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November 21, 2023

**VIA EMAIL ONLY**

Mr. Steve Cassulo  
[Steven.Cassulo@WasteConnections.com](mailto:Steven.Cassulo@WasteConnections.com)  
District Manager  
Chiquita Canyon Landfill  
29201 Henry Mayo Drive  
Castaic, CA 91384

Subject: **CHIQUITA CANYON LANDFILL (SWIS No. 19-AA-0052)  
CALRECYCLE'S REVIEW OF CONDITIONS AT THE LANDFILL  
Response Letter**

Dear Mr. Cassulo:

This letter provides continuing recommendations and comments after the November 2, 2023 visit to Chiquita Canyon Landfill (CCL), by the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency (LEA), CalRecycle, South Coast Air Quality Management District (SCAQMD), Los Angeles Regional Water Quality Control Board (RWQCB), the Department of Toxic Substances Control (DTSC) and the United States Environmental Protection Agency (USEPA). It also responds to CCL's October 20, 2023 letter.

While the LEA is pleased that CCL is implementing many of the mitigation actions required by the October 17, 2023 LEA Letter (LEA mitigation actions), the recent visit to CCL confirmed to the LEA and CalRecycle that specific additional mitigation actions are needed for the protection of public health and environment. Please find the enclosed November 14, 2023 correspondence from CalRecycle that contains its analysis of the ongoing and uncontrolled reaction at CCL. CalRecycle's letter specifically reiterates four mitigation measures that have not been implemented by CCL.

The LEA is very concerned that CCL has new leachate outbreaks and stability issues with leachate saturated slope and waste, while at the same time, the issues with high temperatures, landfill gas collection, excessive leachate production, and unusual and large-scale settlement persist. It appears unlikely that CCL's current mitigation measures will be sufficient to control and contain the reaction, which is expanding toward other areas of the landfill. The LEA has determined that it is necessary that CCL submit a plan to facilitate the immediate implementation of a soil reaction break/barrier, should it become necessary, to prevent the reaction from intensifying and/or expanding to other portions of the landfill. This includes preventing the reaction from reaching the working face that the customers use for solid waste disposal, and to maintain the site in reasonable repair, as required by 27 California Code of Regulations ("CCR") § 20750.

Because this reaction continues to expand, CCL must be proactive and have a future plan to ensure that it is able to control and contain the reaction and the site is maintained in reasonable repair for the protection of public health and environment. The plan must be submitted to the LEA for approval.

Given the recommended measures from CalRecycle to mitigate the reaction along with the new observations from the recent site visit, the LEA is requiring CCL to complete the following actions:

#### **1. Reaction Break/Barrier**

CCL must construct a soil reaction break/barrier at a predesignated area(s) if the reaction reaches the determined action line.

- A. Develop a soil reaction break/barrier plan and propose a set of criteria (e.g., what temperature thresholds at which temperature probes that border the reaction area) that would require CCL to install a soil reaction break/barrier between the reaction and operational areas of the landfill. CCL's plan needs to propose the depth, width, and location of the containment trench (wall) based on temperature readings collected by the temperature probe network, and timeline for the construction of a soil reaction break/barrier. Please provide the plan to the LEA for review and approval no later than two weeks after installing temperature monitoring devices as indicated below. CCL will need to use the supporting data to inform the plan. Failure to submit the plan, and implement an LEA approved plan in the event the criteria mandating soil reaction break/barrier implementation is met, could result in the modification of CCL solid waste operations, such as ceasing receipt of waste due to an emergency, potential health hazards, or the creation of public nuisances per Solid Waste Facility Permit LEA Condition 17.A.7. Unless controlled, the reaction will cause the environmental control infrastructure to collapse and create more waste and slope instability, which will jeopardize public health and safety.
- B. To obtain necessary data to determine the action line, CCL needs to collect data regarding intensity, depth, speed and direction of the reaction. It is imperative that CCL install

temperature monitoring devices by January 8, 2024. Temperature devices are the primary method to track the reaction's progression accurately. Table 1 is provided as an initial recommendation for the location of temperature probes. The proposed temperature probe locations include sixteen assessments and six sentry temperature probes. This design would allow CCL to track the reaction spatially and provide a decision matrix to develop a plan to contain the reaction and prevent it from moving east and south. (See, October 17, 2023 LEA Letter - Mitigation Action #9.)

