

**Department of Resources Recycling and Recovery**  
**SCOPE OF WORK**

**Reduction of Volatile Organic Compounds Emissions from Composting Operations**

**I. INTRODUCTION/OBJECTIVES**

Volatile Organic Compound (VOC) emissions from compost facilities can be highly variable and are influenced by factors such as composting technology, feedstock mix, and operational parameters (initial grind, porosity, saturation, aeration, etc.). This contract will (1) produce a guidance document to assist local air districts in reviewing applications and developing permit conditions for composting facilities, (2) develop technical guidance for compost facility operators regarding strategies to maximize compost system performance while minimizing air emissions, and (3) educate air district staff and compost facility operators through a series of workshops strategically located around the State.

The decomposition of organic materials results in VOC emissions which can be regulated under the federal Clean Air Act (CAA). VOCs are a precursor to ground-level ozone, a component of smog. By manipulating the compost process via specific management practices, VOC emissions may be reduced by 60 to 92 percent compared to organic materials that degrade naturally in an unmanaged process (Buyuksonmez, 2007). However, research is needed to identify specific management practices, operational parameters, feedstock blends, moisture levels, and composting approaches that can effectively manage VOC emissions.

In California, local air districts have the primary responsibility for implementation of the New Source Review (NSR) program, which regulates emissions from industrial sources that emit air pollutants. The California NSR permit program is derived from the federal Clean Air Act. Specific to NSR, each air district must include in its air quality attainment plan a stationary source control program designed to achieve no net increase in emissions of nonattainment pollutants or their precursors for all new or modified sources that exceed emissions thresholds.

As part of the permitting process, a project is subject to the rules of each individual air district. If an air district's NSR rules require it, a project must calculate emissions from each individual component source and total emissions to determine the applicability of various permitting requirements. In addition, the applicant may be required to conduct a survey to determine what methods, measures, or control technologies are available for controlling emissions. During the permit process, an air district can prepare an engineering analysis that includes emission calculations, an analysis of whether the project will meet district, state, and federal air quality regulations, assumptions used to evaluate the acceptability of the project, and required conditions of design and operation to achieve and maintain compliance. This contract will assist both local air districts and compost facility operators with the permitting process.

This contract shall directly help California achieve the requirements of Senate Bill 1383 (Lara, Chapter 395, Statutes of 2016) which requires a reduction in the disposal of organic materials in landfills by 50 percent by 2020 and 75 percent by 2025. CalRecycle estimates the state will need between 75 and 100 new or expanded compost and anaerobic digestion facilities to recycle sufficient organic materials to achieve the SB 1383 goals.

## **II. WORK TO BE PERFORMED**

The contractor shall collect and compile existing VOC emissions data from all publicly available sources to determine whether specific operational parameters result in specific VOC emission rates, conduct field research to fill in data gaps, and prepare a guidance document. The guidance document will assist local air districts in reviewing applications and developing permit conditions for composting facilities and develop technical guidance for compost facility operators regarding strategies to maximize compost system performance while minimizing air emissions. The contractor will also conduct a series of workshops strategically located around California to educate air district staff and compost facility operators.

Composting operational parameters include, but are not limited to, feedstock blends, carbon-to-nitrogen ratio, aeration rates and related oxygen levels, initial grind size and its impacts on porosity and bulk density, watering practices including saturation levels, pile temperature, and pile size and shape. Composting technologies include, but are not limited to fabric covers, compost caps (e.g. 6"-12" of finished compost on top of piles), biofilters, and open windrows. Feedstock blends include materials reasonably expected to be diverted from landfill disposal pursuant to SB 1383, including food and green materials, liquid or solid digestate from anaerobic digesters, and agricultural materials such as food processing residues.

The contractor shall perform emissions testing to fill in data gaps to identify VOC emissions rates for specific operational parameters. The work performed pursuant to the contract shall use industry standard methods and testing protocols. The contractor shall consider various feedstock blends that may include, but not be limited to green waste, food waste, anaerobic digestate, and organics separated from the disposed municipal solid waste stream (MSW).

The contractor shall prepare a guidance document that relies upon scientific data to correlate composting operational parameters and technologies to a range of expected VOC emission rates. The final guidance document, and all supporting documents and data sets, shall be of sufficient quality and scientific rigor to be relied upon by local or regional air quality management districts, the California Air Resources Board (ARB), CalRecycle, and stakeholders for permitting, development of regulations, policy decisions, and derivative work.

