

**Draft Scope of Work
2020 California Statewide Disposal-
Based Waste Characterization Study**

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Section VI Description of Work

Work to be Performed

This Contract is for waste characterization research. The research consists of three parts to be conducted concurrently:

- **Part 1.** A comprehensive statewide Disposal Facility-Based Waste Characterization Study to determine the statewide waste disposal composition;
- **Part 2.** A Multi-Family Generator-Based Waste Characterization Study to determine the disposed waste composition and disposal rate for multi-family residences; and
- **Part 3.** A Moisture Analysis Study to analyze moisture absorbed by specific paper types collected for Part 1 of the study.

This scope of work contains a description of the tasks required to successfully complete all three parts of this study. They are:

- For the **Disposal Facility-Based Waste Characterization Study** the Contractor shall complete Tasks 1-3.
- For the **Multi-Family Generator-Based Waste Characterization Study**, the Contractor shall complete Tasks 4-6.
- For the **Moisture Analysis Study of Paper Types**, the Contractor shall complete Tasks 7-9.
- In addition, the Contractor shall complete Tasks 10-11 (universal tasks for all 3 parts).

The Proposal shall provide a draft implementation plan for all three parts of the study that addresses how the Proposer shall accomplish each task and subtask. In addition, for each part of the study, the draft implementation plan shall address the following:

1. How the Contractor shall staff the project (roles, responsibilities, and numbers of staff and supervisors),
2. How the Contractor shall train staff,
3. A list of equipment for each part of the study,
4. A tentative timeline of work, including:
 - a. start-up tasks,
 - b. logistical arrangements,
 - c. training,
 - d. travel,
 - e. set-up,
 - f. sample collection/sorting/analysis (as applicable to each part),
 - g. data entry,
 - h. data quality control, and
 - i. delivery of final data sets to CalRecycle.
5. A thorough discussion of all proposed approaches, methodologies, and/or alternatives to achieve the goals of each part including:

- a. how, using statistics and any relevant data, the proposed number of hand-sort samples for Part 1 of the study, will accomplish the goals that section,
 - b. how representative samples for each part shall be selected and collected and not introduce bias,
 - c. how adequate sample weights shall be achieved,
 - d. how random samples shall be selected, along with strategies to collect samples from different types of trucks/vehicles, and identify specific methodologies for each part of the study, and
 - e. how the proposals for each part of the study shall result in representative data and shall achieve the goals of the study.
6. A discussion of contingency measures to deal with logistical, equipment (e.g. weighing scale malfunction), weather, or other problems encountered in the field, including refusal of cooperation by a generator or a sorting site, or other unforeseen circumstances; and
 7. The number of samples to be processed in each part of the study and an explanation of how the proposed number of samples in each part of the study shall result in representative data and shall achieve the goals of the study.
 8. A detailed photography plan that will allow CalRecycle to clearly visualize loads and samples of solid waste to be characterized in all parts of the study.

Special Considerations

A strong and comprehensive bid for the contract should address the following areas. These will be an important part of the scoring criteria and final selection process.

1. A detailed justification (e.g. prior experience, literature review, statistical analyses) for the number of hand-sort samples proposed by the Contractor, for Part 1 of the study, to be distributed amongst the four sectors below (final allocation of samples will be determined by the Contract Manager):
 - a. Residential
 - b. Commercial and Multi-family
 - c. Self-haul
 - d. Transfer Trucks
2. A clear statement acknowledging that a pre-determined number of visual sorts is not applicable in this study and should not be included in the Contractor's proposal. Loads to be sorted visually will be assessed, per special considerations outlined in this scope of work, as the study progresses.
3. Please note that the 50 samples required for Part 2, Multi-Family Generator-Based Waste Characterization Study, should not be included in the total number of samples proposed for Part 1 of the study.
4. In addition to the proposed number of samples for Part 1 and the 50 required samples for Part 2, the Contractor must show their estimation for the number of sampling days required to collect and sort/characterize those samples. As an

example, 720 sample and assuming 12 sample sorts per day would equate to 60 field days.

5. A proposal must pass ALL sections of the scoring criteria to be considered. If a proposal fails ANY section of the scoring criteria, their proposal will fail and not be considered any further.
6. The number of hand-sort samples and accompanying justification proposed for Part 1 of the study will be part of the scoring process.

Tasks Identified

PART 1: Disposal Facility-Based Waste Characterization Study (Tasks 1-3)

Task 1 – Initial Meeting to Review Disposal Facility-Based Study Implementation Plan

- A. This meeting shall coincide with the meetings required in Tasks 4 and 7.
- B. Within 10 calendar days after contract approval, the Contractor shall meet in-person with CalRecycle's Contract Manager (Contract Manager) at the CalRecycle office in Sacramento to identify logistical details and fine-tune the approaches in the following areas:
 - 1) The timeline and logistics for sampling.
 - 2) The potential sampling locations and sample allocations. CalRecycle reserves the right to update locations and allocations if necessary.
 - 3) The specific materials to be included. The Contract Manager will provide a final list of defined material types for hand-sorting and visual characterizations.
- C. Within 15 calendar days of meeting, the Contractor shall submit any proposed revisions to the plan based on the meeting.
- D. The Contract Manager will review the revised plan to ensure it accurately represents the agreed upon details and is consistent with both this RFP and the resulting Contract. The Contract Manager will respond within 15 calendar days with any needed final edits to the proposed revisions.
- E. The Contractor shall make required changes, if any, and submit to the Contract Manager within 15 calendar days of receiving the edits. Work shall not begin on Tasks 2 and 3 without the Contract Manager's written approval confirming that any proposed revisions or required changes have been made and are satisfactory.

