

**CESER QUALITY MANAGEMENT PLAN (QMP)**

Office of Research and Development

Center for Environmental Solutions & Emergency Response (CESER)

*Land Remediation & Technology Division (LRTD)*

*Environmental Decision Analytics Branch (EDAB)*

*Strategies for Characterization of Food Waste*

EPA CESER Technical Lead Person: Dr. *Daniel L. Young*

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*Co-Technical Lead: Dr. David Meyer*

*Extramural Research*

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# Approval Page

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| **QA Project Plan Title:** | **Strategies for Characterization of Food Waste** | |
| **CESER QA Tracking ID:** | **K-LRTD-0032360-QM-1-0** | |
| **EPA CESER Project Approvals** | | |
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| Name: TLP’s Supervisor  Dr. Michael Gonzalez | | Signature/Date: |
| Name: QA Manager  Jill Hoelle | | Signature/Date: |
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| **Contractor Approvals** | | |
| Name: Contractor Manager/Lead  N/A  (*signatures required after WA funded and QMP revised*) | | Signature/Date: |
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| Name: Other Contractors | | Signature/Date: |
| Name: Other Contractors | | Signature/Date: |

# Distribution

This Quality Management Plan (QMP) will be distributed to the staff of the U.S. Environmental Protection Agency (EPA) and contract staff. A copy of the approved signed document will be provided to all staff involved in the project, including those who join the project after the initial distribution of the QMP. All staff will be directed and encouraged to use the most current approved and signed version of this QMP, downloadable via ORD QA TRACK @ the Project tracking webpage <http://qatrack.epa.gov/projects/>.

## Key Words

Food waste, landfill diversion, waste management, sustainable materials management, plastics.

## Final Product(s)

EPA report or peer-reviewed publication

## Interdependencies

This work is related to additional food waste research under SHC RA7, including life-cycle analyses of various approaches to managing food waste.

The findings of Product 4.2 will inform this product: Food Waste “State of the Science” Report.

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# 1.0 Management and Organization

## 1.1 Quality Policy

It is the policy of CESER that systematic planning shall occur for all CESER research products. Depending on the scope of research, as well as on any contractual or Agency requirements, planning documents (including QAPPs) appropriate to the scope are developed. The CESER Division QAMs participate in the planning process by providing QA expertise and guidance on the QA requirements for research activities.

This ‘Quality Management Plan’ (QMP) may be viewed as the ‘umbrella’ document under which individual projects are conducted. The QMP is then supported by project-specific QA Project Plans. A QA Project Plan is the ‘blueprint’ by which individual projects involving environmental data are implemented and assessed and how specific quality assurance (QA) and quality control (QC) activities will be applied during a particular project. EPA requirements for QA Project Plans are defined in EPA Requirements for Quality Assurance Project Plans (QA/R-5) (EPA 2001). In some cases, a QA Project Plan and a Quality Management Plan may be combined into a single document that contains both organizational and project-specific elements. The QA Manager for the EPA organization sponsoring the work has the authority to determine when a single document is applicable and will define the content requirements of such a document.

## 1.2 Purpose

To document the overall policy, scope, applicability, and management responsibilities of the organization’s quality system.

## 1.3 Project Organization

“*Strategies for Characterization of Food Waste Project*” is primarily supported by the Office of Research & Development (ORD), Center for Environmental Solutions & Emergency Response (CESER), Land Remediation & Technology Division (LRTD), Environmental Decision Analytics Branch (EDAB) with Dr. Daniel L. Young serving as the product lead, Dr. David Meyer is the output lead, and Dr. Michael Gonzalez is the Manager with oversight for the Project. The project is under StRAP SSHC.7, ‘*Life Cycle Inventories and Methodologies*’ SHC.O21, ‘*Characterization of Food Waste Reduction and Strategies and Identification of Food Waste Prevention Solutions*.’

## 1.4 Project QAPPs

Initial work will consist of an in-depth literature review of existing data following an approved EPA Quality Assurance Project Plan (QAPP) developed in accordance with the approved schedule outlined in this QMP.

Sampling and Analysis will be performed by a contractor following an approved EPA Quality Assurance Project Plan (QAPP) developed in accordance with the approved schedule outlined in this QMP.

