EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-001

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	Model, Machine, Fabricate and

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Richard Valentine	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4437 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

PERFORMANCE WORK STATEMENT

WA Title: Model, Machine, Fabrication, and Electronic Shop Support

WA Number 0-001 WACOR: Richard E. Valentine

Contract # EP-C-15-008 Alternate WACOR: Paul W. Groff

Period of Performance: The period of performance in the Performance Work Statement (PWS) shall be from April 01, 2015through March 31, 2016.

Summary of Objectives: The Contractor shall provide technical, trade, and craft support for pilot scale, bench scale, and measurement equipment used by the following entities at Research Triangle Park, NC: EPA/NRMRL/APPCD, NERL, NHEERL, NHSRC/DCMD, and OAQPS. Examples of support include preparation of custom designs and layouts for innovative sampling apparatus and instrumentation, installation and repair of air pollution control equipment such as combustors, baghouses, diesel engines and generators, refrigeration equipment, light-duty and heavy-duty dynamometers, wind tunnels, HVAC, and remote sampling trailers.

Background: the organizations listed above conduct a wide variety of pollution prevention programs in analytical laboratories and bay areas at RTP. All research apparatus requires initial fabrication and installation. Upon startup, the same equipment requires routine maintenance and repair, and may require modification based on changing program needs. The on-site Shop function provides real-time access to such support for all Principal Investigators and their associated scientists.

Scope: The Contractor shall provide machinists, fabricators, plumbers, electricians, and electronics technicians skilled in the design, fabrication, and assembly of research equipment from raw materials including stainless steel, aluminum, Plexiglas, Teflon, Teflon, PVC. The Contractor shall provide technicians skilled in the design, fabrication, and assembly of structural steel and scaffolding used to support sampling and analytical equipment for use at elevated locations.

The Contractor shall operate specialized equipment in the Machine and Fabrication Shop. Typical skills include machining, welding, cutting, plumbing, carpentry, and assembly of finished parts into working systems. The Contractor shall provide machinists skilled in the operation of engine lathes, milling machines, Computer-Numeric Controlled (CNC) milling machines and CNC lathes, saws, drill presses, sanders, welders, plasma cutting tables, and other

ATTACHMENT A

standard machine shop equipment. Contractor shall modify, or outfit research vehicles for on-road testing.

The Contractor shall provide licensed electricians and electronics technicians for power wiring of equipment and electronic circuitry. The Contractor shall provide technician and engineering support for design, fabrication, and assembly of complex circuitry including personal computer hardware, operating systems, breadboards, printed circuit boards, and computer networks. The Contractor shall have experience reading schematic drawings and using diagnostic equipment such as multi-meters, signal generators, and oscilloscopes. The Contractor shall have experience in fabricating custom electronic devices and cables as well as experience in the repair of scientific instrumentation such as gas analyzers, chromatographs, data acquisition systems, and standard laboratory equipment. The Contractor shall have specialized experience in troubleshooting and repair of industrial electric and electronic controls and computer-to-instrument interfaces such as RS232 and USB used on pilot and bench scale research equipment. Specific tasks cannot be predicted because they are so varied, however attachment A to this SOW shows examples of the types of work to be ordered under this work assignment.

Technical Approach: At the direction of the WAM, the Contractor shall prepare Shop Service Request forms for all tasks performed under the Shop WA. Examples of the types of requests the contractor will be fulfilling are in attachment A to this PWS. The Contractor representative shall meet weekly with the WAM to discuss and prioritize the Service Requests. The Contractor shall provide the WAM with weekly electronic time accounting which shall denote the organization for whom the work was performed. The Contractor shall maintain Government equipment in good and proper working condition. Repairs and maintenance of Shop equipment shall be directed by the WAM. The Contractor shall adhere to all EPA and local Health and Safety regulations, conduct good working practice, and operate in accordance with EPA/RTP's Environmental Management System (EMS) policies and the EPA/RTP Chemical Hygiene Plan. These task are relevant to Sections 3.0 and 6.0 of the Contract Performance Work Statement.

Quality Assurance: Not Required.

Deliverables: Completed Work Request forms shall be considered deliverables. Priorities shall be assigned or re-assigned by the WAM at weekly meetings. The Contractor shall maintain the file of completed Work Requests in the Machine Shop and update and compile the forms quarterly. Completed quarterly documents and files shall then be kept in the custody of the WAM.

REQUEST FOR SHOP SERVICES (e-form)

EPA Requestor: G. Hayles

Contact Name/Phone Number: D. Nash / x1451 or 919-621-0828 (cell)

Requisition Date: 9/9/14 Required Completion Date: 9/12/14

Task#	Task Name
1	☒ APPCD Fabrication and Design
2	☐ APPCD Repairs and Modifications to Program Equipment
3	☐ APPCD Repairs and Modifications to Building Utilities
4	☐ APPCD Clean Up and Maintenance
5	☐ NHSRC
6	☐ NERL
7	☐ NHEERL
8	☐ DCMD
9	☐ Electronic Support
10	☐ A3X031
11	☐ ERT
12	☐ NERL Platform

Materials Provided: Circuit Board

WA Number for Additional Materials Required: 5-64

Drawings Attached: ☐ Yes ☒ No

Description of Work: [THREE LINES MAX] Make (2) Mounting brackets for circuit boards

Shop personnel Only

LOE Estimate	LOE Actual	WAM Approval	Date
	2	REV	9/10/14

NOTE: This form is required for all tasks requiring more than 1 hr of labor.

(rev. 11-2-2013)

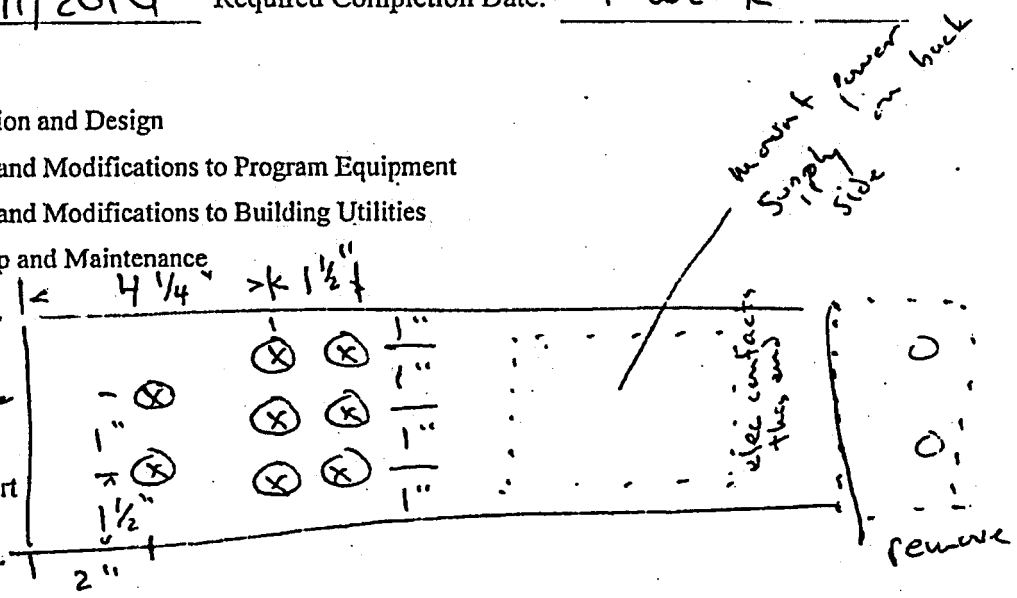
REQUEST FOR SHOP SERVICES (e-form)

EPA Requestor: GREENWELL D389

Contact Name/Phone Number: x 2828

Requisition Date: 9/11/2014 Required Completion Date: 1 WEEK

Task#	Task Name
1	☒ APPCD Fabrication and Design
2	☐ APPCD Repairs and Modifications to Program Equipment
3	☐ APPCD Repairs and Modifications to Building Utilities
4	☐ APPCD Clean Up and Maintenance
5	☐ NHSRC
6	☐ NERL
7	☐ NHEERL
8	☐ DCMD
9	☐ Electronic Support
10	☐ A3X031
11	☐ ERT
12	☐ NERL Platform



Materials Provided: Aluminum Plate & Power Supply

WA Number for Additional Materials Required: Cookstove

Drawings Attached: ☒ Yes ☐ No

Description of Work: [THREE LINES MAX] Cut to 19" length and punch 8 holes. mount power supply

Shop personnel Only

LOE Estimate	LOE Actual	WAM Approval	Date
	—	REV	9/17/14

NOTE: This form is required for all tasks requiring more than 1 hr of labor.

(rev. 11-2-2013)

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-002

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Jeff Ryan	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-1437 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Combustion Process Emissions Measurements Methods Development Support
WA #: 0-02 WACOR: Jeff Ryan
Contract #: EP-C-008 Alternate WACOR: Ed Brown

Period of Performance: The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

Background:

With the implementation of ORD's Path Forward initiative, the Air, Climate, Energy (ACE) research component includes targeted research specifically to support the Program Office's and their emissions measurement methods development needs. This WA is intended to support several research "Tasks" (ACE Tasks 222, 096, and 224) identified in the ACE Research Action Plan. Moreover, this WA is intended to implement research that encompasses multiple OAR emissions measurement methods development topics and needs.

These include:

- Evaluation of Hg and NIST traceable gases to support regulatory compliance
- Evaluation of nitrous oxide (N_20) CEMs to support Greenhouse Gas (GHG) monitoring
- Evaluation of Fourier Transform Infrared (FTIR) for the measurement/monitoring of organic and inorganic Hazardous Air Pollutants (HAPs)
- Evaluation of performance-based approaches for assessing emissions measurement data quality
- Evaluation of innovative measurement/monitoring approaches and technologies
- Evaluation of mercury (Hg) measurement quality issues associated with the utility industry practice of coal bromine addition for Hg control
- Evaluation of EPA's Method 26A ability to quantify and speciate HBr and Br_2 emissions in combustion systems
- Resolution of the fundamental discrepancy between elemental (Hg^0) and oxidized ($HgCl_2$) NIST traceable reference gases.

The purpose of this WA is to conduct research that targets the regulatory research needs identified above. This research support is expected to require laboratory and pilot-plant testing in order to fully understand the quality of the measurement technologies under investigation. An additional purpose of this WA is to support maintenance and operations of the Multipollutant Control Research Facility (MPCRF).

Summary of Objectives:

The overall objective of this project, and therefore the primary focus of this WA, is to demonstrate the readiness and quantitative measurement performance of commercially available, gas analyzers or CEMs for point source monitoring and compliance measurement applications. A desired outcome of this work is to generate data that will support the formal development of emissions monitoring procedures.

Another objective of this WA is to examine the impact on the quality of regulatory compliance Hg emissions measurements where bromine is added to coal prior to combustion to enhance Hg control. This process results in the presence of bromine (HBr and Br_2) in the stack gas which has the potential to impact the quality of compliance measurements, particularly those made by Hg CEMS. A component of this research will include the development/evaluation of HBr and Br_2 measurement methods.

Another major objective of this project, is to assess the suitability of existing monitoring (i.e., PS-2, Part 75) approaches that can be used to establish formal EPA, N_2O-specific monitoring specifications and procedures that can be used to support GHG regulatory actions.

Another major objective of this WA is to evaluate FTIR, as well as other innovative monitoring technologies, as a regulatory compliance monitoring tool for select organic and acid gas HAPs. Formaldehyde, benzene, naphthalene and acrolein along with HF and HCN are of primary interest. Technology sensitivity (detection limits), proper wavelengths for quantitation, spectral interferences, status and availability of calibration standards are examples of associated considerations. It is anticipated that this work shall require a combination of theoretical and empirical information gathering including some pilot-plant testing on the MPCRF. An additional objective is to consider potential formal changes to Method 320 and Performance Specification 15 so that a revised versions can be proposed.

Scope of Work:

TASK 1. Work Plan, Reporting, Budget, And WA Management

The contractor shall prepare and deliver to the WA manager (WAM) a work plan and budget within 20 days of WA effective date. The work plan must include a description of how the contractor shall accomplish each task, along with a breakdown of level of effort by professional level per task; a cost breakdown per task, and any underlying assumptions used. The contractor shall conduct activities necessary to manage the WA, including at least weekly communication with the EPA WAM.

TASK 2. Preparation of WA QAPP(s)

Several individual QAPPs are anticipated (e.g, M26A testing, Hg gas standards testing, N_2O monitoring methods, etc). These QAPPs shall be developed according to the requirements in Appendix #1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

TASK 3. Pilot-Plant Testing to Evaluate M26A Measurement Quality

The contractor shall conduct parametric testing on EPA's Multi-Pollutant Combustion Research Facility (MPCRF) to evaluate the quantitative measurement performance of HCl, Cl_2, HBr and Br_2 using EPA Method 26A. The contractor shall establish representative measurement environments

while firing on natural gas and coal combustion conditions as a minimum. As less than ideal measurement performance is anticipated, the contractor shall attempt to chemically understand the reasons for measurement performance, including potential mitigation techniques.

TASK 4. Evaluation of Performance-Based Measurement Quality Indicating Approaches

The contractor shall conduct testing on EPA's Multi-Pollutant Combustion Research Facility (MPCRF) designed to evaluate the quantitative performance of various probe flow/dilution ratio determination approaches associated with dynamic spiking as an overall measurement performance indicator. This testing shall be performed on CEMS capable and incapable of measuring tracer gases. In addition, the contractor shall conduct testing to examine performance-based testing to evaluate approaches for assessing measurement interferences as well as measurement levels of detection.

TASK 5. Experiments to Resolve the Elemental vs. Oxidized Hg Discrepancy

The contractor shall conduct experiments to further characterize the fundamental differences between NIST traceable solution $HgCl_2$ generators and Hg_0 generators. Ideally, these experiments will indicate which gas standard is accurate and which is not. Should this be the case, the contractor shall propose experiments to determine the reason for the discrepancy.

TASK 6. Evaluation of Hg Compressed Gases and NIST-Traceability

The contractor shall evaluate elemental Hg compressed gas standards to determine if they can meet EPA requirements for NIST traceability to the extent that they can be used for regulatory purposes.

TASK 7. Combustion Testing of HAP Measurement/Monitoring Technologies

The contractor shall conduct laboratory and pilot-scale combustor testing to characterize the measurement performance of HAP measurement/monitoring technologies such as FTIR and cavity ring-down to measure HAPs which include, but are not limited to: formaldehyde, benzene, naphthalene and acrolein along with HF and HCN. The intent is to gain an indication of the lowest concentrations that can be potentially measured. The combustion environment and associated complexities shall be considered in addition to fundamental aspects such as FTIR system path length, appropriate quantitation wavelength(s) and spectral/data resolution. Quantitative measurement performance shall include evaluation by dynamic spiking. The contractor shall use EPA Method 320 as an initial framework for FTIR measurements. However, the contractor shall consider additional performance-based measurement approaches that may prove superior to those approaches presently contained in Method 320 – the data from these approaches are needed by the WACOR to enable a formal revision to Method 320 by the WACOR.

TASK 8. Combustion Testing of Trace Level VOC Measurement Method

The contractor shall conduct proof-of-concept testing on EPA's Multi-Pollutant Combustion Research Facility (MPCRF) to evaluate the quantitative measurement performance of trace level

VOCs using SUMMA cans combined with dynamic dilution of stack gas. The objective of this testing is to determine if this ambient measurement technology can be adapted to stack gas measurements. Testing should utilize performance-based measurement approaches such as those contained in EPA Method 18 (paired measurements, static/dynamic spiking)

TASK 9. Pilot-Plant Testing of N_20 CEMs

The contractor shall conduct laboratory and pilot-scale combustor testing to characterize the measurement performance of candidate N_20 analyzers. EPA Performance Specification 18 shall be used as a framework for testing Testing shall be conducted with simulated and actual emission environments (e.g., fossil fuel combustion). Emphasis shall include the lowest concentrations that can be measured reliably as well as concentrations anticipated at Adipic and Nitric Acid plants (~500-1000ppm). The candidate N_2O CEMs technologies shall be as representative as possible of those commercially available. The contractor will be responsible for obtaining the N_2O CEMs to be tested. The purchase or leasing of N_2O CEMs shall be considered. At least 4 different N_2O CEMs are desired to be tested.

TASK 10. Multi-Pollutant Combustion Research Facility – Repair and Operational Support

The majority of the pilot-scale research identified above will take place using APPCD/APTB's Multi-Pollutant Combustion Research Facility (MPCRF). This WA will support the repair, maintenance, and operations of this research facility. This WA will also procure and provide fuel (primarily coal) and fuel storage for daily operations and testing. In addition, this WA will support the repair, maintenance, and operations of this research facility by procuring necessary repair parts (e.g., tubing, fittings, thermocouples, gauges, etc) as well as expendable materials (e.g., filters, reagents, gases, etc)

Deliverables

Multiple deliverables are required as a function of this WA. These include, but are not limited to:

- Preparation of necessary QAPPs/QATPs
- Draft Data Reports - Test data summaries for each test series, including brief summaries of associated testing activities and procedures, copies of all ancillary data forms and log sheets
- Final Data Reports – All raw and summarized measurements data, QA/QC report of data quality and data limitations, if any.
- The contractor shall prepare a draft version of potential N_2O monitoring procedures. The contractor shall use 40 CFR Part 60 Performance Specification 18 as a template. The EPA WACOR will provide the electronic versions of the template to the contractor. The EPA WACOR will be responsible for finalizing these documents

Data Reporting Requirements

Data from all tests will be reported in electronic files. They will be assembled in individual Excel notebooks that are unique for each test. Each Excel notebook will consist of:

- Summary page to summarize relevant information from the test
- Narrative page that will give a description of the test, analytical method, deviations from operating procedures during the analysis, deviations from specifications in the test plan or QAPP, problems encountered during the test or analysis, questions or issues concerning individual data points, special actions taken to verify data, data that should be further evaluated by the reviewer, and questions and issues to be addressed in preparation of the final data summary and report
- Data pages which contain all of the raw data as compiled by the individual instruments for field samples, lab samples, and QC samples
- QA/QC pages in which all pertinent QA/QC data are presented

QA/QC Requirements

Multiple QAPPs will be required for this WA. The QAPPs shall be developed according to the requirements in Attachment #1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

Reports of Work:

The contractor shall prepare a work plan and budget as described in Task 1 within 20 days of WA effective date. The contractor shall prepare and submit monthly reports in accordance with the terms and conditions of the contract.

Health and Safety Protocols shall be prepared and submitted for approval as required by contractor, APPCD, and SHEM safety personnel.

The contractor shall maintain at least weekly communications with the WAM. Additionally the contractor shall inform the PO and the WAM in writing when 75% of the total funds and/or hours contained in the work plan are expended.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT & METHOD DEVELOPMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

□ **QAPP Requirements for Software Development Projects**

X **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

NRMRL QAPP REQUIREMENTS FOR METHOD DEVELOPMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Provide a description of the situation that requires the generation of a new or modified method.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Identify the specific analyte(s) of interest and the matrix/matrices under study.
3.2 Identify the analytical approach that will be used and how it will be optimized for this study. Also describe any tests of interference and analyte stability.
3.2 Identify the method performance metrics (QA/QC checks) that will be used to evaluate the method, including the procedures used. These metrics could include (but are not limited to) positive and negative controls, sensitivity, precision, accuracy, recovery, linearity, specificity, robustness, and range.

4. SAMPLING PROCEDURES

4.1 Provide the requirements for samples that will be used to test the method (including matrix and presence/concentration of analytes).
4.2 If synthetic (i.e., laboratory-prepared) samples are used, describe the preparation of these samples.
4.3 If non-synthetic (i.e., real-world sample) samples are used, address the following:
- describe the sampling design that will be used and the steps taken to assure that representative samples are collected
- discuss or reference each sampling procedure
- provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis
- describe procedures for packing and shipping samples, and provisions for maintaining chain-of-custody, as applicable

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.

5. MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each preparation or analytical procedure to be used, if known. Include steps for preparation, calibration, measurement, quality control, and reporting.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6. METHOD PERFORMANCE METRICS

For each method performance metric (QA/QC check) identified in Section 3.2, specify the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

7. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8. REPORTING

8.1 List and describe the deliverables expected from each project participant.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report, etc.). If a method/SOP will be developed, specify the required format.

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-003

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name:

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Gayle Hagler
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-2827
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Village Green Project: Solar- and wind-powered air measurement stations for communities

1.0 Background:

During 2012 through early 2015, EPA has demonstrated the feasibility of collecting valuable air pollution and weather data in real-time, transparently providing the data to the public, and keeping the system infrastructure at a minimal footprint. Called the Village Green Project (VGP), this project was a research and engineering challenge to develop an air measurement system that would fit seamlessly into a community outdoor space. In older towns in the United States, the central common open area has been called a "village green" for generations. The VGP design ended up taking the form of a park bench outfitted with solar panels to supply renewable power to instruments measuring fine particles ($PM_{2.5}$), ozone, wind, temperature, and humidity. These data are wirelessly transmitted using a cellular modem and the data are supported by EPA's AirNow database and website.

To date, EPA has built, installed, and maintained VGP stations in several United States locations, including Durham, NC, Washington, D.C., Philadelphia, PA, and Kansas City, KS. The Philadelphia, Washington, D.C., and Kansas City, locations incorporated some new design features, including combined solar and wind power, an internal heater triggered to turn on at very low temperatures, and a small nitrogen dioxide sensor incorporated for evaluation purposes. In addition, one rooftop variation of the design was installed in Hong Kong, China. All the domestic locations have data streaming supported through EPA's AirNow program, while the Hong Kong data is supported by a local university (City University of Hong Kong). More information on the project is available at the public websites – epa.gov/villagegreen (informational site) and airnow.gov/villagegreen (data website). From this previous work, the EPA WACOR has detailed design documents and system operation code that will be provided to the contractor to guide the assembly of new stations.

This work assignment includes tasks to install and maintain additional VGP stations in the United States, as well as provide maintenance support to existing stations. In addition, one deployment location will include testing and utilizing several additional low cost sensors to further evaluate local air quality conditions. The new VGP data streams will be hosted by the AirNow program.

2.0 Task and Method Overview

WA-03 includes tasks that involve installing multiple VGP stations in the United States, maintaining existing stations, and conducting some additional air sensor research activities at one of the deployment locations.

Field data collection described in the following tasks will be conducted as detailed in the Category IV QAPP, which will be provided to the contractor for concurrence. The contractor shall review the QAPP and ensure that it is within the scope of this SOW and that it is adequate for the implementation of this SOW. The contractor work assignment leader and QA officer shall provide written documentation to the WA COR as record that they have reviewed the QAPP and agree that it addresses the needs of this SOW and the requirements in Attachment #1, or the contractor shall respond in writing with suggested revisions to make the QAPP meet the requirements of this SOW and the requirements in Attachment #1. It is the responsibility of the contractor work assignment leader to document this process. Upon receipt of the concurrence, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Work involving environmental data collection will not commence without an approved QAPP.

Task 1. Preparatory activities for three new Village Green stations

The contractor shall provide full planning and deployment support for three new Village Green Project stations, which are: (1) Village Green – Oklahoma (VG-OK), (2) Village Green – Connecticut (VG-CT), and (3) Village Green – Illinois (VG-IL). The planning support shall include attending conference calls (two 1-hour meetings per month, per location), developing site planning documents, and planning all logistical aspects for station deployment. Materials are already procured for all three stations, VG-OK is already fabricated, and VG-CT and VG-IL are partially fabricated. The contractor shall complete building, testing, and deploying the stations to the selected locations by the WA COR. The stations shall include instruments approved by the WA COR measuring PM2.5, ozone, weather, and a trial nitrogen dioxide/ozone sensor. The VG-CT and VG-IL shall be combined wind and solar-powered stations, with incorporated temperature-triggered heating to protect instruments during low temperatures. The VG-OK station is anticipated to be solar-only for power. All stations are anticipated to have local display of real-time data on signs located nearby – the sign graphic file will be provided by the WACOR. As the VG system is a custom technology developed within EPA, successful fabrication and deployment requires knowledge and experience involving system controls, Arduino microcontroller programming, air quality instrumentation, and solar- and wind-power systems. The contractor shall conduct quality assurance checks per the existing QAPP and establish data communication with the existing Village Green project database (AirNow-Village Green). The contractor shall provide on-site training to local partners who will provide maintenance support to the project.

Deliverable 1.1. The contractor shall provide a site deployment plan (site drawings and logistics) for each location within 14 days of site selection by the WA COR.

Deliverable 1.2. The contractor shall provide documentation of preparatory quality assurance checks and system communication tests within 60 days of the initiation of the WA.

Deliverable 1.3. The contractor shall provide documentation of the successful installation through photos, a spreadsheet documenting on-site quality checks, and microcontroller code for each of the three new VGP sites.

Task 2. VGP station maintenance

The contractor shall provide maintenance and troubleshooting to existing stations, which varies by location. Successful troubleshooting requires significant knowledge of Arduino microcontroller programming and components, air monitoring instrumentation, cellular communications, and system controls. The contractor shall provide the following types of maintenance for the VGP stations already existing and after installation:

- For the Durham, NC location – the contractor shall provide all maintenance for the station, including routine quality checks, instrument maintenance, troubleshooting, and back-up data download. The routine maintenance is estimated at eight hours per month and consumables/repair items at $2000 in total.
- For the Philadelphia, Washington, D.C., Kansas City, Hartford, Oklahoma City and Chicago stations – the contractor shall provide troubleshooting advice to the local agency staff operating the stations and provide repair/replacement of components. The estimated time regarding remote troubleshooting support to the operator involved is two hours per location, per month (12 hours monthly). In addition, the contractor shall estimate a total of six trips to sites in the United States for on-site troubleshooting/repair support. Repair materials are estimated at $10,000 in total (e.g., replacement components for power system, air monitoring instrument, LCD screen in the sign, etc.).
- For the Hong Kong location – the contractor shall provide only remote troubleshooting support via email and phone calls to the site partner maintaining the station. The amount of troubleshooting time is estimated at two hours per month.

Deliverable 2.1. The contractor shall provide a short monthly report including a log of system general operation and any troubleshooting interactions by the contractor for each station operating in the United States. The report shall include any updates to microprocessor code or system configuration required for troubleshooting,

Task 3. Interactive sensor system

The contractor shall fabricate five portable air sensor boxes for use in a classroom outreach activity. The air sensor boxes shall include a low cost particle sensor (e.g., Shinyei PPD60), fan providing ventilation, global positioning system (GPS), onboard microcontroller, and rechargeable battery. The entire sum of components per sensor

box is anticipated to be under $1000. The boxes shall be easily carried or worn, durable against dropping, and lightweight. The battery power shall be sufficient for at least 3 hours of use. The sensor box shall have an integrated screen display of the data and provide data updates on a 10 second or faster time basis. The sensor box shall also have a simple method to download the data that is already formatted into a RETIGO format (refer to http://ofmpub.epa.gov/rsig/rsigserver?retigo/stable/retigo_tutorial.html). The contractor shall provide a safety certification of the devices and a user manual.

Deliverable 3.1. The contractor shall provide a proposed design of the air sensor boxes to the WA COR within 45 days of WA initiation.

Delierable 3.2. The contractor shall provide a working prototype of the air sensor boxes to the WA COR within 60 days of receiving approval of the proposed design.

Delierable 3.3. The contractor shall provide the five final air sensor boxes to the WA COR along with documentation.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

- ☐ **NRMRL's Quality System Specifications:**

  (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
  (2) an organizational chart showing the position of the QA function;
  (3) delineation of the authority and responsibilities of the QA function;
  (4) the background and experience of the QA personnel who will be assigned to the project; and
  (5) the organization's general approach for accomplishing the QA specifications in the SOW.

- ☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

- ☐ **NRMRL's Quality System Specifications:**

  (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
  (2) an organizational chart showing the position of the QA function; 07/14/08 A-2
  (3) delineation of the authority and responsibilities of the QA function;
  (4) the background and experience of the QA personnel who will be assigned to the project; and
  (5) the organization's general approach for accomplishing the QA specifications in the SOW.

- ☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

- ☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

☐ **QAPP Requirements for Secondary Data Projects**

☐ **QAPP Requirements for Research Model Development and/or Application Projects**

☐ **QAPP Requirements for Software Development Projects**

☐ **QAPP Requirements for Method Development Projects**

☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-005

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 0-005 Analy Support...PM2.5

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 5.0; 2.0

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Michael Hays
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3984
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Statement of Work
EP-C-15-008
WA 0-005
POP: April 1, 2015 through March 31, 2016
Michael Hays, WACOR

I. **Title:** Analytical laboratory support for the physical and chemical characterization of organic gases and PM2.5

II. **Background:** The Air Pollution Prevention and Control Division's (APPCD) Emissions Characterization and Prevention Branch (ECPB) conducts research on fine particulate matter (PM2.5) and aerosol emissions as they pertain to the implementation of the National Ambient Air Quality Standards (NAAQS). Measurement of the physical and chemical properties of both gas- and particle-phase emissions is a research priority for ECPB. These measurements are used as input to National emissions inventories and to establish global air quality trends and to understand related public health effects. Chemical source profiles are also used in source-receptor models that apportion ambient gases and PM2.5 to various anthropogenic and natural emissions sources. NRMRL-ECPB aims to characterize gas- and particle-phase source emissions and to develop and evaluate methods to measure and prevent these emissions. This Work Assignment seeks to update and upgrade source emissions profiles and PM2.5 mass emissions factors while improving the quality of data used for dispersion and source-receptor modeling and for evaluating current risk management and regulatory strategies.

In sum, the objectives of this project are to physically and chemically characterize source-related gas and PM2.5 samples for: (i) improving chemical source profiles; (ii) accurately apportioning ambient organic matter; (iii) improving fine PM mass and individual gas and PM component emission factors; and for (iv) supporting health and toxicological research.

III. **Work Assignment Objective:** The objective is to provide the Fine PM Characterization Laboratory (FPMCL) technical support for the chemical characterization of PM2.5 filter samples collected from a variety of important sources, especially, but not exclusively, combustion sources. Support for semi-volatile organic compounds (SVOCs) and gas-phase samples collected on polyurethane foam plugs (PUFs), SUMA canisters, and similar sampling media or devices shall also be provided. The contractor shall be responsible for the characterization of (1) gas- and particle-phase emissions from residential- and industrial-scale boilers and (2) samples from emissions tests conducted with jet engines and with vehicles or generators burning diesel, bio-diesel, and ethanol-gas fuel blends. Characterization of near-source samples including those collected near roadways, biomass burning, industrial or commercial activities or similar polluted environments shall be necessary. Before analysis of any sample set the contractor shall seek the technical direction of the WA task manager. In some cases, the WA task manager will direct the contractor to provide samples to other authorized laboratory personnel for specialized sample analysis. An additional objective shall be to provide the WA task manager with a written report on a monthly basis or upon completion of the chemical and physical characterization of an emissions source.

IV. **Scope-of-Work:** In fulfillment of the objectives of this Work Assignment, the following Tasks listed below shall be performed by the Contractor, and throughout the course of performing these Tasks, the Contractor shall comply with (1) a new written QAPP to be submitted for approval, and a QAPP for a similar previous work to be provided by the WACOR to aid in new QAPP development. (2) all its addendums and (3) the FPMCL Facility Manual. All work will be conducted using these existing documents. Moreover, the contractor shall follow all issued standard operating procedure (SOP), chemical hygiene, and Laboratory related health and safety plans.

V. In accordance with laboratory protocols established by the EPA for analysis of volatile and semi-volatile organic gases and PM2.5 samples, the contractor shall acquire laboratory supplies and consumables needed to accomplish the technical laboratory support work described below. The analytical protocols will be provided to the Contractor by the EPA Work Assignment Manager prior to initiation of the technical work.

A. The contractor shall determine the purity of each new lot of extraction solvents and, as necessary, purify any solvents that may be contaminated by commercial practices. The solvents shall be of sufficient purity to enable extraction and analysis of the samples and shall not contain interfering contaminants that may detract from the Data Quality Objectives of the project. The Data Quality Objectives are to be specified in the project QAPPs as stated above. The purity of the solvent shall be documented by the contractor and identification of the solvent lot used for sample extraction shall be reported by the contractor. The contractor shall include this information in the monthly written progress reports. Or this information shall be contained in the final report written for each source following the completion of its characterization. Biological fluids such as simulated lung or gastric fluids or bronchial lavage fluids may also be used as part of this project.

B. The contractor shall clean substrates, sampling train components, and sample containers for collection of gases, liquids, and PM2.5, for field deployment, or for in-house sampling campaigns. Sample substrates and blanks may include Teflon membrane and quartz fiber filters, XAD-coated annular denuders, aluminum foil, XAD impregnated quartz filters, glass beads, PUF (polyurethane foam plugs) and various SUMA canisters. Also, the contractor shall provide clean glassware for use in the analyses of the PM samples. Decontamination methods will involve various solvent rinses and/or high temperature thermal removal of contaminants as described in the facility manual.

C. The contractor shall condition and weigh Teflon filters and Al foil substrates before and after PM sample collection in accordance with established EPA weighing procedures and quality control.

D. The contractor shall maintain a sample custody log of samples submitted for analysis following sample collection. For the vast majority of cases, it shall be necessary for a number of individual samples from a single source to be composited, thereby requiring careful recording of the composited samples. Before samples are composited, the contractor shall notify the WAM of the intention to do so. The WAM will also notify the contractor of the analytical method to be applied prior to analyzing any sample set.

E. Using protocols established and supplied by the EPA Work Assignment Manager, the contractor shall perform solvent or thermal extractions of particulate matter and semi-volatile organic matter samples collected on various media substrates. Samples shall be prepared so that analyte concentrations are appropriate for precise and accurate quantitative analysis of individual trace organic compounds and major inorganic ions. Once the individual species are identified and quantified in the PM mixture, the contractor shall report the raw and processed data and appropriate proof of the data quality to the WAM. The contractor shall also be responsible for running library searches on chromatographic data for the tentative identification of organic molecules in the PM extracts. The results of each search shall be reported by the contractor and compared against an appropriate blank to ensure validity. For quantified compounds, the contractor shall report whether (1) standards were available, (2) the compounds were within the calibration range, (3) the quantified compounds were above or below minimum detectable or quantifiable levels, and (4) the type of model used to fit calibration data. The contractor shall perform an identical set of functions for the gas-phase pre-concentration system used to analyze volatile organic compounds (VOCs), many of which are hazardous air pollutants.

F. Following a procedure established and provided by the EPA Work Assignment Manager, the contractor shall perform derivatization of polar organic compounds that enables quantitative resolution of such compounds via gas chromatography/mass spectrometry. Suitable standards shall also be derivatized by the contractor and used to (1) estimate deuterated standard recoveries (by making multiple GC/MS runs of the deuterated standards during a sample run sequence) and (2) to populate appropriate calibration database levels. Documentation of data quality for the derivatization steps shall be performed by the contractor. This data quality documentation shall be linked to specific PM extract samples analyzed by GC/MS. The contractor shall purchase derivatization equipment needed to conduct *on-line* or *in-situ* methylation and silyatoin experiments. Purchased equipment shall be compatible with the GC-MS technology and instrumentation available in the FPMCL and shall include an auto-sampler device.

G. The contractor shall provide for appropriate handling and disposal of all laboratory waste solvents and other laboratory waste materials.

H. The contractor shall operate, maintain, and modify, as necessary, analytical instrumentation and ancillary equipment in the EPA FPMCL. (Note: this Task includes ensuring appropriate instrument gases are provided (e.g., He, H_2, N_2, and air). The contractor shall maintain a file of operating manuals for all equipment and instruments. Equipment and instruments included in this Task are:

- HP-7890/7000 Auto sampler/Gas Chromatograph/MSD (qqq) in Room E580-A
- HP-6890/5793 Thermal extraction unit/Gas Chromatograph/MSD/FID in E580-A
- HP-6890/5793 Thermal extraction unit/2-dimensional Gas Chromatograph/MSD/ in E589-A
- HP-6890/5793 VOC pre-concentrator (ENTECH Inc) Gas Chromatograph/MSD/ in E288
- HPLC-MS (Q-TOF) and N_2-generator in E589
- Zymark TurboVap solvent concentrator in E580-A
- Cryofreezer in E580
- Fisher Isotemp muffle furnance in E569
- Skutt ceramic kiln in E578-A
- Nuaire horizontal clean bench in E578-A
- Sunset Thermal-Optical Elemental/Organic Carbon Analyzers in E-581-A and E589

- Thelco convection oven in E581-A
- Ainsworth semi-micro balance in E581-A or high-bay area
- Dionex 120 ion chromatograph in E581-A
- Sartorius MC5 microbalance in E580-A
- Cahn ultra microbalance in E580-A
- Terra Universal modular clean room in E580-A
- Dracor water purification system in E581-A
- Frigidaire commercial freezer and additional cryo-freezer units in E578
- Domnic-Hunter hydrogen generators (2) in E581-A

L. The contractor shall maintain a complete and up-to-date chemical inventory for the FPMCL Facility along with Material Safety Data Sheets for all chemicals.

M. The contractor shall update, as needed, the Facility Manual for the PM2.5 Analytical Facility which includes as a minimum the following items:

- General facility lay-out
- List of equipment by name, serial and model no, custodial account ID, EPA decal no., and location
- Computer software and hardware
- Safety/Health protocols
- Quality Assurance and Control protocols
- Sampling and Analysis Methods (ASTM, EPA, Miscellaneous Operating Procedures)

N. With the exception of the miscellaneous operating procedures (MOPs) for cleaning sample substrates, laboratory glassware, and sampling train components for which the Contractor shall be responsible, the QA/QC protocols, analytical protocols, and other MOPs will be provided by the EPA Work Assignment Manager for incorporation into the Facility Manual. The Facility Manual is a working document and will incorporate new material as protocols are established or modified and additional equipment is acquired.

O. The contractor shall supply to the WAM on a monthly basis a written progress report that includes: (1) a list by identification number of the samples analyzed; (2) the type of analysis done; (3) the results and data analysis; (4) an interpretation of the results; (5) future work planned in the laboratory; (6) proof of data quality; (7) description of experimental procedure used and any observed anomalous behavior; and (8) description of laboratory operations; The contractor shall also provide to the WAM electronic copies of completed data sets and data analysis by source. In the event that the analysis of sample substrates from a single test source are completed, the contractor shall produce a written report describing the results of the analysis, the source sampling test conditions, and any other pertinent particle sizing and/or counting data.

VI. **Labor mix:** To achieve the objectives of the WA the following labor mix is required: (1) a person with extensive experience in chemical analysis using chromatography (GC-MS/FID, LC-MS, etc.). This individual shall have at least 15 years of GC-MS experience and be familiar with the extraction and pre-concentration procedures used for PM and miscellaneous organic gases. This individual shall be responsible for GC-MS (qqq) analysis and interpretation of GC-MS data as stated above. This person shall be capable of following all the required QA/QC procedures established in any relevant QA protocols and shall be required to communicate results to the WA task manager. This individual shall also be responsible for certain research pursuits as they relate to the analysis of GC-MS data, including library searches and the application of identified deconvolution algorithms. The contractor shall ultimately be responsible for all of the GC-MS data quality provided to the WA task manager. (2) an individual who assists with extractions, sampling and media pretreatment and sample handling, and other similar logistical tasks shall occasionally be needed.

VII. **Equipment purchase:** The contractor shall look into the possibility of further automating the micro-solvent extraction, filtering, and concentration techniques. In consultation with the WAM, the contractor shall purchase technology that improves the analytical sample throughput or speed at which these steps can be conducted. Additional sampling equipment shall also be purchased in the event there is a need to complete a project in a timely manner.

VIII. **Deliverables:** The contractor shall deliver: (1) a written report containing the final sampling and PAH chemical analysis results for aerosol particles emitted from a series of cook stove tests conducted with multiple biomass fuels and stoves (due on or before August 15, 2015); (2) A novel physiological-based extraction method using lung fluids developed for better PM dosimetry (due on or before October 1, 2015); (3) Analysis report of an SVOC matrix captured using a novel 3-stage cryo-sample collection unit developed in collaboration with NHEERL and the Joint Fire Sciences (February 28, 2015); (4) a written report containing the final sampling and chemical analysis results for aerosol particles emitted from hydronic heater tests with multiple biomass pellet

fuels (due on or before December 15, 2015).

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-006

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Jim Jetter
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-4830
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Cookstove Emissions and Fuel Efficiency Research

WA #: 006 WACOR: Jim Jetter

Contract #: EP-C-15-008

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

The primary objective of this WA (work assignment) is to measure energy efficiency and air pollutant emissions from practical, fuel-efficient, "clean-burning" cookstoves. Pollutant emissions from "clean-burning" solid-fuel stoves shall be compared to emissions from the traditional "three-stone" fire, as well as to emissions from liquid- and gas-fueled stoves. This study provides stove emissions information that will be valuable to Global Alliance for Clean Cookstoves (the Alliance) partners disseminating stove technology in the field. Additionally, this study is exploring how cookstove performance and emissions are affected by conditions including fuel moisture content, fuel size and shape, operator technique, weather conditions, pot size and shape, and stove durability. Results from this study will support the development of testing protocols and standards through ISO Technical Committee 285, Clean Cookstoves and Clean Cooking Solutions. This work also provides technical support for the development of Regional Testing and Knowledge Centers, many of which are sponsored by the Alliance. Stoves to be tested are identified below.

BACKGROUND

This work is part of EPA's commitment in support of the Global Alliance for Clean Cookstoves. The Alliance was launched after ten years of foundational work conducted by the EPA-led Partnership for Clean Indoor Air (now integrated with the Alliance). The Alliance is a public-private partnership that seeks to save lives, improve livelihoods, empower women, and protect the environment by creating a thriving global market for clean and efficient household cooking solutions. Its ambitious goal is to foster the adoption of clean cookstoves and fuels in 100 million households by 2020. For more information, see the Alliance web site at: http://www.cleancookstoves.org/

The WHO (World Health Organization) estimates that household air pollution mainly from solid-fuel cookstoves causes more than 4 million premature deaths annually – greater than the combined impact of HIV, malaria, and tuberculosis globally. Cookstove emissions of black carbon, brown carbon, organic carbon, CO_2, and methane also affect global climate change.

Reducing household air pollution associated with burning solid fuels provides multiple benefits. Human health is improved through better indoor air quality and ambient air quality. Sustainability and ecology are promoted through reduced deforestation and protection of biodiversity. Global climate change is addressed through reduced emissions of greenhouse gases and other climate forcers. International relations are improved through collaboration with partners.

SCOPE

The scope of this WA includes operation of research facilities, testing of stoves and fuels, gravimetric filter sample analysis, data processing and analysis, and other activities, as described in detail below.

TECHNICAL APPROACH /OBJECTIVES

Operation of research facilities. The contractor shall operate an existing cookstove test facility in the EPA High Bay Building (Room H-106). This system has capabilities for testing stoves with tall chimneys and for measuring emissions at various dilution ratios. The contractor shall operate, maintain, and repair the facilities, as needed. EPA will provide instrumentation. The contractor shall provide continuous improvement of the system, as needed, to meet QA requirements, improve efficiency of operations, and improve general quality.

Testing of stoves and fuels. The EPA WACOR will obtain the stoves and will specify which stoves will be tested. The Contractor shall operate the stoves during the testing. Stoves to be tested will include the following types:

- Gasifier-type, rocket-type, and charcoal-fuel-type stoves identified for round-robin testing in coordination with the Global Alliance for Clean Cookstoves, Regional Testing and Knowledge Centers
- Three advanced technologies developed through the U.S. Department of Energy's cookstove research program
- Two stoves to be identified in a joint U.S. – China Ministry of Science and Technology (MOST) project. The two stoves shall be tested with the WBT (Water Boiling Test) Version 4.2.3 (described below) as well as the China test protocol: http://cleancookstoves.org/technology-and-fuels/testing/protocols.html

- Stoves to be tested experimentally to support development of international protocols and standards through ISO Technical Committee 285 – Clean Cookstoves and Clean Cooking Solutions
- Additional test replications required for meeting QA requirements for stoves previously tested.

Total number of stove/fuel combinations to be tested: 40 total with completion of 2 per month.

Fuels to be tested. Wood-burning stoves shall be tested with high- and low-moisture hardwood, red oak, fuel. Freshly cut "green" red oak firewood without bark, lengths approximately 14", will be obtained from a local vendor. The wood shall be cut on a table saw and/or band saw to produce sticks that shall be approximately 2 cm x 2 cm in cross section. Half of the fuel wood shall be air dried to a moisture content of approximately 10 percent (on a wet basis), and the other half of the fuel wood shall be stored in air-tight barrels in a freezer to keep the moisture content at approximately 30 percent.

The charcoal stoves shall be tested with "lump" charcoal (not compressed briquettes) similar to that available in developing countries. Stoves shall be tested with "dry" charcoal (approximately 5 percent moisture content on a wet basis). Charcoal stoves shall be tested following guidelines available from the Global Alliance for Clean Cookstoves web site:
http://cleancookstoves.org/binary-data/DOCUMENT/file/000/000/401-1.pdf

All fuels shall be analyzed for moisture content using ASTM Standard Method D4442-07. Moisture content of the fuels shall be measured on each day of testing. A random sample of fuel wood, with a mass of approximately 100 g, shall be weighed with an electronic balance. The sample shall be dried in a ventilated oven for at least 8 hours, and then the sample shall be weighed periodically until no mass change is detected. The percent moisture content in the wood on a percent wet basis shall be calculated and recorded.

All fuels shall be analyzed for heat of combustion using ASTM Standard Method ASTM D5865-04. This testing shall be done by a qualified outside laboratory.

Air pollutants to be measured. The contractor shall measure emissions of the following pollutants for each stove and fuel combination:

- CO2 - real-time, CEM (IR)
- CO - real-time, CEM (IR)
- PM2.5, measured gravimetrically, filter sample taken during each of the three phases of the WBT (Water Boiling Test – see below)
- BC (black carbon) – real-time with aethalometer
- EC (elemental carbon) and OC (organic carbon) – quartz filter sample taken during each of the three phases of the WBT and analyzed with the thermal-optical method. Quartz "back-up" filter sample also taken during each WBT phase to quantify the gas-phase artifact

- PM, submicrometer particles measured with SMPS (scanning mobility particle sizer)
- THC (total hydrocarbon) - real time, FID total HC analyzer
- CH4 (methane) - real time, FID analyzer
- Other pollutants may be added if resources (instruments and personnel) are available

The EPA will furnish instrumentation and equipment necessary to measure air pollutants.

BC/EC/OC analysis will be provided by EPA Emissions Characterization and Prevention Branch, contact: Michael Hays

Test protocol. WBT (Water Boiling Test) Version 4.2.3 available at: http://cleancookstoves.org/technology-and-fuels/testing/protocols.html

A summary of the performance test protocol follows:

"This modified version of the well-known Water Boiling Test (WBT) is a simulation of the cooking process that can be performed on most stoves in use throughout the world. While the test is not intended to replace other forms of stove assessment, it is designed to be a simple method by which stoves made in different places and for different cooking applications may be compared by a standardized and replicable protocol."

"The WBT ...consists of three phases.

1) In the first phase, the tester begins with the stove at room temperature and uses a pre-weighed bundle of wood to boil a measured quantity of water in a standard pot. The tester then replaces the boiled water with a fresh pot of cold water to perform the second phase of the test.

2) In the second phase, water is boiled beginning with a hot stove in order to identify differences in performance between a stove when it is cold and when it is hot.

3) Lastly, the tester again boils a measured amount of water and then, using a pre-weighed bundle of wood, simmers the water at just below boiling for a measured period of time (45 minutes). The third step simulates the long cooking of legumes or pulses that is common throughout much of the world."

"This combination of tests is intended to measure the stove's performance at both high and low power outputs, which are important indicators of the stove's ability to conserve fuel."

Gravimetric filter sample analysis. The contractor shall perform gravimetric filter analysis for $PM_{2.5}$ using EPA facilities in Room E-487. The contractor shall perform manual or robotic weighing of the filters.

Data analysis. The contractor shall provide support for processing and analyzing data from the cookstove tests conducted under this WA. The contractor shall work closely with the EPA WACOR. The contractor shall use DASYLab software for data acquisition and Microsoft Excel spreadsheets for processing data. Microsoft Access may be used in the future for managing data. The contractor-provided support shall include QA checks of manual data entry, importing raw data into "daily data" spreadsheets, importing processed data from "daily data" spreadsheets into "stove/fuel spreadsheets," evaluating carbon balance calculations, and final QA checks. The contractor shall identify tests that do not meet QA requirements, and repeat tests if necessary. This work will be described in a QAPP (Quality Assurance Project Plan) and associated MOPs (see below). The work will be coordinated with the EPA WACOR, and the EPA WACOR will provide further details.

The contractor shall use the automated system that has been developed to enable immediate data processing following each stove test (not including analysis of samples that require post-processing, e.g., filter samples).

Results. The contractor shall deliver data to the EPA WACOR in Microsoft Excel files that can be easily analyzed. Results shall be reported as averages and standard deviations for the three tests for each stove. The contractor shall report data including all parameters in the WBT test protocol, and the data shall be in format similar to that used in previous testing.

SAFETY

The Contractor shall comply with a Health and Safety Protocol. The Contractor shall maintain a safe working environment during testing.

QUALITY ASSURANCE

A new QAPP (Level II) will be prepared and submitted for approval, and a QAPP for a similar previous work will be provided by the WACOR to aid in the development of the new QAPP. Internal technical systems audits have previously been completed, and the project was approved by an EPA internal quality assurance review. An internal audit of data quality was also previously performed. If any revision of the QAPP (and associated MOPs) is required, the QAPP shall be reviewed and approved by the ARCADIS work assignment leader and QA officer. Once it has obtained their approval, it shall be submitted to the EPA QA staff for review and approval. It shall be accompanied by a signature page that is signed by the ARCADIS work assignment leader and QA officer to show that they have reviewed and approved the revised QAPP. It is the responsibility of the ARCADIS work assignment leader to document this process. Upon receipt of the signed QAPP, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Any work involving environmental

data shall not commence until the QAPP has received official approval from the EPA QA staff.

See: ATTACHMENT #1 TO STATEMENT OF WORK FOR QA CATEGORY II PROJECTS.

DELIVERABLES

The Contractor shall prepare and deliver brief, monthly progress reports in accordance with the reporting requirements in the contract. The contractor shall deliver data and filter samples to the EPA WACOR. The final report will be prepared by the EPA WACOR and will be in the form of EPA reports and a manuscript to be submitted to a peer-reviewed journal for publication. Contractor personnel may be coauthors of the publications.

SCHEDULE of DELIVERABLES

Raw test data, filter samples, and processed data shall be deliverables.

Schedule is as follows:

January 31, 2016	Complete cookstove testing
February 28, 2016	Deliver all filter samples and raw test data
March 31, 2016	Complete data analysis and quality assurance, and deliver all processed data

ATTACHMENT #1 TO STATEMENT OF WORK FOR QA CATEGORY II PROJECTS

NRMRL QA Requirements and Definitions

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The QAPP shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

Definitions:

Environmental Data - These are any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, that are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization=s/program=s quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization=s/program=s QMP shall address all elements listed in the ARequirements for Quality Management Plans@ in Appendix B of the NRMRL QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

EPA=s Quality System Website: http://www.epa.gov/quality/

EPA=s Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

□ **NRMRL=s Quality System Specifications:**

(1) a description of the organization=s Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization=s general approach for accomplishing the QA specifications in the SOW.

Category Level Designations (determines the level of QA required):

□ **Category I Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in R-5.

X **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in R-5.

□ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type.

□ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type.

Suggested Content for Required Elements of QA Project Plans as per R-5:

GROUP A PROJECT MANAGEMENT

There are nine elements in this group. These address project administrative functions and project concerns, goal(s), and approach(es) to be followed.

Element A1- Title and Approval Sheet

- Project title
- Organization name
- Names, titles, signatures, and signature dates of the approving officials

Element A2- Table of Contents

- Table of Contents;
- List of Figures, Tables, References and Appendices
- Document control format

Element A3- Distribution List

Names of individuals and organization(s) to receive a copy of the approved QA Project Plan

Element A4- Project/Task Organization

- List of individuals and organizations involved with the project, identifying their roles and responsibilities
- Documentation of project QA Manager's independence
- Identification of the individual responsible for maintaining the official, approved QA Project Plan
- Organizational chart showing relationships and lines of communication among project personnel

Element A5- Problem Definition/Background

- Statement of specific problem to be solved, decision to be made, or outcome to be achieved
- Background information

Element A6- Project/Task Description

- Summary of work to be performed and products
- Project schedule
- Maps, tables, etc. showing geographic locations

Element A7- Quality Objectives and Criteria

- Outputs from the systematic planning process (e.g., DQOs) used to design the study
- Measurement performance or acceptance criteria established as part of the study design. These relate the quality of data needed to the established limits on the chance of making a decision error or of incorrectly answering a study question

Element A8- Special Training/Certifications

- Description of how the most current approved QA Project Plan will be distributed to project staff
- List of records to be included in the data report package
- List of any other project documents to be produced
- Information on the final disposition of records and documents, including location and retention schedule

Element A9- Documentation and Records

- Any specialized training or certifications needed by personnel
- Plans for providing, documenting, and assuring this training

GROUP B: DATA GENERATION AND ACQUISITION

The ten elements in this group address data generation and data acquisition and management activities.

Element B1- Sampling Process Design (Experimental Design)

Description of project's experimental design

Element B2- Sampling Methods

- Description of sample/data collection procedures
- List of equipment needed
- Identification of performance requirements
- Description of corrective actions to be taken if problems arise

Element B3- Sample Handling and Custody

Description of sample handling requirements and transfer, and for ultimate disposal

Element B4- Analytical Methods

- Description of analytical methods to be used
- Identification of any performance criteria
- Description of corrective actions when problems arise

Element B5- Quality Control

- List of QC activities needed for sampling, analytical, or measurement techniques, along with their frequency
- Description of control limits for each QC activity and corrective actions when these are exceeded
- Identification of any applicable statistics to be used

Element B6- Instrument/Equipment Testing, Inspection, and Maintenance

- List of equipment and/or systems needing periodic maintenance, testing, or inspection, and the schedule for such
- Description of how inspections and periodic preventive maintenance procedures will be performed and documented
- Discussion on how critical spare parts will be supplied and stocked
- Description of how re-inspections will be performed and effectiveness of corrective actions determined and documented

Element B7- Instrument/Equipment Calibration and Frequency

- List of all project tools, gauges, instruments, and other sampling, measuring, and test equipment which should be calibrated
- Description of calibration method and identification of any certified equipment and/or standards to be used
- Details of how calibration records will be maintained and traceable to the instrument/ equipment

Element B8- Inspection/Acceptance of Supplies and Consumables

- A list of project supplies and consumables that may directly or indirectly affect the quality of the results
- The acceptance criteria for them
- Identification of those responsible

Element B9- Non-direct Measurements

- Identification of any existing data that will be obtained from non-measurement sources, such as literature files and historical databases
- Description of how you intend to use the data
- Your acceptance criteria and any limitations for using such data

Element B10- Data Management

- Description of the project data management process
- Description of or reference to the office's standard record-keeping procedures and document control, data storage, retrieval, and security systems
- Identification of data handling equipment and procedures to process, compile, and analyze project

data
- Discussion of data handling procedures to detect and correct errors and loss during data processing
- Examples of any forms or checklists to be used
- Identification of any specific computer hardware/software performance requirements and how configuration acceptability will be determined
- Description of how applicable information resource management requirements will be satisfied, as well as any applicable Agency information resource management requirements (EPA Directive 2100, EPA QA Project Plans only)

GROUP C: ASSESSMENT AND OVERSIGHT

Assessments or evaluations are designed to determine whether the QA Project Plan is being implemented as approved (conformance/nonconformance), to increase confidence in the information obtained, and ultimately to determine whether the information may be used for their intended purpose. The two elements in this group detail what assessments or evaluations will occur both during and after the project. Data assessments, such as data verification and validation, are discussed in the Group D elements.

Element C1- Assessments and Response Actions

- Description of project assessments planned and a brief discussion of the information expected
- Approximate schedule for these assessments and their reports
- For any planned self-assessments, identification of potential participants and their relationship within the project organization
- For independent assessments, identification of the organization and person(s) that will conduct the assessments
- Identification of how, when, and to whom the results of each assessment will be reported and corrective actions implemented

Element C2- Reports to Management

- Frequency and distribution of reports to inform management (EPA or otherwise) of the project's status
- Identification of report preparer and recipients, as well as any specific actions or recommendations recipients are expected to make

GROUP D: DATA VALIDATION AND USABILITY

The three elements in this group address the final project checks to see if the data or product obtained will conform to the project's objectives, and to estimate the effect of any deviations. For projects that use existing data, these elements focus on evaluating how data values from these acquired data sets will be used to determine the quality objectives for the new data use. For a modeling project, this process is similar to confirming that the steps in the modeling process were followed correctly to produce the model outputs and that the results meet project objectives.

Element D1- Data Review, Verification, and Validation

State the criteria for deciding to accept, reject, or qualify project data in an objective and consistent manner

Element D2- Verification and Validation Methods

- Description of how project data will be verified and validated
- Discussion of how any issues will be resolved and identification of who has the authority for resolving them
- Description of how results will be conveyed to data users
- Explanation of how validation issues differ from verification issues for this project

- Examples of any forms or checklists to be used and identification of any project-specific calculations

Element D3- Reconciliation with User Requirements

- Description of how project results will be reconciled with the requirements defined by the data user or decision maker
- An outline of methods proposed to analyze the data and determine possible anomalies or departures from assumptions made when the project was planned
- Description of how reconciliation with user requirements will be documented, issues will be resolved, and how limitations on the use of the data will be reported to decision makers

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-007

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2)

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Susan Thorneloe
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-2709
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Work Statement

WA Title: ***Characterizing cross-media transfers from landfills, and management of coal ash and other industrial by-products***

WA #: 0-007 WACOR: S. Thorneloe

Contract #: EP-C-15-008 Alternate WACOR: R. Shores

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES
To complete

(1) Documentation of the analysis using the Leaching Environmental Assessment Framework (LEAF), XRF, and CVAA to evaluate any differences in the mobility of metals for coal that has been treated with calcium bromide to enhance oxidation of Hg to better capture Hg in stack emissions at a coal-fired power plant.
(2) Report and analysis of findings of evaluation of incoming waste for organics in municipal solid waste to determine the Lo that is representative of discarded waste being landfilled;
(3) Complete coding of user friendly interface and tutorials for Leach-XS-Lite which is a data management and visualization tool for use of LEAF.

BACKGROUND

This work assignment will build on previous research to improve the understanding of cross media transfers related to management of landfills, coal ash, and other industrial by-products. This research supports program office needs to provide the technical basis for evaluating emissions to the environment that can cross air, water, and land.

The major focus of this work assignment is on the use of the Leaching Environmental Assessment Framework (LEAF) to evaluate how air pollutants in fly ash and other air pollution control residues may re-enter the environment based on how the material is managed through disposal or use in engineering and commercial applications. LEAF is also suitable for use on a broad range of industrial by-products and therefore OSWER is developing a guidance document on the use of LEAF relying on outputs

from this research. This work assignment will help support the regulatory effort through completion of Version 1 of LeachXS-Lite including responding to stakeholder and external review in addition to documenting analysis completed shortly before the end of ContractEP-C-09-027, WA 5-07. The work planned for completing LeachXS-Lite to convert it from a research version to a more user friendly tool suitable for implementation and transparency in evaluating beneficial use or other management options of coal ash and other industrial by-products.

The funding for the landfill research is from a CRADA with Covanta Energy. The focus of this work is to reduce current uncertainties to estimate landfill gas emissions by quantifying all biodegradable components in municipal solid waste from sorting waste from several different municipalities. In the previous work assignment under the former on-site contract, samples were collected and analyzed to prepare a report. The Contractor shall sample one more site and complete a final report to document this effort and how Lo may differ based on the findings of this research.

Provided below is a list of tasks for FY2015 for the research to be conducted through this work assignment.

SCOPE

1. ***Development/Modification/Compliance with QAPP***: The contractor shall develop quality assurance documentation as required in Appendices #1, 2, and 3 to this Statement of Work. Any work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff. The contractor shall comply with all requirements as delineated on the "Quality Assurance Review Form" included with this extramural activity.

   There is an existing QAPP for this research (Q-TRAK # 03069-A00244) which will should help prepare new QAPPs appropriate for this new contract. Updates as needed will be prepared along with identifying all key personnel. There is also an approved QAPP for the CRADA funded project (Q-TRAK# 13029/A 19326). This QAPP was approved on Dec 9, 2013 and will also need to be developed as a new QAPP for this contract.

2. ***Completion of Leach-XS Lite.*** The Contractor shall make improvements to the user interface based on comments from the EPAWA-COR including update of input templates, integration of embedded tutorials, and addition of screening assessment scenarios as embedded assessments to develop an improved source term for use in OSWER's Industrial Waste Management Evaluation Model (IWEM) [http://www.epa.gov/osw/nonhaz/industrial/tools/iwem/] or other ground water transport and fate model. The Contractor shall make changes to IWEM as needed based on EPA review of the software meeting the requirements for EPA software products.

3. The Contractor shall complete work to meet the goals of a Cooperative Research and Development Agreement to reduce current uncertainties on factors used to estimate carbon emissions from landfills. This includes improving component specific gas potential values, quantity of non-fossil carbon that may not be degraded over a 100-year time horizon, and

accounting for differences between carbon collected versus carbon released through leaks in a landfill. The Contractor shall document this research into a report for publication through EPA's review process. The contractor shall sample one more site and complete the documentation of the work into an EPA report.

4. Under the former on-site contract, analysis of a fly ash that resulted from burning coal at a plant where calcium bromide was used was completed. For this work assignment, the results need to be documented into a memo for use by the WA-COR including the results from CVAA analysis, XRF and LEAF test methods.

5. OSWER has requested that the recently validated and posted methods that comprise the Leaching Environmental Assessment Framework be evaluated to determine the suitability, cost, time, and effort involved to integrated organics including PAHs into the existing methods that evaluating leaching for diffusion, percolation, and mass transfer while considering differences in waste form including granular materials and monoliths. The Contractor shall participate in a July workshop that will help answer questions on how LEAF might be adapted versus other potential approaches to be discussed during the OSWER- conducted workshop this summer.

   The output from this effort will document the work involved to integrated organics into LEAF if the workshop decides that is the best direction for the program office. If that is determined, then we will support providing comments on the methods and guidance on how to get methods through SW846 development, validation, and applications. Attached are documents to be considered as part of the evaluation

CEN-TC351-WG1_N0669_CEN_TS_16637-3_ | Organic contaminant leaching.docx | N0088_CD_21268-3.pdf

Schedule of Deliverables

Task 1 -	New QAPPS for Task 2, 3, and 4
Task 2 –	TBD based on priorities specified by OSWER
Task 3 –	Within 9 months of award
Task 4 -	Within 3 months of award
Task 5 -	Within the performance period

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW)

FOR SECONDARY DATA PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

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(3) delineation of the authority and responsibilities of the QA function;

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http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001
http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

☐ **QAPP Requirements for Measurement Projects**

X **QAPP Requirements for Secondary Data Projects**

☐ **QAPP Requirements for Research Model Development and/or Application Projects**

☐ **QAPP Requirements for Software Development Projects**

☐ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR SECONDARY DATA PROJECTS

GENERAL REQUIREMENTS

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.

1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Identify the secondary data needed to meet the project objective(s). Specify requirements relating to the type of data, the age of data, geographical representation, temporal representation, and technological representation, as applicable.

3.2 Identify the source(s) for the secondary data. Discuss the rationale for selecting the source(s) identified. If a hierarchy of sources exists for the gathering of secondary data, specify that hierarchy.

4. QUALITY METRICS

4.1 Specify the quality requirements of the secondary data. These requirements must be appropriate for the intended use of the data. Address accuracy, precision, representativeness, completeness, and comparability, if applicable.

4.2 Describe the procedures for determining the quality of the secondary data.

4.3 If no project-specific data quality requirements exist, state this in the QAPP. If the quality of the secondary data will not be evaluated by EPA, require that a disclaimer be added to any project deliverable to indicate that the quality of the secondary data has not been evaluated by EPA for this

specific application. Provide the wording for the disclaimer.

5. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

5.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

5.2 Describe data validation procedures used to ensure the reporting of accurate project data.

5.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

5.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

5.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

5.4 Describe data storage requirements for both hard copy and electronic data.

6. REPORTING

6.1 List and describe the deliverables expected from each project participant.

6.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report, etc.). Specify the source(s) of the secondary data in any deliverable.

7. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

ATTACHMENT #2 TO THE STATEMENT OF WORK (SOW)

FOR SOFTWARE DEVELOPMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

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(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

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http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

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http://www.epa.gov/quality/qs-docs/r2-final.pdf

□ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001
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□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

X **QAPP Requirements for Software Development Projects**

□ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR SOFTWARE DEVELOPMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the software and its intended application.

- ☐ **NRMRL's Quality System Specifications:**

  (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

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NRMRL QAPP REQUIREMENTS FOR SOFTWARE DEVELOPMENT PROJECTS

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1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the software and its intended application.

1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. FUNCTIONAL REQUIREMENTS

3.1 Provide a list of the most important functions that the software system must address.

3.2 Identify requirements for functionality, external interfaces (includes graphical user interfaces and interfaces which are needed for other programs to call subroutines from the software, as applicable), performance, and design constraints. Each requirement should be uniquely identified and defined such that its achievement is capable of being objectively verified and validated.

3.3 Specify computer hardware and operating system requirements.

4. SYSTEM DESIGN

4.1 Provide an overview of the system design (e.g., block diagrams showing relationships between major program modules, hardware devices, and data input/output).

4.2 Describe the components and subcomponents of the software design, including databases and internal interfaces. The description should link the software structure to the functional requirements.

4.3 Provide the rationale for selecting the proposed hardware and software tools

5. IMPLEMENTATION

5.1 Describe how a working software system is developed from the design specifications.

5.2 Describe how the requirements for functionality, external interfaces, performance, and design constraints will be verified and validated.

5.3 Describe how release and delivery of the product is managed, including versions for alpha and beta testing.

5.4 Describe the procedures for controlling, documenting, and archiving all significant changes to software and hardware.

5.5 Identify the archiving software used for controlling, documenting, saving, and recovering changes made to the source code.

6. VALIDATION, VERIFICATION, AND TESTING

6.1 Describe the testing strategy that will be used along with the procedures for each planned test. Testing may include individual module tests, integration tests, system testing, acceptance testing, and alpha and beta testing.

6.2 Describe the procedure for checking the correctness of outputs.

6.3 Describe how it will be determined if the developed software product conforms to requirements, and whether the software product fulfills the intended use and user expectations. This includes analysis, evaluation, review, inspection, assessment, and testing of the software product and the processes that produced the product.

7. DOCUMENTATION, MAINTENANCE, AND USER SUPPORT

7.1 Specify the requirements for project documentation (e.g., requirements and design document, configuration maintenance plan, operations manual, source code, user's guide).

7.2 Describe the procedures for maintenance and user support when software or data generated by the project will be distributed outside NRMRL.

7.3 Define the methods and facilities used to maintain, store, secure, and document controlled versions and related artifacts of the identified software during all phases of the software life cycle.

8. REPORTING

8.1 List and describe the deliverables expected from each project participant.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., software, user documentation, user interface).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

ATTACHMENT #3 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

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(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

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http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

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  http://www.epa.gov/quality/qs-docs/r2-final.pdf

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☐ **QAPP Requirements for Method Development Projects**

☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

2. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.

1.2 State the purpose of the project and list specific project objective(s).

3. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

4. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

3.3 Describe the general approach and the test conditions for each experimental phase.

5. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

4.5 Describe the method for uniquely numbering each sample.

4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-008

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	008 Environmental Implicat....

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Chun-Wai Lee	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-7663 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Environmental Implication of Advanced Combustion Technologies

WA #:0-008 WACOR: C. W. Lee

Contract #: EP-C-15-008 Alternate WACOR: Bill Linak

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The primary objective of this project is to investigate the transformation of air pollutants under simulated oxy-coal and oxy-natural gas firing conditions. The effects of this unique combustion environment on the performance of existing air pollution control devices such as fabric filter (FF) and electrostatic precipitator (ESP), wet scrubber, and selective catalytic reduction (SCR), will be evaluated. The potential of the compression and purification (CPU) technology to remove pollutants produced under oxy-coal and oxy-natural gas combustion conditions will also be assessed.

BACKGROUND

Oxygen enrich coal (oxy-coal) combustion as applied to utility coal boilers has been considered one of the promising advanced technologies for mitigating global climate change caused by emissions of CO_2 from coal-fired power plants. This emerging advanced combustion technology currently under development essentially involves process modifications to remove ~80% of volumetric input flow (nitrogen) so as to produce a concentrated CO_2/H_2O exhaust amenable to further processing, compression, and sequestration. There is very little information on how pollutant species such as sulfur, fuel nitrogen, ash, metals, Hg, potential organic hazardous air pollutants (HAPs), etc. will behave and be transformed under the unique conditions of oxy-coal combustion and also the effects of this unique environment on the performance of existing pollution control devices. These transforming pollutant species are likely to affect the operation of different boiler and pollution control systems in both adverse and perhaps beneficial ways. Further, emissions that would normally escape controls and be released as air emissions (O_2, SO_2, SO_3, NO, NO_2, ultrafine ash and metals, Hg, Se, and organic HAPs) now may be compressed and sequestered with the CO_2 and affect its chemistry during transport and in geological storage. In this project, the effect of oxy-coal combustion on the formation and behavior of these pollutants and the effect of this environment on the performance of existing pollution control devices will be investigated.

There is also a significant lack of understanding regarding the environmental issues associated with the CO_2 compression process following the oxy-combustion. Key questions include: (1) what flue gas components, compositions, and concentrations can be processed by compression and purification units (CPUs) and what additional pretreatment is required; (2) how do flue gas species partition to the various CPU effluents; (3) how do process changes on the combustion side that affect CPU operation and partitioning; (4) what purity of CO_2 produced from the CPU is required to ensure safe, very long-term, geologic sequestration; and (5) is it possible for trace levels of impurities (such as oxygen, nitrogen, argon, acids, particles, metals, CO, organics, etc.) to be compressed and sequestered with the CO_2? Air Liquide, a leading industrial gas provider, has developed a compression and purification technology concept to capture, compress, and purify CO_2 generated from the oxy-coal combustion process for sequestration purposes. The process is designed to process the CO_2-enriched flue gas generated from the oxy-coal combustion process through compressing and condensing CO_2 to separate it from other condensable and non-condensable flue gas components for pipeline transportation and geologic sequestration. The multi-stage compression and purification unit (CPU) process can also separate pollutants and impurities from the flue gas. In contrast to existing conventional coal-fired power plants, this process has the potential to produce near zero emissions of air pollutants. APPCD and Air Liquide are collaborating on their experimental research efforts for evaluating the potential of CPU technologies to reduce pollutants from oxy-coal combustion under a Cooperative Research and Development Agreement with EPA (CRADA). The objectives of research are: to examine different flue gas conditioning and CPU configurations options, and how these affect partitioning, emissions, and potential CO_2 purity and; to validate the efficiency of various CPU process parameters to partition and remove pollutant species (SOx, NOx, Hg, PM, H_2O, CO, organic VOCs, etc.).

SCOPE

TASK 1. Work Plan, Reporting, Budget, And WA Management

The contractor shall prepare and deliver to the WA manager (WAM) a work plan and budget within 20 days of WA effective date. The work plan shall include a description of how the contractor shall accomplish each task, along with a breakdown, per task, level of effort by professional level, a cost breakdown, and any underlying assumptions used. The contractor shall conduct activities necessary to manage the WA, including at least weekly communication with the EPA WAM. When responding to this WA, the contractor shall assume the responsibility to operate the IFR. The contractor shall update the existing Quality Assurance Project Plan (QAPP) under the direction of the WAM as specified in Attachment #1. Work involving environmental data shall not commence until the QAPP has received official approval from the EPA Quality Assurance Staff. The contractor shall comply with all requirements as delineated on Attachment #1 to the SOW.

TASK 2 Drop Tube Furnace Experiments

Experimental studies shall collect and analyze gas and particle emissions as a function of oxy-coal operating parameters (O_2, CO_2, H_2O, and temperature). The drop tube furnace shall be operated according to design specifications and establish operating conditions for producing coal combustion aerosol. Characterize the physical and chemical characteristics of drop tube furnace emissions during combustion of pulverized coal. This characterization shall provide data that shall be used to set operating parameters, such as fuel and oxygen feed rates and corresponding exhaust gas characteristics. Quantities to be measured include air and coal feed rates, outlet gas temperature, particle size distribution, and mass emission rates, particle compositions, O_2, CO, NO_x, SO_2, H_2O, and CO_2 gas concentrations. The contractor shall provide support and expertise for sampling and characterization of inorganic and carbonaceous particulate matter emissions.