Task 2 – Coordinate with Disposal Facilities and Determine Field Schedule

- A. SITE COORDINATION:
 - 1) Sampling Site List:

- a) At least 45 calendar days before each sampling period begins, the Contract Manager will provide the Contractor with the final list of sampling locations, the number of sampling days and samples to be hand-sorted at each site, and the proposed allocations to each source type at each site.
 - b) Within 10 calendar days, the Contractor shall inform the Contract Manager if additional information is needed.
 - c) If additional information is needed, the Contract Manager will provide it within 10 calendar days of receiving the request.
- 2) The Contractor shall promptly contact each site to establish contact and confirm logistics (e.g. sample collection date(s), health and safety requirements, and availability of a loader/skid steer loader and an equipment operator/driver).
- 3) The Contractor shall coordinate with the Contract Manager to minimize impacts to the field schedule and to request replacement sampling sites if needed.
- 4) When scheduling sampling activities at sites, the Contractor shall ensure accurate and representative sampling at each site by incorporating information on variations in site operations, waste flows, on-site processing/handling, and other relevant information.

B. FIELDWORK SUMMARY:

- 1) Tentative schedule:
 - a) At least 20 calendar days before each sampling period begins, the Contractor shall provide a tentative schedule for sampling site order.
 - b) The Contractor shall include an overall schedule for fieldwork, describing start-up tasks, travel, set-up, and sorting days, and confirm the number of samples at each site and from each source.
 - c) The Contract Manager will review the schedule within seven calendar days and identify any concerns.
 - d) The Contractor shall address any concerns within seven calendar days.

C. The Contractor shall be responsible for the final coordination and logistical arrangements with each site.

Task 3 – Perform Fieldwork-Field Sampling and Sorting at Disposal Facilities

- A. **SAMPLING PERIODS:** The Contractor shall conduct sampling during two, 4-month sampling periods, no less than two months apart. CalRecycle anticipates that the two seasons will span calendar year 2020 and early 2021.
- B. **VEHICLE SELECTION:** The Contractor shall select vehicles from which to collect samples to comply with the sample source sector allocations provided by the Contract Manager. The source sector allocations shall specify the number of samples to be taken from vehicles delivering single-family residential route loads, commercial/multi-family route loads, transfer truck loads, and self-haul loads. The

Contractor shall select vehicles from which to sample in a manner that is representative of the loads delivered to the sampling site and does not introduce bias.

- C. **VEHICLE DATA COLLECTION:** For each load sampled at a facility, the Contractor shall obtain and record:
- 1) A unique identification (ID) number for each sample taken.
 - 2) The date of collection.
 - 3) The name of the sampling site.
 - 4) Local weather conditions.
 - 5) Any notes or unusual circumstances.
 - 6) The jurisdiction (city or unincorporated county area) and county of origin.
 - 7) Vehicle type and the source sector: (1) single-family residential route load, (2) commercial/multi-family route load, (3) transfer truck loads, and (4) self-haul loads.
 - 8) For each commercial/multi-family load, the estimated percentage of multi-family waste.
 - 9) For each self-haul load, the subsector of origin: (1) residential, (2) general commercial/industrial, (3) construction and demolition, (4) roofing, (5) landscaper, (6) disaster debris, (7) designated waste, or (8) other (specify subsector).
 - 10) For each transfer truck, the total weight delivered, the name of the originating facility, the number of samples collected from the load, and any other pertinent information.
- D. **SAMPLE COLLECTION:** The Contractor shall collect samples of waste from selected vehicles at sampling sites. If a transfer station is substituted for a landfill, the Contractor shall collect samples only of materials destined for disposal after any processing.
- E. **SAMPLE WEIGHT:** The Contractor shall collect samples that weigh at least 200 pounds for each load sampled from all vehicle types. The Contract Manager shall reject each underweight sample and the Contractor shall substitute additional samples that meet the weight requirement. If a self-haul load weighs less than 200 pounds (as do many passenger carloads), the Contractor shall collect additional loads from the same class of vehicle and subsector of origin until the total weight exceeds 200 pounds. After combining these subsamples, the Contractor shall handle and count the aggregate as one sample. If submitted sample data is below the agreed upon weight, the samples shall not be accepted as fulfilling the terms of the contract, and the Contract Manager will have the discretion to withhold the payment for each underweight sample.
- F. **NUMBER OF SAMPLES PER LOAD:** The Contractor shall collect samples in a manner that is representative of the selected load and does not introduce bias.

- 1) The Contractor shall collect only one sample from each selected route truck or self-haul vehicle.
- 2) For each selected transfer truck, the Contractor shall collect two samples, each composed of three subsamples from distinct locations in the load.
- 3) If a transfer/processor is substituted for a landfill as a sampling site, the Contractor shall collect samples from route trucks and self-haul vehicles as identified in Task 3.F.1 above, and distinct samples from the tipping floor representative of waste outflows destined for disposal.

G. CHARACTERIZING THE MATERIAL:

- 1) HAND-SORTING: The Contractor shall hand-sort all samples, except as provided in subsection 2) below for visual characterizations.
 - a) The Contractor shall hand-sort samples of solid waste into individual material types on the finalized material list from Task 1.
 - b) The Contractor shall sort all materials with a particle size of 2 inches or larger. If it is practical to sort distinct, easily identifiable and sortable objects (such as plastic bottle caps) that are smaller than 2 inches, the Contractor shall do so. For materials smaller than 2 inches that are not distinct, easily identifiable and sortable objects, the Contractor shall classify this material as "mixed residue."
 - c) For material that is difficult to sort due to adhesion, wetness, or partial decomposition, the Contractor shall make their best judgement to categorize the material. If it is practical to separate joined materials (such as a zip lock bag with metal screws in it), the Contractor shall do so.
- 2) VISUAL CHARACTERIZATIONS: After a load is selected, the Contractor shall determine if hand-sorting is impractical and/or unsafe. In these cases, the Contractor shall document the reasons for the determination and conduct a visual estimation to characterize the entire load.
 - a) The Contractor shall be permitted to conduct a visual characterization only on loads that:
 - Are composed of no more than ten different, clearly distinct material types,
 - Do not contain bagged materials, and
 - Do not contain heterogeneous mixtures of materials.
 - b) The Contractor shall visually characterize the entire load, not just a 200-pound sample.
 - c) The Contractor shall characterize the material into the individual material types from the finalized material list in Task 1.
 - d) The Contractor shall have two staff independently conduct the visual characterization. These staff shall then discuss and agree on a final

characterization result that gives the percentage of each material in the entire load.