*Table 1. The proposed temperature probe locations using the SCS Engineering Reaction Area Map, dated 11/1/2023.*

<b>Area for Temperature Probes</b>	<b>Number and Location of Temperature Probes</b>
Northern Flank, Map B3	One: In between CV-1908 and CV2326
Western Slope, Map C3 to H3	Three: Next to CV-2006, CV-2342A, CV-2002
Southern Flank, Map F3 to H5	Four: Next to CV-2344, CV-1610 (Sentry), 50 feet to the south of CV-2348
Eastern Flank, Map	Fourteen: Next to CV-2302, CV-2204, CV-100 (Sentry), H-2277A, CV-103, CV-74R, CV-1425, CV-1421, CV-2204, CV-1423 (Sentry), CV-2333, CV-99 (Sentry), CV-1906 (Sentry), CV-85S (Sentry)

Please note that the wellhead temperature CCL is taking does not reflect the actual temperature of the well and there can be significant difference in temperature ranging from 50 °F to 100 °F. For example, the temperature difference was 52 °F in well CV-2201 between the well and wellhead as indicated in CalRecycle's Review dated October 16, 2023.

## 2. Cover

Because of the ongoing reaction, the cover that is currently in place is not adequate and not performing to the standards to maintain the site in reasonable repair. A flexible membrane liner ("FML") can prevent surface emissions of landfill gas while reducing oxygen infiltration. However, a soil cover can be implemented within weeks to reduce the exceptionally high concentrations of surface emissions and leachate seeps. Quickly implementing soil cover will reduce odors and impact on the community. The FML can be installed at a later date to reduce odors further. Per Solid Waste Facility Permit LEA Condition 17.B.3, the LEA is requiring CCL to provide more stringent nuisance control measures with the cover as follows:

- A. Place and compact a minimum cover of 24 inches of  $1 \times 10^{-6}$  low permeability soil in and around the Reaction Settlement Area and any well showing signs of a reaction, i.e., any wells with temperature over 160°F or CO concentrations over 1,500 ppmv by December 14,

2023. (See, October 17, 2023 LEA Letter - Mitigation Action #2.) Submit a completion report to the LEA no later than two weeks after completion.

- B. Develop a written plan that includes documentation and tracking of the fissures, settlement, and tension cracks in the soil cover for LEA review and approval by December 6, 2023. The written plan needs to include a photo log of the fissure location including the length and severity. Upon LEA approval, CCL must submit a weekly report to the LEA by each Tuesday.

**3. Slope stability**

Given the prior slope instability on the western slope near the leachate outbreak, CCL shall perform a slope stability analysis in this area for LEA review, as saturated waste has very low shear strength. Submit a work plan with a timeline for LEA review and approval by December 14, 2023.

**4. Manufacturer Maximum Temperature Design Specifications**

CCL needs to collect temperatures in and around the reaction area to meet the manufacturer's temperature design specifications/recommendations to ensure that the French drain does not fail due to elevated temperature of the leachate soon after installation, leaving leachate seepage without control at the site. This additional step is necessary because of the ongoing reaction and to ensure that the public does not come into contact with leachate.

The LEA recommends CCL outfit all temperature probes with remote telemetry technology to track the reaction. CCL should continue to implement the recommended mitigation measures and continue to work with the appropriate State and local agencies to resolve the odor nuisance and other serious conditions at the landfill.<sup>1</sup>

Please provide written response to the LEA by Wednesday, December 6, 2023, and submit the required plan, data, and report by the due dates indicated above.

Should you have any questions regarding the foregoing, please contact me.

Sincerely,



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<sup>1</sup> California's environmental laws are enforced by state and local agencies, each responsible for enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticide laws. Therefore, regulations governing solid waste disposal in the State of California enforced by the LEA do not address air or water quality aspects of the environment that are regulated by other state or local agencies. (27 CCR § 20005(b); Public Resources Code § 43021.)