TASK 3. IFR Experiments

Operation of the IFR

An existing QAPP shall be updated by the contractor for this particular Task. The contractor shall not begin data collection until the QAPP is approved by EPA Quality Assurance Staff. The contractor shall assist in the operation of the IFR. This shall include but not be limited to: natural gas, pulverizing coal, operating the IFR under air- and oxygen-firing modes including the associated air pollution equipment, removing ash and scrubber residue from the facility, and operation of the flue gas sampling system.

Flue Gas Sampling and Analysis

The contractor shall provide support and expertise in vapor-phase sampling for flue gas. This shall include, but not be limited to CO_2, CO, O_2, SO_2, NO_x and total hydrocarbon (THC) measurements taken with continuous emission monitors (CEMs). The contractor shall also provide support and expertise on sampling and characterization of other pollutants which shall be included but not limited to fly ash and metals, Hg, Se, As, and organic hazardous air pollutants (HAPs).

Effect of oxygen enriched combustion on PM emissions and VOC emissions

The contractor shall operate the IFR under oxy-coal firing mode for evaluating the effect of oxy-coal firing on the control of particulate matter (PM). A new electrostatic precipitator (ESP) has been installed recently to the IFR for removing PM from the flue gas in order for recycling most of the flue gas back to the IFR furnace. Flue gas recyling is essential in all oxy-combustion processes. The objective of this subtask is to evaluate the PM control efficiency of the ESP operated under different voltages and current conditions during oxy-coal combustion. The efficient control of PM is very important for the safe operation of the oxy-coal combustion process. The contractor shall provide support and expertise for sampling PM simultaneously at both the inlet and outlet of the ESP using modified EPA Method 5. The contractor shall also provide support and expertise for the characterization of the PM passing through the inlet and outlet location of the ESP using on-line PM measurement instruments including scanning mobility particle analyzer/aerodynamic particle sizer (SMPS/APS) and the laser-based total PM

analyzer made by SICK. The combustion conditions of all the PM control tests will be well characterized. This shall include, but not be limited to CO_2, CO, O_2, SO_2, and NO_x measurements taken with the continuous emission monitors (CEMs). The contractor shall also provide support and expertise on measurements of other specialty gases that are possibly presented in oxy-coal combustion such as N_2O and N_2.

The contractor shall operate the IFR under both oxy-natural gas and oxy-coal firing modes for evaluating the effect of oxygen enriched combustion on emissions of volatile organic compounds (VOCs). The objective of this sub-task is to characterize VOC emissions from both oxy-natural gas combustion and oxy-coal combustion under different IFR furnace operating conditions. The contractor shall provide support and expertise for sampling VOC emissions using the SUMMA canisters. The VOCs samples contained in the canisters will be analyzed using gas chromatography coupled with mass spectrometry (GC/MS) by the existing organic lab set up in the Emissions Characterization & Prevention Branch (ECPB) for measuring VOC emissions from different combustion sources. The contractor shall also provide support and expertise on sampling and characterization of other pollutants such as organic HAPs.

Purchasing of Expendable Supplies

The contractor shall be responsible for purchasing general expendable supplies required to maintain operation of the IFR including the CPU. The WAM shall provide approval for any purchases related to the supplies listed below.

These supplies shall include, but not be limited to:

a) Calibration, supply and carrier gases for analytical systems

b) Valves, tubing and piping

c) Compression fittings

d) Coal and transportation of the coal to EPA's RTP, NC facility

e) Chemicals and reagents including hydrated lime for the wet scrubber

f) Sorbent tubes and other gas-sampling consumables

TASK 4. CPU Installation and Testing

The contractor shall provide technical support to APPCD in the collaborative CPU research with Air Liquide. This support shall include the construction and installation of a laboratory scale CO_2 CPU unit compatible with the IFR combustion research facility that will be used for conducting experiments to evaluate pollutant and purification process effects in oxy-coal combustion systems. Detailed designs for the CPU are being provided by Air Liquide as part of a CRADA with EPA. EPA will provide the large capital components and as many of the small components (valves, fittings, mass flow controllers, meters, etc.) as practical. The contractor

shall coordinate through the WACOR with Air Liquide for addressing technical issues associated with the compatibility of the CPU design and the IFR facility, and once the components are delivered, the contractor shall provide technical support to APPCD to assemble and install the laboratory scale CO_2 CPU and integrate the CPU with the IFR and its SCADA control system. APPCD will provide components and parts for CPU, which include but not limited to the compressor, environmental box, dryers, coolers, flow indicators and controllers, temperature flow indicators and controllers, tubing and fittings. The contractor shall assemble these components and integrate the CPU within the IFR combustor and its SCADA control system following the design provided by Air Liquide. It is understood that while as many components as possible will be provided by EPA, there are likely to be numerous small components that will need to be customized and constructed on-site.

The contractor shall maintain strict control of all Confidential Business Information (CBI) provided by Air Liquide through the WAM for this task as it is required by Contract (EP-C-15-008) on handling of CBI by the contractor.

Task5. Maintenance and Repair of Facility

The contractor shall modify, maintain, operate, and make improvements to the existing drop tube furnace and the IFR facility, and provide all necessary hardware. The two facilities shall also include any instrumentation required to maintain safe and continuous operating conditions. The contractor shall provide the labor necessary to maintain and repair the IFR including the CPU with associated air pollution equipment such as ESP and other auxiliary equipment. Examples include repairing glassware, calibrating nozzles, pitot tubes, dry gas meters (DGMs), tracking equipment inventories, etc. Conduct of specific actions will be approved in writing by the WACOR prior to initiation of any identified support action.

TECHNICAL APROACH/OBJECTIVES

Approach:

The IFR shall be operated under flue gas recirculation with PM control for simulating firing conditions similar to those of the oxy-coal firing boilers currently under development. The objective shall be to achieve greater than 80% CO_2 concentration in the flue gas measured at the outlet of the furnace. Coal combustion flue gases have much significantly higher SO_2 concentration and low moisture content than those of natural gas combustion flue gases. The moisture content in the re-circulated combustion flue gas generated by the IFR shall be reduced substantially by passing the flue gas through a moisture condenser followed by an electric re-heater.

The coals tested in the project shall be identified and selected from commercial suppliers. Initial effort of the tests shall be focused on those coals which have been tested by major oxy-coal combustion organizations from academia and industry.

Objective:

Tests shall be conducted on APPCD's two existing combustion research facilities, the drop tube furnace and the Innovative Furnace Reactor (IFR). The drop tube furnace is a bench-scale system designed to study coal combustion under well controlled environment. The pilot scale, refractory-lined, down-fired furnace (150,000 Btu/hr nominal firing rate) which has been used to generate a coal combustion environment and flue gas cooling conditions similar to those of coal-fired utility boilers. The IFR is equipped with an electrostatic precipitator (ESP) for particulate matter (PM) control. Tests will be performed on this facility to evaluate the emissions and control from oxy-coal combustion. The IFR has been modified for firing natural gas and coal under simulated O_2 and CO_2 enrich conditions similar to those of oxy-natural gas and oxy-coal firing boilers currently under development by the industry. Recirculation of flue gas in the modified IFR's flue gas ductwork, is proposed in the testing of this WA. A laboratory scale CO_2 CPU unit which is compatible with the IFR combustion research facility will be installed in cooperation with Air Liquide. The potential of CPU technology to remove pollutants produced under oxy-coal and oxy-natural gas combustion conditions will be assessed.

QUALITY ASSURANCE

The contractor shall update the Quality Assurance Project Plan (QAPP) as required in Attachment #1 to the Statement of work for "Characterization and Control of Emissions from Oxy-Coal Combustion." After revision, the QAPP shall be reviewed and approved by the contractor work assignment leader and QA officer. Once it has obtained their approval, it shall be submitted to the EPA QA staff for review and approval. It shall be accompanied by a signature page that is signed by the contractor work assignment leader and QA officer to show that they have reviewed and approved the QAPP. It is the responsibility of the contractor work assignment leader to document this process. Upon receipt of the signed QAPP, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Any work involving environmental data shall not commence until the QAPP has received official approval from the EPA QA staff.

DELIVERABLES

The contractor shall deliver raw analytical data (computer files and data sheets) and reduced data in the form of Excel spreadsheets, pie charts, and graphs of the data collected for each experimental study.

SCHEDULE of DELIVERABLES

The contractor shall provide all the data listed as deliverables above to WACOR by the end of the period of performance.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-009

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-009 Open Area Emissions

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2)

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Brian Gullett	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-1534 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Work Assignment 009
Contract EP-C-15-008
Period of Performance April 1, 2015 – March 31, 2016

Performance Work Statement (PWS)
Open Area and Trace Emission Sampling

I. BACKGROUND

EPA is developing methods to sample open area and trace pollutant sources for a broad array of pollutants and source types. These methods include aerial and ground-based mobile measurements as well as stationary measurements. These methods are applicable to a variety of sources such as prescribed fires, landfills, agricultural operations, ordnance disposal, waste combustors, and area industrial sources. These measurements result in concentration values and emission factors. Sampling fires, for example, makes use of the carbon balance method to determine emission factors. Emissions of interest include, PM, black carbon, organics, and metals, among others.

This proposed work represents a continuation of previous work at EPA.

II. PURPOSE

Open area source measurements

Field and laboratory-based measurements of open area sources, such as burning, will be used to derive emission factors which can be input into dispersion models for predicting near-source concentrations and exposures. Potential field sources include controlled-burn agricultural fields, prescribed forest burns, ordnance disposal, wildfires, landfills and landfill fires, industrial flares, lagoons, and large area industrial facilities.

The sampled data will be used to derive emission factors and to make a comparison between field testing and laboratory simulations, as available. Other than emission factor data, the project intends to establish a sound scientific basis and agreement on methodology on how experiments should be undertaken to generate emission factors that will be scientifically accepted.

Point source measurements

Sampling for trace organic air toxics, as well as accompanying pollutants, is necessary for source quantification, emissions prevention, and emissions control. Advanced and standard techniques will be used to quantify pollutants and the operating parameters of the facility that result in these pollutants.

Background Information and **Special Instructions**

- The Contractor is expected to use government furnished equipment (GFE) for the work. This shall include sampling equipment, aerial and ground-based sampling equipment, the open burn test facilities, the Resonance Enhanced Multiphoton Ionization (REMPI)/gas chromatograph(GC)/preconcentrator (PC) system, the organic support analytical laboratory equipment, and related support equipment.
- The Contractor shall supply other equipment as needed.
- The Contractor is expected to run a 20-day OBTF testing program at the EPA
- The Contractor is expected to conduct a 10-day (plus travel) testing program with REMPI at a Northeast U.S. industrial facility and, as directed by the work assignment contracting officer's representative (WACOR), a 15-day (plus travel and weekends) program at a waste combustor in China
- The Contractor is expected to conduct a 20-day field testing campaign(s) for open area emission sampling in the continental U.S.
- Facility operating manuals for the above-mentioned devices shall be followed. Analytical methods and sampling procedures shall follow EPA protocols where practical and applicable.

- The Contractor is advised that the output of this programmatic effort will be reports to external sponsors, conference presentation, as well as scholarly, peer-review journal publications.

III. PERFORMANCE WORK STATEMENT

The Contractor shall undertake laboratory- and field-based work in the following areas:

Task 1. Emissions from Simulated Open Area Burning

It is anticipated that the contractor shall conduct 20 burn test-days in the large open burn test

facility (OBTF) using biomass or biomass-derived materials or the small, temporary burn test facility with potentially alternative materials. At the direction of the WACOR, the contractor shall run the continuous emission monitor (CEM) sampling, biomass or fuel sorting and preparation, burn preparation, OBTF preparation, the conduct of the burn, and the facility clean up. The Contractor shall install and maintain CEMs as directed by the WACOR. The contractor shall analyze target analytes for chemical analysis, including, at the discretion of the WACOR, PM2.5 and PM10, black carbon, PXDD/PXDF, CO, CO2, volatiles, hydrocarbons, and PAHs, and related pollutants.

Task 2. **Emissions from Field-Based Open Area Burning**

It is anticipated that the Contractor shall provide logistical, equipment, and analytical support to one or two field sampling campaigns totaling 20-days including both ground and aerial sampling. Aerial sampling may involve lofting the 55 lb "Flyer" sampling apparatus and the 8 lb "Kolibri" sampling apparatus at the discretion of the WACOR. The Contractor shall include staff with the appropriate certifications and knowledge to control these ground and aerial sampling systems, such as, if necessary, understanding of FAA rules regarding unmanned aerial systems operation and aviation communications capabilities (e.g., Notice to Airmen, FAA flight operation permission/waivers). Tethers, winches, helium if needed, and aerial platforms will be supplied by the Contractor as necessary. All sampling will be done by others. The contractor, at the discretion of the WACOR, shall analyze target analytes for chemical analysis, including, at the discretion of the WACOR, PM2.5 and PM10, black carbon, PXDD/PXDF, CO, CO2, volatiles, hydrocarbons, semi-volatiles, PAHs, and related pollutants.

Task 3. Electronic waste GEEP

The Contractor shall analyze and report on existing data from the GEEP electronic waste recycling plant study done in the past. Their reporting will take the form of writing assistance for a journal article or articles to report the results. The analysis shall include emission factors and material balances. Approximately 2 weeks time is anticipated.

Task 4. REMPI

A Cooperative Research and Development Agreement (CRADA) with Covanta involves a field diagnostic at one of its municipal waste combustors (MWC). The purpose of the diagnostic is to conduct sampling and monitoring to assess the cause of variations in emissions of polychlorinated dibenzodioxin/dibenzofuran. This will be accomplished by a combination of extractive sampling and laboratory analysis as well as near real time analysis. In accord with this, the Contractor shall use an existing Quality Assurance Project Plan (QAPP), run preparatory maintenance tests on the PC/GC/REMPI, gather and assess equipment/standard/gas/supply needs, travel to likely a New England site to conduct a field diagnostic, operate sampling equipment, provide support with laboratory analyses, conduct data analyses, and report on the field testing efforts.

Eight days of field testing plus travel days will be involved. The Contractor shall transport equipment including sampling probes, heated lines, power cables, chemicals, sampling boxes and meters, and the concentrator/gas chromatograph/resonance enhanced multiphoton ionization (REMPI) system. Approximately 60 M23 samples, 15 Tenax samples for volatile organic carbons, and 85 Tenax/REMPI samples are predicted. The Contractor is referred to a previous, similar QAPP effort for WA4-08 "Southeastern Public Service Authority Power Plant Measurement Test Campaign IV", February 2009. Current plans, subject to change, are for May or June testing.

Task 5. REMPI in China

At the discretion of the WACOR, the Contractor shall conduct a 15-sampling-day campaign located, likely, in Hangzhou, China, similar to that in Task 4. However, in this instance the Contractor will only operate the REMPI system with GC and Concentrator and not conduct other standard sampling efforts. Two operators are anticipated for the system.

Task 6. Maintenance

The Contractor shall provide support to maintain test facilities and equipment therein including the open burn test facility, ground ATVs and trailers, sampling equipment, aerial and ground sampling equipment, and REMPI system. About 6 weeks time is anticipated.

IV. Quality Assurance.

The Contractor shall adhere to and ensure that all applicable QA/QC and safety and health rules and requirements are met. Work involving environmental data shall not commence until the

quality assurance documentation has received official approval from the EPA Quality Assurance Staff. Since this work covers measurement to determine emission factors, the contractor shall document quality assurance/control data as required for Measurement Projects (see Attachment #1) to this PWS. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

The modified QAPP shall be reviewed and approved by the ARCADIS work assignment leader and QA officer. Once it has obtained their approval, it shall be submitted to the EPA QA staff for review and approval. It shall be accompanied by a signature page that is signed by the ARCADIS work assignment leader and QA officer to show that they have reviewed and approved the QAPP.

It is the responsibility of the ARCADIS work assignment leader to document this process. Upon receipt of the signed QAPP, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Work involving environmental data shall not commence until the QAPP has received official approval from the EPA QA staff.

IV. DELIVERABLES AND SCHEDULE

The Contractor shall ensure that all reporting requirements as specified by the Contract are met.

1. Weekly Meetings and E-Mail Reports: The WACOR and contractor's project manager shall hold biweekly project meetings to discuss Task-specific progress, issues, and action items. The contractor project manager shall send an e-mail report to the WACOR within one business day of this meeting, unless otherwise specified by the WACOR. The e-mail report shall:

- Specify work goals and priorities for each Task under this work assignment;
- Document action item issues planned in the last weekly meeting for each Task;
- Specify the status of outstanding Task-specific test plans, QA plans, and safety plans; and
- Itemize issues and concerns that need resolution for each Task.

2. Monthly Task Progress and Cost Reports: The contractor's monthly report to EPA shall summarize work activities (accomplished and planned) for each Task in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges.

3. Health and Safety Protocols: Health and safety protocols for each Task shall be updated or prepared as required by the EPA ERC and APPCD safety personnel. These protocols shall be approved by the WACOR and safety personnel prior to the conduct of any testing.

4. Quality Assurance Project Plan (QA/QC) and Test Plans: The contractor shall perform the activities described in these Tasks with reference to the QAPPs entitled

- U.S. EPA Evaluation of Dioxin Emissions Pre-testing Phase,
- Burning CCA-Treated Wood in the Open Burn Test Facility (OBTF),
- Development of analysis methods for the study of PCDD/F TEQ indicators, and
- Evaluation of Dioxin-Like Emissions from Residential Wood Combustion.
- Determination of Emission Factors from Open Burning and Open Detonation of Military Ordnance and its Addendum

5. Facility Manual(s): Relevant manuals shall be reviewed, updated, and approved as specified in QA requirements for facility manuals provided by the EPA QA office.

6. RCRA Compliance reports for activities conducted in the RCRA and Air permitted facility (as relevant): These reports shall be provided to the WACOR and EPA personnel responsible for the permitted facility, upon request.

7. Additional Information.

- Additional instructions will be conveyed in writing by the WACOR in accordance with the "Technical Direction" clause.
- Travel to one U.S.-based conference is anticipated as well as technical support travel to the field sampling locations mentioned above.
- Applicable sections of the contract include 1.1-1.6. 1.8, 2.0 – 7.0.

V. MILESTONES

The following milestones are identified:

- 20 days after WA award. The Contractor shall prepare a Work Plan and deliver to the PO and WACOR.
- 14 days after Work Plan approval. The Contractor shall complete preparation of QA plans for each Task above, as directed by the WACOR and the available testing schedule.
- TBD*. The Contractor shall complete testing and laboratory analysis on OBTF fuel burns (Task 1) including analytical determinations, procedural and QC documentation, and data QC checks.
- TBD*. The Contractor shall complete logistical, equipment, sampling, and analytical

support for one or two field samplings effort (Task 2).

- TBD*. The Contractor shall complete testing and laboratory analysis on one or two industrial field sources (Tasks 4&5) including analytical determinations, procedural and QC documentation, and data QC checks. *

* To Be Determined; dependent upon funding sources.

➢ Attachment 1. NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS: Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5. MEASUREMENT PROCEDURES

5.1. Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2. If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6. QUALITY METRICS (QA/QC CHECKS)

6.1. For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2. Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

- 7.3.1 If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
- 7.3.2 If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8. REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-011

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-011 Fate/Transport SVOCs

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 5, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Xiaoyu Liu	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-2459 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: The Fate and Transport Mechanisms Study of Semi-Volatile Organic Compounds (SVOCs) in Indoor Environment

WA #: WA 011 WACOR: Xiaoyu Liu

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE:

The period of performance detailed in the Performance Statement of Work (PSW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

The overall objective of this project is to study the fate and transport mechanisms of Semi-Volatile Organic Compounds (SVOCs) in indoor environment to support the U.S. Environmental Protection Agency's (EPA's) sustainability activities on chemicals of concern. This project is to develop analytical methods and test protocols for studying the fate and transport mechanisms of SVOCs indoors and to collect data on parameters for quantifying the fate and transport of SVOCs indoors including partitioning between sources and air, source and interior surface materials and interaction between indoor sources and dust.

BACKGROUND

Improving air quality and assuring the safety of chemicals are two of the seven priorities for EPA's future addressed by the EPA Administrator. EPA has created the Chemical Safety for Sustainability (CSS) research program to enhance scientific approaches for understanding current and emerging chemicals, and how this is essential for effective environmental decision making in the 21st century.

It is well known that humans are exposed to multiple pollutants from multiple sources via different pathways and routes in the real environments. Many of the EPA's priority pollutants, including polychlorinated biphenyls (PCBs), brominated flame retardants, perfluorinated compounds (PFCs), bisphenol A (BPA), phthalates, and pesticides, are SVOCs and non- volatiles that are released from a vast number of building materials and consumer products. Understanding the transport mechanisms of these compounds between sources, air, house dust, and interior surfaces in residential environment will help to characterize human exposures, develop/refine source-to-exposure-to-dose models, and develop strategies that

enlighten risk assessments and policy decisions to minimize exposures and to protect human health.

Little is known about SVOCs source and exposure mechanisms. Because of the lack of standards or reliable methods for characterizing SVOC sources, fate and transport, it is often the case that the advance of data collection for SVOCs is far behind model development. The critical data gap for indoor SVOC research includes: (1) emission rates, (2) sorption rates, (3) critical parameters for exposure modeling: material/air partition coefficients and solid-phase diffusion coefficients, sorption rate constants, concentration in the sources and (4) data to support the development of quantitative structure–activity relationship (QSAR) models and mass transfer models (including fugacity models) to predict the SVOC emissions and transport in indoor environments. Our research will directly support rapid prediction of chemical exposure under CSS by providing chemical concentrations and other parameters as part of the basic model input.

SCOPE

Under this WA, the Contractor shall provide technical support to EPA by developing analytical and sampling methods, and conducting chamber or other tests for SVOCs include but not limited to organophosphorus flame retardants (OP-FRs), including tris(2-chloroethyl) phosphate(TCEP), tris(1-chlor-2-propyl) phosphate (TCPP) and tris(1,3-dichloro-2-propyl) phosphate (TDCPP).

TECHNICAL APROACH/OBJECTIVES

The contractor shall conduct the following tasks:

Task 1. Set up Analytical and Sampling Systems for SVOC Tests

Testing chambers, such as small chamber, micro chamber, and large chamber systems will be used for the project. Test samples will be collected on sampling media, such as polyurethane foam (PUF) and Tenax. The contractor shall set up chamber testing system, sample collection and extraction systems. There are various existing analytical methods for SVOCs analysis, including gas chromatography / mass spectrometry (GC/MS), high-performance liquid chromatography (HPLC) and liquid chromatography / tandem mass spectrometry (LC/MS/MS). The Contractor shall review the literatures, set up analytical instruments and optimize analytical methods for the project.

Task 2. Develop SVOC Sources

Constant emission sources are important for SVOC sink effect and transport study. The Contractor shall develop constant emission sources of the flame retardants, TCPP, TDCPP, and TCEP and for other SVOCs. The selection of other target SVOCs

will consult with EPA WACOR and will be based on project needs, vapor pressure ranges, analytical methods, and availability of the sources.

Task 3. Gas Phase Study

The contractor shall conduct chamber or other tests to investigate the gas phase SVOC fate and transport on building materials and consumer products. The contract shall develop and improve sampling methods for testing when needed.

Task 4. Indoor Sources and Dust Study

The contractor shall conduct chamber tests to study the transport mechanisms between indoor SVOC sources and settled and/or suspended dust. For settled dust tests, this will include dust/source direct contact and air/dust partition using different type of dust, different SVOC sources and under different chamber conditions. The work plan will be developed with consultation of the WACOR.

QUALITY ASSURANCE

The contractor shall adhere to the QA requirements as delineated in Attachment #1 to the PWS. A new QAPP will need to be written and submitted for approval, and that a QAPP for a similar previous work will be provided by the WACOR to aid in the development of the new QAPP. Work shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

DELIVERABLES and SCHEDULE of DELIVERABLES

The Contractor shall submit the QAPP within 30 days of receiving the directions from the WACOR.

The Contractor shall finish at least 2 dust chamber tests for the three flame retardants (TCPP, TDCPP, and TCEP) by March 31, 2016. The Contractor shall also provide (1) test material information; (2) environmental data for each test; (3) sampling information; (4) analytical data in excel files. These shall be submitted to the WACOR within 10 business days after each test.

The Contractor shall provide sampling and analytical support to the experiments conducted by EPA staff and ORISE postdoc.

The Contractor shall prepare MOPs for the experimental procedures.

The Contractor shall provide the EPA WAM monthly progress reports as specified in the contract. The Contractor shall alert the WACOR in advance if they expect a substantial delay in completing the task or submitting the deliverable.

The Contractor shall provide necessary health and safety protocol and documentation.

ATTACHMENT #1 TO The PERFORMANCE WORK STATEMENT (PWS) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

- ☐ **NRMRL's Quality System Specifications:**

  (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

  (2) an organizational chart showing the position of the QA function; 07/14/08 A-2

  (3) delineation of the authority and responsibilities of the QA function;

  (4) the background and experience of the QA personnel who will be assigned to the project; and

  (5) the organization's general approach for accomplishing the QA specifications in the SOW.

- ☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

  http://www.epa.gov/quality/qs-docs/r2-final.pdf

- ☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

☐ **QAPP Requirements for Secondary Data Projects**

☐ **QAPP Requirements for Research Model Development and/or Application Projects**

☐ **QAPP Requirements for Software Development Projects**

☐ **QAPP Requirements for Method Development Projects**

☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.

1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

4.5 Describe the method for uniquely numbering each sample.

4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-012

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

Accounting and Appropriations Data

☐ Superfund [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Mark Mason (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4835 FAX Number: 919-541-2157
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Spray Foam Emission Measurement Method Development

WA #: WA 0-012 WACOR: Mark Mason

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE:

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 01, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

This project seeks to develop methods and data to characterize Spray Polyurethane Foam (SPF) insulation emissions during and following application. Data generated in this project will assist EPA and other stakeholders in developing effective risk management strategies and guidance regarding re-entry and re-occupancy of buildings insulated with spray polyurethane foam and assist stakeholders in understanding longer-term potential chemical emissions from SPF insulation. The data generated will also inform the CSS program Life-cycle and Human Exposure Modeling (LC-HEM) team in selection of a product or material for case study of the LC-HEM approach.

BACKGROUND

EPA, NIOSH, OSHA, the CPSC, and others are concerned about exposures of Spray Polyurethane Foam (SPF) insulation applicators, building tradesmen, occupants, and bystanders to isocyanates, flame retardants, amine catalysts, propellants, other SPFI reagents and reaction products that are emitted during and after SPF insulation application. SPF insulation products are used extensively to insulate building and seal air leakage pathways. Recent estimates place the number of buildings insulated in the U.S. with SPF insulation materials in the range of 70,000 to 100,000 per year. Because SPF products can be very effective in insulating buildings and reducing uncontrolled air leakage, SPF products have the potential to play an important role in reducing heating and cooling loads for buildings, a major source of energy consumption and greenhouse gas emissions.

SPF insulation is manufactured on-site using specialized equipment that mixes and blows SPF reagents onto target surfaces where, depending upon formulation and application, the reactants polymerize and expand to form either open or closed-cell foam. SPF is produced using two-component, high and low pressure systems, as

well as one-component systems contained in spray cans that are used for sealing air pathways around plumbing and electrical penetrations, window and door frames. Reagent containers for two-component systems range in size from 55 gallon drums used by commercial applicators to one to five gallon containers for use in low-pressure systems employed by professionals and available to DYI homeowners. One component systems are widely available in hardware and building product stores and typically contain 16 to 32 oz. of SPF insulation reagent in aerosol spray cans.

The chemical constituents of two-component systems consist of "A" side and "B" side chemicals that are mixed in a chamber of the spray gun. "A" side components consist of a mixture of Methylene diphenyl diisocyanate (MDI) and higher molecular oligomers of MDI (pMDI) whereas the "B" side contains proprietary mixtures of polyols, amine catalysts, blowing agents, surfactants, flame retardants, and propellants. When the product is applied, exothermic chemical reactions between "A" and "B" side components occur and the product expands rapidly to form open or closed cell foam. This initial expansion occurs within seconds or minutes of application. Additional reactions or curing may continue for an additional amount of time, e.g., 12 to 72 hours, depending upon formulation, substrate, and environmental conditions during application.

Some SPF compounds are known sensory irritants and sensitizers, e.g., isocyanate exposure is considered to be the leading attributable cause of workplace-related asthma. MDI irritates the eyes, irritates and sensitizes the respiratory tract and skin. Recently, MDI skin exposure has been shown to induce MDI-specific immune sensitivity and promote respiratory tract inflammation responses in animal systems. Pre-maternal exposure to isocyanates has been linked to increased risk of respiratory sensitivity in newborns. Amine catalysts may also cause respiratory tract, eye, and skin irritation and sensitization. Blowing agents may also irritate respiratory tract, eyes, and skin, and may have other central nervous system (CNS) effects. At least one of the flame retardants reportedly in use in SPF products has recently been listed as a Proposition 65 chemical in California.

Development of asthma has been linked to homeowners who reentered their home four hours after application of SPF insulation.(Tsuang and Huang, JOEM, Vol. 54, number 3, March 2012).Due to the increasing use of these products and reports of adverse health effects from some homeowners following installation of SPF insulation, there is a need for an improved understanding of the multi-pollutant emissions and exposures from SPF during application, curing, and post-curing and for improved understanding of the impact of environmental variables on emissions and cure time and movement of emissions from application site to inhabited spaces.

There are currently no consensus test methods, data, or models that characterize emissions from SPF products and relate emissions to potential exposure, hazard, and risk. Consequently, there is uncertainty regarding safe reentry time for building occupants following application of SPF in part due to the lack of consensus test

methods that can be used to generate reliable data on which to base decisions. There is also little data available that characterizes the transport within a building of gases and particles that are generated during and following SPF installation.

SCOPE

Under this WA, the Contractor shall provide technical support to EPA's SPF emissions test method development and SPF emissions characterization research project by providing preparation of test chambers and sampling media for collection of emissions, sampling from chambers using selected media, analysis of samples, reporting of results, as specified below. EPA designed experiments may be conducted in micro chambers, small chambers, full-scale chambers and a research test house.

Experiments will be designed to identify emissions, characterize the time course of emissions, investigate the impacts of environmental variables (substrate, temperature, relative humidity, application depth, A/B side ratio, etc.), and investigate scaling between test systems of different sizes. The contractor shall provide support for data analysis and modeling of source emissions data generated in test chamber systems.

TECHNICAL APROACH/OBJECTIVES

The contractor shall conduct the following tasks:

Task 1. Provide sampling and analysis support to SPF emissions tests

EPA staff will produce on-site and acquire from other sources samples of SPF insulation. Potential sources include three low pressure two component products acquired by EPA for methods development research and samples of surrogate SPF insulation products that were designed, tested and are produced as needed by the ACC Center for Polyurethanes Industries (CPI) to support methods development within the industry and other stakeholders.

Samples of commercial products acquired by EPA will be prepared by EPA in a dedicated spray booth or emissions test chamber and placed by EPA or contractor staff into emissions test chambers supplied with clean, conditioned air. Volatile and semi-volatile organic compound emissions will be collected from the chamber air and concentrated on sampling media, such as Tenax, DNPH, and specialized denuder/filter combination samplers for collection of reactive isocyanates. The contractor may also collect, extract, and analyze surface wipe samples to identify and quantify emissions deposited on surfaces of test chambers. The contractor shall identify and quantify emissions collected in samples by thermal desorption/gas chromatography with mass spectral detection (TD-GC/MS), and liquid extraction with GC/MS analysis.

The contractor shall prepare chamber testing systems, prepare sample collection media and extraction systems for specific experiments.

1a. The contractor shall calibrate, operate and maintain the Markes TD-100 automated thermal desorption system coupled to an Agilent 7890A GC with Agilent 5970C MS for identification and quantification of volatile and semi-volatile organic compound emissions from SPF samples collected on thermal desorption sampling media in experiments outlined below and in other experiments that EPA WACOR will describe in technical directives.

1b. The contractor shall clean, prepare, track and QC Tenax and mixed bed sorbent (Markes C3XX) sampling media for use in sampling per existing miscellaneous operating procedures (MOPs).

1c. The contractor shall calibrate, operate and maintain a Hewlett-Packard 6890 GC with HP 5973 MS equipped with an 6890 series auto sampler for analysis of liquid extracts of surface wipe samples, deposition samples, and extracts of polyurethane foam semivolatile organic samplers (PUF) and SPF insulation sample extracts (see task 4).

1d. The contractor shall transfer data generated on analytical instruments into approved spreadsheets that become the electronic record of the experiment, and bring together all data relevant to the experiment. The contractor shall review data generated by the contractor for completeness, identify apparent outliers and flag data that do not appear to meet quality criteria. The contractor shall report apparent anomalies in the data, summarize and report indicators of data quality as specified by test plans and as required by an approved Quality Assurance Project Plan (QAPP).

1e. The contractor(s) shall be certified for use of supplied air respirator to enable preparation of foam for placement in test chambers, collection of samples and operation of instruments in and near areas of SPF application. Two contractor staff typically suit up to assist in initiating an experiment where EPA produces SPF insulation, and samples are cut from bulk material and placed in emissions test systems.

1f. The contractor shall clean emissions test chambers and conduct air and surface sampling and analyses to verify cleanliness of the test chamber system.

Task 2. Provide support to the ASTM Consensus SPF Methods Development Task

EPA expects to participate in an ASTM SPF methods development task by evaluating a draft protocol for testing cured SPF samples using micro chambers (dynamic headspace cells). SPF insulation samples will be produced at an American Chemistry Council (ACC)/industry stakeholder laboratory and shipped to participants for emissions testing using micro chambers and/or small chambers. Prior to testing, the contractor will be provided with a list of target compounds for the surrogate product testing. The contractor shall:

2a. Prepare calibration solutions for target compounds not currently in the calibration suite.

2a. Initiate testing within 24 hours of receipt of the samples and conduct testing according to the draft ASTM protocol. Chamber air flow rate, temperature, relative humidity, and sampling schedule will be provided in the draft protocol.

2b. The contractor shall prepare a MOP for set up and operation of the new Markes M-CTE 250 micro chamber/thermal extractor system and submit it for review and approval by the EPA WACOR and QA staff.

Task 3. Provide support to Full-scale Emissions Testing experiments

The contractor shall assist EPA in setup of the 30 m^3 test chamber for characterization of application phase emissions. EPA expects to conduct a minimum of four full-scale chamber tests of two-component low pressure systems, following pilot tests that will be conducted by EPA with contractor sampling and analysis support, to develop a draft protocol.

3a. The contractor shall assist with chamber modifications and evaluation of the effectiveness of such modifications that are designed to prevent, control and minimize contamination of chamber surfaces, particularly flame retardants.

3b. The contractor shall assist in development and demonstration of sampling and analysis systems specific to quantification of propellants such as R 134a that are too volatile for analysis by the TD-100 GC MS system.

3c. The contractor shall provide extraction, sampling and analysis of C3 samplers, PUF and wipe samplers collected in full-scale tests.

Task 4. Develop and demonstrate an extraction method for flame retardants from SPF insulation materials

Upon technical direction from the WACOR, the Contractor shall develop and demonstrate an extraction method for the flame retardant TCPP and other target compounds that have been observed in the emissions of SPF. Compounds will be selected in consultation with the EPA WACOR. This is an adaptation of the method used by Liu (WA0-011) to extract FRs from PUF samplers. Pilot tests have shown that the method may work for SPF insulation samples. However, no work beyond proof of concept has been conducted due to resource limitations.

Task 5. Provide blinded quality control samples for specific sampling media and analysis systems as specified in test plans. The contractor shall:

5a. Provide blinded QC challenge samples to EPA analysts quantifying isocyanates using ISO 17734. The contractor shall spike ASSET samplers with known amounts of dibutylamine (DBA) stabilized isocyanate standards for LC-

MS/MS analysis by EPA and/or a contract laboratory. EPA will provide the samplers and standard spiking solutions for dilution and spiking by the contractor.

5b. Identify a commercial laboratory with demonstrated ability to identify and quantify selected isocyanates collected on ASSET sampling media to provide independent verification of isocyanates identified and quantified by EPA. The laboratory shall have demonstrated capability to quantify methyl isocyanate, phenyl isocyanate, methylenediphenyl isocyanate (4,4'- and 2,4'-MDI), and polymeric MDI (3,4,5 ring MDI) at levels of <5 nano gram per sample.

5c. The contractor shall provide unknown challenge standard solutions for HPLC analysis by EPA.

5d. Spike Tenax and C3 (Tenax/carbon adsorbent) wipe and PUF samplers for analysis by contractor staff. Contractor staff who are not analyzing the samples shall spike them.

QUALITY ASSURANCE

The contractor shall adhere to the QA requirements as delineated in Attachment #1 to the Statement of Work. A new QAPP will need to be written and submitted for approval, and that a QAPP for a similar previous work will be provided by the WACOR to aid in the development of the new QAPP. Work shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

DELIVERABLES and SCHEDULE of DELIVERABLES

The Contractor shall submit the QAPP within 30 days of receiving the directions from the WACOR.

The EPA expects to complete micro chamber and/or duplicate small chamber (53 liter volume electro-polished stainless steel) emissions tests for up to three different two component low pressure SPF insulation kit systems (Products 1, 2, and 3) by October 30, 2015, or within 75 days of approval of the QAPP. Existing micro chamber emissions data for Product 2 will be used to select target compounds and select test parameters. The contractor shall provide results of analyses of samples within 10 business days of completion of analyses of samples for each experiment.

EPA will conduct full-scale emissions testing that include application phase during the period of August through December, 2015. The contractor shall provide sampling and analysis support for pilot tests and for up to four emissions tests following development of a draft protocol.

The Contractor shall report results for the ASTM protocol evaluation testing within ten business days of completion of analyses of samples. The schedule for other testing and deliverables may be adjusted to accommodate the ACC/CPI foam production schedule.

The EPA will provide (1) test material information; (2) environmental data for each test. The Contractor shall provide (1) sampling information; (2) analytical data in excel files. These shall be submitted to the WACOR within 10 business days after completion of each test.

The contractor shall provide a draft final report containing all data and analyses generated by the contractor within 45 days of the WA end date (3/31/2016). EPA will review the draft report and provide comments within 21 days. The contractor shall respond to review comments and provide a revised final draft within 15 days of receiving EPA review comments.

The Contractor shall provide the EPA WAM monthly progress reports as specified in the contract. The Contractor shall alert the WACOR in advance if they expect a substantial delay in completing any task or submitting a deliverable.

The Contractor shall provide necessary health and safety protocol and documentation.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function; 07/14/08 A-2

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

□ **QAPP Requirements for Software Development Projects**

□ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.

1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

4.5 Describe the method for uniquely numbering each sample.

4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-013

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Ken Krebs
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-2850
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT & METHOD DEVELOPMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

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(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
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☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

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□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

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X **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

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EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

NRMRL QAPP REQUIREMENTS FOR METHOD DEVELOPMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Provide a description of the situation that requires the generation of a new or modified method.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Identify the specific analyte(s) of interest and the matrix/matrices under study.
3.2 Identify the analytical approach that will be used and how it will be optimized for this study. Also describe any tests of interference and analyte stability.
3.2 Identify the method performance metrics (QA/QC checks) that will be used to evaluate the method, including the procedures used. These metrics could include (but are not limited to) positive and negative controls, sensitivity, precision, accuracy, recovery, linearity, specificity, robustness, and range.

4. SAMPLING PROCEDURES

4.1 Provide the requirements for samples that will be used to test the method (including matrix and presence/concentration of analytes).
4.2 If synthetic (i.e., laboratory-prepared) samples are used, describe the preparation of these samples.
4.3 If non-synthetic (i.e., real-world sample) samples are used, address the following:
- describe the sampling design that will be used and the steps taken to assure that representative samples are collected
- discuss or reference each sampling procedure
- provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis
- describe procedures for packing and shipping samples, and provisions for maintaining chain-of-custody, as applicable

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.

5. MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each preparation or analytical procedure to be used, if known. Include steps for preparation, calibration, measurement, quality control, and reporting.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6. METHOD PERFORMANCE METRICS

For each method performance metric (QA/QC check) identified in Section 3.2, specify the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

7. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8. REPORTING

8.1 List and describe the deliverables expected from each project participant.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report, etc.). If a method/SOP will be developed, specify the required format.

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-017

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008	Contract Period: 04/01/2015 To 03/31/2016 Base X Option Period Number	Title of Work Assignment/SF Site Name: 0-017 Novel Sampling... VOCs
Contractor: JACOBS TECHNOLOGY INC.	Specify Section and paragraph of Contract SOW: 2, 6	

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: John Kinsey (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-4121 FAX Number:
Project Officer Name: Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Novel Sampling Techniques for Measurement of Aircraft Volatile and Non-Volatile PM Emissions

WA #: 017 WACOR: John Kinsey

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The overall objective of this project is to determine if total (volatile + non-volatile) particulate matter (PM) from aircraft turbine engines can be determined using one or more prototype dilution techniques as outlined below.

BACKGROUND

Aircraft PM is formed in the engine combustor due to incomplete combustion of fuel, and in the atmosphere through gas-to-particle transformations of organic and sulfur-based volatile components upon cooling and mixing with the atmosphere. PM emitted from the engine at exit temperatures and pressures are defined as non-volatile, whereas those formed via gas-to-particle conversion in the atmosphere downstream of the engine are known as volatile PM. Accurate measurement of non-volatile PM from aircraft engines is a daunting task due to the harsh environment found at the engine exit, particle losses during transport in the sample lines, and physical and chemical transformations of the sample as it is transported to analytical instrumentation. Reliable measurements of volatile PM are even more challenging as these are formed in the exhaust plume and are greatly influenced by ambient conditions and composition of the volatile species.

The Oak Ridge National Laboratory (ORNL)/Air Force Research Laboratory (AFRL)/University of Dayton Research Institute (UDRI) team has developed a unique dilution chamber (DC) system to homogeneously dilute and condition aircraft exhaust for the measurement of total (volatile + non-volatile) PM while sampling at the engine exit. In a separate effort, Aerodyne Research Inc. (ARI) has produced a condensation dilution probe (CDP) to effectively control the formation of volatile particles to simulate atmospheric processing behavior and to quantify this contribution on the total PM mass emissions. Both devices have shown excellent potential when tested in laboratory and limited field environments. Further demonstrations of these devices may lead to the development of more reliable

methodologies for the measurement of both volatile and non-volatile PM emissions from turbine engines at the engine exit.

The first demonstration test was conducted at Wright-Patterson Air Force Base (WPAFB) on a T-63 engine under a prior contract in September 2013. A second demonstration test using a C-17 aircraft was performed in June 2015. The goal of this Work Assignment (WA) will be to complete data analyses for the second demonstration test and assist with reporting of all results from the study.

SCOPE

The contractor shall assist the WACOR with final data analyses and reporting of results from the second demonstration test. This work shall mainly include the results generated by the continuous emission monitoring equipment for gaseous pollutants but may include other parameters as well. In addition, as resources permit, the contractor shall also assist the WACOR with preparation of the project final report for both test campaigns including publications support. Additional background information will be provided to the contractor after initiation of the WA.

QUALITY ASSURANCE

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance staff. A new Quality Assurance Project Plan (QAPP) will be developed for the study including the work conducted under this Work Assignment. This QAPP will be based on a prior version prepared under EPA Contract EP-C-09-027, WA 6-78.

DELIVERABLES

The deliverables for this WA will consist of at least reduced data summaries and associated analyses. Other input to the final report shall also be prepared by the contractor, as time and resources permit.

SCHEDULE of DELIVERABLES

The reduced data set from the second demonstration test shall be provided to the WACOR by the contractor no later than October 15, 2015. Other deliverables associated with the final report will be needed by October 31, 2015.

STAFFING REQUIREMENTS

It is anticipated that a PL-2 engineer familiar with the on-site testing will be needed to complete all work to be conducted in this Work Assignment. The small budget available for this work precludes the use of more senior staff.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

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(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

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(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
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□ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

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- ☐ **QAPP Requirements for Secondary Data Projects**
- ☐ **QAPP Requirements for Research Model Development and/or Application Projects**
- ☐ **QAPP Requirements for Software Development Projects**
- ☐ **QAPP Requirements for Method Development Projects**
- ☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

---

NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-019

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name John Kinsey
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-4121
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: PM/Air Toxics from Commercial Aircraft Engines

WA #: 0-019 WACOR: John Kinsey

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

The overall objective of this project is to characterize the particulate matter (PM) and air toxic emissions from commercial aircraft turbine engines. Specific aspects of this ongoing 11 year project are outlined below.

BACKGROUND

Aircraft PM is formed in the engine combustor due to incomplete combustion of fuel, and in the atmosphere through gas-to-particle transformations of organic and sulfur-based volatile components upon cooling and mixing with the atmosphere. PM emitted from the engine at exit temperatures and pressures are defined as non-volatile, whereas those formed via gas-to-particle conversion in the atmosphere downstream of the engine are known as volatile PM. Accurate measurement of non-volatile PM from aircraft engines is a daunting task due to the harsh environment found at the engine exit, particle losses during transport in the sample system, and physical and chemical transformations of the sample as it is transported to analytical instrumentation. Reliable measurements of volatile PM are even more challenging as these are formed in the exhaust plume and are greatly influenced by ambient conditions and composition of the volatile species.

A number of studies have been conducted by EPA to characterize the PM and toxic air emissions from commercial aircraft engines. Two recent projects include:

- Black Carbon Instrument Comparison: This testing program evaluated four different methods for the determination of black carbon and elemental carbon using both a laboratory soot generator (Jing Mini-CAST) and aircraft turbine exhaust. A draft final report is available for the laboratory study and is undergoing peer review. The turbine measurements were conducted in September 2012 at Wright Patterson Air Force Base (WPAFB) on a T-63 turboshaft engine and the data were reduced and analyzed but never published. In addition, a new instrument (SuperMAAP) was produced under

this project and further development is needed with respect to the LabView program used to operate the instrument and other possible "fixes."

- Variable Response in Aircraft nvPM (non-volatile particulate matter) Testing (VARIAnT): The purpose of this test campaign was to assess the source(s) of variability between multiple (and theoretically identical) prototype sampling systems measuring the emissions from the same source as determined in prior engine tests. The first campaign was conducted in September 2014 at the University of TN Space Institute near the U. S. Air Force's Arnold Engineering Development Center (AEDC) in Tullahoma, TN. The data from this campaign have been reduced and analyzed which indicate that the major source of variability observed between systems was associated with lack of agreement between the two types of nvPM mass analyzers being used (laser induced incandescence [LII] and photoacoustic soot sensing [PASS] analyzers). To further investigate this issue, additional research was conducted during the spring of 2015 in Europe in response to the VARIAnT 1 preliminary results.

  A VARIAnT 2 study is currently being planned for August 2015 to reproduce some of the European testing and expand on the particle sizing work conducted during VARIAnT 1 to determine system particle losses. This study will involve additional measurements using both a Mini-CAST propane diffusion burner as well as a J-85 turbojet engine located at AEDC to further characterize sampling system particle losses plus reevaluate the performance of the two black carbon analyzers used to measure nvPM after modification of the LII.

SCOPE

The contractor shall assist the WACOR with the following research:

- Task 1: The contractor shall provide technical support to the black carbon instrument validation program described above on an as-needed basis. As part of this support, the contractor may be asked to provide assistance to complete the final report for the laboratory study including production support as resources permit. The contractor may also be required to support preparation and submission of a draft journal article on the instrument comparison testing conducted in September 2012 at Wright Patterson Air Force Base. Other support may include: additional data analyses; responding to quality assurance and peer review comments, as needed; or additional work on the SuperMAAP instrument.

- Task 2: The most important task to be conducted under this WA shall be to provide technical support for the two campaigns conducted under the

VARIAnT experimental program. This work shall include finalization of the VARIAnT 1 data as well as preparation and implementation of the VARIAnT 2 campaign.

The contractor shall prepare the necessary test equipment for VARIAnT 2 and deploy this equipment to AEDC from August 16 to September 1, 2015 per the approved Quality Assurance Project Plan for the program as prepared by the WACOR. The contractor shall also assist the WACOR with the conduct of the research and subsequent data analyses. Most of the actual data reduction will be performed by study collaborators on-site but at least some data analysis support shall be required from the contractor after completion of the field testing. Preliminary VARIAnT 2 data are needed by the end of September 2015 in order to influence a final regulation being promulgated by the International Civil Aviation Organization for new and in-production commercial aircraft engines. Thus, the VARIAnT 2 testing is of the upmost importance to EPA's Office of Transportation and Air Quality and should be granted highest priority.

QUALITY ASSURANCE

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance staff. One or more new Quality Assurance Project Plans (QAPPs) will be developed including the work conducted under this Work Assignment. These QAPPs will be based on prior versions prepared under EPA Contract EP-C-09-027.

DELIVERABLES

The deliverables for this WA will consist of at least:

1. Final results from VARIAnT 1
2. Preliminary results from the VARIAnT 2 test campaign.

SCHEDULE of DELIVERABLES

The above deliverable shall be provided by the contractor no later than September 30, 2015.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

X **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

□ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

- ☐ **QAPP Requirements for Secondary Data Projects**
- ☐ **QAPP Requirements for Research Model Development and/or Application Projects**
- ☐ **QAPP Requirements for Software Development Projects**
- ☐ **QAPP Requirements for Method Development Projects**
- ☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-019

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 0-19 Amd 1

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name John Kinsey
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-4121
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: PM/Air Toxics from Commercial Aircraft Engines

WA #: 0-019, Amendment 1 WACOR: John Kinsey

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the date of receipt through March 31, 2016.

SUMMARY OF OBJECTIVES

The overall objective of this project is to characterize the particulate matter (PM) and air toxic emissions from commercial aircraft turbine engines.

SCOPE

The following new task is hereby added to the Performance Statement of Work:

- Task 3: The contractor shall provide data analysis and reporting support to the WACOR for the two aircraft engine campaigns (September 2014 and August 2015) conducted under the VARIAnT experimental program. This work shall include finalization of the VARIAnT test data, organization of the experimental results in the form of tables, graphs, and other summary information, and the drafting of input to one or more journal articles reporting the experimental results of the two test campaigns. The contractor shall also provide document production and word processing services on an as needed basis.

  In addition, the contractor shall also send personnel to the VARIAnT 2 test site (University of TN Space Institute) to retrieve Government owned equipment, gas bottles, etc. that were intentionally left behind to support further testing which has now been postponed until a later date. Tentatively, this activity is scheduled for the first week of December 2015.

QUALITY ASSURANCE

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance staff. This work was performed under existing Quality Assurance Project Plans (QLOG No. A-20406/QLOG No. 14019 and QLOG

No. A-21231/QTRAK No. 15019) approved in August 2014 and August 2015, respectively. No new data will be collected.

DELIVERABLES

The deliverables for this WA will consist of:

1. All Government property and related equipment returned to EPA's RTP campus.
2. Final results from VARIAnT 1 and 2 in a form suitable for publication
3. Input to one or more journal articles

SCHEDULE of DELIVERABLES

Deliverable 1 shall be completed no later than December 31, 2015 unless circumstances preclude access to the test site. The remaining deliverables shall be provided to the WACOR no later than March 31, 2016.

STAFFING

Due to the complexity of the work conducted and data collected, the technical support needed for Deliverables 2 and 3 of this WA can only be provided by staff intimately familiar with the research conducted on-site during both test campaigns.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-020

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	020

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 2, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name John Kinsey (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4121 FAX Number:
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Biomass Pellet Emissions and Energy Efficiency

WA #: 020 WACOR: John Kinsey

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The objectives of this project are to characterize the emissions and energy efficiency of an outdoor hydronic heater while burning two non-woody biomass fuels as compared to wood pellets.

BACKGROUND

Under a previous project, NRMRL characterized the emissions and energy efficiency of four outdoor wood-burning hydronic heaters as part of a Cooperative Research and Development Agreement (CRADA) with the New York State Energy Research and Development Authority (NYSERDA). As a follow-up to this research, NRMRL is in the process of conducting a similar study for the use of non-wood biomass fuels in a pellet-fired hydronic heater owned by Cornell University again using CRADA funding from NYSERDA. The purpose of this Work Assignment (WA) is to complete the CRADA-funded research which was started under EPA Contract No. EP-C-09-027, WAs 5-19 and 5-20 but abruptly stopped due to a water leak in the EPA's High Bay building. All preparations for testing were made but no actual experiments were conducted.

SCOPE

The contractor shall assist EPA in the performance of the research outlined in the draft QAPP supplied by the WACOR. This work shall include operation of the appliance to be tested and all emissions and process monitoring equipment which is assumed to be completely ready for immediate use in the project. The specific experiments to be conducted, measurements to be made, and chemical analyses to be performed shall be as outlined in the draft QAPP or as otherwise directed by the EPA WACOR. The work conducted shall be conducted in a similar manner as that

outlined in the prior hydronic heater testing performed for NYSERDA.[1] As time and resources permit, the contractor shall also perform applicable data reduction and analysis activities in order to help prepare for preparation of the final test report.

QUALITY ASSURANCE

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance staff. A new Quality Assurance Project Plan (QAPP) will be developed for the study including the work conducted under this Work Assignment. This QAPP will be based on a prior version prepared under EPA Contract EP-C-09-027, WA 5-80 which is available as a draft to this project.

DELIVERABLES

The deliverables for this WA will be final test results and other technical input to a final report.

SCHEDULE of DELIVERABLES

The following schedule shall be followed unless otherwise justified to the WACOR:

1. Submission of QAPP: No later than 10 working days from issuance of the Work Assignment
2. First test run: No later than 15 working days from issuance of the Work Assignment
3. Completion of experiments: January 15, 2016

STAFFING

Since this is a continuation of a project started on a previous contract, it is assumed that all necessary preparations have been made to begin testing. As such it is anticipated that only minimal PL-4 will be required to conduct measurements according to well established protocols. Therefore, any use of PL-4 labor must be kept to a minimum and throughly justified in the Work Plan for the study.

---

[1] Gullett, B., R. Dodder, I Gilmour, M. Hays, J. Kinsey, W. Linak, D. Loughlin, L. Oudejans, T. Yelverton, G. Wood, M. Toney, A. Touati, J. Aurell, S-H. Cho, and S. Sidhu, "Environmental, Energy Market, and Health Characterization of Wood-Fired Hydronic Heater Technologies," Report No. 12-15, New York State Energy Research and Development Authority, Albany, NY (2012).

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

□ **QAPP Requirements for Software Development Projects**

□ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-020

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name John Kinsey	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-4121 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Biomass Pellet Emissions and Energy Efficiency

WA #: 020 Amendment 1 WACOR: John Kinsey

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The objectives of this project are to characterize the emissions and energy efficiency of an outdoor hydronic heater while burning two non-woody biomass fuels as compared to hardwood pellets.

SCOPE

The following new task is hereby added to the Performance Statement of Work:

- In this task, the contractor shall perform the necessary testing, sample collection, and analyses for the study as outlined in the approved QAPP. This shall include all applicable measurements for emissions and appliance operation while burning the previously acquired pellet fuels in the Reka HKRST/V-FSK 20 hydronic heater installed outside of the High Bay building. Samples collected during each test shall also be transferred to the applicable EPA personnel for chemical analysis per the approved QAPP. Reduced data from all continuously monitored parameters shall also be provided by the contractor to the EPA WACOR for further analysis and inclusion in a final report.

QUALITY ASSURANCE

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance staff. A new Quality Assurance Project Plan (QAPP) was developed for the study including the work conducted under this Work Assignment.

DELIVERABLES

The deliverables for this WA will be final test results and other technical input to a final report.

SCHEDULE of DELIVERABLES

The following schedule shall be followed unless otherwise justified to the WACOR:

1. Completion of testing and sample/data transfer: March 31, 2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-021

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name:

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Eben Thoma
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-7969
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Fenceline, Fugitive, and Area Source Emissions Measurements and Methods

WA #: 0-21 WACOR: Eben Thoma

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of the award through March 31, 2016.

SUMMARY OF OBJECTIVES

This work assignment (WA) continues research efforts in the fenceline, fugitive, and area source emissions measurement topic area. The goal of this WA is to continue development of select aspects of these technologies, demonstrate them in the field where possible, and document them through method development activities.

BACKGROUND

Reducing fugitive and area source emissions of greenhouse gases (GHGs), hazardous air pollutants (HAPs), other volatile organic compounds (VOCs), and certain inorganic gases from industrial facilities, agricultural operations, energy production, and waste disposal, is an ongoing priority for EPA and our state and local co-regulators. Unlike stack emissions, fugitive and area source releases are difficult to detect and measure, due to the spatial extent and inherent temporal variability of the potential sources.

Fenceline, process, and control system monitoring using new technical approaches (e.g. optical remote sensing (ORS), infrared cameras, hyper spectral imaging, mobile measurements, passive sampler and sensor network techniques) can augment manual leak detection and repair LDAR programs (where they exist) by providing spatially-resolved, speciated, and/or near real-time emissions information. Time-integrated passive sampling is also an important emerging screening approach (reference draft method 325A and B). The detection of fugitive emission by time-resolved monitors, coupled with wind direction data, can be used to pinpoint and

repair fugitive leaks with short response times, greatly decreasing the potential for emissions.

SCOPE

The primary resource allocation for this WA is associated with Task 1. The contractor shall prepare a work plan (WP) that includes individual itemized cost and LOE estimates for each Task set, along with delivery dates. The contractor shall track expenditure for each task individually.

For Task 1 planning purposes, the contractor shall assume 1.0 man days per week on average for a 10-month period for execution of field study activities. The contractor shall assume no more than $3000 of travel associated with Task 1. The contractor shall assume no more than $15,000 total for equipment rental, shipping, materials, general development, and site infrastructure costs for Task 1.

TECHNICAL APROACH/OBJECTIVES

Under the technical direction of the EPA work assignment manager (WAM), the contractor shall execute the tasks listed below. The contractor shall assume bi-weekly meetings and conference calls to review progress with the WAM and EPA collaborating groups related to these efforts. Meeting frequency in the planning phases of the projects shall be greater. The contractor shall evaluate the potential need for outside consultants and/or laboratories with expertise in the various technical areas to meet deliverables and shall be responsible for defining, executing, and managing any subcontracts that may be required. The contractor shall be responsible for arranging and executing any required equipment rentals, site access agreements, and related infrastructure needs (e.g. trailer and equipment transport, land power drop, permits, etc.) as part of the execution of any field campaigns or evaluations. The contactor shall be responsible for all safety and health coordination for any visiting site field operations.

Task 1: Fenceline technology field testing and data analysis

For background information on a somewhat similar study that involved passive samplers and sensors, reference EPA QAPP for Philadelphia Passive Sampler and Sensor Study under NRMRL QLOG No. A-18508, QTRAK No. 13010, and NERL QAPP "Collaborative Evaluation/Validation of a Low-Cost Volatile Organic Compound Passive Sampling Method" and associated 2015 AWMA conference papers to be provided.

In consultation with EPA and the collaborator team, the contractor shall plan and execute one or more fenceline technology field testing and data analysis studies. These studies shall include several potential combinations of passive sampler (PS), sensor, mobile, and optical remote sensing systems. The PS portion of the testing program (if executed) shall be based on a nominal two-week deployment schedule. The contractor shall assume that EPA will cover the PS shipping costs and that EPA ORD NERL lab will provide analysis of the passive samplers in a similar fashion to the above referenced study. The emphasis shall be on UV optical remote sensing technologies and methods for the initial phases of the project. For the purposes of this work assignment the term "field testing" includes both offsite deployments and testing at the EPA open path range. Data analysis activities shall involve specialized processing of existing or acquired data using best available technical approaches.

Task 1.1: Development of field testing and analysis options (planning phase)

The locations, durations, and specific equipment utilized for the fenceline field studies shall be determined as part of the planing phase of the projects. In the planning phase, the contractor shall analyze cost-effective field deployment options for the studies and communicate this analysis to the EPA and potentially a collaborator group as part of regular meetings. A factor that shall influence the field study site selection portion of the planning process includes (but shall not be limited to) the proximity of contractor personnel to the desired field study areas to facilitate cost-effective execution of a long-term testing program. If no contractor personnel are available in the study area, then the possibility for cost-effective subcontracting for deployment shall be at the discretion of the contractor. The contractor shall assume the following initial areas of the U.S. as potential study locations: RTP NC (EPA ORS test range), Philadelphia PA, Corpus Christi TX, Houston TX, Los Angeles Area CA, San Francisco Bay Area CA, Detroit MI, Sarnia Ontario Canada. The default first study shall be testing of UV optical remote sensing technologies and methods in RTP NC.

The selection of specific equipment for testing and special data analysis procedures shall also be part of the planning phase of the projects. Factors that affect equipment selection shall include (but shall not be limited to) deployment and operation cost, site-specific deployment factors, the interest in the specific technology set by potential site collaborators, and equipment availability. The emphasis shall be on UV optical remote sensing technologies and methods for the initial phases of the project however the equipment set could include one or more of the following: passive samplers (PS), and real-

time automated forms of lower cost solar-powered sensors, compact Sentinel units (see EPA AWMA reference to be provided), lower cost open-path ultraviolet optical spectroscopy, and lower cost open-path infrared optical spectroscopy (e.g. TDL or filter correlation); hyperspectral imagers, all with wind monitoring capability. The fenceline equipment selection analysis shall include all site and maintenance requirements for specific equipment, quality assurance testing requirements, and data analysis needs for the deployment, with emphasis on remotely accessible data forms where possible. The default first study shall be testing of UV optical remote sensing technologies and methods in RTP NC for a one to two month period with a potential follow-on at a remote testing location TBD.

The deliverable for the Task 1.1 planning exercises is one or more options analysis documents in the form of approximate 5-10 page short-form summaries that outline all aspects of a specific potential deployment scenario and/or data analysis options with associated costs. The options analysis document shall include a description of any perceived uncertainties that could be detrimental to project execution (e.g. site access constraints or infrastructure uncertainties). The option analysis documents shall be required only for primary selected opportunities (not for all potential deployment scenarios). The contractor shall communicate information on potential deployment scenarios to the WAM as part of regular meetings. The WAM shall indicate by technical direction if a specific deployment opportunity shall be developed as an optional analysis document. The options analysis document shall form the basis for the project QAPP if the field study is selected to proceed.

Task 1.2: Development of QAPPs, safety plans, project agreements

Based on the options analysis documents provided in Task 1.1, the WAM and collaborator group shall make a decision on initiation of the potential field project. If a decision to proceed is made, the WAM shall communicate this to the contractor through technical direction and preparation for the field study shall then begin. After receipt of the technical direction to proceed, the contractor shall prepare an EPA Category III QAPP and associated SOPs for the project. The contractor shall prepare an integrated safety plan with site collaborators. The contractor shall initiate any required subcontracts, equipment rentals, or other arrangements needed to execute the study. The contractor shall execute any required predeployment quality assurance testing or needed equipment integration or fabrication. The contractor shall prepare and document the operational capability of all field systems prior to deployment. The contractor shall prepare QAPP amendments, standard

operating procedures, and calibration records for all deployed technologies on an as required basis. The field study shall not be initiated until EPA has approved the QAPP and all predeployment procedures are complete.

Task 1.3: Execution of field tests and data analysis activities

The contractor shall execute the field tests and data analysis activities as per the approved QAPP(s). The contractor shall prepare and deploy any required optical remote sensing systems, passive samplers (PS) and/or real-time instruments, and document all quality assurance and chain of custody information as per the approved QAPP. The contractor shall assume no PS data reporting requirements for the project. The contractor shall assume that all PS analysis and reporting will be performed by EPA ORD and EPA ORD shall be responsible for all PS-related shipping costs. The contractor shall be responsible for all other deployment shipping costs. The contractor shall be responsible for delivery of all PS deployment notes and quality assurance information as per QAPP schedule. The contractor shall assume a nominal two-week deployment schedule for the PSs if deployed.

The contractor shall be responsible for all deployed field instruments and sensor data, QA assurance testing data and procedures, monitoring of real-time data quality indicators, archiving of all data including spectral information and primary and secondary (local area) meteorological measurement data and any available collaborator comparison data at the site that is part of the QAPP. The contractor shall create monthly data packages including time-aligned information from the various instruments and data sources along with QA flags and notes in Microsoft Excel or CSV text format, with spectral data in native formats. All data analysis activities and software required to reduce the data to useable form shall be documented. These data packages shall be delivered to the EPA WAM on a monthly basis. A monthly short form report in Microsoft Word format shall be included with the data package and provide a brief summary of field test activities, QA testing results, and any anomalies encountered during the deployment that month.

Task 2: Development of a Report on Open-Path UV Spectroscopy for Refinery Fenceline Measurements of Benzene.

Using input from independent technical experts in the topic area (as required), the contractor shall develop an EPA report on the state of the science on open-path ultraviolet spectroscopy for refinery fenceline monitoring applications. The report shall include a definition of and analysis

approaches for determination of method detection limits, quantitation limits, and the spectral interference and noise-limited factors that affect these limits. These detection limit analyses shall be based on real-world finite-width plume detection scenarios (not on length-extrapolated homogenous concentration calculations). The report shall include quality assurance metrics for real-time detection limit verification and in-field operational verification procedures. The report shall also include a summary of commercially available instruments and analysis of the full implementation and maintenance costs (ranges) for these technologies. The report shall include recommendations for in field (real optical path) quality assurance testing procedures including both functional optical cell (flow-through)-based approaches and post-acquisition spectral analysis approaches, including projected costs for these procedures.

QUALITY ASSURANCE

Work involving collection of environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff. The Quality Assurance Project Plans (QAPPs) associated with these tasks shall be at a Category III level (unless otherwise specified) and must include all necessary elements as described in the referenced documentation (See Attachment 1).

All QAPPs and QAPP addendums shall be reviewed and approved by the contractor's WA leader and QA officer. Once it has obtained their approval, it shall be submitted to the EPA QA staff for review and approval. It shall be accompanied by a signature page that is signed by the contractor's WA leader and QA officer to show that they have reviewed and approved the QAPP. It is the responsibility of the contractor's WA leader to document this process. Upon receipt of the signed QAPP, the EPA WA manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. For work involving analysis by outside laboratories, the contractor shall review and document all subcontractor quality management plan information as per current contract and EPA QA policy requirements.

DELIVERABLES

For all data analysis and reporting deliverables, the contractor shall provide materials in Microsoft Word™ and Excel™ formats along with all raw and processed files and spectral fits for the provided data in native formats unless otherwise specified.

All deliverables are due before March 31, 2016 unless otherwise noted

Task 1.1: Options analysis document to be delivered within 14 calendar days of receiving technical direction from the WAM that a field study is under consideration for execution.

Task 1.2(A): QAPP for submission to EPA QA review to be delivered within 14 calendar days of receiving technical direction that a field study shall be executed.

Task 1.2(B): Reponses to EPA QA comments and revised QAPP to be delivered within 14 calendar days of receiving EPA QA review comments.

Task 1.3: Monthly data packages and short-form reports for in-process field studies to be delivered on the last business day of each calendar month as on an as-required basis.

Task 2A: Revised outline of EPA Report on Open-Path UV Spectroscopy for Refinery Fenceline Measurements of Benzene to be delivered before August 31, 2015.

Task 2B: Draft EPA Report on Open-Path UV Spectroscopy for Refinery Fenceline Measurements of Benzene to be delivered before October 31, 2015.

SCHEDULE of DELIVERABLES

See DELIVERABLES section for a Deliverable due dates.

All deliverables are due before March 31, 2016 unless otherwise noted

ATTACHMENT #1
TO THE STATEMENT OF WORK (SOW)

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in

order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD:

☐ **NRMRL=s Quality System Specifications:**

(1) a description of the organization=s Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization=s general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL=s Quality System Specifications:**

(1) a description of the organization=s Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization=s general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

X **QAPP Requirements for Secondary Data Projects**

☐ **QAPP Requirements for Research Model Development and Application Projects**

☐ **QAPP Requirements for Software Development Projects**

X **QAPP Requirements for Method Development Projects**

☐ **QAPP Requirements for Design, Construction, and Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS: Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

4.5 Describe the method for uniquely numbering each sample.

4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5. MEASUREMENT PROCEDURES

5.1. Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2. If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6. QUALITY METRICS (QA/QC CHECKS)

6.1. For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the

frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2. Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1 If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2 If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8. REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-022

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-022 Raleigh Multi Poll...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Sue Kimbrough	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-2612 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

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1 **TITLE:** Raleigh Multi-Pollutant Site

2 **DATE:** August 1, 2015 PoP: Award through March 31,2016.

3 BACKGROUND

EPA in collaboration with the Federal Highway Administration (FHWA) has conducted two long-term near-road studies in Las Vegas, NV and Detroit, MI. The Las Vegas study was completed in March, 2010 and the Detroit study was completed in June, 2011. A principal driver behind these studies was a Settlement Agreement between FHWA and Sierra Club to perform near-road air pollution studies.

On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2). To determine compliance with the new standard, EPA established new ambient air monitoring and reporting requirements for NO_2. At least one monitor must be located near a major road in any urban area with a population greater than or equal to 500,000 people. Raleigh, NC is such an urban area.

For the study covered by this SOW, EPA will be collaborating with the North Carolina Department of Environment and Natural Resources' (NCDENR) Air Quality Division and FHWA regarding a near-road air pollution study. This collaboration leverages resources of all three agencies with regards to establishing a long-term study site for EPA's near-road research program and interest in air pollution control strategies and exposure assessment, a long-term near road NO_2 monitoring site for NCDENR, and a long-term near-road site for FHWA's interest in identifying effective strategies for mitigating air pollution from transportation sources.

The Raleigh Near-Road site will function as a multi-pollutant measurement research site that will include (but not limited to) NO, NO_2, NO_X, CO, BC, mobile source air toxics (MSATs), particulate ($PM_{2.5}$), ultrafine particulate, etc. The objective of the research study is to determine mobile source air pollution concentrations and variations in concentrations as a function of distance from the highway and to establish relationships between mobile source air pollution concentrations as related to highway traffic flows including traffic count, vehicle types and speeds; and meteorological conditions such as wind speed and wind direction. As such, the

Raleigh Near-Road study would be expected to provide data detailing concentrations and distributions of motor vehicle emitted pollutants including regulated gases, air toxics, and particulate matter. Specifically, the data will be used to address the following goals:

1. Identify the existence and extent of elevated air pollutants near roads.
2. Determine how vehicle operations and local meteorology influence near road air quality for regulated and air toxic pollutants.
3. Collect data that will be useful in evaluating and refining, if necessary, models used to determine the emissions and dispersion of motor vehicle related pollutants near roadways.

The following site is currently selected and measurements are underway:

1. Raleigh, NC

4 APPLICABLE, CONTROLLING DOCUMENTS AND WEB SITES:

"Monitoring Protocol", Attachment A to this document (previously provided under EP-C-09-027, WA 2-39); Also located at this URL: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/near_road_study/

FHWA's The National Near Roadway MSAT Study Web Page -- http://www.fhwa.dot.gov/environment/airtoxicmsat/

Office of Environmental Information. ***EPA Requirements for Quality Assurance Project Plans***, EPA QA/R-5, EPA/240/B-01/003, U.S. Environmental Protection Agency. March 2001. http://www.epa.gov/quality/qs-docs/r5-final.pdf.

Office of Environmental Information. ***Guidance for Quality Assurance Project Plans*** (QA/G-5), EPA /240/R-02/009, U.S. Environmental Protection Agency. December 2002, http://www.epa.gov/quality/qs-docs/g5-final.pdf.

5 TECHNICAL REQUIREMENTS/TASK DESCRIPTION:

The technical basis for this effort will be the "Monitoring Protocol" – Attachment A. The contractor shall perform the Monitoring Protocol as described in Attachment A of this document (previously provided under EP-C-09-027, WA 6-22). The contractor shall propose alternative methods/approaches that may yield cost-savings over the life of the project. These alternative methods/approaches should be construed as encompassing all aspects of the project.

Before this work is initiated the contractor shall meet with the EPA researchers to ensure that the objectives of this project and the resource boundaries are understood.

5.1 Raleigh Near-Road site

5.1.1 Study Site/City Site

The near-road study site was selected in collaboration with North Carolina DENR Air Quality Division staff. Throughout the rest of this SOW the site will be referenced as the Raleigh Near-Road site or Triple Oak site.

The terms "location" and "site" shall be interpreted to include the AIRS site [(site on EPA campus behind the National Computer Center (NCC)] as well as the Triple Oak site that will be operated for the duration of this study as required by the specific needs of this project. A GoogleMaps image of the site is provided as Attachment B.

