mitigate several unintended consequences of the measures directed by DPW and implemented to date.

We have observed that Sunshine Canyon has exerted major efforts to improve the collection of landfill gas, including:

- Installation of over 19,000 feet of new piping;
- Extensive maintenance work on individual wells;
- Addition of four new condensate collection sumps to reduce the incidence of condensate blockages in collection pipes;
- Installation of more than 20 new gas extraction wells;
- Construction of a new 36-inch primary header pipe;
- Installation of an additional gas flare and blower system; and
- Installation and operation of an on odor control misting system at the active disposal area and near the front gate of the landfill.

Based on our experience and knowledge of the site, we believe that the most effective measures for reducing odor problems at Sunshine Canyon are those related to landfill gas and the odor control misting system. We believe the least effective measures are those related to daily cover, which also have adverse side effects on landfill operations and environmental controls.

The practice of placing compacted soils at the end of each day and not removing it before placing additional waste on subsequent days creates a series of small waste cells separated by barriers of soil. Native soil used for cover at Sunshine Canyon is generally classified as silty sand (SM), clayey sand (SC) or clay CL), all of which are relatively impermeable. Experts in the solid waste industry have recognized potential problems associated with use of low hydraulic conductivity cover soils. Professor David Daniel noted the effects of cover soil on leachate management in Geotechnical Practice for Waste Disposal (Chapman and Hall, 1993):

> *One problem that daily cover can create is hydraulic isolation of one cell from another. If the daily cover consists of relatively impermeable soil, water cannot migrate uniformly through the waste. Instead, water will be channeled in the landfill. Some cells may be saturated with water and others may be virtually dry. Wide variation in moisture conditions leads to problems with differential settlement and leachate collection. If leachate will be reintroduced to the disposal unit (Leachate recirculation), it is particularly important that daily cover has a high hydraulic conductivity. A common manifestation of low-hydraulic -conductivity daily cover is the appearance of leachate seeps on landfill covers: leachate flows laterally along the surface of daily cover rather than infiltrating downward, until the leachate "daylights" on the sloping cover of a landfill.*

Leachate generated within the small cells is impeded from percolating downward to the leachate collection system at the landfill bottom, potentially resulting in leachate seeps from side slopes and saturation of gas wells. Both of these adverse events have previously been observed at Sunshine Canyon. Leachate seeps are likely to reoccur with greater frequency during the rainy season, likely resulting in WDR violations and odor issues related to leachate seeps during the time of year when control of seeps is most difficult.

Landfill gas management is significantly affected by daily cover soil:

> *The natural tendency of landfill gases that are lighter than air, such as methane, is to move upward, usually through the landfill surface. Upward movement of landfill gas can*

> *be inhibited by densely compacted waste or landfill cover material (e.g., by daily soil cover and caps). When upward movement is inhibited, the gas tends to migrate horizontally to other areas within the landfill or to areas outside the landfill, where it can resume its upward path. Basically, the gases follow the path of least resistance.* (Cheremisnoff, Nicholas P., Handbook of Solid Waste Management and Waste Minimization Technologies. Butterworth-Heineman, 2003.)

Landfill gas vertical extraction wells, which form the great majority of LFG collectors at Sunshine Canyon, are generally installed after refuse depths in an area reach 75 to 100 feet, and are installed with perforations in the lower 2/3 to 3/4 of the well, and solid pipe near the surface. As additional refuse is placed, the solid pipe section is raised, and the vacuum on the well adjusted to draw gas in upper layers down toward the perforated sections of the collection pipe. If relatively impermeable layers of cover soil impede the downward flow of gas, the well becomes ineffective for control of gas near the surface and can contribute to surface emissions and odor problems at the site.

The problem is exacerbated by the buildup of leachate in gas wells that occurs when daily cover soil barriers prevent vertical migration of leachate to the leachate collection and removal system. Leachate has been observed to collect in gas wells at Sunshine Canyon, rendering them ineffective for removal of gas, which then migrates to the surface to add to the odor problem.

In addition to their adverse effects on control of landfill gas, leachate and odor, the practices of using 9 inches of soil daily, not using alternative daily cover, and not removing soil for reuse before placing additional refuse contribute to significant operational issues in conflict with provisions of the Conditional Use Permit (CUP) and approved Joint Technical Document (JTD) for the landfill:

- The additional soil used as cover consumes landfill disposal capacity, hampering efforts to maximize the amount of solid waste that can be disposed in the facility as required by County CUP Condition 23.

- Excessive use of on-site soil for daily cover will result in future shortfalls of cover soil and require importation of soil for daily, intermediate and final cover, with adverse environmental and financial impacts to landfill operations.

Use of alternative daily cover to reduce soil use and waste of airspace capacity is universally practiced throughout the solid waste industry and specifically at landfills in Southern California. In light of the progress made in reducing off-site odor complaints and the above adverse effects of the restrictions on daily cover, we strongly recommend that Sunshine Canyon repeat your request for the following modifications to the conditions imposed by the DPW letter of September 27, 2011, listed in order of importance:

1. Cover soil may be removed prior to placement of additional waste on top of previously disposed waste.

2. Daily cover soil, when applied, may be a minimum of 6 inches thick as provided by 27 CCR 20680(a).

3. Alternative daily cover, including geosynthetic blankets or processed green material, may be used as described in the approved JTD and Solid Waste Facility Permit for the City/County landfill.