### Approach

1. Expected location(s) and number of test sites desired.
   1. Are these typically large composting facilities or onsite at supermarkets or both?
   2. How many locations should we evaluate?
2. Rough sampling parameters.
   1. Like how will we do this?
   2. What are we looking for?
3. Expected budget (which will be moderated by the expectation for sites due to travel and equipment or sampling costs).
   1. Assume $100k per year.
   2. If the contractor has to dig through compost piles to look for plastic pieces this could get expensive.

### Potential Roadblocks

1. Project will be dependent on cooperation from unknown entities,
2. Work to be completed at unknown locations,
3. QAPP must set defined amounts of time for sampling and analysis,
4. Undefined sampling/ interruptions to operations most likely will occur and must be planned for in advance,
5. We need to develop a protocol first and part of that protocol development is assessing the feasibility, location, partners etc.

## 1.5 Data Storage and Retrieval

Supporting documents for the various aspects of this project will be developed and provided as electronic attachments to this QMP and available either as approved pdf’s in [ORD QA TRACK](https://qatrack.epa.gov/projects/), SOPs will be available at ORD@Work [Standard Operating Procedures (SOPs) link](https://webx.ord.epa.gov/quality-assurance/standard-operating-procedures-sops?combine=&field_sop_previous_number_value=&title=&field_lab_value=ceser&field_sop_contact_value=&field_discipline_value=&items_per_page=10) or as specified in the approved Project QAPPs.

Each major aspect of the project (Existing Data collection, Software Development, and Sampling and Analysis) will have specific information on data storage and retrieval, which includes pertinent QA and SOP documents. Daniel Young, USEPA, ORD, CESER, LRTD will be the project’s quality assurance manager. Dr. William Shuster will be responsible for overseeing updates to this QMP and associated documents.

## 1.6 Project Personnel

The project organization is depicted in Figure 1 for staff with program management and technical responsibilities and those with quality assurance/quality control (QA/QC) roles. It shows the relationships including lines of authority (and reporting) and lines of communication among all project participants, including those from EPA.

**Key**

Reporting Authority

Communication

\_ \_ \_ \_ \_ \_ \_ \_

Figure 1: Project Organization

### Product Manager, Michael Gonzalez, CESER

Dr. Michael Gonzalez, Supervisor (EPA) will have oversight of this QMP. He will provide ideas and guidelines to cover the scope of this research proposal, participating actively in the review of all reports and in the implementation of QAPPs and SOPs. In addition, he will participate in the technical meetings with the other principal investigators to ensure the work progresses in accordance with this described research, develop new models and their validation, and prepare technical reports and peer review articles.

### Output Lead, David Meyer, CESER

Dave will need to complete this…

### Product Lead, Daniel L. Young, CESER

Dr. Daniel Young, Principal Investigator (EPA) will have oversight of Django/PostgreSQL tool for alpha and beta independent verification and validation of standalone/deployed tool. He will provide ideas and guidelines to cover the scope of this research proposal. In addition, he will advise through meetings and discussions to complete all tasks so that all achievements are in accordance with this described research. He will serve as the Work Assignment Contracting Officer’s Representative (WACOR). As a WACOR, he is a key player in protecting the Government’s interests and carrying out the Government’s obligations under the contract. To do so effectively, it is imperative that he is familiar with the contract terms and conditions as well as his responsibilities and limitations as a WACOR.

### Quality Assurance Manager (QAM), Jill Hoelle, CESER

Jill Hoelle will provide independent QA oversight to ensure that planning and plan implementation are in accordance with the approved Quality Assurance Project Plan (QAPP). She will provide technical direction from a QA/QC perspective to EPA PIs on an as needed basis. She will enter QAPP and related products into ORD QA Track database.

### Product Contributors

Shannon Kenny, ORD/IOAA; Tim Torma, ORD/IOAA

### Partners

Cheryl Coleman, OLEM/ORCR; Lana Suarez, OLEM/ORCR

# 2.0 Quality System Components

## 2.1 Purpose

To document how an organization manages its quality system and defines the primary responsibilities for managing and implementing each component of the system.