5.1.1.1 Site Infrastructure

The contractor shall be responsible for negotiating and maintaining all of the necessary leasing, site operation permits, electrical connections, security/insurance arrangements to operate this site for the duration of the study as required by the specific needs of this project. The contractor shall be responsible for maintaining (including but not limited to) shelter condition/integrity and HVAC operations. The contractor shall be responsible for payment of electricity and communication (data and phone) costs incurred at the Raleigh air monitoring sites. The contractor shall be responsible for ensuring appropriate calibration gases are made available for the duration of the study as required by the specific needs of this project.

5.1.1.2 Training Activities

The contactor shall be responsible for arranging training on equipment as required by the specific needs of this project. This training would include analyzers, data loggers and data logging software. While instruments concepts are similar among the same instrument types, actual instrument operations may differ significantly between different vendors. Thus training is needed to understand specific instrument, data loggers and software utilized by this project.

5.1.1.3 Field Deployment

5.1.2 Commencement of Site Operations

Site operations commenced during a previous work assignment (EP-C-09-027, Opt. 4, WA-22) and continued during (EP-C-09-027, Opt. 6, WA-22). Remote monitoring of instrumentation will be performed by EPA staff at the RTP Facility utilizing a PC running WinAQMS/Airodis. When instrument performance issues occur, a site operator will be dispatched on an as needed basis and as resources permit.

5.1.2.1 Pollutants of Interest

The contractor shall collect monitoring data for the pollutants of interest as required by the specific needs of this study. The pollutants of interest are as follows:

Pollutant	Surrogate Species	Monitoring Method	Frequency	Sampling Period	Samples / Sampling Frequency	Samples/Year
Sulfur Dioxide		Ecotech 9850	Continuous	Continuous	Continuous	Continuous
Carbon Dioxide		LI-COR	Continuous	Continuous	Continuous	Continuous
Ozone		Ecotech 9810	continuous	continuous	continuous	continuous
Nitrogen Dioxide		Aerodyne CAPS NO_2	continuous	continuous	continuous	continuous
Particle No.		TSI CPC 3783	continuous	continuous	continuous	continuous
Ultrafines		TSI 3031	Continuous	Continuous	Continuous	Continuous
Diesel Particulate Matter	Carbon Monoxide	Ecotech 9830	Continuous	Continuous	Continuous	Continuous
	Nitrogen Oxides	Ecotech 9841			Continuous	Continuous
	Black Carbon	Aethalometer			Continuous	Continuous
	$PM_{2.5}$	SHARP	Continuous	Continuous	Continuous	Continuous

Pollutant	Surrogate Species	Monitoring Method	Frequency	Sampling Period	Samples / Sampling Frequency	Samples/Year
1,3-butadiene, benzene (including other btex compounds)		Continuous	Continuous	Continuous	Continuous	Continuous
Wavetronix (traffic counts)		Radar	Continuous	Continuous	Continuous	Continuous

5.1.2.2 Meteorological Instrumentation

The contractor shall provide logistical support with regards to the operation of the following suite of meteorological instrumentation: 3-D sonic anemometer, temperature probe, relative humidity sensor, solar radiation sensor, barometric pressure sensor, and rain gauge. The contractor shall assist with the operation and trouble-shooting of these instruments on an as needed basis and as identified by the WACOR.

5.1.2.3 Other Instrumentation/analyzers.

The contractor shall assist with the operation and calibration on an as needed basis the following instruments: two Chromatotec semi-continuous GCs. The contractor shall assist with the installation, operation and calibration of an Aerodyne CAPS NO_2 instrument. The contractor shall assist with the installation, operation, calibration and trouble-shooting of other instruments/analyzers that may be identified by the WACOR as needed for the Raleigh Near-Road Multi-Pollutant site.

5.1.2.4 Data Completeness

The contractor shall collect monitoring data with completeness criteria as shown in the table below and as required by the specific needs of this study.

Pollutant	Sampling Approach	Accuracy	Precision	Data Completeness
Sulfur dioxide	Continuous monitoring UV fluorescence	20%	10%	80%
Carbon dioxide	non-dispersive infrared	20%	10%	80%
Carbon monoxide	Continuous monitoring (NDIR FRM CO analyzer)	20%	10%	80%
Nitrogen oxides	Continuous monitoring (Chemiluminescence NOx analyzer)	20%	10%	80%
Ozone	Continuous monitoring UV photometry	20%	10%	80%

Pollutant	Sampling Approach	Accuracy	Precision	Data Completeness
NO2	Continuous monitoring Optical absorption spectrometer	20%	10%	80%
Black carbon (surrogate - diesel)	Continuous monitoring (Aethalometer)	5%	5%	80%
$PM_{2.5}$	Continuous monitoring (SHARP)	20%	10%	80%
Ultrafines	Continuous monitoring (TSI)	20%	10%	80%
Particle No.	Continuous monitoring (TSI)	20%	10%	80%
$PM_{2.5}$	Integrated filter sampling ($PM_{2.5}$ FRM method)	20%	10%	90%
Continuous GC				
Benzene (MSAT)	Continuous GC	10%	5%	80%
1,3-Butadiene (MSAT)		10%	5%	80%
Other BTEX compounds		10%	5%	80%

5.1.2.5 Maintenance of Equipment

The contractor shall be responsible for the proper maintenance of equipment as required by the needs of this study.

5.1.2.6 Supplies and Other Miscellaneous Equipment

The contractor shall purchase or otherwise have available any additional miscellaneous equipment or supplies that may be needed for successful completion of this effort. The contractor shall consult with the EPA WAM and other EPA technical representatives prior to purchasing items in excess of $2,000.

The contractor shall lease or purchase as needed the required supplies such as calibration gases and other miscellaneous equipment not already specifically identified as required by the needs of this study.

5.1.3 Traffic Monitoring and Vehicle Classification

Traffic data is being collected by US EPA utilizing a Wavetroix radar unit (SmartSensor HD).

5.1.3.1 Statistical Analysis

The contractor shall provide logistical support for (but is not limited to) the preparation of tables, graphs, text, etc. that would be used to create report(s) as required by the needs of this study. The results of statistical analyses or other relevant calculations shall be provided to the EPA WAM in the required QA/QC audit reports, quarterly data reports and a final report as required by the specific needs of this study. The contractor shall consult with the EPA WAM and other EPA technical representatives on the nature of the statistical software prior to implementation.

5.2 Quality Assurance Project Plan (QAPP)

The contractor shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form" and the NRMRL QA Requirements/Definitions List included with this effort. The work to be performed falls under the QA requirements for "**Measurement**" projects, Category III. See http://intranet.epa.gov/nrmintra/lsas/eqmp/pdf/MeasurementQAPPNRMRLrev0.pdf. WACOR will prepare a new QAPP with input from the contractor. A previously approved QAPP will be supplied to the contractor (QAPP QTRAK # is 07035-A12395). The QAPP is a "living document" and as such may require modifications as required by the needs of this study. The contractor shall provide input and revisions to the QAPP as required by the needs of this study.

5.3 Safety Plan

The contractor shall prepare or revise as necessary a Safety Plan. A Safety Plan was previously developed under Contract EP-C-09-027, WA 4-22.

5.4 Project Reports

The contractor shall provide monthly reports as required by the specific needs of this study. Section 8 of the Monitoring Protocol (Attachment A) contains the relevant details.

6 DEFINITIONS:

Air Monitoring Station -- Air monitoring stations are shelters containing the air sampling instrumentation including the meteorological instrumentation, data logging hardware, software, communications and any other equipment and supplies as required by the specific needs of the *FHWA Detailed Monitoring Protocol*. For this project, air monitoring stations may be standard utility trailers or converted shipping containers.

7 REPORTING REQUIREMENTS

1. The EPA WAM and other EPA technical representatives will develop a new QAPP for this task. A previously approved QAPP will be supplied to the contractor (QAPP QTRAK # is 07035-A12395). The QAPP is a "living document" and as such may require modifications as required by the needs of this study. The contractor shall provide input and revisions to the QAPP as required by the needs of this study. The specific details of the required QAPP are discussed in a previous section of this SOW.

2. The contractor shall schedule monthly conference calls with the EPA WAM during which task progress and issues will be discussed. The contractor shall summarize the notes from each of these conference calls in the form of an e-mail message to the EPA WAM.

3. The contractor shall provide monthly reports as required by the specific needs of this study. Section 8 of the Monitoring Protocol contains the relevant details.

DELIVERABLES

1. The EPA WAM and other EPA technical representatives will develop a new QAPP for this task. A previously approved QAPP will be supplied to the contractor (QAPP QTRAK # is 07035-A12395). The QAPP is a "living document" and as such may require modifications as required by the needs of this study. The contractor shall provide input and revisions to the QAPP as required by the needs of this study. The specific details of the required QAPP are discussed in a previous section of this SOW. The specific details of the required QAPP are discussed in a Section 5.2 of this SOW. This QAPP shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form" and the NRMRL QA Requirements/Definitions List included with this effort. The work to be performed falls under the QA requirements for "**Measurement**" projects, Category III. See ***EPA Requirements for Quality Assurance Project Plans***, EPA QA/R-5, EPA/240/B-01/003, March 2001, http://www.epa.gov/quality/qs-docs/r5-final.pdf. Additional guidance with regards to measurement QAPP requirements may be found in Chapter 2 of the Guidance for Quality Assurance Project Plans (QA/G-5), EPA /240/R-02/009, December 2002,

http://www.epa.gov/quality/qs-docs/g5-final.pdf. This QA/QC plan shall be provided to the EPA WAM in an MS Word format (1 electronic & 5 hardcopies).

2. The EPA QA Representative will provide written & oral comments to the EPA WAM and other EPA technical representative's contractor within 6 weeks of the delivery of the QA/QC plan (Item 1 above).

3. The contractor shall prepare monthly reports as required by the specific needs of this study. These reports shall be provided to the EPA WAM in an MS Word format (1 electronic & 5 hardcopies).

The EPA WAM will provide written and oral comments to the contractor within 7 days of the delivery of the monthly report.

Summary of Deliverables		
Item	**Description**	**Due Date**
a	QA/QC Plan	Input required 6 weeks after delivery of draft QAPP by WACOR
b	Email Summaries	2-days after each conference call
c	Monthly Reports	10-days after end of month

8 SPECIAL TERMS AND CONDITIONS

Attachment	Contents
A	Monitoring Protocol (To be supplied by WACOR as e-version PDF)
B	Site Map
C	QA Requirements

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf**

TO BE SUBMITTED POST-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf**

□ **Category I or II Quality Assurance Project Plan (QAPP): prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf**

X Category III or IV QAPP: prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X QAPP Requirements for Measurement Projects

□ QAPP Requirements for Secondary Data Projects

□ QAPP Requirements for Research Model Development and/or Application Projects

□ QAPP Requirements for Software Development Projects

□ QAPP Requirements for Method Development Projects

□ QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

1. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

2. PROJECT DESCRIPTION AND OBJECTIVES

2.1 Describe the process and/or environmental system to be evaluated.

2.2 State the purpose of the project and list specific project objective(s).

3. ORGANIZATION AND RESPONSIBILITIES

3.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
3.2 Include a project schedule that includes key milestones.

4. SCIENTIFIC APPROACH

4.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
4.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
4.3 Describe the general approach and the test conditions for each experimental phase.

5. SAMPLING PROCEDURES

5.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
5.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
5.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
5.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
5.5 Describe the method for uniquely numbering each sample.
5.6 Describe procedures for packing and shipping samples, including procedures to avoid cross- contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

6 MEASUREMENT PROCEDURES

6.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
6.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

7. QUALITY METRICS (QA/QC CHECKS)

7.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for

performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
7.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

8 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

8.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
8.2 Describe data validation procedures used to ensure the reporting of accurate project data.
8.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
8.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
8.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
8.4 Describe data storage requirements for both hard copy and electronic data.

9 REPORTING

9.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
9.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

10. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-023

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	023 Investigation of...Gensets

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Tiffany Yelverton	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-9456 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

Investigation of Emissions from Stationary Diesel Gensets with Alternative Fuels

Period of Performance: August 1, 2015 through March 31, 2016

I. Background

The 2011 National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Reciprocating Internal Combustion Engines (RICE), written by EPA's Office of Air Quality Planning and Standards (OAQPS), regulates emissions from both diesel and spark-ignited IC engines. This RICE Rule must be revisited and updated every few years and as such, new technologies must be considered. For this reason, research with alternative fuels is necessary to attempt to meet/exceed PM (and other) pollutant emissions standards currently regulated. Further, at the time the initial ruling was proposed and finalized, it was unclear as to whether or not these diesel generators were of concern for particulate emissions, particularly black carbon (BC).

While this rule pertains to both pre- and post-combustion control of emissions, the focus of the previous portion of this study was post-combustion controls for particulate matter (PM). The current study will follow that work by looking at pre-combustion control of emissions – namely blending of alternative fuels with ultra-low sulfur diesel (ULSD). The alternative fuels being considered include, but are not limited to, natural gas, propane, and dimethyl ether (DME). While the investigation described within is a set of tests designed to determine emission factors of pollutants, it is NOT to inform OAR/OAQPS of needed emissions standards or regulations.

Specifically, this work will continue to investigate PM, BC, and gaseous emissions (CO, CO_2, O_2, etc.) from two diesel generators (5.5 and 200 kW genset), with ULSD and ULSD blended with alternative fuels at various blend ratios. Each engine and fuel combination will be run at two conditions: approximately 50% and 90% load. The exhaust from these engines will be ducted into the Highbay building (at EPA's RTP location) and into the flue gas cleaning system (FGCS or APCS). From these exhausted emissions, a slip stream will be pulled for sampling purposes. Under certain testing conditions, dilution will be necessary in order to avoid overwhelming the measurement instrumentation.

II. Purpose

These tests will be used to further understand emissions from stationary diesel generators fueled with ULSD and alternative fuels. These tests are specifically designed to investigate

particulate emissions, but will require gaseous emissions investigation as well. The ultimate goal of the investigation will be to provide emission factors for various diesel and blended fuel ratios at varying engine loads. The resulting data will be used by ORD and by OAQPS/OAR. The results of these tests will NOT be used to set emission limits or to determine NESHAP rules.

Background Information and Special Instruction

- It is expected that much of the data obtained via this work assignment may be dispensed to the general public via open presentation at technical conferences and through publication in peer-reviewed scientific journals.
- The Contractor is expected to use government furnished equipment (GFE) for this work and shall work with the WAM to accomplish these tasks.
- Facility operating manuals and standard operating procedures shall be followed when applicable and available.
- The Contractor shall participate in safety training as per EPA guidelines.
- The Contractor shall adhere to the QA requirements as delineated in Attachment #1 to the Statement of Work. Any work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Stuff.

III. Statement of Work

Task 1. Develop/Review/Revise QAPP (as needed)

Prior to the start of the testing period, the Contractor shall work with the WAM to provide a QAPP for EPA review in order to ensure that the description of all sampling practices/methods and the test plan are current and accurate.

Deliverables – The Contractor shall work with the WAM to review, and revise as needed, the quality assurance project plan (QAPP) to ensure its accuracy and that it is in accordance with Appendix #1 (attached) to the Performance Work Statement for each work assignment task involving collection or generation of environmental data. The QAPP must be approved by the QAM prior to any data being acquired or used (by 09/30/2015).

Task 2: Conduct Runs According to the QAPP/Test Plan

Each test "run" shall be one 4- to 7-hour day of operation, where sampling period will depend upon fuel being tested. It is likely that two to three test runs per week shall occur. The Contractor shall be responsible for engine operation and preparation of the sampling equipment and glassware for all of the runs; however, the contractor shall not necessarily be

responsible for day-to-day operation of the online black carbon (PASS3, SP2, AE22) instrumentation. The Contractor shall, in coordination with the WAM, conduct experimental runs according to the schedule and conditions described in the QAPP which includes, but is not limited to, the testing of two different generators with multiple ULSD and alternative fuel blend ratios (as described in the below table).

Projected Conditions for Each Test

Engine	Fuel	Engine Load	Number of Test Days
5.5 kW Yanmar	ULSD	~50% and ~90%	1-2
	ULSD + Natural Gas (10%)	~50% and ~90%	1-2
	ULSD + Natural Gas (20%)	~50% and ~90%	1-2
	ULSD + Natural Gas (30%)	~50% and ~90%	1-2
	ULSD + DME (10%)	~50% and ~90%	1-2
	ULSD + DME (20%)	~50% and ~90%	1-2
	ULSD + DME (30%)	~50% and ~90%	1-2
200 kW Kohler	ULSD	~50% and ~90%	1-2
	ULSD + Natural Gas (10%)	~50% and ~90%	1-2
	ULSD + Natural Gas (20%)	~50% and ~90%	1-2
	ULSD + Natural Gas (30%)	~50% and ~90%	1-2
	ULSD + DME (10%)	~50% and ~90%	1-2
	ULSD + DME (20%)	~50% and ~90%	1-2
	ULSD + DME (30%)	~50% and ~90%	1-2
	Total Test Days		**14-28**

Deliverables – The Contractor shall provide the WAM with an engine operator, needed test equipment, and support for sample collection for all scheduled test days.

Task 3: Coordinate Analysis of Experimental Samples

The Contractor shall, when needed, coordinate the transport and analysis of experimental samples using appropriate off-site analytical laboratories. The specific analytical requirements will be described in the QAPP. While the exact number of samples to be analyzed off-site is unknown at this time, fuel analysis as well as filters for organic and elemental carbon concentrations (NIOSH5040) may require off-site analysis.

Deliverables – The contractor shall provide chain of custody reports for all samples sent off-site for analysis as well as the results reported from these analyses. For on-site sample analysis, the Contractor shall provide results from these analyses. For off-site analyses, the contractor shall initiate transport and analysis of samples within two weeks of collection.

Task 4: Assemble Run Data and Analytical Results into a Usable Data Package and Provide a Written Summary

The Contractor shall assemble the run data (i.e. experimental conditions) and analytical results into formats that can be used or reported, as discussed with WAM. The Contractor shall work with the WAM to ensure that the appropriate data formats are used. The Contractor shall write up a short summary report following each run and should further assemble analytical data into table and plot formats if needed.

Deliverables – The Contractor shall provide analytical results and the data package within two weeks of receiving analytical reports from the off-site laboratory.

Task 5. Procurement of Fuel for Operation of the Stationary Diesel Generators

The Contractor shall procure any needed ultra-low sulphur (ULSD), non-highway diesel fuel, or chemical/gas cylinders for testing or instrumentation (e.g. DME, calibration gases, etc.). The Contractor shall work with a local company to purchase needed fuel and have it delivered to EPA's RTP campus for the purposes of this investigation. The diesel fuel shall be delivered and stored on-site in an approved storage facility. The Contractor shall be responsible for ensuring that the fuel storage facility is prepared properly, with assistance from the WAM, for the delivery of the fuel.

Deliverables – The Contractor shall provide the needed fuels for testing. The fuel shall be procured and delivered no later than two weeks after the WAM makes a request.

IV. Other Deliverables

The Contractor shall provide the WAM with a records Package at the completion of the tasks of this work assignment (03/31/2016). This electronic records package shall contain copies of laboratory data sheets, experimental observations (in a lab notebook), minutes of meetings, etc. The records package shall contain enough information such that the work could be independently repeated if desired.

The Contractor's monthly report to EPA shall summarize work activities (accomplished and planned) for each task in this work assignment, including (but not limited to) the status of applicable tests, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges.

All safety and quality assurance requirements for APPCD projects are documented in protocols prepared prior to initiating a project, as required in the Contractor's contract. As part of the EPA-RTP's normal operational requirements, a detailed facility health and safety plan shall be prepared by the Contractor for each of the experimental systems that will be used for this proposed research. Health and safety protocols for each task shall be updated or prepared as required by the EPA-RTP Campus Safety personnel. These protocols shall be approved by the WAM and safety personnel prior to conducting any tests.

Appendix #1 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ NRMRL's Quality System Specifications:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

□ NRMRL's Quality System Specifications:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function; 07/14/08 A-2

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

□ Category I or II Quality Assurance Project Plan (QAPP): prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001
http://www.epa.gov/quality/qs-docs/r5-final.pdf

X Category III or IV QAPP: prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X QAPP Requirements for Measurement Projects

□ QAPP Requirements for Secondary Data Projects

□ QAPP Requirements for Research Model Development and/or Application Projects

□ QAPP Requirements for Software Development Projects

□ QAPP Requirements for Method Development Projects

□ QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

1. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

2. PROJECT DESCRIPTION AND OBJECTIVES

2.1 Describe the process and/or environmental system to be evaluated.

2.2 State the purpose of the project and list specific project objective(s).

3. ORGANIZATION AND RESPONSIBILITIES

3.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

3.2 Include a project schedule that includes key milestones.

4. SCIENTIFIC APPROACH

4.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

4.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

4.3 Describe the general approach and the test conditions for each experimental phase.

5. SAMPLING PROCEDURES

5.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

5.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

5.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

5.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

5.5 Describe the method for uniquely numbering each sample.

5.6 Describe procedures for packing and shipping samples, including procedures to avoid cross- contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

6 MEASUREMENT PROCEDURES

6.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

6.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

7. QUALITY METRICS (QA/QC CHECKS)

7.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

7.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

8 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

8.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

8.2 Describe data validation procedures used to ensure the reporting of accurate project data.

8.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

8.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

8.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

8.4 Describe data storage requirements for both hard copy and electronic data.

9 REPORTING

9.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

9.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

10. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-024

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-024 Emission..Combustion...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Tiffany Yelverton	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-9456 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

PERFORMANCE STATEMENT OF WORK

Emissions Investigation on a Pilot-Scale Coal-Fired Combustion Facility

Period of Performance: August 1, 2015 through March 2016.

I. Background

This work assignment describes follow-on work to further investigate surrogate measurements for hard to measure organic species (specifically hazardous air pollutants – HAPs), as well as investigate and characterize particulate matter (PM) emissions using control devices. Further, this study will focus on not only coal, but also several biomass products blended at various ratios with coal up to 80% by mass. As with previous studies, this will utilize ORD's Multipollutant Control Research Facility (MPCRF) to test a range of coal types, biomass blends, and process configurations.

The MPCRF is located in the High Bay Building (HBB) on EPA's Research Triangle Park campus. It is a pilot-scale combustion research facility rated at 4MMBtu/hr (roughly 1.2 MWt). It is capable of firing pulverized coals (and/or biomass blended with coal), natural gas, and Number 2 fuel oil. This combustor is also equipped with several control technologies: (i) low NOx burners, (ii) a selective catalytic reduction (SCR) unit (with Cormetech catalyst), (iii) an electrostatic precipitator (ESP), (iv) fabric filters (positioned in parallel), and (v) a wet lime-based flue gas desulfurization (FGD) scrubber. The facility has the capability to use many of these control technologies simultaneously or can bypass a given control for individual investigation. Furthermore, the MPCRF is equipped with continuous emissions monitors (CEMs) for on-line measurement of O_2, CO_2, NO, NO_2, SO_2, CO, and Hg. There are multiple sampling ports throughout the gas flow path. The facility has several heat exchangers in series in order to remove heat such that the flow path of the flue gas has a similar temperature profile to that seen in a full-scale power plant.

II. Purpose

These tests will be used to further examine PM and gaseous emission characterizations in order to inform OAQPS on the viability of the surrogacy approach, and the relevancy of using biomas products as "drop-in" replacements for coal, while combusting coal and coal blended with varying levels of biomass. These tests will build upon similar testing from 2012 through 2014 and will incorporate online (real-time) measurement techniques to avoid time-integrated filter samples (FTIR, aethalometer, etc.). Furthermore, the tests will also investigate the emissions from blending biomass with coal under normal operating conditions of the MPCRF. The resulting data will be used by ORD and by OAQPS/OAR.

The results of these tests will NOT be used to set emission limits or to determine the maximum achievable control technology.

Background Information and Special Instruction

- It is expected that much of the data obtained via this work assignment may be dispensed to the general public via open presentation at technical conferences and through publication in peer-reviewed scientific journals.
- The Contractor is expected to use government furnished equipment (GFE) for this work and shall work with the WAM to accomplish these tasks.
- Facility operating manuals and standard operating procedures shall be followed when applicable and available.
- The Contractor shall participate in safety training as per EPA guidelines.
- The Contractor shall adhere to the QA requirements as delineated in Attachment #1 to the Statement of Work. Any work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Stuff.

III. Statement of Work

Task 1. Revise/Combine the Existing QAPP

Prior to the start of the testing period, the Contractor shall work with the WAM to provide a quality assurance project plan (QAPP) for review in order to ensure that the description of all sampling practices/methods and the test plan are current and accurate.

Deliverables – The Contractor shall work with the WAM to review, and revise as needed, the QAPP to ensure that it is in accordance with Appendix #1 to the Performance Work Statement for each work assignment task involving collection or generation of environmental data. The QAPP must be approved by the QAM prior to any data acquisition or analysis (by 09/30/2015).

Task 2. Conduct Runs According to the QAPP/Test Plan

Each test "run" shall be one 8-hour day of operation, where roughly 4-hours will be a sampling period. It is likely that two test runs per week, biweekly, can occur. The Contractor shall be responsible for coal and biomass preparation (pulverizing/shredding, storage, etc.), organization and storage as well as preparation of the sampling equipment and glassware for all of the runs; however, the contractor is not necessarily responsible for day-to-day operation of the MPCRF. The Contractor shall, in coordination with the WAM, conduct experimental runs according to the schedule and conditions described in the existing/revised QAPP which includes testing up to four different types of coal, coal blended

with multiple biomass products individually, and at varying ratios of biomass with multiple configurations of the available PM, NO_x, and SO_2 control technology equipment on the MPCRF.

The Contractor shall also support similar organic species testing conducted under a separate work assignment. This support will likely include organic HAPs (e.g, aromatic VOCs and carbonyls) sampling and analysis. As this support is dependent on the collaborating work assignment, the actual support required and schedule will be provided in writing by the WAM at a later date. Therefore, while conducting these tests, the Contractor shall also be responsible for support of other experimental sampling as described under a second work assignment (WA 0-2) as determined and submitted at a later date.

Deliverables – The Contractor shall provide the WAM with pulverized coal and biomass, clean/ready to use test equipment/sample trains, support for preparing and operating the facility, and support for sample collection for all scheduled test days.

Task 3: Set-up of Coal Preparation Equipment

The Contractor shall use the procured parts and equipment to set up the new coal preparation and storage facility with input from the WAM. The facility plans/needs will be provided by the WAM in order for the contractor to complete. The contractor shall also be responsible for the procurement of smaller pieces of parts and equipment to complete the set up of the new coal preparation and storage facility. Some of the physical construction of the coal preparation and storage facility shall be accomplished by the contractor, but under Work Assignment 0-1.

Deliverables – The Contractor shall set up the coal preparation and storage facility such that it is useable for testing with biomass. Further, the contractor shall notify the WAM of other needed parts prior to purchase and give at least bi-weekly verbal updates of progress toward completion. The target date for completion of the construction of the new preparation and storage facility should be no later than 10/30/2015.

Task 4: Coordinate Analysis of Experimental Samples

The Contractor shall, when needed, coordinate the transport and analysis of experimental samples using appropriate off-site analytical laboratories. The specific analytical requirements will be described in the QAPP. While the exact number of samples to be analyzed off-site is unknown at this time, filters will likely need to be analyzed off-site for organic and elemental carbon concentrations (NIOSH5040), proximate/ultimate analyses of coals and biomass products, as well as potentially arranging wet-chemistry sample train analysis.

Deliverables – The Contractor shall provide chain of custody reports for all samples sent off-site for analysis as well as the results reported from these analyses. For on-site sample analysis, the Contractor shall provide results from analyses.

Task 5: Assemble Run Data and Analytical Results into a Usable Data Package and Provide a Written Summary

The Contractor shall assemble the run data (experimental conditions, flue gas components, etc.) and analytical results into formats that can be used or reported. The Contractor shall work with the WAM to ensure that the appropriate data formats are used. The Contractor shall write up a short summary report following each run and should further assemble analytical data into table and plot formats.

Deliverables – The Contractor shall provide analytical results and the data package within two weeks of receiving analytical reports from the off-site laboratory.

Task 6: Purchase Needed Analytical Equipment

The Contractor shall purchase any needed equipment to analyze the flue gas generated from the combustion of coal blended with biomass. The equipment could include, but is not limited to: a portable FTIR or a single wavelength photoacoustic soot spectrometer. Further information regarding specific characteristics and parameters of the needed pieces of equipment will be provided by the WAM as needed.

Deliverables – The Contractor shall provide the needed equipment to be able to analytically characterize the PM and gaseous emissions from the combustion of the blended coal and biomass product(s). Further, the Contractor shall notify the WAM of arrival of all pieces of equipment such that the WAM can make arrangements for implementation and use of the instruments on the current testing.

IV. Other Deliverables

The Contractor shall provide the WAM with a records Package at the completion of the tasks of this work assignment. This records package shall contain copies of laboratory data sheets, experimental observations (in a lab notebook), minutes of meetings, etc. The records package shall contain enough information such that the work could be independently repeated if desired.

The Contractor's monthly report to EPA shall summarize work activities (accomplished and planned) for each task in this work assignment, including (but not limited to) the status of applicable tests, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges.

All safety and quality assurance requirements for APPCD projects are documented in protocols prepared prior to initiating a project, as required in the Contractor's contract. As part of the EPA-RTP's normal operational requirements, a detailed facility health and safety plan shall be prepared by the Contractor for each of the experimental systems that will be used for this proposed research. Health and safety protocols for each task shall be updated or prepared as required by the EPA-RTP Campus Safety personnel. These protocols shall be approved by the WAM and safety personnel prior to conducting any tests.

Appendix #1 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ NRMRL's Quality System Specifications:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

□ NRMRL's Quality System Specifications:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function; 07/14/08 A-2

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ Quality Management Plan: prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

□ Category I or II Quality Assurance Project Plan (QAPP): prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001
http://www.epa.gov/quality/qs-docs/r5-final.pdf

X Category III or IV QAPP: prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X QAPP Requirements for Measurement Projects

- ☐ QAPP Requirements for Secondary Data Projects

- ☐ QAPP Requirements for Research Model Development and/or Application Projects

- ☐ QAPP Requirements for Software Development Projects

- ☐ QAPP Requirements for Method Development Projects

- ☐ QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

1. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

2. PROJECT DESCRIPTION AND OBJECTIVES

2.1 Describe the process and/or environmental system to be evaluated.

2.2 State the purpose of the project and list specific project objective(s).

3. ORGANIZATION AND RESPONSIBILITIES

3.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

3.2 Include a project schedule that includes key milestones.

4. SCIENTIFIC APPROACH

4.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the

types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

4.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

4.3 Describe the general approach and the test conditions for each experimental phase.

5. SAMPLING PROCEDURES

5.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

5.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

5.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

5.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

5.5 Describe the method for uniquely numbering each sample.

5.6 Describe procedures for packing and shipping samples, including procedures to avoid cross- contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

6 MEASUREMENT PROCEDURES

6.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

6.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

7. QUALITY METRICS (QA/QC CHECKS)

7.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

7.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

8 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

8.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

8.2 Describe data validation procedures used to ensure the reporting of accurate project data.

8.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

8.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

8.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

8.4 Describe data storage requirements for both hard copy and electronic data.

9 REPORTING

9.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

9.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

10. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-024

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016
Base X Option Period Number

Title of Work Assignment/SF Site Name:

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name: Tiffany Yelverton
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-9456
FAX Number:

Project Officer Name: Robin Baily
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-7906
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

STATEMENT OF WORK AMENDMENT I

WA 0-024: Emissions Investigation on a Pilot-Scale Coal-Fired Combustion Facility

<u>Amended</u> Task 2: Conduct Runs According to the QAPP/Test Plan

While the original statement of work describes testing on the MPCRF while firing coal blended with biomass products, this amended task will require more preparation of the biomass products in order to stay on schedule for testing and reporting deadlines. In order to have enough torrefied biomass for necessary testing on the MPCRF, it is necessary to work through the Contractor's approved subcontract with North Carolina State University (NCSU) in the month of March while NCSU's torrefaction facility is operating. Therefore, and to no fault of the Contractor, this will require 2 full weeks of preparation outside of the already estimated biomass preparation days outlined in the original statement of work, as well as partial payment of the subcontract to NCSU. The Contractor shall support this additional work in the same manner explained in the tasks listed in the original statement of work.

Deliverables – The Contractor shall provide the WAM with prepared biomass, clean ready to use test equipment/sample trains, and support for sample collection for all scheduled prep and test days.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-026

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-026 Roadside Monitoring.....

Contractor	Specify Section and paragraph of Contract SOW
JACOBS TECHNOLOGY INC.	4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Richard Baldauf	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4386 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Mobile monitoring to quantify motor vehicle emissions and near-road air quality

WA #: 26 WACOR: Rich Baldauf

Contract #: EP-C-15-008 Alternate WACOR: Tom Long

PERIOD OF PERFORMANCE

The period of performance shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

This work assignment will focus on two primary objectives:

1. Development of methods to use mobile monitoring as a chase vehicle to determine motor vehicle emission rates; conduct pilot studies in US and China
2. Use mobile monitoring techniques to quantify how roadside vegetation can mitigate near-road air quality, including development of dispersion model algorithms

BACKGROUND

Recent research by the EPA shows how mobile monitoring can be used to assess motor vehicle emissions and impacts on near-road air quality. The use of mobile monitoring for vehicle emissions studies can provide a method to obtain large-scale emissions factors under real-world driving conditions. This type of technique can be especially important to obtaining emission factors in areas with little data for local emission inventories. This technique has applications for US cities as well as developing countries.

To mitigate the growing public health concerns on near-road exposures to traffic emissions, roadway design, including the presence of vegetation, has been shown to alter concentrations of traffic-generated pollutants away from the road. Field study measurements have been collected under previous studies to determine associations among vegetation and near-road air quality. In addition, studies have been conducted quantifying how solid barriers affect near-road pollutant transport and dispersion. From these studies, model algorithms have been developed. In addition, these model algorithms have also been evaluated for potential use in describing near-road pollutant transport in the presence of vegetation barriers. The

goal of this project is to evaluate and refine the vegetation model algorithm through collection of independent field data and comparing the RLINE model algorithm.

SCOPE

The contractor shall help develop methods of using an electric vehicle mobile monitoring vehicle as a chase platform to obtain motor vehicle emissions factors. This will include the supervision and training of up to three graduate-level students from China on the inclusion and alignment of analyzers and sampling ports on the Geospatial Monitoring of Air Pollution (GMAP) electric vehicle or equivalent, as well as supervise the development of analytical and testing strategies to optimize measurement procedures. The contractor shall also execute two field studies: 1) lasting for two (2) weeks in the Research Triangle Park, NC area and 2) lasting 4 to 6 weeks in China to measure particulate matter (PM), nitrogen dioxide (NO_2), and carbon dioxide (CO2) to obtain motor vehicle emission rates. The GMAP vehicle and sampling equipment are already on the contract and available for use in this study. EPA will also provide a trailer to transport the GMAP vehicle to and from the site in RTP, if deemed necessary by the WA COR. Note that a separate vehicle will be used for the China study, so the contractor will supervise sampling equipment operation and maintenance, while driving will be done by the trained Chinese students.

The contractor shall also analyze GMAP and other fixed-site monitoring data collected to evaluate the impact of roadside vegetation on near-road air quality conducted for Arcadis Work Assignment 40 under the previous contract. The monitoring data will be compared to modeling results using algorithms and techniques developed under this previous WA developed for assessing solid and vegetative roadside barriers. Model results will be compared to the monitoring results. The vegetative barrier algorithm will be modified as appropriate based on the results of the field study and consultation with the EPA WA COR.

TECHNICAL APROACH/OBJECTIVES

Task 1. Site Selection and Preparation

The EPA WA COR shall recommend sites in the RTP area for conducting the US pilot chase study. The contractor shall visit the selected monitoring locations in coordination with EPA personnel as required for the purpose of evaluating field sampling deployments and provide recommendations on final road segment selection. Final site selection will be determined by the EPA WA COR. For the chase study in China, EPA and contractor personnel will coordinate with Chinese collaborators at Tsinghua University in determining an appropriate site location, which will likely require a trip to China separate from the study for this purpose.

Task 2. Technical and Safety Support for the Electric Vehicle

The GMAP vehicle is an electric vehicle specially customized to support onboard sampling. Given its limited driving range and specialized design, contractor support shall provide general vehicle support and vehicle transportation to field sites. The contractor shall update and implement the safety plan for field deployment activities involving the GMAP vehicle as well as the SUV used for both GMAP transport and field sampling. The safety plan was developed for previous studies, and includes emergency response protocols in the event that the GMAP vehicle loses power while driving on a highway or arterial road. In addition, a multi-year technical support agreement is in place to ensure that the vehicle manufacturer will provide on-site troubleshooting in the event of significant vehicle performance issues during a field campaign.

Deliverable 2.1: Contractor shall submit an updated GMAP vehicle safety plan for the field study to the EPA WA COR prior to initiating field measurements and provide general vehicle support. If applicable, the plan developed for this option period can be used for this field study.

Deliverable 2.2: Contractor shall provide a signed agreement for technical support from the GMAP vehicle manufacturer through at least three months after the proposed completion date for this project in the contractor's project workplan, to be completed prior to initiating field measurements. This agreement shall include in-person support during domestic deployments. If applicable, the agreement developed for this option period can be used for this field study.

Task 3. Mobile Monitoring Instrumentation Support

The contractor shall conduct mobile monitoring instrumentation support activities prior to deployment to the field, including measurement inter-comparison tests, instrument calibration and maintenance, and development work to improve measurement accuracy. These work activities include, but are not limited to, inter-comparison activities for a one-week period of monitoring instrumentation sampling while on-board the mobile monitoring vehicles in motion and during fixed sampling. No environmental data collection with this instrument shall begin without an approved addendum. While the contractor only needs to provide raw sampling data, supervision of data analysis by Chinese students will be needed to ensure valid data comparisons.

Deliverable 3.1: The contractor shall provide raw time-stamped inter-comparison data to the EPA WA COR, within one week of sampling completion.

Task 4. Field Measurements

The contractor shall execute a two-week field monitoring study over consecutive weeks, at locations to be determined in the RTP area to measure motor vehicle exhaust emission rates using the GMAP vehicle in a chase mode. The contractor will drive the GMAP along preselected routes following light and heavy-duty vehicles

for several minutes to estimate emissions. The contractor shall also supervise a four-week field monitoring study over consecutive weeks, at locations to be determined in Beijing, China to measure motor vehicle exhaust emission rates using the GMAP vehicle in a chase mode based on the methods developed in the RTP-area pilot study. The GMAP will follow light and heavy-duty vehicles for several minutes to estimate emissions. The contractor shall also assist personnel at Tsinghua University in processing and analyzing the data to determine emission rates. Field sampling shall be conducted for approximately 4 hours each day, overlapping multiple driving times including morning and/or afternoon commute periods. In addition to the monitoring period, transportation, set-up, break-down, and data storage are estimated to take approximately 4 hours per sampling day. The field sampling configurations and quality assurance requirements are described in an approved Category III QAPP which will be provided by the EPA WA COR with assistance from the contractor. A draft QAPP will be developed for the pilot study in RTP. Lessons learned from the pilot study will be used to develop a final QAPP for the Beijing study. This QAPP shall be accompanied by a signature page that is signed by the contractor's work assignment leader and QA officer to show that they have reviewed and approved the QAPP. It is the responsibility of the contractor's work assignment leader to document this process. Upon receipt of the signed QAPP, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Work involving environmental data shall not commence until the QAPP has received official approval from the EPA Quality Assurance Staff. In the event that inclement weather or other unavoidable circumstances prevent field sampling, a sampling day may be cancelled and rescheduled to meet the target of 10 (RTP) and 20 (Beijing) sampling days for the respective studies.

The contractor shall also supervise a 4 to 6 week field study in Beijing and Nanjing, China with Tsinghua University personnel involved with the U.S. pilot study. The field sampling configurations and quality assurance requirements will be described in an approved Category III QAPP which will be provided by the EPA WA COR with assistance from the contractor after potential modification based on the results of the U.S. pilot study.

For the RTP study, the contractor will be responsible for transporting all vehicles and equipment to and from the study site each sampling day. The contractor will use the EPA facilities for vehicle and equipment storage and re-charging. The contractor shall prepare for and conduct measurements of PM, NO_2, and CO_2 onboard the electric monitoring vehicle. In addition to the collection of air monitoring data, the contractor shall also collect video of highway traffic during data collection. The field sampling campaign will be manned with personnel with sufficient expertise to ensure a minimum 80% completeness Data Quality Objective, as described in the QAPP.

Deliverable 4.1: The contractor shall provide raw time-stamped measurement data to the EPA WA COR, within one week of sampling completion in the RTP chase study.

Task 5. Air Quality Modeling

For the roadside vegetation data, the contractor shall use the results of the field measurements to evaluate the adequacy of the barrier algorithm for estimating the impacts of vegetative barriers on dispersion of pollutants near roadways. Based on results of the evaluation, the contractor shall modify model algorithms to account for the effects of vegetative barriers.

Specifically, the contractor shall implement the vegetation barrier algorithm into the RLINE model, test it, make modifications as necessary, and compare model results with field study data as follows:

- Prepare model inputs (including source configurations, meteorological characterizations and model receptors) for simulating the test periods of vegetative/porous barrier field measurements, including but not limited to the following near-roadway studies: Wind Tunnel (data will be provided by EPA), Mebane (data will be provided by EPA), Chapel Hill (data will be provided by EPA), Detroit (collected under WA2-40) and new field study (task 5).
- Obtain traffic data from the state or local transportation agency for the highway segment adjacent to the study site, including total traffic volume, average speeds and vehicle classifications, preferably at 15-minute averages
- Perform model simulations using the RLINE dispersion model and the inputs for the studies identified in this task above
- Process RLINE model output files for comparison with field measurements from the studies identified in this task above
- Compare modeled and measured concentrations for the solid and vegetative/porous barrier cases
- Calculate model performance metrics such as bias, standard deviation, and geometric mean as functions of downwind distance, and meteorological parameters (stability, u-star, and wind speed)
- Test and modify parameterizations in barrier algorithm based on barrier height, distance between roadway and barrier, porosity, vegetation type, and meteorological parameters (e.g. u-star and surface roughness)
- Implement modifications to the barrier algorithm methodology into RLINE using FORTRAN

Deliverable 5.1: The contractor shall provide a database of model inputs for the field studies to be evaluated (historical and work done under this WA)

Deliverable 5.2: The contractor shall provide model outputs for all RLINE calculations

Deliverable 5.3: The contractor shall provide a description and model code for the vegetation barrier algorithm

Deliverable 5.4: The contractor shall provide a summary report of model vs. measurement results for the field studies evaluated that includes a list of field studies evaluated (including the work under this WA), model inputs used, and comparison of results

QUALITY ASSURANCE

The field sampling configurations and quality assurance requirements for this work will be described in two separate, approved Category III QAPPs which will be provided by the EPA WA COR with assistance from the contractor, one for the chase studies and the other for the roadside vegetation study. These QAPPs shall be accompanied by a signature page that is signed by the ARCADIS work assignment leader and QA officer to show that they have reviewed and approved the QAPP. It is the responsibility of the ARCADIS work assignment leader to document this process. Upon receipt of the signed QAPP, the EPA work assignment manager and QA manager will review and approve the QAPP and they will add their signatures to the signature page. Work involving environmental data shall not commence until the QAPP has received official approval from the EPA Quality Assurance Staff. As noted in Task 5, a draft QAPP will be developed for the chase vehicle study in RTP, with a final QAPP developed for the Beijing study based on lessons learned during the pilot study.

DELIVERABLES

Deliverable 2.1: Contractor shall submit an updated GMAP vehicle safety plan for the field study to the EPA WA COR prior to initiating field measurements and provide general vehicle support. If applicable, the plan developed for this option period can be used for this field study.

Deliverable 2.2: Contractor shall provide a signed agreement for technical support from the GMAP vehicle manufacturer through at least three months after the proposed completion date for this project in the contractor's project workplan, to be completed prior to initiating field measurements. This agreement shall include in-person support during domestic deployments. If applicable, the agreement developed for this option period can be used for this field study.

Deliverable 3.1: The contractor shall provide raw time-stamped inter-comparison data to the EPA WA COR, within one week of sampling completion.

Deliverable 4.1: The contractor shall provide raw time-stamped measurement data to the EPA WA COR, within one week of sampling completion in the RTP chase study.

Deliverable 5.1: The contractor shall provide a database of model inputs for the field studies to be evaluated (historical and work done under this WA)

Deliverable 5.2: The contractor shall provide model outputs for all RLINE calculations

Deliverable 5.3: The contractor shall provide a description and model code for the vegetation barrier algorithm

Deliverable 5.4: The contractor shall provide a summary report of model vs. measurement results for the field studies evaluated that includes a list of field studies evaluated (including the work under this WA), model inputs used, and comparison of results

SCHEDULE of DELIVERABLES

Deliverable 2.1 and 2.2: Within 30 days of workplan approval

Deliverable 3.1: Within 7 days of inter-comparison sampling completion

Deliverable 4.1: Within 7 days of sampling completion

Deliverables 5.1 and 5.2: Within 90 days of workplan approval

Deliverables 5.3 and 5.4: Within 150 days of roadside vegetation study data collection

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW)

FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function; 07/14/08 A-2

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,

http://www.epa.gov/quality/qs-docs/r2-final.pdf

□ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

□ **QAPP Requirements for Software Development Projects**

□ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.

1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.

2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.

3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.

3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.

4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.

4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.

4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.

4.5 Describe the method for uniquely numbering each sample.

4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-027

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-5104
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: APPCD Metrology QA Laboratory Support

WA #: 0-027 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WA issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform monthly Quality Assurance and/or Quality Control QA/QC checks of the X-ray Fluorescence (XRF) in Room E360. The Contractor shall assist Principle Investigators (PI) with scheduling XRF usage, sample preparation and analysis of collected samples. The Contractor will inform the WACOR of any scheduling conflicts and of any non-routine maintenance issues.

(5) The Contractor shall report the total number of hours and the total expenses incurred for all objectives, with each monthly invoice, in this Statement of Work (SOW).

(6) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(7) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(8) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(9) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(10) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(11) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: Recertification of APPCD Analytical Balances

The Contractor shall recertify all analytical balances that are in active use and that have not been recertified within the past year. These balances have been identified in a spreadsheet that has been prepared by APPCD's QA team and this spreadsheet will be made available to the Contractor. The Contractor shall contact the individual who has been identified as each balance's custodian to arrange for a date to recertify the balance. After each balance recertification, the Contractor shall update the spreadsheet and the Contractor shall maintain that spreadsheet in a location easily accessible to all APPCD staff.

OBJECTIVE 2: Monitoring of Temperatures of APPCD Refrigerators and Freezers

APPCD has purchased HOBO® temperature data loggers to monitor the temperatures of APPCD refrigerators and freezers. The Contractor shall verify the calibration of the data loggers on a annual basis. After the verification, the Contractor shall deploy the data loggers in APPCD refrigerators and freezers. Thrice-yearly the Contractor shall download temperature data from the data loggers, replace batteries if necessary and post the downloaded data in a location easily accessible to all APPCD staff.

OBJECTIVE 3: Weights, Flows, Temperature, Pressure, Voltage and Relative Humidity (RH) Calibration Support

The Contractor shall calibrate/verify Weight sets, Flow devices, Temperature devices, Pressure devices, Voltage devices and RH Meters for APPCD Labs. The total number of APPCD devices is difficult to calculate due to instruments that are purchased, excessed or moved based on project activity. The Contractor shall use their best practice to accommodate as many of the calibrations as possible and inform the WACOR of any difficulties that may arise.

OBJECTIVE 4:- Duke Forest Site Support

Duke Forest is a remote location near Chapel Hill, NC where EPA is continuing research. The Contractor shall provide support for this location by providing calibrations and/or repairs to the sampling equipment, this includes equipment in Lab E584 that will be deployed at Duke Forest Site and Duke Forest site modifications. Specific details shall be detailed in Technical Directives from the WACOR.

QUALITY ASSURANCE

Quality Assurance for any individual instrument would fall under the QAPP for the program that the instrument is being used by.

DELIVERABLES

The Contractor shall provide the following reports for APPCD:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.
e) Status of the Facility Manuals.
f) Any other activities that would impact the operation of the Met Lab.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(5) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(6) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

Each calibration report will be considered a deliverable. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-028

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-5104
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: NHEERL Metrology QA Laboratory Support

WA #: 0-028 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WA issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform monthly Quality Assurance and/or Quality Control QA/QC checks of the X-ray Fluorescence (XRF) in Room E360. The Contractor shall assist Principle Investigators (PI) with scheduling XRF usage, sample preparation and analysis of collected samples. The Contractor will inform the WACOR of any scheduling conflicts and of any non-routine maintenance issues.

(5) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(6) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(7) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(8) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(9) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(10) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: NHEERL Calibration of Analytical

The Contractor shall perform measurement device and equipment calibrations that conform to the NHEERL Calibration SOPs or ISO 17025 and the GUM. Some of these devices will be carried to the Met Lab for calibration. Other devices cannot be physically carried to the Met Lab facility, therefore the Contractor will need to take portable calibration equipment to the NHEERL Lab to perform the calibration. The Contractor shall maintain a record and data base of all equipment calibrations and calibration schedules. The following devices from NHEERL will be calibrated by the Met Lab:

354	balances
24	plate readers
74	pH meters
2	luminometers
26	spectrometers

7	Thermometers
30	mass sets
2000	pipettes

<u>OBJECTIVE 2:</u> NHEERL Additional Calibration and Repairs

The Contractor shall calibrate other devices not on this list as labor hours will allow. There may be circumstances where the calibration (or repair) of an instrument is beyond the technical expertise of the Met Lab. If this occurs, the Contractor shall make the arrangements with the instrument vender to have the instrument repaired and /or recalibrated. The Contractor shall communicate with the WACOR the status of that instrument throughout that process.

DELIVERABLES

The Contractor shall provide the following reports for APPCD:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.
e) Status of the Facility Manuals.
f) Any other activities that would impact the operation of the Met Lab.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(5) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(6) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7

Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA	United States Environmental Protection Agency Washington, DC 20460 **Work Assignment**	Work Assignment Number 0-029 ☐ Other ☐ Amendment Number:

Contract Number	Contract Period 04/01/2015 To 03/31/2016 Base X Option Period Number	Title of Work Assignment/SF Site Name
EP-C-15-008		

Contractor	Specify Section and paragraph of Contract SOW
JACOBS TECHNOLOGY INC.	

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance
From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Scott Moore (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-5104 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work

WA Title: DCMD Metrology QA Laboratory Support

WA #: WA 0-029 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WA issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform monthly Quality Assurance and/or Quality Control QA/QC checks of the X-ray Fluorescence (XRF) in Room E360. The Contractor shall assist Principle Investigators (PI) with scheduling XRF usage, sample preparation and

analysis of collected samples. The Contractor will inform the WACOR of any scheduling conflicts and of any non-routine maintenance issues.

(5) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(6) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(7) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(8) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(9) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(10) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: Recertification of DCMD Analytical Balances

The Contractor shall recertify all analytical balances that are in active use and that have not been recertified within the past year. The Contractor shall contact the individual who has been identified as each balance's custodian to arrange for a date to recertify the balance. After each balance recertification, the Contractor shall update the Met lab database. Contractor shall perform a verification of any of DCMD's weight sets upon request or as needed.

OBJECTIVE 2: Monitoring of Temperatures of DCMD Refrigerators and Freezers

DCMD has purchased HOBO® temperature data loggers to monitor the temperatures of DCMD refrigerators and freezers. The Contractor shall verify the calibration of the data loggers on an annual basis. After the verification, the Contractor shall deploy the data loggers in DCMD refrigerators and freezers. Thrice-yearly the Contractor shall

download temperature data from the data loggers, replace batteries if necessary and post the downloaded data in a location easily accessible to all DCMD staff.

<u>OBJECTIVE 3:</u> Weights, Flows, Temperature, Pressure, Voltage and Relative Humidity (RH) Calibration Support

The Contractor shall calibrate/verify Weight sets, Flow devices, Temperature devices, Pressure devices, Voltage devices and RH Meters for DCMD Labs. The total number of DCMD devices is difficult to calculate due to instruments that are purchased, excessed or moved based on project activity. The Contractor shall use their best practice to accommodate as many of the calibrations as possible and inform the WACOR of any difficulties that may arise.

<u>OBJECTIVE 4:</u> DCMD Additional Calibration and Repairs

The Contractor shall calibrate other devices not on this list as labor hours will allow. There may be circumstances where the calibration (or repair) of an instrument is beyond the technical expertise of the Met Lab. If this occurs, the Contractor shall make the arrangements with the instrument vender to have the instrument repaired and /or recalibrated. The Contractor shall communicate with the WACOR the status of that instrument throughout that process.

DELIVERABLES

The Contractor shall provide the following reports for DCMD:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.
e) Status of the Facility Manuals.
f) Any other activities that would impact the operation of the Met Lab.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any

documents or literature during any of these correspondences will also be made available to the WACOR.

(5) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(6) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-030

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-5104
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: OAQPS Metrology QA Laboratory Support

WA #: WA 0-030 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

This work assignment will cover one area of support for the $PM_{2.5}$, $PM_{10-2.5}$ and Lead (Pb) Performance Evaluation Programs (PEPs). The set of tasks will be to coordinate the annual certification of NIST traceability of calibration and reference standards used by EPA or its contractors and Federal Land Managers in cooperative monitoring and quality assurance programs. This work must be repeated annually because accuracy and reliability are paramount. The programs in which the reference standards are deployed to calibrate or audit performance parameters are required by 40 CFR Part 58 Appendix A.

EPA implements the Performance Evaluation Programs (PEPs) to assess bias of measurements made by the national $PM_{2.5}$ FRM/FEM monitoring network; the Lead (Pb) monitoring network, and in 2012 the

PM_{coarse} network (fraction of PM-10 that is larger than $PM_{2.5}$). It is implemented through EPA Regional ESAT contractors and some State, local and Tribal audit staff. The national objective is accomplished by simultaneously measuring the same ambient pollutant concentration as a network sampler with a well maintained and closely controlled FRM sampler. EPA employs a fleet of these samplers. The fleet of samplers should operate as near identically as possible. NIST Traceable multi-calibrators (and some single-parameter devices) are used to ensure the temperature and barometric pressure sensors used by the samplers generate consistent and reproducible results. Sampler flow rates are controlled to within 4% based on the required accuracy of the calibrators.

Also EPA Regional Staff, State auditors, and Federal Land Managers perform periodic site and sampler performance audits at sites indicated above as well as the IMPROVE Network. The Calibrators/audit reference standards are similar and sometime the exact instruments used for the PEP program.

The following work assignment will provide the annual certification of the multi calibrators/audit reference standards by a NIST accredited Metrology laboratory serviced by AMEC, on the EPA Campus at RTP, NC.

The tasks will include (a) maintaining the inventory of calibrators/audit reference standards that are used in the programs under EPA oversight; (b) logistical assistance in collecting the calibrators/audit standards from the Regional, State and FLM partners; (c) performing the NIST traceability procedures; (d) allowing OAQPS to post verify the calibrators prior to returning the instruments to their location of deployment; [1] (e) returning instruments to their locations of deployment; (f) and issuing instrument advisories and a final report.

The project will certify a total of approximately 90 instruments. The instruments are typically collected in approximately 4 to 5 groups of like kind. The WAM will provide an inventory from which a natural grouping regimen will emerge. The processing of a group is called a "Round." For example, each Region will ship one of their 2 or 3 BGI Delta Cals in round 1and the other(s) in round 2. Each group is batch-processed by the metrology lab, which minimizes set-up costs and expedites the return to service.

Any instruments that do not operate within acceptance limits are identified. Certain instruments may not perform adequately at all of their design ranges; however, they may operate satisfactorily in the range or ranges that are necessary for the program in which they are deployed. Advisories of these instruments shall be issued to the EPA Regional Staff and support contractors that are responsible for their field use. An example of a previous year's report, both written and on a CD, will be provided to illustrate the desirable format and provide a starting data set. The final annual report contains the inventory, an updated Summary Report and a comprehensive report of results.

Resource Material: OAQPS will supply contact and shipping addresses for EPA Regional ESAT contacts, participating State local or Tribal partners, and any incidental contact information as the need arises.

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[1] Occasionally an instrument has exhibited a broken wire in this test. It has to be shipping to Mesa Labs for repair before returning to service.

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WAs issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(5) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(6) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(7) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(8) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(9) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: Details of the objective associated with this WA are stated below:

The contractor shall manage the National Institute of Science and Technology (NIST)-traceability certification of calibrators and audit reference standards for Regional PEP and speciation auditors that support the PEP and speciation programs. Instruments shall include:

- VWR** digital temperature meters and probes
- Dwyer** Handheld pressure verification device
- Andersen** Instruments dry gas meters
- R&P Chinook** flow transfer standard devices
- BGI Delta-Cal temperature, pressure, and flow calibration device
- BGI Tri-Cal or Tetra Cal temperature, pressure, and flow calibration device
- BGI HiVolCals (for high volume samplers)

** Most of these devices have been phased out of use by PEP field scientists by direction of the OAQPS QA lead for PEP and speciation, although some may be reinstituted for Pb PEP sampler internal audit devices

The NIST certifications confirm the manufacturer's claim for accuracy and readability and must be accomplished on an annual basis. Initial vendor certifications are on record at EPA. Copies of the previous annual certification will be provided and a copy should arrive with each instrument shipped by the personnel, who uses it.

OBJECTIVE 2: Calibrator Inventory Maintenance

The Contractor shall add to the "Instruments to Inventory" section of the certification notebook for the following:

A. Any additional verification equipment that is purchased by EPA OAQPS and is deployed to a specific Region's PEP implementing contractor or SLT agency
B. Any verification equipment the EPA Regional PEP and QA staff identifies as additional audit equipment for use in the PEP or for auditing PM2.5 chemical speciation, IMPROVE networks.
C. Approximately 90 instruments are deployed through the 10 Regional PEPs and OAQPS . The inventory should include approximately 22 new high volume flow or multi parameter calibration standards that have been added over the last 2 years for the implementation of the Pb PEP. The inventory should be reviewed to assure that they have been accounted for. It is likely that a few calibrators are expected may be replaced over time.

The contractor shall also document if, when and why a calibrator or audit reference standard is removed from service.

OBJECTIVE 3: Coordinate the certification process

The Contractor shall:

A. Organize the collection of similar calibration/audit standards in up to 4 groups or rounds. The ESAT contractor or the PEP lead in each Regional Office, or the staff persons in participating SLT agencies will ship the calibrators to the Contractor's RTP address.
B. When the EPA ORD's Metrology Lab contractor receives the calibrators they shall confirm each one's data on the inventory and make a preliminary assessment of its serviceability. (Sometimes upon arrival one or another characteristic is inoperable.) If a repair is necessary to make the instrument operational, the contractor shall contact the appropriate vendor (MESA Labs purchased BGI Incorporated in 2014) acquire a "Return/Repair Authorization Number," and ship it directly to that vender for a cost estimate of the repair. The cost estimate shall be forwarded to the EPA WAM who will approve and arrange for payment of the repair or postpone it. EPA will cover shipping through an existing contract with UPS.
C. The Metrology lab contractor shall perform NIST traceability certifications and provide appropriate certificates with the instruments.
D. Upon certification the Metrology lab contractor shall turn over the calibrators to OAQPS to post verify the calibrators prior to returning the instruments to their location of deployment. OAQPS will return the calibrators to the metrology laboratory with their results, which will be included in the annual report.
E. Identify calibrators and audit reference standards that are performing near and below the acceptable tolerance limits. Some instruments such as the BGI TriCal or TetraCal may perform outside of acceptance limits in operating ranges that are not likely to be encountered in the PEP program or other auditing activities. These instruments may be returned to field service, but advisories of their performance shall be sent to the personnel who use the instrument. If instruments are found to perform outside of the acceptance range the metrology lab shall consult with MESA Laboratories to determine if the instrument may be adjusted modulating the affected sensor's electronic signal. If adjustment is not possible the instrument shall be subject to the repair process in Task B above.
F. The Metrology Lab contractor shall make a hard copy of every certificate and include it with the instrument upon return to its location of deployment. Digital copies of the certificate shall be forwarded to the OAQPS PEP lead. A digital copy of all certificates shall also be maintained by the metrology lab. These copies may be stored for a period of 5 years.
G. Ensure all calibration/audit reference standards are shipped back to their location of deployment: EPA OAQPS AAMG, the appropriate EPA Region or their ESAT contractor, any other participating agency approved by the WAM. The OAQSP PEP lead will provide all contact information and shipping addresses.

<u>OBJECTIVE 4:</u> Document Results

- The Contractor shall compose and issue advisories (mentioned in Tasks 2B and 2E) to each EPA Regional Office PEP lead and their supporting contractor, or other EPA or Federal agency auditor, or other SLT contact who is responsible for, or utilizes a calibrator/audit device that has exhibited a performance outside of the acceptance limits for a given range of the measured parameter during the certification.
- The contractor shall compile an annual summary report of certification results and the details of the findings. The OAQPS PEP lead will provide a template of this document produced under previous contracts and work assignments.

DELIVERABLES

The Contractor shall provide the following reports for OAQPS:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(5) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(6) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

The contractor shall schedule each round of calibrations with OAQPS based on the next due date for calibration or availability of the equipment. The Contractor shall inform the WACOR and the OAQPS contact of any variance to the calibration schedule. All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-031

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY. (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-5104
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: ITFB Metrology QA Laboratory Support

WA #: WA 0-031 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WA issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(5) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(6) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(7) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(8) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(9) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: Recertification of ITFB's Analytical Balances

The Contractor shall recertify all analytical balances that are in active use and that have not been recertified within the past year. The Contractor shall contact the individual who has been identified as each balance's custodian to arrange for a date to recertify the balance. After each balance recertification, the Contractor shall update the Met Lab Database.

OBJECTIVE 2: Weight sets, Flows, Temperature, Pressure, Voltage and Relative Humidity (RH) Calibration Support

The Contractor shall calibrate/verify Weight sets, Flow devices, Temperature devices, Pressure devices, Voltage devices and RH Meters for ITFB Labs. The total number of ITFB devices is difficult to calculate due to instruments that are purchased, excessed or moved based on project activity. The Contractor shall use their best practice to accommodate as many of the calibrations as possible and inform the WACOR of any difficulties that may arise.

OBJECTIVE 3: ITFB Additional Calibration and Repairs

The Contractor shall calibrate other devices not on this list as labor hours will allow. There may be circumstances where the calibration (or repair) of an instrument is beyond

the technical expertise of the Met Lab. If this occurs, the Contractor shall make the arrangements with the instrument vender to have the instrument repaired and /or recalibrated. The Contractor shall communicate with the WACOR the status of that instrument throughout that process.

OBJECTIVE 4: ITFB Calibration of Analytical Equipment

The Contractor shall perform equipment calibrations to the following list of devises:
a) 37 Flow devices
b) 11 Relative Humidity Probes
c) 3 Pressure devices
d) 4 Ozone Analyzers
e) Any other devise as needed

OBJECTIVE 7: ITFB Additional Calibration and Repairs.

The Contractor shall calibrate other devices not on this list as labor hours will allow. There may be circumstances where the calibration (or repair) of an instrument is beyond the technical expertise of the Met Lab. If this occurs, the Contractor shall make the arrangements with the instrument vender to have the instrument repaired and /or recalibrated. The Contractor shall communicate with the WACOR the status of that instrument throughout that process.

DELIVERABLES

The Contractor shall provide the following reports for APPCD:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.
e) Status of the Facility Manuals.
f) Any other activities that would impact the operation of the Met Lab.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because

multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(5) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(6) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-032

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-5104
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: NHEERL MED Metrology QA Laboratory Support

WA #: WA 0-032 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WA issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(4) The Contractor shall perform monthly Quality Assurance and/or Quality Control QA/QC checks of the X-ray Fluorescence (XRF) in Room E360. The Contractor shall assist Principle Investigators (PI) with scheduling XRF usage, sample preparation and analysis of collected samples. The Contractor will inform the WACOR of any scheduling conflicts and of any non-routine maintenance issues.

(5) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(6) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(7) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(8) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(9) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(10) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

OBJECTIVE 1: NHEERL Mid-Continent Ecology Division (MED) Met Lab Support

The Contractor shall select a Designated Specialist (DS) for pipette calibrations that conform to the NHEERL-MED Calibration SOPs or ISO 17025 and the GUM. These devices shall be calibrated on site or mailed to the DS. NHEERL-MED will pack and mail (via any carrier at the discretion of NHEERL-MED) all of the devices (i.e. pipettes) to be calibrated to the DS. NHEERL-MED will be responsible for all shipping charges. The Contractor shall maintain a record and data base of all equipment calibrations and calibration schedules. NHEERL-MED will have 600 pipettes be calibrated via the Met Lab. NHEERL-MED would like to maintain a schedule of calibrating 150 pipettes (or ¼ of their total volume) every 3 months.

DELIVERABLES

The Contractor shall provide the following reports for NHEERL MED:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of pipette calibrations performed.
b) Any costs incurred during calibration activities.
c) Any maintenance activities performed.
d) Any documentation activities performed.

(2) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(3) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(4) The Contractor shall provide a Calibration Certificate for each device and give it to the Principle Investigator (PI) or to the Contractor Task Lead and keep a copy (either hard copy or electronic) on record.

(5) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-033

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Scott Moore
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-5104
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: OZONE Metrology QA Laboratory Support

WA #: WA 0-033 **WACOR:** Scott A. Moore

Contract #: EP-C-15-008 **ALT. WACOR:** Paul W. Groff

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

INTRODUCTION

Good Quality Assurance (QA) practice requires that routine operations in a research facility be conducted according to prescribed procedures and that data be of known and adequate quality. To ensure good QA, it is necessary that instrumentation be maintained in good working condition and that it be checked regularly to ensure that it produces reliable data. The Environmental Protection Agency (EPA) requires that QA practices be established and applied to all research measurement efforts. The Metrology Laboratory (Met Lab) provides QA assistance to EPA researchers by providing the procedures and the standards to calibrate various scientific devices.

SUMMARY OF OBJECTIVES

The objective of this Work Assignment (WA) is to provide Met Lab support to EPA researchers. The Met Lab is a facility with the capabilities to check (or audit) the calibration of EPA measurement instrumentation. A second objective is to provide support for preparing and verifying Performance Evaluation Audit (PEA) samples. The overall goal is to ensure and document that operations performed in EPA facilities produce data that will be of scientifically and legally defendable quality. This WA does not pertain to the calibration of facility devices such as smoke detectors, lights, or any health and safety related devices such as ambient Carbon Monoxide (CO) monitors that alarm strictly for safety reasons.

BACKGROUND

Data Uses:
Primary users of the products of this WA will be researchers and operators of equipment in the EPA facilities. The following divisions are currently using the Met Lab services:
The Air Pollution Prevention and Control Division (APPCD)
The National Health and Environmental Effects Research Laboratory (NHEERL)
The Office of Air Quality Planning and Standards (OAQPS)

The Decontamination and Consequence Management Division (DCMD)
The National Exposure Research Laboratory (NERL)

Calibration and PEA results can be reported in research reports to support or verify findings. All Quality Assurance Project Plans (QAPP) will be the responsibility of the project lead or principle investigator of the equipment being calibrated.

Lab Site: The Met Lab is located in rooms D360-A, D362 and D364-A in EPA's Research Center in Research Triangle Park, NC.

Experience: Personnel assigned to this WA must be capable of performing the tasks listed in each of the assigned Tasks, which include electrical work, plumbing, general experience with lab equipment and materials, a familiarity with the calibration of measurement devices and a fundamental understanding of the principals behind the measurements. Lab personnel will also require the ability to reduce data and report it according to the International Organization for Standardization (ISO) "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO 17025) standard and the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

SCOPE

(1) The Met Lab was developed as a central means of providing the best practice for the calibration of laboratory equipment and at a low price by sharing those costs between various labs. The Contractor shall use their best practice in sharing the costs of equipment calibrations, repairs, system upgrades, purchases and labor hours evenly (based on volume of work) between all the WAs issued pertaining to Metrology Support.

(2) The Contractor shall obtain performance specifications on potential calibration equipment. The Contractor shall maintain and upgrade calibration systems and equipment as needed. Final decisions regarding upgrading and replacing equipment will be relayed to the Contractor in a technical directive through the WA Contracting Officer Representative (WACOR).

(3) The Contractor shall maintain Met Lab equipment in proper working order. The Contractor shall identify calibration needs and ensure that the necessary factory equipment calibrations for the Met Lab equipment are kept up to date. The Contractor shall maintain a record of all maintenance activities. Whenever practically possible, the calibration data for this equipment shall include National Institute of Standards and Technology (NIST) traceable information.

(5) The Contractor shall perform measurement device and equipment calibrations that conform to ISO 17025 and the GUM. The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR will assign project priority.

(6) The Contractor shall continue to apply the ISO 17025 standards in the operation of the Met Lab. Details of the ISO 17025 Accreditation will be detailed in a separate WA.

(7) The Contractor shall provide Technical Support for any Principle Investigator (PI) that may need assistance with projects that will need Met Lab support.

(8) The Contractor shall develop, document, and implement detailed calibration operating procedures for all laboratory calibration services.

(9) The Contractor shall assemble and maintain a system of published procedures and product information relevant to calibration measurement procedures and measurement devices.

(10) The Contractor shall confirm the current acceptable validation methods for all calibration systems used in the Met Lab and also for the calibration tracking system. Any confirmation of validation methods shall be documented. All database functions that are user-programmed shall be tested and the validation documented. Each revision to the database software (exclusive of the data in the database) shall have an identifiable revision number assigned to it.

TECHNICAL APPROACH/OBJECTIVES

<u>OBJECTIVE 1:</u> Standard Reference Photometer (SRP) Ozone Support

(1) The Contractor shall receive an Ozone measuring devise and unpack the equipment to be set it up to run against EPA's Primary Standard Reference Photometer serial number 01 (SRP-01). The designated Lab is D360-A.

(2) The Contractor shall break down an Ozone measuring devise in preparation for shipping it back to the specific owner

(3) The Contractor shall perform repairs on the SRPs as per Technical Directives from the WACOR. The Contractor shall copy any data recored to the EPA Server for safe storage.

(5) The Contractor shall run QA/QC Checks, Verifications, Re-Verifications and Calibrations on any Guest Ozone standards.

(6) The Contractor shall maintain the Zero Air Supply used for the Ozone Lab.

(7) The Contractor shall maintain a calibration schedule for various support instrumentation such as the Barometric Pressure Sensor, the STOLAB Temperature calibrator and the Fluke Digital Volt Meter.

(8) The Contractor shall perform QA evaluations using Excel and Word templates provided with the SRP Software.

(9) The Contractor shall provide the WACOR with documentation on any calibration that is performed for final approval and before it is released to any other entity.

(10) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(11) The Contractor shall be responsible for the annual re-verification of SRP-01, which is performed by NIST. The WACOR will issue a TD concerning details of the re-verification of SRP-01.

DELIVERABLES

The Contractor shall provide the following reports for APPCD:

(1) Monthly reports of the laboratory support activities including the following:

a) The number of and type of calibrations performed.
b) Any maintenance activities performed.
c) Any documentation activities performed.
d) Any other activities that would impact the operation of the Met Lab.

(2) Special reports as requested via a Technical Directive by the WACOR.

(3) The Contractor shall respond to calibration needs by giving priority to projects that have time constraints. If calibrations cannot be delivered on time because multiple projects have overloaded the ability of the laboratory, the WACOR shall be notified and then provide technical direction to the Contractor for prioritization.

(4) The WACOR shall be copied on all correspondence to and from any laboratories and venders used in the completion of the tasks associated with the projects. Any documents or literature during any of these correspondences will also be made available to the WACOR.

(5) Formatting of reports shall be consistent with historical reporting and electronic files shall be compatible with Agency Standard Software. During EPA Fiscal Year 2015 (FY15) federal employees and Contractors will be using Windows 7 Enterprise, Adobe Reader 10 and Microsoft Office 2013. Any upgrades will be

announce by OEI. Hard copies of reports are acceptable; however, electronic copies are encouraged.