- e) The Contractor shall use volume-to-weight conversion factors to estimate the individual weights of each material type identified in the visual characterization. The Contractor shall provide the conversion factors to the Contract Manager for review and approval prior to conducting visual characterizations.
- f) The Contractor shall clearly identify each sample that is visually characterized to distinguish it from hand-sort data.
- g) The Contractor shall provide a narrative description for why a visual characterization was appropriate for each specific load.
- h) The Contract Manager will reject samples that do not meet the criteria for visual characterization as identified above and the Contractor shall substitute the rejected samples with additional samples that do meet the criteria. If the substituted samples do not meet the above criteria, the Contract Manager will have the discretion to withhold payment for each rejected sample, not to exceed the marginal sample cost for this task.

3) IMPACT OF VISUAL CHARACTERIZATIONS ON OVERALL SAMPLE NUMBERS:

- a) When used as described above, a visual characterization may substitute for a hand-sort. However, visual characterizations are substantially faster and cheaper than hand-sorts. The Contractor shall substitute a hand-sort sample with visual characterizations, but there shall be five visual characterizations assessed for each hand-sort that is substituted/removed. The Contractor shall evaluate each sample-by-sample case whether a load is appropriate for hand-sort or visual characterization.
- b) If the Contractor does not conform to the requirements for visual characterizations, the Contract Manager may place a cap on the number of visual characterizations or prohibit additional visual characterization.

H. DIGITAL IMAGES: The Contractor shall provide a photography plan that will address the specifications described below:

- 1) When taking digital images of each load/sample, the Contractor shall place a placard on, adjacent, or near the load/sample clearly identifying the unique load/sample ID number, location, and date. The Contractor shall name each digital image file so it correlates to the unique load/sample ID. The Contractor shall provide images with a minimum resolution of 12-megapixels. If the digital image requirements are not met as previously described, such as, but not limited to, blurry images, the load is not clearly identified, and/or improper file naming, the digital images shall not be accepted as fulfilling the contract, and the Contract Manager will have the discretion to withhold payment for each mishandled sample.

2) SAMPLE SELECTION IMAGES:

- a) For each selected route truck, self-haul vehicle and transfer truck, the Contractor shall take image(s) that clearly allow for visualization of the entire waste load, after being dumped by the truck/vehicle and before removal of waste sample.

3) CHARACTERIZATION IMAGES:

- a) For hand-sorts, the Contractor shall meet the following specific photography requirements in their plan:
 - i. At least 2 images taken from different angles of the waste sample that clearly shows the entire content of the waste sample. If needed, the Contractor shall break open garbage bags and/or spread out the sample to obtain adequate digital images. If digital images are submitted and garbage bags are not broken open and/or the sample is not spread out to adequately show the contents of the sample, the Contract Manager will have the discretion to withhold payment for each unsatisfactory digital image.
- b) For visual characterizations, the Contractor shall take the following digital images of the waste load to demonstrate the visual characterization criteria are met:
 - i. The Contractor shall take image(s) that clearly allow for visualization of the entire waste load, after being dumped by the truck/vehicle and before removal of waste sample. This is critical for allowing the Contract Manager to assess if the selected load qualified for visual characterization.
 - ii. At least 2 images of the waste load that clearly shows the entire content of the load. If needed, the Contractor shall break open garbage bags and/or spread out the load to obtain adequate digital images. If digital images are submitted and garbage bags are not broken open and/or the load is not spread out to adequately show the contents of the load, the Contract Manager will have the discretion to withhold payment for each unsatisfactory digital image. If an image is not in focus/clear or lacks to show the entire content of the load, then it cannot be confirmed if the load has qualified for a visual characterization. In this case, the sample cannot be counted, and the Contractor must re-sample accordingly. The Contract Manager will have 7 calendar days to review the previous weeks visual characterization pictures, if any, and determine if any samples need to be re-collected. If the Contractor has left the area and re-sampling at the same site is no longer logistically feasible, the Contract Manager, in consultation with the Contractor, will decide how to re-allocate that sample.

- 4) SORTED MATERIAL TYPES IMAGES: For each remainder composite category and mixed residue (a total of 10 material types), the Contractor shall take a digital image showing the individual items in sorted material types (i.e., a picture of the contents spread out on the ground) from 10 distinct samples each. The Contractor shall take digital images on different sample days.
- I. DATA COLLECTION: The Contractor shall record all characterization data for each sample:
 - 1) For hand-sorts, the weight of each sorted material type and total sample weight shall be recorded. The Contractor shall use a scale that is accurate to within 0.01 pounds and is connected to a computer to record weights. The Contractor shall record weights in decimal pounds.
 - 2) For visual characterizations, the percentage of each material in the entire load and the tare weight of the entire load. The Contractor shall report percentages to the nearest percent. The Contractor shall record weights in decimal pounds and provide all volume-to-weight conversion factors used.
- J. QUALITY CONTROL: The Contractor shall implement quality assurance and quality control (QA/QC) measures in the field to ensure the accuracy of the data collected.
- K. HEALTH AND SAFETY: The Contractor shall have a health and safety plan, implement health and safety measures, conduct training and monitor effectiveness. The Contractor shall comply with all local, state, and federal health and safety codes, regulations, and laws.
- L. EQUIPMENT: The Contractor shall provide all equipment needed for fieldwork, including health and safety equipment. During the initial site recruitment, CalRecycle will determine if a loader/skid steer loader and an equipment operator/driver are available on-site. If a loader/ skid steer loader or similar equipment and an equipment operator/driver are not available, the Contractor shall arrange to rent a loader/ skid steer loader or similar equipment and provide a certified/trained operator/driver.
- M. FIELD OBSERVATIONS: The Contractor shall accommodate observation by the Contract Manager, other CalRecycle staff, and possibly other interested parties, at the sampling sites.