Steve Cassulo, District Manager  
Chiquita Canyon Landfill  
November 21, 2023  
Page 5 of 5

Karen Gork, Chief Environmental Health Specialist  
Los Angeles County LEA

Enclosure

cc: (Via electronic correspondence only)

- Robert Ragland, Los Angeles County Department of Public Health
- Liza Frias, Los Angeles County Department of Public Health
- Nichole Quick, M.D., Los Angeles County Department of Public Health
- Shikari Nakagawa-Ota, Los Angeles County Department of Public Health
- Renee Jensen, LEA Counsel ([rjensen@fwhb.com](mailto:rjensen@fwhb.com))
- Blaine McPhillips, Senior Deputy County Counsel
- Emiko Thompson, Los Angeles County Department of Public Works
- Alex Garcia, Los Angeles County Department of Regional Planning
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- Wes Mindermann, CalRecycle ([wes.mindermann@calrecycle.ca.gov](mailto:wes.mindermann@calrecycle.ca.gov))
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- Jeff Lindberg California Air Resources Board ([jeff.lindberg@arb.ca.gov](mailto:jeff.lindberg@arb.ca.gov))
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- Douglas Cross, Los Angeles Regional Water Quality Control Board ([dcross@waterboards.ca.gov](mailto:dcross@waterboards.ca.gov))

November 14, 2023

Ms. Karen Gork, MPH, REHS  
Chief Environmental Health Specialist  
Solid Waste Management Inspection and Enforcement Program  
Los Angeles County Department of Public Health – Environmental Health  
5050 Commerce Drive  
Baldwin Park, California 91706

**Subject: Review Chiquita Canyon Landfill (19-AA-0052) Response Letter**

Dear Ms. Gork:

CalRecycle staff are providing this letter in response to your request for technical assistance in reviewing the Chiquita Canyon Landfill (CCL) response letter concerning the odor incident.

The following comments are provided to the Los Angeles Local Enforcement Agency (LEA) as assistance to support the program in carrying out its responsibilities on permitted disposal sites. The final determination as to the comments to be provided to the responsible party is within the sole purview of the LEA, acting within the parameters of its discretion, in accordance with its vested authority under its certification as defined in Title 14, California Code of Regulations (14 CCR), Division 7, 27 CCR, Division 2, Subdivision 1 (Section 20005 et seq.), and Division 30 of the Public Resources Code.

For this response, I visited the site on November 2, 2023, and reviewed the following documents submitted to the LEA:

- Chiquita Canyon Landfill Response to CalRecycle Review of the Odor Issues at CCL, dated October 20, 2021;
- SCS Engineers Reaction Area Map, de-watering for CCL dated November 1, 2023;
- SCS Engineers Reaction Area Map, existing wells for CCL dated November 1, 2023;
- SCS Engineers De-watering System Layout or CCL dated September 15, 2023; and
- SCS Field Services Boring Log for the new wells installed July to October 2023.

**Site Visit**

A multi-agency site visit was conducted on November 2, 2023. Staff from the LEA, CalRecycle, South Coast Air Quality Management District (SCAQMD), Los Angeles

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Regional Water Quality Control Board (RWQCB), Department of Toxic Substances Control (DTSC), and the United States Environmental Protection Agency (USEPA) toured the site with CCL staff. During the visit, CCL staff discussed the remedial and odor control actions they had implemented. The CCL has installed 48 new gas control wells. Based on temperature readings during drilling, the new gas wells were constructed using either PVC-SHC 80, CVPC-SHC 80, or stainless steel. While installing the stainless-steel gas wells in some areas with the highest recorded temperatures, three well borings (i.e., CV-1534A, CV-1532B, and CV2338) resulted in the release of leachate under pressure. The CCL is also installing a French drain along the western slope to mitigate the leachate outbreak. To address off-site odors, the CCL staff has placed several agricultural-size fans at the west boundary of the landfill. During the site visit, I detected odors onsite and used real-time field equipment to monitor temperatures, volatile organic compounds (VOCs), oxygen, carbon monoxide, methane, and hydrogen sulfide.