SHEDULE OF DELIVERABLES

All calibration reports would be considered a deliverables. The Contractor shall provide all deliverables within 14 days after completing a calibration. Monthly reports shall be due at the same time the contractor invoiced EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-034

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name:

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Thomas Long
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3944
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

EP-C-15-008/0-034

POP: August 1, 2015 through March 31, 2016

Title: Mobile Source Emissions Measurement and Characterization

Description

Generate emissions data from three vehicles satisfying Office of Transportation and Air Quality requirements for new Motor Vehicle Emission Simulator (MOVES), TBD. Chassis dynamometer driving cycles will consist of one Federal Test Protocol (http://www.epa.gov/otaq/emisslab/methods/huddscol.txt) and three repetitions of a locally developed cycle which is approximately 20 minutes in duration. These driving cycles will be repeated until nine valid (see below) data sets are created. On road measurements with a PEMS unit will be made over the road. Each set of routes is expected to be completed in one working day. A set of three routes is to be repeated by all three vehicles four times.

Background

This project directly addresses the air, climate, and human health program areas, and supports other motor vehicle projects. While the two currently regulated "critical pollutants", particulate matter (0.01 grams per brake-horsepower-hour (g/bhp-hr)) and NO_x (0.20 g/bhp-hr) impact air quality and related health issues, proposed new rules focus on two related areas with broader environmental and social effects: vehicle fuel economy and greenhouse gas (GHG) emissions. The two go hand-in-hand because burning carbon-based petroleum fuels creates carbon emissions, so improving fuel economy directly lowers an internal combustion engine's main GHG, carbon dioxide (CO_2).

New vehicle rules are being phased in between 2014 and 2018 as part of an overall energy strategy that looks to reduce U.S. dependency on foreign energy supplies and lower CO_2 creation to address global warming concerns.

It is estimated that commercial trucks consume more than 2-million barrels of oil every day and account for 20% of transportation-related GHGs. For example, the state of California estimates that diesel trucks are responsible for seven and a half percent of all of California's global warming pollution.

The call for truck rules does not come with specific target numbers, but requires EPA, with the aid of the National Highway Transportation Safety Administration (NHTSA) to set standards based on research data. Much of the guidance for determining the standards will come from a congressionally mandated report. Created under the auspices of the National Research Council (NRC), "Technologies and Approaches Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles" was put together by a 19-member panel that combined academic researchers, engineers, and technologists with backgrounds in truck and component manufacturing.

Given the size of the existing database for emissions from either Medium Heavy-Duty Trucks

(MHDT) or gas direct injection (GDI) vehicles, this study hopes to provide insight into whether it is necessary to modify MOVES to improve these emission factors or to fill similar gaps in represented emission factors.

Scope and Objectives

This Work Assignment (WA) has been designed to fill data gaps or improve existing emission factors for the use case of MHDT or GDI (or similar missing emission factors to be specified by OTAQ).

- Testing will be conducted on either three MHDT or three GDI vehicles. MHDT vehicles will be tested under both laden, 90% Gross Vehicle Combined Weight Rating (GCWR) and unladen (50% GVWR) conditions. GDI vehicles will be tested at ambient temperatures of 72 °F (22 °C) and 20 °F (-7 °C).
- On road routes are local. Two of the routes are in Chapel Hill and one is in Hillsborough. Considerations included a protracted grade and varying traffic conditions in each of the speed ranges 0 to 25 mph, 25 to 50 mph, and above 50 mph. Due to fueling and travel considerations, all routes must be completed in a 5 hour time frame, including one half hour for the drivers to eat lunch.
- Chassis dynamometer test cycles will include a cold start FTP followed by three warm start Mobile Source Distributed Power Driving Schedules designed to generate data in each of the operating modes represented in the MOVES model.
- Core dynamometer bench measurements will include Total hydrocarbon (THC), non-methane hydrocarbons (NMHC), non-methane organic gas (NMOG), oxides of nitrogen (NOx), nitrogen dioxide (NO_2), carbon monoxide (CO), carbon dioxide (CO_2) and particulate matter (PM)
- Core portable emissions measurement system (PEMS) measurements will include Total hydrocarbon (THC), nitrogen oxide (NO), oxides of nitrogen (NOx), nitrogen dioxide (NO_2), carbon monoxide (CO), and carbon dioxide (CO_2)
- Chassis dynamometer testing shall also generate speciated volatile organic compound (speciated VOC) data. VOC compounds of interest include C1 – C12 hydrocarbons as well as light alcohols and carbonyls

Task 3 Test Fuels and Lubricants

The Contractor will be required to provide test fuel. Fuel will conform to the requirements stated in the each vehicle's operating manual and be procured from the distributor as a single batch. The Contractor will provide speciated analyses of the fuels sampled before and after project emissions testing and speciated analysis of the lubricant sampled after project emissions testing.

Task 4 Vehicle Procurement and Preparation

The Contractor shall be required to provide three test vehicles. Two will be driven on-road by Contractor personnel. The other one will be driven on-road by government personnel. All three will be driven on the chassis dynamometer by government personnel.

Each vehicle to be tested shall undergo a thorough inspection before beginning the test preparation sequence. This includes inspection and documentation of the engine, transmission, axles, exhaust system and tires, and documentation of the ECM status. Descriptively titled photographs of the vehicles' exhaust systems, engine plates, and emission plates shall be taken and included as part of the progress and final reports. The Contractor shall collect and record vehicle information as described in the Quality Assurance Project Plan (QAPP). Preparation will include assisting with the performance of on-road coastdowns.

Each vehicle shall then undergo initial crankcase oil, oil filter and air filter replacement. Oil and air filters shall be procured by the Contractor according to manufacturer's recommendations. Engine oil recommended in the owner's manual of each vehicle shall be used. The recommended grade of lubricant shall be purchased.

After the last test of each vehicle in the program, the Contractor shall record the lubricant level indicated on the dipstick before collecting a 0.25-quart oil sample for analysis.

If any of the vehicles are equipped with traction control, the Contractor shall ensure that the traction control is disabled either through an interior disable button or other method (remove power fuse to anti-lock brake system (ABS), and place a placard in the vehicle indicating the method of disabling traction control if driver input is required.. The Contractor will be provided target road load coefficients and set road load coefficients for the test vehicles according to 40 CFR 1066.301 and 40 CFR 1066.310 (or the Contractor may propose and use an alternate method, subject to approval by EPA). For the purpose of this study, the agreed road load setting shall remain the same for all testing on a given vehicle.

The Contractor shall provide hardware and software for reading and archiving vehicle engine control module (ECM) data during emissions testing.

Task 5 Vehicle Testing

5.1 Basic Testing Protocol

The basic dynamometer testing protocol begins with a cold start Federal Test Protocol (FTP), followed by three warm start Mobile Source Distributed Power Driving Schedules (MSDPDS). For GDI light-duty vehicles (LDV) this protocol will be conducted in compliance with CFR Part 86 Subpart C, CFR Part 1065, and CFR part 1066. For MHDT the HD-UDDS will be conducted in compliance with CFR Part 86 Subpart N, and CFR Part 1065. This test sequence will be repeated for each vehicle. For MHDT, this test sequence will be performed in both the laden and unladen conditions. For GDI LDVs, this test sequence will be performed at ambient temperatures of 72 °F (22 °C) and 20 °F (-7 °C). Each test condition will be run on each vehicle at least three times. A fourth test may be run if necessary as described in 5.1.1. MHDT tests will be performed on the 72-inch single roll electric heavy-duty chassis dynamometer. GDI LDV tests will be performed on the 48-inch single roll electric light-duty chassis dynamometer. The EPA will provide the same driver to be used for all tests on a given vehicle.

The gaseous emissions to be measured and reported are THC, CH4, NO_x, NO_2, CO, and CO_2. The Contractor will use cleaned SUMMA cans (provided by the EPA) to collect sample from which the US EPA will speciate the VOCs. The Contractor shall speciate the oxygenates. The Contractor will provide polyurethane foam (PUF) sorbent plugs and collect samples on which the US EPA will conduct PAH analyses. The Contractor will provide teflon filters for the EPA to perform metals analysis on the runs made on the chassis dynamometer. The Contractor will provide DNPH cartridges and collect samples on which the US EPA will conduct carbonyl analyses. The Contractor will provide teflon filters on which the the US EPA will collect samples and perform gravimetric analyses.

During all emission tests, the Contractor shall record the following ECM parameters at the rate of 1 Hz using Contractor-supplied data acquisition equipment:

- RPM
- Vehicle speed
- Engine load
- MIL status
- Absolute throttle position
- Engine coolant temperature
- Short term fuel trim-bank 2
- Long term fuel trim-bank 2
- Fuel/air commanded equivalence ratio
- Alcohol fuel percent
- Manifold absolute pressure
- Spark advance
- PID Control Module Voltage
- Air Flow Rate From Mass Air Flow Sensor

The facilities for testing shall be maintained in conformance with the requirements of 40 CFR Part 86 Subparts C and N and 40 CFR Part 1066 as they apply to vehicle emissions testing. THC, CH4, NO_x, NO_2, CO, and CO_2 emissions sampling and measurement shall be conducted as specified in 40 CFR 1065. The minimum detection limit for NO_2, measurements shall be 5 ppb. If some aspect of testing will need to be done in variance to the above specifications the Contractor shall describe why that is the case and how it may impact the test results.

Variances must be approved by the EPA WAM before testing may begin.

The Contractor shall verify that the tunnel flow remained constant during the test. The CVS blower shall be kept on for ½ hour before the first emission test on a given day and continuously between emission tests to ensure tunnel stability.

The Contractor shall provide defined and maintained cooling fan placement and flow for each test vehicle on all the tests. The flow of air sweeping the vehicle in the test cell shall be consistent between tests.

The Contractor shall perform "blank" UDDS tests at one month intervals during this program. These tests will involve running the full test sequence drawing only background air into the sampling system. All sampling systems will be operated and measurements will include:

- Phase level THC, CH_4, CO, NO_x, CO_2, PM, NO_2, VOCs (including alcohols and carbonyls)
- Continuous THC, CH_4, CO, CO2 and NO_x

The Contractor is not expected to provide a technician to support the three weeks of PEMS testing but the vehicle leases will not to span the duration from test preparation at the beginning of October 2015 through the end of March 2016 to allow for the vehicles to be used for onroad testing by EPA personnel.

5.2 Speciation of Volatile Organic Compounds (VOCs), Dynamometer Tests

Sampling and analysis of alcohols shall be done using CARB method 1001, "Determination of Alcohols in Automotive Source Samples by Gas Chromatography" as modified by the MOP included in the QAPP. Sampling and analysis will be the responsibility of the Contractor.

Sampling and analysis of carbonyl compounds shall be done using TO-11a. Carbonyl sampling is to be performed by the Contractor. Carbonyl analysis will be performed by the EPA.

The Contractor shall seal and store alcohol samples at a temperature below 40°F immediately following collection. The Contractor shall make every effort to analyze these samples on the day they are collected, but no later than within six calendar days.

The Contractor shall provide segregated storage for alcohol and carbonyl samples to prevent their contamination.

No more than one vehicle shall be tested on the chassis dynamometer per test day, unless the Contractor can demonstrate that the total number of vehicles tested on that day and the timing of their tests will not compromise the time limit requirements imposed on sample analyses.

5.3 (Reserved)

5.4 PM measurement and Analysis

For tests on the chassis dynamometer, PM shall be collected on a Teflon filter and quartz filter for mass determination and subsequent chemical analysis. The sampling method shall allow for the collection of sufficient sample for chemical analyses. PM mass will be measured as specified in 40 CFR Part 1065. Two parallel filters will also be collect samples for each phase. Testing will be conducted collecting PM samples in

parallel. One set of filters will be at the cerfication filter face velocity of 100 cm/s and the other will be set to alternate speeds as specified by OTAQ. Other deviations from this method will require approval from EPA.

Task 6 Coordination and Support of Non-regulated Emissions Measurements

6.1 UV-DOAS Instrument
(Reserved)

6.2 FTIR
Coordinate with Edgar Thompson as he conducts FTIR measurements from a probe into the dilution tunnel.

6.3 PAH
Coordinate with Michael Hays to provide sufficient media to sample PAH's for 3 of the five sample phases per test. This will include use of alternate absorbents to polyurethane foam (PUF).

6.4 VOC
Coordinate with Tom Long or designee to use sufficient clean and prepared SUMMA cans for VOC analysis for all five sample phases per test.

6.5 Metals
Coordinate with Michael Hays to provide sufficient media for metals analysis on two of the five sample phases per test.

Task 7 Deliverables

7.1 Work Plan

The Contractor shall submit a work plan for this Work Assignment.

7.2 Infrastructure Support Allocation Report

The Contractor shall provide a report detailing the resources from this work assignment apportioned to support of Task 8. This report is not to exceed one page of narrative providing the amount of ODC and LOE expended to support Task 8 and a brief statement of what was accomplished.

7.3 (Reserved)

7.4 Monthly Reports

The Contractor shall provide monthly progress reports and invoices in accordance with contract. See the Reports of Work, EPAAR clause 1552.211-70, Submission of Invoices, EPAAR clause 1552.232-70.

Schedule of Deliverables

Steps	Completion Date
Project work plan submission	Within 20 calendar days of receipt of WA
Emissions Testing Start	October 15, 2015
Emissions Testing Complete	January 30, 2015
Infrastructure Support Allocation Report	March 21, 2016

8 Mobile Source Dynamometer Research Laboratory Infrastructure Support (to be priced separately)

In fulfillment of the objective of this task, the following Subtasks shall be performed by the Contractor, and throughout the course of performing these Subtasks, the Contractor shall comply with the most recent Mobile Source Emissions Measurement and Characterization Quality Assurance Project Plan (QAPP) and the SOP for the dynamometer or PEMS to be used that week. Total cost of LOE and ODC to complete Task 8 shall not exceed $130,000.

8.1.1 The Contractor shall prepare and operate the dynamometer, analytical bench, CVS sampling system and Portable Emissions Measurement Systems in accordance with the CFR and laboratory protocols established by the EPA. Variances are permitted only by technical direction and/or approval of the WAM.

8.1.2 The Contractor will perform instrument/equipment evaluations and repairs as necessary to demonstrate and maintain proper operability and will assist in facility/equipment problem resolution

8.1.3 The Contractor shall acquire supplies, consumables, and calibration/reference materials needed to assess regulated emissions, PM2.5, carbonyls, VOCs, SVOCs, MSATs, and oxygenates. Gas standards will be procured from Scott Specialty Gases or a vendor whose compliance with EPA standards has been shown to be statistically equivalent.

8.1.4 The Contractor shall forward the raw data to the WAM on the day the samples are taken.

8.1.5 Quality assurance forms provided by the WAM to the Contractor will be completed in accordance with WAM technical direction. An electronic copy (PDF) will be provided to the WAM on the day of completion.

8.1.6 Protocols will be provided to the Contractor by the EPA Work Assignment Manager prior to initiation of the technical work.

8.1.7 The Contractor shall maintain a sample custody log of PM, DNPH, water impingers, passivated canisters, fuels, and bags submitted for sampling and/or received for analysis following sample collection. In the majority of cases, it may be necessary for a number of individual samples from a single source to be composited, thereby necessitating careful recording of the composited samples. The WAM will also notify the Contractor of the analytical method they plan to apply prior to analyzing any sample set.

8.1.8 The Contractor shall provide for appropriate handling and disposal of all laboratory waste materials, including expired test fuels.

8.1.9 The Contractor shall operate, maintain, modify, and calibrate analytical instrumentation and ancillary equipment in the EPA Mobile Source Emissions Measurement and Characterization Lab. The Contractor shall maintain a file of operating manuals for all equipment and

instruments.

8.1.10 The Contractor shall maintain a complete and up-to-date inventory for the MSEMC lab along with Material Safety Data Sheets for all chemicals and gases.

8.1.11 The Contractor shall supply to the WAM on a monthly basis a written progress report that includes: (1) a list by run number of the dynamometer tests completed; (2) a list by identification number of the samples provided for analysis; (3) description of experimental procedure used and any observed anomalous behavior; (4) list of calibrations completed with the date of each instruments calibration respectively, and (5) a general description of laboratory operations. The Contractor shall also provide to the WAM electronic copies of raw data sets.

8.1.12 Labor mix: To achieve the objectives of the WA the following labor mix is required:
A person with extensive (seven or more years) experience in operation of a dynamometer analysis bench. This technician must have expertise in the area of wiring, plumbing, and trouble-shooting an analytical instrument bench. This requires a fundamental understanding of the principles of chemiluminescent detection, non-dispersive infrared detection, non-dispersive ultraviolet detection, and flame ionization detection. The technician must be able to perform instrument calibrations, understand the principles behind these processes to properly assess corrective actions in the likely event of anomalous phenomena in the course of instrument calibrations. The technician is generally the first person to identify instrument malfunctions and bring this to the attention of the senior dynamometer technician. The technician must be familiar with the operational software for the dynamometer. The technician must understand and comply with the operational specifications for chassis dynamometers contained in the CFR. The technician must have experience in and knowledge of automotive systems, research fuels handling, and basic refrigeration.

The technician must be strong enough to move heavy equipment (in accordance with OSHA regulations). The technician assists the EPA's senior dynamometer technician in all technical functions. The technician will help prepare sample media and operate sampling equipment to collect mobile source samples. He will occasionally maintain the laboratory instrumentation, clean glassware and other laboratory consumables as required by quality assurance log samples as appropriate and other especially routine tasks. This individual shall pay special attention to detail as it relates to logging samples and recording substrate weights.

8.1.13 Provision of Spares, Parts, Equipment, and Instruments
These parts, components, equipment, and instruments must be directly applicable to the function of the light-duty, heavy-duty, small engine, or portable dynamometers and their sample systems.
a. The Contractor shall provide adequate spares, parts, equipment, and instruments to perform the weekly dynamometer emissions tests.
b. Spares, parts, equipment, and instruments will include but are not limited to those listed in Attachment 2. Quantities will be held at the specified levels in Attachment 2.

Work Assignment Manager (WAM): Thomas Long
Alternate WAM: Richard Baldauf

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT PROJECTS

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD (mark all that apply):

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

□ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

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X **QAPP Requirements for Measurement Projects**

□ **QAPP Requirements for Secondary Data Projects**

□ **QAPP Requirements for Research Model Development and/or Application Projects**

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□ **QAPP Requirements for Method Development Projects**

□ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

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NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

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4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
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5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

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7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-035

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2):

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Gayle Hagler (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-2827 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

WA 0-035: Region 2 Port Air Monitoring Station Closure

EP-C-15-008/0-035
POP: August 1, 2015 through March 31, 2016

1.0 Background:

An air and weather measurement station has been operating since 2012 in Elizabeth, New Jersey, near the Port of New York and New Jersey. This station was originally fabricated in Research Triangle Park, NC, then transported to NJ and installed to contiuously operate air monitoring instrumentation. The key components of the station include a trailer with mast, meteorological instruments (wind, temperature, and humidity sensors), an integrated particulate matter instrument situated on the rooftop, and rack-mount instruments for particulate matter ($PM_{2.5}$, black carbon) and gases (carbon monoxide, oxides of nitrogen, sulfur dioxide). In addition, the station includes calibration equipment and certified gas cylinders, data logging equipment, integrated air conditioning units and instrument plumbing (tubing, inlets).

This work assignment supports the conclusion of this research station, transportation of the trailer and all research instrumentation to Research Triangle Park, NC, and the restoration of the grounds to their original state. The trailer is situated in a park located near the harbor (Arthur Kill Park), in a land area that was undeveloped and can be returned to be level ground. A power line is run from a nearby pole to the station.

As this WA does not include the collection of any environmental data, no QA plan is anticipated.

2.0 Task and Method Overview

WA-35 includes the decommissioning of an research air monitoring shelter in Elizabeth, NJ, restoration of grounds, transportation of all equipment, and maintenance of all instrumentation to be ready for new field research studies.

Task 1. Decommission air monitoring shelter.

The contractor shall prepare for and fully decommission air monitoring shelter in Elizabeth, NJ. The contractor shall participate in planning meetings with the project team, approximately 1-2 hrs per week for six weeks. The contractor shall prepare the trailer for transportation, including bringing it to be travel-ready (tire and other vehicle maintenance), facilitating power disconnect with the local power utility, and lowering air monitoring mast. The contractor shall safely package all research instrumentation and consumables for transportation. No on-site quality checks nor data retrieval is anticipated. The contractor shall provide insurance for all equipment during transport. The contractor shall transport the trailer and all equipment to the EPA-RTP facility and organize research equipment in a laboratory space at the direction of the WACOR.

Deliverable 1.1. The contractor shall provide a brief site decommissioning plan, including planned schedule, to the WACOR within 30 days of the WA initiation. The plan can be submitted by email.

Deliverable 1.2. The contractor shall provide documentation of the restoration of the grounds to the WACOR through photographs and an email summary, within 60 days of the WA initiation.

Task 2. Instrumentation maintenance

The contractor shall assess all instrumentation transported to the EPA-RTP facility and provide all scheduled and necessary maintenance to have the instruments fully ready for field deployment. This maintenance includes testing instrumentation operability, instrument maintenance, and replacement of consumables. Instrument maintenance kits and services for the suite of instruments is estimated to cost approximately $25,000.

Deliverable 2.1. The contractor shall provide update instrumentation calibration sheets and documentation of all maintenance steps conducted per instrument, within 90 days of the return of instrumentation to the EPA-RTP facility.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-036

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	036 NEIC GMAP support

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Eben Thoma	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-7969 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: NEIC GMAP Upgrade

WA #: 0-36 WACOR: Eben Thoma

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of the award through March 31, 2016.

SUMMARY OF OBJECTIVES

This WA will upgrade the GMAP OTM 33 mobile measurement system owned by EPA OECA NEIC as specified in the task section.

BACKGROUND

Reducing fugitive and area source emissions of greenhouse gases (GHGs), hazardous air pollutants (HAPs), other volatile organic compounds (VOCs), and certain inorganic gases from industrial facilities, agricultural operations, energy production, and waste disposal, is an ongoing priority for EPA and our state and local co-regulators. Unlike stack emissions, fugitive and area source releases are difficult to detect and measure, due to the spatial extent and inherent temporal variability of the potential sources.

Fugitive emissions detection and measurement using new technical approaches (e.g. infrared cameras, sensors, and mobile measurements) can augment manual leak detection and repair LDAR programs (where they exist) by providing spatially-resolved, speciated, and/or near real-time emissions information. The detection of fugitive emissions by time-resolved monitors, coupled with wind direction data, can be used to pinpoint and repair fugitive leaks with short response times, greatly decreasing emissions. Mobile measurements approaches are particularly useful to identify spatially distributed fugitive emissions and assisting in compliance activities.

As part of previous contracts, and with in-house EPA resources, several EPA mobile measurement systems (GMAP systems) have been developed since

2010. The most advanced system belongs to EPA NEIC and is stationed in Denver Colorado. This WA further develops and documents this system.

SCOPE

This WA will upgrade and document the OECA NEIC GMAP system as detailed below. Specific hardware and software upgrades will be executed and an SOP and trouble-shooting guide will be produced and reviewed by EPA ORD NRMRL QA and OECA NEIC.

TECHNICAL APROACH/OBJECTIVES

Under the technical direction of the EPA work assignment manager (WAM) and in consultation with the EPA NEIC technical lead, the contractor shall execute the tasks listed below. The contractor shall assume bi-weekly meetings and conference calls to review progress with the WAM and NEIC technical lead related to these efforts. Meeting frequency in the planning phases of the projects shall be greater. The contractor shall evaluate the potential need for outside consultants and/or laboratories with expertise in the various technical areas to meet deliverables and shall be responsible for defining, executing, and managing any subcontracts that may be required. The contractor shall be responsible for arranging and executing any required equipment purchases or shop work necessary to complete task.

Task 1: Upgrade and documentation of NEIC GMAP OTM 33 mobile measurement system.

Task 1.1: Based on information provided by the WAM and NEIC Technical lead, the contractor shall review the current system design and software of the EPA NEIC GMAP OTM 33 system to facilitate technical discussions.

Task 1.2: Under the technical direction of the WAM and in consultation with the EPA NEIC technical lead, the contractor shall develop a function specification for software changes and engineering support plan for hardware changes the NEIC GMAP upgrade. This shall include the plan to develop the documentation for the upgraded system. The contractor shall assume that the NEIC OTM 33 vehicle will remain in Denver and that the some implementation elements will be executed remotely by the EPA NEIC

technical lead. In some cases, equipment may be shipped back and forth from Denver to RTP for reconfiguration.

To aid in contractor WA cost estimate development, some elements of the upgrade are listed below. The elements are subject to change based on technical discussions and design review.

Example Hardware changes:

- The existing cellular modem shall be removed and replaced with upgraded capability for data transmission to home base.
- The WiFi camera shall be reconfigured so that it connects with CAT5 cable
- The router shall be reconfigured to disable WiFi and antenna removed
- The laptop shall connect to the network with CAT5 cable
- A new external hard drive will be ordered
- A new ruggedized laptop shall to support field operation of the system shall be ordered and configured to Agency standards. The solid state hard drive will be encrypted and a new cellular Internet card would be purchased. Detailed specifications below:
  - Specifications for ruggedized laptop:
  - Intel Core i7-2620M, 2.7GHz, 3MB Cache or Better
  - Minimum 14" monitor
  - Internal 8x DVD+/- RW
  - 512MB Onboard Video Card
  - Memory - 6GB DDR3 / Expandable to 8GB DDR
  - 250GB SSD
  - Gigabit Ethernet
  - Integrated smart card reader
  - Integrated cellular Internet card

- A new rackmount computer shall be ordered to replace the existing rackmount unit. The new computer will run Windows 7 (same as the existing computer) and will be configured to Agency standards including hard drive encryption. Detailed specifications below:
  - 1U rack mount mountable
  - Able to operate at 40C sustained ambient temperatures

- Minimum 6 USB ports (2 front, 4 rear)
- Ethernet port
- PCI express x16 slot (to accommodate com port expansion card, full height, half length)
- DVD +/- RW drive
- Minimum 4GB RAM
- Solid State Hard drive, minimum 256 GB
- Intel i3 4th generation processor or better

Example Software changes:

A function specification shall be developed that will document software changes for the custom LabView MEMS software in the NEIC GMAP system. Some example changes are:

- Upgrading remote data view capability (from home base)
- Fix graph freezing issue
- Change bar graph on GUI to a graph of all compounds (selectable) during all operating modes except stationary measurement (bar graph must remain in this mode) either by changing the interface screen for selected modes or providing a different version of the software
- Provide a tab with a graph that presents only the gps and concentration plot without google earth image
- Provide a selectable forced scale for google earth concentration plots
- Provide a selection for either highest value or average value on google earth plots
- Provide wind direction and speed data on google earth plots using aio and gps data, selectable for one indicator of average speed and direction for run or as arrows (average for each data block) for each data block on graph. Speed scale should be selectable for specified fixed scale or autoscale
- Automate saving of Duvas raw data files using supplied file folder and filename storage conventions
- Automate saving to external hard drive simultaneously with saving to control computer hard drive using supplied file folder and filename storage conventions

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- Possible integration of simplified OTM 33A emision rate analysis software as a separate routing (To be determined).

The contractor shall the contractor shall deliver the upgrade plan, including costing, (consisting of the function specification for software changes and engineering support plan for hardware changes) to the EPA WAM and NEIC Technical Lead for review and approval.

Task 1.3: Upon receipt of technical direction (approval of upgrade plan), the contractor execute the upgrade.

Task 1.4: The contractor shall ensure that the engineering changes and software revisions are documented and shall prepare a Standard Operating Procedure (SOP) and troubleshooting Guide for the updated EPA NEIC GMAP OTM 33 System.

QUALITY ASSURANCE

The need for development of a quality assurance project plan is not anticipated for Task 1 since no environmental data will be collected. The Standard Operating Procedure (SOP) and troubleshooting Guide shall be reviewed and approved by NRMRL and NEIC.

As general guidance for this contract:

Work involving collection of environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff. The Quality Assurance Project Plans (QAPPs) associated with these tasks shall be at a Category III level (unless otherwise specified) and must include all necessary elements as described in the referenced documentation (See Attachment 1).

All QAPPs and QAPP addendums shall be reviewed and approved by the contractor's WA leader and QA officer. Once it has obtained their approval, it shall be submitted to the EPA QA staff for review and approval. It shall be accompanied by a signature page that is signed by the contractor's WA leader and QA officer to show that they have reviewed and approved the QAPP. It is the responsibility of the contractor's WA leader to document this process. Upon receipt of the signed QAPP, the EPA WA manager and QA

manager will review and approve the QAPP and they will add their signatures to the signature page. For work involving analysis by outside laboratories, the contractor shall review and document all subcontractor quality management plan information as per current contract and EPA QA policy requirements.

DELIVERABLES

For all reporting deliverables, the contractor shall provide materials in Microsoft Word™ and Excel™ formats along with all raw and processed files if needed. The revised data acquis ion software shall be provided in LabVIEW compiled and native formats (to allow editing) with version control.

Task 1: All deliverables are due before March 31, 2016 unless otherwise noted

Task 1.1: The technical review shall be completed by within 30 calendar days of initiation of Task 1.

Task 1.2: The upgrade plan shall be delivered within 60 calendar days of initiation of Task 1.

Task 1.3: The upgrade plan shall be executed (completed) within 60 days of approval of the upgrade plan.

Task 1.4: Documentation, SOP, and troubleshooting guide shall be delivered by January 15, 2016.

SCHEDULE of DELIVERABLES

See DELIVERABLES section for a Deliverable due dates.

All deliverables are due before March 31, 2016 unless otherwise noted

ATTACHMENT #1
TO THE STATEMENT OF WORK (SOW)

NRMRL Quality Assurance (QA) Requirements

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8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-038

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: WA 0-038

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name: Michael Hays
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3984
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Statement of Work

I. **Title:** Chemical characterization of PM2.5 from oil burning samples (EP-C-15-008, WA 0-038)
POP Award through March 31, 2016

II. **Background:** The Natural Resource Damage Assessment (NRDA) under the Oil Pollution Act of 1990 is being conducted by the federal government trustees and five Gulf state Trustees after the Deepwater Horizon (DWH) oil spill. The goal of the DWH NRDA in the Gulf is an assessment and restoration of the injured or lost resources and the services those resources provide. The Trustees are currently in the injury assessment and restoration planning stage of the DWH NRDA process. Trustees are implementing studies to evaluate the extent, severity, and duration of injuries resulting from exposure to DWH oil, dispersant, and/or response activities undertaken to prevent, minimize and/or remediate oiling. During restoration planning, trustees determine the appropriate type and amount of restoration needed to compensate the public for these injuries in a way that leads to restoration.

ORD shall conduct an injury assessment by conducting experimental oil burns under conditions that simulate those from the DWH burn and capture the emissions for analysis of chemical and toxicological properties. By combining engineering, chemistry, and biology expertise in an integrated study design, this proposal will provide a comprehensive assessment of the emissions and toxicity of airborne particulate matter pollution emitted from burning oil released by the DWH spill. The specific objectives of this project are to physically and chemically characterize PM2.5 samples from burning oil for: (i) improving chemical source profiles; (ii) accurately apportioning ambient organic matter; (iii) improving fine PM mass and PM component emission factors; and for (iv) determining extractable organic matter (EOM) in support of health and toxicological research.

III. **Work Assignment Objective:** The objective is to provide the Fine PM Characterization Laboratory (FPMCL) technical support for the chemical characterization of PM2.5 filter samples collected from NRDA-related oil burning. Support for semi-volatile organic compounds (SVOCs) and gas-phase samples collected on polyurethane foam plugs (PUFs), quartz and Teflon filters and similar sampling media or devices shall also be provided. The contractor shall be responsible for the characterization of particle-phase emissions from NRDA oil burning and for the determination of the PM EOM. Before analysis of any sample set the contractor shall seek the technical direction of the WA task manager. In some cases, the WA task manager will direct the contractor to provide samples to other authorized laboratory personnel for specialized sample analysis. An additional objective shall be to provide the WA task manager with a written report upon completion of the EOM determination and chemical and physical characterization of the NRDA oil burning PM.

IV. **Scope-of-Work:** In fulfillment of the objectives of this Work Assignment, the following Tasks listed below shall be performed by the Contractor, and throughout the course of performing these Tasks, the Contractor shall comply with (1) a set of two written QAPPs prepared by the WAM and colleagues. (2) all QAPP addendums and (3) the FPMCL Facility Manual. All work shalll be conducted using these existing documents. Moreover, the contractor shall follow all issued standard operating procedure (SOP), chemical hygiene, and Laboratory related health and safety plans for EOM determinations and chemical characterization.

V. In accordance with laboratory protocols established by the EPA for analysis of PM2.5 samples, the contractor shall acquire laboratory supplies and consumables needed to accomplish the technical laboratory support work described below. The analytical protocols will be provided to the Contractor by the EPA Work Assignment Manager prior to initiation of the technical work.

A. The contractor shall determine the purity of each new lot of extraction solvents and, as necessary, purify any solvents that may be contaminated by commercial practices. The solvents shall be of sufficient purity to enable extraction and analysis of the samples and shall not contain interfering contaminants that may detract from the Data Quality Objectives of the project. The Data Quality Objectives are to be specified in the project QAPPs as stated above. The purity of the solvent shall be documented by the contractor and identification of the solvent lot used for sample extraction shall be reported by the contractor. The contractor shall include this information in the monthly written progress reports. Or this information shall be contained in the final report written for each source following the completion of its characterization. Biological fluids such as simulated lung or gastric fluids or bronchial lavage fluids may also be used as part of this project.

B. The contractor shall clean substrates, sampling train components, and sample containers for collection of particles, for field deployment, or for in-house sampling campaigns. Sample substrates and blanks may include Teflon membrane and quartz fiber filters, XAD-coated annular denuders, aluminum foil, XAD impregnated quartz filters, glass beads, PUF

(polyurethane foam plugs) and various SUMA canisters. Also, the contractor shall provide clean glassware for use in the analyses of the PM samples and for EOM determinations. Decontamination methods will involve various solvent rinses and/or high temperature thermal removal of contaminants as described in the facility manual.

C. The contractor shall condition and weigh Teflon filters and Al foil substrates before and after PM sample collection in accordance with established EPA weighing procedures and quality control.

D. The contractor shall maintain a sample custody log of samples submitted for analysis following sample collection. For the vast majority of cases, it shall be necessary for a number of individual samples from a single source to be composited, thereby requiring careful recording of the composited samples. Before samples are composited, the contractor shall notify the WAM of the intention to do so. The WAM will also notify the contractor of the analytical method to be applied prior to analyzing any sample set.

E. Using protocols established and supplied by the EPA Work Assignment Manager, the contractor shall perform solvent or thermal extractions of particulate matter and semi-volatile organic matter samples collected on various media substrates. Samples shall be prepared so that analyte concentrations are appropriate for precise and accurate quantitative analysis of individual trace organic compounds and major inorganic ions. Once the individual species are identified and quantified in the PM mixture, the contractor shall report the raw and processed data and appropriate proof of the data quality to the WAM. The contractor shall also be responsible for running library searches on chromatographic data for the tentative identification of organic molecules in the PM extracts. The results of each search shall be reported by the contractor and compared against an appropriate blank to ensure validity. For quantified compounds, the contractor shall report whether (1) standards were available, (2) the compounds were within the calibration range, (3) the quantified compounds were above or below minimum detectable or quantifiable levels, and (4) the type of model used to fit calibration data.

F. Following a procedure established and provided by the EPA Work Assignment Manager, the contractor shall perform derivatization of polar organic compounds that enables quantitative resolution of such compounds via gas chromatography/mass spectrometry. Suitable standards shall also be derivatized by the contractor and used to (1) estimate deuterated standard recoveries (by making multiple GC/MS runs of the deuterated standards during a sample run sequence) and (2) to populate appropriate calibration database levels. Documentation of data quality for the derivatization steps shall be performed by the contractor. This data quality documentation shall be linked to specific PM extract samples analyzed by GC/MS. The contractor shall purchase derivatization equipment needed to conduct *on-line* or *in-situ* methylation and silyatoin experiments. Purchased equipment shall be compatible with the GC-MS technology and instrumentation available in the FPMCL and shall include an auto-sampler device.

G. The contractor shall provide for appropriate handling and disposal of all laboratory waste solvents and other laboratory waste materials.

H. The contractor shall operate, maintain, and modify, as necessary, analytical instrumentation and ancillary equipment in the EPA FPMCL. (Note: this Task includes ensuring appropriate instrument gases are provided (e.g., He, H_2, N_2, and air). The contractor shall maintain a file of operating manuals for all equipment and instruments. Equipment and instruments included in this Task are:

- HP-7890/7000 Auto sampler/Gas Chromatograph/MSD (qqq) in Room E580-A
- HP-6890/5793 Thermal extraction unit/Gas Chromatograph/MSD/FID in E580-A
- HP-6890/5793 Thermal extraction unit/2-dimensional Gas Chromatograph/MSD/ in E589-A
- HP-6890/5793 VOC pre-concentrator (ENTECH Inc) Gas Chromatograph/MSD/ in E288
- HPLC-MS (Q-TOF) and N_2-generator in E589
- Zymark TurboVap solvent concentrator in E580-A
- Cryofreezer in E580
- Fisher Isotemp muffle furnance in E569
- Skutt ceramic kiln in E578-A
- Nuaire horizontal clean bench in E578-A
- Sunset Thermal-Optical Elemental/Organic Carbon Analyzers in E-581-A and E589
- Thelco convection oven in E581-A
- Ainsworth semi-micro balance in E581-A or high-bay area
- Dionex 120 ion chromatograph in E581-A
- Sartorius MC5 microbalance in E580-A

- Cahn ultra microbalance in E580-A
- Terra Universal modular clean room in E580-A
- Dracor water purification system in E581-A
- Frigidaire commercial freezer and additional cryo-freezer units in E578
- Domnic-Hunter hydrogen generators (2) in E581-A

L. The contractor shall maintain a complete and up-to-date chemical inventory for the FPMCL Facility along with Material Safety Data Sheets for all chemicals.

M. The contractor shall update, as needed, the Facility Manual for the PM2.5 Analytical Facility which includes as a minimum the following items:

- General facility lay-out
- List of equipment by name, serial and model no, custodial account ID, EPA decal no., and location
- Computer software and hardware
- Safety/Health protocols
- Quality Assurance and Control protocols
- Sampling and Analysis Methods (ASTM, EPA, Miscellaneous Operating Procedures)

N. With the exception of the miscellaneous operating procedures (MOPs) for cleaning sample substrates, laboratory glassware, and sampling train components for which the Contractor shall be responsible, the QA/QC protocols, analytical protocols, and other MOPs will be provided by the EPA Work Assignment Manager for incorporation into the Facility Manual. The Facility Manual is a working document and will incorporate new material as protocols are established or modified and additional equipment is acquired.

O. The contractor shall supply to the WAM a written monthly progress report upon project completion that includes: (1) a list by identification number of the samples analyzed; (2) the type of analysis done; (3) the results and data analysis; (4) an interpretation of the results; (5) future work planned in the laboratory; (6) proof of data quality; (7) description of experimental procedure used and any observed anomalous behavior; and (8) description of laboratory operations; The contractor shall also provide to the WAM electronic copies of completed data sets and data analysis by source. In the event that the analysis of sample substrates from a single test source are completed, the contractor shall produce a written report describing the results of the analysis, the source sampling test conditions, and any other pertinent particle sizing and/or counting data.

VI. Labor mix: To achieve the objectives of the WA the following labor mix is required: (1) a person with extensive experience in chemical analysis using chromatography (GC-MS/FID, LC-MS, etc.). This individual shall have at least 15 years of GC-MS experience and be familiar with the extraction and pre-concentration procedures used for PM and EOM determinations. This individual shall be responsible for GC-MS (qqq) analysis and interpretation of GC-MS data as stated above. This person shall be capable of following all the required QA/QC procedures established in any relevant QA protocols and shall be required to communicate results to the WA task manager. This individual shall also be responsible for certain research pursuits as they relate to the analysis of GC-MS data, including library searches and the application of identified deconvolution algorithms. The contractor shall ultimately be responsible for all of the GC-MS data quality provided to the WA task manager. (2) an individual who assists with extractions, sampling and media pretreatment and sample handling, and other similar logistical tasks shall also be needed.

VII. Equipment purchase: The contractor shall look into the possibility of further automating the micro-solvent extraction, filtering, and concentration techniques. In consultation with the WAM, the contractor shall purchase technology that improves the analytical sample throughput or speed at which these steps can be conducted. Additional sampling equipment shall also be purchased in the event there is a need to complete a project in a timely manner.

VIII. Deliverables: The contractor shall deliver: (1) a written report containing the final sampling and chemical analysis results for aerosol particles emitted from NRDA oil burning studies (due on or before August 15, 2016); (2) Full report of the results for EOM determinations (April 15, 2016).

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-040

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	WA 0-040

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name Xiaoyu Liu	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-2459 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Chamber Testing for Tire Crumb Research Study

WA #: 0-040 WACOR: Xiaoyu Liu

Contract #: EP-C-15-008 Alternate WACOR:

PERIOD OF PERFORMANCE:

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The overall objective of this project is to identify and characterize constituents, emissions, and potential exposure of recycled rubber tire crumbs. It is to support federal effort to better understand the manufacturing and use for recycled tire-derived playground surface materials. This project is to conduct small and micro chamber tests to characterize the potential Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) emissions from recycled rubber tire crumbs.

BACKGROUND

Concerns have been raised about the safety of recycled rubber tire crumbs used in synthetic turf fields in the United States. The studies conducted to date have not shown elevated health risks from playing on fields with synthetic turf. However, these studies have various limitations and do not comprehensively address the concerns about the potential health risks associated with exposure to constituents in the tire crumb. Because of these health concerns and the need for additional information, federal partners are working together over the next 12 months to fill in important data gaps, particularly with respect to understanding potential exposures to constituents in the tire crumbs. Additionally, concerns about crumb rubber use in athletic fields have led to concerns by the public about the safety of other uses of recycled tires, such as those processed into playground surface materials and rubber tire mulch used on playgrounds, in both cases to protect against impact injuries.

Recycled rubber tire crumbs are a complex materials, have the potential to release a variety of chemicals and particles to the air under various weathering conditions. A study is need to identify and quantify chemical emissions, including VOCs and

SVOCs under different weathering conditions, e.g. temperature, humidity, and UV light.

SCOPE

For the project, the Contractor shall provide technical support to EPA by developing sampling methods and conducting small chamber and micro chamber tests for the project. A series of chamber tests will be mainly conducted between May 1 and July 31, 2016. The tasks are listed below. For this work assignment period, the Contractor shall conduct Task 1 and possibly Task 2.

TECHNICAL APROACH/OBJECTIVES

The contractor shall conduct the following tasks:

Task 1. Set up Testing and Sampling Systems for Tire Crumb Tests

Testing chambers, such as small chamber and micro chamber systems, will be used for the project. Two micro chamber systems and four to eight small chambers are to be used under at least two temperature conditions. The WACOR will identify the temperatures and other test conditions and sampling media once the project plan is finalized. The contractor shall set up and optimize all chamber testing and sampling systems with the specified test conditions.

Tasks 2. Prepare QAPP

The contract shall prepare the QAPP when the project plan is finalized. This project will be QA category A. A new QAPP will need to be written and submitted for approval. Work shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

Task 3. Conduct Chamber Tests

The contractor shall conduct small chamber and micro chamber tests and collect air samples from the chambers. The tire crumbs for testing will be provided by the WACOR. The samples will be collected at defined time. No time series samples will be collected for each test. After collection, the sampling media will be sent to the researchers at National Exposure Research Laboratory (NERL) for VOCs and SVOCs analysis. The contractor shall provide Chain-of-Custody to document tire crumbs sample receiving, air sample collection, and sample media delivering.

QUALITY ASSURANCE

The contractor shall adhere to the QA requirements as delineated in Attachment #1 to the Statement of Work.

DELIVERABLES and SCHEDULE of DELIVERABLES

The Contractor shall submit the QAPP within 30 days of receiving the directions from the WACOR.

The Contractor shall finish about 150 micro chamber tests and 150 small chamber tests between May 1 and July 31, 2016. The final number of tests will be notified by WACOR when the project plan is finalized. The Contractor shall also provide (1) test material information; (2) Chain-of-Custody; (3) environmental data for each test; (3) sampling information. These shall be submitted to the WACOR within 5 business days after each test.

The Contractor shall provide the EPA WACOR biweekly progress reports as specified in the contract. The Contractor shall alert the WACOR in advance if they expect a substantial delay in completing the task or submitting the deliverable.

The Contractor shall provide necessary health and safety protocol and documentation.

ATTACHMENT #1 TO STATEMENT OF WORK FOR QA CATEGORY II PROJECTS

NRMRL QA Requirements and Definitions

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The QAPP shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

Definitions:

Environmental Data - These are any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. For EPA, environmental data include information collected directly from

measurements, produced from software and models, and compiled from other sources such as data bases or the literature.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, that are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NRMRL QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

□ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

Category Level Designations (determines the level of QA required):

- ☐ **Category I Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in R-5.
- X **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in R-5.
- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type.
- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type.

Suggested Content for Required Elements of QA Project Plans as per R-5:

GROUP A PROJECT MANAGEMENT

There are nine elements in this group. These address project administrative functions and project concerns, goal(s), and approach(es) to be followed.

Element A1- Title and Approval Sheet

- Project title
- Organization name
- Names, titles, signatures, and signature dates of the approving officials

Element A2- Table of Contents

- Table of Contents;
- List of Figures, Tables, References and Appendices
- Document control format

Element A3- Distribution List

Names of individuals and organization(s) to receive a copy of the approved QA Project Plan

Element A4- Project/Task Organization

- List of individuals and organizations involved with the project, identifying their roles and responsibilities
- Documentation of project QA Manager's independence

- Identification of the individual responsible for maintaining the official, approved QA Project Plan
- Organizational chart showing relationships and lines of communication among project personnel

Element A5- Problem Definition/Background

- Statement of specific problem to be solved, decision to be made, or outcome to be achieved
- Background information

Element A6- Project/Task Description

- Summary of work to be performed and products
- Project schedule
- Maps, tables, etc. showing geographic locations

Element A7- Quality Objectives and Criteria

- Outputs from the systematic planning process (e.g., DQOs) used to design the study
- Measurement performance or acceptance criteria established as part of the study design. These relate the quality of data needed to the established limits on the chance of making a decision error or of incorrectly answering a study question

Element A8- Special Training/Certifications

- Description of how the most current approved QA Project Plan will be distributed to project staff
- List of records to be included in the data report package
- List of any other project documents to be produced
- Information on the final disposition of records and documents, including location and retention schedule

Element A9- Documentation and Records

- Any specialized training or certifications needed by personnel
- Plans for providing, documenting, and assuring this training

GROUP B: DATA GENERATION AND ACQUISITION

The ten elements in this group address data generation and data acquisition and management activities.

Element B1- Sampling Process Design (Experimental Design)

Description of project's experimental design

Element B2- Sampling Methods

- Description of sample/data collection procedures
- List of equipment needed
- Identification of performance requirements

- Description of corrective actions to be taken if problems arise

Element B3- Sample Handling and Custody

Description of sample handling requirements and transfer, and for ultimate disposal

Element B4- Analytical Methods

- Description of analytical methods to be used
- Identification of any performance criteria
- Description of corrective actions when problems arise

Element B5- Quality Control

- List of QC activities needed for sampling, analytical, or measurement techniques, along with their frequency
- Description of control limits for each QC activity and corrective actions when these are exceeded
- Identification of any applicable statistics to be used

Element B6- Instrument/Equipment Testing, Inspection, and Maintenance

- List of equipment and/or systems needing periodic maintenance, testing, or inspection, and the schedule for such
- Description of how inspections and periodic preventive maintenance procedures will be performed and documented
- Discussion on how critical spare parts will be supplied and stocked
- Description of how re-inspections will be performed and effectiveness of corrective actions determined and documented

Element B7- Instrument/Equipment Calibration and Frequency

- List of all project tools, gauges, instruments, and other sampling, measuring, and test equipment which should be calibrated
- Description of calibration method and identification of any certified equipment and/or standards to be used
- Details of how calibration records will be maintained and traceable to the instrument/ equipment

Element B8- Inspection/Acceptance of Supplies and Consumables

- A list of project supplies and consumables that may directly or indirectly affect the quality of the results
- The acceptance criteria for them
- Identification of those responsible

Element B9- Non-direct Measurements

- Identification of any existing data that will be obtained from non-measurement sources, such as literature files and historical databases

- Description of how you intend to use the data
- Your acceptance criteria and any limitations for using such data

Element B10- Data Management

- Description of the project data management process
- Description of or reference to the office's standard record-keeping procedures and document control, data storage, retrieval, and security systems
- Identification of data handling equipment and procedures to process, compile, and analyze project data
- Discussion of data handling procedures to detect and correct errors and loss during data processing
- Examples of any forms or checklists to be used
- Identification of any specific computer hardware/software performance requirements and how configuration acceptability will be determined
- Description of how applicable information resource management requirements will be satisfied, as well as any applicable Agency information resource management requirements (EPA Directive 2100, EPA QA Project Plans only)

GROUP C: ASSESSMENT AND OVERSIGHT

Assessments or evaluations are designed to determine whether the QA Project Plan is being implemented as approved (conformance/nonconformance), to increase confidence in the information obtained, and ultimately to determine whether the information may be used for their intended purpose. The two elements in this group detail what assessments or evaluations will occur both during and after the project. Data assessments, such as data verification and validation, are discussed in the Group D elements.

Element C1- Assessments and Response Actions

- Description of project assessments planned and a brief discussion of the information expected
- Approximate schedule for these assessments and their reports
- For any planned self-assessments, identification of potential participants and their relationship within the project organization
- For independent assessments, identification of the organization and person(s) that will conduct the assessments
- Identification of how, when, and to whom the results of each assessment will be reported and corrective actions implemented

Element C2- Reports to Management

- Frequency and distribution of reports to inform management (EPA or otherwise) of the project's status
- Identification of report preparer and recipients, as well as any specific actions or recommendations recipients are expected to make

GROUP D: DATA VALIDATION AND USABILITY

The three elements in this group address the final project checks to see if the data or product obtained will conform to the project's objectives, and to estimate the effect of any deviations. For projects that use existing data, these elements focus on evaluating how data values from these acquired data sets will be used to determine the quality objectives for the new data use. For a modeling project, this process is similar to confirming that the steps in the modeling process were followed correctly to produce the model outputs and that the results meet project objectives.

Element D1- Data Review, Verification, and Validation

State the criteria for deciding to accept, reject, or qualify project data in an objective and consistent manner

Element D2- Verification and Validation Methods

- Description of how project data will be verified and validated
- Discussion of how any issues will be resolved and identification of who has the authority for resolving them
- Description of how results will be conveyed to data users
- Explanation of how validation issues differ from verification issues for this project
- Examples of any forms or checklists to be used and identification of any project-specific calculations

Element D3- Reconciliation with User Requirements

- Description of how project results will be reconciled with the requirements defined by the data user or decision maker
- An outline of methods proposed to analyze the data and determine possible anomalies or departures from assumptions made when the project was planned
- Description of how reconciliation with user requirements will be documented, issues will be resolved, and how limitations on the use of the data will be reported to decision makers

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-059

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-072 Assessment of Rain, Wate

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 4

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Worth Calfee	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-7600 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

ASSESSMENT OF RAIN, WATER WASH-DOWN, AND GROSS DECONTAMINATION METHODS FOR REDUCTION, REMOVAL, OR INACTIVATION OF SPORES ON URBAN SURFACES

PROJECT# HS5.01.02-335

WORK ASSIGNMENT 0-59

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. PERIOD OF PERFORMANCE 2
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TITLE

Assessment of Rain, Water Wash-Down, and Gross Decontamination Methods for Reduction, Removal, or Inactivation of Spores on Urban Surfaces.

I. PERIOD OF PERFORMANCE

The period of performance for the work under this work assignment shall be date of award through March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work shall determine the effectiveness of spore removal from surfaces by various liquid application procedures. Application procedures shall model rain (various intensities), wash-down as a mitigative measure, and other gross-decon approaches that utilize liquids sprayed onto surfaces to reduce contaminants and exposure. Parameters such as wash down liquid, additives, pressure, flow rate, material type, and spray duration shall be evaluated for their ability to physically remove spores from surfaces. The collateral damage to materials during decontamination procedures will be monitored. These data will inform spore removal and transport in an urban environment during a wide area incident and response.

III. RELEVANCE

This project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Division (CMAT), regarding an understanding of Fate and Transport of Contaminants in a Wide Area Incident, and regarding the effectiveness of Gross Decontamination (Wash Down) Procedures for spore removal. Due to the potential relevance of this project in preparing for the Federal response to wide-area anthrax incidents, this project will be managed by NHSRC with the support of a multidiscipline project team.

IV. BACKGROUND

Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special Teams which includes the CBRN CMAT, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

In 2001, the introduction of a few letters containing anthrax spores into the U.S. Postal Service system resulted in the contamination of several facilities. Although most of the facilities in which these letters were processed or received in 2001 were heavily-contaminated, they were successfully remediated with approaches such as fumigation with chlorine dioxide or VHP®. It is well agreed that additional quick, effective and economical decontamination methods having the capacity to be employed over wide areas (outdoor and indoor) are required to increase preparedness for such a release.

Following a wide-area contamination incident, it has been generally accepted that responders and remediation workers will use wash-down methods to reduce the amount of residual contamination on buildings, streets, and objects (cars, park benches, vegetation, etc.). These procedures are expected to reduce the amount of contamination spread (via aerosol) to non-contaminated areas, and reduce the risk of exposure to emergency personnel and civilians after reoccupation. Currently, there are few data that describe the effectiveness of such wash-down procedures. A systematic evaluation of such wash-down methods, and identification of parameters for optimizing the effectiveness of these approaches is needed.

Numerous factors can influence spore transport in the urban environment following an incident. Redistribution of spores by rain and stormwater runoff is expected in the days following a release. Data on the effectiveness of spore removal from surfaces under typical precipitation conditions are not well known. These data are critical for determining the fate of contaminants in an urban setting.

V. SCOPE

The purpose of this project is to determine the effectiveness of wash-down gross decon methods, rain, and over-land flows (urban runoff) for removing spores from surfaces. These objectives shall be accomplished through Five Tasks.

In Task 1, spore removal from surfaces by over-land flows shall be determined. A test bed shall be devised whereby repeatable amounts of contaminants are added to either coupons or flow waters, coupons of repeatable characteristics are constructed and tested, flows of various durations and rates (volume per time) are administered, and repeatable and consistent runoff

sample collection is executed. Spore recoveries in runoff waters shall be utilized to characterize the effects of the controlled variables on over-land flow spore removal efficiency.

In Task 2, spore removal from surfaces shall be evaluated for simulated rain events. Rain, of varying intensities and durations shall be modeled in the laboratory. Contaminated coupons (aerosol deposited or liquid deposited), shall be subjected to the simulated rain. Runoff samples shall be collected at various intervals to determine the magnitude and temporal characteristics of spore removal.

In Task 3, at least eight tests shall be conducted to determine the effect of varying spray parameters (i.e., flow rate, pressure, liquid chemistry, angle etc.), on spore removal. Transport of spores in to runoff and aerosol fractions shall be determined.

In Task 4, the effects of concrete on spore viability shall be determined. These data are important, as concrete has a high pH, and may reduce the viability over time, and can therefore impact the modeling of spore fate and transport in an urban environment.

The results tasks 1 through 4 shall be documented in one final report discussing removal efficacy as a function of independent variables and operational factors associated with each removal method. A draft report shall be provided to the U.S. EPA Work Assignment Manager (EPA WAM) for review and comment. A final report incorporating comments from the EPA WAM, and including a separate documentation of the disposition of comments, shall also be provided as the final deliverable on this work assignment. All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

Task 5, complete report update of "Expedient Approaches for the Management of Wastes Generated from Biological Decontamination Operations in an Indoor Environment – Evaluation of Waste Sampling and Decontamination Procedures" (EPA/600R-14/262, 2014). This report shall be updated with all data generated by Dr. Calfee's efforts, not included in the 2014 report. This report draft shall be delivered by 12-1-2015. The final shall be delivered by 1-15-2016.

VI. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project for both tasks is as follows, as briefly mentioned in the Section VI:

- inoculation of the materials with *Bacillus atrophaeus* (formerly, *Bacillus globigii*) spores via aerosol deposition using the procedures developed by Calfee et al., Journal of Microbiological Methods 2013(92375-380),
- application of prescribed flow methods or wash-down procedures;
- assessment of viable spores in runoff liquids, in starting inoculation (via sampling of inoculation control coupons), and potential cross-contamination (via sampling of negative controls [blanks]);

All sample analysis is outside of the scope of this work assignment. Samples shall be transferred to the on-site Microbiology Lab for analysis under a separate work assignment.

VII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by the contractor for use in this effort.

VIII. TECHNICAL RISK

The technical risk involved in this project is thought to be minimal. The purpose of the effort is to provide information pertinent to the development of operational strategies for the decontamination methods included in the study. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to this purpose.

IX. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

X. TASKS

Prior to initiation of the testing described in the tasks below, a quality assurance project plan (QAPP) or amendment to existing QAPPs shall be provided to EPA for review and comment. After revision based upon EPA comments (as necessary) and approval by EPA, work may commence. At least eight Category 3 or Category 4 - Applied Research QAPPs have been approved by the U.S. EPA for prior testing that have relevance to this effort (QAPPs can be provided to contractor after initiation of Work Assignment):

- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 1 – Development and Evaluation of the Decontamination Procedural Steps (July 2009)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 2 – Operational-scale Study of Full Decontamination Procedures (October 2009)
- Application Studies of Biological Agent Decontamination Methods (April 2008)
- Effectiveness of Physical and Chemical Cleaning and Disinfection Methods for Removing, Reducing or Inactivating Agricultural Biological Threat Agents (August 2010)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 4 – Optimization of method parameters and impact of surface grime (June 2011).
- Assessment of Water Wash Down for Mitigation of Cesium Chloride Contamination PART II Pressure Washing
- Penetration of Radiological Dispersal Device (RDD) Material (CsCl and CoCl2) on Urban Building Surfaces: Effects of Serial Water Washdown
- Optimization of Water Wash down Using Simulated Firehose for RDD Decontamination

These QAPPs shall be used as the basis for the QAPP for the specific work described in this SOW. The QAPP, including any amendments, must be approved by the U.S. EPA in writing (e.g., signature on the approval page) prior to the start of any work. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in four major tasks. The specific details related to these tasks are described below.

Task 1:

Evaluation Over-Land Flow for Spore Removal from Surfaces

In this task, various flows of water shall be evaluated for spore removal from urban surface materials. Contamination starting condition shall be varied, such that dry aerosols, wet inoculums, and contaminants residing only in flow waters (not on coupons initially, but flowed over material coupons to determine losses to the surfaces) will be evaluated. Flow rate, slope of surfaces, and duration of flow shall also be varied. These evaluations shall occur over 18 tests. A sufficient number of test and control replicates shall be included in the test matrix. Test variables are outlined in Table 1.

Table 1: Task 1 Test Variables

Tests	Materials	Flow Variables	Contamination Variable
1-18	Concrete 1% slope, Concrete 2% slope, Concrete 5% slope	Rate, Duration	Aerosol Deposition onto Dry Coupon, Wet Deposition onto Dry Coupon, Spores residing in Flow Water, *Bacillus atrophaeus* versus *Bacillus thuringiensis*

Task 2:

Determination of Spore Removal from Surfaces by Simulated Rain

In Task 2, at least 18 tests shall be conducted to determine the effectiveness of spore removal by simulated rainfall on concrete. Varying durations and intensities of rain shall be evaluated for spore removal from surfaces.

Table 2: Task 2 Test Variables

Tests	Materials	Rain Variables	Contamination Variable
1-18	Concrete	Rate (in/hour), Duration, droplet size	Aerosol Deposition onto Dry Coupon, Wet Deposition onto Dry Coupon

Task 3:

Evaluation wash-down approaches for physical removal of surface biological contamination

In Task 3, at least 16 tests shall be conducted to determine the effectiveness of wash-down procedures on sections of selected outdoor material types (i.e., concrete, glass, etc.). Spray parameters such as nozzle type, flow rate, application duration, additives, and spray pattern (wash down from above on vertical surfaces versus perpendicular spray-down for vertical surfaces) shall be evaluated. In addition to determining surface removal effectiveness (by determining spore relocation into runoff liquid and aerosolization) shall be determined.

Test variables for Task 3 are outlined in Table 3.

Table 3: Task 3 Test Variables

Tests	Materials	Flow Variables	Contamination Variable
1-16	Concrete (horizontal), Glass (vertical),	Orientation (from above, from side), Pressure (up to fire hose or pressure washer), Rate, Duration, spray pattern	Aerosol Deposition onto Dry Coupon, Wet Deposition onto Dry Coupon

Task 4:

Determination of spore survival in saturated and unsaturated concrete and asphalt matrices

In Task 4, two approaches will be utilized to determine spore survival in common urban porous surface types (i.e., concrete and asphalt). Survival will be determined under saturated (covered

in water) and unsaturated (dry) conditions. The two approached shall include (1) inoculation of small material coupons with spores, subjecting these coupons to saturated or unsaturated conditions for a duration of time (i.e., 1 month) and determining spore survival at 6 non-zero time points; or (2) mixing pulverized concrete or asphalt with spore inoculums, and determining survival over time under saturated and unsaturated conditions. These data will aid in predicting spore fate and transport in a wide-area urban incident.

Additional Test Requirements:

- Wash-down liquids shall be confirmed to be free of confounding levels of background contamination prior to the initiation of each test.

- Air samples shall be taken in the decontamination chamber during the wash-down process to indicate the presence of resuspended viable spores. This samples shall be collected in accordance with the air sampling described in the approved QAPP entitled, Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 2 – Operational-scale Study of Full Decontamination Procedures (October 2009)."

- After completion of each test, the chamber and all contents shall be thoroughly decontaminated with a proven procedure.

- All samples shall be transferred to the on-site Microbiology Lab in sterile primary independent packaging within sterile secondary containment containing logical groups of samples. All samples shall be accompanied by a completed chain of custody form.

- All microbiological analysis for samples described in this SOW shall be performed by the on-site Microbiology Lab. This analysis is outside of the scope of this SOW.

- All tests shall be extensively and adequately photographed and video documented to convey the test procedures.

Task 5:

Develop and deliver updated report; "Expedient Approaches for the Management of Wastes Generated from Biological Decontamination Operations in an Indoor Environment – Evaluation of Waste Sampling and Decontamination Procedures". The contractor shall utilize EPA 600R/14/262 as the base, and input reduced data from Dr. Calfee's waste decontamination testing conducted to date. Data are provided on DTRL share drive. Data reduction and graphic generations are expected to be commensurate of the previous data and graphs in the base report.

Reporting

The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from a test under Task 1 and 2. This template shall be

approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WAM within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission. Transmission shall occur via e-mail to the EPA WAM informing him/her that the data is ready for viewing.

A draft report detailing the test results and lessons learned from Tasks 1 through 4 shall be submitted to the EPA WAM within 30 days following the completion of the testing and no later than 2/10/2016. The Final Report shall be delivered no later than 3/30/2016. A draft and final report for Task 5 shall be delivered by 12/1/2015 and 1/15/2016, respectively. Tasks 1 through 4 report shall include documentation of the time required to complete each entire test procedure and all procedural steps. Both reports shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

XI. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 3.

Table 3: Deliverable Schedule

Deliverable	Due Date
Draft QAPP	20 working days after initiation of this Work Assignment
Final QAPP	10 working days following receipt of EPA comments
QAPP Amendment	As necessary
Draft Report (Tasks 5)	12/1/2015
Final Report (Tasks 5)	1/15/2016
Draft Report (Tasks 1 through 4)	3/1/2016
Final Report (Tasks 1 through 4)	3/30/2016

XII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WAM shall occur within one week from the completion of data analysis.

- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WAM. The papers shall be authored or co-authored by the EPA WAM, at the discretion of the WAM. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-060

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-060 Low Tech Decon... Chal

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 2, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Worth Calfee	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-7600 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

EVALUATION OF LOW-TECH DECONTAMINATION METHODS UNDER OPERATIONALLY CHALLENGING ENVIRONMENTS

PROJECT# HS6.02.01-19

(APPCD ON-SITE CONTRACT EP-C-15-008)
WORK ASSIGNMENT 0-60

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. TITLE 2
II. PERIOD OF PERFORMANCE 2
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XII. DELIVERABLE SCHEDULE 7
XIII. REPORTING REQUIREMENTS 7
XIV. REFERENCES 8

TITLE
Evaluation of Low-Tech Decontamination Methods under Operationally Challenging Environments

I. PERIOD OF PERFORMANCE
The period of performance for the work under this work assignment shall be August 1, 2015 through March 31, 2016.

II. SUMMARY OF OBJECTIVES
This work shall estimate the occurrence and potential reduction of viable bacterial spores (i.e., effectiveness) as a function of the remediation activities applied under situations and conditions challenging to in-field operations.

III. RELEVANCE
This project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Division (CMAD). In addition, the project is relevant to the U.S. EPA's Office of Pesticide Programs (OPP) crisis exemption process and OPP's regulatory function under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Due to the potential relevance of this project in preparing for the Federal response to wide-area anthrax incidents, this project will be managed by NHSRC with the support of a multidiscipline project team.

IV. BACKGROUND
Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special

Teams which includes the CBRN CMAD, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

VI. SCOPE

The purpose of this project is to determine the effectiveness of a set of decontamination procedures which include spraying surfaces with sporicidal liquids, when rendered under "operationally challenging conditions and situations". Decontamination methods shall evaluated, when utilized under prescribed challenging conditions, by their efficacy (removal or inactivation of bacterial spores) and by their ability to be executed per the prescribed procedure without difficulty. A lower-tech approach, for the purpose of this effort, is defined as procedures not requiring specialized materials or equipment (i.e., products available at a local hardware store). The procedures to be tested are based upon the outcomes from previous work by EPA and the procedures were originally developed based use for the remediation of the wooden shed in Danbury, CT[1].

In Task 1, the contractor shall coordinate with the WAM and the EPA project team to determine the prioritized list of "operationally challenging environments and situations" to consider for evaluation.

In Task 2, at least three low-tech decontamination approaches shall be evaluated for decontamination effectiveness and operational ease under six different challenging situations or environments (identified under Task I).

The results of each task shall be documented in a draft data summary, as a function of independent variables and operational factors associated with each procedure.

VII. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project for both tasks is as follows, as briefly mentioned in the Section VI:

- inoculation of the materials with *Bacillus atrophaeus* (formerly, *Bacillus globigii*) spores via aerosol deposition using the procedures developed by Calfee et al., Journal of Microbiological Methods 2013(92375-380),
- application of prescribed decontamination methods or procedures under prescribed conditions;
- assessment of residual viable spores (via post-decontamination sampling), starting inoculation (via sampling of positive controls), and potential cross-contamination (via sampling of negative controls [blanks]);
- analysis of subsequent decontamination procedure residues (e.g., waste, waste water or air samples);
- determination of decontamination effectiveness as measured by log reduction from the surfaces of test coupons compared to positive controls; and

- documentation of operational considerations (e.g., cross-contamination, procedural time, impacts on materials and personnel, difficulties during procedure, possible enhancements to procedure).

All sample analysis is outside of the scope of this work assignment. Samples shall be transferred to the NHSRC RTP Microbiology Lab for analysis under a separate work assignment (EP-C-15-008).

VIII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by the contractor for use in this effort.

IX. TECHNICAL RISK

The technical risk involved in this project is thought to be minimal. The purpose of the effort is to provide information pertinent to the development of operational strategies for the decontamination methods included in the study. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to this purpose.

X. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

XI. TASKS

Prior to initiation of the testing described in the tasks below, a quality assurance project plan (QAPP) shall be provided to EPA for review and comment. After revision based upon EPA comments (as necessary) and approval by EPA, work may commence. Numerous Category 3/Applied Research QAPPs have been approved by the U.S. EPA for prior testing that have relevance to this effort (these QAPPs can be provided by the WAM after award).

- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 1 – Development and Evaluation of the Decontamination Procedural Steps (July 2009)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 2 – Operational-scale Study of Full Decontamination Procedures (October 2009)
- Application Studies of Biological Agent Decontamination Methods (April 2008)
- Effectiveness of Physical and Chemical Cleaning and Disinfection Methods for Removing, Reducing or Inactivating Agricultural Biological Threat Agents (August 2010)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 4 – Optimization of method parameters and impact of surface grime (June 2011).

These QAPPs shall be used as the basis for the QAPP for the specific work described in this SOW. The QAPP, including any amendments, must be approved by the U.S. EPA in writing (e.g., signature on the approval page) prior to the start of any work. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in two major tasks. The specific details related to these tasks are described below.

Task 1:

For Task 1, the contractor shall organize and convene teleconference or workgroup meetings to facilitate generation of a prioritized list of challenges, or challenging conditions, for operational execution of low-tech decontamination procedures. The workgroup members shall be solicited and organized by the WAM. The list of workgroup members will be provided to the contractor, by the WAM, upon award.

Task 2:

For Task 2, the contractor shall devise and execute a series of laboratory-scale tests to evaluate decontamination procedures (efficacy and operational ease) under the sets of conditions or situations prioritized in Task 1. The selected conditions for testing shall be based upon 1) the rank from the prioritized list and 2) the ability to execute within the budget, resources, and time allotted. A conceptual test matrix for Task 2 is outlined in Table 2.

Table 2: Task 2 Test Matrix

Test	Decon Procedure	Challenging Condition
1	1	1
2	2	
3	3	
4	1	2
5	2	
6	3	
7	1	3
8	2	

9	3	
10	1	4
11	2	
12	3	
13	1	5
14	2	
15	3	
16	1	6
17	2	
18	3	

- The runoff of any liquid (rinsate) applied to the materials shall be collected, neutralized, and submitted to the NHSRC RTP Microbiology Lab for quantitative viable spore analysis via direct plating. This shall be done by collection of runoff in a sterilized container containing an appropriate amount of neutralizer (e.g., STS). Aliquots of the runoff shall be taken and filtered (rinsed) for analysis.

- Rinse water (if needed) shall be confirmed to be free of confounding levels of background contamination prior to the initiation of each test.

- After the decontamination, all surfaces shall be allowed to become visibly dry before being sampled. After at least a period of one day, post-decontamination sampling shall be performed in accordance with the methods prescribed herein and defined in the approved final QAPP.

- All equipment (e.g., brushes, storage bins, etc.) shall be properly sterilized according to the procedures defined in the QAPP prior to the initiation of each test. The procedure is expected to be soaking or washing hard, non-porous materials with a pH-amended bleach solution. Proper decontamination includes selective verification of a representative number of items to be used in a test.

- After completion of each test, the chamber and all contents shall be thoroughly decontaminated with a proven procedure.

- All samples shall be transferred to the NHSRC RTP Microbiology Lab in sterile primary independent packaging within sterile secondary containment containing logical groups of samples. All samples shall be accompanied by a completed chain of custody form.

- All microbiological analysis for samples described in this SOW shall be performed by the NHSRC RTP Microbiology Lab. This analysis is outside of the scope of this SOW.

- All tests shall be extensively and adequately photographed and video documented to convey the test procedures.

Reporting

The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from testing. This template shall be approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WAM within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission. Transmission shall occur via e-mail to the EPA WAM informing him/her that the data is ready for viewing.

A draft data summary, detailing the test results and lessons learned from the testing shall be submitted to the EPA WAM within 30 days following the completion of the testing and no later than 3/15/2016. This data summary shall include documentation of the time required to complete each entire test procedure and all procedural steps. The summary shall include any digital photos necessary to illustrate the findings.

XII. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 3.

Table 3: Deliverable Schedule

Deliverable	Due Date
Draft QAPP	20 working days after initiation of this Work Assignment
Final QAPP	10 working days following receipt of EPA comments
Draft Data Summary	3/15/2016

XIII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WAM shall occur within one week from the completion of data analysis.
- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WAM. The papers shall be authored or co-authored by the EPA WAM, at the discretion of the WAM. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

XIV. REFERENCES

1. After Action Report – Danbury Anthrax Incident, U.S. EPA Region 1, September 19, 2008.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-061

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Worth Calfee
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-7600
FAX Number: 919-541-0496

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Biocontaminant Laboratory Technical Support
Statement of Work

Project# HS6.02.01
Work Assignment 0-61
(APPCD ON-SITE CONTRACT EP-C-15-008)

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I. TITLE: Biocontaminant Laboratory Technical Support

II. PERIOD OF PERFORMANCE

The period of performance for this work assignment shall be from the August 1, 2015 – March 31, 2016.