CalRecycle Responsibilities regarding Part 1:

- A. CalRecycle will determine how the samples (total number to be proposed by the Contractor) shall be distributed between facilities, sources, and sampling periods. CalRecycle will use preliminary in-house data to suggest possible sample allocation. This will be discussed and finalized during the initial meetings between the Contract Manager and the Contractor.
- B. CalRecycle will set two distinct 4 months sampling periods in 2020 and mid-2021, separated by not less than two months. The specific dates of the sampling periods will be finalized based on the date of contract execution.

- C. CalRecycle will allocate approximately half of the samples to each sampling period. The number of samples and sampling days will be based on the total number of samples proposed by the Contractor.
- D. Subject to logistics and recruitment success, CalRecycle will recruit 35-45 sampling sites. CalRecycle will roughly allocate the number of samples to facilities based on their level of disposal.
- E. To gather data representative of California's waste stream, CalRecycle will attempt to recruit the largest landfills in California (Table 1. Largest landfills in California) as sampling sites. CalRecycle will attempt to recruit sites that accept approximately 75 percent of statewide disposal.

Table 1. Largest landfills in California in descending order of percentage waste disposed in 2018

Name	SWIS	County	% of CA waste disposed in 2018
El Sobrante Landfill	33-AA-0217	Riverside	8.47%
Frank R. Bowerman Sanitary LF	30-AB-0360	Orange	5.92%
Olinda Alpha Landfill	30-AB-0035	Orange	5.35%
Sunshine Canyon City/County Landfill	19-AA-2000	Los Angeles	5.28%
Chiquita Canyon Sanitary Landfill	19-AA-0052	Los Angeles	3.83%
Otay Landfill	37-AA-0010	San Diego	3.47%
Simi Valley Landfill & Recycling Center	56-AA-0007	Ventura	3.19%
Mid-Valley Sanitary Landfill	36-AA-0055	San Bernardino	2.82%
Altamont Landfill & Resource Recovery	01-AA-0009	Alameda	2.46%
Sycamore Landfill	37-AA-0023	San Diego	2.38%
Potrero Hills Landfill	48-AA-0075	Solano	2.34%
West Miramar Sanitary Landfill	37-AA-0020	San Diego	2.30%
Central Disposal Site	49-AA-0001	Sonoma	2.27%
Badlands Sanitary Landfill	33-AA-0006	Riverside	2.23%
Sacramento County Landfill (Kiefer)	34-AA-0001	Sacramento	2.15%
Forward Landfill, Inc.	39-AA-0015	San Joaquin	2.14%
Keller Canyon Landfill	07-AA-0032	Contra Costa	2.03%
Recology Hay Road	48-AA-0002	Solano	1.79%
Monterey Peninsula Landfill	27-AA-0010	Monterey	1.63%
Toland Road Landfill	56-AA-0005	Ventura	1.57%
American Avenue Disposal Site	10-AA-0009	Fresno	1.51%
Lamb Canyon Sanitary Landfill	33-AA-0007	Riverside	1.49%
Corinda Los Trancos Landfill (Ox Mtn)	41-AA-0002	San Mateo	1.46%
Newby Island Sanitary Landfill	43-AN-0003	Santa Clara	1.38%
Prima Deshecha Landfill	30-AB-0019	Orange	1.36%
Anderson Landfill, Inc.	45-AA-0020	Shasta	1.29%
Antelope Valley Public Landfill	19-AA-5624	Los Angeles	1.29%

Bakersfield Metropolitan (Bena) SLF	15-AA-0273	Kern	1.16%
Scholl Canyon Landfill	19-AA-0012	Los Angeles	1.01%
Redwood Landfill	21-AA-0001	Marin	0.90%
Azusa Land Reclamation Co. Landfill	19-AA-0013	Los Angeles	0.90%
H.M. Holloway Inc.	15-AA-0308	Kern	0.89%
Visalia Disposal Site	54-AA-0009	Tulare	0.81%
Highway 59 Landfill	24-AA-0001	Merced	0.80%
Calabasas Landfill	19-AA-0056	Los Angeles	0.80%

- F. CalRecycle will attempt to select only landfills as sampling sites for the collection and sorting of waste. If a selected landfill does not participate, CalRecycle will attempt to recruit the next largest landfill(s) and/or large transfer station(s) that send waste to the original landfill. CalRecycle may substitute landfills or transfer stations as needed. CalRecycle will provide a preliminary list of potential sites to the Contractor prior to the meeting identified in Task 1. Additional information on potential facilities can be found at:
<https://www2.calrecycle.ca.gov/SWFacilities/Directory/>
- G. To gather data representative of California's waste stream, CalRecycle will recruit sites throughout the State. Most sites will likely be located near large urban areas, with very few sites in rural areas.
- H. To stratify by source, CalRecycle will allocate the samples proportionally to approximate the statewide contribution of each source to the overall waste stream. For each sampling site, CalRecycle will identify how many samples of waste destined for disposal will be taken from each source: vehicles delivering single-family residential route loads, commercial/multi-family route loads, transfer truck loads, and self-haul loads.
- I. CalRecycle will determine the material types for hand-sorting and visual characterizations. CalRecycle does not anticipate any alterations to the list of material types (Table 2. 2020 Material Type List). However, The Contract Manager strongly encourages feedback about the material types from the Contractor and may change the material type list accordingly.
- J. CalRecycle will conduct analyses of the data and prepare any final reports.

Table 2. 2020 Material List and Definitions by Category

(Note: This list is still being finalized and will become final before official advertisement of the Request for Proposal)

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PART 2: Multi-Family Generator-Based Waste Characterization Study (Tasks 4-6)

Task 4 – Initial Meeting to Review Multi-Family Generator Study Implementation Plan

- A. This meeting shall coincide with the meetings required in Tasks 1 and 7.
- B. Within 10 calendar days after contract approval, the Contractor shall meet in-person with the Contract Manager at the CalRecycle office in Sacramento, to identify logistical details and fine-tune the approaches in the following areas:
 - 1) The timeline and logistics for sampling.
 - 2) The potential sampling nodes and sampling logistics.
 - 3) The specific materials to be included – identical to Part 1.
- C. Within 15 calendar days of meeting, the Contractor shall submit any proposed revisions to the plan based on the meeting.
- D. The Contract Manager will review this submittal to ensure it accurately represents the agreed upon details and is consistent with both this RFP and the resulting Contract. The Contract Manager will respond within 15 calendar days with any needed final edits to the proposed revisions.
- E. The Contractor shall make required changes, if any, and submit to the Contract Manager within 15 calendar days of receiving the edits. Work shall not begin on Tasks 5 and 6 without the Contract Manager's written approval confirming that any proposed revisions or required changes have been made and are satisfactory.