## 2.2 Training Policy

It is ORD policy that all persons performing, managing, or directing projects have appropriate training for their assigned work. The greatest challenge of a research laboratory in meeting its obligations and commitments, both in the short and long term, is its management of human resources. Maintaining a highly qualified and well-trained staff is essential in meeting organizational goals and continuous quality improvement. Therefore, an effective training program will result in increased productivity, continued expansion of laboratory skills and capabilities.

## 2.3 Quality Objectives and Criteria for Measurement Data

The investigators will follow appropriate, established protocols so that data conforms to commonly accepted and reasonable standards of accuracy and resolution. The standards are detailed in the family of supporting QAPPs and SOPs related to this project, which are addressed in this QMP under associated sections.

## 2.4 Technical Training

Personnel who have been trained and qualified conduct all quality-related activities performed under this QMP project. Training and qualification documentation should be maintained in personnel training files. These files include the following information on each employee:

• Internal/external training

• QA training

• Health and safety training

• Hazardous Waste Management

## 2.5 QA Training

All project participants are expected to complete required EPA QA training before any data collection activities. This includes the QA orientation training for new employees on the ORD QMP, and the applicable EPA policies for laboratory research (PPM 13.4) and recordkeeping (PPM 13.2). Additional requirements include familiarization with this QMP, and the CESER related SOPs. The EPA Quality Assurance Manager (QAM) document QA orientation training. The output lead is responsible for ensuring that all required training is completed before data collection begins, including that the QMP, QAPPs and SOPs are reviewed, and the QA requirements understood and implemented prior to work starting.

# 3.0 Personnel Qualification and Training

## 3.1 Purpose

To document the procedures for assuring that all personnel performing work for an organization have the necessary skills to effectively accomplish their work.

## 3.2 Special Training/Certification

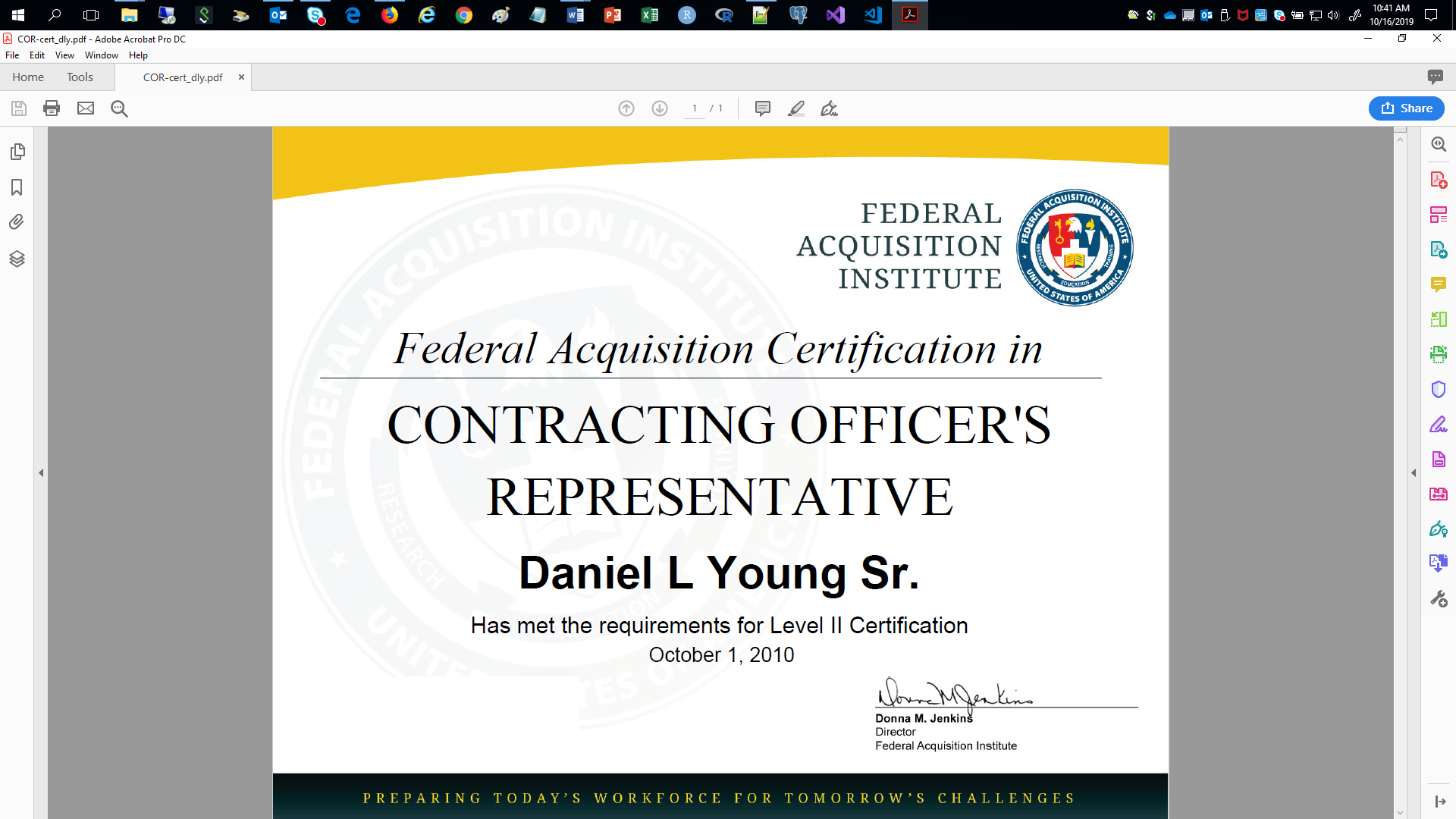
Dr. Young has skills consistent with the requirements of overseeing and implementing the work outlined in this QMP. He is currently certified as a Level II FAC-COR with the agency.