III. SUMMARY OF OBJECTIVES

The proposed work will provide microbiological support to on-going and planned research efforts conducted by EPA's National Homeland Security Research Center (NHSRC). Such support includes, but is not limited to, growth and maintenance of biological cultures and stocks; preparation of media and reagents used in microbiological analyses; organization, inventory, and upkeep of laboratory notebooks, glassware, equipment, and supplies; preparation of suspensions of various surrogate biological agents; sterilization of test materials and instruments; inoculation of coupons and materials used in decontamination studies; creation of new and update of existing MOPs used in decontamination research; and numerous laboratory analyses used to determine survivorship of biological agents in decontamination, disposal, and containment studies.

IV. RELEVANCE

The results of the work conducted under this WA study will be used to support other research projects related to the selection and application of candidate decontamination technologies for buildings or areas (i.e., indoor or outdoor scenarios) contaminated with biological warfare agents. Data generated through this work will also support containment and disposal-related homeland security research. The results of these works will be made available through published reports, journal papers, and conference abstracts and presentations.

V. BACKGROUND

Following a bioterrorist attack, materials contaminated with biological agent pose significant health threats. The EPA's NHSRC conducts research to develop methods and technologies able to rapidly and cost-effectively remediate areas affected by a bioterrorism attack. Tasks performed under this work assignment support such research.

VI. SCOPE

The objective of this work is to provide high-quality microbiological support to homeland security-related decontamination, disposal, and containment research projects. Most (but not all) of these projects being supported will be conducted via WAs under this contract as well. Such projects often require material coupons spiked with surrogate organisms as well as survivability analyses of coupons following treatment. For these tasks, laboratory technicians trained in aseptic techniques and general microbiological laboratory procedures shall carry out biological analyses on samples generated during decontamination, disposal, and containment research. Data generated and collected during these analyses shall be properly recorded and shared in a timely manner. In

addition, a significant amount of laboratory management is needed to sustain an efficient workflow.

VII. TECHNICAL APPROACH

Microbiological efforts will generally include the following activities: (1) preparation (e.g., sterilization) and analysis of coupons using various types of materials and biologicals (2) analysis of decontamination and containment research samples (3) developing standard diagnostic protocols for several decontamination technologies to assess microbial survivability (4) preparation of microbiological media and reagents (5) and timely reporting of data . Note: The treatment studies themselves (e.g., fumigation at specified conditions, rotary kiln operation, deposition studies, etc) will be conducted via the use of other WAs performed under this contract. The general purpose of this WA is to provide microbiological support for those other WAs. Additionally, projects may be initiated by the WAM in order to fully utilize personnel during periods of low workload.

The specific microbiological laboratory efforts will include (but not limited to) such things as the following:

(1) Spiking of coupons with the appropriate controls for any NHSRC decontamination, disposal, and/or containment projects.
(2) Growth and maintenance of the bacterial (and viral) cultures used for the standard diagnostic protocols
(3) Perform the survivability analyses as required by the projects mentioned above.
(4) Develop standard diagnostic protocols if necessary to assess microbial survivability
(5) Prepare, sterilize, dispense, and confirm sterility of microbiological media.
(6) Properly destroy and dispose of contaminated/spiked testing materials
(7) Maintain laboratory notebooks, supplies, reagents, microbiological media, equipment, and certificates.
(8) Operation and maintenance of in–house microbiological instruments and equipment.
(9) Evaluate data acquired and prepare reports documenting the results obtained, and the quality of the results. The reports shall include any tables, charts, graphs, drawings, or appendices necessary to fully explain the experiments performed, shall clearly document the results, and shall support the quality of data included.
(10) Provide the raw data to the WAM of this WA, and as well to the WAM of the project being supported. Data shall be provided electronically in a timely manner (as soon as available, not greater than 2 days following completion of the analysis generating said data) when requested or as indicated by a QAPP. All data sheets shall be legible, and contain all pertinent identifier information (i.e., technician name, date, number of WA being supported, analyses performed, organism, etc.)
(11) The contractor shall comply with all QA, outlined in the QAPPs developed under WA that provide samples for analysis by this WA.

(12) Electronic records management of sample ID's, Chains of custody, sample data, data tracking and reporting, etc. The staff shall work to develop a barcode based LIMS to increase workflow and efficiency.

(13) Use of Spiral Plating instruments, and Q-count automated colony enumerators

(14) Detailed recording of microbiological procedures in well-organized laboratory notebooks. Citation of MOPs rendered, time stamps for various activities, lengths of incubation, traceability of activities to individual technicians, etc. are expected to be recorded.

VIII. FACILITIES AND MATERIALS

All tasks described in this SOW shall be performed in-house, at the EPA's Research Triangle Park (RTP) facilities at 109 T.W. Alexander Dr. The Biocontaminant Laboratory located in E390 is a BSL-2 facility equipped with biological safety cabinets, microbial dynamic and static growth test chambers and bioaerosols test chambers as well as standard microbiological equipment such as steam autoclaves; incubators; refrigerators; centrifuges; light, fluorescent, and phase contrast microscopes, colony counters; and analytical balances.

IX. TASKS

To achieve the desired objective of this effort, the Microbiological work for this SOW can be broken down into five tasks.

Task 1. Coupon preparation and inoculation

The materials and size of the coupons shall be specified by the WAM based upon the inoculation and analytical procedures to be used, which will be specified in the QAPP for each WA the microbiology lab is supporting. There shall be at least three classes of coupons for each of the DCMD projects mentioned above: (1) positive controls, (2) negative controls, and (3) test coupons. The positive controls and test coupons shall be spiked with the appropriate biological surrogate (spores, vegetative bacteria, or virus). The negative controls shall undergo the coupon preparation (e.g., sterilization), but shall not be spiked with any target. The spiking procedure shall be appropriately documented in the QAPP. Method demonstration shall be performed and deemed acceptable to the WAM of this WA in conjunction with the WAM of the project the microbiology lab is supporting, prior to the inoculation of the coupons. The basis for acceptability shall be the acceptance criteria set-forth in the QAPP. All positive control, negative control, and test coupons shall be transferred from and to the Biocontaminant lab according to the delivery schedule to be discussed for each project. All transfers shall be accompanied by chain-of-custody (COC) form.

The described procedures are for planning purposes only and may be changed by the WAM, in consultation with the contractor, within the level of effort anticipated for the SOW as currently written. It is expected that approximately 12,000 test coupons or test samples shall be inoculated, sampled, and analyzed over the course of this option period.

Task 2. Agent Survivability analyses.

Agent growth on coupons will be evaluated qualitatively and quantitatively as specified in the standard operating procedures (MOPs 6516, 6526, 6527, 6528, 6529, 6535a, and MOP 6555 -6566, to be provided after award) of the Biocontaminant Laboratory Facility manual, or as specified in a QAPP. Under the guidance of the WAM, the contractor shall develop standard diagnostic protocols if necessary to assess survivability.

Task 3. Ancillary Research Projects

Additional projects may be designed and requested by the WAM to fully utilize the contractor personnel during periods of reduced workload. Such projects may include, but are not limited to: laboratory organization and cleaning, limit of detection studies, sampling efficiency studies, decontaminant technology application and efficacy studies, microbial characterization studies, bacterial spore purification studies, sampling and analysis methods development studies, and studies involving aerosol deposition of spores onto material surfaces. This task may require the contractor to briefly work in Highbay labs or other labs within the EPA-RTP facility.

Task 4. Laboratory Management

The efficiency of the Biocontaminant Laboratory workflow requires effective laboratory management as well as significant and vast knowledge of microbiological methods, theory, and principles. The microbiological lab manager should have previously demonstrated the ability to design and conduct microbiological investigations (for example, through Ph.D. dissertation), troubleshoot issues effectively, write documents and methods in scientific prose, and publish results in scientific journal (i.e, first or corresponding author).

All microbiological technical staff shall maintain laboratory notebooks of all activities; keep all utilized equipment up-to-date with regards to certification and routine maintenance; maintain inventories of frequently utilized chemicals, reagents, and media as to prevent delays in experimentation due to insufficient supplies; carefully plan all work as to maximize the use of staff; maintain and update MOPs and MSDS repository; perform periodic disinfection of laboratory surfaces and biological safety cabinets; maintain temperature records for laboratory incubators, refrigerators, and freezers; and promptly inform the WAM of any issues associated with laboratory work, workload, equipment failures, or supply needs. Media, supply, and reagent preparation (operation of automated plate pourer, autoclave, dishwasher, etc.) to support analyses are also the responsibility of this Work Assignment.

Task 5. Agent Recovery and Inoculum Preparations for Aerosol Testing Research

This task will involve providing microbiological support to on-going and new research initiatives involving aerosol testing. The Aerosol Test Facility (ATF) group will be utilizing agent preps, inoculated coupons, etc. prepared under this task. Also under this task, samples collected during bioaerosol testing within the ATF shall be analyzed for viable microorganisms. Approximately 2000 samples shall be analyzed by culture-based methods, and approximately 200 sample inocula shall be prepared over the course of this Task. The WAM will coordinate with those in the ATF group to ensure efficient transfer of samples between the laboratories. Data shall be reported to the WAM, and PI (indicated by the WAM), as data are available.

X. MILESTONES, DELIVERABLES, AND COMPLETION DATES

Data Delivery
Raw data (e.g., plate counts, qualitative growth results, etc.) shall be emailed to the WAM, and by carbon copy (cc) to the WAM of the project the microbiology lab is supporting, as soon as the data become available (not greater than 2 working days after completion of the analysis generating the data).

Reporting
The Contractor shall provide written quarterly status reports using an MS WORD format to the EPA Biocontaminant lab WAM. The reports shall be prepared specifying the following: (1) summary of work conducted during the preceding months, including tables and/or charts using MS EXCEL format, as appropriate, with sufficient annotation as deemed adequate by the EPA WAMs, (2) analyses of the work in accordance to the expectations specified by the QAPP of each project, (3) progress on each task and the reason for any deviations from the project schedule, (4) work anticipated during the coming quarter. These reports shall be submitted electronically near the end of each quarter. Additionally, pdf copies of the laboratory notebook, including the pages documenting activities performed during the period, shall be created and delivered electronically to the WAM the same day the quarterly report is delivered.

XI. RESPONSIBILITIES

This WA will be managed by the USEPA Office of Research and Development, National Homeland Security Research Center (NHSRC), Decontamination and Consequence Management Division (DCMD) in Research Triangle Park, NC. The Work Assignment Contractor Officer Representative will be M. Worth Calfee (phone 919-541-7600, email Calfee.Worth@epa.gov).

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-062

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-062 Decon Process Ind...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Worth Calfee (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-7600 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

EFFECTIVENESS OF ON-SITE WASTE TREATMENT USING LOW TECH METHODS FOR MATERIALS CONTAMINATED WITH BACTERIAL SPORES

PROJECT# HS6.04.04-66

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. TITLE 2
II. PERIOD OF PERFORMANCE 2
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IX. TECHNICAL RISK 5
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TITLE
Decontamination of Bundled/Bagged Waste with pH-adjusted bleach

I. PERIOD OF PERFORMANCE
The period of performance for the work under this work assignment shall be April 1, 2015 through March 31, 2016.

II. SUMMARY OF OBJECTIVES
This work shall estimate the efficacy of liquid pH-adjusted bleach-based decontamination approaches for *in situ* treatment of bundled or bagged waste items generated from an indoor office setting. Various waste sampling approaches shall be evaluated, to determine the most efficient means of sampling building residue, pre- and post-decontamination. The anticipated deliverable will be a step-wise document for on-scene responders and remediation teams providing an option(s) for on-site waste treatment during responses involving the indoor environment.

III. RELEVANCE
This project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Team (CMAT). In addition, the project is relevant to the U.S. EPA's Office of Pesticide Programs (OPP) crisis exemption process and OPP's regulatory function under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Due to the potential relevance of this project in preparing for the Federal response to a wide-area anthrax dissemination, this project will be managed by NHSRC with the support of a multidiscipline project team.

V. BACKGROUND
Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide

expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special Teams which includes the CBRN CMAT, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

In 2001, the introduction of a few letters containing anthrax spores into the U.S. Postal Service system resulted in the contamination of several facilities. Although most of the facilities in which these letters were processed or received in 2001 were heavily-contaminated, they were successfully remediated with approaches such as fumigation with chlorine dioxide or VHP®. It is well agreed that additional quick, effective and economical decontamination methods having the capacity to be employed over wide areas (outdoor and indoor) are required to increase preparedness for such a release.

In addition to fumigation used in primarily, heavily-contaminated facilities, other cleaning methods were used in secondarily contaminated (e.g., cross-contaminated letters potentially in contact with the anthrax spores containing letters or tracked from primarily contaminated sites) areas or primarily contaminated facilities showing a minimal presence of anthrax spores. These methods included combinations of disposal of contaminated items, vacuuming, and the use of liquid sporicides such as a pH-adjusted bleach solution. However, waste disposal was a significant obstacle and cost during most previous anthrax clean-ups. If proven effective, a "lower-tech" approach to decontaminating bagged/bundled waste prior to disposal could reduce overall remediation costs by reducing the amount of waste treatment required off-site by specialized facilities (i.e., medical waste incinerators). Developing and demonstrating lower cost solutions to waste management could significantly increase EPA's readiness to respond to a wide area release.

VI. SCOPE

The purpose of this project is to determine the effectiveness of expedient decontamination procedures when applied to bagged/bundled contaminated waste. Effectiveness will be determined by sampling the waste contents following decontamination. An expedient approach, for the purpose of this effort, is defined as procedures not requiring specialized materials or equipment (i.e., products available at a local hardware store). The procedures to be tested are based upon the outcomes from previous work conducted by US EPA's NHSRC (BOTE Report, EPA600R-14-262 (and references therein)).

In Task 1, at least four waste decontamination approaches shall be evaluated for effectiveness. Waste materials typical of indoor office or residential environments shall be selected and included in tests. Waste shall be experimentally contaminated. A subset of waste samples (bags/bundles) shall remain untreated and serve as positive controls. Additional replicate bags/bundles shall be subjected to the decontamination treatment. Appropriate sampling

strategies shall be selected, optimized, and utilized to determine the survivorship of *Bacillus* spores following treatment. The purpose of this task is to identify effective and efficient means to decontaminate waste in situ (i.e., on-site, not requiring hazardous transport and treatment at remote, specialized, off-site facilities)

In Task 2, at least four sampling methods will be evaluated for collection efficiency on common building debris items, pre- and post-decontamination. Common sampling approaches (sponge wipe, gauze wipe, vacuum sock, vacuum cassette, swabs, etc.) shall be compared to innovative approaches to sampling building debris (grab samples, extraction of waste materials, etc.). These data will be beneficial to responses, as they will all responders to select appropriate sampling methods, allow targeted sampling plans based upon material-impacts on sampling efficiencies, and inform confidence in decontamination approaches.

The results of both tasks shall be documented by drafting an updated version of EPA Report "EPA 600/R-14/262". The updated report shall discuss efficacy as a function of independent variables and operational factors associated with each procedure. A draft updated report shall be provided to the U.S. EPA Work Assignment Manager (EPA WAM) for review and comment. A final report incorporating comments from the EPA WAM, and including a separate documentation of the disposition of comments, shall also be provided as the final deliverable on this work assignment. All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

VII. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project for both tasks is as follows, as briefly mentioned in the Section VI:

- inoculation of the materials with *Bacillus atrophaeus* (formerly, *Bacillus globigii*) spores via aerosol deposition using the procedures developed by Calfee et al., 2013 (Journal of Microbiological Methods, 92:375-380);
- application of prescribed decontamination methods or procedures;
- assessment of residual viable spores (via post-decontamination sampling), starting inoculation (via sampling of positive controls), and potential cross-contamination (via sampling of negative controls [blanks]);
- analysis of subsequent decontamination procedure residues (e.g., waste, waste water or air samples);
- determination of decontamination effectiveness as measured by log reduction from the test samples compared to positive control samples; and
- documentation of operational considerations (e.g., cross-contamination, procedural time, impacts on materials and personnel).

Decontamination can be defined as the process of inactivating or reducing a contaminant in or on humans, animals, plants, food, water, soil, air, areas, or items through physical, chemical, or other methods to meet a cleanup goal. In terms of the surface of a material, decontamination can be accomplished by physical removal of the contamination or via inactivation of the contaminant with antimicrobial chemicals. Physical removal could be accomplished via *in situ* removal of the

contamination from the material or physical removal of the material itself (i.e., disposal). Similarly, inactivation of the contaminant can be done *in situ* or after removal of the material for ultimate disposal. During the decontamination activities following the results of the 2001 anthrax incidents, a combination of removal and *in situ* decontamination was used. The balance between the two was facility dependent and factored in many issues (e.g., physical state of the facility); one factor was that such remediation was unprecedented for the United States Government (USG) and no technologies had been proven for such use at the time. The cost of disposal proved to be very significant and was complicated by the nature of the waste (e.g., finding an ultimate disposal site). Since 2001, a primary focus for facility remediation has been on improving the confidence in *in situ* decontamination methods and evaluating waste treatment options to be able to provide information necessary to optimize the decontamination/disposal paradigm; this optimization has a very significant impact on reducing the cost of and time for the remediation effort.

All sample analysis is outside of the scope of this work assignment. Samples shall be transferred to the on-site Microbiology Lab for analysis under a separate work assignment (EP-C-09-027, WA 4-13).

VIII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by the contractor for use in this effort.

IX. TECHNICAL RISK

The technical risk involved in this project is thought to be minimal. The purpose of the effort is to provide information pertinent to the development of operational strategies for the decontamination methods included in the study. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to this purpose.

X. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

XI. TASKS

Prior to initiation of the testing described in the tasks below, a quality assurance project plan (QAPP) shall be provided to EPA for review and comment. After revision based upon EPA comments (as necessary) and approval by EPA, work may commence. Five Category 3/Applied Research QAPPs have been approved by the U.S. EPA for prior testing that have relevance to this effort.

- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 1 – Development and Evaluation of the Decontamination Procedural Steps (July 2009)

- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 2 – Operational-scale Study of Full Decontamination Procedures (October 2009)
- Application Studies of Biological Agent Decontamination Methods (April 2008)
- Effectiveness of Physical and Chemical Cleaning and Disinfection Methods for Removing, Reducing or Inactivating Agricultural Biological Threat Agents (August 2010)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 4 – Optimization of method parameters and impact of surface grime (June 2011).

These QAPPs shall be used as the basis for the QAPP for the specific work described in this SOW. The QAPP, including any amendments, must be approved by the U.S. EPA in writing (e.g., signature on the approval page) prior to the start of any work. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in two major tasks. The specific details related to these tasks are described below.

Task 1:

Evaluation of waste decontamination procedures

In this task, at least four approaches to bagged/bundled waste decontamination shall be evaluated for effectiveness at reducing the viability of *Bacillus* spores. These evaluations shall occur over 6 tests. A sufficient number of test and control replicates shall be included in the test matrix.

At least three waste material combinations shall be evaluated. At least four unique combinations of decontaminant (i.e., pH-adjusted bleach and Spor-klenz) and decontaminant application (decontaminant application method, frequency, and/or flow rate) shall be evaluated. An example test matrix for Task 1 is outlined in Table 1.

Table 1: Example Task 1 Test Matrix

Test	Decontamination Approach	Material Combination
1	1	1
	2	
2	3	
	4	
3	1	2
	2	
4	3	
	4	
5	1	3
	2	
6	3	
	4	

Task 2:

Evaluation of waste (building debris) sampling methods

In Task 2, the efficiency of various sampling methods shall be evaluated on sections of selected materials. Materials shall be of pre- and post-decontamintated state (with or without decontaminant residues). Commonly-used sampling approaches (swabs, wipes, sponges, vacuums, etc.) and innovative approaches (extraction, grab, etc.) shall be evaluated for collection efficiency for the various items and conditions (pre- or post-decon).

Reporting

The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from a test under Task 1 and 2. This template shall be approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WAM within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission. Transmission shall occur via e-mail to the EPA WAM informing him/her that the data is ready for viewing.

A draft final report update (update to EPA 600/R-14/262), detailing the test results and lessons learned from the testing shall be submitted to the EPA WAM within 30 days following the completion of the testing and no later than 2/28/2013. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted

by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

XII. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 3.

Table 3: Deliverable Schedule

Task	Deliverable	Due Date
1,2	Draft QAPP Amendment	10 working days after initiation of this Work Assignment
1,2	Final QAPP Amendment	10 working days following receipt of EPA comments
1,2	Draft final report update	2/15/2016
1,2	Final report update	10 working days after receiving comments from EPA

XIII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WAM shall occur within one week from the completion of data analysis.
- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WAM. The papers shall be authored or co-authored by the EPA WAM, at the discretion of the WAM. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

XIV. REFERENCES

1. After Action Report – Danbury Anthrax Incident, U.S. EPA Region 1, September 19, 2008.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-063

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-063 Decon Heavily.... Part 2

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 12/31/2015

Comments:
The period of performance for the work under this work assignment shall be from August 1, 2015 through December 31, 2015. This project shall not incur any costs in calendar year 2016.

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Worth Calfee (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-7600 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

DECONTAMINATION OF HEAVILY SOILED SURFACES

PROJECT# HS6.02

WORK ASSIGNMENT 0-63

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. TITLE 2
II. PERIOD OF PERFORMANCE 2
III. SUMMARY OF OBJECTIVES 2
IV. RELEVANCE 2
VI. SCOPE 3
VII. TECHNICAL APPROACH 3
VIII. AFFORDABILITY 3
IX. TECHNICAL RISK 4
X. FACILITIES AND MATERIALS 4
XI. TASKS 4
XII. DELIVERABLE SCHEDULE 7
XIII. REPORTING REQUIREMENTS 7

TITLE
Decontamination of Heavily Soiled Surfaces, Part 2 – Decontamination Testing

I. PERIOD OF PERFORMANCE
The period of performance for the work under this work assignment shall be from August 1, 2015 through December 31, 2015. This project shall not incur any costs in calendar year 2016.

II. SUMMARY OF OBJECTIVES
To conduct decontamination tests on heavily soiled surfaces, and generate report for findings of previous and current tests with MS2 and *Bacillus atrophaeus* testing on grimed and non-grimed surfaces.

III. RELEVANCE
This project supports jointly held missions of the U.S. Department of Homeland Security and the U.S. Environmental Protection Agency (U.S. EPA). Within the U.S. EPA, this project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Team (CMAT). In addition, the project is relevant to the U.S. EPA's Office of Pesticide Programs (OPP) crisis exemption process and OPP's regulatory function under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Due to the potential relevance of this project in preparing for the Federal response to a wide-area anthrax dissemination, this project will be managed by NHSRC with the support of a multidiscipline project team.

V. BACKGROUND
Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination

events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special Teams which includes the CBRN CMAT, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

Releases of Biological Materials can be in the form of intentional and directed releases of organisms, such as the anthrax mailings of 2001; or can be in the form of foreign animal disease (FAD) incidents. Either scenario pose significant challenges with regards to determining the extent of contamination, containing the contaminant spread, and remediating such that reoccupancy can occur. The current effort supports multi-agency objectives of better understanding and preparing for remediation of heavily soiled surfaces following a biological release.

VI. SCOPE

The purpose of this project is to evaluate common decontamination methods for inactivation of Bacillus spores or a viral agent (surrogate for FMDV) on test surfaces. Test materials (concrete and treated wood) should be loaded with an amount and type of grime/soil that reflects challenging environments expected to be encountered during wide-area decontaminations. Grime formulations and sampling methods developed previously under this project shall be utilized. A report shall be drafted to document the methods and findings of this effort.

VII. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project is as follows:

A known quantity of surrogate organism will be deposited on large coupons (1 $ft.^2$ or greater) of different materials common to agricultural settings, which may include unpainted (smooth finish) concrete and treated plywood. Additional organic burden will be added to a subset of the test replicates to assess the impact of surface-associated soil/grime on decon efficacy. The coupons will then be treated with the selected cleaning and disinfection methods, and the effectiveness of each method will then be measured by the reduction of spores achieved. Spore relocation to aerosol and rinsate fractions shall be determined as well. All test parameters, such as test chamber size, coupon materials and sizes, decontamination methods, methods of application, contact time, spore type and environmental test conditions will be determined by agreement among participating experts. The collective set of tests must be able to be completed within the allotted budget.

VIII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by

the contractor for use in this effort.

IX. TECHNICAL RISK

The technical risk involved in this project is thought to be moderate. Bacterial spores are expected to be resistant to inactivation in soil/grime matrices; however viral surrogates may be less persistent in such unfavorable conditions. There exists some risk that no soiled condition will permit recovery of viral surrogates from surfaces. These data may suggest that viral persistence in soiled matrices is not high; however, these data would be circumstantial. The purpose of the effort is to provide information pertinent to the test parameter development. Such parameters will be used in subsequent decontamination method testing. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to wide-area decontamination.

X. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

XI. TASKS

The Tasks outlined in this SOW shall be conducted according to the Category IV quality assurance project plan (QAPP) entitled "Decontamination of Heavily Soiled Surfaces – Part I – Summary of Scoping Tests for Follow-up Decontamination Testing" and Amendment 1 to the QAPP, "Decontamination of Heavily Soiled Surfaces, Decontamination Study" (both approved by EPA QA). Further revision to the QAPP may be required, and EPA QA approval will be required prior to test commencement. A copy of the abovementioned approved QAPP will be provided upon award.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in two major tasks. The specific details related to these tasks are described below.

Task 1:

Conduct four laboratory-scale decontamination tests, in accordance with the abovementioned QAPP. The test matrix and variables to be included are shown in Table 1. Test design should follow that reported in EPA600/R-11/092. Tests shall evaluate various spray-based decontamination methods, for efficacy against spores or virus surrogate organisms, on wood and concrete surfaces (Table 2), with and without agricultural grime (Table 3).

Table 1: Test Matrix

Test	Test Organism	Decontaminant	Material Type	Coupon Condition	Total# Test Samples*
1	MS2	2% Citric Acid	Concrete	Grimed	10
2					
3	MS2	2% Citric Acid	Treated Plywood	Grimed	
4					
5	MS2	pH-Adjusted Bleach	Concrete	Grimed	
6					
7	MS2	pH-Adjusted Bleach	Treated Plywood	Grimed	
8					

five (5) test coupons, TCs; three (3) positive controls (PCs), one (1) procedural blank (PB), one (1) negative control;

Table 2. Material specifics for coupons

Material	Description	Manufacturer/ Supplier Name	Coupon Surface Size, L x W	Material Preparation
Pressure-Treated Wood	3/4" thick, 4' by 8' ACQ-D pressure treated plywood	Georgia-Pacific/Lowe's	14" x 14"	- Remove wood particles using soft-briste brush - Sterilize (VHP®)
Concrete	Quikrete Type I & II Portland Cement; Quikrete All Purpose Sand	The QUIKRETE® Companies/Lowe's	14" x 14"	- Remove particles by powerwashing - After powerwashing, allow to air dry in climate-controlled environments for at least five days - Sterilize (autoclave)
Stainless Steel	Multipurpose Stainless Steel (48" x 48"), type 304, #2B mill (unpolished), 0.036" thick	McMaster-Carr	14" x 14"	- Remove any lubricant/grease from shearing with acetone and wipe dry - Remove particles and dust by wiping clean with water and wipe dry - Sterilize (autoclave)

Table 3. Constituents for Grime Manufacturing

Raw Material Name	Trade Name	Manufacturer	CAS #	Product #
Natural humus	Ancient Forest .5 CF Humus Soil Amendment	General Organics, USA	NA	GH3200
Paraffin oil	Paraffin oil; puris	Sigma-Aldrich, USA	8012-95-1	18512-1L
Used crankcase motor oil	NA	Obtain from any local auto service station	NA	NA
Portland cement	QUIKRETE® Portland Cement	**QUIKRETE®, USA**	NA	1124
Silica	Silicon dioxide, ~99%, 0.5-10 µm	Sigma-Aldrich, USA	14808-60-7	S5631-1KG
Carbon black	Raven 401	Powder Technology Inc., PTI, USA		
Oleic acid	Oleic acid technical grade, 90%	Sigma-Aldrich, USA	112-80-1	364525-1L
Kaolin clay	Kaolin*	Sigma-Aldrich, USA	1332-58-7	18672-2.5KG
Iron oxide	**Ferric oxide**	Sigma-Aldrich, USA	1309-37-1	310050-500G
Stearic acid	Stearic acid ≥95%	Sigma-Aldrich, USA	57-11-4	W303518-1KG-K
Lanolin	Lanolin	Sigma-Aldrich, USA	8006-54-0	L7387-1KG
Manure	Dried homogenized 50%/50% hog/cow manure	The Animal and Poultry Waste Management Center at North Carolina State University, USA	NA	NA

Task 3:
Generate Report Draft, revise report per EPA WACOR, EPA Peer-Reviewer, and EPA QA comments. Deliver Final EPA Report to WACOR.

Reporting
The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from a test under Task 1. This template shall be approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WACOR within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission. Transmission shall occur via e-mail to the EPA WACOR informing him/her that the data is ready for viewing.

A draft final report detailing the test results and lessons learned from the testing shall be submitted to the EPA WACOR within 30 days following the completion of the testing and no later than 11/30/2015. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WACOR for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 5 working days from receiving the official comments from the EPA WACOR. A separate document detailing the response to comments shall also be submitted to the EPA WACOR by the contractor with the final version of the report.

XII. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 4.

Table 4: Deliverable Schedule

Deliverable	Due Date
Draft Report	11/30/2015
Final Report	5 working days after receiving all EPA Comments or 12/23/2015 (whichever comes first)

XIII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WACOR shall occur within one week from the completion of data analysis.
- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WACOR. The papers shall be authored or co-authored by the EPA WACOR, at the discretion of the WACOR. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-063

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	063 decon of heavily soiled...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:
The amended WA extends the POP and due date of deliverables to 3/31/16. This WA was slow in staffing up so work began later than anticipated.

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name Worth Calfee	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-7600 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK
AMENDMENT 1

DECONTAMINATION OF HEAVILY SOILED SURFACES

PROJECT# HS6.02

WORK ASSIGNMENT 0-63

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. TITLE 2
II. PERIOD OF PERFORMANCE 2
III. SUMMARY OF OBJECTIVES 2
IV. RELEVANCE 2
VI. SCOPE 3
VII. TECHNICAL APPROACH 3
VIII. AFFORDABILITY 3
IX. TECHNICAL RISK 4
X. FACILITIES AND MATERIALS 4
XI. TASKS 4
XII. DELIVERABLE SCHEDULE 7
XIII. REPORTING REQUIREMENTS 7

TITLE
Decontamination of Heavily Soiled Surfaces, Part 2 – Decontamination Testing

I. PERIOD OF PERFORMANCE
The period of performance for the work under this work assignment shall be from date of Award through March 31, 2016.

II. SUMMARY OF OBJECTIVES
To conduct decontamination tests on heavily soiled surfaces, and generate report for findings of previous and current tests with MS2 and *Bacillus atrophaeus* testing on grimed and non-grimed surfaces.

III. RELEVANCE
This project supports jointly held missions of the U.S. Department of Homeland Security and the U.S. Environmental Protection Agency (U.S. EPA). Within the U.S. EPA, this project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Team (CMAT). In addition, the project is relevant to the U.S. EPA's Office of Pesticide Programs (OPP) crisis exemption process and OPP's regulatory function under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Due to the potential relevance of this project in preparing for the Federal response to a wide-area anthrax dissemination, this project will be managed by NHSRC with the support of a multidiscipline project team.

V. BACKGROUND
Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination

events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special Teams which includes the CBRN CMAT, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

Releases of Biological Materials can be in the form of intentional and directed releases of organisms, such as the anthrax mailings of 2001; or can be in the form of foreign animal disease (FAD) incidents. Either scenario pose significant challenges with regards to determining the extent of contamination, containing the contaminant spread, and remediating such that reoccupancy can occur. The current effort supports multi-agency objectives of better understanding and preparing for remediation of heavily soiled surfaces following a biological release.

VI. SCOPE

The purpose of this project is to evaluate common decontamination methods for inactivation of Bacillus spores or a viral agent (surrogate for FMDV) on test surfaces. Test materials (concrete and treated wood) should be loaded with an amount and type of grime/soil that reflects challenging environments expected to be encountered during wide-area decontaminations. Grime formulations and sampling methods developed previously under this project shall be utilized. A report shall be drafted to document the methods and findings of this effort.

VII. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project is as follows:

A known quantity of surrogate organism will be deposited on large coupons (1 $ft.^2$ or greater) of different materials common to agricultural settings, which may include unpainted (smooth finish) concrete and treated plywood. Additional organic burden will be added to a subset of the test replicates to assess the impact of surface-associated soil/grime on decon efficacy. The coupons will then be treated with the selected cleaning and disinfection methods, and the effectiveness of each method will then be measured by the reduction of spores achieved. Spore relocation to aerosol and rinsate fractions shall be determined as well. All test parameters, such as test chamber size, coupon materials and sizes, decontamination methods, methods of application, contact time, spore type and environmental test conditions will be determined by agreement among participating experts. The collective set of tests must be able to be completed within the allotted budget.

VIII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by

the contractor for use in this effort.

IX. TECHNICAL RISK

The technical risk involved in this project is thought to be moderate. Bacterial spores are expected to be resistant to inactivation in soil/grime matrices; however viral surrogates may be less persistent in such unfavorable conditions. There exists some risk that no soiled condition will permit recovery of viral surrogates from surfaces. These data may suggest that viral persistence in soiled matrices is not high; however, these data would be circumstantial. The purpose of the effort is to provide information pertinent to the test parameter development. Such parameters will be used in subsequent decontamination method testing. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to wide-area decontamination.

X. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

XI. TASKS

The Tasks outlined in this SOW shall be conducted according to the Category IV quality assurance project plan (QAPP) entitled "Decontamination of Heavily Soiled Surfaces – Part I – Summary of Scoping Tests for Follow-up Decontamination Testing" and Amendment 1 to the QAPP, "Decontamination of Heavily Soiled Surfaces, Decontamination Study" (both approved by EPA QA). Further revision to the QAPP may be required, and EPA QA approval will be required prior to test commencement. A copy of the abovementioned approved QAPP will be provided upon award.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in two major tasks. The specific details related to these tasks are described below.

Task 1:

Conduct four laboratory-scale decontamination tests, in accordance with the abovementioned QAPP. The test matrix and variables to be included are shown in Table 1. Test design should follow that reported in EPA600/R-11/092. Tests shall evaluate various spray-based decontamination methods, for efficacy against spores or virus surrogate organisms, on wood and concrete surfaces (Table 2), with and without agricultural grime (Table 3).

Table 1: Test Matrix

Test	Test Organism	Decontaminant	Material Type	Coupon Condition	Total# Test Samples*
1	MS2	2% Citric Acid	Concrete	Grimed	10
2					
3	MS2	2% Citric Acid	Treated Plywood	Grimed	
4					
5	MS2	pH-Adjusted Bleach	Concrete	Grimed	
6					
7	MS2	pH-Adjusted Bleach	Treated Plywood	Grimed	
8					

five (5) test coupons, TCs; three (3) positive controls (PCs), one (1) procedural blank (PB), one (1) negative control;

Table 2. Material specifics for coupons

Material	Description	Manufacturer/ Supplier Name	Coupon Surface Size, L x W	Material Preparation
Pressure-Treated Wood	3/4" thick, 4' by 8' ACQ-D pressure treated plywood	Georgia-Pacific/Lowe's	14" x 14"	- Remove wood particles using soft-briste brush - Sterilize (VHP®)
Concrete	Quikrete Type I & II Portland Cement; Quikrete All Purpose Sand	The QUIKRETE® Companies/Lowe's	14" x 14"	- Remove particles by powerwashing - After powerwashing, allow to air dry in climate-controlled environments for at least five days - Sterilize (autoclave)
Stainless Steel	Multipurpose Stainless Steel (48" x 48"), type 304, #2B mill (unpolished), 0.036" thick	McMaster-Carr	14" x 14"	- Remove any lubricant/grease from shearing with acetone and wipe dry - Remove particles and dust by wiping clean with water and wipe dry - Sterilize (autoclave)

Table 3. Constituents for Grime Manufacturing

Raw Material Name	Trade Name	Manufacturer	CAS #	Product #
Natural humus	Ancient Forest .5 CF Humus Soil Amendment	General Organics, USA	NA	GH3200
Paraffin oil	Paraffin oil; puris	Sigma-Aldrich, USA	8012-95-1	18512-1L
Used crankcase motor oil	NA	Obtain from any local auto service station	NA	NA
Portland cement	QUIKRETE® Portland Cement	**QUIKRETE®, USA**	NA	1124
Silica	Silicon dioxide, ~99%, 0.5-10 µm	Sigma-Aldrich, USA	14808-60-7	S5631-1KG
Carbon black	Raven 401	Powder Technology Inc., PTI, USA		
Oleic acid	Oleic acid technical grade, 90%	Sigma-Aldrich, USA	112-80-1	364525-1L
Kaolin clay	Kaolin*	Sigma-Aldrich, USA	1332-58-7	18672-2.5KG
Iron oxide	**Ferric oxide**	Sigma-Aldrich, USA	1309-37-1	310050-500G
Stearic acid	Stearic acid ≥95%	Sigma-Aldrich, USA	57-11-4	W303518-1KG-K
Lanolin	Lanolin	Sigma-Aldrich, USA	8006-54-0	L7387-1KG
Manure	Dried homogenized 50%/50% hog/cow manure	The Animal and Poultry Waste Management Center at North Carolina State University, USA	NA	NA

Task 3:

Generate Report Draft, revise report per EPA WACOR, EPA Peer-Reviewer, and EPA QA comments. Deliver Final EPA Report to WACOR.

Reporting

The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from a test under Task 1. This template shall be approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WACOR within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission. Transmission shall occur via e-mail to the EPA WACOR informing him/her that the data is ready for viewing.

A draft final report detailing the test results and lessons learned from the testing shall be submitted to the EPA WACOR within 30 days following the completion of the testing and no later than 3/15/2016. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WACOR for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 5 working days from receiving the official comments from the EPA WACOR. A separate document detailing the response to comments shall also be submitted to the EPA WACOR by the contractor with the final version of the report.

XII. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 4.

Table 4: Deliverable Schedule

Deliverable	Due Date
Draft Report	3/15/2016
Final Report	5 working days after receiving all EPA Comments or 3/31/2016 (whichever comes first)

XIII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WACOR shall occur within one week from the completion of data analysis.
- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WACOR. The papers shall be authored or co-authored by the EPA WACOR, at the discretion of the WACOR. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-064

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-064 Parametric Testing....

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 4, 5, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Sangdon Lee (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4531 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work

WA Title: **Optimization of Critical Parameters for Aggressive Air Sampling**

WA #: 064 WACOR: Sang Don Lee

Contract #: EP-C-15-008 Alternate WACOR: Worth Calfee

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The goal of this work is to improve the aggressive air sampling (AAS) method for use in sampling *Bacillus* anthracis spores.

BACKGROUND

In the event of a release of biological material in an urban area that would require decontamination for the purpose of public safety. In such an event, a wide range of surfaces would be contaminated. The Environmental Protection Agency (EPA) has the responsibility for protecting human health and the environment from these contaminated areas. Accurate measurements of residual contamination are needed to inform decisions on re-entry and reoccupation of spaces following site decontamination. For a wide area contamination incident, traditional surface sampling methods (i.e., wipe, swab and vacuum sock) used for clearance sampling may require an extensive number of samples, which may be time and labor intensive to achieve a reasonable confidence. Judgmental sampling is an alternate strategy which can reduce the total number of samples. However, statistical analyses of results from this sampling strategy are not applicable. Innovative techniques, such as Aggressive Air Sampling (AAS), may prove useful as an additional method to currently-used surface sampling methods and, with additional research, may be used as an alternative method in certain situations (i.e., detection of spore presence from unknown hot spots, wide spread contamination with concentration close to detection limit for surface sampling methods, etc.), and effectively shorten the timeline to recovery and/or reduce the sampling burden during a response. AAS could be used for numerous building interiors for rapid sampling with fewer required personnel, and in certain scenarios such as covert wide area contamination, could reduce the total number of samples per unit area compared to the current surface sampling methods. Given that surface sampling is one of the critical bottlenecks in the remediation process, AAS could ultimately result in a decrease in overall cleanup time. Unlike surface sampling, AAS indicates airborne concentrations of respirable size particles that can be used to assess risk of inhalation exposure and as a result, risk of inhalation anthrax. Surface sampling does not differentiate particle size nor does it allow for determining the fraction of particles that could become re-aerosolized. The purpose of this Work Assignment is to help determine appropriate AAS procedures for *Bacillus anthracis*

sampling. The U.S. Environmental Protection Agency (EPA)/National Homeland Security Research Center (NHSRC) will support this work Statement of Work (SOW).

SCOPE

This Work Assignment will identify factors affecting spore suspension from the existing AAS method, assess the impacts of environmental condition (e.g., surface types, humidity, spore size distribution, spore loading) on spore suspension, and optimize the existing AAS components (e.g., sampling flow rate, number of samplers, mixing fan, leaf blower) for spore resuspension and collection.

TECHNICAL APROACH/OBJECTIVES

The contractor shall provide the personnel, equipment, materials, and supplies necessary to perform the following Work Assignment for development of a biological surface sampling device. This Work Assignment is written such that there are options in which this task can be accomplished. Test parameters shall be consulted with the EPA WAM prior to develop a QAPP.

A. Development of a Quality Assurance Project Plan (QAPP)
Project-specific details, including but not limited to number of tests, coupon materials, sampling strategies, analytical techniques, experimental controls, and coupon dosing method shall be outlined in a QAPP. The QAPP shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this IA (see Attachment #1) and the NHSRC QA requirement as defined in Attachment #1. No experimentation shall begin before this task is approved by the EPA Quality Assurance Officer (QAO) and by the CDC technical point of contact. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

B. Simulation using computational modeling
The Contractor shall simulate the aggressive air sampling under various conditions. The simulation conditions will be provided by the EPA WAM. The simulation results shall determine the optimal conditions for AAS such as sampling flow rate, location of sampler, mixing fan capacity, etc.

C. Experimentation
Significant effort is anticipated for fabrication and sterilization of the numerous material coupons needed for testing including test surface materials, spore suspension testing chamber, leaf blower, etc. All tests shall be conducted considering the methods determined from the Task B and described in the EPA report, Systematic Evaluation of Aggressive Air Sampling for Bacillus anthracis Spores (600/R-13/068) and the QAPP utilized for WA 3-19. All test coupons shall be prepared using *Btk* spores (Bacillus atrophaeus if *Btk* is not available) via aerosol deposition. The total number of tests will be up to 10. The test conditions shall be determined based on the results from the computational modeling and consultation with the EPA WAM. For these tests, experimentation shall be carried out in accordance with the QAPP. Deviations from the QAPP shall be documented in writing and justified.

D. The contractor shall prepare a full report detailing the test results and lessons learned from the testing. The report shall follow the EPA report format. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

QUALITY ASSURANCE

See the task A in the previous section

DELIVERABLES

The contractor shall submit deliverables in electronic and hard copy formats. (Some deliverables are information products and may need to be formatted, or entered, as required, in online tools.) Draft and final deliverables shall be in Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Microsoft Project, and/or Adobe PDF Format.

QAPP
A draft QAPP shall be provided by the EPA within 45 days of the award of this agreement. This shall be provided prior to commencement of the tests described within this SOW. The combined QAPP and Work Plan shall include scope, scheduling, and costing information for each of the tests planned.

Report
A Draft Report shall be provided to EPA for review by December 31st, 2015. The final report shall be provided to EPA within 2 weeks on receipt of EPA's comments on the draft report.

SCHEDULE of DELIVERABLES

See the previous section for schedule.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-065

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-065 Floor Sampling in Ina...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 2, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Sangdon Lee (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-4531 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work

WA Title: (AFSD) Operational Assessment of Automated Floor Sampling Device for *Bacillus anthracis* Spores in Inaccessible Areas

WA #: 065 WACOR: Sang Don Lee

Contract #: EP-C-15-008 Alternate WACOR: Worth Calfee

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

This work will assess the prototype automated floor sampling devices on the effectiveness of the device to sample *B. anthracis* spores in the inaccessible areas.

BACKGROUND

The U.S. Department of Homeland Security (DHS) and the Environmental Protection Agency (EPA) have collaboratively developed the automated floor sampling device (AFSD) using the commercially available robotic cleaners for sampling *Bacillus anthracis* spores. The AFSDs have been evaluated for their applicability under various surface types and contamination scenarios. The sampling efficacy of AFSDs is comparable to the currently-used sampling methods. The AFSDs can sample wider area per sampling and help reduce labors compared to the currently-used sampling methods. This project will assess the AFSDs applicability for operating in the inaccessible areas for *B. anthracis* spore sampling. The purpose of this Work Assignment is to help determine appropriate AFSD procedures for *Bacillus anthracis* sampling. The U.S. Environmental Protection Agency (EPA)/National Homeland Security Research Center (NHSRC) will support this work Statement of Work (SOW).

SCOPE

The technical objective of this project is to evaluate the AFSDs and test its sampling efficacy of *anthracis* spores in inaccessible areas. Sufficient replicates, blanks, and positive controls shall be used, consistent with standard microbiological and quality assurance procedures, past work conducted by the contractor, and studies being currently conducted by the contractor.

TECHNICAL APROACH/OBJECTIVES

The contractor shall provide the personnel, equipment, materials, and supplies necessary to perform the following Work Assignment for development of a biological surface sampling device. This Work Assignment is written such that there are options in which this task can be accomplished. Test parameters shall be consulted with the EPA WAM prior to develop a QAPP.

A. Development of a Quality Assurance Project Plan (QAPP)
Project-specific details, including but not limited to number of tests, coupon materials, sampling strategies, analytical techniques, experimental controls, and coupon dosing method shall be outlined in a QAPP. The QAPP shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this IA (see Attachment #1) and the NHSRC QA requirement as defined in Attachment #1. No experimentation shall begin before this task is approved by the EPA Quality Assurance Officer (QAO) and by the CDC technical point of contact. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

B. Preparation of Simulated Inaccessible Areas
The Contractor shall prepare different inaccessible areas up to three. The inaccessible areas are the areas where contamination level is potentially high but the currently-used sampling methods cannot be fully applicable. The size of the setup shall be large enough to represent the real inaccessible areas. Significant effort is anticipated for fabrication and sterilization of the test setup. EPA WAM will provide the types of inaccessible areas. One potential example area is the HVAC.

C. Experimentation
The Contractor shall conduct the tests to evaluate the AFSD's usability in the identified inaccessible areas. The AFSDs shall be evaluated for the following aspects such as sampled area, sampling efficacy, sampling duration, any observed limits of sampling, etc. All tests shall be conducted using *Btk* spores (*Bacillus atrophaeus* if *Btk* is not available) via aerosol deposition. Two spore loadings on horizontal surface shall be tested (10 and 10^5 CFUs per ft^2). Up to three different AFSDs will be evaluated. The types of AFSDs will be provided by the EPA WAM. Each test shall be replicated three times. For these tests, experimentation shall be carried out in accordance with the QAPP. Deviations from the QAPP shall be documented in writing and justified.

D. The contractor shall prepare a full report detailing the test results and lessons learned from the testing. The report shall follow the EPA report format. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

QUALITY ASSURANCE

See the task A in the previous section

DELIVERABLES

The contractor shall submit deliverables in electronic and hard copy formats. (Some deliverables are information products and may need to be formatted, or entered, as required, in online tools.) Draft and final deliverables shall be in Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Microsoft Project, and/or Adobe PDF Format.

QAPP
A draft QAPP shall be provided by the EPA within 45 days of the award of this agreement. This shall be provided prior to commencement of the tests described within this SOW. The combined QAPP and Work Plan shall include scope, scheduling, and costing information for each of the tests planned.

Report
A Draft Report shall be provided to EPA for review by December 31st, 2015. The final report shall be provided to EPA within 2 weeks on receipt of EPA's comments on the draft report.

SCHEDULE of DELIVERABLES

See the previous section for schedule.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-066

☐ Other ☐ Amendment Number:

Contract Number	EP-C-15-008
Contract Period	04/01/2015 To 03/31/2016
Base	X
Option Period Number	
Title of Work Assignment/SF Site Name	0-066 Development of a Vac....
Contractor	JACOBS TECHNOLOGY INC.
Specify Section and paragraph of Contract SOW	1, 2, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Sangdon Lee	(Signature)	(Date)	Branch/Mail Code:
			Phone Number 919-541-4531
			FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code:
			Phone Number: 919-541-3670
			FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code:
			Phone Number:
			FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code:
			Phone Number: 513-487-2351
			FAX Number: 513-487-2109

Performance Statement of Work

WA Title: **Development of a Vacuum-based Biological Agent All Surface Sampler**

WA #: 066 WACOR: Sang Don Lee

Contract #: EP-C-15-008 Alternate WACOR: Worth Calfee

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The proposed work will evaluate options for developing a sampling device that can be used universally on porous and non-porous surface types for collection biological agents. Options for the proposed work include the development of a new surface sampling device that is vacuum-based and includes a liquid dispenser or the development of a new sampling nozzle as described above to augment a COTS device. The ultimate object is to develop a surface sampling device that can be applied to any surface type and could therefore be used in place of all existing devices and methods during the response to a biological incident. Scientifically-testing sampling methods will provide increased confidence in the ability to characterize contamination following such an event.

BACKGROUND

The product from this work will significantly decrease surface sample collection and analysis time. Currently, there are three surface sampling devices used for biological agents including swabs, wipes, and vacuums fitted with filter-type collection media. Operationally and logistically it is challenging to prepare and utilize these three different collection methods. Furthermore, total sample collection efficiency for each of the three methods range from 12 to 40%. The new sampling device will be operationally and logistically more efficient and total sample collection efficiencies are expected to be higher than existing devices. For the swabs, wipes and vacuums; laboratory processing includes removing the biological agent from the sampling media. During this processing there are agent losses due to inefficiencies. The developed device will not require post-collection processing, as agents are captured directly into a liquid that can be analyzed. As such, the developed method will likely have higher recovery efficiencies than the existing methods. The results of this work will be made available through published reports, journal papers, and/or conference abstracts and presentations.

SCOPE

Prototype sampling instruments or alterations to existing sampling equipment shall be made according to input from the Project Team, consisting of members of EPA's Office of Emergency Management, and EPA's Office of Research and Development. The test will determine the proper sampling liquid, liquid

amount and sampling procedure. Commercially available devices or laboratory developed and modified sampling devices will be evaluated for collection efficiency through a set of controlled tests. For example, a known quantity of *Bacillus* spores will be deposited by aerial dispersion onto large coupons (1 $ft.^2$ or greater), constructed of a relevant material type (i.e., carpet). The coupons will then be subjected to vacuum-based sampling, using the device of interest. Recovery will be determined for each sampling device according to culture-based microbiological assays. All test parameters, such as test chamber size, coupon materials and sizes, sampling methods, methods of extraction / analysis will be determined by agreement among participating experts mentioned previously.

TECHNICAL APROACH/OBJECTIVES

Facilities and Materials

All tasks described in this SOW shall be performed in-house, at the EPA's Research Triangle Park (RTP) facilities at 109 T.W. Alexander Dr., unless approved otherwise by the EPA WAM. The sampling activities shall be conducted in the NHSRC's Decontamination Technologies Research Lab (DTRL) located in H-224, H-222, H-122a, and H-130a. The lab contains the necessary equipment for the tasks described herein. The analysis of the biological samples shall be conducted in the Microbiology lab, located in E-386, E-388, and E-390.

Tasks to be performed

The contractor shall provide the personnel, equipment, materials, and supplies necessary to perform the following Work Assignment for development of a biological surface sampling device. This Work Assignment is written such that there are options in which this task can be accomplished. Test parameters shall be consulted with the EPA WAM prior to develop a QAPP.

A. Development of a Quality Assurance Project Plan (QAPP)
   Project-specific details, including but not limited to number of tests, coupon materials, sampling strategies, analytical techniques, experimental controls, and coupon dosing method shall be outlined in a QAPP. The QAPP shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this IA (see Attachment #1) and the NHSRC QA requirement as defined in Attachment #1. No experimentation shall begin before this task is approved by the EPA Quality Assurance Officer (QAO) and by the CDC technical point of contact. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

B. Development of a Bio All Surface Sampler: up to 10 different types of commercial products shall be evaluated for up to 5 different surface types. The selection criteria shall be provided by the EPA WAM. If there is no appropriate sampler identified, then a proto-type sampler shall be developed or modified in the laboratory.

C. The evaluation will be conducted based on the findings from the previous work under EP-C-09-027 WA 5-26. The findings include liquid type, liquid volume, and temporal laps between liquid

application and suction. The evaluation will be conducted by comparing sampling efficacies of aerosol deposited *Bacillus* spores between the commercial products and the currently-used sampling methods on various surfaces. The surfaces will include concrete, carpet, tile, laminate, glass, etc. Three different spore loadings will be used for evaluation. The spore loadings will vary from 10^2 to 10^7 CFUs per ft^2. The contractor shall take digital photos and videos of test procedures.

D. The contractor shall prepare a full report detailing the test results and lessons learned from the testing. The report shall follow the EPA report format. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

QUALITY ASSURANCE

See the task A in the previous section

DELIVERABLES

The contractor shall submit deliverables in electronic and hard copy formats. (Some deliverables are information products and may need to be formatted, or entered, as required, in online tools.) Draft and final deliverables shall be in Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Microsoft Project, and/or Adobe PDF Format.

QAPP
A draft QAPP shall be provided by the EPA within 45 days of the award of this agreement. This shall be provided prior to commencement of the tests described within this SOW. The combined QAPP and Work Plan shall include scope, scheduling, and costing information for each of the tests planned.

Report
A Draft Report shall be provided to EPA for review by September 30, 2015. The final report shall be provided to EPA within 2 weeks on receipt of EPA's comments on the draft report.

SCHEDULE of DELIVERABLES

See the previous section for schedule.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-067

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Marshall Gray
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-4303
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

WORK ASSIGNMENT (WA)

1. Contractor: 0-067 2. Contract No.: EP-C-15-008

3. Contract Period: BASE 4. W.A. Number: 0-067

5. WA Amendment No: 0

6. W.A. Title:

Developing Table of Forces for Human Activity as it Relates to Reaerosolization and Exposure to Bacillus anthracis spores from Outdoor Urban Surfaces

7. Check Applicable Boxes ☒Original W.A. ☐ W.A. Amendment ☐ Work Plan Approval ☐ Other

8. WACOR:____Marshall Gray DCMD/NHSRC, MD E343-06 919-541-4303 919-541-0496
(Name, Branch/Division, Mail Code, Phone and Fax Numbers)

Alternate WACOR: : __Russell Wiener DCMD/NHSRC MD- D205-03 919-541-1910, 919-541-0496
(Name, Branch/Division, Mail Code, Phone and Fax Numbers)

NOTE: An Alternate WACOR must be nominated for each work assignment, or separate justification provided.

9. Est. Labor Hours 1240 Change ☒+/ ☐- Revised Total Hours

WP Approved CPFF Total $ 115000 Change ☒+/☐- Revised Total CPFF $

10. Completion Date March 31, 2016 Revised Completion Date

11. Relevant Contract SOW Sections: NHSRC Budget Task: HS 4.04.02-511

Introduction, sections: 1.7, 2.0, 3.0, 4.0, 5.4, 5.5

12. Comments:

WA: 0-067
WACOR: Marshall Gray

EP-C-15-008
Alt COR:

POP: August 1, 2015 through March 31, 2016

Developing Table of Forces for Human Activity as it Relates to Reaerosolization and Exposure to Bacillus anthracis spores from Outdoor Urban Surfaces

(A) *Goal/Purpose:* The goal of this work is to evaluate human activity and associated forces and their thresholds to initiate reaerosolization. This task will support the goals of the SPORE Program.

(B) *Background Information:* In the event of a release of biological material in an urban area that would require decontamination for the purpose of public safety, the potential of resuspension of said materials is of great interest to EPA and the Department of Homeland Security. In such an event, a wide range of surfaces would be contaminated. The Environmental Protection Agency (EPA) has the responsibility for protecting human health and the environment from secondary emission of materials from these areas. EPA may be required to mitigate, provide consequence management, and decontaminate the area of concern. To this end, the EPA Office of Research and Development (ORD) National Homeland Security Research Center (NHSRC), Decontamination and Consequence Management Division (DCMD) is conducting research to investigate the resuspension of surrogate spores in the Aerosol Test Facility (ATF).

Long-Term Goal 2: The Office of Solid Waste and Emergency Response and other clients use Homeland Security Research Program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environment and APG (41) - The Homeland Security Research Program will deliver reports and databases with information on the movement and the health effects of contaminants form the basis of the need for this work.. The information is instrumental for containing contamination and mitigating health effects. Determination of the bacterial spore (Anthrax spore surrogates) resuspension efficiency is necessary based on the historic release of Anthrax by terrorists in the US and the lack of data demonstrating the ability of spores to resuspend in quantities of public health concern. There are gaps in understanding the influences of human activities as it related to reaerosolization. The purpose of this work assignment is to initiate research in this area. The U.S. Environmental Protection Agency (EPA)/National Homeland Security Research Center (NHSRC) will support this work Statement of Work (SOW).

Work will be conducted at EPA. Information obtained during this work will inform the following issues:

• understand the impact of human activities on reaerosolization.

(C) *Statement of Work/Tasks:* The Contractor shall:

A series of reports have be produced by EPA on prior studies to quantitate the resuspension of spores and other surrogates from common outdoor surfaces. A set of laboratory experiments has been completed studying the degree of resuspension of bar-coded BtK spores under a variety of test conditions. EPA wishes to continue and expand these experiments to study the influences of human activity as it relates to reaerosolization of spores from surfaces, ultimately to better understand human exposure. The methodologies to apply the spores and the data set for the forces required to resuspend spores from the test surfaces will be provided by EPA upon request. The specific surface types selected will be based on the results of the previous work done for EPA and will also be provided upon request. All prior reports and documentation for prior studies conducted for EPA will be made available to the contractor upon request.

Microbiological organisms, supplies, and analyses shall be conducted under a separate WA. Under the current WA, the contractor shall notify the EPA WAM of all microbiological tasks required for the completion of this work assignment as part of the Work Plan development process. Samples will be

delivered within the amount of time specified in the QAPP. The referenced documents attached below, available through the COR, will be utilized for biological sampling, quality assurance.

The Contractor shall provide a new table of deliverables and a timeline for the work to be performed within 30 days of the initiation of this Work Assignment.

Task 1: Task 1: Literature review on forces from human activity as it relates to reaerosolization thresholds:

The Contractor shall conduct a literature review regarding the influences of human activity as it relates to reaerosolization of spore. The Contractor shall identify research knowledge gaps in the quantitative estimation of risk posed by these activities. Provide the WACOR with a prioritized set of controlled tests to examine any knowledge gaps. The WACOR will make the determination on which, if any, tests to pursue. Note, the use of human subjects in research will require approvals by the EPA Institutional Research Board (IRB).

Date of Completion: August 31, 2015.

Task 2: Experimental design of controlled test:

The Contractor shall use barcoded Btk as the surrogate for Ba reaerosolization utilizing the methodology developed in in prior experiments conducted for EPA. Based upon the recommendation from the WACOR, the contractor shall provide an experimental design to address the reaerosolization of spores as it relates to human activities. Activities are anticipated to be associated with outdoor walking, running, yard work, bicycling, lawn mowing, leaf blowing, and other common outdoor activities. If IRB requirements are initiated due to the use of humans in research, the contractor shall complete required IRB training and submit required documents to the WACOR for presentation to the IRB.

Date of Completion: September 30, 2015.

Task 3. Conduct controlled tests:

Phase (1) The contractor shall, upon approval from the WACOR, (including QAPP, IRB (if applicable), etc. approval) execute controlled experiments to quantitatively measure the reaerosolization of spores from defined surfaces due to selected human activities as described in Task 2. Measurement shall include human breathing zone sampling to estimate exposure to spores during activities.

Date of Completion: February 28, 2016

Task 4: Data Analysis and Final Reporting:

The Contractor shall provide data analysis, statistical analysis of the data utilizing methods such as Anova and PCA to determine the key test parameters impacting spore resuspension and provide a final report.

Date of completion May 30, 2016.

The Contractor shall prepare monthly reports to EPA that will summarize the work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The QAPP produced for prior studies by EPA may be utilized as a basis for the QAPP for this work assignment if applicable. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are

clearly indicated.

(D) *Deliverables and Project Schedule, Acceptance Criteria:*

- Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WACOR within 30 days of the Contracting Officer's signature. A Quality Assurance Project Plan (QAPP) shall be provided within 90 days. The Contractor shall develop a QAPP following the EPA Guidance for Quality Assurance Project Plans and Modeling (QA/G-5M) and Guidance for Quality Assurance Project Plans (QA/G-5) which can be found at http://www.epa.gov/quality/qa_docs.html. 2. A final report shall be provide to the WACOR on or before March 31, 2016.

(E) *QA/QC Requirements for WA:* Calibrations of scientific instruments shall be performed under existing Standard Operating Procedures. Standard "good laboratory practices" for maintaining notebooks shall be employed.

(F) *Special Requirements:* The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the additions to the research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided in NHSRC's QMP. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

(G) *Reports and Meetings:*

Need	Meeting Purpose	Frequency
X	to discuss workplan	Once
X	to review data or analyses	Weekly
X	to review monthly cost report	Monthly

(H) *Travel/Training Requirements*: Travel ☐ is ☒ is not anticipated to be charged under this work assignment. If travel is anticipated, the dates and circumstances necessitating travel chargeable to this work assignment will be specified by Technical Directive. Travel will be reviewed and approved by the WACOR. Requests for travel shall include: (1) name of traveler(s) and job duties, (2) description of circumstances necessitating travel, (3) location of travel, and (4) estimated cost breakdown by categories

(I) *Management Controls*: See Contract Management Controls.

(J) *Staffing Requirements*:

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-068

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-068 Thermal... CBR

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 1, 2, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Paul Lemieux (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-0962 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

PERFORMANCE WORK STATEMENT
for
Thermal Destruction of CBR Contaminants HS 6.04.04 - 251

PURPOSE OF WORK ASSIGNMENT

The contractor shall provide support for operation, maintenance, sampling/analysis, and modification to the in-house rainbow furnace and tests to combust cesium-doped biomass in the rainbow furnace and/or rotary kiln incinerator simulator and acquire and analyze samples from those tests.

BACKGROUND

In the aftermath of a Radiological Dispersal Device (RDD) in an urban setting, there is the potential for the generation of significant quantities of contaminated biomass. These wastes are likely candidates for incineration as a means for volume reduction, due to the costs of disposal for Low Level Radioactive Waste (LLRW). Cesium (Cs), a metallic element, is a likely radionuclide that may be used in an RDD, and presents problematic behavior in combustion systems due to its volatility and solubility in water. Unlike organic compounds, combustion or incineration systems cannot destroy the elemental metal constituents, although high temperature combustion environments will induce metal transformations. These transformations are usually thought to exacerbate their harmful effects, since many of the metal species, including Cs, readily vaporize within combustion environments. Subsequently, this saturated vapor will nucleate and condense downstream of the flame, contributing to a fume of submicron aerosol. These particles, because of their small size, are difficult to collect in pollution control systems. Emissions of particulate-bound radioactive isotopes, such as ^{137}Cs, from combustion systems, are highly undesirable. Moreover, chlorinated metal species that are collected often exhibit increased volatility, while chlorinated and sulfated metal species may exhibit increased water leachability.

The purpose of this research is to investigate biomass-bound Cs behavior, speciation, and transformations in combustion and incineration systems and examine methods and modifications to control Cs speciation and particle size distribution. One process of interest involves sorbent injection, whereby the high temperatures of practical incinerators might be exploited to transform Cs into constituents that are both more easily collected than Cs-containing effluents in the absence of combustion modifications.

Past work (Yoo et al., 2005; Lemieux et al., 2013) has shown that kaolinite, an alumino-silica sorbent can capture significant quantities of Cs fed into a combustion system. Experiments envisioned here will use the same small laboratory scale 82 kW in-house research combustor (rainbow furnace). Cs will be continuously introduced into the vertical furnace bound on ground corncob or other suitable ground biomass material, through a variable swirl burner. Kaolinite will be injected along the centerline in the post flame at a location based on the optimum temperature determined by Yoo et al. (2005).

Measurements of both the submicron aerosol size distribution and the size segregated particulate composition in the exhaust will allow the effects of sorbent injection to be ascertained. The presence of other naturally occurring alkali metals (Na and K) and Cl will be evaluated for their propensities to interfere or preferentially react with the sorbent.

Previous testing was performed examining the combustion of cesium-containing biomass (corncob flour) in the Rainbow furnace, with the addition of sorbent to evaluate the sorbents' ability to capture cesium from the furnace flue gases. The WACOR will provide the earlier QAPP and associated operating procedures. Based on analysis of the data, it was determined that it is necessary to run the test matrix using a different biomass (Pine Flour). In addition, it may be desirable to run the experiments on a different combustor that burns the fuel in a mass-burn mode such as the rotary kiln incinerator simulator.

DETAILED TASK DESCRIPTIONS

Task 1) The contractor shall run additional cesium-contaminated biomass combustion experiments performed on the Rainbow furnace in the same manner as previously performed (the WACOR will supply existing QAPPs and procedures as necessary). The following run conditions, shall be performed in triplicate, for a total of approximately 10 days of testing:

- Pine Flour Alone
- Pine Flour/Cesium
- Pine Flour/Cesium/Sorbent

Additional elemental analysis of the sorbent material shall be performed using X-Ray Fluorescence (XRF).

Task 2) The contractor shall provide technical support, operating experience, analytical support, and expendable materials to conduct these tests using the EPA rainbow furnace and/or rotary kiln incinerator simulator. This support shall include:

- Provide expendable materials and building supplies to modify, operate, and maintain the rainbow furnace, or other in-house combustor, as appropriate.
- Provide engineering and operating labor for the design and execution of test plans on these furnaces.
- Maintain, calibrate, and operate monitoring equipment according to NRMRL/APPCD's Recommended Operating Procedures (ROPs) and instrument manuals.
- Collect and retain necessary operational data to ensure compliance EPA Safety, Health, and Environmental Management (SHEM) requirements.

DELIVERABLES

1. Planning Meetings: The WACOR and contractor's project manager shall arrange periodic project meetings to discuss Task-specific progress, issues, and action items.

2. Monthly Task Progress and Cost Reports: The Contractor's monthly report to EPA shall summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges.

3. Health and Safety Research Protocols: Health and safety research protocols shall be prepared or updated as required by the EPA Facility and APPCD safety personnel. These protocols shall be approved by the WAM and safety personnel prior to the conduct of any testing.

4. Quality Assurance Project Plans (QAPPs): Existing QAPPs shall be updated as required by the EPA Facility and safety personnel. These protocols shall be approved by the WAM and safety personnel prior to the conduct of any testing. The contractor shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action. The contractor shall prepare a QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the type of research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided in NHSRC's QMP. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

5. Data Reports: The Contractor shall prepare data summaries and Quality Control data reports of all facility-specific data in lieu of an overall final report. Each Quality Control report shall be in a format suitable for EPA/NHSRC publication and shall discuss how well various measurements described in the QA plan were met.

References

Yoo, J., Shinagawa, T., Wood, J., Linak, W., Santoianni, D., King, C., Seo, Y., and J. Wendt, "High-Temperature Sorption of Cesium and Strontium on Dispersed Kaolinite Powders" Environ. Sci. Technol. 2005, 39, 5087-5094.

Lemieux, P., S. Lee, L. W., and C. Winterrowd, "Capture of Cesium During Biomass Combustion Using In-Furnace Sorbent Injection" in 2013 International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors (IT3/HWC) 2013: San Antonio, TX.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-069

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
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- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

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1										
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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Paul Lemieux
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-0962
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name:
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

STATEMENT OF WORK
Contract EP-C-15-008

PROJECT: HS 6.03.02
WORK ASSIGNMENT: 0-069

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

I. TITLE

Remediation of Radioactively Contaminated Soils

II. PERIOD OF PERFORMANCE

The period of performance for the tasks detailed in this Statement of Work (SOW) shall be from August 1, 2015 to March 31, 2016.

III. SUMMARY OF OBJECTIVES

Particle size and activity measurements will be conducted to determine if radioactivity is associated with fine or coarse soil partitions. Various chemical and physical methods will be tested for removal of radioactive contamination. These methods include: leaching, sedimentation, vibration, solvent extraction, flotation, and electrolytic remediation.

IV. BACKGROUND

It is estimated that the volume of contaminated material generated in a radiological dispersal device (RDD) could exceed the current capacity of all three of the licensed low-level radioactive waste disposal facilities. An accident on the scale of Fukushima Daiichi would increase these waste volumes even more. A significant fraction of the projected contaminated waste produced from cleanup of a wide-area radiological incident may be soil of various types depending on the location of the incident. Nationally, the Agency is challenged with large-scale radioactively contaminated projects related to phosphogypsum and uranium mine tailings. There are currently about 1 billion tons of phosphogypsum in Florida alone that are elevated in radium and cannot be used. In the Navajo Nation there are over 500 abandoned uranium mines as well as homes and drinking water sources with elevated levels of radiation.

The disposal of radioactively contaminated soils is limited to a handful of regulated disposal facilities nationwide. This accounts for a relatively high cost for disposal and transportation compared with other removals. Research is warranted to reduce the volume of soils during a cleanup to just those soils that exceed the cleanup standard, and to investigate soil treatment options to reduce the volume of contaminated soils. This research effort will also help any future large-scale contamination scenarios that create large volumes of waste.

Over the last few years Region 7 has conducted several removal actions at radium-contaminated sites and has developed a mobile soil screening technique to rapidly analyze soil samples and to help reduce the disposal of clean soils during a cleanup. Research in the screening and treatment of radium, uranium and thorium in soils can potentially reduce the cost and offer remedial alternatives for these projects.

The specific research proposal would focus on radioactive measurement, soil properties, and chemical/mineral extraction of radium, uranium and thorium from background soils that contain different levels of natural radioactivity, i.e. clay and shale.

V. SCOPE

The scope of this Work Assignment (WA) is to support the EPA personnel who will be conducting these experiments. Specifically the contractor will prepare samples and assist EPA in radiation safety procedures (e.g., radiation surveys in the laboratory).

VI. TECHNICAL APPROACH

The technical approach in this WA is to study the soil samples and then conduct a series of physical and chemical methods to remove the radium, uranium, and thorium from the soil samples.

VII. AFFORDABILITY

In comparison to the labor costs, only a minimal amount of expendable materials are required to be purchased by the contractor.

VIII. TECHNICAL RISK

The technical risk involved in this project is considered to be moderate. These methods have been tested in the laboratory to some extent but not under these conditions. All information obtained is expected to be relevant.

IX. FACILITIES AND MATERIALS

All work on this project described in this statement of work shall be performed at the U.S. EPA's facilities located at 109 TW Alexander Dr, Research Triangle Park, NC. Testing is anticipated to be performed in a High Bay Building Room 234.

X. TASKS

The contractor shall perform the following tasks as part of this work assignment:

TASK 1. PREPARATION OF LABORATORY

The contractor shall prepare H 236 for the experimental work. EPA Region 7 will supply instrumentation to detect and quantify radiation. It is anticipated that the following equipment will need to be setup in the laboratory but the contractor shall also provide input into what other equipment is required for the testing. EPA will provide this equipment.

- Standard particle size sieves, Mesh sizes: 12, 30, 50, 100, 200 and 400;
- x10 loop or microscope;
- laboratory-sized gravity concentrating shaker table (e.g.: http://mine-engineer.com/mining/minproc/gravity-conc.htm), or dry vibrating "shape separation" table (e.g. http://epsc.wustl.edu/geochronology/wirfley.htm)
- ultrasonic cleaner;
- flotation cell;
- electrokinetic remediation cell (soil cell, electrode compartments, electrolyte solution reservoirs and power supply).

TASK 2. SOIL TESTING

The EPA will provide 55-gallons of Lane Shale from under the Bethany Falls Limestone and approximately 55-gallons of clay from Kansas City, MO for use in this work assignment. A sample of each soil type has been analyzed by EPA's NAREL lab in order to verify field-counting methods. NAREL's final analysis shows clay at 1 pCi/g Ra-226 and the shale at 5-6 pCi/g Ra-226.

The contractor shall mix the soil for field counting for Ra226, U238, and Th232. The contractor shall sieve each soil type will be sieved (using Mesh sizes: 12, 30, 50, 100, 200 and 400) and prepare triplicate samples of each partition. These samples shall be provided to EPA personnel who will field-count the samples to study the activity as a function of particle size. Enough soil in each partition to fill the Quick Count jar will be needed to indicate whether activity is related to particle size. The EPA will provide this volume to the contractor. The contractor shall then mill the two soils and repeat the sieving, then providing the sieved sampled to the EPA personnel so that they can observe any differences in sieving partitions and activity.