The contractor shall conduct workshops throughout the state in locations agreed upon by CalRecycle, air districts, and the contractor. Workshops will be

conducted in key air districts that (1) have a high potential to construct new or expanded compost facilities, (2) have impacted air quality or are upwind of impacted districts, (3) generate large amounts of organic waste, or (4) are within close proximity to markets for compost products.

### **III. TASKS IDENTIFIED**

All tasks must be accepted, and all deliverables must be approved in writing by the CalRecycle contract manager prior to payment for each task and deliverable.

#### **Task 1: Meet with Stakeholders, Acquire Data, and Identify Operational Parameters.**

The contractor shall collaborate with CalRecycle, local air district staff and stakeholders to ensure proposed work is appropriate to accomplish the objectives of this contract. In particular, the contractor shall meet with staff associated with the CalRecycle-ARB-CAPCOA (California Air Pollution Control Officers Association) Compost Working Group to (1) request assistance to acquire all relevant air emissions data from studies which have been submitted to the districts, and (2) receive feedback on proposed scope and focus of study. The contractor shall meet, either by phone or in person, with staff from the South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, Bay Area Air Quality Management District, and at least two other state air quality districts to receive input. The contractor shall keep detailed records of all meetings. The contractor shall also schedule and arrange at least two meetings with appropriate compost facility operators to gain an understanding of their perspectives regarding the practicality of implementing operational parameters. The contractor will also need to identify and recruit compost facilities to participate in the field research (see Task 4) portion of the contract.

The contractor shall identify and address key operational parameters, and composting technologies and systems that can be parametrically compared to a baseline. Composting operational parameters include, but are not limited to, feedstock blends, carbon-to-nitrogen ratio, aeration rates and related oxygen levels, initial grind size and its impacts on porosity and bulk density, watering practices including saturation levels, pile temperature, and pile size and shape. Composting technologies include, but are not limited to fabric covers, biofilter compost caps (e.g. 6"-12" of finished compost on top of piles), biofilters, and open windrows.

The Contractor shall suggest methods and processes to compile existing VOC emission data that can be attributed to a specific operational parameter and/or technology. If any data is deemed proprietary, Contractor shall strategize how to effectively aggregate data to protect individual facilities. The Contractor shall identify data gaps essential to manage expected SB 1383 feedstocks and take into account air district permitting concerns identified through the collaborative stakeholder process.

## **Task 2: Analyze existing emissions data.**

The Contractor shall analyze all available data to determine key data gaps, especially with regard to the types of materials and feedstock blends likely to be collected as a result of SB 1383. Feedstock blends include materials reasonably expected to be diverted from landfill disposal pursuant to SB 1383, including food, food soiled paper, green materials, liquid or solid digestate from anaerobic digesters, and agricultural materials such as food processing residues. The contractor shall present this analysis to CalRecycle and to staff associated with the CalRecycle-ARB-CAPCOA Compost Working Group for further discussion. The Contractor shall meet with the CalRecycle Contract Manager, to discuss the preliminary findings and data gaps, and based on those findings, the CalRecycle contract manager will schedule up to two meetings with stakeholders to further discuss the preliminary findings and data gaps and get feedback.

## **Task 3: Design of Field Research Project and preparation of detailed project budget.**

After determining key data gaps, the Contractor shall design a field research project to fill key data gaps. The Contractor shall prepare a detailed budget for funds allocated to the field research portion of the project. The detailed budget shall indicate the number of emission samples collected, the operational parameters being tested, and the types of pollutants tested. The Contractor shall present the proposed Field Research Project and associated budget to the CalRecycle contract manager for approval. The CalRecycle Contract Manager will share the proposed field research with the CalRecycle-ARB-CAPCOA Compost Working Group for discussion and concurrence. The Contractor shall incorporate feedback from the Compost Working Group in finalizing study design. After CalRecycle approves the budget, the contract will be amended to add the detailed budget for Task 4 to the Agreement. No work will be performed on Task 4 until the contract amendment is executed and approved by the Department of General Services.

## **Task 4: Conduct Field Research Project.**

The Contractor shall conduct the field research and collect all field data using approved methods. All samples shall be sent to an accredited laboratory. The Contractor shall follow accepted best practices for sample storage and transportation, as indicated in the Field Research plan and associated budget. The Contractor shall consult with the Compost Working Group while planning the field research project and arrange for site visits to allow observation of the field research activities.