I will be pleased to join you in meeting with DPW staff and the other regulatory agencies with responsibilities for air quality, water quality and disposal operations to discuss the benefits of our recommended changes. If there are any questions, please call me at (949) 206-0157.

Sincerely,

M. Ali Mehrazarin, P.E.
Principal Engineer

SUNSHINE CANYON LANDFILL

SCL - LEA

LOCAL ENFORCEMENT AGENCY

SCL LEA Visqueen Pilot Program for Visual Confirmation of Landfill Surface Emissions

Objective:

Test a simple method to visually determine and physically measure the level of emissions over a period of time for various areas of the Sunshine Canyon Landfill.

Methodology:

Place visqueen in 5 meter by 5 meter squares in selected areas for the pilot testing to determine if the emissions can be visually seen and physically measured ("bubble effect"). Barometric and other weather data at the landfill will be recorded and matched with time-lapse (time-series) data.

The edges of the visqueen sheet will be anchored in trenches and "sealed" so that any emissions from the surface will be physically trapped by the visqueen. Part of this test is to determine if localized rapidly escaping landfill gas emissions in the form of an overpressure "burst" can be measured and/or visually documented. The short term "bursts" of landfill gas emissions can potentially generate intense odors for a short duration in the local neighborhood.

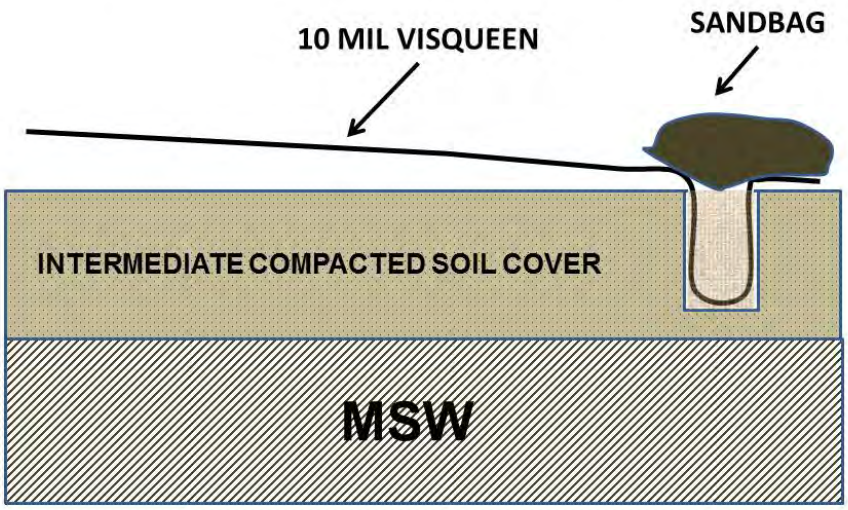
Since the emissions will be trapped by the visqueen, there may be the possibility of the trapped landfill gas emissions being removed, e.g., drawn back into the landfill, by the changing barometric pressure and/or of the LFG collection system removing the landfill gas accumulated under the visqueen.The use of time lapse cameras with nighttime flash capability will be utilized to see the time-series movement (landfill gas buildup) of the visqueen.

Time-lapse cameras will be mounted on wooden stakes and set for photographing the visqueen on a periodic basis (e.g., every 10 minute interval) or at an interval to be determined, depending upon the initial test results. The length of the test shall be for a period of one week, and can be extended, as determined by the SCL LEA.

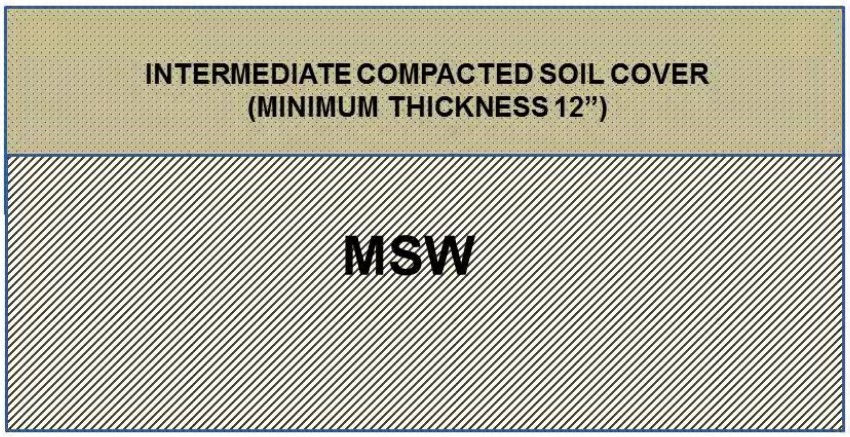
Areas selected for the pilot testing will be based on AQMD's 4th quarter Rule 1150.1 emissions report for the Sunshine Canyon Landfill and/or areas selected by the SCL LEA. Should a "statistically representative" sampling of the overall SCL surface be identified, the SCL LEA will determine the optimum number and size of the "test plots" needed.