TASK 3. ATTACH AND PROTECT A DETECTOR TO AN EXCAVATOR

The EPA will provide a gamma detector for the design of a detachable sheath to fix the detector to a hydraulic thumb of an excavator. The contractor shall assist EPA with the design of this sheath. Once the design is complete, the contractor will manufacture a working prototype. EPA will then place the detector inside the sheath and perform tests with the shale and clay materials to determine the efficiency and sensitivity to Ra226. The contractor shall provide an excavator thumb to attach to the excavator for duration of the design and testing phase.

TASK 4. LEACHING AND SEDIMENTATION WITH AND WITHOUT MILLING

The contractor shall prepare samples (3 test samples, a control sample) for determination of the leaching percentage of water-soluble radionuclides. This leaching percentage will be determined by measuring the activity of the soil before and after it is mixed with water. The contractor shall provide aliquots of the dry soil to the EPA personnel for counting. After this counting, the contractor will mix an equal volume of the water to these test sample dry aliquots of the two soils (in a screening jar to verify moisture is not affecting the gamma count) and agitate the samples for at least 1 minute. The contractor shall then filter the water out of the sample and the contractor shall provide these samples to the EPA personnel for recount.

The contractor shall then prepare samples (in triplicate) for sedimentation with native material and with sieved partitions for both the clay and shale soils. The mass of the sample is TBD by the EPA WAM. The contractor shall prepare three equal partitions from the bottom, middle and top of the sedimentation columns and add water. Shaking and settling times are TBD by EPA WAM. Once the sedimentation is complete, the contractor shall dewater the samples as much as possible and count. If sedimentation does result in separation for native or further separation for sieved portions, as evidenced by the EPA counting measurements of the sedimented samples versus non-sedimented samples, the contractor shall repeat the experiment but this time increasing the mass of the samples and creating additional partitions.

The contractor shall repeat sample preparation for the leaching and sedimentation experiments now using material that has been milled. Specifically, the contractor shall mill the two sample types, providing 3 test samples and a control sample for both the leaching and sedimentation testing. The contractor shall then provide these samples to EPA personnel for counting.

TASK 5. VIBRATION AND SOLUBILITY

The contractor shall prepare the samples for this test (3 test samples, 1 control) for both soil types and shall sonicate these samples (conditions TBD by EPA WAM) for 5 different time points (TBD by EPA WAM). After sonication, these samples will be provided to the EPA WAM for analysis.

After the sonication tests are complete, the use of solvents to extract the radioactive elements from the samples will be tested. The contractors shall prepare the samples for these tests. Specifically, the contractor shall take aliquots of each soil type for extraction with water, followed by extraction with magnesium chloride solution (to extract the water-soluble and exchangeable radium species), and then extraction with sodium acetate/acetic acid solution (to leach the radium fraction bounded to carbonate species). Measurements will be taken after each extraction step by EPA

personnel. The contractor shall prepare these samples in triplicate and shall also prepare a control sample (sample that has not been extracted).

TASK 6: FLOTATION AND ELECTROLYSIS

The contractor shall prepare samples and conduct flotation tested with reagents most suitable for extracting radium, uranium and thorium (TBD by EPA WAM). The contractor shall take aliquots of both soil types and prepare triplicate test samples and a control sample. The test samples shall be placed into the flotation cell (conditions TBD by EPA WAM). After flotation, the samples shall be provided to the EPA personnel for counting.

Lastly, the contractor shall mix samples of each soil type with water and conduct electrolysis testing shall be conducted. The electrode conditions, electrolyte solutions, and soil cell. A control and 3 test samples will be tested for each soil type.

TASK 7. RADIATION SAFETY SUPPORT

The contractor shall assist EPA personnel conducting the activity measurements by providing laboratory radiation survey assistance.

XI. DELIVERABLE SCHEDULE

On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, cumulative financial expenditures and cost and schedule variance. The contractor shall also have bi-weekly meetings with the EPA WAM and the project team for the duration of the WA.

The deliverables in the form of experimental details and samples are shown in Table 1.

Table 1: Deliverable Schedule

Task Number	Deliverable	Due Date
1	Laboratory Setup	1 week from award
2-7	Generation of Samples	April 1 – June 30

XII. REPORTING REQUIREMENTS

- Data related to this project shall be stored on the US EPA server's "DTRL" shared drive.
- Transfer of project data shall occur at the conclusion of each experiment within each task. Detailed written summaries of experimental procedures and results shall be provided to the WAM within one week from completion of the data analysis. These reports shall indicate the operational conditions (e.g., decontamination solution preparation procedure and exposure time)

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-071

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 0-071 Swiffer Wipes for Bior..

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lukas Oudejans	Branch/Mail Code:
(Signature) (Date)	Phone Number 919-541-2973
	FAX Number:
Project Officer Name Kevin Sudderth	Branch/Mail Code:
(Signature) (Date)	Phone Number: 919-541-3670
	FAX Number:
Other Agency Official Name	Branch/Mail Code:
(Signature) (Date)	Phone Number:
	FAX Number:
Contracting Official Name Mark Cranley	Branch/Mail Code:
(Signature) (Date)	Phone Number: 513-487-2351
	FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Operational testing of Swiffer wipes for household bioremediation

WA #: 0-071 WACOR: Lukas Oudejans

Contract #: EP-C-15-008 Alternate WACOR: Sang Don Lee

NHSRC Project Number: HS 6.03.02-0098

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

1. SUMMARY OF OBJECTIVES

This work will evaluate the use of dust sweepers to remove Bacillus anthracis surrogate spores from hard, nonporous floor materials as a low-tech activity to reduce overall exposure. This work will also assess whether unintentional exposure may occur due to reaerosolization of spores during this surface cleaning process.

2. BACKGROUND

EPA's Homeland Security Research Plan recognizes that the environmental cleanup following a chemical, biological, or radiological event involves an interconnected system of activities that require coordinated efforts to optimize cleanup effectiveness, minimize cost and recovery time, and reduce unintended consequences. Currently, EPA's National Homeland Security Research Center (NHSRC) is evaluating decontamination technologies against B. anthracis as part of remediation operations. Following a wide area anthrax spore release, it is likely that home owners at the edge of an evacuation zone may consider taking self-help actions that would reduce their indoor exposure risk. Self-help actions may include efforts to transfer biological spores from indoor surfaces by vacuuming or dust sweeping. Here, floor sweepers such as the Swiffer® Sweeper will be evaluated on its use to remove spores from flooring materials. The results of this work could potentially inform self-help recommendations for the general public after a biological event.

3. SCOPE

This study will measure the effectiveness of dusting of hard surface floors to remove spores. This will be addressed at both high and low and contamination levels. It will also address whether this process creates an inhalation hazard due to the reaerosolization of spores during the dusting process. The focus will be on the Swiffer® Sweeper product as a floor dusting

method that is widely used and available and is considered to be representative of dusting actions on floors using similar products.

4. TECHNICAL APROACH

The contractor shall provide the personnel, equipment, materials, and supplies necessary to perform the following Work Assignment tasks. All microbiological preparation and analyses will be covered under the parallel on-site Biolaboratory work assignment on this contract.

Task 1: Preparation of the Quality Assurance Project Plan (QAPP)

The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) **Category 3**. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List.

A Category 1 or 2 QAPP must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category 3 QAPP can be either based on the R5 guidance or a project-specific QA requirements provided on the NHSRC@work website. *The appropriate project-specific QA requirement information must be provided by the COR as Attachment 2.*

The **QAPP** must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Task 2: Test chamber

The contractor shall design and build a new test chamber or modify an existing test chamber to conduct experiments described in the statement of work. This chamber shall include ports for air sampling according to NIOSH guidelines during the sweeping of the surface.

Task 3: Extraction method development

The contractor shall develop methods for extraction of B.a. surrogate spores from sweeper size wipes. The contractor shall assess whether immediate extraction is required as to confirm that the wetted sweeper wipe has no sporicidal activity.

Task 4: Dusting tests

The contractor shall conduct replicate tests that will assess the transfer of spores from floor surface to a sweeper wipe. These tests shall also consider a second sweeping effort using a new sweeper wipe. During these tests, air samples from within the chamber shall be collected to assess whether reaerosolization of spores occurs. Both a wide and "hot spot" inoculation of the approximately 42" by 42" surface area shall be considered

as part of these tests. Three subsections of the 42" by 42" surface shall be wiped during the hot spot tests for enumeration of transferred spores. A subset of conditions shall be repeated at high spore loading concentrations. The contractor shall anticipate to conduct up to 8 test conditions which shall generate approximately 200 samples for enumeration of viable spores.

5. QUALITY ASSURANCE

The QAPP must be approved prior to the start of any environmental data collection. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

1. The contractor shall have biweekly meetings with the EPA WAM to discuss any technical difficulties and report progress.

2. The contractor shall transmit all data related to method development and/or demonstrations prior to continuation with Task 4.

3. The contractor shall transmit all data from Tasks 2-4 prior to the end of the option period. Raw and processed data shall be provided in MS Excel spreadsheets. Contractor shall transmit this data as soon as it has been internally reviewed for quality assurance.

7. SCHEDULE of DELIVERABLES

Table 1: Delivery Schedule

Deliverable	Due Date
Biweekly research meetings	N/A
Draft QAPP	3 weeks after award of WA
Final QAPP	14 days after receipt of comments to draft from EPA WAM and QA manager
Data Summary Report on Swiffer dusting operations	March 31, 2016

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-072

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 0-022 Impact Surface Dirt ....

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Lukas Oudejans
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-2973
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Impact of surface dirt & grime on use of bleach for bio decon

WA #: 0-72 WACOR: Lukas Oudejans

Contract #: EP-C-15-008 Alternate WACOR: Worth Calfee

NHSRC Project Number: HS 6.03.02-0123

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

1. SUMMARY OF OBJECTIVES

This work will evaluate the impact of dirt and grime as present on subway building materials and exteriors of subway car materials have on the efficacy of pH amended bleach (pAB). This will be assessed through measurement of residual amounts of spores on surfaces and in effluent following each step of the previously defined bleach spray application process. This assessment will provide insight whether pre cleaning of a surface using e.g. water and soap is a necessarily requirement to reach a 6-log reduction in viable spores.

2. BACKGROUND

In the event of a chemical/biological incident in a transportation hub like a subway system, remediation may require the use of various decontamination approaches ranging from volumetric decontamination by fumigation to surface decontamination using readily available decontamination products such as bleach. Previous (EPA-NHSRC) studies have shown that sporicidal solutions like pH amended bleach can be highly efficacious. Limited data exist on the impact of "dirt and grime" to the efficacy of pAB. A recent report [1] looked into the impact of a light dirt and grime loading. This study will continue to build on that report by investigating the efficacy of pAB and pAB with surfactant when used to decontaminate heavily grimed surfaces as frequently encountered in a subway system.

3. SCOPE

This study will determine whether heavily grimed surfaces can be decontaminated using pAB as per previously identified spray procedures or whether additional steps are required.

4. TECHNICAL APROACH/OBJECTIVES

The overall technical direction follows approaches established under previous onsite contracts including the step by step application of bleach solution by sprayer. For each test, the effort shall include recovery of viable spores from the subway material and from effluent during each of the application steps. Each test point will consist of three test coupons and three positive controls that are contaminated but are not to be decontaminated. Test and analytical methods shall be adopted from existing standard operating procedures (SOPs) in consultation with the EPA work assignment manager (WAM).

The contractor shall perform the following tasks as part of this work assignment. All microbiological preparation and analyses will be covered under the concurrent onsite Biolab work assignment on this contract.

Task 1: Preparation of the Quality Assurance Project Plan (QAPP)

The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) **Category 3**. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List.

A Category 1 or 2 QAPP must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category 3 QAPP can be either based on the R5 guidance or a project-specific QA requirements provided on the NHSRC@work website. *The appropriate project-specific QA requirement information must be provided by the COR as Attachment 2.*

The **QAPP** must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

TASK 2. SUBWAY SURFACE SAMPLE PREPARATION

The subway building materials samples are expected to be highly irregular in shape and size, including a large variety in thickness. The contractor shall assess the inventory of subway material samples as provided by US EPA. Irregular shaped coupons shall be cut into square coupons in consultation with the EPA WAM. About half of the coupons (exact number to be determined in consultation with EPA WAM) shall undergo a cleaning procedure which will be provided by the EPA WAM. This procedure is derived from the procedures used by New York City (NYC) Metropolitan Transportation Authority (MTA) for cleaning in subways.

TASK 3. SUBWAY GRIME CHARACTERIZATION

- The contractor shall characterize the grime as extracted from a small subset of coupons for properties such organic carbon content, metals, and metal oxides.

TASK 4. SURFACE SAMPLING

The contractor shall conduct experiments that will determine the sampling method of B. anthracis surrogate spores from the provided subway surfaces. Such sampling methods may depend on the size (up to 14" by 14") of the available materials/coupons. The contractor shall determine the recovered number of spores following aerosol deposition of B. anthracis surrogate spores using vacuum sock sampling, sponge wipe sampling, and using gauze sampling. Results from this test will determine the appropriate sampling method of the coupons under Task 6.

TASK 5. INOCULATION

The contractor shall use a previously designed method for dry deposition of bioaerosols onto 14"×14" coupons (effective deposition area 12"×12") and/or modifications for smaller (down to 2" diameter) surface sizes. To eliminate the need of individual delivery systems, the contractor shall demonstrate that expected levels of spores can be delivered without significant settling time following inoculation, i.e. rely on impaction. The contractor shall evaluate whether reproducible aerosol deposition occurs such that dosing of multiple material coupons in immediate succession is possible using a single deposition procedure. Such assessment shall occur in triplicate (using stainless steel as the surface material) and shall be conducted at two spore loadings to be established by the EPA WAM during the writing of the QAPP. Wipe sampling from the individual surfaces shall be used to quantify the number of spores deposited.

TASK 6. DECONTAMINATION TESTS

The contractor shall expect to conduct sprayed pH amended bleach decontamination experiments using up to three subway building materials and up to three exterior materials from subway car exteriors. For both groups, grimed coupons and grimed, than cleaned, coupons shall be included in the test matrix.

For each test point, three replicates shall be decontaminated while three other coupons shall be used for positive controls. Each test point should include one laboratory blank (no inoculation, no decontamination) and one procedural blank (decontaminated with no inoculation). Coupons shall be positioned in both horizontal and vertical positions unless there is a single prevailing position for such material.

Each test shall include enumeration of residual viable spores from coupons surfaces and viable spores in effluent. The contractor shall determine the efficacy (log reduction) of the overall decontamination procedure per material and grime conditions. The contractor shall provide a qualitative assessment of the impacts that pAB has on the coupon materials. Digital photographs shall be made to support these observations.

An adaptive testing approach shall be used in which testing results will be used to modify subsequent decontamination conditions that would lead to improved performance, if applicable.

The contractor shall expect to conduct these tests at a high (greater than $1x10^7$ CFU per coupon). A subset (less than 50%) shall be repeated at a low (1×10^2 CFU per coupon) level

All experiments shall be conducted using a medium, spray booth, size chamber. Initial parameters such as contamination concentrations, contact times will be established in consultation with the EPA WAM during the writing of the QAPP.

TASK 7. TEST REPORT

The contractor shall prepare a full evaluation report (a draft version for EPA WAM review followed by a revised draft for EPA peer and QA review; and a final version) which shall include a summary of findings, test conditions, methods, quality assurance, and results of the tests conducted per the requirements of this SOW. The report shall conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPN 800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

5. QUALITY ASSURANCE

The QAPP must be approved prior to the start of any environmental data collection. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

1. The contractor shall create a draft and final QAPP as per Task 1
2. The contractor shall transmit all data from Tasks 2-6 prior to the end of the option period. Raw and processed data shall be provided in MS Excel spreadsheets. Contractor shall transmit this data as soon as it has been internally reviewed for quality assurance.
3. The contractor shall create a draft final report, revise this report based on peer and QA review, and finalize as a full evaluation report as per Task 7 description.
4. On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, cumulative financial expenditures and cost and schedule variance.

7. SCHEDULE of DELIVERABLES

Deliverable	*Schedule*
QAPP Draft– Task 1	15 business days after award
QAPP Final	2 weeks after receipt EPA QA comments
Project Kickoff Meeting	Prior to final approval of QAPP
Draft Test Report – Task 7	March 1, 2016
Final Report	March 31, 2016

8. KEY REFERENCES

[1] EPA report EPA/600/R-12/591: ***Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Evaluation of Spray Method Parameters and Impact of Surface Grime***

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-073

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

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Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lukas Oudejans	Branch/Mail Code:
	Phone Number 919-541-2973
(Signature) (Date)	FAX Number:
Project Officer Name Kevin Sudderth	Branch/Mail Code:
	Phone Number: 919-541-3670
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Other Agency Official Name	Branch/Mail Code:
	Phone Number:
(Signature) (Date)	FAX Number:
Contracting Official Name Mark Cranley	Branch/Mail Code:
	Phone Number: 513-487-2351
(Signature) (Date)	FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Wet-vacuum sampling of soluble chemical agents on building surfaces

WA #: 0-073 WACOR: Lukas Oudejans

Contract #: EP-C-15-008 Alternate WACOR: Sang Don Lee

NHSRC Project Number: HS5.02.01-0199

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

1. SUMMARY OF OBJECTIVES

This work will develop standard test methods for a wet vacuum approach for sampling of surface areas contaminated with toxic chemicals and/or chemical warfare agent (CWA) surrogates.

2. BACKGROUND

In the event of a chemical incident, samples must be collected, preserved, and analyzed to assess the size of the contaminated area and, following decontamination efforts, to determine whether cleanup goals have been accomplished. Surface sampling is typically conducted using wipes with a relatively small sampling area. Statistical sampling theory result fairly quickly in a large number of these small samples that would be required to support confident decision making. With a limited capacity to analyze chemical samples, especially for chemical warfare agents, such sampling approach may become rather difficult to implement as part of the remediation and clearance process. Aside from revising sampling strategies, sampling larger areas is an alternative approach to reduce the number of samples. Avoiding the wipe extraction step by direct sampling of a solvent would also reduce the burden on an analytical laboratory.

In this work assignment, a wet vacuum sampling approach will be assessed on its ability to sample various indoor surfaces for the presence of TICs and/or CWA simulants. Under a previous contract, the wet vacuum sampling approach was investigated, using a custom made device, through initial selection of best solvent (isopropyl alcohol [IPA] over water or water with tween), solvent amount (50 mL for an approximately 12"x12" surface area), and optional time (10 sec) between wetting and sampling of a stainless steel surface contaminated with a chemical.

The work described in this PWS builds on this initial work and its associated method development. The EPA WACOR will inform the contractor about the outcome of this method

development at the onset of this project. The contractor shall incorporate elements of this method development study and shall not repeat those studies.

3. SCOPE

This study will determine whether wet vacuuming is a suitable option in sampling for and/or removal of water soluble chemicals. It will address operational aspects to the use of a wet vacuum system. The focus will be on two commercially available small, handheld or backpack held systems.

4. TECHNICAL APROACH/OBJECTIVES

Prototype sampling instruments or alterations to existing sampling equipment shall be made by the contractor according to input from the EPA WAM. The contractor shall use a previously determined sampling liquid (isopropanol or water), liquid amount and sampling procedure. Details will be provided by the EPA WAM. The contractor shall expect only minor method development related to the use of wet vacuum to sample surfaces. Commercially available devices and an in-house developed device will be evaluated for collection efficiency through a set of controlled tests. Three chemicals with low volatility and various degrees of solubility in water have been selected by the EPA WAM (phenol, nitrobenzene, and triethylphosphate [TEP]). They are to be deposited onto large coupons (14"×14"), constructed of three relevant materials, namely stainless steel, laminate, and vinyl. The coupons will then be subjected to vacuum-based sampling, using the device of interest. The two selected wet vacuum devices are the BISSELL Little Green ProHeat Compact Multi-Purpose Carpet Cleaner and Rug Doctor Portable Spot Cleaner (Machine) Wet-Vacuum Sampling.

Recovery will be determined for each sampling device by analysis of the extract. All other test parameters, such as sampling approaches and methods of extraction / analysis will be established following discussion with the EPA WAM. The contractor shall consider contacting an accredited chemical analysis laboratory for chemical analysis of the samples. The contractor shall be responsible for all communications with the subcontractor, including Quality Assurance and Quality Control of analysis and results. The contractor shall ship extraction samples as created under these Tasks to the subcontracted chemical analysis laboratory.

The contractor shall provide the personnel, equipment, materials, and supplies necessary to perform the following Work Assignment tasks:

Task 1: Preparation of the Quality Assurance Project Plan (QAPP)

A QAPP entitled "Decontamination Solution Methods for Toxic Industrial Chemicals: Assessment of Decontamination Application and Sampling Method; Part 2. Task B" was approved by EPA on October 7, 2014. This QAPP was amended (July 8, 2015) to reflect the actual test matrix. Both QAPP documents will be made available to the contractor.

Should amendments to the QAPP be required, the contractor shall prepare amendments to the QAPP in accordance with Quality Assurance (QA) **Category B**. Attachment 1 to this Performance Work Statement (PWS) provides information regarding NHSRC QA Requirements/Definitions List. An amendment to the **QAPP** must be approved prior to the start of any data collection described in such amendment. Additional information related to QA requirements can be found at www.epa.gov/quality.

Task 2: Optimization of the wet vacuum process

A wetting agent is the liquid used for wetting of the coupons surface and, after the appropriate amount of processing time, is removed from the coupons surface using the wet-vacuum technique. The wetting agent for the wet-vacuum sampling using the prototype device will be isopropanol which was found under a previous EPA contract to be the best performing sampling liquid and ease-of-use since it does not include the extraction step required for the other tested wetting agents (water, and 2% Tween solution in water). Preliminary work on a previous contract on the portable carpet cleaners showed excessive evaporation of the isopropanol during sampling, resulting in negligible recovery of the wetting agent. Therefore, water was chosen as the wetting agent for these two commercial cleaners. The contractor shall verify that sufficient amounts of wetting solvent are collected for both wet vacuum devises as to allow for analysis of the targeted analytes.

Task 3: Evaluation

The contractor shall determine the overall effectiveness of two commercial devices as a function of the material type. The type and volume of the wetting solvent, and the elapsed time between the time the spraying was completed, and the time when the vacuuming is started shall be set at 10 seconds.

The contractor shall use three building materials, namely stainless steel, laminate flooring, and vinyl flooring. To ensure continuity of testing conducted under a previous contract, the contractor shall use existing supply of materials or order according to the following specifications:

Material	Description	Manufacturer/ Supplier Name
Stainless Steel	Multipurpose Stainless Steel (48" 48"), type 304, #2B mill (unpolished), 0.036" thick	McMaster-Carr
Laminate Flooring	Project Source 8.05-in W x 3.96-ft L Natural Oak Smooth Laminate Wood Planks	Clarion laminates LLC./Lowe's
Vinyl Flooring	8-ft x 12-ft Casa Grande Beige Pre-Cut Sheet Vinyl, residential grade, low gloss, stain resistant, scratch resistant, 0197" thick	Casa Grande/Lowe's Home Improvement Store

Five (5) replicate test coupons and one procedural blank coupon of each material type shall be included in each test - a total of six (6) coupons for each chemical-surface combination wet vacuum device. There shall also be associated lab blank (LB) samples.

The contractor shall create a test matrix which allows for sampling of the three identified chemicals on the three identified surfaces and sampled using two identified different wet vacuum devices. Under a previous research contract, the wet vacuum sampling of phenol in stainless steel (both wet vacuum systems) and phenol on laminate (Bissell unit only) were completed. Samples were sent to a subcontracted chemical analysis laboratory. The contractor shall not repeat these three experiments; however, results from these three experiments shall be incorporated in the data summary report (Task 4). The EPA WACOR shall provide the results of these three tests to the contractor.

Task 4: Data Summary Report

Following completion of all data collection, a brief report shall be prepared documenting the details of the tests, including methods, quality control measures utilized, collected data, interpreted results, and conclusions.

5. QUALITY ASSURANCE

QAPP amendments must be approved prior to the start of any environmental data collection identified in such amendment. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

1. The contractor shall have biweekly meetings with the EPA WAM to discuss any technical difficulties and report progress.
2. The contractor shall create amendments to the existing QAPP, if needed, as per Task 1
3. The contractor shall transmit all data related to method development and/or demonstrations prior to continuation with Task 3.
4. The contractor shall transmit all data from Tasks 2-3 prior to the end of the option period. Raw and processed data shall be provided in MS Excel spreadsheets. Contractor shall transmit this data as soon as it has been internally reviewed for quality assurance.

7. SCHEDULE of DELIVERABLES

Deliverable Schedule.

Deliverable	Due Date
Biweekly research meetings	N/A
Amendment to QAPP Final version of QAPP amendments	3 weeks after award of WA 14 days after receipt of comments to draft from EPA WAM and QA manager
Data Summary Report Wet Vacuum Sampling	February 1, 2016

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-074

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2017 Base X Option Period Number	0-074

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2017 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name Lukas Oudejans	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-2973 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Assessment of decontamination solution application methods for decontamination of surfaces contaminated with organophosphates

Abbreviated WA Title: Decon solution application methods for pesticides

WA #: 0-74 WACOR: Lukas Oudejans

Contract #: EP-C-15-008 Alternate WACOR: Paul Lemieux

NHSRC Project Number: HS 6.03.02-434

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

1. SUMMARY OF OBJECTIVES

This work will evaluate decontamination solution application methods that are being used in the field in response to e.g., the misuse or overuse of pesticides associated with the bed bug epidemic. This will be accomplished through measurement of decontamination efficacies of known efficacious decontaminants using various techniques (spray, soak, wipe, brush, etc.) on medium size surfaces. Results from this study will inform remediation specialists in the field on the best approach in cleanup of pesticides in indoor environments.

2. BACKGROUND

There has been an increase in pesticide misuse incidents for controlling bed bugs and other insects in indoor environments. These incidents include pesticide products not registered by the US EPA for indoor use or approved pesticide products that are improperly applied or at concentrations that exceed the labeled rates. The bed bug epidemic is expected to result in a growing number of incidents. EPA Regional Offices are often called on to assist local communities in remediating homes and businesses following indoor misapplications where pesticide levels may be unsafe. Currently, there are no tools to adequately evaluate pesticide residues on indoor surfaces to determine potential risk to occupants, and no effective cleaning procedures to reduce pesticide levels in affected structures. Therefore, occupants continue to inhabit contaminated buildings or are forced to vacate contaminated properties, or attempt to decontaminate them creating more toxic byproducts or further dispersing contamination. Pesticide manufacturers and the Office of Pesticide Programs offer virtually no assistance when these products are applied illegally or in unintended ways.

The goals of this project are to provide responding agencies with information to evaluate the effectiveness of cleaning approaches. This effort will build on previous efforts under EPA's Homeland Security Research Program (HSRP) that determined conditions that led to effective cleanup of building materials.

3. SCOPE

Here, the focus will be on the best approaches to decontaminate contaminated surfaces. This study will determine whether expected decontamination efficacy can be impacted by the approach to deliver the decontaminant.

4. TECHNICAL APROACH/OBJECTIVES

The overall technical direction follows approaches established under previous onsite contracts in which decontamination efficacies were determined for liquid decontaminants applied to medium sized material coupons. For each test, the effort shall include measurement of the recovery of residual pesticide amounts from the material and compared to the amount extracted from a non-decontaminated coupon to measure the efficacy of the decontaminant and application approach. Test and analytical methods shall be adopted from existing standard operating procedures (SOPs) in consultation with the EPA work assignment manager (WAM).

Task 1 Preparation of the Quality Assurance Project Plan (QAPP)

The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) Category B (formerly Category 3 or 4). Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List.

QAPPs being developed for Category A (formerly Category 1 or 2) projects shall be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category B (formerly Category 3) QAPP can be developed based on the R5 guidance or a project-specific QA requirements provided by the COR as Attachment 2 (optional).

The QAPP must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Task 2 Method Demonstration/Development

Method development will be required to develop or demonstrate sufficiently high extraction of targeted pesticide by wiping of coupons and demonstration that the proposed extraction procedure of the wipe can also function as a method to "quench" the decontamination reaction. All method developments and demonstrations shall be conducted using triplicate coupons and shall include appropriate blanks.

The EPA WACOR will provide information on recommended wipe material, solvent selection, and solvent volume added to wipe, and further extraction procedures to facilitate the method demonstration.

Task 3 Decontamination Testing

The Contractor shall construct a test matrix for the surface decontamination testing. Each test point shall consist of at least three (3) replicates of the test coupons (contaminated and decontaminated), three (3) replicates of the positive controls (contaminated but not

decontaminated), and one (1) procedural blank (not contaminated but decontaminated). Each test condition shall also include a laboratory blank for each material on the day of testing.

The contractor shall anticipate to evaluate up to five different delivery approaches to deliver up to two decontaminants to up to three indoor material surface types that are contaminated with up to three pesticides. Delivery approaches may consist of spraying of the product, wiping of the product, scrubbing and combinations thereof. The contractor shall expect to recover residual pesticides both shortly after completion of the minimum decontamination solution contact time and after an overnight contact of the decontaminant with the surface.

Information on the pesticides, surface materials, and application approaches will be provided by the WACOR prior to the development of the QAPP.

The contractor shall consider analysis by an external accredit laboratory should in house analytical capabilities not be available.

Task 4 Test Report

The contractor shall prepare a full evaluation report (a draft version for EPA WAM review followed by a revised draft for EPA peer and QA review; and a final version) which shall include a summary of findings, test conditions, methods, quality assurance, and results of the tests conducted per the requirements of this SOW. The report shall conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPN 800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

5. QUALITY ASSURANCE

The QAPP must be approved prior to the start of any environmental data collection. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

1. The contractor shall create a draft and final QAPP as per Task 1
2. The contractor shall transmit all data from Tasks 2-3 prior to the end of the option period. Raw and processed data shall be provided in MS Excel spreadsheets. Contractor shall transmit this data as soon as it has been internally reviewed for quality assurance.
3. The contractor shall create a draft final report, revise this report based on peer and QA review, and finalize as a full evaluation report as per Task 4 description.
4. On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, cumulative financial expenditures and cost and schedule variance.

5. SCHEDULE of DELIVERABLES

Deliverable	*Schedule*

QAPP Draft – Task 1	21 business days after award
QAPP Final – Task 1	2 weeks after receipt EPA QA comments
Draft Test Report – Task 4	March 1, 2016
Final Test Report	March 31, 2016

To the Statement of Work
NHSRC QA Requirements/Definitions List

EPA=s Quality System Website: http://www.epa.gov/quality
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html
EPA's Quality System Website: http://www.epa.gov/quality/qs-docs/r5-final.pdf

In accordance with EPA CIO 2105.0 (Order), EPA 2105-P-01-0 (Manual), and conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All Quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approve the quality documentation. The Quality Assurance Project Plan (QAPP) shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

NHSRC's Quality System Specifications for Extramural Actions –

These requirements typically pertain to single project efforts. The five specifications are:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

NHSRC QA Requirements/Definitions List

Category Level Designations (determines the level of QA required):

- ☐ **Category 1 Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP: QAPP** requirements for the specific project type (see below).

- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP. QAPP** requirements for the specific project type (see below).

Project Types:

These outlines of NHSRC's QAPP Requirements for various project types, from Appendix B of the NHSRC QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario and QAPP's must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

- ☐ **Applied Research Project** - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Applied Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Basic Research Project** - pertains to a study performed to generate data used to evaluate unproven theories, processes, or technologies. These studies are often bench-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Basic Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Design, Construction, and/or Operation of Environmental Technology Project** - pertains to environmental technology designed, constructed and/or operated by and/or for EPA. The QAPP shall address requirements in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/QS-docs/g11-final-05.pdf. For additional information, you may refer to Part C of "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology," ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995.

- ☐ **Geospatial Data Quality Assurance Project** - pertains to data collection; data processing and analysis; and data validation of geospatial applications. The QAPP shall address requirements in the EPA Quality System document "Guidance for Geospatial Data Quality Assurance Project Plans" G-5S at http://www.epa.gov/quality/QS-docs/g5g-final-05.pdf.

- ☐ **Method Development Project** - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. The QAPP shall address all requirements listed in "QAPP Requirements for Method Development Projects" from Appendix B of the NHSRC QMP.

- ☐ **Model Development Project** - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. The QAPP shall address requirements in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M at http://www.epa.gov/quality/QS-docs/g5m-final.pdf.

- ☐ **Sampling and Analysis Project** - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. The QAPP shall address all requirements listed in "QAPP Requirements for Sampling and Analysis Projects" from Appendix B of the NHSRC QMP.

- **Secondary Data Project** - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. The QAPP shall address all requirements listed in "QAPP Requirements for Secondary Data Projects" from Appendix B of the NHSRC QMP.

- **Software Development and Data Management Project** - pertains to software development, software/hardware systems development, database design and maintenance, data validation and verification systems. The QAPP shall address all requirements listed in "QAPP Requirements for Software Development Projects" from Appendix B of the NHSRC QMP.

Definitions:

Environmental Data - These are any measurement or information that describe environmental processes, location, or conditions; ecological or health effects directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or literature.

Incremental Funding - Incremental funding is partial funding, no new work.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, which are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NHSRC QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r2-final.pdf.

R-5. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r5-final.pdf.

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

Technical Lead Person (TLP) - This person is technically responsible for the project. For extramural contract work, the TLP is typically the contracting officer's representative (COR). For intramural work, the TLP is typically the Principal Investigator.

Abbreviations:

COR	Contracting Officer's Representative
NHSRC	National Homeland Security Research Center
NRMRL	National Risk Management Research Laboratory
QA ID	Quality Assurance Identification
QAPP	Quality Assurance Project Plan
QS	Quality System
TLP	Technical Lead Person
IAG	Interagency Agreement
QA	Quality Assurance
QAM	Quality Assurance Manager
QMP	Quality Management Plan
SOW	Statement of Work
CRADA	Cooperative Research & Development Agreement

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-076

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Shannon Serre
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-3817
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

STATEMENT OF WORK

Material Compatibility for Historic Items Decontaminated with Gamma Irradiation

HS.6.03.03
WA 0-76
(APPCD ON-SITE CONTRACT EP-C-15-008)

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

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TITLE
Material Compatibility for Historic Items Decontaminated with Gamma Irradiation.

I. PERIOD OF PERFORMANCE
The period of performance for the work under this work assignment shall be from 8/1/15 through 3/31/16.

II. SUMMARY OF OBJECTIVES
Decontamination technologies that have been shown to be successful against biological or chemical agents shall be investigated for incompatibilities with irreplaceable objects such as art work or important paper documents. The proposed investigation will use gamma irradiation to examine the effect on coupons of art work and other materials.

III. RELEVANCE
Gamma irradiation is one option that could be used to inactivate biological spores on an item of historical significance. There are currently no experimental data which can be used to predict the effects of gamma irradiation on irreplaceable high-value objects, such as works of art from the 18th and 19th century. This project will examine the effect of gamma irradiation on high-value items as found in museums and art galleries.

V. BACKGROUND
Homeland Security Presidential Directive (HSPD) 10, directs the U.S. Environmental Protection Agency (EPA), to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the EPA in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological agent release.

EPA's National Homeland Security Research Center (NHSRC) provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. NHSRC's Decontamination and Consequence Management Division (DCMD)'s decontamination research program's goal is to provides expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination events.

Gamma irradiation is one option that could be used to inactivate biological spores on an item of historical significance. There are currently no experimental data which can be used to predict the effects of gamma irradiation on irreplaceable high-value objects, such as works of art from the 18th and 19th century. This project will examine the effect of gamma irradiation on high-value items as found in museums and art galleries.

VI. SCOPE
The purpose of this study is to determine the impact of gamma irradiation on coupons of art work and other representative materials.

VII. TECHNICAL APPROACH
Materials have been exposed to gamma irradiation by the EPA and these items must be monitored over the course of a year for any aesthetic deterioration. The contractor shall provide analysis of these materials using a QAPP which has been developed by the EPA. The contractor shall provide all data to the EPA WAM within one week after completing diagnostic analysis. All coupons shall be evaluated per the appropriate protocol (as documented in the approved QAPP) monthly for a period of 5 months following the treatment date.

The contractor shall perform material compatibility testing on each material found in the target set before and after being subjected to gamma irradiation. The contractor shall evaluate the materials to determine if the sterilization technology damaged the material. The assessment of the impact of sterilization shall include, but not be limited to, visual inspection for aesthetic effects, discoloration, fading, and any odor

emissions. To the extent feasible and available, standardized test and observation methods shall be used. Any alteration in appearance and aesthetics of the material shall be recorded. Inspections of materials shall be documented in writing and by photographs and shall take place at two time points spaced five months apart.

VIII. AFFORDABILITY

This effort is labor intensive, which is where the bulk of the funding is required.

IX. TECHNICAL RISK

The technical risk involved in this project is minimal. The ultimate goal is to determine the effect of gamma irradiation on material coupons and record the effects.

X. FACILITIES AND MATERIALS

All experimental efforts shall be performed by the contractor at the U.S. EPA's Decontamination Technologies Research Laboratory (DTRL) located on the U.S. EPA campus in Research Triangle Park, NC.

XI. TASKS

The work to complete the tasks listed below shall be conducted in the NHSRC/DCMD's Decontamination Technologies Research Laboratories (DTRL) located on EPA's Research Triangle Park, NC campus. The deliverable dates and availability of vendor-supplied equipment shall be used by the contractor work assignment leader (WAL), in consultation with the EPA WAM, to determine the testing schedules.

These test materials for this project shall be representative of irreplaceable objects and works of art found in museums. These materials include old books, oil paintings, or test strips with coloring which are representative of a historic oil painting. The materials shall be prepared as small coupons which shall be subjected to gamma irradiation. This work shall follow a QAPP that was developed by EPA, titled "Material Effects of Fumigants on Irreplaceable Objects." An amendment to this QAPP includes the testing with gamma irradiation. The QAPP and amendment will be provided to the contractor.

The contractor shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this work assignment (see Attachment #1 to the SOW) and the NHSRC QA requirement as defined in Attachment #2 to the SOW. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

The following tasks are defined as part of this work assignment:

Task 1 – Preparation of Work Assignment Work Plan

A detailed Work Plan is due 20 calendar days after receipt of the approved Work Assignment. Content shall be in accordance with terms and conditions of the contract.

Task 2 – Material Effects Assessment

The contractor shall perform material compatibility testing on each coupon found in the target set before and after being subjected to gamma irradiation. The contractor shall evaluate the materials to determine if the irradiation caused any damage to the material. The assessment of the impact of irradiation shall include, but not be limited to, visual inspection for aesthetic effects, discoloration, and fading. To the extent feasible and available, standardized test and observation methods shall be used. Any alteration in appearance and aesthetics of the material shall be noted and recorded. Inspections of materials shall be documented in writing and by photographs and shall take place at two time points spaced five months apart.

All data collected per the QAPP shall be submitted to the EPA WAM within one week after the completion of the analysis. Submission shall be via posting on the NHSRC share drive. This shall include copies of log books and all relevant electronic files.

Task 3 – Report on Material Effects Assessment
The contractor shall submit a draft report on the compilation of results from the effects of gamma irradiation by 1/30/16. The report shall include photographic and graphical documentation, where appropriate, to support the findings. The report shall be provided in both hardcopy and electronic (MS Word) format.

XII. DELIVERABLE SCHEDULE

- On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, quarterly and cumulative financial expenditures and cost and schedule variance.
- A draft report shall be delivered to the EPA WAM by 1/30/16.

Table 2: Deliverable Schedule

Deliverable	Date
Data summaries	Monthly by the last working day in the month
Draft Report	1/30/16

XIII. REPORTING REQUIREMENTS

- The contractor shall prepare Quality Control data reports of all facility-specific data. Each Quality Control report shall be in a format suitable for EPA/NHSRC publication and shall discuss how well various measurements described in the QA plan were met.
- The awardee shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action. The contractor shall prepare a QAPP in accordance with the R-2 and R-5 and/or the attachments provided with the SOW. The QAPP must be approved prior to the start of any work. Additional information related to the QA requirements can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf.
- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-077

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Shannon Serre
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3817
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

To the Statement of Work
NHSRC QA Requirements/Definitions List

EPA=s Quality System Website: http://www.epa.gov/quality
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html
EPA's Quality System Website: http://www.epa.gov/quality/qs-docs/r5-final.pdf

In accordance with EPA CIO 2105.0 (Order), EPA 2105-P-01-0 (Manual), and conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All Quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approve the quality documentation. The Quality Assurance Project Plan (QAPP) shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

NHSRC's Quality System Specifications for Extramural Actions –

These requirements typically pertain to single project efforts. The five specifications are:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

Category Level Designations (determines the level of QA required):

- ☐ **Category 1 Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP: QAPP** requirements for the specific project type (see below).

- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP. QAPP** requirements for the specific project type (see below).

Project Types:

These outlines of NHSRC's QAPP Requirements for various project types, from Appendix B of the NHSRC QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario and QAPP's must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

- ☐ **Applied Research Project** - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Applied Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Basic Research Project** - pertains to a study performed to generate data used to evaluate unproven theories, processes, or technologies. These studies are often bench-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Basic Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Design, Construction, and/or Operation of Environmental Technology Project** - pertains to environmental technology designed, constructed and/or operated by and/or for EPA. The QAPP shall address requirements in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/QS-docs/g11-final-05.pdf. For additional information, you may refer to Part C of "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology," ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995.

- ☐ **Geospatial Data Quality Assurance Project** - pertains to data collection; data processing and analysis; and data validation of geospatial applications. The QAPP shall address requirements in the EPA Quality System document "Guidance for Geospatial Data Quality Assurance Project Plans" G-5S at http://www.epa.gov/quality/QS-docs/g5g-final-05.pdf.

- ☐ **Method Development Project** - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. The QAPP shall address all requirements listed in "QAPP Requirements for Method Development Projects" from Appendix B of the NHSRC QMP.

- ☐ **Model Development Project** - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. The QAPP shall address requirements in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M at http://www.epa.gov/quality/QS-docs/g5m-final.pdf.

- ☐ **Sampling and Analysis Project** - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. The QAPP shall address all requirements listed in "QAPP Requirements for Sampling and Analysis Projects" from Appendix B of the NHSRC QMP.

- **Secondary Data Project** - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. The QAPP shall address all requirements listed in "QAPP Requirements for Secondary Data Projects" from Appendix B of the NHSRC QMP.

- **Software Development and Data Management Project** - pertains to software development, software/hardware systems development, database design and maintenance, data validation and verification systems. The QAPP shall address all requirements listed in "QAPP Requirements for Software Development Projects" from Appendix B of the NHSRC QMP.

Definitions:

Environmental Data - These are any measurement or information that describe environmental processes, location, or conditions; ecological or health effects directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or literature.

Incremental Funding - Incremental funding is partial funding, no new work.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, which are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NHSRC QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r2-final.pdf.

R-5. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r5-final.pdf.

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

Technical Lead Person (TLP) - This person is technically responsible for the project. For extramural contract work, the TLP is typically the contracting officer's representative (COR). For intramural work, the TLP is typically the Principal Investigator.

Abbreviations:

COR	Contracting Officer's Representative	IAG	Interagency Agreement
NHSRC	National Homeland Security Research Center	QA	Quality Assurance
NRMRL	National Risk Management Research Laboratory	QAM	Quality Assurance Manager
QA ID	Quality Assurance Identification	QMP	Quality Management Plan
QAPP	Quality Assurance Project Plan	SOW	Statement of Work
QS	Quality System	CRADA	Cooperative Research & Development Agreement
TLP	Technical Lead Person		

PERFORMANCE WORK STATEMENT (PWS)

Cary Test House Low-Concentration Hydrogen Peroxide Vapor Decontamination Tests

OEM CBRN CMAD
APPCD ON-SITE CONTRACT EP-C-15-08

I. PERIOD OF PERFORMANCE

The period of performance for this work assignment (WA) shall be from April 1, 2015 to March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work will involve evaluating the sporicidal efficacy of low-concentration hydrogen peroxide vapor (Low-C HP) utilizing a house, the Cary Test House. Low-C HP will be generated in the Cary House using room or house vaporizers or humidifiers. The number, size, placement, and run times of the vaporizers will be the parameters of interest. Tests will be conducted utilizing bacterial spores, the dependent variables (such as *Bacillus atrophaeus* or *Geobacillus stearothermophilus,* surrogates for *Bacillus anthracis*) placed on coupons and those coupons placed into the Cary House. A report shall be drafted of the methods and results.

III. BACKGROUND

Work will build upon (but not duplicate) similar tests conducted in the COMMANDER. Hydrogen peroxide vapor will be disseminated through the use of either off-the-shelf room or house vaporizers or humidifiers.

IV. TECHNICAL APPROACH

In the Cary House, decontamination efficacy will be determined based on inactivation of bacterial spores disseminated on coupons and those coupons placed throughout the Cary House. This work assignment covers only the efforts related to conducting the decontamination tests. All microbiological preparation and analyses work will be conducted by the on-site Biolab under a separate work assignment on this same contract.

V. AFFORDABILITY

This effort is labor/time intensive, which is where the bulk of the funding is required. Normal expendable laboratory items are also required for this project.

VI. FACILITIES AND MATERIALS

All tasks described in this PWS shall be performed in-house, at the rented Cary House facilities at McDonald Woods, Cary, NC.

VII. TASKS

No work conducted under this WA shall duplicate work conducted under previous work assignments, unless directed by the WA manager (WAM), and in order to troubleshoot problems from previous work and to assess repeatability (precision) of the data gathered previously. All

microbiological preparation and analyses work will be conducted by the on-site Biolab under is work assignment.

The Contractor shall perform the following tasks:

1. Prepare a quality assurance project plan (QAPP), which shall cover the experiments as described in Task 2 of this PWS. To the extent feasible, the QAPP shall be consistent with and based upon existing QATPs, developed under other similar work assignments from previous or current APPCD contracts.

2. Conduct microbiological tasks including the inoculation of coupons, analyze coupons, etc. Estimated at 100 sample coupons per run, for a total of 500 coupons.

3. Conduct up to five tests in the Cary House utilizing Low-C HP. Tests will determine the log reduction in viable bacterial spores on coupons placed in the Cary House. Subtasks for conducting tests shall include the following:

    - Maintain security of house?
    - Prepare house, set up vaporizers, monitor HP concentration in air
    - Place coupons in house, collect coupons after test,

4. Provide general support for maintaining the field equipment and collecting data such as HP air monitoring, temperature, and relative humidity inside and out of the test house; and weather parameters such as wind velocities and precipitation. This support shall include assembly, maintenance, troubleshooting, and configuration for any equipment used for testing. Support shall also include the purchase of any expendable materials, with prior approval from the WAM, for use in this project.

5. Report the results of all tests, including data received from the Biolab (work conducted under the Biolab WA, in support of this WA) to the WAM as soon as possible via email and through other agreed upon means. The WAM shall be notified immediately of any problems encountered with field equipment, the Cary Test House, or in the laboratory or with the results obtained. These data shall include any generated data files (i.e., logged data) properly annotated, reports of the experimental conditions, calibration checks, measured variables, and a listing of the samples awaiting further analysis.

6. Analyze the data per the requirements in the QATP and in consultation with the WAM, and report the results of these analyses as soon as possible via email and through other agreed upon means. The expected data analyses would be in the form of Excel spreadsheets or other appropriate software.

7. Meet with the WAM at least every week to provide a project status update. The update shall include a synopsis of activities taking place the past week, problems encountered, and work planned for the next week.

8. Update the health and safety research protocols, as needed, as required by the EPA Facility and APPCD safety personnel. Updates to these protocols shall be approved by the EPA WAM and safety personnel prior to the commencement of any testing. The contractor shall provide a copy of the health and safety plan to the WAM and the ORD-Safety Office for discussion.

9. Prepare monthly reports to EPA that summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

VIII. DELIVERABLE SCHEDULE

The following table outlines the expected schedule that the contractor shall meet for the period covered by this PWS. The schedule assumes a start date of May 1, 2015. Dates dependent upon completion of specific tasks shall be updated based on discussions between the contractor WAL and EPA WAM during the development of the test plans to cover the work specified herein.

Suggested Deliverable Schedule

Deliverable	**Completion Date**
Submit work assignment plan	5/15/15
Submit first draft of test/QA Project Plan	5/21/15
Revise test/QA Plan amendment per WAM comments	2 weeks after comments received
Submit draft report	9/31/15
Submit final report based on comments from WAM	2 weeks after comments received

IX. REPORTING REQUIREMENTS

- The Contractor shall prepare a brief memorandum to the WAM which discusses how well various measurements described in the QA plan were met.

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.

- All data and analyses worksheets generated as discussed in Section VII shall be provided in electronic format in Excel and/or other appropriate software, in consultation with the WAM.

X. QUALITY ASSURANCE

The awardee shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action, see attachment #1 and #2. The contractor shall prepare a QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the type of research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided at www.epa.gov/guality. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Note: Leroy Mickelsen and Shannon Serre will be the WAMs for this work.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-079

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lukas Oudejans	Branch/Mail Code:
(Signature) (Date)	Phone Number 919-541-2973
	FAX Number:
Project Officer Name Kevin Sudderth	Branch/Mail Code:
(Signature) (Date)	Phone Number: 919-541-3670
	FAX Number:
Other Agency Official Name	Branch/Mail Code:
(Signature) (Date)	Phone Number:
	FAX Number:
Contracting Official Name Mark Cranley	Branch/Mail Code:
(Signature) (Date)	Phone Number: 513-487-2351
	FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Chlorine dioxide fumigation of subway materials

WA #: 0-79 WACOR: Lukas Oudejans

Contract #: EP-C-15-008 Alternate WACOR: Joe Wood

NHSRC Project Number: HS 6.02.01-0016

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

1. SUMMARY OF OBJECTIVES

This work will evaluate the impact of dirt and grime, as present on subway related materials, have on the efficiency of chlorine dioxide (ClO2) fumigation technology against B. anthracis (surrogate) spores. This WA will interpret enumerated viable spores results from fumigation tests conducted under a different contract and combine them with results to be obtained from biological samples that were collected as part of the fumigation testing but have not been analyzed under the same aforementioned contract. This WA will not include additional experimental research.

2. BACKGROUND

In the event of a chemical/biological incident in a transportation hub like a subway system, remediation may require the use of volumetric decontamination approaches such as fumigation as an effective decontamination method. Previous (NHSRC) studies have shown that fumigants like chlorine dioxide and hydrogen peroxide vapors can be highly efficacious if applied under the specific environmental (temperature and relative humidity) conditions. It is, however, unclear what the impact is on the efficacy of dirt and grime on these realistic building materials. Such presence may result in change in sporicidal activity of the fumigant and may require changes in operational fumigation conditions ("material demand") to reach remediation goals.

3. SCOPE

This WA will use results from previous research efforts and combine them into a data report in which enumerated results are transferred into actual colony forming units (CFUs) per coupon. The EPA WAM will provide access to the raw enumeration data for processing.

4. TECHNICAL APROACH/OBJECTIVES

The contractor shall perform the following tasks as part of this work assignment. All microbiological analyses will be covered under the concurrent onsite Biolab work assignment on this contract.

Task 1: Preparation of the Quality Assurance Project Plan (QAPP)

The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) **Category 3**. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List.

A Category 1 or 2 QAPP must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category 3 QAPP can be either based on the R5 guidance or a project-specific QA requirements provided on the NHSRC@work website. *The appropriate project-specific QA requirement information must be provided by the COR as Attachment 2.*

The **QAPP** must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Task 2. Data Gathering, Processing and Test Report Writing

The contractor shall prepare a full evaluation report (a draft version for EPA WAM review followed by a final version for EPA peer and QA review to be handled by the EPA WAM) related to the chlorine dioxide fumigation of subway material coupons as conducted under a different contract. The EPA WAM will provide access to the data sheets and data report as a starting point of writing of this evaluation report. This report shall include the test conditions, methods, quality assurance, and results of the tests conducted per the requirements of this SOW. The report shall conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPN 800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

5. QUALITY ASSURANCE

The QAPP must be approved prior to the start of any environmental data collection. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

1. The contractor shall create a draft and final QAPP as per Task 1.

2. The contractor shall deliver a draft and final report version of the evaluation report as per Task 2.

3. On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, cumulative financial expenditures and cost and schedule variance.

7. SCHEDULE of DELIVERABLES

Deliverable	***Schedule***
QAPP Draft– Task 1	15 business days after award
QAPP Final	2 weeks after receipt EPA QA comments
Draft Test Report – Task 2	August 28, 2015
Final Report – two weeks after receipt of EPA WAM comments	2 weeks after receipt of EPA WAM comments

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-079

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lukas Oudejans	(Signature)	(Date)	Branch/Mail Code:
			Phone Number 919-541-2973
			FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code:
			Phone Number: 919-541-3670
			FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code:
			Phone Number:
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Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code:
			Phone Number: 513-487-2351
			FAX Number: 513-487-2109

Performance Statement of Work

Amendment 1

WA Title: Chlorine dioxide fumigation of subway materials

WA #: 0-79

WACOR: Lukas Oudejans

Contract #: EP-C-15-008

Alternate WACOR: Joe Wood

NHSRC Project Number: HS 6.02.01-0016

Changes to PWS are highlighted in yellow

PERIOD OF PERFORMANCE

No change.

1. SUMMARY OF OBJECTIVES

This work will evaluate the impact of dirt and grime, as present on subway related materials, have on the efficiency of chlorine dioxide (ClO2) fumigation technology against B. anthracis (surrogate) spores. This WA will interpret enumerated viable spores results from fumigation tests conducted under a different contract and combine them with results to be obtained from biological samples that were collected as part of the fumigation testing but have not been analyzed under the same aforementioned contract. ~~This WA will not include additional experimental research.~~ This WA amendment will investigate the combination of pre wetting of surfaces followed by chlorine dioxide fumigation at otherwise low relative humidity.

2. BACKGROUND

No change.

3. SCOPE

This WA will use results from previous research efforts and combine them into a data report in which enumerated results are transferred into actual colony forming units (CFUs) per coupon. The EPA WAM will provide access to the raw enumeration data for processing. Research data acquired through this amendment to the PWS will be reported as a data report at the conclusion of this study.

4. TECHNICAL APROACH/OBJECTIVES

The contractor shall perform the following tasks as part of this work assignment. All microbiological analyses will be covered under the concurrent onsite Biolab work assignment on this contract.

Task 1: Preparation of the Quality Assurance Project Plan (QAPP)

No change

Task 2. Data Gathering, Processing and Test Report Writing

The contractor shall prepare a full evaluation report (a draft version for EPA WAM review followed by a final version for EPA peer and QA review to be handled by the EPA WAM) related to the chlorine dioxide fumigation of subway material coupons as conducted under a different contract. The EPA WAM will provide access to the data sheets and data report as a starting point of writing of this evaluation report. This report shall include the test conditions, methods, quality assurance, and results of the tests conducted per the requirements of this SOW. The report shall conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPN 800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

NEW Task 3. Chlorine Dioxide Fumigation of Wetted Surfaces

Task 3.1:

The contractor shall prepare an amendment to an existing QAPP in accordance with Quality Assurance (QA) **Category B**. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List.

The QAPP amendment must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Task 3.2: Fumigation tests

The contractor shall conduct decontamination tests with pre wetted building material surfaces using chlorine dioxide gas fumigation under conditions that are otherwise known to be less efficacious against *bacillus anthracis* surrogate spores. The contractor shall construct a test matrix that will investigate the impact of a pre-wetted surface on the chlorine dioxide decontamination efficacy. The contractor shall anticipate to

conduct up to 4 fumigation tests of less than 12 hr length. Specific fumigation test conditions will be provided by the EPA WACOR.

Task 3.3

The contractor shall support the placement of novel low cost chlorine dioxide sensors within the modified glovebox for one of the chlorine dioxide fumigation tests. The contractor shall also support similar efforts for two other fumigation technologies to be tested within the same time period using two different chambers. This support shall include the placement of sensors in a hydrogen peroxide vapor and bleach fogging environment.

Task 3.4: Report

The contractor shall deliver a data summary report describing results from Task 3.2.

5. QUALITY ASSURANCE

The QAPP amendment must be approved prior to the start of any environmental data collection. Additional information related to the QA requirements can be found at http://www.epa.gov/quality.

6. DELIVERABLES

No changes except:

1. The contractor shall deliver a data summary report describing tests conducted under the new Task 3.
2. The contractor shall process temperature and relative humidity data as used under Task 3.3 in real time or within one day from generation

7. SCHEDULE of DELIVERABLE for NEW TASK 3

Deliverable	*Schedule*
QAPP Amendment Draft– Task 3.1	15 business days after receipt of Amendment
QAPP Amendment Final – Task 3.1	2 weeks after receipt EPA QA comments
Data Summary report – Task 3	March 31, 2016

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-080

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

Accounting and Appropriations Data

☐ Superfund [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Joe Wood
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-5029
FAX Number: 919-541-0496

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

STATEMENT OF WORK

Feasibility Study for Capture and Regeneration of Methyl Bromide
WA 080
ON-SITE RESEARCH LABORATORY SUPPORT CONTRACT EP-C-15-08
WACOR Joseph Wood
Alt WACOR Shannon Serre

I. PERIOD OF PERFORMANCE

The period of performance for this work assignment (WA 080) shall be from August 1, 2015 to March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work will involve literature search and review, feasibility analysis, and laboratory experiments relative to the capture and regeneration of methyl bromide (MeBr) for use as a fumigant/decontaminant for anthrax spores.

III. BACKGROUND

MeBr fumigation has been shown to be effective in decontaminating buildings contaminated with *Bacillus anthracis* (Ba) spores. Further, previous lab and field tests have shown that activated carbon (AC) is effective in capturing the MeBr following fumigation. However, with this approach, the MeBr is not readily available for reuse. In the event of a large urban Ba spore release, large quantities of MeBr would be needed. The purpose of this study is to evaluate the feasibility of options that could be used to capture the MeBr following decontamination and then process it for reuse (i.e., at a high concentration, high purity) for further fumigations for decontamination.

The most likely options (based on current commercial practice) for consideration for the capture of MeBr include, but are not limited to, AC and wet scrubbing. With the AC approach, the contractor shall examine techniques to process the AC to allow for reuse of the AC, as well as technical approaches to regenerate the MeBr for use in additional fumigations. With the wet scrubbing approach, the contractor shall consider absorption liquids to capture MeBr with or without reacting with the MeBr, followed by subsequent processing steps to allow for reuse of the MeBr. Other more novel MeBr capture and recovery methods may be considered as well, such as carbon cloths; electrothermal regeneration of carbon beds or cloths (this process could also release or regenerate MeBr at potentially suitably high concentrations); operations to separate and liquefy MeBr (e.g., pressurization, cryogenic processes) or other gas constituents from the fumigation exhaust gas, such as water vapor; and membrane operations.

IV. TECHNICAL APPROACH

The contractor shall meet with the WA manager to discuss and receive literature already gathered by the project team. The contractor shall conduct its own literature search and review. The contractor shall then meet with the WAM to decide which capture and regeneration approach to assess in a small laboratory study.

V. AFFORDABILITY

This effort is labor intensive, which is where the bulk of the funding is required. Normal expendable laboratory items are also required for this project.

VI. FACILITIES AND MATERIALS

All tasks described in this SOW shall be performed in-house, at the EPA's Research Triangle Park (RTP) facilities at 109 T.W. Alexander Dr.

VII. TASKS

The Contractor shall perform the following tasks:

1. Conduct a search and review of the literature and commercial usage on the operations that could be used for the following:
    - Capture of MeBr following fumigation
    - In-situ regeneration of MeBr from the capture process so that it could be used for additional fumigations
    - If AC is used for the capture, methods to regenerate the AC in-situ

2. Provide a short report (no more than 4 pages) on the findings from Task 1. This report shall address the following criteria for each technology identified in Task 1:
    - Expected performance
    - Current use in practice
    - Expected issues
    - Costs and environmental issues

    The report shall also provide a recommendation on which technology(ies) to evaluate in the laboratory.

3. Prepare a quality assurance/test plan (QATP), which shall cover the experiments as described in Task 4 of this SOW. The QATP shall be in agreement with the requirements set forth in the Quality Assurance Requirement Form (QARF) and as delineated in "Attachment #1". To the extent feasible, the QATP shall be consistent with and based upon existing QATPs, developed under other similar work assignments from previous or current APPCD contracts.

4. Set up experimental apparatus and conduct up to 7 experiments to assess the performance of the MeBr capture and regeneration technology selected in Task 2.

5. Provide general support for maintaining the lab equipment. This support shall include assembly, maintenance, troubleshooting, and configuration support for the any equipment used for testing. Support shall also include the purchase of any expendable materials, with prior approval from the WAM, for use in this project.

6. Report the results of all tests to the WAM as soon as possible via email and through the use of the DTRL share drive. The WAM shall be notified immediately of any problems

encountered in the laboratory or with the results obtained. These data shall include any generated data files (i.e., logged data) properly annotated, reports of the experimental conditions, calibration checks, measured variables, and a listing of the samples awaiting further analysis.

7. Analyze the data per the requirements in the QATP and in consultation with the WAM, report the results of these analyses as soon as possible via email and through the use of the DTRL share drive. The expected data analyses would be in the form of Excel spreadsheets or other appropriate software.

8. Meet with the WAM at least every week to provide a project status update. The update shall include a synopsis of activities taking place the past week, problems encountered, and work planned for the next week.

9. Update the health and safety research protocols, as needed, as required by the EPA Facility and APPCD safety personnel. Updates to these protocols shall be approved by the EPA WAM and safety personnel prior to the commencement of any testing. The contractor shall provide a copy of the health and safety plan to the WAM and the ORD-Safety Office for discussion.

10. Prepare monthly reports to EPA that summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

VIII. DELIVERABLE SCHEDULE

The following table outlines the expected schedule that the contractor shall meet for the period covered by this SOW. The schedule assumes a start date of April 1, 2013. Dates dependent upon completion of specific tasks shall be updated based on discussions between the contractor WAL and EPA WAM during the development of the test plans to cover the work specified herein.

Suggested Deliverable Schedule

Deliverable	**Completion Date**
Submit work assignment plan.	8/15/15
Submit Task 2 short report	12/1/15
Submit first draft of test/QA Plan amendment	9/15/15
Revise test/QA Plan amendment per WAM comments	2 weeks after comments received
Complete Task 4 experiments	2/28/16
Complete data analysis per Task 7	3/31/16
Complete other tasks	ongoing

IX. REPORTING REQUIREMENTS

- The Contractor shall prepare a brief memorandum to the WAM which discusses how well various measurements described in the QA plan were met.

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.

- All data and analyses worksheets generated as discussed in Section VII. shall be provided in electronic format in Excel and/or other appropriate software, in consultation with the WAM.

X. QUALITY ASSURANCE

The awardee shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action, see attachment #1 and #2. The contractor shall prepare a QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the type of research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided in NHSRC's QMP. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-081

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-081 Fogging Sporicidal Li...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Joe Wood	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-5029 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

Fogging of Sporicidal Liquids
WA 081
ON-SITE RESEARCH LABORATORY SUPPORT CONTRACT EP-C-15-08
WACOR Joseph Wood
Alt WACOR Worth Calfee

I. PERIOD OF PERFORMANCE

The period of performance for this work assignment (WA 081) shall be from August 1, 2015 to March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work will assess the decontamination efficacy for the fogging of sporicidal liquids (such as pH-amended bleach, peracetic acid, others) in inactivating bacterial spores (surrogate for *Bacillus anthracis*) inoculated onto building and other types of materials.

III. BACKGROUND

The results of these tests will provide information on how effective different fogs of sporicidal liquids are in inactivating bacterial spores as a function of material, sporicidal liquid, and fogging operational parameters. This information will be useful in determining whether fogging may be an appropriate decontamination technique for certain types of materials or environments following an intentional release of *B. anthracis* spores.

The purpose of the study is to quantify the recovery of a *B. anthracis* spore surrogate from building and outdoor materials (coupons), with and without exposure to an aerosolized sporicidal liquid. Experimental variables may include, but are not limited to, the sporicidal liquid, coupon material, fog operational parameters such as the quantity fogged and contact time, and coupon location or orientation within the test chamber. The test matrix will be adjusted as testing proceeds to discover the minimum fog requirements needed for effective fog conditions, e.g., greater than six log reduction (LR) achieved on all coupons. It is anticipated that *B. atrophaeus* (aka Bg) will be the test surrogate organism, although this will be determined in consultation with the WAM during the development of the Quality Assurance Project Plan (QAPP). The materials that will be used for testing have not been selected at the writing of this Task Order, but will be selected in consultation with the WAM.

The fog tests shall be conducted in a chamber with a volume ~ 24 cubic meters, to allow for sufficient dispersal of the sporicidal aerosol. The fogger to be used in the experiments will be provided by the WAM, and is expected to be a Minncare® Mini Dry Fogger. Additional foggers may also be tested. Sufficient replicates, blanks, and positive controls shall be used, consistent with previous EPA and other peer reviewed anthrax decontamination studies and quality assurance procedures.

IV. TECHNICAL APPROACH

For each test, the effort shall include the recovery of the spore surrogate from each material before (positive control) and after each test has been completed. For each test, five replicates for

each test material and five replicates for each positive control shall be included in each experiment.

V. AFFORDABILITY

This effort is primarily labor intensive, which is where the bulk of the funding is required. Normal expendable laboratory items are also required for this project.

VI. FACILITIES AND MATERIALS

All tasks described in this SOW shall be performed in-house, at the EPA's Research Triangle Park (RTP) facilities at 109 T.W. Alexander Dr.

VII. TASKS

The Contractor shall perform the following tasks:

1. Preparation of the Quality Assurance Project Plan (QAPP). The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) Category 3. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding NHSRC QA Requirements/Definitions List. A Category 1 or 2 QAPP must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category 3 QAPP can be either based on the R5 guidance or the project-specific QA requirements provided on the NHSRC@work website. The QAPP must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

2. The contractor shall conduct testing according to the following requirements:

    A. Coupons and microbiological and related methods (e.g., spore preparation, sterilization and preparation of coupons, numbers of replicates and blanks, inoculation of spores onto coupons, recovery and quantitation of spores from coupons, characterization of efficacy, etc.) conducted under this WA shall be documented in the QAPP, and shall be consistent with those described in U.S. EPA Report: Evaluation of Chlorine Dioxide Gas and Peracetic Acid Fog for the Decontamination of a Mock Heating, Ventilation, and Air Conditioning Duct System. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-14/014, 2014; and in the article by Wood, Joseph P., et al. "Evaluation of peracetic acid fog for the inactivation of *Bacillus anthracis* spore surrogates in a large decontamination chamber." *Journal of hazardous materials* 250 (2013): 61-67. Quality control/quality assurance procedures for all microbiological related analyses and measurements shall be documented in the QAPP. It is expected that 18 mm coupons shall be used for testing and inoculated using a metered dose inhaler approach.

    B. Operation of the fogger and chamber environment shall be consistent (to the extent practicable) with the fog and chamber methods described in this journal article: Wood, Joseph P., et al. "Evaluation of peracetic acid fog for the

inactivation of *Bacillus anthracis* spore surrogates in a large decontamination chamber." *Journal of hazardous materials* 250 (2013): 61-67. All measurements related to the operation of the chamber and fogger (e.g., temperature, RH, chemical concentration, pressures, flow rates), and associated QA/QC procedures, shall be documented in the QAPP.

C. The contractor shall prepare and set up the test chamber as a mock office environment for the study, consistent with U.S. EPA Report 600/R-14/208 titled "Decontamination of a Mock Office Using Chlorine Dioxide Gas." This shall be done in consultation with the WAM, and include provisions for the measurement of, and acquisition of data for, temperature, relative humidity (RH), and fog chemical active ingredient concentration. The chamber shall include typical office objects (e.g., coupons may be placed under a table) to challenge the fog dispersal process and small fan(s) for mixing. The fogger shall be placed inside the test chamber and be supplied with a clean, oil-free compressed air source. The test chamber shall be expected to be capable of accommodating small fluctuating air flows and pressure during fogging, allow for a sufficient seal during dwell time, and then capable of sufficient aeration following the dwell time.

D. Test Matrix: The contractor shall conduct 15 fog chamber tests. Initial test conditions shall be selected in consultation with the WAM during the writing of the QAPP, and follow-on test conditions shall be selected based on results of ongoing tests. That is, in consultation with the WAM, the test matrix will be adjusted as testing proceeds to discover the minimum fog requirements needed for effective fog conditions, e.g., greater than six LR achieved on all coupons. Adjustments in fog requirements may include parameters such as sporicidal liquid quantity to be fogged, fog duration, dwell time, type of fogger, and minimum or maximum RH levels. Other experimental variables may include, but are not limited to, the sporicidal liquid, coupon material, and coupon location or orientation within the test chamber. Sporicidal liquids to be assessed initially shall include pH-amended bleach, but may also include (but not limited to) other liquid sporicides such as peracetic acid and aqueous hydrogen peroxide solutions.

E. Coupons: It is expected that 18 mm coupons shall be used for testing and inoculated using a metered dose inhaler approach, as described here: Lee, SD, et al. Development of an Aerosol Surface Inoculation Method for Bacillus Spores. Appl. Environ. Micro., 77(5):1638-1645, (2011). The selection of materials for use as coupons shall be conducted in consultation with the WAM during the writing of the QAPP. For each material, five replicate test coupons and 5 replicate positive controls shall be included in each experiment, with a sufficient number of field and laboratory blanks. These shall be prepared, inoculated with the target spore forming microorganism, and analyzed, according to the QAPP.

F. A separate set of approximately 500, 18 mm coupons shall also be inoculated using the MDI approach. These will be used for a different EPA decontamination project being conducted off-site.

G. Following inoculation of spores onto coupons, test coupons shall be placed throughout the test chamber, oriented vertically and horizontally, and may be placed underneath or behind objects in the chamber to assess adequate dispersion of the fog. Positive control coupons shall be placed in a separate small chamber and left undisturbed until completion of each experiment. Following each experiment, test coupons, blanks, and positive control coupons shall be collected and then analyzed.

H. Measurement of fog environment: Measurement and logging of data for fog and chamber environmental and operational parameters such as temperature, RH, and concentration shall be conducted for each experiment according to the QAPP.

I. Documentation of visible damage to materials as a result of fogging: The contractor shall note any visible change or damage in appearance to coupon materials at 1 and 7 days after completion of each experiment. Visible changes (i.e., comparing positive controls to test coupons) to materials shall be documented with photographs.

3. Provide general support for maintaining the lab equipment. This support shall include assembly, maintenance, troubleshooting, and configuration support for the any equipment used for testing. Support shall also include the purchase of any expendable materials, with prior approval from the WAM, for use in this project.

4. Report the results of all tests to the WAM as soon as possible via email and through the use of the DTRL share drive. The WAM shall be notified immediately of any problems encountered in the laboratory or with the results obtained. These data shall include any generated data files (i.e., logged data) properly annotated, reports of the experimental conditions, calibration checks, measured variables, and a listing of the samples awaiting further analysis.

5. Analyze the data per the requirements in the QAPP and in consultation with the WAM, report the results of these analyses as soon as possible via email and through the use of the DTRL share drive. The expected data analyses would be in the form of Excel spreadsheets or other appropriate software.

6. Meet with the WAM at least every week to provide a project status update. The update shall include a synopsis of activities taking place the past week, problems encountered, and work planned for the next week.

7. Update the health and safety research protocols, as needed, as required by the EPA Facility and APPCD safety personnel. Updates to these protocols shall be approved by the EPA WAM and safety personnel prior to the commencement of any testing. The contractor shall provide a copy of the health and safety plan to the WAM and the ORD-Safety Office for discussion.

8. Prepare monthly reports to EPA that summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and

cost are clearly indicated.

9. Prepare a draft test report. The scope of the report shall be similar to previous EPA published reports. See, for example, U.S. EPA Report 600/R-14/208, titled "Decontamination of a Mock Office Using Chlorine Dioxide Gas". In lieu of an EPA report (and in consultation with the WAM), the contractor may prepare a manuscript for submission to an appropriate scientific journal, such as the *Journal of Applied Microbiology*.

VIII. DELIVERABLE SCHEDULE

The following table outlines the expected schedule that the contractor shall meet for the period covered by this SOW. The schedule assumes a start date of April 1, 2015. Dates dependent upon completion of specific tasks shall be updated based on discussions between the contractor WAL and EPA WAM during the development of the test plans to cover the work specified herein.

Suggested Deliverable Schedule

Deliverable	**Completion Date**
Submit work assignment plan	8/15/15
Submit first draft of test/QA Plan amendment	9/1/15
Revise QA Plan per WAM comments	2 weeks after comments received
Complete Task 2 experiments	2/28/16
Complete Task 9 report	3/15/16
Complete other tasks	ongoing

IX. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.