Task 5 – Coordinate with Multi-Family Residences and Determine Field Schedule

A. SITE COORDINATION

- 1) Multi-Family Residences Site List:
 - a) At least 45 calendar days before each sampling period begins, the Contract Manager will provide the Contractor with the final list of recruited multi-family residences and the pertinent logistical information to facilitate sample collection from each multi-family residence.
 - b) Within 10 calendar days, the Contractor shall inform the Contract Manager if additional information is needed.
 - c) If additional information is needed, the Contract Manager will provide it within 10 calendar days of receiving the request.
- 2) The Contractor shall contact each site, as appropriate, to establish contact and confirm logistics.
- 3) The Contractor shall coordinate with the Contract Manager to minimize impacts to the field schedule and to request replacement multi-family residences if needed.
- 4) When scheduling sampling activities at multi-family residences, the Contractor shall ensure accurate and representative sampling by incorporating information on variations in waste storage, on-site processing/handling, and other relevant information.

B. FIELDWORK SUMMARY:

- 1) Tentative schedule:
 - a) At least 20 calendar days before each sampling period begins, the Contractor shall provide a tentative schedule for multi-family sampling.
 - b) The Contractor shall include an overall schedule for fieldwork, travel, and sample collection, as well as confirm the number of multi-family residences to be sampled and the nodes to be used for sorting (if applicable).
- 2) The Contract Manager will review the schedule within 7 calendar days and identify any concerns.
- 3) The Contractor shall address any concerns within 7 calendar days.
- 4) The Contractor shall be responsible for the final coordination and logistical arrangements with each multi-family residence.

Task 6 – Perform Fieldwork-Field Sampling and Sorting from Multi-Family Residences

- A. **SAMPLING PERIODS:** The Contractor shall use the same two sampling periods as stated in Part 1, Task 2.
- B. **SAMPLE COLLECTION:** The Contractor shall collect multi-family samples at the site of generation (e.g. apartment buildings) from waste destined for disposal.
 - 1) **MULTIPLE BINS:** If there are multiple bins, the Contractor shall take subsamples from the bins to be representative of waste on-site and combine the subsamples into one representative sample.
 - 2) **SAMPLE WEIGHT:** The Contractor shall collect samples that weigh at least 200 pounds. If a multi-family residence has less than 200 pounds of waste to sample, the Contractor shall collect additional waste on subsequent days until the total weight exceeds 200 pounds. After combining these subsamples, the Contractor shall handle and count the aggregate as one sample. The Contract Manager shall reject each underweight sample and the Contractor shall substitute additional samples that meet the weight requirement. If submitted sample data is below the agreed upon weight, the samples shall not be accepted as fulfilling the contract, and the Contract Manager shall have the discretion to withhold payment for each underweight sample.
 - 3) **SAMPLE VOLUME:** The Contractor shall determine the combined bin volume of the waste bins on-site and estimate total volume of all on-site waste at the time of collection. The Contractor shall estimate the in-place sample volume at the time of collection.
- C. **HAND-SORTING THE MATERIAL:** The Contractor shall hand-sort all multi-family samples.
 - 1) The Contractor shall hand-sort samples of solid waste into individual material types on the finalized material list from Task 1.
 - 2) The Contractor shall sort all materials with a particle size of 2 inches or larger. If it is practical to sort distinct, easily identifiable objects (such as plastic bottle caps) that are smaller than 2 inches, the Contractor shall do so. For materials smaller than 2 inches

that are not distinct, easily identifiable and sortable objects, the Contactor shall classify this material as “mixed residue.”

- 3) For material that is difficult-to-sort due to adhesion, wetness, or partial decomposition, the Contractor shall make their best judgement to categorize the material. If it is practical to separate joined materials (such as a zip lock bag with metal screws in it), the Contractor shall do so.

D. DIGITAL IMAGES: The Contractor shall follow their same photography plan as Task 3H, while meeting the specifications outlined below:

- 1) When taking a digital image of each bin/sample, the Contractor shall place a placard on, adjacent, or near the bin/sample clearly identifying the unique sample ID number, location, and date. The Contractor shall name each digital image file so it correlates to the unique bin/sample ID. The Contractor shall provide images with a minimum resolution of 12-megapixels. If the digital image requirements are not met as previously described, such as, but not limited to, blurry images, the load is not clearly identified, and/or improper file naming, the digital images shall not be accepted as fulfilling the contract, and the Contract Manager shall have the discretion to withhold payment for each mishandled sample.
- 2) For each multi-family sample, the Contractor shall take:
 - a) Image(s) that clearly allow for visualization of the contents in the entire waste bin, before removal of waste sample.
 - b) At least 2 images of the waste sample that clearly shows the content of the waste sample. If needed, the Contractor shall break open garbage bags and/or spread out the sample to obtain adequate digital images. If digital images are submitted and garbage bags are not broken open and/or the sample is not spread out to adequately show the contents of the sample, the Contract Manager will have the discretion to withhold payment for each unsatisfactory digital image.

E. DATA COLLECTION:

- 1) The Contractor shall collect the following information at each multi-family residence:
 - a) The sample weight and volume,
 - b) Confirmation of number and size (volume) of waste bins at the site,
 - c) Collection frequency for the bins,
 - d) Total volume of waste in disposal bin at sample collection,
 - e) Sample collection and bin observations on whether it was an appropriate day to obtain representative data on volumes,
 - f) Accurate accumulation time of waste or rate of accumulation (cubic yards/hours of bin accessibility) and raw data for accumulation time calculations,
 - g) Confirmation of number of occupied units and corresponding unit size (number of bedrooms/unit) and
 - h) Other pertinent information.