A more sophisticated version of the visqueen test can be done if the above pilot shows promise to visually demonstrate the surface emissions for landfill gas. A "flux box" version of the visqueen plastic can be utilized to more easily calculate the volume of the gas collected. A square "box" can be constructed of the visqueen (which can allow for the expansion of the volume), and can have wooden "siding" to give the "inflated visqueen flux box" a shape that makes volume calculation possible. The following pictorial diagrams provide a recommended method.

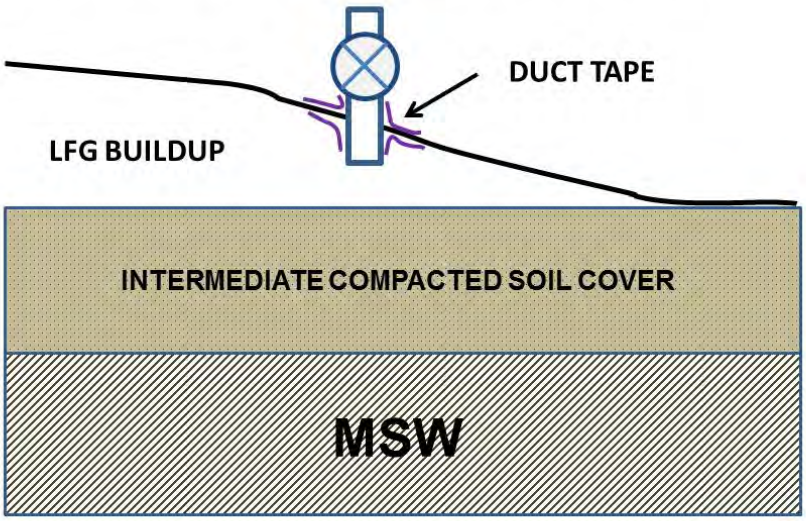
PILOT TEST VISQUEEN INSTALLATION



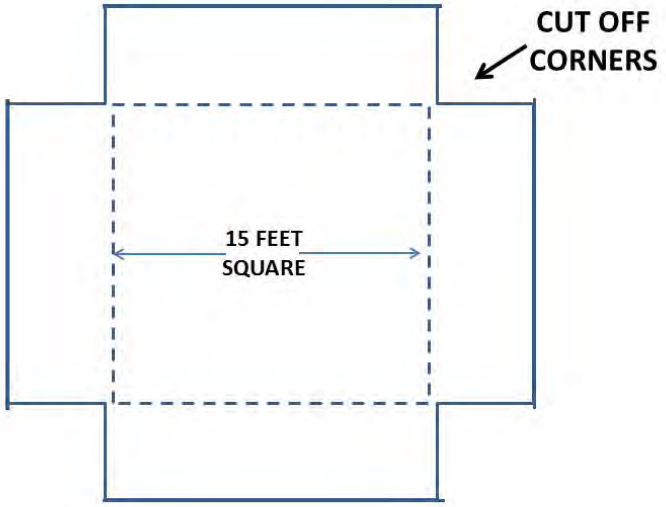
EXISTING INTERMEDIATE COVER



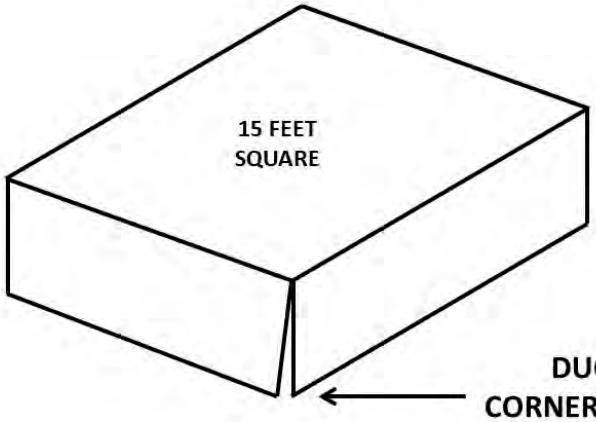
VISQUEEN LFG VALVE INSTALLATION



ALTERNATIVE VISQUEEN CONFIGURATION

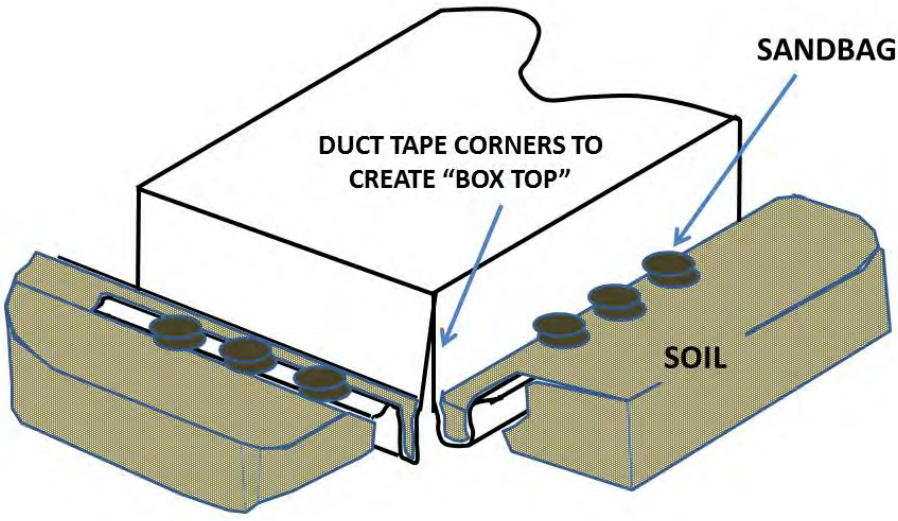


ALTERNATIVE VISQUEEN CONFIGURATION

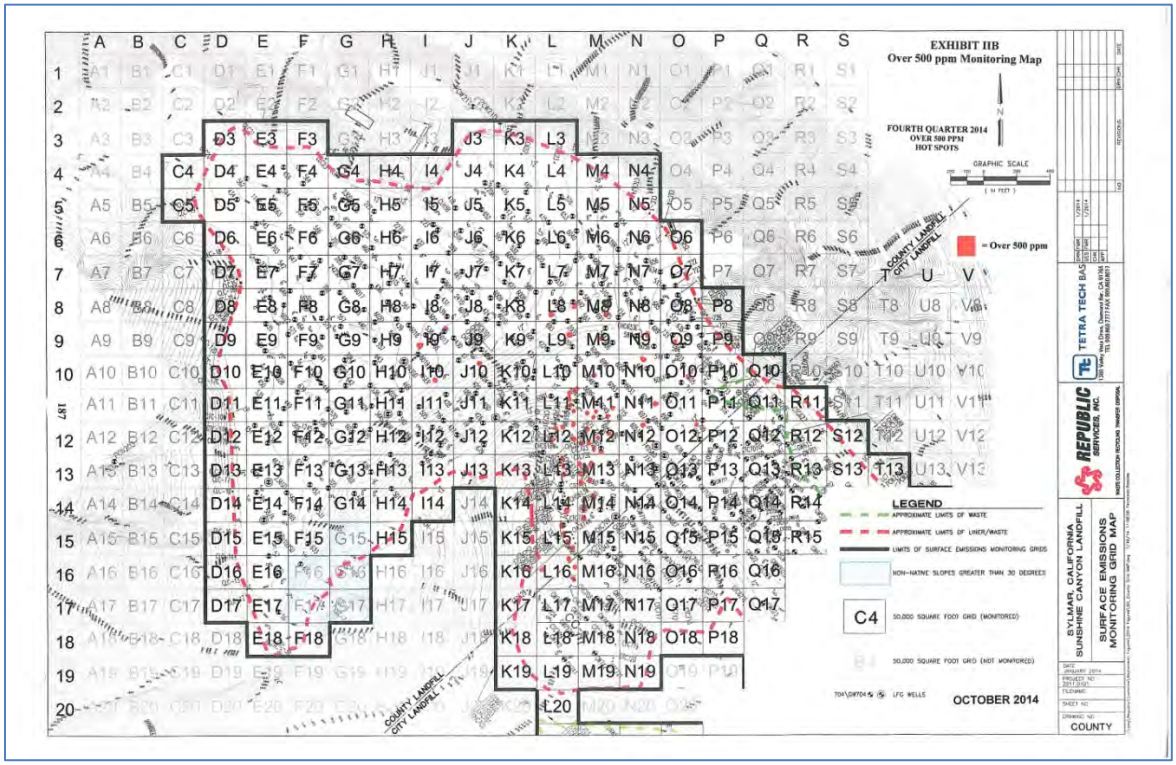


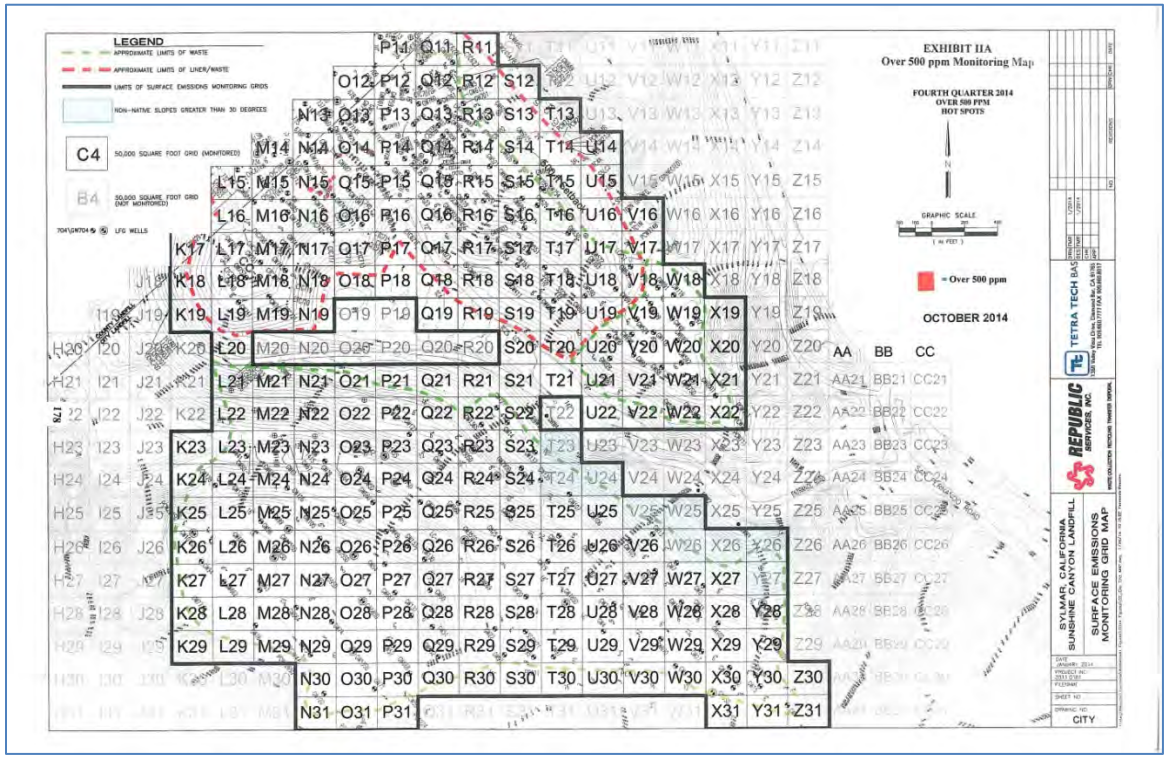
DUCT TAPE
CORNERS TO CREATE
"BOX TOP"

ALTERNATIVE VISQUEEN CONFIGURATION



Existing surface emissions monitoring maps identify the areas with emission exceedances and are being considered as locations of the test plots.





Should there be landfill gas buildup under the visqueen, the SCL LEA inspectors will measure the methane content of the gas (using Landtec GEM 500 and OVA), and also collect a gas sample(s) (in a Tedlar bag) for laboratory analysis of AQMD Rule 1150.1 components. Any cuts, tears, and/or punctures to the visqueen will be repaired by using plastic backed duct tape