## 3.3 Project Management

Dan has experience in project management with the Office of Research & Development (ORD) from 2008 to present. In addition, he has overseen projects as a Manager with the US Department of Homeland Security, Customs and Border Protection; US EPA Region 6; US DOE OCRWM (Yucca Mountain); and US DOE Fernald Environment Management Project; 1990 to 2008.

## 3.4 WACOR

He has served as a Level II COR with US EPA since October 1, 2010.



# 4.0 Procurement of Items and Services

## 4.1 Purpose

To document the procedures for purchased items and services that directly affect the quality of environmental programs.

## 4.2 Review and Approval

The WACOR and/or Alternate WACOR are responsible for ensuring that procured items and services are of acceptable quality, including the review of objective evidence of quality for applicable items and services furnished by suppliers and subcontractors, source selection, source inspections, supplier audits, and examination of deliverables. He/she will coordinate with the EPA COR to ensure these duties are carried out per EPA policies.

## 4.3 QAPPs

Specific guidance for procurement will be addressed in the associated QAPPs and contact approval activities maintained in ORD QA TRACK.

## 4.4 Funding

$100k per year.

# 5.0 Documents and Records

## 5.1 Purpose

To document appropriate controls for quality-related documents and records determined to be important to the mission of the organization.

## 5.2 ORD Records Management Policy

CESER LRTD follows the guidance given in the Agency's Information Resources Management Policy Manual Chapter 10, Records Management. The Office of Information Resources Management (OIRM) in EPA's Office of Administration and Resources Management (OARM) is responsible for the management of EPA's records. The legal requirements for EPA's record management is contained in the Federal Records Act of 1950, as amended (44 U.S.C.), and the Paperwork Reduction Act of 1980 (44 U.S.C.) (5).

Administrative records management of research activities for this work is with the EPA product lead, Dr Daniel Young. This person is responsible for records inventory, classification, document control, vital records, records life cycle and disposition, and information security. These records include: budget information, records for managing contracts and subcontracts, property inventory, and other organizations receiving funds from EPA. Agency Project Officer also maintain Records of Interagency Agreements and Cooperative Agreements.

Research data management is the responsibility of the individual researcher and/or project leader. Data are recorded in laboratory notebooks or the CESER SciNote ELFN <https://ordscinote.epa.gov/> following the EPA ORD Laboratory Research Notebook Policy (PPM 13.2). These records will be managed according to the applicable EPA records retention requirements.