- 2) The Contractor shall assign a unique ID number to each sample, and record the date of collection, name and location of the multi-family residence including jurisdiction (city or unincorporated county) and county.
 - 3) The Contractor shall record the weight of each sorted material type and total sample weight. The Contractor shall use a scale that is accurate to within 0.01 pounds and is connected to a computer to record weights. The Contractor shall record weights in decimal pounds.
- F. **QUALITY CONTROL:** The Contractor shall implement QA/QC measures in the field to ensure the accuracy of the data collected.
 - G. **HEALTH AND SAFETY:** The Contractor shall have a health and safety plan, implement health and safety measures, conduct training and monitor effectiveness. The Contractor shall comply with all local, state, and federal health and safety codes, regulations, and laws.
 - H. **EQUIPMENT:** The Contractor shall provide all equipment needed for fieldwork, including health and safety equipment.
 - I. **FIELD OBSERVATIONS:** The Contractor shall accommodate observation by the Contract Manager, CalRecycle staff, and possibly other interested parties, during the collection of samples at multi-family residences.

CalRecycle Responsibilities regarding Part 2:

- A. CalRecycle will recruit the multi-family residences to be sampled and provide logistical information needed for sample collection (e.g. contact person, number and location of bins, pick-up day). A multi-family residence is defined as a building or complex consisting of 5 or more dwelling units.
- B. CalRecycle will allocate approximately half of the multi-family samples (50 samples total) to each sampling period established in Part 1. At the minimum number of samples, this equates to 25 multi-family samples per sampling period.
- C. At a minimum, CalRecycle will recruit 50 multi-family residences distributed throughout the state based on proximity to the selected sampling sites (nodes) in Part 1. The Contractor shall transport the multi-family samples to these nodes where the sorting shall occur.
- D. CalRecycle will select disposal sampling sites in Part 1 and designate them as sampling nodes for the multi-family study. CalRecycle will attempt to recruit all multi-family residences from within 10 miles of each node and will not recruit a residence further than 30 miles from the node.
- E. CalRecycle will provide the material type list to be used (same as in Part 1).
- F. CalRecycle will conduct analyses of the data and prepare any final reports.

PART 3: Moisture Analysis Study of Specified Paper Types (Tasks 7-9)

CalRecycle is interested in gathering preliminary information on the cost and logistics of carrying out a contamination study. To accomplish this, CalRecycle needs to perform a pilot study and will require the Contractor to design and conduct a Moisture Analysis Study to measure moisture

content of specified paper types (listed in Table 3) during the sampling period compared to weight of the same materials after moisture removal. To achieve this, CalRecycle requires:

1. The Moisture Analysis Study be planned and completed in such a way to capture sample differences in moist and dry climates around the state.
2. Only measure moisture content.
3. Only measure moisture content in the specific paper types listed in Table 3.

CalRecycle has budgeted \$37,000 for this part of the study. The Contractor will take the budget and the specific details above to design and conduct a Moisture Analysis Study plan that includes:

- Number of samples per paper type (Table 3).
- Transport of the required material types to the location of analysis.
- Securing the appropriate location to do the analysis. Pest, such as rodents, can be a big problem in these cases. The Contractor shall secure a location free of potential pest infestation, and
- Logistics of the analysis.

Task 7 – Initial Meeting to Review Moisture Analysis Study Plan. This meeting shall coincide with the meetings required in Tasks 1 and 4.

- A. Within 10 calendar days after contract approval, the Contractor shall meet in-person with the Contract Manager at the CalRecycle office in Sacramento to identify logistical details and fine-tune the approaches in the Moisture Analysis Study plan in the following areas:
 - 1) The timeline and logistics for sample collection and analyses.
 - 2) The locations and methods to be used for the Moisture Analysis Study.
 - 3) The specific materials to be included in the Moisture Analysis Study.
- B. Within 15 calendar days of meeting, the Contractor shall submit any proposed revisions to the plan based on the meeting.
- C. The Contract Manager will review this submittal to ensure it accurately represents the agreed upon details, is consistent with both this RFP and the resulting Contract. The Contract Manager will respond within 15 calendar days with any needed final edits to the proposed revisions.
- D. The Contractor shall make required changes, if any, and submit to the Contract Manager within 15 calendar days of receiving the edits. Work shall not begin on Tasks 8 and 9 without the Contract Manager's written approval confirming that any proposed revisions or required changes have been made and are satisfactory.

Task 8 – Determine Moisture Analysis Study Field Schedule

A. Sampling Sectors:

- 1) At least 45 calendar days before each sampling period begins, the Contract Manager will provide the Contractor with the final number of samples to collect from each

source/sector for the moisture analysis at each site. This will be based on total samples per material type proposed in the Contractors Moisture Analysis Study Plan.

- 2) Within 10 calendar days, the Contractor shall inform the Contract Manager if additional information is needed.
 - 3) If additional information is needed, the Contract Manager will provide it within 10 calendar days of receiving the request.
- B. At least 20 calendar days before each sampling period, as an addition to the tentative schedule in Task 2.B (which covers the sorting), the Contractor shall provide an overall schedule for sample collection, handling, transport and analysis. The review process and timeline shall be the same as Task 2.B.
- C. The Contractor shall be responsible for the final coordination and logistical arrangements with each site and/or off-site location used for the analyses.