- All data and analyses worksheets generated as discussed in Section VII. shall be provided in electronic format in Excel and/or other appropriate software, in consultation with the WAM.

X. QUALITY ASSURANCE

Additional information related to QA requirements can be found at www.epa.gov/quality.

To the Statement of Work
NHSRC QA Requirements/Definitions List

EPA=s Quality System Website: http://www.epa.gov/quality
EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html
EPA's Quality System Website: http://www.epa.gov/quality/qs-docs/r5-final.pdf

In accordance with EPA CIO 2105.0 (Order), EPA 2105-P-01-0 (Manual), and conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All Quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approve the quality documentation. The Quality Assurance Project Plan (QAPP) shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

NHSRC's Quality System Specifications for Extramural Actions –

These requirements typically pertain to single project efforts. The five specifications are:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

NHSRC QA Requirements/Definitions List

Category Level Designations (determines the level of QA required):

- ☐ **Category 1 Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP: QAPP** requirements for the specific project type (see below).

- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP. QAPP** requirements for the specific project type (see below).

Project Types:

These outlines of NHSRC's QAPP Requirements for various project types, from Appendix B of the NHSRC QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario and QAPP's must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

- ☐ **Applied Research Project** - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Applied Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Basic Research Project** - pertains to a study performed to generate data used to evaluate unproven theories, processes, or technologies. These studies are often bench-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Basic Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Design, Construction, and/or Operation of Environmental Technology Project** - pertains to environmental technology designed, constructed and/or operated by and/or for EPA. The QAPP shall address requirements in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/QS-docs/g11-final-05.pdf. For additional information, you may refer to Part C of "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology," ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995.

- ☐ **Geospatial Data Quality Assurance Project** - pertains to data collection; data processing and analysis; and data validation of geospatial applications. The QAPP shall address requirements in the EPA Quality System document "Guidance for Geospatial Data Quality Assurance Project Plans" G-5S at http://www.epa.gov/quality/QS-docs/g5g-final-05.pdf.

- ☐ **Method Development Project** - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. The QAPP shall address all requirements listed in "QAPP Requirements for Method Development Projects" from Appendix B of the NHSRC QMP.

- **Model Development Project** - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. The QAPP shall address requirements in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M at http://www.epa.gov/quality/QS-docs/g5m-final.pdf.

- **Sampling and Analysis Project** - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. The QAPP shall address all requirements listed in "QAPP Requirements for Sampling and Analysis Projects" from Appendix B of the NHSRC QMP.

- **Secondary Data Project** - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. The QAPP shall address all requirements listed in "QAPP Requirements for Secondary Data Projects" from Appendix B of the NHSRC QMP.

- **Software Development and Data Management Project** - pertains to software development, software/hardware systems development, database design and maintenance, data validation and verification systems. The QAPP shall address all requirements listed in "QAPP Requirements for Software Development Projects" from Appendix B of the NHSRC QMP.

Definitions:

Environmental Data - These are any measurement or information that describe environmental processes, location, or conditions; ecological or health effects directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or literature.

Incremental Funding - Incremental funding is partial funding, no new work.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, which are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NHSRC QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r2-final.pdf.

R-5. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001 http://www.epa.gov/quality/QS-docs/r5-final.pdf.

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

Technical Lead Person (TLP) - This person is technically responsible for the project. For extramural contract work, the TLP is typically the contracting officer's representative (COR). For intramural work, the TLP is typically the Principal Investigator.

Abbreviations:

COR	Contracting Officer's Representative		IAG	Interagency Agreement
NHSRC	National Homeland Security Research Center		QA	Quality Assurance
NRMRL	National Risk Management Research Laboratory		QAM	Quality Assurance Manager
QA ID	Quality Assurance Identification		QMP	Quality Management Plan
QAPP	Quality Assurance Project Plan		SOW	Statement of Work
QS	Quality System		CRADA	Cooperative Research & Development Agreement
TLP	Technical Lead Person		IAG	Interagency Agreement

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-082

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-082 Water Treatment... Ant..

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Russell Wiener (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-1910 FAX Number: 919-541-0496
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

WA 0-082
R. Wiener, WACOR

EP-C-15-008
M. Gray, Alt COR

Use of Water Treatments to Inhibit Resuspension of Anthrax Sports.

(A) *Goal/Purpose:* The goal of this work is to compare and characterize the resuspension of bacterial spores off of outdoor surfaces that have and have not been treated to suppress reaerosolization. This task will support the goals of the SPORE Program.

(B) *Background Information:* In the event of a release of biological material in an urban area that would require decontamination for the purpose of public safety, the potential of resuspension of said materials is of great interest to EPA and the Department of Homeland Security. In such an event, a wide range of surfaces would be contaminated. The Environmental Protection Agency (EPA) has the responsibility for protecting human health and the environment from secondary emission of materials from these areas. EPA may be required to mitigate, provide consequence management, and decontaminate the area of concern. To this end, the EPA Office of Research and Development (ORD) National Homeland Security Research Center (NHSRC), Decontamination and Consequence Management Division (DCMD) is conducting research to investigate the resuspension of surrogate spores in the Aerosol Test Facility (ATF).

Long-Term Goal 2: The Office of Solid Waste and Emergency Response and other clients use Homeland Security Research Program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environment and APG (41) - The Homeland Security Research Program will deliver reports and databases with information on the movement and the health effects of contaminants form the basis of the need for this work.. The information is instrumental for containing contamination and mitigating health effects. Determination of the bacterial spore (Anthrax spore surrogates) resuspension efficiency is necessary based on the historic release of Anthrax by terrorists in the US and the lack of data demonstrating the ability of spores to resuspend in quantities of public health concern. The purpose of this Work Assignment is to help determine an appropriate simulant spore for Bacillus anthracis as well as determine the effectiveness of reaerosolization suppression methodologies related to support field decontamination programs. The U.S. Environmental Protection Agency (EPA)/National Homeland Security Research Center (NHSRC) will support this work Statement of Work (SOW).

Work will be conducted at EPA. Information obtained during this work will inform the following issues:

- understand the impact of wetting on resuspension
- make a quantitative comparison between wet and dry surfaces

(C) *Statement of Work/Tasks:* The Contractor shall:

A series of reports have be produced by EPA on prior studies quantitate the resuspension of spores and other surrogates from common outdoor surfaces. A set of laboratory experiments has been completed studying the degree of resuspension of bar-coded BtK spores under a variety of test conditions. EPA wishes to continue and expand these experiments to characterize the effect of wetting and high relative humidity on the level of applied resuspension forces to the surface needed to remove the spores. The methodologies to apply the spores and the data set for the forces required to resuspend spores from the test surfaces will be provided by EPA upon request. The specific coupon types selected will be based on the results of the previous work done for EPA and will also be provided upon request. All prior reports and documentation for prior studies conducted for EPA will be made available to the contractor upon request.

Microbiological organisms, supplies, and analyses shall be conducted under a separate WA. Under the current WA, the contractor shall notify the EPA WAM of all microbiological tasks required for the completion of this work assignment as part of the Work Plan development process. Samples will be

delivered within the amount of time specified in the QAPP. The referenced documents attached below, available through the COR, will be utilized for biological sampling, quality assurance.

The Contractor shall provide a new table of deliverables and a timeline for the work to be performed within 30 days of the initiation of this Work Assignment.

Task 1: Validation of an inert test particle:

The Contractor shall conduct laboratory experiments to compare the degree of resuspension of an inert aerosol (fluorescent died PSL) under a subset of test conditions that have been conducted and reported on in past experiments by EPA. The report elucidating these experiment shall be available to the contractor from EPA upon request. The test design should be utilized to limit the number of test points needed for characterization and comparison to the results currently available on Btk spores. These tests shall be performed by the Contractor in the ATF in RTP, NC.

Date of Completion: March 31, 2016.

Task 2: The impact of coupon wetting on spore resupension:

The Contractor shall use barcoded Btk as the surrogate for Ba reaerosolization utilizing the methodology developed in in prior experiments conducted for EPA. The effect of coupon wetting shall be studied. The Contractor shall determine that the coupons are fully saturated and have a known amount of free water on them. The water shall be applied after depositing the test aerosol on the coupon in the same manner as used in prior experiments conducted for EPA. A subset of the coupon types utilized in in prior experiments conducted for EPA shall be tested. The specific coupon types selected will be based on the results of the previous in prior experiments conducted for EPA and the determination of significant differences between coupon types on reaerosolization. All documentation regarding prior experimental work is available upon request from EPA.

Date of Completion: March 31, 2016.

Task 3: Data Analysis and Final Reporting:

The Contractor shall build upon prior reporting to further the interpretation of the test study results and provide a non-dimensional analysis (similitude analysis). The contractor shall provide statistical analysis of the data utilizing methods such as Anova and PCA to determine the key test parameters impacting spore resuspension.

Date of completion March 31, 2016.

Task 4: Statistical Analysis and Technical Editing: If time and funding permit the Contractor shall interpret study results from prior and concurrent work conducted by NHSRC and utilize this information and data to determine (and where necessary test) new hypotheses relevant to study results. The contractor shall provide all necessary statistical and technical editing support for NHSRC projects.

Date of completion March 31, 2016.

The Contractor shall prepare monthly reports to EPA that will summarize the work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The QAPP produced for prior studies by EPA may be utilized as a basis for the QAPP for this work assignment if applicable. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

(D) *Deliverables and Project Schedule, Acceptance Criteria:*

- Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WACOR within 30 days of the Contracting Officer's signature. A Quality Assurance Project Plan (QAPP) shall be provided within 90 days. The Contractor shall develop a QAPP following the EPA Gudiance for Quality Assurance Project Plans and Modeling (QA/G-5M) and Guidance for Quality Assurance Project Plans (QA/G-5) which can be found at http://www.epa.gov/quality/qa_docs.html. 2. A final report shall be provide to the WACOR on or before March 31, 2016.

(E) *QA/QC Requirements for WA:* Calibrations of scientific instruments shall be performed under existing Standard Operating Procedures. Standard "good laboratory practices" for maintaining notebooks shall be employed.

(F) *Special Requirements:* The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the additions to the research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided in NHSRC's QMP. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

(G) *Reports and Meetings:*

Need	Meeting Purpose	Frequency
X	to discuss workplan	Once
X	to review data or analyses	Weekly
X	to review monthly cost report	Monthly

(H) *Travel/Training Requirements*: Travel ☒ is ☐ is not anticipated to be charged under this work assignment. If travel is anticipated, the dates and circumstances necessitating travel chargeable to this work assignment will be specified by Technical Directive. Travel will be reviewed and approved by the WACOR. Requests for travel shall include: (1) name of traveler(s) and job duties, (2) description of circumstances necessitating travel, (3) location of travel, and (4) estimated cost breakdown by categories

(I) *Management Controls*: See Contract Management Controls.

(J) *Staffing Requirements*:

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-083

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008	Contract Period: 04/01/2015 To 03/31/2016 Base X Option Period Number	Title of Work Assignment/SF Site Name: 0-083 Foam-based Decon....
Contractor: JACOBS TECHNOLOGY INC.	Specify Section and paragraph of Contract SOW: 2	

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Worth Calfee (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-7600 FAX Number: 919-541-0496
Project Officer Name: Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

STATEMENT OF WORK

EVALUATION OF FOAM-BASED DECONTAMINANTS

PROJECT# HS6.02.01 - 131
EP-C-15-008
WORK ASSIGNMENT 0-83

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HOMELAND SECURITY RESEARCH CENTER
DECONTAMINATION AND CONSEQUENCE MANAGEMENT DIVISION

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TITLE
Evaluation of Foam-Based Decontaminants

I. PERIOD OF PERFORMANCE

The period of performance for the work under this work assignment shall be August 1, 2015 through March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work shall be conducted to compare fundamental aspects (efficacy, wetting time, etc.) of spray-based sporicidal decontaminants when applied as a liquid versus a foam.

III. RELEVANCE

This project supports the mission of the Decontamination and Consequence Management Division (DCMD) within the U.S. Environmental Protection Agency's (U.S. EPA) National Homeland Security Research Center (NHSRC) by providing relevant information pertinent to the decontamination of contaminated areas resulting from an act of terrorism. The project supports the EPA's Homeland Security Research Program (HSRP) and the NHSRC's strategic goals as described in detail in the Homeland Security Research Multi-year Strategic Plan (draft, November 26, 2008). Specifically, the project is relevant to Long-Term Goal 2 (LTG-2) which states, "The Office of Solid Waste and Emergency Response (OSWER) and other clients use homeland security research program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environments." This project addresses a direct need expressed by OSWER's CBRN Consequence Management Advisory Team (CMAT). In addition, the project is relevant to the U.S. EPA's Office of Pesticide Programs (OPP) crisis exemption process and OPP's regulatory function under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Due to the potential relevance of this project in preparing for the Federal response to wide-area anthrax incidents, this project will be managed by NHSRC with the support of a multidiscipline project team.

IV. BACKGROUND

Under Homeland Security Presidential Directive (HSPD)-10, the U.S. Department of Homeland Security (DHS) is tasked to coordinate with other appropriate Federal departments and agencies, to develop comprehensive plans which, "provide for seamless, coordinated Federal, state, local, and international responses to a biological attack." As part of these plans, the U.S. EPA, in a coordinated effort with DHS, is responsible for "developing strategies, guidelines, and plans for decontamination of persons, equipment, and facilities" to mitigate the risks of contamination following a biological weapons attack.

NHSRC provides expertise and products that can be widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents. Within NHSRC, DCMD's decontamination research program's goal is to provide expertise and guidance on the selection and implementation of decontamination methods and provide the scientific basis for a significant reduction in the time and cost of decontamination events. The NHSRC's research supports OSWER and OPP. OSWER, through its Special Teams which includes the CBRN CMAT, supports the emergency response functions carried out by the Regional Offices. OPP supports the decontamination effort by providing expertise on

biological agent inactivation and ensuring that the use of pesticides in such efforts is done in accordance with FIFRA. Close collaboration between the different program offices having homeland security responsibilities is sought in order to rapidly increase the U.S. EPA's capabilities to help the Nation recover from a terrorist event involving the intentional release of CBR materials. Such collaborations are fostered through efforts such as PARTNER.

In 2001, the introduction of a few letters containing anthrax spores into the U.S. Postal Service system resulted in the contamination of several facilities. Although most of the facilities in which these letters were processed or received in 2001 were heavily-contaminated, they were successfully remediated with approaches such as fumigation with chlorine dioxide or VHP®. It is well agreed that additional quick, effective and economical decontamination methods having the capacity to be employed over wide areas (outdoor and indoor) are required to increase preparedness for such a release.

In addition to fumigation, which was used primarily in large, heavily-contaminated facilities, other decontamination methods were used. These methods included combinations of disposal of contaminated items, vacuuming, and the use of liquid sporicides such as a pH-adjusted bleach solution. If proven effective, "lower-tech" decontamination methods could reduce overall remediation costs through increased decontamination capacity and reduced reliance on specialized contractors. Developing and demonstrating lower cost solutions to decontamination could significantly increase EPA's readiness to respond to a wide-area release.

Decontamination can be defined as the process of inactivating or reducing a contaminant in or on humans, animals, plants, food, water, soil, air, areas, or items through physical, chemical, or other methods to meet a cleanup goal. In terms of the surface of a material, decontamination can be accomplished by physical removal of the contamination or via the inactivation of the contaminant with antimicrobial chemicals. Physical removal could be accomplished via *in situ* removal of the contamination from the material or physical removal of the material itself (i.e., disposal). Similarly, inactivation of the contaminant can be done *in situ* or after removal of the material for ultimate disposal. During the decontamination activities following the results of the 2001 anthrax incidents, a combination of removal and *in situ* decontamination was used. The balance between the two was facility-dependent and factored in many issues; one factor was that such remediation was unprecedented for the United States Government (USG) and no technologies had been proven for such use at the time. The cost of disposal proved to be very significant and was complicated by the nature of the waste and the difficulties in brokering approved disposal sites). Since 2001, a primary focus for facility remediation has been on improving the confidence in *in situ* decontamination methods and evaluating waste treatment options to be able to provide information necessary to optimize the decontamination/disposal paradigm; this optimization has a very significant impact on reducing the cost of and time for the remediation effort.

V. SCOPE

The purpose of this project is to compare liquid-based and foam-based application of sporicidal decontaminants for decontaminating indoor and outdoor building materials following an anthrax incident. Key factors, such as wetting duration, volume of liquid applied, sporicidal efficacy, collateral damage to materials, and ease of use (including clean up after application) shall be

evaluated under lab-scale tests. A survey of currently and commercially available methods for generating foam from liquids shall be conducted. Following identification of foam-generating methods, and selection of the preferred method for testing; decontamination tests shall be conducted with pH-adjusted bleach, diluted bleach (1:10 in water), and one additional peroxide or PAA based sporicide. Decontamination efficacy, on surfaces contaminated with *Bacillus* spores, will be determined for foam- and liquid-based decontaminants, in a side-by-side manner. Testing shall include material types, and decontamination scenarios that are expected to result in higher efficacies for a foam based approach (i.e., inverted surfaces, etc.). The collateral damage to materials during decontamination procedures will be monitored. This effort can be broken down into six Tasks. These tasks are described in Section X.

VI. TECHNICAL APPROACH

The general approach that shall be used to meet the objectives of this project for both tasks is as follows, as briefly mentioned in the Section VI:

- inoculation of the materials with *Bacillus atrophaeus* (formerly, *Bacillus globigii*) spores via aerosol deposition using the procedures developed by Calfee et al., 2013 (Journal of Microbiological Methods, 92:375-380);
- spray application of prescribed foam or liquid decontaminants;
- assessment of residual viable spores (via post-decontamination sampling), starting inoculation (via sampling of positive controls), and potential cross-contamination (via sampling of negative controls [blanks]);
- analysis of subsequent impacts to materials;
- determination of decontamination effectiveness as measured by log reduction from the test samples compared to positive control samples; and
- documentation of operational considerations (e.g., cross-contamination, procedural time, impacts on materials and personnel).

All sample analysis is outside of the scope of this work assignment. Samples shall be transferred to the on-site Microbiology Lab for analysis under a separate work assignment. Generation of sampling kits falls within the scope of this work assignment.

VII. AFFORDABILITY

Components of this study are expected to be somewhat labor intensive; the decontamination processes, sampling, and laboratory assays will require extensive human resources. Relative to the labor costs, only a minimal amount of expendable materials are required to be purchased by the contractor for use in this effort.

VIII. TECHNICAL RISK

The technical risk involved in this project is thought to be minimal. The purpose of the effort is to provide information pertinent to the development of operational strategies for the decontamination methods included in the study. Hence, all information obtained in this project (whether intended or not) is expected to be significantly relevant to this purpose.

IX. FACILITIES AND MATERIALS

All work on this project described in this statement of work (SOW) shall be performed at the U.S. EPA's facilities located at 109 T.W. Alexander Dr., Research Triangle Park, NC. This study shall be conducted in H122A and/or H130A.

X. TASKS

Prior to initiation of the testing described in the tasks below, a quality assurance project plan (QAPP) shall be provided to EPA for review and comment. After revision based upon EPA comments (as necessary) and approval by EPA, work may commence. At least five Category 3 or Category 4 - Applied Research QAPPs have been approved by the U.S. EPA for prior testing that have relevance to this effort (can be provided by WAM after award):

- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 1 – Development and Evaluation of the Decontamination Procedural Steps (July 2009)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 2 – Operational-scale Study of Full Decontamination Procedures (October 2009)
- Application Studies of Biological Agent Decontamination Methods (April 2008)
- Effectiveness of Physical and Chemical Cleaning and Disinfection Methods for Removing, Reducing or Inactivating Agricultural Biological Threat Agents (August 2010)
- Assessment of Liquid and Physical Decontamination Methods for Environmental Surfaces Contaminated with Bacterial Spores: Part 4 – Optimization of method parameters and impact of surface grime (June 2011).

These QAPPs shall be used as the basis for the QAPP for the specific work described in this SOW. The QAPP, including any amendments, must be approved by the U.S. EPA in writing (e.g., signature on the approval page) prior to the start of any work. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

All test activities shall be fully documented during the activity via narratives in laboratory journals, the use of digital photography and video. This information shall be incorporated into the final report, as warranted to document and convey the findings of this effort. The documentation should include, but not be limited to, record of time required for each decontamination step or procedure, visual observations during the procedures, any deviations from the test plans, physical impacts on the materials, and impacts on the decontamination or sampling personnel.

The technical approach to be used throughout this study shall be developed considering the background information provided in Section V and this section. This study shall be done in six major tasks. The specific details related to these tasks are described below.

Task 1:

Development of the QAPP

Under Task 1, an EPA-approved QAPP, outlining the scoping tests to be performed and data to be collected, shall be developed. IMPORTANT: This project shall receive technical direction from the PI (Worth Calfee) and an inter-EPA-Office product/project team. Key decisions shall be collectively decided upon by the group, in order to maximize operational and scientific merit. At the onset, the contractor shall schedule a kick-off meeting to gain a working understanding of the objectives. Regular updates shall be given by the contractor to the group via teleconference and/or email.

Task 2:

Survey of Readily-Available Foam Generation Methods or Devices

The contractor shall conduct a search for readily-available foam generation methods and devices that are compatible with the application (spray-based decontamination of indoor and outdoor surfaces) and liquids (bleach, hydrogen peroxide, peroxyacetic acid, etc.) intended for use during expedient indoor or outdoor decontamination operations. Foam generation methods should be operationally fieldable. The contractor, under the direction of the WAM and project team, shall down-select one or two foam generation methods/devices to utilize in subsequent tasks.

Task 3:

Compare Response Variables when Sporicidal Decontaminants are applied as Liquid or Foam

Sporicidal decontaminants (diluted bleach, pH-adjusted bleach, etc.) shall be applied to small coupons, each as a liquid or as a foam. For a given spray duration, application procedure, or volume dispensed, response variables such as total visibly wetted contact time, volume applied, material impacts, and/or decontamination efficacy shall be determined. This task will parametrically determine the differences in key response variables, when comparing liquid to foam application of a given decontaminant. These data will be useful in determining the utility of each approach.

Table 1: Task 3 Test Matrix

Test#	Sporicide	Applied As:	Material Types	Test Variable (to control)	Response Variable (to measure)
1-12	Diluted bleach, pH adjusted bleach, Sporklenz ® (or other sporicidal liquid)	Liquid, Foam	Drywall, glass or steel, concrete or wood (2 material types)	Spray duration, reapplication frequency, volume dispensed	Wetted contact time, volume dispensed, decontamination efficacy

Task 4:

Evaluate response variables under various conditions

Following Task 3 completion, a more rigorous investigation of decontaminant efficacy shall be evaluated in a side-by-side manner for two or three decontaminants, when applied as a liquid versus applied as a foam. Coupon orientation (horizontal, vertical, inverted), material type, and application protocol (spray volume and/or contact time) shall be varied in these tests.

Table 2: Task 4 Test Matrix

Test #	Sporicide	Applied As:	Material Types	Orientation	Test Variable (to control)	Response Variable (to measure)
13-24	2 or 3 selected from Task 4	Liquid, Foam	1 or 2 selected from Task 4	Vertical, Horizontal, Inverted	Spray duration, reapplication frequency, volume dispensed	decontamination efficacy

Task 5:

Evaluate foam and liquid decontaminant efficacy when applied to a larger-scale and/or unique space (confined space, HVAC, etc.)

Table 3: Task 5 Test Matrix

Test#	Decontaminant	Applied As:	Material Types	Test Variable (to control)	Response Variable (to measure)
25-30	1 selected from Task 4	Liquid, Foam	TBD	TBD	TBD

Task 6:

Report Preparation

The contractor shall design an MS Excel data reporting sheet template prior to the start of any work that conveys all relevant information from a test under Task 1 and 2. This template shall be approved by the EPA for use, prior to conducting any testing described in this SOW. All photographs and videos shall be properly documented, indicating the exact tests in which they were taken. A log (in MS Excel) of all photographs and videos shall be maintained with the electronic files. The log shall include a description of each photograph and video, and include the test number and date. All electronic files shall be stored in a project folder set up on the EPA's DTRL share drive. All information relevant to a test (reporting sheet, digital photographs, videos, log file) shall be transmitted to the EPA WAM within 1 week from the completion of the sample analysis. This data shall have been QA/QC'd by the contractor prior to transmission.

Transmission shall occur via e-mail to the EPA WAM informing him/her that the data is ready for viewing.

A draft final report detailing the test results and lessons learned from the testing shall be submitted to the EPA WAM within 30 days following the completion of the testing and no later than **2/1/2016**. This report shall include documentation of the time required to complete each entire test procedure and all procedural steps. The report shall include any digital photos necessary to illustrate the findings. The draft report shall be submitted by the EPA WAM for review from within EPA, including a Quality Assurance review. A final report incorporating requested changes, correction, and clarification resulting from the review process shall be submitted by the contractor within 15 days from receiving the official comments from the EPA WAM. A separate document detailing the response to comments shall also be submitted to the EPA WAM by the contractor with the final version of the report.

XI. DELIVERABLE SCHEDULE

The deliverables previously described in this SOW with the scheduled due date are shown in Table 4.

Table 4: Deliverable Schedule

Task	Deliverable	Due Date
1	Draft QAPP	20 working days after initiation of this Work Assignment
1	Final QAPP	10 working days following receipt of EPA comments
2	Results (list) from Foam Method Survey	30 working days after initiation of this Work Assignment
6	Draft Report	2/1/2016
6	Final Report	15 days after receiving comments from EPA

XII. REPORTING REQUIREMENTS

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.
- All data related to this project shall be stored on the U.S. EPA servers in the DTRL share folder.
- Data transfer to the EPA WAM shall occur within one week from the completion of data analysis.
- In lieu of final reports for each or any task, journal papers within each task may be submitted at the discretion of the EPA WAM. The papers shall be authored or co-authored by the EPA WAM, at the discretion of the WAM. To serve in lieu of the final report, the journal articles must contain all of the relevant information that would have appeared in the final report.
- All products developed under this SOW (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance tab.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-084

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Stuart Willison
(Signature) (Date)
Branch/Mail Code:
Phone Number 513-569-7253
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

Title: **Developing Remediation Tools, Including Surface Wipe Sampling Methods, for Evaluating Indoor Contamination from Pesticide Misuse**

WA #: 6-74 WACOR: Stuart Willison

Contract #: EP-C-15-008 Alternate WACOR: Emily Snyder

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of the award through March 31, 2016.

SUMMARY OF OBJECTIVES

The objectives of this effort are to develop sampling, analytical and assay methods to determine if surface pesticide residues present before and after decontamination procedures are below a health-based threshold value and determine optimum methods for decontamination of these pesticides in indoor environments. The approach will provide a flexible, but consistent, set of guidelines to better understand the application and interpretation of data for the method during the remediation phases of an incident.

BACKGROUND

There has been an increase in reported pesticide misuse incidents for controlling bed bugs and other insects in indoor environments. These incidents include pesticide products not registered by the EPA for indoor use or approved pesticide products that are applied improperly or at concentrations that far exceed the labeled rates. The bed bug epidemic is expected to result in a growing number of incidents. EPA Regional Offices are often called on to assist local communities in remediating homes and businesses following indoor misapplications where pesticide levels may be unsafe. However, there are no tools for adequately evaluating pesticide residues on indoor surfaces to determine potential risk to occupants, and no effective cleaning procedures to reduce pesticide levels in affected structures. Therefore, occupants continue to inhabit contaminated buildings, or are forced to vacate contaminated properties, or attempt decontamination themselves, which may create more toxic byproducts or further dispersing contamination. Pesticide manufacturers and the Office of Pesticide Programs offer little assistance when these products are applied illegally or in unintended ways.

Federal, state and local agencies responding to pesticide incidents regularly seek guidance about interpreting indoor surface wipe sample results. However, current practices for collecting, processing, and analyzing surface wipe samples for indoor pesticide incidents vary with respect to wipe material and size, selection and amount of wetting agent, template size, wiping technique, and types of sampled surfaces, among other factors. Such variations exist because of numerous wipe sampling methods, each utilizing slightly different materials and standard operating procedures. Beyond numerous standard operating procedures that exist, sampling practices vary widely, even at the federal, state, and local

levels. Because of the variability at all levels, there is no overwhelming consensus for sample collection wipe procedures for the wider range of pesticides and surfaces encountered, particularly for indoor misuse situations[1234], with relatively little known about the reliability and comparability of the different wipe sampling materials, techniques and incorporated methods. As a result, it is difficult to compare and interpret data results obtained through different methods, so assessing and responding to incidents is challenging and will complicate incident response. If wipe samples provide the basis for critical decisions about evacuation and remediation actions, it is important to better understand sampling, processing, and analysis variables and limitations, and have a more consistent set of guidelines.

Although limited, current research indicates that many variables associated with the surface sampling process affect residue removal efficiency, precision and accuracy. Very little is known about how the different methods compare for reliability and validity. Recent research conducted by the National Exposure Research Laboratory (NERL) associated with a separate pesticide RARE project identified concerns with residue recovery when dealing with high surface concentrations as typically encountered in pesticide misuse cases. Additional questions became relevant when attempting to address the need for different methods to detect low versus high surface residues to capture more accurate information and to avoid underestimating exposures. Currently NERL has examined standardizing techniques for the collection of low concentrations of pesticide residues, and has developed wipe extraction procedures. NERL has continued to explore and evaluate wipe techniques across different concentrations and the influence of pesticide formulations and sample wipe efficiency from different residential surfaces.

Recent research conducted by the National Homeland Security Research Center (NHSRC) includes the development of wipe sampling and analysis methods for chemicals, including pesticides that are of a primary concern from a homeland security perspective. Most concentration levels investigated are low, but higher concentrations should also be investigated to ensure that dedicated wipe sampling and analysis procedures used during the characterization and decontamination phases of an incident will work as intended. Wipe sampling and analysis methods have been developed with a particular focus on certain challenges that are common for such procedures, including: wipe selection, wetting solvents, different morphologies, and porosity of the wiped surfaces. In addition to wiping surfaces, wipe extraction procedures will also need to be developed and followed for data comparability amongst the many labs analyzing potentially hundreds of thousands of generated samples throughout the remediation phase of an incident.

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[1] *American Healthy Homes Survey: A National Study of Residential Pesticides Measured from Floor Wipes*, D. M. Stout II, et al. *Environ. Sci. Technol.* **2009**, 43, 4294-4300.

[2] *Sampling of Common Pesticides and PCBs from Inert Surfaces,* EPA/330/1-90-001, October 1989, B. L. Carr and D. F. Hill, National Enforcement Investigations Center, Denver, CO.

[3] *A Literature Review of Wipe Sampling Methods for Chemical Warfare Agents and Toxic Industrial Chemicals,* EPA/600/R-07/004, January 2007, Prepared by Battelle, Columbus, OH 43201, for Stephen Billets, U.S. Environmental Protection Agency, Office of Research and Development National Exposure Research Laboratory, Environmental Sciences Division, Las Vegas, NV 89119.

[4] *Comparison of wipe materials and wetting agents for pesticide residue collection from hard surfaces*, N.C. Deziel, et al. Sci. of the Total Environ. **2011**, 409, 4442-4448.

SCOPE

The scope of this WA is to generate the extracts from the wipe sampling studies and potentially for small coupon decontamination testing.

TECHNICAL APROACH/OBJECTIVES

Details for the general technical approach can be found in Section VI. The contractor shall conduct wipe sampling efficiency studies in phases that study the impacts of specific variables, such as wipe material and wipe solvent, and pesticide formulations. Each tested variable is further described within the phases described in QAPP.

The contractor shall perform the following tasks for this work assignment:

TASK 1. DEVELOPMENT OF THE QAPP

The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) Category III. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding **NHSRC QA Requirements/Definitions List.**

If a Category I or II QAPP is required, it must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category III QAPP can be either based on the R5 guidance or a project-specific QA requirements provided on the NHSRC@work website.

The **QAPP** must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information related to QA requirements can be found at www.epa.gov/quality.

The contractor must prepare a Quality Assurance Project Plan for approval by NHSRC. Work on NHSRC tasks cannot proceed until the contractor receives notification from the PO via e-mail that utilization of the QAPP is approved for use.

Deliverables: Quality Assurance Project Plan (QAPP).

The contractor shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action, see attachment #1 and #2. The EPA WAM, in concert with the project team, will prepare a amend an existing QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf and the NHSRC Quality Assurance (QA) requirement as defined in Attachment #2 to the SOW. A draft of the QAPP will be provided for comments to the contractor before review by the EPA Quality Assurance Manager. The contractor and EPA WAM shall respond to comments and submit the QAPP for approval to the EPA Quality Assurance Manager. The QAPP, including any amendments, shall be approved by the U.S. EPA in writing (e.g., signature on the

approval page) prior to the start of any work. Additional information related to QA requirements can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf.

Task 2: Wipe Sampling- Completed for Phase 1

Wipe sampling for all phases will be performed. Phase 1 was completed from the previous ARCADIS contract, thus, only Phase 2 and 3 will need to be performed. So that uniformity and that Phase 1 work is understood, Phase 1 planning is being kept in the document and is described below. The contractor shall conduct a series of experiments focusing on the analytes listed in Phase 1. The chosen pesticides will be applied to three different wipes, one of which will be determined to be a preferred wipe based on efficiencies for recovering pesticides of interest from a previous investigation. The two remaining wipes will be chosen based on availability from commercial vendors and preferred wipe type for field samplers. All three wipes will be subjected to at least the 2 solvents listed within Phase 1 to determine which wetted solvent would more efficiently recover the analyte of interest. Phase 1 will narrow down a preferred wipe type and wetting solvent for optimal analyte recovery and this test matrix can be found in Table 1. After the completion of Phase 1, the contractor shall complete Phase 2 which will apply the chosen wipe and wetting solvent to a series of experiments focusing on the number of wipes to be used when collecting samples subjected to different analyte concentrations on a surface. This test matrix is outlined in Table 2. Lastly, Phase 3 will investigate the recovery efficiency of the target analytes from different surfaces and compare the data to the previous Phases for comparison on a metal surface. This phase includes investigation of wipe sampling for neat chemical vs. pesticide formulation as a function of surfaces, and potentially solvents and this test matrix can be found in Table 3. Each Phase will be performed separately and discussed at the completion to ensure proper selections prior to beginning the next Phase. Furthermore, funds shall be added as needed to ensure completion of each Phase and any modifications, which may be needed to ensure proper investigations are performed.

Table 1 - Phase 1, Test matrix to examine wipe type and solvent for stainless steel. Completed-7/31/15

Pesticide	Solvent	Wipe Type* (Cotton wipe provided by EPA WAM, e.g. Cotton Gauze)	Wipe Type* (TBD-e.g., Cotton Twill)	Wipe Type* (COTS – TBD-e.g., IPA-prewetted wipe)
Fipronil (and formulation of fipronil, if necessary)	Solvent 1 (IPA)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank
	Solvent 2 (Acetone)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank

Deltamethrin (and formulation of deltamethrin, if necessary)	Solvent 1 (IPA)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank
	Solvent 2 (Acetone)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank
Permethrin (and formulation of Permethrin, if necessary)	Solvent 1 (IPA)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank
	Solvent 2 (Acetone)	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank	5 test wipes, 1 wipe spike, 1 wipe blank

Table 2. Phase 2, Down select solvent and wipe type to study Phase 2.

If down selection of wipe is not possible, then Phase 2 may be discussed as follows for each Wipe Type as listed in Table 2. If down selection is possible, then only one Wipe Type will be tested. If not, then multiple, if not all wipes, will need to be carried forward from Phase 1. As a result, the medium concentration may be dropped to focus on the extreme concentration ranges. A tentative Phase 2 plan is as follows:

Pesticide	Wipe/Solvent (IPA)	Low concentration	Medium concentration (may be unnecessary and dropped if not needed)	High concentration
-	Wipe	Cotton Twill	Cotton Twill	Cotton Twill
-	Wipe (if necessary)	Cotton Gauze	Cotton Gauze	Cotton Gauze

-	Wipe (if necessary)	IPA pre-wetted	IPA pre-wetted	IPA pre-wetted
Fipronil	*2 wipes per coupon for low (and medium) surface concentration test; wipes extracted analyzed separately *3 wipes per coupons for high surface concentration test; wipes extracted analyzed separately Wetting solvent and wipe type – selected based on Phase 1 results	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*3x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *3x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank
Deltamethrin	*2 wipes per coupon for low and medium surface concentration test; wipes extracted analyzed separately *3 wipes per coupons for high surface concentration test; wipes extracted analyzed separately Wetting solvent and wipe type – selected based on Phase 1 results	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*3x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *3x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank
Permethrin	*2 wipes per coupon for low and medium surface concentration test; wipes extracted analyzed separately *3 wipes per coupons for high surface concentration test; wipes extracted analyzed separately Wetting solvent and wipe type – selected based on Phase 1 results	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*2x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *2x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank	*3x3 test wipes (Wipe Type 1), 1 wipe spike, 1 wipe blank *3x3 test wipes (Wipe Type 2), 1 wipe spike, 1 wipe blank

Table 3. Phase 3, Down select number of wipes and potential concentration to study Phase 3

Pesticide	Solvent(s)	Surface 1*	Surface 2*	Surface 3 (stainless steel)*
Fipronil	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank
Deltamethrin	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank
Permethrin	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank
Fipronil Formulation	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank
Deltamethrin Formulation	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank
Permethrin Formulation	TBD	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank	5 test wipes, 1 wipe spike, 1 wipe blank, 1 surface blank

The wipes containing the target pesticides will be extracted in the appropriate solvent via sonication in a TBD solvent.

TASK 3: ANALYTICAL SUPPORT

Under this task the contractor shall dry down all of the extracts that are balanced in TBD solvent as outlined in the QAPP "Developing Remediation Tools and Approaches to Address Indoor Contamination from the Misuse of Pesticides for Bed Bug Control". A solvent (e.g., methanol or acetonitrile) conducive for use with LC/MS applications will be applied to samples in place of hexane if LC is needed over GC. The contractor shall also prepare instrument detection limit standards (10) and calibration standards (5

per pesticide) for both GC/MS and LC/MS/MS of the samples. The specifications for these standards shall be provided by the EPA WAM. The contractor shall also add the internal standards (provided by the EPA WAM) to all of the vials that will be analyzed by GC/MS or LC/MS/MS prior to delivering them to the analytical laboratory.

All experiments and sample preparation of samples for the project described in this statement of work shall be performed at the U.S. EPA's facilities located at 109 TW Alexander Dr, Research Triangle Park, NC. Testing is anticipated to be performed in a chemical hood in H-210 and chemical analyses of the samples are expected to also occur in Research Triangle Park, NC, under this PWS.

The technical risk involved in this project is considered to be moderate. Prior goals evaluated malathion and carbaryl. Current goals will be to further validate surface wipe and extraction methods for assessing residual pesticide levels for similar pesticides of interest, including fipronil, deltamethrin, and permethrin and/or formulations for any of the 5 pesticides listed above. These goals are a low technical risk. All information obtained is expected to be relevant.

QUALITY ASSURANCE

A draft test/QA plan for these experiments will be provided by the EPA WAM prior to commencement. This test/QA plan shall be finalized by the contractor. See Task 1 above. The work was completed prior to the amendment and will be used for all investigations for the current work assignment through from May through September 30, 2015.

DELIVERABLES

On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress (including estimated percent of project completed), problems encountered, cumulative financial expenditures and cost and schedule variance. The contractor shall also have bi-weekly meetings with the EPA WAM and the project team for the duration of the WA.

The deliverables in the form of experimental details and extracts are shown in Table 4.

SCHEDULE of DELIVERABLES

Table 4: Deliverable Schedule

Task Number	Deliverable	Due Date

1	Comments Related to Review of Draft QAPP	8/14/15
2a	Extracts from Phases 1 for Wipe Sampling	Completed
2b	Extracts from Phases 2 for Wipe Sampling	8/1/15-3/31/16
2c	Extracts from Phases 3 for Wipe Sampling	8/1/15-3/31/16

REPORTING REQUIREMENTS

- Data related to this project shall be stored on the US EPA server's DTRL shared drive. Electronic data for this WA should be minimal but may include titration data for decontamination solutions.
- Transfer of project data shall occur at the conclusion of each experiment within each task. Detailed written summaries of experimental procedures and results shall be provided to the WAM within one week from completion of the data analysis. These reports shall indicate the operational conditions (e.g. decontamination solution preparation procedure and exposure time)

Attachment 1: NHSRC QA Requirements/Definitions List

EPA=s Quality System Website: http://www.epa.gov/quality

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

EPA's Quality System Website: http://www.epa.gov/quality/qs-docs/r5-final.pdf

In accordance with EPA CIO 2105.0 (Order), EPA 2105-P-01-0 (Manual), and conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All Quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approve the quality documentation. The Quality Assurance Project Plan (QAPP) shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

NHSRC's Quality System Specifications for Extramural Actions –

These requirements typically pertain to single project efforts. The five specifications are:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

NHSRC QA Requirements/Definitions List

Category Level Designations (determines the level of QA required):

- ☐ **Category I Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP: QAPP** requirements for the specific project type (see below).

- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP. QAPP** requirements for the specific project type (see below).

Project Types:

These outlines of NHSRC's QAPP Requirements for various project types, from Appendix B of the NHSRC QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario and QAPP's must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

Applied Research Project - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Applied Research Projects" from Appendix B of the NHSRC QMP.

Design, Construction, and/or Operation of Environmental Technology Project - pertains to environmental technology designed, constructed and/or operated by and/or for EPA. The QAPP shall address requirements in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/QS-docs/g11-final-05.pdf. For additional information, you may refer to Part C of "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology," ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995.

Geospatial Data Quality Assurance Project - pertains to data collection; data processing and analysis; and data validation of geospatial applications. The QAPP shall address requirements in the EPA Quality System document "Guidance for Geospatial Data Quality Assurance Project Plans" G-5S at http://www.epa.gov/quality/QS-docs/g5g-final-05.pdf.

Method Development Project - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. The QAPP shall address all requirements listed in "QAPP Requirements for Method Development Projects" from Appendix B of the NHSRC QMP.

Model Development Project - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. The QAPP shall address requirements in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M at http://www.epa.gov/quality/QS-docs/g5m-final.pdf.

Sampling and Analysis Project - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. The QAPP shall address all requirements listed in "QAPP Requirements for Sampling and Analysis Projects" from Appendix B of the NHSRC QMP.

Existing Data Project - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. The QAPP shall address all requirements listed in "QAPP Requirements for Secondary Data Projects" from Appendix B of the NHSRC QMP.

Software Development and Data Management Project - pertains to software development, software/hardware system development, database design and maintenance, data validation and verification systems. The QAPP shall address all requirements listed in "QAPP Requirements for Software Development Projects" from Appendix B of the NHSRC QMP.

Definitions:

Environmental Data - These are any measurement or information that describe environmental processes, location, or conditions; ecological or health effects directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or literature.

Incremental Funding - Incremental funding is partial funding, no new work.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, which are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NHSRC QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r2-final.pdf.

R-5. EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001
http://www.epa.gov/quality/QS-docs/r5-final.pdf.

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

Technical Lead Person (TLP) - This person is technically responsible for the project. For extramural contract work, the TLP is typically the contracting officer's representative (COR). For intramural work, the TLP is typically the Principal Investigator.

Abbreviations:

COR	Contracting Officer's Representative	IAG	Interagency Agreement
NHSRC	National Homeland Security Research Center	QA	Quality Assurance
NRMRL	National Risk Management Research Laboratory	QAM	Quality Assurance Manager
QA ID	Quality Assurance Identification	QMP	Quality Management Plan
QAPP	Quality Assurance Project Plan	SOW	Statement of Work
QS	Quality System	CRADA	Cooperative Research & Development Agreement
TLP	Technical Lead Person		

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-085

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Russell Wiener
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-1910
FAX Number: 919-541-0496

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

WA 0-085
WACOR: R. Wiener

EP-C-15-008
Alt WACOR: M. Gray

Title: Draft Design of Anthrax Exposure Field Study to be Implemented Immediately after an Incident Utilizing..... (AKA: Anthrax Field Exposure Study)

POP: August 1, 2015 through March 31, 2016

(A) *Goal/Purpose:* The goal of this work is to draft a field study design to be implemented after a biological incident in an urban area. This task will support the goals of the SPORE Program.

(B) *Background Information:* In the event of a release of biological material in an urban area that would require decontamination for the purpose of public safety, there is an immediate need to be able to collect information as to the extent of the area of contamination, the concentration of contaminants, and the primary and secondary dispersion of the contaminants. This information is important to both EPA and the Department of Homeland Security. In such an event, a wide range of surfaces would be contaminated. The Environmental Protection Agency (EPA) has the responsibility for protecting human health and the environment from secondary emission of materials from these areas and may be required to mitigate, provide consequence management, and decontaminate the area of concern. To this end, the EPA Office of Research and Development (ORD) National Homeland Security Research Center (NHSRC), Decontamination and Consequence Management Division (DCMD) is conducting research to develop guidance on post incident field monitoring.

Long-Term Goal 2: The Office of Solid Waste and Emergency Response and other clients use Homeland Security Research Program products and expertise to improve the capability to respond to terrorist attacks affecting buildings and the outdoor environment and APG (41) - The Homeland Security Research Program will deliver reports and databases with information on the movement and the health effects of contaminants form the basis of the need for this work.. The information is instrumental for containing contamination and mitigating health effects. Determination of the bacterial spore (Anthrax spore surrogates) dispersion and resuspension after the release of Anthrax by terrorists in the US is a major public health concern. The purpose of this Work Assignment is to help develop a field study design for a potential release of Bacillus anthracis spores. This field study would be used to help define and support field decontamination programs. The U.S. Environmental Protection Agency (EPA)/National Homeland Security Research Center (NHSRC) will support this work Statement of Work (SOW).

(C) *Statement of Work/Tasks:* The Contractor shall:

The Contractor shall provide a new table of deliverables and a timeline for the work to be performed within 30 days of the initiation of this Work Assignment.

Task 1: Preparation of the Quality Assurance Project Plan (QAPP) [*The COR or PO must provide the QA Category in the Performance Work Statement.*]
The contractor shall prepare a QAPP in accordance with Quality Assurance (QA) Category____3___. Attachment 1 to the Performance Work Statement (PWS) or Statement of Work (SOW) provides information regarding **NHSRC QA Requirements/Definitions List.**

A Category 1 or 2 QAPP must be developed in accordance with the document titled "EPA Requirements for Quality Assurance Project Plans." EPA QA/R-5 can be found at http://www.epa.gov/quality/qs-docs/r5-final.pdf. At the discretion of the COR, a Category 3 QAPP can be either based on the R5 guidance or a project-specific QA requirements provided on the NHSRC@work website. *The appropriate project-specific QA requirement information must be provided by the COR as Attachment 2.*

The **QAPP** must be approved prior to the start of any literature searches (existing data), data collection, gathering, synthesizing, or data generation (laboratory) work. Additional information

related to QA requirements can be found at www.epa.gov/quality.

Task 2: Literature Review and Outline of the Draft Design of Anthrax Exposure Field Study to be Implemented Immediately after an Incident Utilizing Existing Methods:
The Contractor shall conduct a literature review regarding the design of field sampling studies for monitoring Biological and Chemical Agents. If necessary due to lack of prior documentation, this review may also include Radiological Agents. The Contractor shall also review all applicable field study monitoring methods currently available for the field study. The contractor shall develop a comprehensive outline of the field study design document for EPA review.
Date of Completion: September 1, 2015.

Task 3: The Draft Design of an Anthrax Exposure Field Study to be Implemented Immediately after an Incident Utilizing Existing Methods:

The Contractor shall develop a Draft Design of an Anthrax Exposure Field Study to be Implemented Immediately after an Incident Utilizing Existing Methods. This should be a comprehensive design, including logistics, available standard operating procedures for the methods to be utilized in the study, sample protocols, data sheets, and all other pertinent data and information gathering methodologies to be utilized in the field operations.

Date of Completion: March 31, 2016.

Task 4: Data Analysis and Final Reporting:

The Contractor shall provide the EPA with a comprehensive final report including the draft study design, literature review, references, SOPs and all other supporting documents.

Date of completion March 31, 2016.

Task 5: Statistical Analysis and Technical Editing: If time and funding permit the Contractor shall interpret study results from prior and concurrent work conducted by NHSRC and utilize this information and data to determine (and where necessary test) new hypotheses relevant to study results. The contractor shall provide all necessary statistical and technical editing support for NHSRC projects.

Date of completion March 31, 2016.

The Contractor shall prepare monthly reports to EPA that will summarize the work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The QAPP produced shall meet the requirements in Appendix B, below. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

(D) *Deliverables and Project Schedule, Acceptance Criteria:*

- Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WACOR within 30 days of the Contracting Officer's signature. A Quality Assurance Project Plan (QAPP) shall be provided within 90 days. The Contractor shall develop a

QAPP following the EPA Gudiance for Quality Assurance Project Plans and Modeling (QA/G-5M) and Guidance for Quality Assurance Project Plans (QA/G-5) which can be found at http://www.epa.gov/quality/qa_docs.html. 2. A final report shall be provide to the WACOR on or before March 31, 2016.

(E) *QA/QC Requirements for WA:* See Appendix B below. Standard "good laboratory practices" for maintaining notebooks shall be employed.

(F) *Special Requirements:* The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the work plan to cover all tasks through the WA end date. The hours and costs shall be broken down by tasks. The contractor shall modify the QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the additions to the research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided in NHSRC's QMP. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

(G) *Reports and Meetings:*

Need	Meeting Purpose	Frequency
X	to discuss workplan	Once
X	to review data or analyses	Weekly
X	to review monthly cost report	Monthly

(H) *Travel/Training Requirements*: Travel ☐is ☐ is not anticipated to be charged under this work assignment. If travel is anticipated, the dates and circumstances necessitating travel chargeable to this work assignment will be specified by Technical Directive. Travel will be reviewed and approved by the WACOR. Requests for travel shall include: (1) name of traveler(s) and job duties, (2) description of circumstances necessitating travel, (3) location of travel, and (4) estimated cost breakdown by categories

(I) *Management Controls*: See Contract Management Controls.

(J) *Staffing Requirements*:

Appendix B REQUIREMENTS AND GUIDANCE

For Category I (enforcement, litigation, or projects involving human subjects) and Category II (development of environmental regulations or standards), NHSRC=s requirements are those listed in EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA QA/R-5, EPA/240/B-01/003, March 2001. Guidance for Quality Assurance Project Plans, EPA QA/G-5, EPA/600/R-98/018, February 1998 may be used to help address these requirements. (These documents are available at http://www.epa.gov/quality/)

QAPP requirements for Category III (Applied Research) and Category IV (Basic Research) are presented in this appendix. Guidance for Quality Assurance Project Plans, EPA QA/G-5, EPA/600/R-98/018, February 1998 referenced above may be used to help address the requirements listed for Category III and IV QAPPs; however, only the requirements listed in this appendix need to be addressed.

QAPP requirements for Sampling and Analysis Projects, Secondary Data Research Projects, Methods

Development Projects, and Software and Data Management Projects are also presented in this appendix. Requirements for modeling projects are currently under development. (See your QAM if you need these requirements.)

For projects involving design, construction, and/or operation of environmental technology, the requirements in Part C of ASpecifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology,@ ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995 will be followed.

The requirements for QMPs submitted to NHSRC in response to solicitations are also presented in this appendix.

QAPP REQUIREMENTS FOR PROJECTS USING SECONDARY DATA

A secondary data project involves the gathering and/or use of existing environmental data for purposes other than those for which they were originally collected. These secondary data may be obtained from many sources, including literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. For these projects, a QAPP shall be prepared to include the requirements identified below. If primary data will also be generated as part of the project, then the information below can be incorporated into the associated QAPP to address the secondary data. The following requirements should be addressed as applicable.

SECTION 1.0, PROJECT OBJECTIVES, ORGANIZATION, AND RESPONSIBILITIES

1.1 The purpose of study shall be clearly stated.

1.2 Project objectives shall be clearly stated.

1.3 The secondary data needed to satisfy the project objectives shall be identified. Requirements relating to the type of data, the age of data, geographical representation, temporal representation, and technological representation, as applicable, shall be specified.

1.4 The planned approach for evaluating project objectives, including formulas, units, definitions of terms, and statistical analysis, if applicable, shall be included.

1.5 Responsibilities of all project participants shall be identified, meaning that key personnel and their organizations shall be identified, along with the designation of responsibilities for planning, coordination, data gathering, data analysis, report preparation, and quality assurance, as applicable.

SECTION 2.0, SOURCES OF SECONDARY DATA

2.1 The source(s) of the secondary data must be specified.

2.2 The rationale for selecting the source(s) identified shall be discussed.

2.3 The sources of the secondary data will be identified in any project deliverable.

SECTION 3.0, QUALITY OF SECONDARY DATA

3.1 Quality requirements of the secondary data must be specified. These requirements must be appropriate for their intended use. Accuracy, precision, representativeness, completeness, and comparability need to be

addressed, if applicable. (If appropriate, a related QAPP containing this information can be referenced.)

3.2 The procedures for determining the quality of the secondary data shall be described.

3.3 If no quality requirements exist, this shall be stated in the QAPP. If no quality requirements exist or if the quality of the secondary data will not be evaluated by EPA, the QAPP shall require that a disclaimer be added to any project deliverable to indicate that the quality of the secondary data has not been evaluated by EPA for this specific application. The wording for the disclaimer shall be defined.

SECTION 4.0, DATA REPORTING, DATA REDUCTION, AND DATA VALIDATION

4.1 Data reduction procedures specific to the project shall be described, including calculations and equations.

4.2 The data validation procedures used to ensure the reporting of accurate project data shall be described.

4.3 The expected product document that will be prepared shall be specified (e.g., journal article, final report, etc.).

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-085

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Russell Wiener
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-1910
FAX Number: 919-541-0496

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-086

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lukas Oudejans	Branch/Mail Code:
	Phone Number 919-541-2973
(Signature) (Date)	FAX Number:
Project Officer Name Kevin Sudderth	Branch/Mail Code:
	Phone Number: 919-541-3670
(Signature) (Date)	FAX Number:
Other Agency Official Name	Branch/Mail Code:
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Contracting Official Name Mark Cranley	Branch/Mail Code:
	Phone Number: 513-487-2351
(Signature) (Date)	FAX Number: 513-487-2109

To the Statement of Work
NHSRC QA Requirements/Definitions List

EPA=s Quality System Website: http://www.epa.gov/quality

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html
EPA's Quality System Website: http://www.epa.gov/quality/qs-docs/r5-final.pdf

In accordance with EPA CIO 2105.0 (Order), EPA 2105-P-01-0 (Manual), and conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All Quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approve the quality documentation. The Quality Assurance Project Plan (QAPP) shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

NHSRC's Quality System Specifications for Extramural Actions –

These requirements typically pertain to single project efforts. The five specifications are:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

NHSRC QA Requirements/Definitions List

Category Level Designations (determines the level of QA required):

- ☐ **Category 1 Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in "EPA Requirements for QA Project Plans, EPA QA/R-5.

- ☐ **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP: QAPP** requirements for the specific project type (see below).

- ☐ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of "EPA Requirements for QA Project Plans, EPA QA/R-5 as outlined in the **NHSRC's QMP. QAPP** requirements for the specific project type (see below).

Project Types:

These outlines of NHSRC's QAPP Requirements for various project types, from Appendix B of the NHSRC QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario and QAPP's must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

- ☐ **Applied Research Project** - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Applied Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Basic Research Project** - pertains to a study performed to generate data used to evaluate unproven theories, processes, or technologies. These studies are often bench-scale. The QAPP shall address all requirements listed in "QAPP Requirements for Basic Research Projects" from Appendix B of the NHSRC QMP.

- ☐ **Design, Construction, and/or Operation of Environmental Technology Project** - pertains to environmental technology designed, constructed and/or operated by and/or for EPA. The QAPP shall address requirements in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/QS-docs/g11-final-05.pdf. For additional information, you may refer to Part C of "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology," ANSI/ASQC E4-1994, American Society for Quality Control, Milwaukee, WI, January 1995.

- ☐ **Geospatial Data Quality Assurance Project** - pertains to data collection; data processing and analysis; and data validation of geospatial applications. The QAPP shall address requirements in the EPA Quality System document "Guidance for Geospatial Data Quality Assurance Project Plans" G-5S at http://www.epa.gov/quality/QS-docs/g5g-final-05.pdf.

- ☐ **Method Development Project** - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. The QAPP shall address all requirements listed in "QAPP Requirements for Method Development Projects" from Appendix B of the NHSRC QMP.

- ☐ **Model Development Project** - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. The QAPP shall address requirements in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M at http://www.epa.gov/quality/QS-docs/g5m-final.pdf.

- ☐ **Sampling and Analysis Project** - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. The QAPP shall address all requirements listed in "QAPP Requirements for Sampling and Analysis Projects" from Appendix B of the NHSRC QMP.

- ☐ **Secondary Data Project** - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. The QAPP shall address all requirements listed in "QAPP Requirements for Secondary Data Projects" from Appendix B of the NHSRC QMP.

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EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-100

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 0-100 REM Program

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Robert Vanderpool
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-7877
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Technical Support for the Reference and Equivalent Methods Program

WA #: 100 WACOR: Robert Vanderpool

Contract #: EP-C-15-008 Alternate WACOR: Jonathan Krug

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

By agreements with the Office of Air Quality Planning and Standards (OAQPS), the National Exposure Research Laboratory (NERL) of the Office of Research and Development (ORD) provides research and development of new air monitoring methods and associated quality assurance procedures in connection with new or existing national ambient air quality standards (NAAQS). Research and technical support to NERL's Reference and Equivalent Methods Program is needed which will include (1) development and/or revision of Federal reference methods, (2) technical review and evaluation of formal applications received by EPA for reference and equivalent method determinations under 40 CFR Part 53 as amended December 18, 2006, (3) technical support related to the operation, performance, and quality assurance of existing reference or equivalent methods and their implementation in national air monitoring networks, and (4) research on new measurement technologies.

BACKGROUND

The Reference and Equivalent Methods Program is carried out by the ORD in support of the OAQPS compliance air monitoring program to implement the national ambient air quality standards under regulations at 40 CFR 50 and 58. NAAQSs are currently established for six pollutants: SO2, NO2, O3, CO, Pb, and particulate matter (PM10, PM2.5 and PM10-2.5). By agreement with the OAQPS, the National Exposure Research Laboratory and ORD provide (a) the necessary research for the development of new Federal reference methods (FRMs) for ambient air monitoring coincident with the establishment of new NAAQSs, (b) development of reference and equivalent method designation requirements associated with new FRMs, (c) primarily technical and associated administrative services to evaluate and process applications for reference and equivalent method determinations and related activities under regulations at 40 CFR 53, as amended December 18, 2006, (d) research, investigation, and (if required) development of remedial techniques to resolve technical or implementation issues that may arise in the use of designated reference and equivalent methods in OAQPS's ambient air surveillance networks, and (e) development of new quality assurance procedures in connection with new

or existing NAAQSs. The Process Modeling Research Branch (PMRB) of NERL is currently responsible for administering this program.

SCOPE

The contractor shall carry out activities related to the processing and technical evaluation of reference or equivalent method applications under EPA regulations at 40 CFR 53, as revised December 18, 2006. The various activities that are required under this task are described in the "Reference and Equivalent Methods Program and Procedures Handbook" (RTI/7490/042-2D), May 2007. The contractor shall carry out only those tasks identified as not inherently governmental in nature.

TECHNICAL APROACH/OBJECTIVES

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

The specific task requirements for evaluation of each reference or equivalent method application may vary somewhat depending upon the specific circumstances of the particular application, which cannot be known until the application is received. In order to meet the 120-day regulatory deadline to respond to applications, the contractor shall evaluate and process each application expeditiously and in all cases shall complete the work not more than 110 calendar days after assuming custody of the application documents. In cases where additional information pertinent to a pending application is received subsequent to the first application review, the contractor shall continue the review activities to consider the new information, with an appropriate extended due date. To accommodate these conditions, the WA COR will issue a written technical directive to the contractor for each application to be processed, with copies furnished to the Project Officer (PO) and to the Contract Officer (CO). Each such technical directive will identify the application to be evaluated, specify any minor deviations in the evaluation protocol for the application, and identify the target date by which the deliverable(s) are to be provided to the WA COR.

The actual number of applications to be processed and the dates on which they will be received and available for processing is not known. However, it is assumed that evaluation of up to nine applications will be required during the course of this Work Assignment. The contractor shall process applications as soon as practicable such that processing of any application is not unduly delayed by the processing of any other application. Technical evaluation and processing of requests for approval of modifications to existing reference or equivalent methods or similar requests shall be processed similarly, as appropriate to the nature of the request, with necessarily shorter completion times appropriate to the shorter regulatory deadline (30 days) for such requests. Any application materials identified as confidential business information (CBI) shall be treated in accordance with CBI regulations and policy restrictions.

Task 2. Investigation of Technical Issues

In support of the reference and equivalent methods program, the contractor shall conduct laboratory and/or field tests and/or other research activities, as appropriate or necessary, related to the investigation and resolution of potential measurement anomalies, interferences, or other technical deficiencies associated with samplers, analyzers, measurement principles or techniques used in designated reference or equivalent methods or related to a pending application. The contractor's work plan shall anticipate up to three such investigations of modest scope. When such a support need arises, the WA COR will issue a written technical directive describing the technical question or issue to be investigated, the scope of the investigation, and the nature of the deliverable needed. If the nature of the issue is such that the scope of the investigation and/or its resolution will require substantial labor hours beyond the amount anticipated in the approved work plan, the contractor, upon receiving such a technical directive, shall prepare a research plan of specific activities to resolve the issue and an associated cost estimate. After review and acceptance of the plan, a written amendment to this work assignment may be issued for the contractor to conduct the proposed work.

QUALITY ASSURANCE (QA)

Standard "good laboratory practices" for maintaining notebooks shall be employed.

The contractor shall follow the protocols, procedures and guidelines of the "Reference and Equivalent Methods Program and Procedures Handbook" as revised May 2007.

Calibration and operation of scientific instruments shall be performed under existing SOPs contained in the Quality Assurance Project Plan "Maintenance, Management, Operation, and Analysis of the Aerosol Test Facility", which will be revised and updated under WA# 101.

DELIVERABLES

Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WA COR.

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

Preliminary results from the wind tunnel evaluation of the prototype inlets shall be provided in the form of spreadsheets and Word documents. Both hard copy and electronic formats of results shall be provided.

Task 2. Investigation of Technical Issues

The contractor shall provide a written report with results of each Technical Issue investigated.

SCHEDULE of DELIVERABLES

Work Plan: Within 20 days of receipt of the Work Assignment or as specified in the contract.

Task 1: As indicated in each Technical Directive issued.

Task 2: Target Delivery Date: 3/31/2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-100

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Robert Vanderpool
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-7877
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Technical Support for the Reference and Equivalent Methods Program

WA #: 100 Amendment 1 WACOR: Robert Vanderpool

Contract #: EP-C-15-008 Alternate WACOR: Jonathan Krug

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

By agreements with the Office of Air Quality Planning and Standards (OAQPS), the National Exposure Research Laboratory (NERL) of the Office of Research and Development (ORD) provides research and development of new air monitoring methods and associated quality assurance procedures in connection with new or existing national ambient air quality standards (NAAQS). Research and technical support to NERL's Reference and Equivalent Methods Program is needed which will include (1) development and/or revision of Federal reference methods, (2) technical review and evaluation of formal applications received by EPA for reference and equivalent method determinations under 40 CFR Part 53 as amended December 18, 2006, (3) technical support related to the operation, performance, and quality assurance of existing reference or equivalent methods and their implementation in national air monitoring networks, and (4) research on new measurement technologies.

BACKGROUND

The Reference and Equivalent Methods Program is carried out by the ORD in support of the OAQPS compliance air monitoring program to implement the national ambient air quality standards under regulations at 40 CFR 50 and 58. NAAQSs are currently established for six pollutants: SO2, NO2, O3, CO, Pb, and particulate matter (PM10, PM2.5 and PM10-2.5). By agreement with the OAQPS, the National Exposure Research Laboratory and ORD provide (a) the necessary research for the development of new Federal reference methods (FRMs) for ambient air monitoring coincident with the establishment of new NAAQSs, (b) development of reference and equivalent method designation requirements associated with new FRMs, (c) primarily technical and associated administrative services to evaluate and process applications for reference and equivalent method determinations and related activities under regulations at 40 CFR 53, as amended December 18, 2006, (d) research, investigation, and (if required) development of remedial techniques to resolve technical or implementation issues that may arise in the use of designated reference and equivalent methods in OAQPS's ambient air surveillance networks, and (e) development of new quality assurance procedures in connection with new

or existing NAAQSs. The Process Modeling Research Branch (PMRB) of NERL is currently responsible for administering this program.

SCOPE

The contractor shall carry out activities related to the processing and technical evaluation of reference or equivalent method applications under EPA regulations at 40 CFR 53, as revised December 18, 2006. The various activities that are required under this task are described in the "Reference and Equivalent Methods Program and Procedures Handbook" (RTI/7490/042-2D), May 2007. The contractor shall carry out only those tasks identified as not inherently governmental in nature.

TECHNICAL APROACH/OBJECTIVES

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

The specific task requirements for evaluation of each reference or equivalent method application may vary somewhat depending upon the specific circumstances of the particular application, which cannot be known until the application is received. In order to meet the 120-day regulatory deadline to respond to applications, the contractor shall evaluate and process each application expeditiously and in all cases shall complete the work not more than 110 calendar days after assuming custody of the application documents. In cases where additional information pertinent to a pending application is received subsequent to the first application review, the contractor shall continue the review activities to consider the new information, with an appropriate extended due date. To accommodate these conditions, the WA COR will issue a written technical directive to the contractor for each application to be processed, with copies furnished to the Project Officer (PO) and to the Contract Officer (CO). Each such technical directive will identify the application to be evaluated, specify any minor deviations in the evaluation protocol for the application, and identify the target date by which the deliverable(s) are to be provided to the WA COR.

The actual number of applications to be processed and the dates on which they will be received and available for processing is not known. However, it is assumed that evaluation of up to seven (7) applications will be required during the course of this Work Assignment. The contractor shall process applications as soon as practicable such that processing of any application is not unduly delayed by the processing of any other application. Technical evaluation and processing of requests for approval of modifications to existing reference or equivalent methods or similar requests shall be processed similarly, as appropriate to the nature of the request, with necessarily shorter completion times appropriate to the shorter regulatory deadline (30 days) for such requests. Any application materials identified as confidential business information (CBI) shall be treated in accordance with CBI regulations and policy restrictions.

Task 2. Investigation of Technical Issues

In support of the reference and equivalent methods program, the contractor shall conduct laboratory and/or field tests and/or other research activities, as appropriate or necessary, related to the investigation and resolution of potential measurement anomalies, interferences, or other technical deficiencies associated with samplers, analyzers, measurement principles or techniques used in designated reference or equivalent methods or related to a pending application. The contractor's work plan shall anticipate up to two (2) such investigations of modest scope. When such a support need arises, the WA COR will issue a written technical directive describing the technical question or issue to be investigated, the scope of the investigation, and the nature of the deliverable needed. If the nature of the issue is such that the scope of the investigation and/or its resolution will require substantial labor hours beyond the amount anticipated in the approved work plan, the contractor, upon receiving such a technical directive, shall prepare a research plan of specific activities to resolve the issue and an associated cost estimate. After review and acceptance of the plan, a written amendment to this work assignment may be issued for the contractor to conduct the proposed work.

QUALITY ASSURANCE (QA)

Standard "good laboratory practices" for maintaining notebooks shall be employed.

The contractor shall follow the protocols, procedures and guidelines of the "Reference and Equivalent Methods Program and Procedures Handbook" as revised May 2007.

Calibration and operation of scientific instruments shall be performed under existing SOPs contained in the Quality Assurance Project Plan "Maintenance, Management, Operation, and Analysis of the Aerosol Test Facility", which will be revised and updated under WA# 101.

DELIVERABLES

Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WA COR.

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

Preliminary results from the wind tunnel evaluation of the prototype inlets shall be provided in the form of spreadsheets and Word documents. Both hard copy and electronic formats of results shall be provided.

Task 2. Investigation of Technical Issues

The contractor shall provide a written report with results of each Technical Issue investigated.

SCHEDULE of DELIVERABLES

Work Plan: Within 20 days of receipt of the Work Assignment or as specified in the contract.

Task 1: As indicated in each Technical Directive issued.

Task 2: Target Delivery Date: 3/31/2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-101

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Robert Vanderpool	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-7877 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Wind Tunnel Evaluation of Candidate Size-Selective Particulate Matter Inlets

WA #: 101 WACOR: Robert Vanderpool

Contract #: EP-C-15-008 Alternate WACOR: Jonathan Krug

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The purpose of this Work Assignment is to conduct size selective evaluations of prototype and commercially available particulate matter (PM) inlets. Tests shall be conducted as a function of sampler design, wind speed, and aerodynamic particle size. Although a limited series of tests may be conducted using monodisperse aerosols, the primary focus of this Work Assignment shall be use of polydisperse aerosols in the range of 2 to 30 micrometers aerodynamic diameter.

BACKGROUND

Ambient particulate matter samples are routinely collected for purposes of conducting special research studies and for assessing compliance with ambient health regulations. Critical to the accurate collection and characterization of ambient particulate matter is the ability of the sampler's inlet to representatively obtain ambient samples independent of aerodynamic particle size and wind speed. However, guidelines for the design of accurate inlets do not exist and many commercially available samplers possess inlets for which no performance data actually exists. As a result, the overall ability of these samplers to accurately measure ambient particulate matter concentrations is highly questionable and results in large uncertainties in making firm observations and conclusions regarding collected ambient data. Research is needed, therefore, to determine the exact size selective performance of the most commonly used aerosol inlets for ambient sampling. Wind tunnel evaluation of size-selective samplers involves the use of references aerosol inlets which operate at known volumetric flow rates.

SCOPE

Wind tunnel tests of the prototype inlets shall be conducted such that an understanding of each inlet's size selective performance shall be obtained as a function of aerodynamic particle size and wind speed. For inlets which do not possess omnidirectional designs, the effect of sampler orientation versus wind direction shall also be determined.

TECHNICAL APROACH/OBJECTIVES

Task 1. Conduct Wind Tunnel Effectiveness Tests of Candidate Samplers

Based on Technical Directive provided by the WACOR, the contractor shall conduct wind tunnel evaluations of prototype samplers of up to seven separate samplers and associated inlet designs. Parameters of importance shall be sampler effectiveness as a function of wind speed (2, 8, and 24 km/hr) as a function of aerodynamic diameter and sampler flow rate. Depending upon the sampler under consideration, either monodisperse aerosols or polydisperse aerosols in the 2 to 30 micrometer size range shall be used.

Task 2. Data Analysis and Reporting

At the completion of Task 1, the contractor shall conduct an analysis of all experimental data collected during this WA. A final report shall be compiled which includes a summary of experimental techniques and results obtained.

All documents required under this Work Assignment shall be delivered to the WA COR and Project Officer (PO), both in hard copy and electronic format, as appropriate.

QUALITY ASSURANCE (QA)

Standard "good laboratory practices" for maintaining notebooks shall be employed.

Calibration and operation of scientific instruments shall be performed under existing SOPs contained in the Quality Assurance Project Plan "Maintenance, Management, Operation, and Analysis of the Aerosol Test Facility", which shall be revised by the contractor and approved by the WACOR and EPA HEASD QA Manager prior to the start of any work on this WA. The revised Quality Assurance Project Plan (QAPP) in Word format (.docx) shall be submitted within 20 days of receipt of the WA.

DELIVERABLES

Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WA COR. All documents required under this Work Assignment shall be delivered to the WA COR and Project Officer (PO), both in hard copy and electronic format, as appropriate.

Quality Assurance Project Plan (QAPP). The revised QAPP to be followed, as noted in the section titled "Quality Assurance, will be provided to the WACOR in Word (.docx) format within 20 days of receipt of the WA for review and approval prior to the start of any work on this WA.

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

Preliminary results from the wind tunnel evaluation of the prototype inlets shall be provided in the form of spreadsheets and Word documents. Both hard copy and electronic formats of results shall be provided.

Task 2. Data Analysis and Reporting.

At the completion of Task 1, the contractor shall conduct an analysis of all experimental data collected during this WA. A final report shall be compiled which includes a summary of experimental techniques and results obtained.