## 5.3 Data Management Practices

Project personnel will implement a document control program to ensure that all necessary documents are prepared and completed during the course of a project, and that the documents can be tracked from initiation to disposal. The ORD policy for paper records. PPM 13.2 “Paper Laboratory Records” sets forth the requirements for research notebook recordkeeping by Project Personnel. EPA draft policy PPM 13.6 for electronic records defines requirements for electronic data management and retention. CESER users may utilize the existing CESER SOPs for electronic data management and results reporting. For management of Software, personnel are required to follow the SOPs listed below:

1. K-LRTD-SOP-1399-0, Software Configuration Management (SCM), Date: 04/11/2018, available at <https://qatrack.epa.gov/media/sop_tab/1399/G-LMMD-SOP-1399-0_SCM_signed.pdf>.
2. K-LRTD-SOP-1396-0, Software Verification & Validation (V&V), Date: 04/11/2018 available at <https://qatrack.epa.gov/media/sop_tab/1396/G-LMMD-SOP-1396-0_Software_V_V_signed.pdf>.

## 5.4 Project Files

Project related files are records that are specific to a project. The following minimum records are filed together as one unit that is called a Project file:

• Original work order/ COC and other pertinent documents received with samples.

• Communications between the laboratory and the USEPA.

• Corrective Action Reports.

• Laboratory data packages.

• Finalized data report.

• Electronic data.

o Raw data collection

o Project personnel are responsible for collected data which includes requirements for QA as well as integrity of data interpretation.

## 5.5 Quality Assurance Files

Quality Assurance files are records that affect reported data but are not limited to a specific project. They cover all aspects of laboratory operation from sample receipt to sample disposition. Following are examples of what are classified as QA records (but not limited to):

• Laboratory Notebooks

• SOPs

• Certification and training records

• Quality certificates

• Laboratory audits

• Personnel training files

• Nonconformance records

# 6.0 Computer Hardware and Software

## 6.1 Purpose

To document how the organization will ensure that computer hardware and software satisfies the organization’s requirements.

## 6.2 Software Management and Piracy Policy

Guidance published by the Office of Environmental Information (OEI) ensures that computer hardware and software used in environmental programs meets technical requirements and quality expectations. Specific guidance includes EPA Directive 2100, Information Resources Management Policy Manual, and EPA Order 2165.1, Software Management and Piracy Policy.

## 6.3 Computer Software Quality Assurance

All records associated with the literature search of existing data will be collected using a Django web application with PostgreSQL database and stored on the US EPA Red Hat Enterprise Linux (RHEL) server at RTP, assigned to the Project Lead.

## 6.4 QAPP: Existing Data, Decision Support Tool, and Software Development

A separate QAPP will be developed to address the QA/QC requirements for Existing Data, Decision Support Tool, and Software Development. The software tracking system will be developed using Django web-based application with PostgreSQL database. It will include both an Excel and Adobe PDF export function for the following minimum PostgreSQL Database Fields (to be expanded upon in QAPP):

|  |  |  |
| --- | --- | --- |
| Django Application |  | PostgreSQL Database Fields |
| Server | v2626umcth937.rtord.epa.gov | Enter User Name |
| IP Address | 134.67.216.106 | Enter User Work Office/Lab |
| Web URL | <https://food_waste.epa.gov/> | Enter User Email |
|  |  | Enter User Phone |
|  |  | Save URL |
|  |  | Enter Title Article |
|  |  | Enter Date Accessed |
|  |  | Enter Comments |

Table 1: Software Tracking Existing Data Study

# 7.0 Planning

## 7.1 Purpose

To document how individual data operations will be planned within the organization to ensure that data or information collected are of the needed and expected quality for their desired use. The intent of this document is to better illustrate the de-packaging technologies (beyond screens and filters) that are increasingly being used by large food waste generators and treatment facilities as primary means of removing plastics. This product will test the performance of de-packaging equipment available on the market in real-world settings. Research will characterize the plastics, including quantity and particle size, in food waste streams before and after the use of de-packaging technologies.