Task 9 – Perform Fieldwork - Conduct Moisture Analysis Study

- A. **SAMPLING PERIODS:** The Contractor shall use the same two sampling periods as in Part 1.
- B. **SAMPLING DAYS:** The Contractor shall gather the material needed for the Moisture Analysis Study on the number of sampling days discussed, selected and agreed upon by the Contract Manager and the Contractor.
- C. **SELECTED MATERIALS:** The Contractor shall gather the selected materials as specified by CalRecycle in Task 7 (see Table 3. Moisture Analysis Material List for the preliminary list).
- D. **SAMPLE COLLECTION:** The Contractor shall collect the selected materials from the sorted materials after they have been weighed and recorded in Part 1. The Contractor shall create one composite sample for each selected material type set from all hand-sorted material on each specified sampling day as agreed upon by the Contract Manager and the Contractor.
- E. **SAMPLE WEIGHTS:** The Contractor shall aggregate material by type until:
- 1) The composite sample for the material type weighs at least 20 pounds, or
 - 2) The end of the sampling day is reached regardless of if the composite sample weighs less than 20 pounds.
- For example, the composite sample of uncoated corrugated cardboard is achieved by aggregating sorted uncoated corrugated cardboard from Task 3 on a given sort day by either collecting up to 20 pounds of the material or by reaching the end of the day, whichever occurs first.
- F. **SAMPLE HANDLING AND STORAGE:** The Contractor shall start the Moisture Analysis Study within one week of the samples being collected to prevent further sample changes and degradation.
- G. **SAMPLE TRACKING:** The Contractor shall assign a new unique sample ID number to each composite sample and associate it with the corresponding unique original sample ID numbers and sectors that contributed to the composite sample, and composite sample weight.

H. SAMPLE ANALYSIS AND STANDARDS:

1) Measure Moisture Absorption by Various Paper Types

- a) The Contractor shall conduct this subtask in the field at the corresponding sampling site or at another location proposed by the Contractor.
- b) The Contractor shall, prior to analysis, record composite sample weight and corresponding composite sample ID number.
- c) The Contractor shall remove moisture from the composite samples at an appropriate location.
- d) The Contractor may air dry the composite samples using a drying method such as a desiccator containing a charged drying agent, an electronic dehumidifier, or a dry heat source. As part of its bid, the Contractor may propose other drying methods to meet the standards and objectives of this task.
- e) The Contractor shall continue the drying process until samples reach equilibrium. Equilibrium has been reached when the weight of the sample does not decrease by more than 1 percent. The Contractor may propose their own sample measurement scheme. As an example, the Contractor could weigh the composite samples, dry for at least four hours and weigh the composite sample again. At that point the Contractor may use the last weight as the final sample weight.
- f) The Contractor shall record composite sample weights and corresponding composite sample ID number.

I. DIGITAL IMAGES:

- 1) When taking a digital image of each composite sample, the Contractor shall place a placard on, adjacent, or near the sample clearly identifying the unique sample ID number, location, and date. The Contractor shall name each digital image file so it correlates to the unique composite sample ID. The Contractor shall provide images with a minimum resolution of 12-megapixels. If the digital image requirements are not met as previously described, such as, but not limited to, blurry images, the composite sample is not clearly identified, and/or improper file naming, the digital images shall not be accepted as fulfilling the contract, and the Contract Manager will have the discretion to withhold payment for each mishandled sample.
- 2) For each composite sample, the Contractor shall take:
 - a) One image that will allow for clear visualization of the entire composite sample, for each sample, before processing.
 - b) One image that will allow for clear visualization of the entire composite sample, for each sample, after processing to remove moisture.

J. DATA COLLECTION: For before and after weights, the Contractor shall measure and record the weight of each composite sample (by material type) using a scale that is accurate to within 0.01 pounds and is connected to a computer to record weights. The Contractor shall record weights in decimal pounds.

K. QUALITY CONTROL: The Contractor shall implement QA/QC measures to ensure the accuracy of the data collected.

- J. **HEALTH AND SAFETY:** The Contractor shall have a health and safety plan, implement health and safety measures, conduct training and monitor effectiveness. The Contractor shall comply with all local, state, and federal health and safety codes, regulations, and laws.
- L. **EQUIPMENT:** The Contractor shall provide all equipment needed for the analysis, including health and safety equipment.
- M. **FIELD OBSERVATIONS:** The Contractor shall accommodate observation by the Contract Manager, CalRecycle staff, and possibly other interested parties, during the collection of composite samples and of the locations/facilities used for the analyses.

Table 3. Moisture Analysis Material List

(Note: This list is still being finalized and will become final before official advertisement of the Request for Proposal)

Paper Categories

	Paper - Category # from Material List and Selected Material Types
1	<ul style="list-style-type: none"> • P1-Uncoated Corrugated Cardboard
2	<ul style="list-style-type: none"> • P2-Coated Corrugated Cardboard
3	<ul style="list-style-type: none"> • P3-Paper Grocery Bags; • P4-Other Paper Bags/Kraft Paper; • P10-Miscellaneous Paper Packaging
4	<ul style="list-style-type: none"> • P5-Newspapers/ Newspaper Inserts
5	<ul style="list-style-type: none"> • P6-White Office-type Paper and Mail
6	<ul style="list-style-type: none"> • P7-Magazine and Catalogs
7	<ul style="list-style-type: none"> • P8-Folding Cartons and Other Paperboard Packaging
8	<ul style="list-style-type: none"> • P13-Compostable Paper—Packaging
9	<ul style="list-style-type: none"> • P14-Compostable Paper—Non-packaging
10	<ul style="list-style-type: none"> • P15-Remainder/ Composite Paper

CalRecycle Responsibilities regarding Part 3:

- A. Table 3 is the final list of material types for use in the moisture analysis. The materials are a subset of those identified in Task 1. The Contractor shall already be sorting the material into the selected materials as part of Task 3.
- B. CalRecycle will allocate approximately half of the total (total sample number to be proposed by the Contractor) moisture analysis composite samples to each sampling period established in Part 1. A composite sample is the combined materials of each specific type identified in Table 3-Moisture Analysis Material List from all samples sorted from Task 3 on a designated sampling day.
- C. The Contract Manager and the Contractor will agree upon which Part 1 sampling sites shall be used to collect the already sorted materials for the Moisture Analysis, and the sampling days on which materials are to be collected.

