



## **Digestion Verification: Addendum 1 to Quality Assurance Project Plan:**

---

### **Metals in Cookware Preparation Method Development Study**

#### **Environmental Assessment Program**

Washington State Department of Ecology  
Olympia, Washington

October 2026, Publication 26-03-118

## Publication Information

---

This Quality Assurance Project Plan Addendum is on the Department of Ecology's website at <https://apps.ecology.wa.gov/publications/SummaryPages/2603118.html> This is an addition to an original Quality Assurance Project Plan (QAPP). It is not a correction (errata) to the original plan.

This QAPP addendum was approved to begin work in August 2026. It was finalized and approved for publication in October 2026.

**Suggested citation for this addendum:**

Holquist, K. and M. Zahn. 2026. Digestion Verification: Addendum 1 to Quality Assurance Project Plan: Metals in Cookware Preparation Method Development Study. Publication 26-03-118. Washington State Department of Ecology, Olympia.

<https://apps.ecology.wa.gov/publications/SummaryPages/2603118.html>.

**Activity Tracker code:**

Ecology's Activity Tracker code for this addendum is 26-013 .

**Original Quality Assurance Project Plan:**

Holquist, K. and M. Zahn. 2026. Quality Assurance Project Plan: Metals in Cookware Preparation Method Development Study. Publication 26-03-112. Washington State Department of Ecology, Olympia.

<https://apps.ecology.wa.gov/publications/SummaryPages/2603112.html>.

Any use of product or firm names in this publication is for descriptive purposes only and does not imply endorsement by the author or the Department of Ecology.

## Contact Information

---

Publications Coordinator  
Environmental Assessment Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600  
Phone: 564-669-3028

Washington State Department of Ecology – [ecology.wa.gov](https://ecology.wa.gov)

|                                    |              |
|------------------------------------|--------------|
| Headquarters, Olympia              | 360-407-6000 |
| Northwest Region Office, Shoreline | 206-594-0000 |
| Southwest Region Office, Olympia   | 360-407-6300 |
| Central Region Office, Union Gap   | 509-575-2490 |
| Eastern Region Office, Spokane     | 509-329-3400 |

The Department of Ecology is committed to providing people with disabilities access to our information and services by meeting or exceeding the requirements of state and federal laws.

To request an ADA accommodation, email [EAPpubs@ecy.wa.gov](mailto:EAPpubs@ecy.wa.gov), call (564)-669-3028, or call Ecology through the Washington Telecommunication Relay for services, including text telephone (TTY) at 711 or through your preferred relay service provider. Visit <https://ecology.wa.gov/accessibility> for more accessibility information.

# Digestion Verification: Addendum 1 to Quality Assurance Project Plan

---

## Metals in Cookware Preparation Method Development Study

by Karna Holquist and Michael Zahn

October 2026

### QAPP Approval Signatures

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Michael Zahn, Author / Project Manager, EAP

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Karna Holquist, Author / Principal Investigator, EAP

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Sara Sekerak, Client, Author's Unit Supervisor, EAP

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Jessica Archer, Client, Author's Section Manager, EAP

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Rob Waldrop, Director, Manchester Environmental Lab, EAP

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Christina Frans, Ecology Quality Assurance Officer, EAP

EAP: Environmental Assessment Program

Signatures are not available on the Internet version.