## **Task 5: Draft Guidance Document and Workshops.**

After all scientifically valid data is compiled and analyzed, the Contractor shall prepare a draft Guidance Document. CalRecycle has the right to review and comment on the preliminary draft report as well as solicit comments on it from the

CalRecycle-ARB-CAPCOA Compost Working Group. The Contractor shall revise the preliminary draft report in response to comments received prior to circulating the draft report for public comment. All data used to calculate VOC emissions rates or ranges shall be formatted to enable ease of understanding. Contractor shall use data tables, charts, and graphs to clarify important observations and trends, and to better enable contrasts and comparisons consistent with ADA accessibility requirements.

In addition to describing lessons learned from the data analysis and Field Research Project, the Final Report shall provide practical techniques by which operators can implement practices that reduce air emissions from composting through the following categories:

- a. Optimum food material/green material blends for various types of composting systems.
- b. Optimum required aeration rates to maintain aerobic conditions in all major composting systems. Strategies to prevent and diffuse fermentation events.
- c. Optimum porosity/bulk density for ground green/woody materials, specifically for base layers and finished compost caps. Strategies to prevent and reverse compaction and air channeling.
- d. Strategies for managing different types of composting systems, positive air, negative air, reversible systems, biofilter compost caps, biofilters and fabric covers. Strategies to ensure stable conditions before removing covers.
- e. Moisture management, impact of solid or liquid digestates, food wastes and other liquids on moisture throughout the pile. Initial wetting strategies to obtain optimum moisture, sprinklers and other methods to enhance emissions control on windrows, eASP systems and on biofilter compost caps.
- f. When materials are considered stable and mature. What are the parameters for moving materials to the “curing area.” Does the addition of food waste impact the length of time necessary to achieve acceptable stability and maturity?

Once CalRecycle has concluded its preliminary review of the draft Guidance Document, the Contractor shall schedule a series of no less than seven workshops around the state. Workshops shall be directed toward air quality district staff and compost facility operators. At least three of the workshop locations shall be in or within 50 miles of the South Coast, San Joaquin and Bay Area air quality districts. One workshop shall be conducted at the CalEPA headquarters building in Sacramento, and one shall be in a rural location, meaning in a county having less than 200,000 tons of disposal per year. The workshop at the CalEPA building shall be recorded and made available on CalRecycle’s website.

### **Task 6: Provide Regular Updates to Staff and Stakeholders.**

The Contractor shall share data on a regular basis, provide monthly updates to CalRecycle, and participate in conference calls to discuss progress on all of the prior tasks when requested. The Contract Manager reserves the right to request interim deliverables, to request the Contractor meet and discuss project outcomes or interim deliverables with external bodies such as staff affiliated with the CalRecycle-ARB-CAPCOA Compost Working Group. If difficulties or delays arise during the implementation of any aspect of the project, the Contractor shall apprise the CalRecycle Contract Manager within one week. The Contractor shall communicate no less than once a month on the progress of the Workplan and the Field Research Plan implementation, either in writing or on conference calls, help arrange research site tours, and may be asked to prepare interim deliverables or presentations on the project during this time.

### **Task 7: Final Guidance Document.**

Following the workshops, the Contractor shall prepare and submit a Final Guidance Document that integrates the results of the workshops and public comments with the Draft Guidance Document. The Final Guidance Document is subject to the review and approval of the CalRecycle contract manager, and must meet all standards as outlined in the [CalRecycle Contractor Publications Guide](https://www.calrecycle.ca.gov/contracts/pubguide) (<https://www.calrecycle.ca.gov/contracts/pubguide>).

The executive summary of the Final Guidance Document shall contain a summary of the initial data analysis, a summary of the Field Research Project, and a provide a table summarizing the expected impact on emissions ranges for items **a-f** in Task 5, above.

Appendices to the Final Guidance Document shall fully document all methodologies used to collect data, provide raw data collected during the Field Research Project, and provide all calculations critical to the correlation of composting operational parameters and technologies to VOC emissions.

Documents created through this project must be fully ADA compliant, including appendices, and delivered in a format acceptable for inclusion on State-government-run web sites. The Contractor shall follow CalRecycle's [Contractor Publication Guide](https://www.calrecycle.ca.gov/contracts/pubguide) (<https://www.calrecycle.ca.gov/contracts/pubguide>). Report revisions may be required by the contract manager prior to written approval of the Final Guidance Document.