Concurrent with this pilot program, the SCL LEA will conduct research into the other components of the landfill gas that may be the cause of the odor. In future tests, laboratory analysis of the landfill gas emissions collected under the visqueen will be requested for identification and quantification for these components.

An initial single test location will be utilized for testing the protocols (e.g., thickness of visqueen, adequacy of time interval for time-lapse measurements, etc.) and optimizing the overall procedures for the full scale effort. The initial field test will also test the limitations of the proposed procedures, e.g., weight of the visqueen and its potential to prevent upward movement of gasses.

Multiple locations will be utilized for the full scale research project. The number of locations will be determined based upon the analysis of the emissions monitoring reports and the statistical requirements for representative sampling (and taking into account the overall time element if the testing can only be done in a few locations at a single time.).

The SCL LEA Board of Directors previously approved of this pilot program. The schedule commencement of this program is March 2015. Cost of the conducting the pilot visqueen test and the cost of the laboratory analysis, and any associated tasks related to landfill odor mitigation is covered by the previously approved budget line under “Research Projects”.

The pilot test will be conducted under SCL LEA supervision, and coordinated with SCL LEA Board Member Skip Bambard.

EQUIPMENT / SUPPLIES

1. Rental (Home Depot): 18” Trenching Machine

2. Visqueen

Husky, Model # CFFR1020 (or equivalent)
Internet # 202184271
20 ft. x 100 ft. 10 mil Flame Retardant Plastic Sheeting
$211.00 / each