# 1.0 Table of Contents

|             |                                                       |          |
|-------------|-------------------------------------------------------|----------|
| <b>1.0</b>  | <b>Table of Contents.....</b>                         | <b>2</b> |
|             | List of Tables .....                                  | 3        |
| <b>4.0</b>  | <b>Project Description .....</b>                      | <b>4</b> |
| 4.4         | Tasks required .....                                  | 4        |
| <b>5.0</b>  | <b>Organization and Schedule.....</b>                 | <b>5</b> |
| 5.4         | Proposed project schedule .....                       | 5        |
| 5.5         | Budget and funding.....                               | 5        |
| <b>6.0</b>  | <b>Quality Objectives.....</b>                        | <b>6</b> |
| 6.1         | Data quality objectives.....                          | 6        |
| <b>8.0</b>  | <b>Field Procedures .....</b>                         | <b>6</b> |
| 8.3         | Containers, preservation methods, holding times ..... | 6        |
| 8.6         | Chain of custody .....                                | 6        |
| <b>9.0</b>  | <b>Laboratory Procedures.....</b>                     | <b>6</b> |
| 9.1         | Lab procedures table .....                            | 6        |
| 9.2         | Sample preparation method(s).....                     | 7        |
| <b>11.0</b> | <b>Data Management Procedures .....</b>               | <b>7</b> |
| 11.2        | Laboratory data package requirements .....            | 7        |
| 11.3        | Electronic transfer requirements.....                 | 7        |
| <b>15.0</b> | <b>References.....</b>                                | <b>8</b> |

Note: The numbered headings in this document correspond to the headings in the original QAPP. Only relevant sections are included here; therefore, some numbered headings may be missing.

## List of Tables

|                                                                   |   |
|-------------------------------------------------------------------|---|
| Table 1. Schedule for completing field and laboratory work. ....  | 5 |
| Table 2. Schedule for final report. ....                          | 5 |
| Table 3. Project budget and funding. ....                         | 5 |
| Table 4. Laboratory budget details. ....                          | 5 |
| Table 5. Sample containers, preservation, and holding times. .... | 6 |
| Table 6. Measurement methods (laboratory). ....                   | 7 |

## 4.0 Project Description

Based on observations from digesting cookware during an ongoing study, Ecology will take additional steps to investigate challenges in preparation methods for metals in cookware. This is an addendum to Quality Assurance Project Plan: Lead in Cookware Preparation Method Development Study (Holquist and Zahn 2026) that will describe those steps. The purpose of this study is to look at the same cookware products digested using EPA Method 3052 (EPA 1996) with the addition of hydrofluoric acid (HF). We will look at digestion method success for these samples by visually comparing digestates from Manchester Environmental Lab to digestates from a process using HF at a contract lab. Visual comparison will be used, and no analysis will be carried out, and no quantitative results will be collected. Photos of the digestate will be included in the final report.

### 4.4 Tasks required

The following tasks will be performed for this study:

- Prepare the cookware for digestion at a contract lab (RJ Lee) by collecting shavings from a drill press.
- Submit up to 58 samples for HF digestion at a contract lab.
- Review contract lab case narrative and photos of sample digestates from the contract lab.

## 5.0 Organization and Schedule

### 5.4 Proposed project schedule

Tables 1 – 2 list key activities, due dates, and lead staff for this project.

**Table 1. Schedule for completing field and laboratory work.**

| Task                                         | Due Date           | Lead Staff     |
|----------------------------------------------|--------------------|----------------|
| Samples submitted for HF digestion           | August 31, 2026    | Karna Holquist |
| Digestion results received from contract lab | September 15, 2026 | Karna Holquist |

**Table 2. Schedule for final report.**

| Task                             | Due Date           | Lead Staff     | Support Staff |
|----------------------------------|--------------------|----------------|---------------|
| Draft to supervisor              | September 31, 2026 | Karna Holquist | Michael Zahn  |
| Draft to client/ peer reviewer   | October 21, 2026   | Karna Holquist | Michael Zahn  |
| Final draft to publications team | November 20, 2026  | Karna Holquist | Michael Zahn  |
| Final report due on web          | February 15, 2027  | Karna Holquist | Michael Zahn  |
| SOP draft to publications team   | September 31, 2027 | Karna Holquist | Michael Zahn  |

### 5.5 Budget and funding

Tables 3 – 4 show the budget for laboratory and other expenses for the project.

**Table 3. Project budget and funding.**

| Item                        | Cost (\$) |
|-----------------------------|-----------|
| Hydrofluoric acid digestion | 6,380     |
| Project Total               | 6,380     |

**Table 4. Laboratory budget details.**

| Parameter                   | Number of Samples | Number of QC Samples | Total Number of Samples | Cost Per Sample (\$) | Lab Subtotal (\$) |
|-----------------------------|-------------------|----------------------|-------------------------|----------------------|-------------------|
| Hydrofluoric acid digestion | Up to 58          | 0                    | Up to 58                | 110                  | 6,380             |
| Laboratory Total            |                   |                      |                         |                      | 6,380             |

## 6.0 Quality Objectives

### 6.1 Data quality objectives

Qualitative data do not have explicit data quality objectives but will be visually reviewed and a yes or no assigned by the PI or PM.