A leachate outbreak in the north at map grid A-5/6 was observed by CalRecycle staff during the site visit. The area around gas well CV-2201 at map grid C-5 was also viewed. See Attachment A photo log for CV-2201. This area has settled 25 to 30 feet since 2022. The slope to the original grade outside the settlement area at gas wells CV-2305 and CV-2315, map grid C/D-6, was walked. At the toe of the slope, a second leachate outbreak and the construction of the French drain at map grid D/E/F-2 were observed. The CCL stated some over-saturated waste had slipped down the toe of the west slope.

During the visit, we discussed whether CCL staff or its consultant had observed industrial waste in the 48 new borings. The staff said the boring materials were typical municipal solid waste, but the observed waste from the reaction area was very wet with little cohesiveness. We also discussed slope instability at the toe of the western slope and whether the French drain would be designed to account for the low shear strength of the wet waste. Lastly, we discussed developing a containment strategy for the reaction area if it expands to the east and impacts the current disposal face. A containment strategy would include the installation of a reaction break made of soil at some predesignated area if the reaction reached the designated containment line.

## **Reaction**

The two CCL reaction site maps from July 2023 and September 2023 show that the incident has expanded in all directions, most notably to the north and west. The approximate size of the incident now is between 30 and 35 acres.



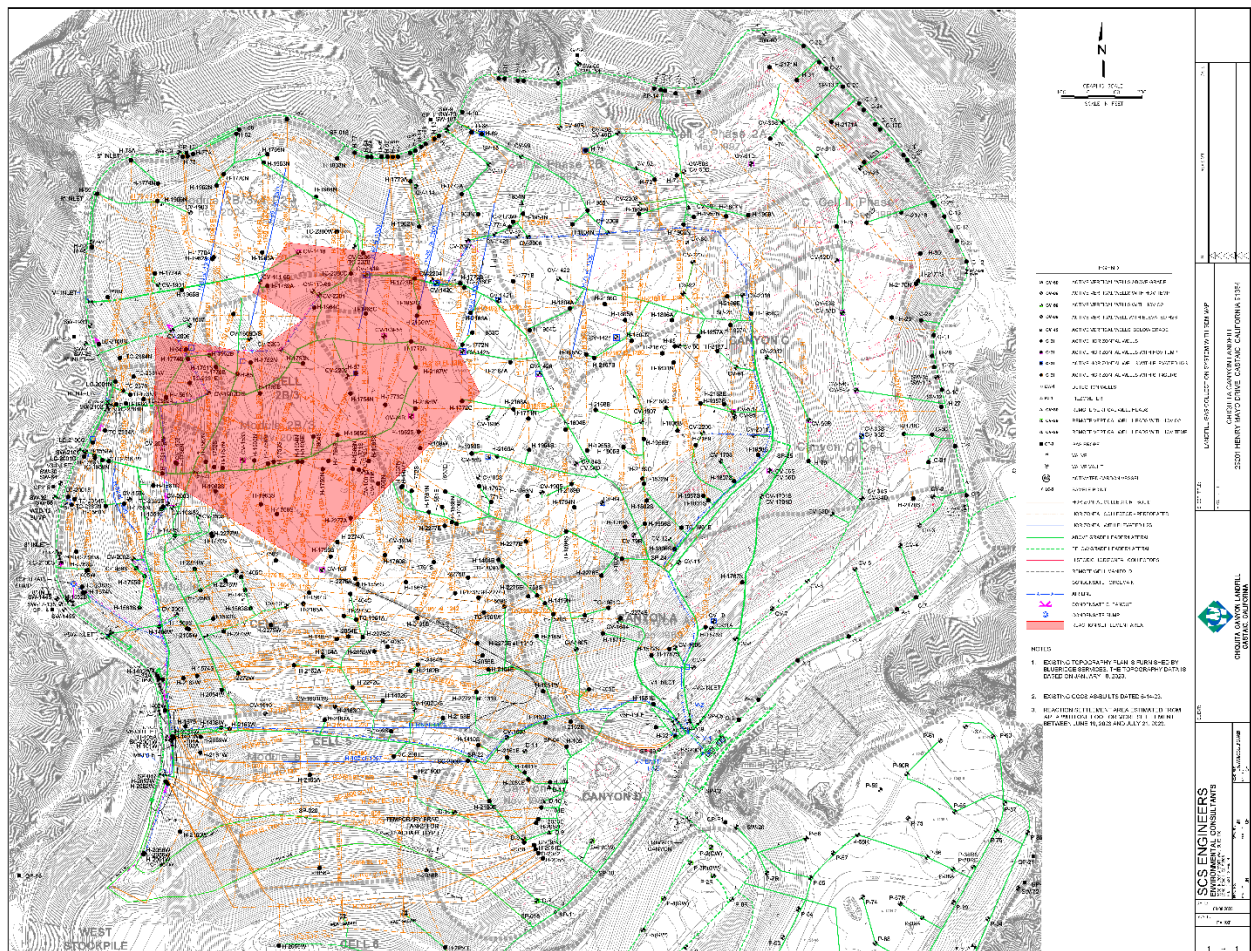


Figure 1. The reaction settlement area at the Chiquita Canyon Landfill. Red indicates one foot or more settlement between June 19, 2023, and July 21, 2023.