Husky, Model # CFHK0620C (or equivalent)
Internet # 100651802
20 ft. x 100 ft. Clear 6 mil Polyethylene Sheeting
$94.00 / each

3. Browning Time-Lapse Trail Camera (with Night Infrared Flash)

Recon Force Full HD Series (Model# BTC-7FHD)

(Size:: 5” x 4” x 2.5”, 1 Year Warranty)

See more at: http://browningtrailcameras.com/our-products/trail-cameras/recon-force-series/#sthash.QToDvPjv.dpuf

Price $150 (plus memory cards)

4. Other Supplies:

Field Equipment:

- Pickaxes, shovels, etc.
- Sandbags
- Stakes (for mounting time-lapse cameras)

Other miscellaneous supplies (e.g., safety supplies, gloves, etc.)

5. SCL LEA Equipment:

Landtec 2000 (Landtec 5000 if approved by SCAQMD)

Organic Vapor Analyzer

Tedlar air sample collection bags (and lightproof transport boxes)

SUNSHINE CANYON LANDFILL

SCL - LEA

LOCAL ENFORCEMENT AGENCY

Republic Services Alternative Daily Cover Pilot Program Evaluation Protocols and Performance Metrics (V1.04)

1. Introduction:

In November 2014, Republic Services submitted a request to conduct a pilot project at Sunshine Canyon Landfill (SCL) using a geosynthetic panel product as an alternative daily cover (ADC) in order to increase the efficiency of the landfill gas collection system and the movement of leachate through the waste mass. The primary purpose for using a geosynthetic ADC is to remove the compacted daily soil cover layers that are relatively impermeable (particularly when saturated with liquid), thereby facilitating the drainage of liquids through the bottom of the landfill into the leachate collection system, thus promoting improved transition of landfill gas to the landfill gas collection extraction wells.