UNIVERSAL TASKS for Parts 1, 2, and 3 (Tasks 10-11)

Task 10 – Data Entry and Data QA/QC

- A. At least 30 calendar days prior to the first sampling period, the Contractor shall submit sample printouts displaying database and/or spreadsheet format to the Contract Manager for approval.
- B. The Contractor shall implement QA/QC measures when providing field-sorting data for each sorted sample (weight of each material type in the sample) and total sample weight for the Disposal Facility-Based study, the Multi-Family Generator-Based study, and the Moisture Analysis Study.
- C. The Contractor shall perform all data entry and follow all quality control measures in their plan to ensure the accuracy of the data entered. The Contractor shall resolve any errors or discrepancies in data discovered during quality control activities and/or review by the Contract Manager.
- D. The Contractor shall enter all data collected into electronic spreadsheets (e.g. Microsoft Excel) compatible with CalRecycle's computer system. The Contract Manager will approve the format and software. Upon contract approval, the Contract Manager shall provide the Contractor with a sample format for data submission. The Contractor shall submit all final data to CalRecycle in electronic form (e.g. via e-mail or uploaded to a secure shared drive).
- E. The Contractor shall present and submit the data as follows: sample IDs in rows and collected data in columns. The Contractor shall submit complete data for each sample, including, at a minimum: (1) unique sample ID number, (2) name of facility/site sample was collected from, (3) date of collection, (4) total disposal sample weight, (5) weight of each disposal component in the sample by material type, (6) data used to calculate waste amounts, (7) truck/vehicle type, (8) sector and subsector for self-haul, (9) jurisdiction of origin (city or unincorporated county area) or facility of origin (for transfer trucks), (10) county of origin, (11) weather conditions on the day of collection, (12) for commercial/multi-family route loads: estimated percentage of multi-family waste, (13) for transfer trucks: name of originating facility, (14) for transfer trucks: total weight of load delivered, (15) weight of material type #1, (16) weight of material type #2-etc., (17) any notes on special circumstance or other information, as applicable, and (18) all digital images. If visual characterizations are conducted, the data needs to clearly distinguish between hand-sorts and visual characterizations and provide justification for visual characterization by sample. Additional data to be submitted for the Multi-Family Generator-Based Study is identified in Task 6 and for the Moisture Analysis Study is identified in Task 9.
- F. The Contractor shall submit final and correct data, after the Contractor has thoroughly reviewed and subjected the data to stringent QA/QC procedures.
- G. The Contractor shall submit all data required for the three parts of the study at least 45 days before the end of the contract. This will allow enough time for the Contract Manager to review the data and correspond with the Contractor regarding any issues.
- H. The Contract Manager will have 30 calendar days to review the submitted data to ensure it is complete, understandable, and usable for subsequent analyses. The Contractor shall respond to any questions and address any problems or discrepancies found by the Contract Manager within 15 calendar days.

Task 11 – Submit Field Data and Summary Reports to CalRecycle

- A. During the sample collection periods, the Contractor shall provide weekly status reports in a format provided by CalRecycle (see Sample Report). The Contractor may propose an alternative format to the weekly report that meets the standards and objectives of the report and subject to the prior approval of the Contract Manager. The reports shall include project statuses including progress made, work done and work pending, any deviation from the plan and a detailed explanation for the deviation. When appropriate, these reports shall also include meeting minutes.
- B. Outside the sample collection periods, the Contractor shall provide monthly status reports, but may do so more frequently.
- C. During field sampling operations, the Contractor shall prepare and submit to the Contract Manager weekly reports containing the following:
 - 1) Final schedule/sampling plan for the upcoming week for disposal sites, multi-family residences, and, as applicable, moisture analysis.
 - 2) Summary of sampling completed during the previous week, including numbers of samples characterized and names of sites from which samples were collected for each sector and/or subsector.
 - 3) Copies of all paper field sheets (if any) and digital images taken for the previous week's work.
 - 4) Reports of any problems, contingency measures taken, or significant findings encountered.
 - 5) Recommendations for adjustments to field procedures, site selection, or general study parameters, if needed.
 - 6) Electronic files that contain the data collected from the previous week.
- D. Not more than 20 calendar days after the completion of data collection for Tasks 3, 6, and 9, the Contractor shall notify the Contract Manager if there are any changes or corrections to the data.
- E. Not more than 25 calendar days after the end of the first and second field periods, the Contractor shall prepare and submit to the Contract Manager a report summarizing information on all samples completed including the following:
 - 1) The total number of samples collected and characterized,
 - 2) For each sample, corresponding site names from which the samples were obtained,
 - 3) For each sample, the sector and/or subsector,
 - 4) A description and explanation of any differences between the final sampling plan and the actual field sampling performed, and
 - 5) A description of any unusual circumstances.

SAMPLE REPORT

Project Name:
Project Status Reporting Period: <i>From:</i> _____ <i>To:</i> _____
Project Manager:
Report Prepared By:
Weekly Project Summary: <i>Enter a brief summary of the project status, noting any key issues for the week. Comment on major deliverables completed; milestones reached and percent complete.</i>

Current Task Summary

Task or Deliverable	Scheduled Completion Date	Actual Completion Date	Issues? If yes, explain
<i>Example: Sample Task 1</i>	<i>31 March 2020</i>	<i>1 April 2020</i>	<i>No issues for Sample Task 1</i>

Accomplished this week
<u>Sites and samples</u>
<u>Hand-Sorting:</u> <i>Indicate number of hand-sorts completed per sector (and subsector), at which sites and day(s) and provide required attachments such as photos or site details</i>
<u>Visual Characterization:</u> <i>Indicate number of visual characterizations completed per sector (and subsector), at which sites and day(s); also provide narrative description(s) per Task 3 and provide required attachments such as photos or site details.</i>
<u>Attachments provided? (Such as copies of paper field sheets (if any), digital images, electronic files that contain data from the previous week)</u> Yes/No <i>If no, provide a reasonable explanation and a date when the attachments will be submitted.</i>
<u>Other items such as problems, contingency measures taken, significant findings encountered, recommendations:</u>

Weekly look ahead - Planned/Scheduled Completion in Next Two Weeks
<u>What sites and how many days per site?</u>
<u>Sample Plan (Confirm the Plan Provided by CalRecycle)</u>
<u>Deliverables Due:</u>
<u>Other items, concerns, issues:</u>