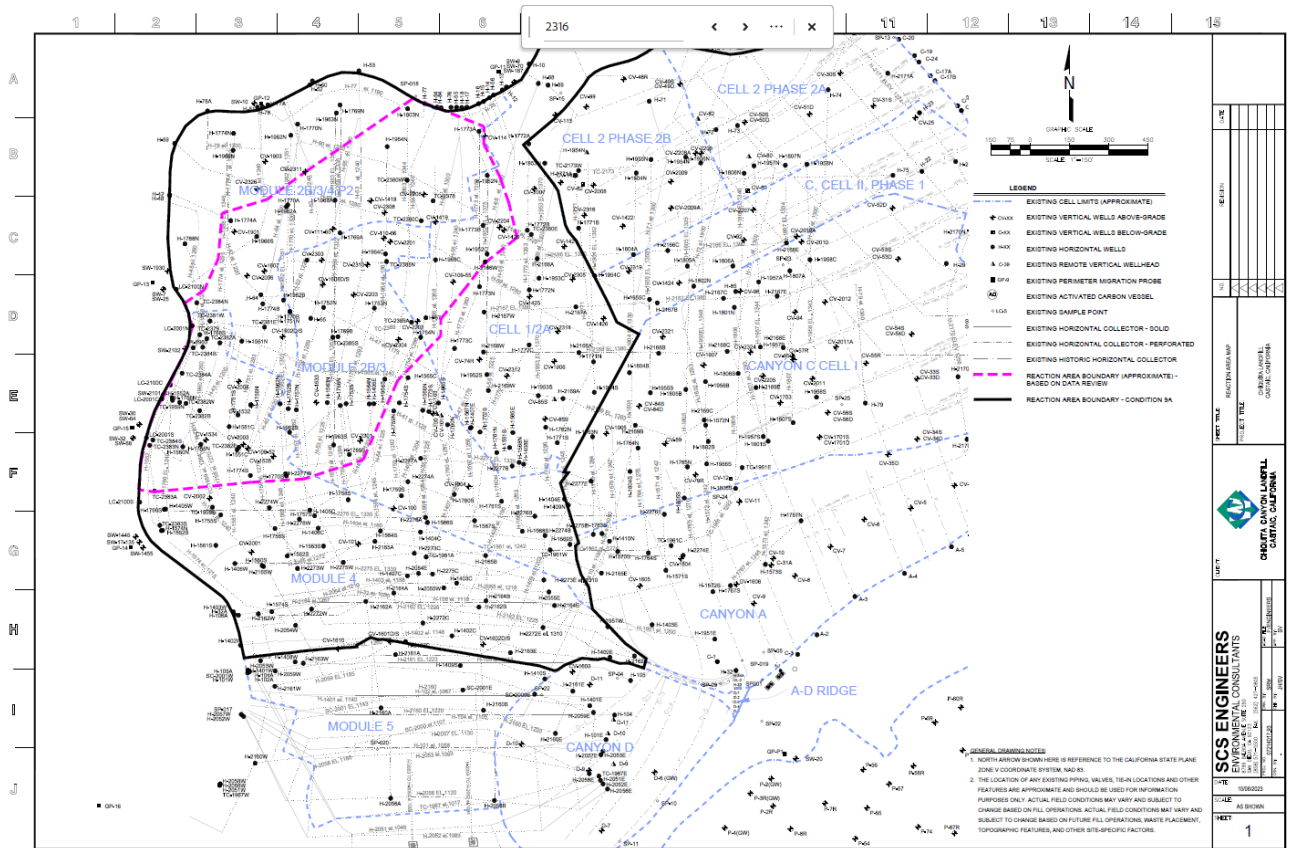


Figure 2. The reaction area is shown as pink dashed lines, September 15, 2023.

## CCL Response and Discussions

Based on the site visit and the additional information provided in the CCL comment letter dated October 20, 2023, CalRecycle staff offer the following comments and recommendations.

### I. Cause Analysis

Before 2014, the waste industry generally defined an elevated temperature landfill ("ETLF") event if a temperature greater than 131°F was observed at the wellhead, whether or not the site had accepted reactive industrial waste. Post 2014, a new definition for an ETLF was developed for Municipal Solid Waste (MSW) landfills to include temperatures above regulatory thresholds (i.e., 131 or 145 °F) due to abnormal chemical reactions within the waste mass that have not experienced a fire. Around 2015, multiple ETLF studies were carried out through the waste industry research foundation, Environmental Research and Education Foundation (EREF). The research group first proposed that ETLF events were a function of landfill depth. The hypothesis was that an ETLF was a function of the ideal gas law (i.e.,  $PV = nRT$ ) and that the waste at depth experienced higher temperatures because of pressure from the waste above. This hypothesis was disproved using temperature profiles from temperature monitoring

devices at ETLF and temperature data from California landfills with deep-fill designs. Their second hypothesis was that elevated temperatures were from a self-sustaining exothermic pyrolysis reaction; however, the EREF also showed that it did not cause elevated temperatures. The current industrial consensus is that ETLFs are due to abnormal chemical reactions from either an exothermic waste or an unknown reactive industrial waste. In my opinion, there are only three known causes of ETLF: (1) thermophilic bacteria, (2) reactive industrial