The ADC, comprised of a non-reusable geosynthetic cover system consisting of a 1.75 mil thick tear-and-puncture-resistant plastic sheet (EnviroCover ADC), will be placed over the entire deck of the working face at the end of each day. The ADC will not be placed on any outside slopes but will be utilized instead of the daily placement of 9 inches of compacted soil. The SCL Local Enforcement Agency (LEA) has reviewed and approved the proposed Republic Services Alternative Daily Cover Pilot Program, (Pilot Program).

The SCL LEA's goal is to conduct a meaningful Pilot Program with sufficient time to fully demonstrate and assess near-term effectiveness of geosynthetic plastic panels as an ADC for the control of "fresh trash odors" as well as long-term effects on the control of "landfill gas odors". To this end, the Pilot Program will be in effect for a period of one (1) year in order to fully evaluate the effectiveness of the geosynthetic cover throughout seasonal changes. Republic Services shall notify the SCL LEA in writing one (1) week prior to the commencement of the Pilot Program.

Specifically, the purpose of the ADC Pilot Program is:

- To determine if the geosynthetic plastic panel ADC product meets the performance requirements of Title 27, California Code of Regulations, Section 20690 for controlling blowing litter, vectors, fires, odor and scavenging, and is as effective as the current daily cover of 9" compacted soil;
- To determine if the use of the geosynthetic plastic ADC enhances/improves the overall efficiency of the landfill gas collection system in the measurable control of landfill gas emissions from the landfill surface;
- Provide a documented technical basis to evaluate the permanent discontinued practice of applying a 9" compacted daily soil cover should the overall performance of the landfill gas collection system measurably improve and landfill gas and trash related odors reduced.

2. SCL LEA Evaluation Protocols and Performance Metrics:

The SCL LEA has developed a set of evaluation protocols and performance metrics that will be utilized in determining the overall effectiveness of the ADC. The primary concern of the SCL LEA is to ensure that the implementation of the ADC Pilot Program does not exacerbate the existing odor problem and that public health and safety and the environment are protected.

The SCL LEA recognizes that there are two major identifiable types of odors: 1) fresh trash smells, and 2) odors associated with landfill gas generated from older decomposing trash. Landfill gas is the carrier mechanism of the odiferous compounds generated by the decomposition of the solid waste. Odor types can generally be characterized as fresh trash smells, landfill gas odors, and/or a combination of the above.

The geosynthetic ADC is designed to provide a complete cover over trash deposited at the working face on the day. The ADC will be required to control "fresh trash" odors emanating from the buried refuse as well as meeting other critical performance requirements of the daily soil cover (e.g., vector, etc.). The SCL LEA will perform periodic random off-hours landfill inspections as well as conduct periodic odor surveillance in

nearby communities. The SCL LEA will work collaboratively with the South Coast Air Quality Management District (SCAQMD) to monitor the community in an event that fresh trash odor complaints are received.

Landfill gas odors are typically not associated with fresh trash odor emissions through the daily cover, but are generated over time with the decomposition of older previously disposed refuse. Landfill gas odors are normally associated with surface emissions passing through the landfill's soil cover. The effectiveness of ADC in the control of landfill gas emissions and associated odors will be evaluated over an extended period of time and cannot be immediately evaluated as a reflection of the ADC performance on a daily basis.

The SCL LEA will require Republic to implement additional odor mitigation measures in the new portions of the landfill where ADC is to be utilized to improve the overall landfill gas collection efficiency.

The SCL LEA reserves the right to suspend or terminate the ADC pilot program at any time should SCL LEA determine that the ADC is not meeting the performance requirements for daily cover or that the use of the ADC is creating additional unacceptable risks to public / environmental safety and health.

2.1 Goals / Objectives of Evaluation Protocols and Performance Metrics:

The SCL LEA will examine the following facts in their evaluation and assessment of the performance of the ADC:

1. Number of odor complaints. SCAQMD will cooperate with the SCL LEA to timely report general information regarding odor-related air quality complaints received by the SCAQMD for which SCL is the alleged source.

   During SCAQMD's normal business hours, Tuesday through Friday, 0700 hrs. to 1730 hrs., SCAQMD will, to the best of their ability, notify the appropriate Republic Service staff within one (1) hour of receipt of the first initial complaint. Republic Services will be solely responsible for advising the SCL LEA that SCAQMD has received an odor-related complaint alleging SCL as the source. Information provided by SCAQMD will include the date and time the complaint was received, complaint description, and the street and block number where the complainant is located. Because SCAQMD's primary responsibility is to respond to and investigate air quality complaints, any subsequent related complaints received after the initial complaint was received will be reported to Republic Services staff as time permits but no later than one (1) hour upon completion of SCAQMD's investigation into the odor event(s).