This document will be updated periodically to document, amend, and otherwise record changes and progress in this monitoring effort. Additional work under this QMP is plan through the end of 2022. Quality Assurance Project Plans will be developed in accordance to prepared to meet a subset of the QA/R-5 requirements, depending on the project type, as specified in the following QAPP Requirements Lists:

1. Existing Data and/or Decision Support Tool,
2. Software and Data Management,
3. Sampling and Analysis.

## 7.2 Problem Definition/Background

The U.S. is committed to reducing food waste by 50% by 2030. To divert food waste from landfills, OLEM promotes anaerobic digestion and composting of food waste; however, contamination of food waste with packaging (including film plastics) may complicate composting and anaerobic digestion operations and decrease the market desirability and safety of land application of the compost and digestate made from food waste.

## 7.3 Schedule

|  |  |  |
| --- | --- | --- |
| Start 10/2019 | | |
| Planning | | |
| *Activity* | Develop Quality Management Plan (QMP) | Q2/2020 |
| *Activity* | Develop Secondary Data/SW QAPP | Q3/2020 |
| *Activity* | Prepare Contract Support Vehicle | Q3/2020 |
| *Activity* | Develop Sampling and Analysis QAPP | Q4/2020 |
| Deliverables | | |
| *Milestone 1* | Testing protocols completed, identification of technologies and locations of sites to be tested finalized (Q4/2021) | Q4/2020 |
| *Milestone 2* | (Subject to successful identification of test locations/ tech in milestone 1) On-site sampling and testing completed, results documented. | Q4/2022 |
| *Milestone 3* | EPA report or peer reviewed article published. | Q2/2022 |
| Delivery 04/2022 | | |

Table 2: Schedule, Planning, and Deliverables.

## 7.4 Results

The results from this study will be useful to OLEM, restaurant and commercial kitchen operators, food retailers, composters, and wastewater treatment facility staff across the U.S. as they seek to exclude plastics (including microplastics) from the food waste stream. The study will examine two primary issues:

1. What is the average occurances of plastics in treating food waste industry wide?

and

1. What current food waste de-packaging technologies are currently available in the U.S.?

## 7.5 Overview

The purpose of this study is to investigate food wastes, which amounts to roughly 40 percent of food in the United States each year.[[1]](#footnote-1) Of the estimated 125 to 160 billion pounds of food that goes to waste every year, much of it is perfectly edible and nutritious. Food waste has a staggering price tag, costing this country approximately $218 billion per year. At a time when 12 percent of American households are food insecure, reducing food waste by just 15 percent could provide enough sustenance to feed more than 25 million people, annually.[[2]](#footnote-2) The USDA and the US Environmental Protection Agency adopted federal targets to cut food waste by 50 percent by 2030.[[3]](#footnote-3)

## 7.6 QAPP: Sampling and Analysis

The U.S. is committed to reducing food waste by 50% by 2030. To divert food waste from landfills, OLEM promotes anaerobic digestion and composting of food waste; however, contamination of food waste with packaging (including film plastics) may complicate composting and anaerobic digestion operations and decrease the market desirability and safety of land application of the compost and digestate made from food waste. De-packaging technologies (beyond screens and filters) are increasingly being used by large food waste generators and treatment facilities as primary means of removing plastics. This product will test the performance of de-packaging equipment available on the market in real-world settings. Research will characterize the plastics, including quantity and particle size, in food waste streams before and after the use of de-packaging technologies. The results from this study will be useful to OLEM, restaurant and commercial kitchen operators, food retailers, composters, and wastewater treatment facility staff across the U.S. as they seek to exclude plastics (including microplastics) from the food waste stream.

## 7.7 Sampling Procedure

Details regarding the sampling approach for this project will be covered in detail in the QAPP listed in section 4.3 of this QMP. The two ways to sample any environmental medium are a grab sample, and a composite sample. Grab samples are, as the name implies, just a quick “grab” of a portion of the material to be analyzed. Composite samples are taken in small “mini-samples,” either on a spatial basis (like temperature measurements in a windrow), temporal basis (time-composited samples) or on a production basis (flow-composited samples). Most of the sampling done in organics recycling facilities for laboratory analysis is done using grab samples. Composited samples are usually done in water quality and air emissions monitoring.