waste, and (3) oxygen intrusion and resulting oxidation/smolder. Additionally, an ETLF can combine reactions such as aluminum dross, baghouse dust, salt cake, fly ash, or other metal oxide waste that can generate enough heat to ignite the surrounding MSW and cause pyrolysis or a smolder. Also, it is believed that hydrogen gas is only produced in landfill gas at concentrations above 2 percent with ETLFs with abnormal chemical reactions and not as a result of smoldering events. While it is true that the hydrogen gas concentration during the smolder phase is minimal since hydrogen gas is flammable and not a product of combustion if the four phases of smoldering are considered, one can see that a smolder can produce hydrogen gas well over 20 percent<sup>1 2</sup> at the pre-combustion phase when gasification is occurring. A typical smolder event has a four-step process that consists of (1) pre-heating, (2) evaporation, (3) pyrolysis/gasification, and (4) oxidation/combustion. The pyrolysis/gasification phase is an endothermic reaction that is not self-sustaining and precedes the exothermic smoldering process (oxidation/combustion). The gasification phase will produce hydrogen gas, carbon monoxide, and short-chain hydrocarbons, while the oxidation/combustion phase will produce carbon dioxide, carbon monoxide, and water with substantial heat. It is also true the waste industry typically does not sample for hydrogen gas at the start of a suspected smolder event. The industry typically monitors for carbon monoxide and fixed gasses using field equipment.

Based on discussions with the landfill staff and a review of the 48 new boring logs, no reactive industrial waste was discovered in the reaction area. This result is expected since it would be remarkable that CCL accepted an unknown reactive industrial waste in an area over 35 acres in Cell 1/2A, Module 2B/3, Module 2B/3/4 P2, and Module 4.