   During non-business hours when odor-related complaints are received for which SCL is alleged as the source, SCAQMD field inspection staff, if available, are dispatched to the field when three or more complaints are received within one (1) hour. In those instances when SCAQMD staff are

deployed for odor complaint investigation purposes, SCAQMD will notify Republic Services' SCL Complaint Hotline (1,800.926.0607) within one (1) hour of arrival at the landfill.

Upon notification by the SCAQMD of an odor event(s), the SCL LEA and Republic Services staff will make every reasonable attempt to determine the source and cause of the odor.

Procedures for notification of complaints to Republic Services shall be reviewed and evaluated by SCAQMD and the LEA 30 days after implementation of the Pilot Program to determine if the notification procedures are effective in meeting Pilot Program goals and objectives. Thereafter, complaint notification procedures shall be reviewed and evaluated quarterly.

SCAQMD may, at any time, revise or terminate such complaint notifications due to resource constraints or if the notification process impedes or hinders field inspection staff from effectively performing their duties.

2. ADC inspection frequency. The ADC will be inspected for its ability to contain odors from the previous day's trash at multiple times, e.g., 1) before the start of operations; and, 2) immediately after the placement of the ADC at the end of daily operations. SCL LEA staff will schedule to do this onsite assessment as part of the daily inspectional routine.

3. Number of water-impacted wells present in 9" soil cover areas vs. the number of water-impacted wells present in ADC applied areas (where 9" of compacted soil without peel back was applied)

4. Number of water impacted wells present in 9" soil cover areas vs. the number of water impacted wells present in ADC applied areas (where 9" of compacted soil without peel back was not applied, new areas)

5. Number of water impacted wells present in 9" soil cover areas vs. the number of water impacted wells present in ADC applied areas (where 9" of compacted soil without peel back was applied and also not applied, e.g., new areas using ADC over on top of or next to where 9" of compacted soil without peel back was applied)

6. Number of landfill gas-related surface emission exceedances, the level of exceedances, and location of exceedances measured monthly for instantaneous and integrated landfill surface emission monitoring as reported quarterly in SCL's SCAQMD Rule 1150.1 quarterly reports. The SCL LEA will review surface emissions data in relation to the locations of where the ADC has been installed and where landfill lifts have been completed and are not part of the active areas. Special attention will be focused on the sloped areas of the different landfill areas.

7. Provide data on the relative volume of landfill gas being collected in the various areas, e.g., Cubic Feet per Minute (CFM), vacuum pressure, e.g., any data that can be utilized to determine

increased gas collection volumes or increased "ease" of collection, e.g., decreased vacuum pressure needed to collect the same amount (volume or increase rate) of landfill gas.

8. Periodic determination if the application of a new layer of municipal solid waste (MSW) over the ADC from the previous day releases additional fresh trash odors (from the previous day's trash).

9. Compare the calculated overall in-place density of trash where 9" soil covered (without peel back) was installed vs. the ADC applied areas (where 9" of compacted soil was not applied), and comparing the permeability (e.g., ease of movement of the gas to the landfill gas extraction wells (using the U. S. EPA LandGEM model and or other models to determine effective radius of influence).

10. Compare actual in place measurement of liquids (moisture content) in 9" soil covered areas(without peel back) vs. moisture content in ADC installed areas (where 9" of compacted soil without peel back was not applied, e.g., new areas with ADC only)

11. Monitor the level of ADC destruction after the dozer 1) pushes the trash onto the liner, and 2) after the dozer compacts newly disposed trash on the ADC. The SCL LEA may request that a controlled area (away from the immediate working face area) be set aside for this test. This will determine whether the 1.75 mil thickness is sufficiently "durable" for its intended purpose (meeting the criteria established in Title 27 Section 20690.

2.2 Other Test the May be Requested by SCL LEA:

1. Use of odorant (trace tracking specific) to be applied at the end of each day of refuse disposal before covering with ADC. SCL LEA staff to assess the performance of the ADC by determining if they can detect the tracking odor after the application of the ADC. A control standard using the 9" of compacted daily soil can also be utilized.

2. The SCL LEA may also request testing the use of ADC as part of a layered intermediate cover to decrease the overall permeability of the intermediate cover.

3. SCL LEA Pilot Program Requirements:

Public health and safety and the protection of the environment are the paramount objectives of the SCL LEA operations. As part of the ADC Pilot Program, the SCL LEA requires certain operations procedures and reporting procedures to be implemented.

The SCL LEA will continue to research best management practices and successful case studies in landfill gas odor reduction during this pilot program. The SCL LEA reserves the right, at any time, to modify and or implement additional requirements to the Pilot Program.

3.1 SCL LEA Required Operational Procedures:

1. The SCL LEA requires that a three foot (3') minimum thickness of trash be pushed onto the ADC and maintained on the ADC before a compactor is allowed to travel over the trash. This is to maintain an adequate "layer" of material to prevent odors underneath the ADC from escaping as it is being punctured or torn from the weight of the dozer. A thicker layer may be required if the three foot layer is not adequate in preventing the odors from escaping. (Note: the SCL LEA acknowledges that it may be difficult to determine whether potential odors at the working face are in fact coming from the trash underneath the ADC. With fresh trash being placed over the ADC, it may be difficult to distinguish between potential odors from the trash being placed over the ADC and potential odors that may be coming from underneath the ADC.) The SCL attempt to determine if there is a "significant increase" in odors, or a "change in the characteristic" of the odor when the fresh refuse is pushed onto and/or compacted by the compactor.