The term “grab sample” can be misleading. Even though a grab sample is being taken, in many cases it should be “representative” of the material being analyzed. Whether it is a true discrete grab sample, or a representative grab sample also depends on what is being analyzed. For example, a discrete grab sample is important when variability needs to be understood (like moisture content or free air space of compost in a windrow). Representative samples are needed where trying to understand system-wide process and product quality goals (like metals content in finished compost or volatile fatty acids in a digester feedstock).

Sample containers should be labeled with the date and time of sampling, source and location of sampling, name of the sampler, identification number for the sample, indication of sample preservation method, and a completed chain-of-custody form.

## 7.8 Analysis Procedure

Details regarding the analysis approach for analyzing plastics in food waste will be covered in the Sampling and Analysis QAPP, once the literature search is completed. Further information is required prior to determine which analytical techniques are best suited once sampling begins.

# 8.0 Implementation of Work Processes

## 8.1 Purpose

To document how work processes will be implemented within the organization to ensure that data or information collected are of the needed and expected quality for their desired use.

## 8.2 Project Changes and Additions

Since the inception of the Characterization of Food Waste monitoring project in 2019, various aspects of the monitoring will change as new activities are completed.

## 8.3 Change Log

Below is a chronological listing of the major changes and additions to the project, including the creation of supporting documents:

1. *QAPP developed/approved.*
   1. *Data – TBD*
   2. *Sampling and Analysis – TBD*
2. *SOPs*
   1. *TBD*

# 9.0 Assessment and Response

## 9.1 Purpose

To document how the organization will determine the suitability and effectiveness of the implemented quality system and the quality performance of the environmental programs to which the quality system applies.

## 9.2 Corrective Actions

Tracking and resolution of corrective actions identified by audits or assessments is a basic management responsibility in CESER, starting at the level of TLP or WACOR, and flowing up to the branch chief, Division Director, and Laboratory Director. Section 9.6 of the CESER QMP provides procedures relating to performing corrective actions for audits and assessments.

Reports from the QA Manager to line management and RAP project leads are provided to evaluate effectiveness of quality improvement activities. Recommendations from the research scientists, RAP project leads, and line management may also be included in reports to CESER management. These reports will be the documentation for assessing the effectiveness of quality improvement activities and will help provide continuous quality improvement.

# 10.0 Quality Improvement

## 10.1 Purpose

To document how the organization will improve the organization’s quality system.

## 10.2 Best Practices

The overall goal of the CESER quality system is to maintain quality research practices as are implemented in EPA ORD laboratories as well as research conducted by EPA contract staff. This will ensure that high-quality science is generated from research activities and collaborations. The following steps are incorporated to meet this goal, as defined in the CESER QMP:

### Preventive action

Preventive action is implemented through QA training activities and by the interaction of QA staff and the research staff on a regular basis, to reinforce understanding and implementation of QA practices and requirements. The goal of preventive action is to minimize problems with the quality of data and products through participation in training and communications with QA staff.

### Problem identification and analysis

Problem identification and analysis is accomplished through QA audits, assessments, and reviews of planning documents and research products.

### Corrective action

Corrective actions identified as the result of reviews and assessments are resolved by the interaction of the researcher, line management and EPA QA manager to implement corrective actions identified during assessments.

### Improvement of practices and processes

Best practices should be identified in the assessments and documented in the review and reports generated from assessments. Research management best practices identified and implemented within EPA ORD laboratories should be adapted wherever possible. This is accomplished by adapting and/or developing innovative QA procedures in collaboration with the EPA researchers.

### Assessment of quality improvement

Assessment of quality improvement focuses on the scientific and engineering research products generated using research data. Quality assurance goals are defined in the QA planning documents and are integral to the RAP planning process. These products must advance the goals of EPA research as defined in the RAP planning process and in the collaborative agreements EPA utilizes to produce these products.

# 11.0 References

1. Guidance for Quality Assurance Project Plans. EPA QA/G-5. December 2002. <https://www.epa.gov/sites/production/files/2015-06/documents/g5-final.pdf>. Accessed 10/15/2019 @ 1300 hrs.
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# Appendix A: Terms and Definitions

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