## II. CalRecycle's Recommendations 1 to 15 (Note: only 2, 8, 9, 13 are discussed further)

*Regarding the previous set of recommendations presented to the LEA in our October 16, 2023, letter, we have the following changes and additions:*

*Recommendation #2: Place and compact a soil cover at least 24 inches in depth*

Additional Comment: A flexible membrane liner ("FML") can prevent surface emissions

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<sup>1</sup> Brown, Joshua K., "Hydrogen-Rich Syngas Derived from Smoldering Biomass and Hydrocarbon Wastes" (2022). Electronic Thesis and Dissertation Repository. 8496.

<https://ir.lib.uwo.ca/etd/8496>

<sup>2</sup> Jafar, Navid H. et al. "Progression of Elevated Temperatures in Municipal Solid Waste Landfills" (2017). American Society of Civil Engineers

of landfill gas while reducing oxygen infiltration. However, a soil cover can be implemented within weeks to reduce the exceptionally high concentrations of surface emissions and leachate seeps. Quickly implementing soil cover will reduce odors and impact the community. The FML can be installed at a later date to reduce odors further. The current intermediate cover should not be viewed as adequate to minimize odors.

*Recommendation #8: Sample the leachate for benzene and other volatile organic compounds.*

Additional Comment: It is recommended that all known liquids and soils/sludge from the reaction area be appropriately characterized. With temperatures documented over 200°F in the reaction area, all leachate and sludge should be tested in addition to the current leachate testing program. CCL should not assume the leachate at the sumps or on the liner is the same as the leachate from the reaction area. At least ten direct leachate samples from the highest temperature wells with pumps should be collected to ensure the leachate is not chemically different from the leachate as the outbreaks or at the leachate collection sumps. The samples should follow state and federal hazardous waste regulations for ignitable, corrosive, reactive, and toxic substances. The transporters and facilities receiving the leachate for processing and disposal must be aware of the chemical composition of the leachate and sludge. CCL should provide a list of facilities that have and are currently receiving the leachate from the reaction area. CalRecycle encourages LEA and CCL staff to work closely with staff from the SCAQMD and the Los Angeles Regional Water Quality Control Board (RWQCB).

*Recommendation #9: Install temperature monitoring devices.*

Additional Comment: While CalRecycle agrees that temperature monitoring devices should not be installed where leachate is under pressure, temperature devices in other locations are necessary to determine the intensity, depth, and direction of the reaction. Temperature devices are the primary method to track the reaction's progression accurately. Table 1 is provided as an initial recommendation for the location of temperature probes. The proposed temperature probe locations include sixteen assessments and six sentry temperature probes. This design would allow the CCL to track the reaction spatially and provide a decision matrix to develop a plan to contain the incident and prevent it from moving east and south.

*Table 1. The proposed temperature probe locations using the SCS Engineering Reaction Area Map, dated 11/1/2023.*

Area for Temperature Probes	Number and Location of Temperature Probes
Northern Flank, Map B3	One: In between CV-1908 and CV2326
Western Slope, Map C3 to H3	Three: Next to CV-2006, CV-2342A, CV-2002
Southern Flank, Map F3 to H5	Four: Next to CV-2344, CV-1610 (Sentry), 50 feet to the south of CV-2348
Eastern Flank, Map	Fourteen: Next to CV-2302, CV-2204, CV-100 (Sentry), H-2277A, CV-103, CV-74R, CV-1425, CV-1421, CV-2204, CV-1423 (Sentry), CV-2333, CV-99 (Sentry), CV-1906 (Sentry), CV-85S (Sentry)

*Recommendation #13: Consider installing remote telemetry technology to continuously collect and analyze landfill gas data at the collection wells.*

Additional Comment: CalRecycle agrees that wells with significant leachate issues, high temperatures, pressure, or material viability issues are unsuitable for telematic technology. CalRecycle recommends outfitting all temperature probes with remote telemetry technology to track the reaction.