2. The landfill working face area will be inspected daily by Republic Services site personnel and on-site LEA personnel for vectors, fires, blowing litter, scavenging, and odors prior to the start of landfilling operations.

3. The two weather stations located at SCL shall collect weather information on a continuous basis including temperature, humidity, wind speed, wind direction and precipitation.

4. Daily monitoring reports and weather information will be provided to the SCL LEA on a monthly basis or as needed during odor events.

5. Keep records / documentation on the amount of ADC material used and a calculated equivalent amount of compacted daily soil that was replaced by the use of the ADC (use a documented average thickness of daily soil cover for this calculation).

3.2 SCL LEA Reporting Requirements:

Reports will include:

1. Any immediate odors detected at the vicinity of the working face during and after the application of the ADC on a daily basis to on-site SCL LEA personnel

2. On a daily basis, report and document any unusual and or "special occurrences" at the working face such as fire, vectors, blowing litter and scavenging

3. All monitoring observations, including daily logs, shall be (reported / submitted / maintained / ?) on a monthly basis

4. Amount (square feet) of ADC utilized shall be reported on a monthly basis

5. Amount of soil (in cubic yards and in tons) conserved by the use of the ADC on a monthly basis

6. Any maintenance issues related to the equipment used for the Pilot Program shall be documented and reported on a monthly basis and how the issue was addressed/corrected

7. Reports of any tears, punctures or unusual observations related to the installation of the ADC and how addressed/corrected on a monthly basis (report daily if occurrence becomes an operational issue)

8. The daily weather information collected from the site's weather stations shall be reported on a monthly basis

9. Provide the SCL LEA documentation on the calculated equivalent amount of compacted daily soil that was replaced by the use of the ADC shall be reported on a quarterly basis (use a documented average thickness of daily soil cover for this calculation).

10. SCL LEA shall be notified in writing one week prior to the start of the Pilot Program.

As previously stated, the SCL LEA reserves the right to terminate the ADC Pilot Program at any time should the SCL LEA determine that the ADC is not meeting the performance standards for daily cover or that the use of the ADC is creating additional unacceptable risks to public health and safety and/or environment.

Note: All actions of the SCL LEA are subject to appeal to the SCL LEA Independent Hearing Board, as described in the most current CalRecycle approved SCL LEA Enforcement Program Plan (posted on the SCL LEA web site (www.scllea.org).

Please contact the following if there are questions or comments:

Mr. David Thompson, REHS
SCL LEA Program Manager
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3550 Wilshire Boulevard, 18th Floor
Los Angeles, CA 90010
Office (213) 252-3932
Cell (213) 248-2539
david.thompson@lacity.org

PROOF OF SERVICE

I am employed in the County of Los Angeles, State of California. I am over the age of 18 and not a party to the within action. My business address is 21865 Copley Drive, Diamond Bar, CA 91765.

On July 12, 2016, I served the within document(s) described as **PETITION FOR AN ORDER FOR ABATEMENT** on the interested parties in this action as stated below:

Thomas Bruen, Esq.
Law Offices of Thomas M. Bruen
1990 N. California Blvd. Ste 608
Walnut Creek, CA. 94596
Telephone: (925) 2953137
E-mail: tbruen@tbsglaw.com

☒ **(BY MAIL)** By placing a true copy of the foregoing document(s) in a sealed envelope addressed as set forth above. I placed each such envelope for collection and mailing following ordinary business practices. I am readily familiar with this District's practice for collection and processing of correspondence for mailing. Under that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid at Diamond Bar, California, in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

☐ (BY FAX) By transmitting a true copy of the foregoing document(s) via facsimile transmission from this District's sending facsimile machine, whose telephone number is (909) 396-2961, to each interested party at the facsimile machine telephone number(s) set forth on the attached mailing list. Said transmission(s) were completed on the aforesaid date at the time stated on the transmission record issued by the District's sending facsimile machine. Each such transmission was reported as complete and without error and a transmission report was properly issued by the District's sending facsimile machine for each interested party served. A true copy of each transmission report is attached to the office copy of this proof of service and will be provided upon request.

☐ (BY PERSONAL SERVICE) I caused to be delivered a true copy of the foregoing document(s) in a sealed envelope by hand to the offices of the above addressee(s).

☒ **(BY E-MAIL)** By transmitting a true .pdf copy of the foregoing document(s) by e-mail transmission from ewhite@aqmd.gov to each interested party at the e-mail address(es) set forth above. Said transmission(s) were completed on the aforesaid date at the time stated on declarant's e-mail transmission record.

Executed on July 12, 2016, at Diamond Bar, California.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Elizabeth White
(Type or print name)

Elizabeth White
(Signature)