

Attachment 1

Department of Resources Recycling & Recovery

SCOPE OF WORK

Evaluation of Engineering Properties for Tire-Derived Aggregate Use in Civil Engineering Applications Contract

I. INTRODUCTION/OBJECTIVES

The objectives of this project are as follows:

- Determine the relevant engineering properties and operational characteristics of Type A Tire Derived Aggregate (TDA) used as a septic tank leachfield drainage media.
- Determine the relationship between fill depth and the internal temperature of Type A TDA exposed to air, to help determine the safety of using TDA in deep open shafts for stormwater treatment.
- Determine the porosity and compressibility of Type A and Type B TDA under compressive loads (i.e., at load conditions including those found in shallow soil covers, such as in a leachfield, and under deep soil covers such as in landfills).

II. WORK TO BE PERFORMED

Work to be performed under this contract involves the evaluation of designated engineering properties of TDA for use in civil engineering projects, the preparation of a report on the findings of each evaluation, and if required presentation(s) of the findings. Where warranted, the information obtained will help promote the use of TDA in civil engineering applications currently under- utilized in California, such as septic systems, storm water retention basins and landfills. The first primary task will evaluate TDA as a drainage media in a septic tank leachfield application. The second primary task will determine the heating properties of TDA in a 20 foot column when one end is exposed to the atmosphere. The third primary task will determine the porosity and compressibility of TDA

III. TASKS IDENTIFIED

Task 1 – Workplan:

The contractor shall develop a Work Plan which will include sufficient detail for design/construction, sampling/data collection, and data analysis/reporting for the three tasks below. The Work Plan shall be approved in writing by the Contract Manager prior to implementation.

Task 2 - TDA Septic Tank Leachfield

Task 2a - Design considerations when using TDA for septic tank leachfields:

Two 30 to 50 foot long trenches will be constructed at the City of Arcata wastewater treatment facility. One trench will be filled with Type A TDA and the other will be filled with gravel to serve as a control for effluent water quality tests. The leachfields will be fed with primary oxidation pond effluent at hydraulic loading rates typical for residential systems. The trenches will be lined with a geomembrane to prevent cross-contamination and the effluent from each trench will be returned to the Arcata treatment system. Any variation in design from the Work Plan must be preapproved in writing by the Contract Manager. Prior to sampling, the Contract Manager must provide written approval that the constructed project meets the requirements of the Work Plan.

Task 2b - Sampling

Sampling of the effluent will be taken at various points along the leachfields and tested for various constituents as specified in the Work Plan. The sampling will be conducted for a period of 12 months with a total project time of 18 months.

Task 2c – Data analysis and report preparation

Contractor shall analyze all data and prepare a draft report that sets out the data, the analysis of the data and the resulting findings. Contract Manager must provide written approval of the report prior to its finalization.

Task 3 - TDA Temperature Profile

Task 3a - Temperature profile of TDA columns exposed to the atmosphere:

A 20-foot tall, 24-inch diameter steel pipe will be erected and filled with Type A TDA with one end exposed to the atmosphere. It is well documented that the potential for the self heating reaction in TDA is greater when the TDA is placed in lifts that are greater than 10 feet. This project will help better understand the heating dynamics of the TDA. Temperature probes will be installed along the length of the column and monitored as specified in the Work Plan. Any variation from the Work Plan must be preapproved in writing by the Contract Manager. Prior to data collection, the Contract Manager must provide written approval that the constructed project meets the requirements of the Work Plan.

Task 3b – Data collection

Contractor shall collect data on the temperature of the TDA as detailed in the Work Plan. Data will be collected for a period of 12 months with a total project time of 18 months.

Task 3c – Data analysis and report preparation

Contractor shall analyze all data and prepare a draft report that sets out the data, the analysis of the data and the resulting findings. Contract Manager must provide written approval of the report prior to its finalization.

Task 4 - TDA Porosity and Compressibility

Task 4a - Porosity and compressibility of TDA under compressive loads:

A four-foot diameter steel circular “tub” will be designed and constructed to serve as the compression chamber. A steel lid fitted with load cells will serve as the compression “piston”. Ten 20-ton capacity jacks mounted on an I-beam frame above the chamber will deliver the compressive loads as outlined in the Work Plan. Any variation from the Work Plan must be preapproved in writing by the Contract Manager. Prior to testing, the Contract Manager must provide written approval that the constructed project meets the requirements of the Work Plan.

Task 4b - Testing

Testing will be completed on both Type A and Type B TDA. The porosity and compressibility of both materials will be determined following the methodology described in the Work Plan. Total project time is expected to be 6 months.

Task 4c – Data analysis and report preparation

Contractor shall analyze all testing data and prepare a draft report that sets out the data, the analysis of the data and the resulting findings. Contract Manager must provide written approval of the report prior to its finalization.

Task 5 – Presentation of findings

If requested by the Contract Manager, Contractor shall prepare a draft presentation of its findings for each project and submit the draft to the Contract Manager for approval. Contract Manager must provide written approval of the presentation prior to its finalization. As required by the Contract Manager, Contractor shall make the presentation(s).

IV. CONTRACT/TASK TIME FRAME

The tasks are not sequential and will overlap in time. Final reports for each task will be received as specified in the Project Workplan and no later than 3/31/2013.

| Task # | Time requirements |
|---|--------------------------|
| 1. Work Plan | 1 month |
| 2. TDA Septic Tank Leachfield | 18 months |
| 2a. Design considerations when using TDA for septic tank leachfield | 6 months |
| 2b. Sampling | 6 months |
| 2c. Data analysis and report preparation | 6 months |
| 3. TDA Temperature Profile | 18 months |
| 3a. Temperature profile of TDA columns exposed to the atmosphere | 6 months |
| 3b. Data Collection | 6 months |

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|---|------------------|
| 3c. Data analysis and report preparation | 6 months |
| 4. TDA Porosity and Compressibility | 6 months |
| 4a. Porosity and compressibility of TDA under compressive loads | 2 months |
| 4b. Testing | 2 months |
| 4c. Data analysis and report preparation | 2 months |
| 5. Presentation of findings | 1 month |
| TOTAL | 24 months |

The following provisions will be included in the Terms and Conditions or Special Terms and Conditions of the Contract:

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, Department of Resources Recycling & Recovery (CalRecycle).

VI. CALIFORNIA WASTE TIRES

Unless otherwise provided for in this Scope of Work, in the event the contractor and/or subcontractor(s) purchase 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 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 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:

VIII. 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 Reports* (available upon request) and shall be reviewed by CalRecycle's Contract Manager in consultation with one of CalRecycle 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.

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