### **Further Recommendations**

Based on my site visit and discussions, CalRecycle staff recommend the LEA consider working with CCL and the other regulatory agencies toward implementing these additional actions:

1. CCL should develop a written plan that tracks the fissures, settlement, and tension cracks in the soil cover, marking the location and documenting the length and severity.
2. Given the prior slope instability on the western slope near the leachate outbreak, CCL should perform a slope stability analysis in this area, as saturated waste has very low shear strength.
3. CCL should collect temperatures in and around the reaction area to ensure all infrastructure improvements meet manufacturer maximum temperature design specifications and/or recommendations.
4. CCL should develop a reaction break plan and propose a set of criteria (e.g., what temperature at which temperature probes) that would require the CCL to install a soil barrier between the reaction and operational areas. The plan should propose the depth, width, and location of the containment trench (wall) based on temperature readings collected by the temperature probe network.

Attachment A contains several photos from the site visit on November 2, 2023. Please do not hesitate to contact me by telephone at (916) 341-6356 or by email at [Todd.Thalhamer@Calrecycle.ca.gov](mailto:Todd.Thalhamer@Calrecycle.ca.gov) if you have comments or questions.

Sincerely,



Todd Thalhamer, P.E.  
Senior Waste Management Engineer  
CalRecycle

Cc: Shikari Nakagawa-Ota, Los Angeles County Department of Public Health  
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**Attachment A**  
**Photo Log**  
**CCL Site Visit, November 2, 2023**





*Photo 1. Location of northern leachate outbreak, CCL November 2, 2023.*





*Photo 2. Gas well CV-2201 at CCL, November 2, 2023.*





*Photo 3. Location of western leachate outbreak, CCL November 2, 2023.*



*Photo 4. Location of western leachate outbreak, CCL November 2, 2023.*



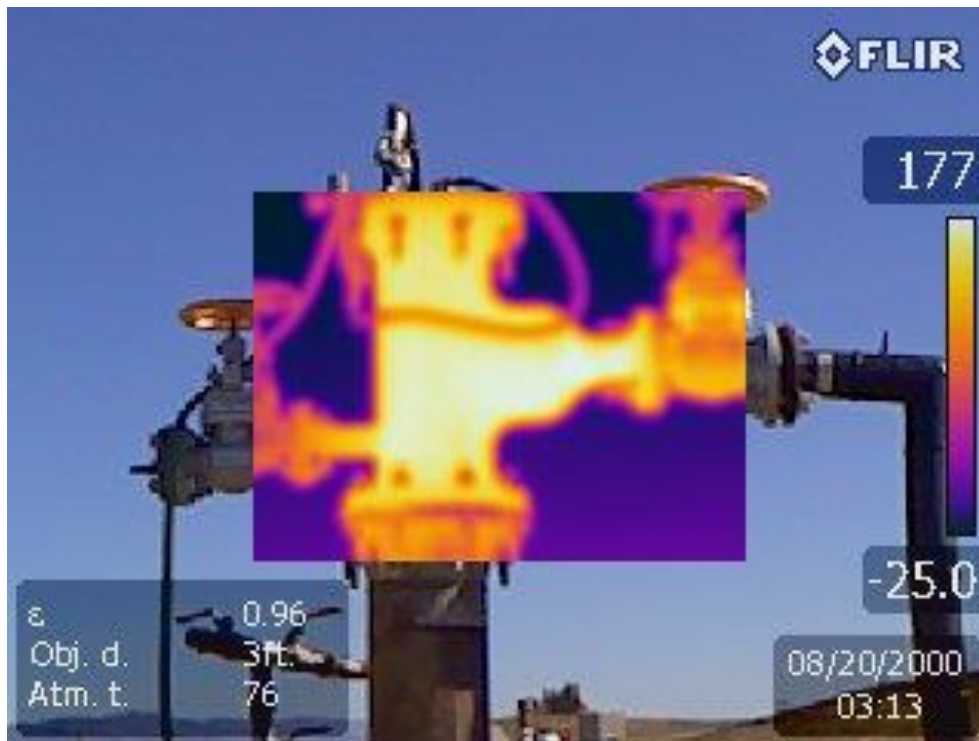


Photo 5. FLIR image of gas well with temperature range up to 177°F at CCL, November 2, 2023.



Photo 6. FLIR image of gas well with temperature range up to 199°F at CCL, November 2, 2023