## **IV. CONTRACT/TASK TIME FRAME**

It is anticipated that this contract will be awarded in May 30, 2020 and expire in May 30, 2022. CalRecycle staff will develop a work order for each task under this contract and the deliverables and time frame for the respective activities will be included in each work order.

<b><i>Action/Work Product</i></b>	<b><i>Date Finished</i></b>
Task 1 – Acquire Data & Identify Parameters	Nov. 1 2020
Task 2 – Analyze Data	Jan. 15, 2021
Task 3 – Design Field Research	March 1, 2021
Task 4 – Conduct Field Research	June 1, 2021
Task 5 – Draft Guidance Document & Workshops	Dec. 1, 2021
Task 6 – Update Staff & Stakeholders	Feb. 30, 2022
Task 7 - Final Report	April 30, 2022

**V. COPYRIGHT PROVISION**

The Contractor shall establish for CalRecycle good title in all copyrightable and trademarkable materials developed as a result of this Scope of Work. Such title shall include exclusive copyrights and trademarks in the name of the State of California, CalRecycle.

**VI. CALIFORNIA WASTE TIRES**

Unless otherwise provided for in this Scope of Work, in the event the Contractor and/or subcontractor(s) purchases waste tires or waste-tire derived products for the performance of this Scope of Work, only California waste tires and California waste tire-derived products shall be used. As a condition of payment under the agreement, the Contractor shall be required to provide documentation substantiating the source of the tire materials used during the performance of this Scope of Work to the contract manager.

**VII. WASTE REDUCTION AND RECYCLED-CONTENT PRODUCT PROCUREMENT**

In the performance of this Agreement, Contractor shall use recycled content, used or reusable products, and practice other waste reduction measures where feasible and appropriate.

Recycled-Content Products: All products purchased and charged/billed to the CalRecycle to fulfill the requirements of this contract shall be Recycled-Content Products (RCPs), or used (reused, remanufactured, refurbished) products. All RCPs purchased or charged/billed to the CalRecycle to fulfill the requirements of the contract shall have both the total recycled-content (TRC) and the postconsumer content (PC) clearly identified on the products. Specific requirements for the aforementioned purchases and identification are discussed in the Terms and Conditions of the Contractual Agreement under Recycled-Content Product Purchasing and Certification.

The Contractor should, at a minimum, ensure that the following issues are addressed, as applicable to the services provided:

## **WRITTEN DOCUMENT PROVISION**

All documents and/or reports drafted for publication by or for CalRecycle in accordance with this contract shall adhere to CalRecycle's *Guidelines For Preparing CalRecycle Reports (available upon request)* and shall be reviewed by CalRecycle's Contract Manager in consultation with one of CalRecycle's editors.

In addition, these documents and/or reports shall be printed double-sided on one hundred percent (100%) recycled-content paper. Specific pages containing full-color photographs or other ink-intensive graphics may be printed on photographic paper. The paper should identify the postconsumer recycled content of the paper (i.e., "printed on 100% postconsumer paper"). When applicable, the Contractor shall provide the contract manager with an electronic copy of the document and/or report for CalRecycle's uses. To the greatest extent possible, soy ink instead of petroleum-based inks should be used to print all documents

## **CONFERENCING PROVISION**

The Contractor shall take any and all steps necessary to make sure that the event is a model for future recycling, waste prevention, diversion, buy recycled, and waste management events.

### Paper Products:

All paper products used to fulfill the requirements of this contract (nametags, badges, letters, envelopes, brochures, etc.) must contain at least 30% postconsumer recycled content fiber.

### Re-usable Cups, Plates & Utensils:

To the greatest extent possible, use re-usable/washable utensils, dishes, tableware, etc., rather than single-use disposable products.

### Leftover Food/Beverages:

All leftover food and/or beverages associated with the event will be donated to an established food donation outlet. Arrangements for the donation must be made prior to the date of the event. CalRecycle staff will assist the Contractor in identifying these donation outlets, if needed.

### Recycling/Composting:

Arrangements must be made with the venue, sponsor, or by contract, to provide adequate collection bins for recyclables, organics (food waste) or biodegradable materials, and trash (non-recyclables). The bins should contain at least 30% post-consumer plastic. In addition, the Contractor shall work with the venue and/or sponsors to maximize diversion of the discarded materials.

### Soy-based Printing Ink:

To the greatest extent possible, soy ink instead of petroleum-based inks should be used to print all documents needed for the event.