## 8.0 Field Procedures

### 8.3 Containers, preservation methods, holding times

Table 5 presents sample containers, minimum quantity, storage and preservation, and holding times for sample matrices.

**Table 5. Sample containers, preservation, and holding times.**

| Parameter    | Matrix                          | Minimum Quantity Required | Container            | Preservative        | Holding Time |
|--------------|---------------------------------|---------------------------|----------------------|---------------------|--------------|
| HF digestion | Metal (with or without coating) | 5 g                       | 4 to 8 oz glass jars | Ambient temperature | 1 year       |

### 8.6 Chain of custody

Appropriate chain of custody procedures will be followed according to SOP PTP001 (Ecology 2018). Products gathered for this study will be kept in locked cabinets in Ecology's product studies preparation room for the duration of the study. Product component samples will be stored in glass sample jars in locked cabinets prior to shipment to the contract lab for laboratory processing (Sekerak 2016). A detailed chain of custody form will accompany all samples during shipment to the contract lab.

## 9.0 Laboratory Procedures

### 9.1 Lab procedures table

Table 6 presents the digestion method that will be performed at the contract lab (HF included).

**Table 6. Measurement methods (laboratory).**

| Analyte      | Sample Matrix                | Sample Number | Arrival Date | Expected Range of Results | Detection or Reporting Limit | Sample Preparation Method | Analytical Method |
|--------------|------------------------------|---------------|--------------|---------------------------|------------------------------|---------------------------|-------------------|
| HF digestion | Metals (coated and uncoated) | Up to 58      | August 2026  | Visual yes/no             | NA                           | EPA 3052                  | NA                |

## **9.2 Sample preparation method(s)**

Product component sample preparation will follow SOP PTP001 for purchase and storage. The contract lab will prepare the samples using EPA method 3052 (EPA 1996), including the use of HF for the digestion. Samples will be dissolved and diluted to a final volume of 50 mL to follow the EPA reference method before being photographed after dilution to volume.

# **11.0 Data Management Procedures**

## **11.2 Laboratory data package requirements**

The lab data will contain all required specific content in the statement of work, along with any sample data generated. The data package must include sample photos sufficient to determine digestion completeness and chain of custody forms needed to perform an independent verification of the digestion and sample handling procedures.

Case narratives will be included to discuss any problems encountered with the pictures, corrective action taken, and changes to the requested digestion method.

## **11.3 Electronic transfer requirements**

Laboratory reports with case narratives will be in PDF format with photos and narrative. A spreadsheet template for tracking photos provided by Ecology will be used unless an alternative format is approved in advance by the project manager.

## 15.0 References

- Holquist, K. and M. Zahn. 2026. Quality Assurance Project Plan: Metals in Cookware Preparation Method Development Study. Publication 26-03-112. Washington State Department of Ecology, Olympia.  
<https://apps.ecology.wa.gov/publications/SummaryPages/2603112.html>.
- Ecology [Washington State Department of Ecology]. 2018 [recertified/not published]. PTP001, Version 2.2, Product Collection and Sample Processing. Olympia, WA. For a copy of this document, please submit a request by visiting [ecology.wa.gov/publicrecords](http://ecology.wa.gov/publicrecords).
- EPA. 1996. Method 3052: Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices. In: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (EPA Publication SW-846), Third Edition, Chapter 3. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.  
<https://www.epa.gov/sites/default/files/2015-12/documents/3052.pdf>
- Sekerak, S. 2016. Quality Assurance Project Plan: Product Testing Program, Version 1.0. Publication 16-03-113. Washington State Department of Ecology, Olympia, WA.  
<https://apps.ecology.wa.gov/publications/SummaryPages/1603113.html>