SCHEDULE of DELIVERABLES

Work Plan: Within 20 days of receipt of the Work Assignment or as specified in the contract.

QAPP: Within 20 days of receipt of the Work Assignment or as specified in the contract.

Task 1: As indicated in each Technical Directive issued.

Task 2: Target Delivery Date: 3/31/2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-101

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Robert Vanderpool
(Signature) (Date)
Branch/Mail Code:
Phone Number 919-541-7877
FAX Number:

Project Officer Name Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Wind Tunnel Evaluation of Candidate Size-Selective Particulate Matter Inlets

WA #: 101 Amendment 1 WACOR: Robert Vanderpool

Contract #: EP-C-15-008 Alternate WACOR: Jonathan Krug

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

The purpose of this Work Assignment is to conduct size selective evaluations of prototype and commercially available particulate matter (PM) inlets. Tests shall be conducted as a function of sampler design, wind speed, and aerodynamic particle size. Although a limited series of tests may be conducted using monodisperse aerosols, the primary focus of this Work Assignment shall be use of polydisperse aerosols in the range of 2 to 30 micrometers aerodynamic diameter.

BACKGROUND

Ambient particulate matter samples are routinely collected for purposes of conducting special research studies and for assessing compliance with ambient health regulations. Critical to the accurate collection and characterization of ambient particulate matter is the ability of the sampler's inlet to representatively obtain ambient samples independent of aerodynamic particle size and wind speed. However, guidelines for the design of accurate inlets do not exist and many commercially available samplers possess inlets for which no performance data actually exists. As a result, the overall ability of these samplers to accurately measure ambient particulate matter concentrations is highly questionable and results in large uncertainties in making firm observations and conclusions regarding collected ambient data. Research is needed, therefore, to determine the exact size selective performance of the most commonly used aerosol inlets for ambient sampling. Wind tunnel evaluation of size-selective samplers involves the use of references aerosol inlets which operate at known volumetric flow rates.

SCOPE

Wind tunnel tests of the prototype inlets shall be conducted such that an understanding of each inlet's size selective performance shall be obtained as a function of aerodynamic particle size and wind speed. For inlets which do not possess omnidirectional designs, the effect of sampler orientation versus wind direction shall also be determined.

TECHNICAL APROACH/OBJECTIVES

Task 1. Conduct Wind Tunnel Effectiveness Tests of Candidate Samplers

Based on Technical Directive provided by the WACOR, the contractor shall conduct wind tunnel evaluations of prototype samplers of up to five (5) separate samplers and associated inlet designs. Parameters of importance shall be sampler effectiveness as a function of wind speed (2, 8, and 24 km/hr) as a function of aerodynamic diameter and sampler flow rate. Depending upon the sampler under consideration, either monodisperse aerosols or polydisperse aerosols in the 2 to 30 micrometer size range shall be used.

Task 2. Data Analysis and Reporting

At the completion of Task 1, the contractor shall conduct an analysis of all experimental data collected during this WA. A final report shall be compiled which includes a summary of experimental techniques and results obtained.

All documents required under this Work Assignment shall be delivered to the WA COR and Project Officer (PO), both in hard copy and electronic format, as appropriate.

QUALITY ASSURANCE (QA)

Standard "good laboratory practices" for maintaining notebooks shall be employed.

Calibration and operation of scientific instruments shall be performed under existing SOPs contained in the Quality Assurance Project Plan "Maintenance, Management, Operation, and Analysis of the Aerosol Test Facility", which shall be revised by the contractor and approved by the WACOR and EPA HEASD QA Manager prior to the start of any work on this WA. The revised Quality Assurance Project Plan (QAPP) in Word format (.docx) shall be submitted within 20 days of receipt of the WA.

DELIVERABLES

Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WA COR. All documents required under this Work Assignment shall be delivered to the WA COR and Project Officer (PO), both in hard copy and electronic format, as appropriate.

Quality Assurance Project Plan (QAPP). The revised QAPP to be followed, as noted in the section titled "Quality Assurance, will be provided to the WACOR in Word (.docx) format within 20 days of receipt of the WA for review and approval prior to the start of any work on this WA.

Task 1. Technical Evaluation of Reference and Equivalent Method Applications.

Preliminary results from the wind tunnel evaluation of the prototype inlets shall be provided in the form of spreadsheets and Word documents. Both hard copy and electronic formats of results shall be provided.

Task 2. Data Analysis and Reporting.

At the completion of Task 1, the contractor shall conduct an analysis of all experimental data collected during this WA. A final report shall be compiled which includes a summary of experimental techniques and results obtained.

SCHEDULE of DELIVERABLES

Work Plan: Within 20 days of receipt of the Work Assignment or as specified in the contract.

QAPP: Within 20 days of receipt of the Work Assignment or as specified in the contract.

Task 1: As indicated in each Technical Directive issued.

Task 2: Target Delivery Date: 3/31/2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-111

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	111 NERL VOC lab support

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:
This Work Assignment is an amendment to the Work Assignment that was approved and sent March 29, 2015. Please provide a Work Plan and Cost Proposal by September 1, 2015.

☐ Superfund — **Accounting and Appropriations Data** — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Karen Oliver	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-2337 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: HEASD VOC Laboratory Support - Determination of Volatile Organic Compounds using Canisters and Sorbent Sampling Methodologies

WA #: 111 Amendment 1 WACOR: Karen Oliver

Contract #: EP-C-15-008 Alternate WACOR: Don Whitaker

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

To provide laboratory and data reduction/analysis support for the NERL HEASD VOC laboratory efforts associated with volatile organic compound (VOCs) analyses. The VOC laboratory is responsible for conducting research using whole air canister methods employing preconcentration/GC-MS techniques and sorbent tube sampling methods employing thermal desorption/GC-MS techniques as detailed in EPA SOPs. This WA also provides electronic shop support for repair and maintenance of VOC laboratory instrumentation as an additional component.

BACKGROUND

The NERL HEASD VOC laboratory provides analytical support and methods development activities for a variety of ORD and OAQPS research efforts. Following are examples of recent and current research activities that require contractor support.

Recent studies in the VOC laboratory have involved collaborations with commercial laboratories, vendors, regional laboratories, ORD laboratories (NRMRL) and OAQPS. The focus of these studies has been diffusive air monitoring at fence-line locations of facilities that emit fugitive and area sources of VOCs. These efforts are in support of OAQPS' proposed fence line monitoring rule for benzene and the associated Draft Methods 325A and 325B. A database of over 6000 sample analyses has been generated in association with these studies. The data include the results of experiments on sampling uptake rates, storage stability, and comparison of tubes from various vendors as well as numerous other experiments. Contractor support is needed to reduce subsets of these data using Excel spreadsheets and assist in preparing and editing journal articles on the data collected during these studies.

Current research efforts under ACE Task 135 include optimization of the determination of acrolein and associated VOCs in canisters using modified EPA Compendium Method TO-15 techniques. Contractor support is needed to clean canisters, prepare calibration standards of various gas mixtures in canisters, calibrate instrumentation, and analyze canister samples. Contractor support is needed to prepare and revise SOPs as necessary and also to prepare summary tables of data generated during the course of the work.

Other current research activities include the use of Carbopack X and other types of diffusive sampling tubes for sampling in indoor and outdoor environments in support of ACE Task 60 and other studies that are currently in the methods development phase. Contractor support is needed to condition Carbopack X and other types of diffusive sampling tubes for use, prepare calibration tube standards using the exposure chamber, monitor the exposure chamber concentrations using the Entech/GC-FID system, prepare and ship sampling tubes for use in field studies, aid in conducting various research experiments (reverse diffusion, temperature and humidity tests, etc.) for validation of target compounds to be collected on sorbent tubes, and analyze samples collected on tubes using thermal desorption/GC-MS techniques.

Additional background information and SOPs are presented in the following EPA-approved Category III QAPPs that are either current or historical for this WA:

- "ACE Task 135 – Improved Method for Measuring Acrolein,"
- "Collaborative Evaluation of a Low-Cost Volatile Organic Compound Passive Sampling Method and Laboratory Intercomparison," (ACE Task 60) and
- "Philadelphia Passive Sampler Method Study. EPA Region 3 Energy RARE Project", QLOG No. A-18508, QTRAK No. 13010.

SCOPE

The contractor shall provide technical support for the NERL HEASD VOC Laboratory as described in the Background and Technical Approach/Objectives.

TECHNICAL APPROACH/OBJECTIVES

Laboratory Activities

1. During periods of active laboratory analyses, the Contractor shall support on a daily basis and as needed, the preparation of canisters for sample collection, preparation of calibration standards in canisters, preparation of sorbent tubes for sample collection, and the preparation of calibration standards on sorbent tubes. The Contractor also shall support the sample analysis and data reduction of the monitoring system associated with the

canister/tube standards loading system (Entech/GC-FID system). In addition, the Contractor shall support the sample analysis and data reduction of canister and/or sorbent tubes using the HEASD VOC laboratory's PerkinElmer thermal desorption/Agilent GC-MS systems, Entech/GC-MS system, and the new Markes Unity/Almsco GC-TOF system. The Contractor shall maintain spreadsheets tracking sorbent tube usage and assist with routine maintenance of laboratory instrumentation. Additional information is provided in the following bullets. Laboratory activities are anticipated to occur for approximately 100% of the stated period of performance.

- The Contractor shall prepare approximately six multipoint calibration tube standard sets (with seven levels of 15 tubes per level expected for each set) using the EPA passive sampler exposure chamber and Carbopack X or similar tubes supplied by EPA.

- The Contractor shall operate the EPA Entech VOC Concentrator/GC-FID system in the exposure chamber laboratory to monitor chamber contents during tube exposures. The Contractor shall monitor GC-FID system stability, recalibrate the system as needed, and reduce, review and compile the analytical data generated with this system.

- The Contractor shall prepare tubes for shipment to the field based on schedules to be provided by EPA.

- The Contractor shall maintain summary spreadsheets of tubes conditioned, standards prepared, and theoretical and actual concentrations of VOCs in the exposure chamber (referencing actual tube identification numbers as appropriate) and provide summaries of the above activities with the monthly reports. VOCs to be reported for sorbent tube research efforts shall include but is not limited to the following compounds: 1,3-Butadiene, benzene, toluene, ethylbenzene, m-xylene, p-xylene, styrene, o-xylene, tetrachloroethene, and carbon tetrachloride.

- The Contractor shall develop methods for the determination of VOCs collected on sorbent tubes and in canisters for analysis using the new Markes Unity/Almsco GC-TOF system and shall analyze samples as needed.

2. The Contractor shall assist in the development and revision of QAPPs and SOPs as needed for laboratory instrumentation and methods. Additionally, the Contractor shall develop an SOP for the Entech 7200/Agilent GC-MS system as well as the new sorbent tube exposure chamber, the TurboMatrix ATD 650/Agilent GC-MS system, and the new Markes Unity/Almsco GC-TOF

system in the HEASD VOC laboratories. The Contractor shall also provide technical editorial review of the QAPPs and SOPs.

Publication Activities

3. The Contractor shall assist in the development and/or revision of as many as two publications on Carbopack X tube fenceline data and data associated with laboratory experiments. Efforts shall include the evaluation of storage stability and method validation experiments for VOCs collected diffusively on Carbopack X sorbent tubes. Activities anticipated for this task shall include but are not limited to conducting basic statistical analyses on existing datasets associated with storage stability, uptake rates, sorbent tube lot differences, methods validation experiments, and other experiments. Product will be graphs and tables for reports, publications, and presentations. The Contractor shall also provide the associated technical narratives for the statistical analyses. Data reduction activities and the development of narratives were begun under a work assignment on a previous contract and will serve as the basis of the currently requested publication activities. These data and documents will be supplied by the WA COR. The Contractor shall also provide technical editorial review of the associated completed documents. Details of this task component may need further clarification by the WACOR and Alternate WACOR through a technical discussion meeting to answer specific Contractor questions.

Electronic Shop Activities

4. The contractor shall provide electronics shop support for VOC laboratory instrumentation. The WACOR will provide technical direction to the contractor for evaluation of VOC laboratory instrumentation and associated equipment and the contractor shall diagnose and recommend repair options to the WA COR in an email. The WACOR will evaluate the recommendations and provide technical direction on how to repair equipment. The contractor shall repair equipment and purchase any required items needed for the repairs. In addition, the contractor shall purchase items needed for VOC laboratory instrumentation and associated equipment calibration based on technical direction of the WACOR.

QUALITY ASSURANCE

The Contractor shall use the existing EPA-approved Category III QAPPs listed in the SOW Background section above and update the QAPPs as needed. Only minor revisions to the QAPPs are expected such as updating organization charts and

staffing lists. The Contractor also shall prepare and revise SOPs for laboratory instrumentation and methods. Some of the specific SOPs to be developed are listed in the Deliverables section below, although additional SOPs may be developed as needed based on technical discussion with the WACOR and/or alternate WACOR. Calibrations of scientific instruments shall be performed under existing Standard Operating Procedures. Standard "good laboratory practices" for maintaining notebooks shall be employed.

DELIVERABLES

• The Contractor shall prepare an SOP for the Entech 7200/Agilent GC-MS system in the VOC laboratories. The final versions of the SOP is due on August 20, 2015.

• The Contractor shall provide spreadsheets; graphical presentations of data using Excel or other appropriate statistical software packages; and technical descriptions of statistical analyses and results for potential reports and journal articles for storage stability, uptake rate, comparison and additional VOC Laboratory studies for the set of VOCs listed above. These items are due on December 16, 2015.

• The Contractor shall prepare an SOP for the the new sorbent tube exposure chamber located in lab D260, the TurboMatrix ATD 650/Agilent GC-MS system system, and the new Markes Unity/Almsco GC-TOF system in the VOC laboratories. The draft versions of the SOPs are due on February 3, 2016, and the final versions are due on March 17, 2016.

• The Contractor shall provide a brief letter report containing the full listing of spreadsheets discussed above that were prepared for this project and documenting any additional supporting information on QA results and on any other topic that helps in interpretation of the results. This report is due on March 31, 2016.

SCHEDULE of DELIVERABLES

SOP on Entech 7200/Agilent GC-MS system – due 8/20/15

Spreadsheets/results for journal articles – due 12/16/15

SOPs on new sorbent tube exposure chamber, TurboMatrix ATD 650/Agilent GC-MS system, and the new Markes Unity/Almsco GC-TOF system – drafts due 2/17/2016 and final due 3/17/2016

Letter report – due 3/31/16

STAFFING QUALIFICATIONS

(a) The Contractor staff selected to conduct the laboratory work must have five or more years of experience in each of the following VOC laboratory activities: Handling Carbopack X tubes (conditioning tubes and preparing them for shipment); using the exposure chamber for preparing calibration standards diffusively on Carbopack X tubes; operating the PerkinElmer automated thermal desorption/Agilent GC-MS systems (Turbomatrix ATD and ATD 650) for the determination of VOCs collected on sorbent tube samples; operating Entech VOC concentrators (7100/7200)/Agilent GC-MS systems for the determination of VOCs collected in canisters; and operating VOC preconcentration (Nutech/Entech)/GC-FID (HP/Agilent) systems in the VOC laboratory.

(b) The contractor staff selected to conduct the electronics shop activities must have ten or more years of specialized experience in troubleshooting and repairing complex air monitoring analytical systems including VOC preconcentration systems and canister cleaning systems and fabricating dilution systems with supporting components such as data loggers and humidity/temperature sensors.

(c) Technical writing and editing assistance is needed for developing SOPs, reports, presentations, and journal articles. The technical writer/editor must have at least 10 years of experience in documenting laboratory procedures and instrumentation for environmental research.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-112

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: -

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Karen Oliver	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-2337 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Alternative Method Program for the Determination of Toxic Organic Compounds in Ambient Air

WA #: 112 WACOR: Karen Oliver

Contract #: EP-C-15-008 Alternate WACOR: Don Whitaker

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

As technology evolves and advancements are made in air toxics research, it is imperative that a program be in place to evaluate and incorporate this technology into methods that will be shared by the air toxics community. Establishing a program to manage past, present, and future Toxic Organic (TO) methods is an ongoing need currently not met. This alternative method program is intended to supplement the overall methods development program ongoing in ORD.

Research and technical support is needed which will include (1) support for the development and documentation of the process by which proposed TO method updates are to be submitted and evaluated, (2) technical review and evaluation of formal submissions received by EPA for consideration in updating the TO methods, (3) technical support related to the laboratory operation, performance, and quality assurance of proposed methods or method updates, and (4) research on new measurement technologies.

BACKGROUND

The current methods used for measuring air toxics (e.g. volatile organic chemicals, aldehydes and ketones, PAHs, metals) are presented in the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition (625/R-96/010b, January 1999). The methods were originally prepared and published in June of 1988 by William T. Winberry, Jr., and Norma T. Murphy of Engineering-Science and R. M. Riggan of Battelle-Columbus Laboratories under contract to the EPA. These first "TO Methods," as they are frequently referred to, consisted of guidance in the form of fourteen performance based methods for measuring various air toxics in ambient air. The 1988 compendium was prepared in response to comments generated by an earlier technical assistance document that was prepared by EPA and published in 1983 (EPA-600/4-83-027). In order to

produce the compendium publication, the authors consulted with scientists both within and outside the Agency to compile the processes of the time that were being used for measuring selected air toxics in ambient air. Two years later (1990) a hardbound copy of the methods was published as Methods for Determination of Toxic Organic Compounds in Air. This represented the state-of-the-science in 1990 and was a compilation of methods designed to provide guidance to regional, state, and local environmental regulatory agencies as well as industry on the determination of selected toxic organic compounds in ambient air. The guidance provided specific sampling and analysis procedures in a standardized format for selected toxic organic compounds.

In 1999, the National Risk Management Research Laboratory (NRMRL) contracted with Eastern Research Group (ERG) who in turn subcontracted with Midwest Research Institute (MRI) to publish the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition (625/R-96/010b, January 1999). This update contains seventeen peer reviewed performance based methods for the determination of volatile, semi-volatile, and selected toxic organic pollutants in ambient air. The intent of this update, as with the original, was to "assist Federal, State, and local regulatory personnel in developing and maintaining necessary expertise and up-to-date monitoring technology for characterizing organic pollutants in the ambient air." The updated methods were compiled from the best elements of methods used by various organizations and were not intended to be associated with specific regulatory purposes but instead were intended to provide technical support, guidance, and information transfer. While never intended to be anything other than guidance, many of these methods have been referenced by laboratories outside the Agency as EPA sanctioned methods.

These guidance methods last updated in 1999 are currently used by laboratories that provide data to EPA for the National Air Toxics Trends Station (NATTS) Network, the Urban Air Toxics Monitoring Program (UATMP), and the Community-Scale Air Toxics Ambient Monitoring Program (CSATAM). The primary objective of NATTS is to obtain a statistically significant quantity of high-quality air toxics measurements such that long-term trends can be identified. The primary objective of UATMP is to characterize the composition and magnitude of air toxics pollution through ambient air monitoring and the primary objective of CSATAM is to conduct local-scale investigative ambient air toxics monitoring projects. Air toxics measurement data generated from these methods are also incorporated in EPA's National Air Toxics Assessments (NATA) and for determining health risks. These programs generally rely on Compendium Methods TO-15 (VOCs by canister), TO-11A (carbonyls by DNPH cartridges), and TO-13A (PAHs).

Currently, there is no process in place for formally updating the Air Toxics Compendium methods. Over the past several years, there have been discussions both within and outside EPA regarding the fact that the Air Toxic Monitoring Methods are considerably outdated having last been revised in 1999. Parties

interested in these methods have questioned when they will be updated and have expressed a willingness to contribute to making needed revisions. Without a formal process to review and officially revise proposed changes to the methods, known problems with the current methods remain unresolved and advances in new technologies and research investments in these areas are stifled. Considering these continuing requests and acknowledging that no current process exists for updating these methods; interested staff from OSA, ORD, and OAQPS have been meeting to explore the possibility of establishing an alternative method program as a potential solution to address proposed updates for these methods.

While the process would apply to all Air Toxics Compendium methods in the (1999) compendium, specific methods of current interest are TO-11A: "Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge followed by High Performance Liquid Chromatography"; TO-15: "Determination of Volatile Organic Compounds in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography Mass Spectrometry"; and TO-17: "Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes". In addition to the above existing methods, a diffusive sampling sorbent tube method recently evaluated by EPA for use in the proposed refinery fence line monitoring rule for benzene (with application to other volatile organic compounds) has also been proposed for inclusion as an addition to the Compendium of Air Toxic Methods.

SCOPE

The contractor shall provide technical support for the following TO Method Update Program activities in two phases. The initial phase for which support is requested in this work assignment includes items (1) and (2) below whereas item (3) is expected to be addressed in a future work assignment amendment:

(1) Development of a process whereby proposed method changes or new methods will be submitted, reviewed and evaluated, (2) formal implementation of the process as an ongoing program that will include announcements of approved changes, replacement of existing air toxics compendium methods as appropriate, and the addition of new methods, and (3) laboratory support for the evaluation of proposed method updates. In order to conduct these TO Method Update Program activities, EPA requires technical and administrative support on an ongoing basis. The required technical and administrative support activities for the current work assignment are listed below under "Technical Approach/Objectives."

TECHNICAL APPROACH/OBJECTIVES

TO Method Update Support Activities

1. The contractor shall support the EPA TO Methods Update program in establishing and documenting the details of the program by providing relevant feedback and editorial support (this will require the expertise mentioned in the staffing qualifications in Section J) on the development of the foundation document of the processes by which interested parties are to submit TO Method updates or new methods for consideration by EPA. Language from the Drinking Water Program is currently being used as a guide.
2. The contractor shall begin to identify and assemble a panel of experts (e.g., staff members from ORD, OAQPS, and external parties such as those from EPA Regional Offices, state and commercial laboratories, etc.) who can be accessible on an ongoing basis to review alternative method submissions using the new TO Methods Update program procedures.
3. The contractor shall prepare an announcement of the program which is expected to be published in the Federal Register as a Notice only.
4. The contractor shall plan how to proceed with activities related to the processing and technical evaluation of method update proposals as follows: The contractor shall receive, review, and prepare a response to each submitter that includes an outline of the evaluation process regarding potential time frames; direct submitted update packages to appropriate reviewers and laboratory personnel as appropriate; assimilate comments from the reviewers; prepare submission package(s) of approved update(s) for posting on a dedicated website. The contractor shall carry out only those tasks identified as not inherently governmental in nature.
5. The contractor shall develop/support as needed a central website location to allow easy access by users of the methods and to document approved changes/comments.

Other Contractor Support Activities

6. As directed by the WA COR through technical directives, the contractor shall provide technical editing and graphics support (if applicable) for work performed under this work assignment, as may be necessary or incidental.

QUALITY ASSURANCE

Standard "good laboratory practices" for maintaining notebooks shall be employed.

For guidance, the contractor shall refer to the protocols, procedures and guidelines of the "Reference and Equivalent Methods Program and Procedures Handbook" as

revised May 2007 and also to the Broadly Applicable Alternative Method Program documents and the "NRMRL QAPP Requirements for Software Development Projects" both of which will be provided by the WA COR upon initiation of the WA.

DELIVERABLES

• The Contractor shall prepare a notice regarding the Alternative Method Program for the Determination of Toxic Organic Compounds in Ambient Air for publication in the Federal Register. The final version of the notice is due on October 30, 2015.

• The Contractor shall prepare the foundation document for the program which shall include input from the WA COR, alternate WA COR and members of the Alternative Method Program team. This document is due on January 15, 2016.

• The Contractor shall provide a list of review panel members and their contact information. This list is due on January 15, 2016.

• The Contractor shall prepare a brief letter report detailing the activities that were conducted/completed during the period of performance. This report is due on March 31, 2016.

SCHEDULE of DELIVERABLES

Federal Register notice – due 10/30/15

Foundation document – due 1/15/16

List of review panel members and contact information – due 1/15/16

Letter report – due March 31, 2016

STAFFING QUALIFICATIONS

The contractor staff selected for this WA must have experience in the following areas:

Five or more years of experience in data review, validation and document preparation for EPA alternative method programs and familiarity with the Federal Register and posting relevant notices therein.

Working knowledge of EPA TO Compendium methods and procedures such as but not limited to the following: Method TO14, Method TO15, and Method TO17 for air samples collected in canisters or on sorbent tubes.

Working knowledge of GC, GC-MS, and GC-TOF instrumentation, thermal desorption and VOC concentration instrumentation from various vendors to

facilitate the review and validation of data packages submitted by the monitoring community.

Ability to provide relevant feedback (this will require the expertise mentioned in the items above) and editorial support on the development of the foundation document of the processes by which interested parties are to submit TO Method updates or new methods for consideration by EPA. In addition, technical writing and editing assistance is needed for developing the foundation document. The technical writer/editor must have at least 8 years of experience in documenting laboratory procedures and instrumentation for environmental research.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-112

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name: 112 qarf amend

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Karen Oliver
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-2337
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Alternative Method Program for the Determination of Toxic Organic Compounds in Ambient Air

WA #: 112 Amendment 1 WACOR: Karen Oliver

Contract #: EP-C-15-008 Alternate WACOR: Don Whitaker

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

As technology evolves and advancements are made in air toxics research, it is imperative that a program be in place to evaluate and incorporate this technology into methods that will be shared by the air toxics community. Establishing a program to manage past, present, and future Toxic Organic (TO) methods is an ongoing need currently not met. This alternative method program is intended to supplement the overall methods development program ongoing in ORD.

Research and technical support is needed which will include (1) support for the development and documentation of the process by which proposed TO method updates are to be submitted and evaluated, (2) technical review and evaluation of formal submissions received by EPA for consideration in updating the TO methods, and (3) technical support related to the laboratory operation, performance, and quality assurance of proposed methods or method updates as well as research on new measurement technologies.

BACKGROUND

The current methods used for measuring air toxics (e.g. volatile organic chemicals, aldehydes and ketones, PAHs, metals) are presented in the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition (625/R-96/010b, January 1999). The methods were originally prepared and published in June of 1988 by William T. Winberry, Jr., and Norma T. Murphy of Engineering-Science and R. M. Riggan of Battelle-Columbus Laboratories under contract to the EPA. These first "TO Methods," as they are frequently referred to, consisted of guidance in the form of fourteen performance based methods for measuring various air toxics in ambient air. The 1988 compendium was prepared in response to comments generated by an earlier technical assistance document that was prepared by EPA and published in 1983 (EPA-600/4-83-027). In order to

produce the compendium publication, the authors consulted with scientists both within and outside the Agency to compile the processes of the time that were being used for measuring selected air toxics in ambient air. Two years later (1990) a hardbound copy of the methods was published as Methods for Determination of Toxic Organic Compounds in Air. This represented the state-of-the-science in 1990 and was a compilation of methods designed to provide guidance to regional, state, and local environmental regulatory agencies as well as industry on the determination of selected toxic organic compounds in ambient air. The guidance provided specific sampling and analysis procedures in a standardized format for selected toxic organic compounds.

In 1999, the National Risk Management Research Laboratory (NRMRL) contracted with Eastern Research Group (ERG) who in turn subcontracted with Midwest Research Institute (MRI) to publish the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition (625/R-96/010b, January 1999). This update contains seventeen peer reviewed performance based methods for the determination of volatile, semi-volatile, and selected toxic organic pollutants in ambient air. The intent of this update, as with the original, was to "assist Federal, State, and local regulatory personnel in developing and maintaining necessary expertise and up-to-date monitoring technology for characterizing organic pollutants in the ambient air." The updated methods were compiled from the best elements of methods used by various organizations and were not intended to be associated with specific regulatory purposes but instead were intended to provide technical support, guidance, and information transfer. While never intended to be anything other than guidance, many of these methods have been referenced by laboratories outside the Agency as EPA sanctioned methods.

These guidance methods last updated in 1999 are currently used by laboratories that provide data to EPA for the National Air Toxics Trends Station (NATTS) Network, the Urban Air Toxics Monitoring Program (UATMP), and the Community-Scale Air Toxics Ambient Monitoring Program (CSATAM). The primary objective of NATTS is to obtain a statistically significant quantity of high-quality air toxics measurements such that long-term trends can be identified. The primary objective of UATMP is to characterize the composition and magnitude of air toxics pollution through ambient air monitoring and the primary objective of CSATAM is to conduct local-scale investigative ambient air toxics monitoring projects. Air toxics measurement data generated from these methods are also incorporated in EPA's National Air Toxics Assessments (NATA) and for determining health risks. These programs generally rely on Compendium Methods TO-15 (VOCs by canister), TO-11A (carbonyls by DNPH cartridges), and TO-13A (PAHs).

Currently, there is no process in place for formally updating the Air Toxics Compendium methods. Over the past several years, there have been discussions both within and outside EPA regarding the fact that the Air Toxic Monitoring Methods are considerably outdated having last been revised in 1999. Parties

interested in these methods have questioned when they will be updated and have expressed a willingness to contribute to making needed revisions. Without a formal process to review and officially revise proposed changes to the methods, known problems with the current methods remain unresolved and advances in new technologies and research investments in these areas are stifled. Considering these continuing requests and acknowledging that no current process exists for updating these methods; interested staff from OSA, ORD, and OAQPS have been meeting to explore the possibility of establishing an alternative method program as a potential solution to address proposed updates for these methods.

While the process would apply to all Air Toxics Compendium methods in the (1999) compendium, specific methods of current interest are TO-11A: "Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge followed by High Performance Liquid Chromatography"; TO-15: "Determination of Volatile Organic Compounds in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography Mass Spectrometry"; and TO-17: "Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes". In addition to the above existing methods, a diffusive sampling sorbent tube method recently evaluated by EPA for use in the proposed refinery fence line monitoring rule for benzene (with application to other volatile organic compounds) has also been proposed for inclusion as an addition to the Compendium of Air Toxic Methods.

SCOPE

The contractor shall provide technical support for the following TO Method Update Program activities. The initial phase for which support was requested in the initial work assignment includes items (1) and (2) below and this amendment now includes item (3) below to the scope of work:

(1) Development of a process whereby proposed method changes or new methods will be submitted, reviewed and evaluated, (2) formal implementation of the process as an ongoing program that will include announcements of approved changes, replacement of existing air toxics compendium methods as appropriate, and the addition of new methods, and (3) laboratory support for the evaluation of proposed method updates and research on new measurement technologies. In order to conduct these TO Method Update Program activities, EPA requires technical, administrative, and laboratory support on an ongoing basis. The required technical and administrative support activities for the current work assignment are listed below under "Technical Approach/Objectives."

TECHNICAL APPROACH/OBJECTIVES

TO Method Update Support Activities

1. The contractor shall support the EPA TO Methods Update program in establishing and documenting the details of the program by providing relevant feedback and editorial support (this will require the expertise mentioned in the staffing qualifications in Section J) on the development of the foundation document of the processes by which interested parties are to submit TO Method updates or new methods for consideration by EPA. Language from the Drinking Water Program is currently being used as a guide.
2. The contractor shall begin to identify and assemble a panel of experts (e.g., staff members from ORD, OAQPS, and external parties such as those from EPA Regional Offices, state and commercial laboratories, etc.) who can be accessible on an ongoing basis to review alternative method submissions using the new TO Methods Update program procedures.
3. The contractor shall prepare an announcement of the program which is expected to be published in the Federal Register as a Notice only.
4. The contractor shall plan how to proceed with activities related to the processing and technical evaluation of method update proposals as follows: The contractor shall receive, review, and prepare a response to each submitter that includes an outline of the evaluation process regarding potential time frames; direct submitted update packages to appropriate reviewers and laboratory personnel as appropriate; assimilate comments from the reviewers; prepare submission package(s) of approved update(s) for posting on a dedicated website. The contractor shall carry out only those tasks identified as not inherently governmental in nature.
5. The contractor shall develop/support as needed a central website location to allow easy access by users of the methods and to document approved changes/comments.

Other Contractor Support Activities

6. As directed by the WA COR through technical directives, the contractor shall provide technical editing and graphics support (if applicable) for work performed under this work assignment, as may be necessary or incidental.

Laboratory Support Activities

7. As directed by the WA COR through technical directives, the contractor shall provide laboratory support for the evaluation of proposed method updates as well as research on new measurement technologies. The exact nature and scope of the laboratory research is not known at this time as it is to a large extent dependent on the update packages received from the air monitoring community, and these packages are not anticipated to be received until late

in the base period of the contract. For the purposes of costing this WA, the WA COR anticipates that the laboratory operations would require support from January through March 2016 and will include editorial staff as well as laboratory staff to assist with development of any necessary QAPPs and SOPs that are not currently available from the WA COR. A minimal amount of electronics shop staff support is also requested to facilitate instrument troubleshooting and repair as well as certification activities for the laboratory.

QUALITY ASSURANCE

Standard "good laboratory practices" for maintaining notebooks shall be employed.

For guidance, the contractor shall refer to the protocols, procedures and guidelines of the "Reference and Equivalent Methods Program and Procedures Handbook" as revised May 2007 and also to the Broadly Applicable Alternative Method Program documents and the "NRMRL QAPP Requirements for Software Development Projects" both of which will be provided by the WA COR upon initiation of the WA.

As this WA progresses and evaluation and development of measurement methods begins to become a priority of the WA, the contractor shall assist with the development of QAPPs that address the pertinent needs of each particular project. The WA COR will relay specifics of QAPP development by technical directive as these specifics are not known at this time and will be dependent on the packages that are received from the air monitoring community.

DELIVERABLES

• The Contractor shall prepare the foundation document for the program which shall include input from the WA COR, alternate WA COR and members of the Alternative Method Program team. This document is due on January 15, 2016.

• The Contractor shall provide a list of review panel members and their contact information. This list is due on January 15, 2016.

• The Contractor shall prepare a notice regarding the Alternative Method Program for the Determination of Toxic Organic Compounds in Ambient Air for publication in the Federal Register. The final version of the notice is due on January 30, 2016.

• The Contractor shall prepare a brief letter report detailing the activities that were conducted/completed during the period of performance. This report is due on March 31, 2016.

SCHEDULE of DELIVERABLES

Foundation document – due 1/15/16

List of review panel members and contact information – due 1/15/16

Federal Register notice – due 1/30/16

Letter report – due March 31, 2016

STAFFING QUALIFICATIONS

The contractor staff selected for this WA must have experience in the following areas:

Five or more years of experience in data review, validation and document preparation for EPA alternative method programs and familiarity with the Federal Register and posting relevant notices therein.

Working knowledge of EPA TO Compendium methods and procedures such as but not limited to the following: Method TO14, Method TO15, and Method TO17 for air samples collected in canisters or on sorbent tubes.

Working knowledge of GC, GC-MS, and GC-TOF instrumentation, thermal desorption and VOC concentration instrumentation from various vendors to facilitate the review and validation of data packages submitted by the monitoring community.

Ability to provide relevant feedback (this will require the expertise mentioned in the items above) and editorial support on the development of the foundation document of the processes by which interested parties are to submit TO Method updates or new methods for consideration by EPA. In addition, technical writing and editing assistance is needed for developing the foundation document. The technical writer/editor must have at least 8 years of experience in documenting laboratory procedures and instrumentation for environmental research.

In addition, the contractor staff selected to conduct the electronics shop activities must have ten or more years of specialized experience in troubleshooting and repairing complex air monitoring analytical systems including VOC preconcentration systems and canister cleaning systems and fabricating dilution systems with supporting components such as data loggers and humidity/temperature sensors.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-113

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-113 Investigations of Atm...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 5, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Michael Lewandowski (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-9421 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work
WA Title: Investigations of Atmospheric Chemistry Processes that Control Ambient Concentrations of Ozone, $PM_{2.5}$, and Air Toxic Compounds.

WA #: 113
Contract #: EP-C-15-008

WACOR: Michael Lewandowski
Alternate WACOR: Tad Kleindienst

PERIOD OF PERFORMANCE
The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015, through March 31, 2016.

SUMMARY OF OBJECTIVES

1. Participate in smog chamber experiments designed to generate secondary inorganic aerosol and secondary organic aerosol (SOA), in order to identify and determine the concentrations of SOA compounds of individual atmospherically relevant hydrocarbons and mixtures of hydrocarbons. The focus of these present set of experiments will be on determining SOA parameters from hydrocarbons that may be of importance in SOA formation, particularly in urban airsheds, under both neutral and acidic conditions. Provide laboratory data and analysis of SOA products from the oxidation of these precursor hydrocarbons, and write up data reports and/or journal articles.

2. Measure concentrations of gas and aerosol phase multi-functional polar compounds and high molecular weight organic compounds in ambient and laboratory samples using derivatization, advanced gas and liquid chromatography/mass spectrometry, and Aerosol Mass Spectrometry (AMS) methods.

3. Conduct chamber and modeling studies of the smog chamber chemistry to improve the gas-phase chemistry of ozone, nitric acid, air toxics, and SOA formed in reactive hydrocarbon/NO_X, hydrocarbon/OH, or hydrocarbon/NO_3 systems.

4. Conduct analytical measurements on samples collected at study sites designated by EPA.

5. Provide support for conducting measurements of aerosol optical thickness from organic carbon formed from chemical reactions for parameters important in radiative forcing considerations related to global climate.

BACKGROUND

Chemical mechanisms are required for developing strategies for controlling ambient $PM_{2.5}$, O_3 and air toxic compounds. Carefully controlled smog chamber experiments, where hydrocarbons are irradiated in the presence of an oxidant (NO_X, H_2O_2 to produce OH radicals in the absence of NO_X, or N_2O_5 as an NO_3 radical source) and secondary gas and aerosol species are measured, provide critical chemical data needed to develop and evaluate gas and aerosol chemical mechanisms. Smog chamber experiments also provide

data for improving air quality modeling O_3, SOA, and secondary air toxic carbonyl compounds (e.g., HCHO, CH_3CHO, or CH_2=CHCHO). Atmospheric chemistry studies will be conducted using a "one-atmosphere" approach and where gas and aerosol parameters are determined simultaneously during an experiment. In cases where the chemical mechanism is too complex, experiments are conducted to parameterize an effect as a function of a measurable quantity (e.g., SOA yield as function of reacted hydrocarbon or mass of organic aerosol mass).

During the previous contract, EP-D-10-070, the EPA-NERL-HEASD on-site contractor carried out smog chamber experiments to determine the importance of SOA compounds from specific HC/oxidant mixtures. Comprehensive organic analysis of the chamber effluent and $PM_{2.5}$ samples was required. The smog chamber samples were analyzed for organic and inorganic composition, with special emphasis placed on the analyses of multi-functional polar organic compounds serving as tracer compounds representative of SOA formation. Laboratory-based mass fractions for SOA were then applied to field study samples to estimate the contribution of SOA from anthropogenic and biogenic precursors. Most recently, mass fraction factors were determined from naphthalene, methylnaphthalenes, and 2-methyl-3-buten-2-ol (MBO).

SCOPE

In this contract period, the contractor shall extend these SOA experiments to provide critical data needed by EPA to assess the impact of SOA from reactions of NO_X, OH, and NO_3 under more extensive conditions. This will include samples from both laboratory experiments and field campaigns. The contractor shall participate in smog chamber experiments designed by EPA to evaluate air quality and climate effects (e.g., aerosol optical depth) from OH initiated reactions with selected hydrocarbons. Experiments will also be designed to study the effect of photochemical mixtures generated from single hydrocarbons or complex sources irradiated in the smog chamber in E 180-M or in the Mobile Chamber system.

TASKS

Task 1. Smog Chamber Investigation

The contractor shall participate in and provide support for laboratory smog chamber experiments. Support shall include maintenance/upkeep of assigned equipment (including the GC-MS system, AMS system, and other chamber-related equipment), repair/troubleshooting of chamber-related instrumentation as needed (including gas monitors, flow controllers, thermostated baths, control devices, etc.), procurement of reactants and sampling media, and synthesis select reagents (such as N_2O_5, methyl nitrite, etc.). The contractor shall be responsible for AMS sampling as directed, and for collection of filter/denuder samples as needed for offline analyses. Collection of samples may include preparation of denuders or filter media, obtaining blanks and background samples, and solvent extraction operations. The contractor shall perform all necessary calibrations and blank

checks in accordance with QA guidelines. The contractor shall insure that all appropriate safety precautions are followed when conducting laboratory experiments. The experimental schedule is expected to include this level of support for approximately 20 dynamic runs and 20 static runs. Each of the chamber experiments will be designed by the NERL WACOR, with the experimental conditions communicated to the contractor through a technical communication during weekly technical meetings. EPA reserves the right to substitute dynamic for static experiments on a one (dynamic) for two (static) basis.

Task 2. Smog Chamber Samples: Advanced Organic Analyses
The contractor shall analyze by mass spectroscopic methods filter or denuder extracts generated from Task 1 experiments. The contractor shall extract denuder or filter samples for each experiment and analyze them for their organic contents according to previously established SOPs. After derivatization by using the O-(2,3,4,5,6,-pentafluorobenzyl)-hydroxylamine (PFBHA) method, the bis-trimethylsilyl-trifluoroacetamide (BSTFA) method, and the boron trifluoride (BF_3) method, or combinations of these techniques, the contractor shall analyze each sample using gas chromatography mass spectroscopy (GC-MS) along with a set of standards that have been approved by EPA. The contractor shall provide interpretation and, where applicable, quantification of the collected MS data.

The contractor shall also analyze, as required, aerosol samples collected in the laboratory for their peroxide content using a derivatization and UV-visible spectroscopic technique. The contractor shall also make measurements of the N_2O_5 concentrations using an NO titration technique using a line-heated zone together with a standard NO_X analyzer.

The contractor shall use the Aerosol Mass Spectrometer to characterize the inorganic and organic components of chamber aerosol during controlled irradiations. The EPA WA COR will provide design details and technical references, as needed.

Task 3. Analysis of $PM_{2.5}$ Field Samples
In the summer of 2013, EPA participated in the Secondary Organic Aerosol Study (SOAS) at a site in the southeastern US (Centreville, AL) and on the EPA RTP campus (AIRS site). The contractor shall complete the analysis of samples and data collected during these studies, including analysis of filter samples by GC-MS and analysis of collected AMS data. The contractor shall provide analysis and interpretation of secondary tracers from analyzed SOAS field study samples in combination with optical analyses to be performed by EPA staff. Reporting of data to appropriate SOAS-specific databases will be required. Extraction and detailed organic analysis of additional filter samples collected in other applicable field sampling locations may also be performed, time permitting.

QUALITY ASSURANCE

The work is to be conducted under the Quality Assurance Project Plan for Investigations of Atmospheric Chemical Processes that Control Ambient

Concentrations of Ozone, $PM_{2.5}$, and Air Toxic Compounds (QAPP-MJ-13-02, Dated: 05/31/2013) written and approved under contract EP-D-10-070 and updated during Option Period 3. Calibrations of scientific instruments shall be performed under existing Standard Operating Procedures found in the QAPP. Standard "good laboratory practices" for maintaining notebooks shall be employed by all staff. If updates to the QAPP or the development of new methods or analytical procedures is deemed necessary, appropriate SOPs will be generated and the QAPP amended as needed.

DELIVERABLES

1) Weekly progress meetings shall be held with the WACOR to discuss technical progress during the week and specific experiments for the following week.

2) Electronic files shall be provided containing all standard chemical analysis data from the chamber. The data will be presented in Excel spreadsheet, where applicable. The spreadsheet files will include data from, for example, analysis of compounds on filter samples. Plots of all relevant data shall be provided. These outputs are required within 2 week of the completion of experiment. The contractor must immediately notify EPA if this schedule cannot be achieved for any experiment and provide the date that the data will be submitted. Following each experiment, a debriefing can be conducted during the weekly meeting to discuss any problems that occurred during the run.

3) Electronic files containing all GC-MS data for each smog chamber experiment or field sample. These files should include both raw GC data files and any appropriate worksheets that incorporate integration, quantification, and calibrations for specific compounds of interest. These outputs are required within 6 weeks of when the samples were submitted to the contractor. The contractor must immediately notify EPA if this schedule cannot be achieved for any experiment and provide the date that the data will be submitted.

4) Each set of electronic files is a final document and shall contain (1) field/laboratory conditions, (2) a description of analytical methods and models employed, (3) raw data including chromatograms and GC-MS spectra, (4) concentrations for all compounds and a description of how the concentrations were calculated, (5) all QA/QC data of sufficient detail, as required for an external audit that may occur at a future date.

5) All data from generated from field samples shall be provided for review and formatted for submission to study-related databases in appropriate formats (i.e., ICART format).

6) If updates to the QAPP or new analytical methods or analytical procedures are developed in the course of the work, proper SOPs will be generated within 2 weeks, and QAPP updates (if necessary) within one month of the changes.

STAFFING REQUIREMENTS

Government analysis of labor mix required to conduct the research under this work assignment: 0.75 FTE physical scientist with expertise in GC/ITMS analysis and analytical procedures for the work up of filter extracts for organic tracer analysis; 0.75 FTE physical scientist to operate the AMS and conduct data analysis for the instrument; 0.25 FTE general maintenance/technical support.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-114

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-114 Ambient Air Monitoring..

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 5, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:
This package is with the CO now. This work has court-mandated timelines and it must resume as soon as possible to meet them.

The PWS and other files have been re-reviewed (7-9-15) and are accurate.

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Russell Long	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-7744 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Ambient Air Monitoring Methods Assessment and Development for Criteria Gas National Ambient Air Quality Standards

WA #: 114 **WACOR:** Russell W. Long

Contract #: EP-C-15-008 **Alternate WACOR:** Rachelle Duvall

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

The National Exposure Research Laboratory, by agreements with the Office of Air Quality Planning and Standards, provides assessment, research and development of air monitoring methods in connection with existing or new national ambient air quality standards (NAAQS) for the Criteria gas pollutants of ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), and carbon monoxide (CO). This research results in the development of federal reference methods (FRM) which are subsequently used to monitor compliance with the corresponding NAAQS. These reference methods are also routinely used for evaluation of federal equivalent methods (FEMs), and as such, there is a need to assess, revise and/or update these reference and/or equivalent methods to meet the current and future NAAQS requirements. There is an additional need for research in the development of new FRMs for newly proposed primary and secondary NAAQS.

BACKGROUND

The NAAQS monitoring regulations require that state, local and Tribal air monitoring agencies must use only EPA-designated reference or equivalent methods in their ambient air monitoring networks to determine compliance with the criteria gas NAAQS. The current reference methods, listed in Appendix to 40CFR50, for monitoring O3 and NO2 are more than three decades old and in some cases based on obsolete technology. For SO2, the FRM has recently been updated however, there is significant uncertainty regarding the applicability of the new FRM under low or background concentration conditions such as those that might be experienced in the proposed SOx-NOx secondary NAAQS monitoring pilot study network. There is also a need to evaluate and develop a new reference method for the NOy indicator of the proposed SOx-NOx secondary NAAQS. These reference methods also serve as a basis for evaluation of federal equivalent methods (FEMs) for US EPA designation.

SCOPE

By agreement with OAQPS, NERL provides the necessary research for the assessment and development of reference and equivalent methods for ambient air monitoring coincident with the establishment of new or revised NAAQS. The Process Modeling Research Branch is currently responsible for administering the Reference and Equivalent Methods program and managing/coordinating the efforts of reviewing and revising and/or updating these reference methods. Research and technical support is needed in revision and/or update of the current FRMs and assessment of current and future FEMs.

TECHNICAL APROACH/OBJECTIVES

Task 1. Technical review of NO2, NOy and other gas phase criteria pollutant methods. The contractor shall perform review of the current gas phase reference methods, listed in Appendices to 40 CFR 50, to determine whether the specified method (a) is still appropriate and widely in use, (b) is based on the modern technology, and (c) and will meet the current and anticipated future NAAQS requirements, including use in secondary NAAQS monitoring networks. The contractor shall also perform review of the novel methodology for the determination of O3, "true" NO2 and other gas phase criteria pollutants in ambient air. As needed, the contractor will perform the appropriate literature search, review existing publications and reports, discuss with expert scientists in that field, and contact the instrument manufacturers. Based on the technical review findings, the contractor will provide a summary of the status of the current FRM and make recommendations regarding revision and/or update of the current reference method. The WA COR will assign priority to the methods to be reviewed and will issue technical directive to the contractor that will identify the material to be evaluated, specify the approach and protocols for the review, and identify the target date by which the deliverable(s) are to be provided to the WA COR.

Task 2. Revision or Update of O3, NO2, and other gas phase criteria pollutant Reference Methods and Development of New FRMs - Based upon technical directive from the WACOR, the contractor will prepare necessary materials to be included in proposed and final rulemaking packets to be published in the Code of Federal Register. During this process, the contractor will review both Parts 50 and 53 of the 40 CFR and ensure consistency in language and technical requirements. This effort will be coordinated with OAQPS. The technical directive will identify the requirements for the revision and/or update of the FRM, specify the protocols, and identify the target date by which the deliverable(s) are to be provided to the WA COR. Any materials identified as CBI shall be treated in accordance with CBI regulations and policy restrictions.

Task 3. Laboratory and ambient assessment and data analysis of NO2, NOy, O3 and other criteria pollutant methods for use as primary and secondary NAAQS FRMs/FEMs. The contractor shall conduct laboratory and ambient based research activities, as appropriate or necessary, related to the assessment and development

of new reference and equivalent methods for NO2, NOy, O3, and other criteria pollutants. The research may include investigation of novel measurement technologies associated with the individual NAAQS criteria pollutants and the applicability of these method to the routine monitoring for NAAQS compliance, resolution of potential measurement uncertainties, interferences, or other technical problems associated with samplers, analyzers, measurement principles or techniques. This work may be performed both in a laboratory setting under controlled conditions and during ambient studies. The contractor support shall include, but is not limited to site, laboratory, and instrument set-up; instrument calibration; instrument maintenance (through the electronics shop); daily operation; performance audits; and data retrieval activities. The contractor shall compile the resulting test data and perform numerical and statistical analysis, as needed. Data may also be obtained or supplemented from other existing sources such as the FEM program, other monitoring programs and studies and scientific publications and reports. The WA COR will issue technical directive identifying the locations and durations of the laboratory and/or ambient/field studies, technical problem or methodology to be researched or investigated and the scope of the research. It is anticipated that the ambient based studies will be performed at the AIRS sampling site in RTP and at the CAPABLE sampling site at NASA LaRC. In addition, up to one field campaigns at a location and time TBD may be performed during this performance period.

Task 4. Provide on-site technical support for identification and evaluation of next generation air monitoring methods for the gas phase criteria pollutants including NO2 and O3. Based upon technical direction from the WACOR, the contractor shall conduct laboratory and ambient based research activities, as appropriate or necessary, related to the evaluation of next generation air monitoring methods for O3, NO2, and other gas phase criteria pollutants. The research may include investigation of sensor measurement technologies associated with the individual NAAQS criteria pollutants and the applicability of these methods to the routine ambient monitoring. This work will be performed primarily in an ambient setting but may also involve controlled laboratory evaluations. The contractor support shall include, but is not limited to deployment of methods to ambient and laboratory sites; set-up, calibration and maintenance (through the electronics shop) of O3, NO2, and other reference instrumentation; daily site/laboratory operation; and data retrieval activities. The contractor shall compile the resulting test data and perform numerical and statistical analysis, as needed. The WA COR will issue technical directive identifying the locations and durations of the laboratory and/or ambient/field studies, technical problem or methodology to be researched or investigated and the scope of the research. It is anticipated that the ambient based studies will be performed at the AIRS sampling site in RTP and at the CAPABLE sampling site at NASA LaRC. In addition, up to one field campaigns at a location and time TBD may be performed during this performance period.

QUALITY ASSURANCE

The contractor shall follow the detailed quality assurance project plans (QAPPs) "Ambient Air Monitoring Methods Assessment and Development for Criteria Gas National Ambient Air Quality Standards" (QAPP-AB-12-02) and "ORD Sensor/Application Test Bed Challenge: Investigation of App/Sensor Response under Controlled Laboratory Conditions" (QAPP-AB-12-03" for the tasks mentioned in the above section. These QAPPs cover laboratory and ambient methods and procedures relevant to O3, NO2, and other criteria gas pollutants.

DELIVERABLES

A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), PO and WA COR within 20 days of receipt of the Work Assignment or as specified in the contract.

The contractor shall provide deliverable(s) as indicated in each technical directive.

Progress on ancillary support shall be documented in the monthly reports, and shall be provided on an as-needed basis.

SCHEDULE of DELIVERABLES

The schedule for deliverable(s) will be provided in each technical directive.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-115

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	Next Gen Air Mon...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 5, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Ronald Williams	(Signature) (Date)	Branch/Mail Code: Phone Number 919-541-2957 FAX Number:
Project Officer Name Kevin Sudderth	(Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Next Generation Air Monitoring Technical Support

WA #:115 WACOR: Ron Williams

Contract #: EP-C-15-008 Alternate WACOR: Gayle Hagler

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

This work assignment shall provide field and/or laboratory technical support involving the evaluation of Next Generation Air Monitor (NGAM) technologies. Such evaluations shall be associated with operation of the devices under conditions defined by the WA COR to provide for their comparison with reference monitors (e.g. FRMs, FEMS, or as designated by the WA COR). To assist the Contractor in understanding the full measure of this WA and development of their cost estimate, a kick off meeting will be held upon award at a time/date of the WA COR selection.

It is anticipated this meeting shall occur within two weeks of the WA initiation date as ongoing field work in the Atlanta, GA area must be maintained in support of this work assignment with minimal interruption. This kick off meeting shall involve key Contractor personnel associated with those anticipated to be involved in field-based evaluation/deployment of low cost sensor technologies and those involved in laboratory evaluation of said technologies. The Contractor is encouraged to review materials on the US EPA's Citizen Science Air Toobox website (www.epa.gov/heasd/airsensortoolbox) **and** (http://www.epa.gov/ttn/amtic/files/2014conference/thubrowngarver.pdf) **as additional background information as to the previous work conducted in support of this research area. . A recent EPA publication highlights general work areas to be covered under this work assignment such as the CAIRSENSE and NGAM sensor evaluation research areas (http://pubweb.epa.gov/ttn/amtic/files/2014conference/tuewatkins.pdf).**

The Contractor shall conduct efforts related to current (existing) field deployment/operation of the CAIRSENSE field site through the end of April 2015 followed by device recovery and refurbishment as instructed through technical direction. CAIRSENSE represents an NGAM test bed where such sensor technology is being directly compared with Federal Reference Method data (FRM). Regional authorities are operating the FRM instrumentation and making data available to ORD in support of this work. Operations at the Atlanta site of CAIRSENSE will be

completed by the late Spring following by the project moving to Denver to test cold weather capabilities of the NGAM instrumentation. Establishment of one or more monitoring platforms to support redeployment activities in or around the Denver, Colorado area shall be performed. Such redeployment activities shall begin in the summer of 2015. The WACOR will provide technical direction on the exact timing and nature of all such redeployment activities.

While the primary objective of this work assignment shall be operation of said NGAM devices under field and/or laboratory conditions, secondary objectives as per technical direction shall involve Contractor evaluation/summarization of NGAM produced test data.

BACKGROUND

ORD has been conducting a variety of both laboratory and field based evaluation of Next Generation Air Monitors (NGAM). . This new work assignment will provide for carry-on activities in support of previously defined research plans.. These previous efforts have included laboratory and/or field evaluations of numerous criteria air pollutant NGAM devices (e.g., nitrogen dioxide, ozone, particulate matter, volatile organic compounds, sulfur dioxide). ORD has published findings from some of these efforts through is Citizen Science Air Toolbox website.

During recent years, there have been significant advances in air pollution sensor technology. Specifically, sensors are now being developed that are much smaller and lower cost than traditional ambient air monitoring systems, with promising data. These types of sensors present an opportunity to advance EPA's strategic goals including community monitoring and environmental justice. One of the potential benefits of these sensors is the ability to deploy a larger number of sensors across a small geographic area (e.g. a neighborhood) and collect data with a level of geographic and temporal resolution that would be cost-prohibitive using traditional monitoring methods.

One such opportunity that ORD has engaged in involves a regional methods project (CAIRSENSE) that intends to evaluate the data quality and utility of the next generation of commercially-available air quality monitoring instrumentation. This project has resulted in the deployment of lower cost, continuous, commercially available monitoring methods at a state or local air agency-operated NCore[1] air monitoring site (Atlanta, GA) to evaluate the quality of data obtained with these new methods versus traditional reference or equivalency methods. In addition, the field deployment has provided the means to test the utility of a low cost wireless sensor network by putting in place several low cost sensors equipped with radio transmitters that allow for wireless data transmission up to a mile or more. This aspect of the project will allow evaluation of deploying these types of monitors to provide a higher level of spatial characterization than has been affordable with traditional air monitoring techniques. Field

[1] NCore sites are part of a national network of multi-pollutant stations intended to provide in-depth measurements of the precursors to ozone and fine particle pollution.

support associated with the CAIRSENSE efforts associated with the Atlanta, GA location will conclude by the end of April 2015 with redeployment of many of its same components to a reference monitor site(s) in or around the Denver, CO area. This redeployment will provide ORD the ability to investigate sensor performance under a significantly different environment (temperature/humidity) as that previously encountered in Atlanta.

Likewise, ORD will be continuing to pursue select onsite laboratory and local (RTP) field site evaluations of NGAM technologies as the opportunity arises. This new work assignment will make provision for such efforts as per technical direction as discovery of new NGAM devices become available over the period of performance.

SCOPE

The Contractor shall conduct laboratory activities as designated by the WA COR onsite at the EPA-RTP campus. Such laboratory activities shall involve potential refurbishment of NGAM devices in preparation for redeployment to Denver as well as select laboratory evaluation versus reference monitors. The WA COR shall provide technical direction on the NGAM devices to be recovered/refurbished/evaluated under laboratory conditions.

Field efforts involving non-local travel requirements shall be limited to the Atlanta, GA and Denver, CO areas. Local EPA RTP air monitoring platforms (AIRS-EPA RTP campus and/or EPA Triple Oaks Near Road trailer) shall be used for all required (non-CAIRSENSE) field efforts.

The WA COR shall provide full technical direction on the types, number, and length of deployment involving all NGAM devices. Contractor acquisition of some low cost NGAMs shall be performed under this work assignment with property accounting performed by the Contractor in support of ORD property maintenance requirements.

TECHNICAL APROACH/OBJECTIVES

Task #1. CAIRSENSE maintenance and deployment

The Contractor shall maintain an existing CAIRSENSE five-node (5) system providing multipollutant readings on a continuous basis, operating on battery and/or solar power, and communicating wirelessly located in Atlanta, GA. All existing monitoring components are to be maintained (collecting data) through April 30, 2015. The stations are designed to operate in environments with and without cell phone signal, therefore local transmission of data using alternate communications protocols (e.g., ZigBee) and on-site data storage are incorporated into the design, as well as an option for the base station to transmit the multi-site data team via cell modem to a contractor-supported server at a one minute time resolution. Target pollutants and specific air sensors as currently defined at the CAIRSENSE monitoring site are to be considered the basis for the support. Any differentiation of the existing CAIRSENSE operation will be defined by technical direction through the WACOR. Such technical

direction would be expected to occur as NGAM devices have failures or other information indicates either their removal or replacement as test conditions/data findings change. The existing multipollutant CAIRSENSE nodes are estimated to have a replacement value of $3500 each, which includes the cost of 3-4 individual pollutant sensors, enclosure, communications, and power. This information is being provided to the Contractor for informational purposes only as there will eventually be the need to migrate the CAIRSENSE from Atlanta to Denver. To the greatest extent possible, existing NGAM devices currently involved in the project will be transferred to Denver and as directed by the WA COR.

The Contractor shall recover all CAIRSENSE items from Atlanta with the exception of the "chicken coop" central platform stand at the conclusion of April 2015. Said materials shall be transported back to the EPA-RTP campus and at the technical direction of the WA COR made ready for redeployment to the next CAIRSENSE site in Denver, CO. It is anticipated that activities needed to refurbish said NGAM devices shall include some laboratory calibration/audits where such activities can be performed.

It is anticipated that redeployment of the central CAIRSENSE test platform ("chicken coop") and any WA COR designated nodes shall be initiated on or about June 2015. The Contractor shall make ready the Denver, CO deployment sites in advance of such activities. The WA COR shall provide assistance in this effort through direct contact with Region 8 officials who have control and access to the planned deployment sites. The contractor shall build and install a structure supporting field testing of sensors next to designated reference stations in the Denver area (as per the Atlanta example). The structure shall provide space, power, and ventilation for small sensors. The structure shall support pole-mountable sensors as well as sensors that have minimal weather protection in their design. The structure shall provide continuous air ventilation to expose sensors without inlets to ambient conditions. In the event the WA COR provides technical direction on evaluation of new NGAMS previously not operating at the Atlanta site, the contractor shall acquire low cost sensors of interest for testing, with a total expenditure estimated at $15,000, with each of 20 sensors estimated at $500-1000 each. The COR shall approve the selection of all such sensors associated with this task. The contractor shall test each sensor for a minimum of 30 days, with the testing detailed in the Quality Assurance Project Plan (QAPP) which will be provided by the WACOR. The contractor shall also provide technical support for ad-hoc testing of such NGAM devices.

To facilitate deployment in Denver, the contractor shall fabricate an enclosure meeting goals of an unobtrusive, compact, and rugged design in like manner to that deployed earlier in Atlanta (Sensor adhoc field testing-SAFT) and incorporating a wireless sensor network-WSN). The contractor shall conduct preliminary testing to evaluate the spatial range possible of the CAIRSENSE, with and without additional small communication relay points incorporated into the deployment. While such a range has been defined for the Atlanta site, different geographical conditions might exist in the Denver area requiring such activities. Even so, the Contractor shall use preexisting information gained from the Atlanta site in establishing the aforementioned spatial range of sensor and relay nodes. Technical direction provided by the WA COR will ultimately establish the full number of nodes to be deployed but for estimation purposes the Contractor shall base their estimate on a total of 8 nodes of which five (5) will be partially constructed of node materials previously used in the Atlanta effort (material costs of ~1.5K each). The new nodes shall be constructed with estimated material costs of ~ 4K based upon previous work in Atlanta. The Contractor shall provide a separate cost estimate associated with operation of the eight (8) node system. The contractor shall test the reliability of the CAIRSENSE data

communications and storage, in the event of a communications disturbance (node failure, loss of cell signal). The contractor shall install the CAIRSENSE at sites selected by the WACOR, which are anticipated to be located in and around the Denver area. Rooftop as well as ground-based locations might be involved. Access to the sites will occur through an ORD-Region 8 agreement and the Contractor will not be responsible for acquiring the rights to locate any of the primary or secondary sensor sites. One site visit is anticipated to be required in support of the field deployment in Denver. The contractor shall maintain the CAIRSENSE sites and contractor-held database for the duration of testing. The database, updated every minute by the CAIRSENSE sites, shall be web-available for restricted viewing by EPA during testing. The Contractor shall maintain the Denver test site(s) through February 2016 with the provision that all materials located at the Denver sites be recovered, returned (EPA-RTP campus), and accounted for by the conclusion of the performance period (by March 31, 2016).

Task #2 EPA-RTP Laboratory/Field site NGAM Evaluation of Select Sensors

While the majority of NGAM evaluations shall take place through the CAIRSENSE test platforms, technical direction from the WA COR shall require select laboratory and/or field evaluations under variable test conditions to be performed. These would be in like manner to those reported on the Citizen Science Air Toolbox website involving nitrogen dioxide, ozone, and volatile organic compound chamber evaluations. Discovery of new NGAMs by the WA COR shall be the primary means by which such evaluations are to be considered. The Contractor shall not be required to conduct such opportunities without direct technical direction of the WA COR. For estimating purposes, the Contractor shall estimate a maximum of 5 (five) sensor devices being identified by the WA COR with their individual costs being no greater than $2500 each. The Contractor shall be required to acquire all identified NGAMS not provided directly by the WA COR. Field collocation evaluations at local EPA facilities shall typically be performed for 30 days. The EPA WA COR will provide all necessary reference data. The Contractor shall be responsible for development of all standard operating procedures and to their approval by the WA COR prior to any evaluation efforts. The Contractor shall summarize findings between test NGAMS and reference monitoring data as directed by the WA COR at the conclusion of each test period.

Similarly, discovery of new NGAM devices may provide for the opportunity for select laboratory scale evaluations. These might consist of direct challenge conditions for such pollutants as nitrogen dioxide, ozone, carbon monoxide, and select volatile organic compounds. Any and all such devices would be tested under technical direction provided by the WA COR. For estimating purposes, the Contractor shall consider that the aforementioned acquisition of five NGAM devices would be inclusive of any laboratory-based device and therefore no additional expense to the work assignment. The Contractor shall consider that a maximum of 45 days of labor would be needed to meet all expected laboratory-based NGAM evaluations.

There exists the possibility that some ongoing data data collections under earlier support effortswill not be summarized as of April 1, 2015. The Contractor shall make provision for summarizing said data following its release by the WA COR. For estimating purposes, a

maximum of 40 hours shall be used to address this possibility in the cost estimate. The WA COR will provide technical direction on any and all such follow on activities.

QUALITY ASSURANCE (QA)

Quality Assurance Project Plans (QAPPs) and their associated Research/Standard Operating Procedures (ROPs/SOPs) that define a majority of the expected work are already in existence (NERL QAPPS QAPP-RM-13-01 (1) "Quality Assurance Project Plan – PM and VOC Sensor Evaluation" and QAPP-AB-12-03 "Quality Assurance Project Plan - ORD Sensor/Application Test Bed Challenge: Investigation of App/Sensor Response under Controlled Laboratory Conditions". In addition, the existing NRMRL/NERL CAIRSENSE Regional Monitoring QAPP (QTRAK No. 14012) is in effect. QA guidelines associated with these three previously approved documents will be maintained under the new Contractor and their quality assurance structure has been fully identified. A new QAPP that will integrate all of the previous individual QAPPs (and Contractor efforts) will be developed by the summer of 2015 to cover the tasks associated with this SOW. SOPs will be developed as stated in Deliverable 2.1 in the "Deliverables and their Schedule" section below.

DELIVERABLES and their Schedule

Task 1 CAIRSENSE

Deliverable 1.1. The contractor shall provide a short report detailing lessons learned from the Atlanta CAIRSENSE design, communications range/durability tests, and estimated maintenance requirements (battery usage, sensor replacement), on or about 6/30/2015.

Deliverable 1.2. The contractor shall maintain the CAIRSENSE web-available database through the end of the performance period (3/31/2016).

Deliverable 1.3. The contractor shall provide raw and processed field data every 30 days during field testing, with the data provided within 21 days of the conclusion of each sampling month where field deployment is active (Atlanta/Denver). The processing steps will be provided in the project specific QAPP to be developed as noted in the Quality Assurance section above

Deliverable 1.4. The contractor shall provide a two-page summary per sensor of the sensor field set-up, data logging process, and observations of utility for routine data collection, within 30 days of sampling completion for any sensor not previously defined by the Atlanta CAIRSENSE efforts (Denver only).

Deliverable 1.5. The contractor shall provide raw and processed data for each sensor on a monthly basis, with the data provided within 21 days of the conclusion of each sampling month. A COR-approved version of an Excel workbook is an acceptable means of Contractor submission of both raw and processed data. The processing steps will be provided in the project specific QAPP to be developed as noted in the Quality Assurance section above.

Task #2 EPA- RTP Laboratory/Field site NGAM Evaluation of Select Sensors

Deliverable 2.1. The Contractor shall provide a WA COR approved standard operating procedure for any NGAM device a minimum of 14 (fourteen) days prior to field deployment or initiation of any laboratory-based effort.

Deliverable 2.2. The Contractor shall provide full release of all data collected from laboratory and field evaluations within 90 days of said completion effort. An Excel data format is required unless specific technical direction by the WA COR is provided in advance.

Deliverable 2.3. The Contractor shall provide an initial report-based summary of test conditions and findings of all evaluations by March 1, 2016. The WA COR shall provide an example of an acceptable format and content in advance of this date. A WA COR approved final report(s) shall be provided by March 31, 2016.

Deliverable 2.4 The Contractor shall develop WA COR directed data summaries from any necessary follow on efforts from the previous WA 4-03 field data collections and deliver such summaries in an WA COR acceptable format by June 30, 2015.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-115

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008	Contract Period: 04/01/2015 To 03/31/2016 Base X Option Period Number	Title of Work Assignment/SF Site Name: 115 Next Gen Air Monitoring
Contractor: JACOBS TECHNOLOGY INC.	Specify Section and paragraph of Contract SOW	

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 08/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Ronald Williams (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-2957 FAX Number:	
Project Officer Name: Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name: Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work

WA Title: Next Generation Air Monitoring Technical Support

WA #:115 WACOR: Ron Williams

Contract #: EP-C-15-008 Alternate WACOR: Gayle Hagler

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from the time of award through March 31, 2016.

SUMMARY OF OBJECTIVES

This work assignment shall provide field and/or laboratory technical support involving the evaluation of Next Generation Air Monitor (NGAM) technologies. Such evaluations shall be associated with operation of the devices under conditions defined by the WA COR to provide for their comparison with reference monitors (e.g. FRMs, FEMS, or as designated by the WA COR). To assist the Contractor in understanding the full measure of this WA and development of their cost estimate, a kick off meeting will be held upon award at a time/date of the WA COR selection. It is anticipated this meeting shall occur within one week of the WA initiation date as critical project sensitive ongoing field work in the Denver, Colorado area must be maintained in support of this work assignment with minimal interruption. This kick off meeting shall involve key Contractor personnel associated with those anticipated to be involved in field-based evaluation/deployment of low cost sensor technologies and those involved in laboratory evaluation of said technologies. The Contractor is encouraged to review materials on the US EPA's Citizen Science Air Toobox website (www.epa.gov/heasd/airsensortoolbox) **and** (http://www.epa.gov/ttn/amtic/files/2014conference/thubrowngarver.pdf) **as additional background information as to the previous work conducted in support of this research area. A recent EPA publication highlights general work areas to be covered under this work assignment such as the CAIRSENSE and NGAM sensor evaluation research areas (http://pubweb.epa.gov/ttn/amtic/files/2014conference/tuewatkins.pdf).**

The Contractor shall conduct efforts related to current operation of the CAIRSENSE-Atlanta field site data portal followed by device recovery at the end of the performance period as instructed through technical direction. CAIRSENSE represents an NGAM test bed where such sensor technology is being directly compared with Federal Reference Method data (FRM). Regional authorities are operating the FRM instrumentation and making data available to ORD in support of this work. Operations at the Atlanta site of CAIRSENSE have been significantly reduced with only minimal nodal sensor operation still in place. The primary CAIRSENSE efforts shall be

associated with moving the sensor test system to Denver to investigate cold weather capabilities of the NGAM instrumentation. Establishment of a monitoring platform to support redeployment activities in the Denver, Colorado area (CAMP-Community Air Monitoring Platform) shall be performed. Such redeployment activities shall begin in August 2015. The WACOR will provide technical direction on the exact timing and nature of all such redeployment activities.

While the primary objective of this work assignment shall be operation of said NGAM devices under field and/or laboratory conditions, secondary objectives as per technical direction shall involve Contractor evaluation/summarization of NGAM produced test data.

BACKGROUND

ORD has been conducting a variety of both laboratory and field based evaluation of Next Generation Air Monitors (NGAM). This new work assignment will provide for carry-on activities in support of previously defined research plans. These previous efforts have included laboratory and/or field evaluations of numerous criteria air pollutant NGAM devices (e.g., nitrogen dioxide, ozone, particulate matter, volatile organic compounds, sulfur dioxide). ORD has published findings from some of these efforts through is Citizen Science Air Toolbox website.

During recent years, there have been significant advances in air pollution sensor technology. Specifically, sensors are now being developed that are much smaller and lower cost than traditional ambient air monitoring systems, with promising data. These types of sensors present an opportunity to advance EPA's strategic goals including community monitoring and environmental justice. One of the potential benefits of these sensors is the ability to deploy a larger number of sensors across a small geographic area (e.g. a neighborhood) and collect data with a level of geographic and temporal resolution that would be cost-prohibitive using traditional monitoring methods.

One such opportunity that ORD has engaged in involves a regional methods project (CAIRSENSE) that intends to evaluate the data quality and utility of the next generation of commercially-available air quality monitoring instrumentation. This project has resulted in the deployment of lower cost, continuous, commercially available monitoring methods at a state or local air agency-operated NCore[1] air monitoring site (Atlanta, GA) to evaluate the quality of data obtained with these new methods versus traditional reference or equivalency methods. In addition, the field deployment has provided the means to test the utility of a low cost wireless sensor network by putting in place several low cost sensors equipped with radio transmitters that allow for wireless data transmission up to a mile or more. This aspect of the project will allow evaluation of deploying these types of monitors to provide a higher level of spatial

[1] NCore sites are part of a national network of multi-pollutant stations intended to provide in-depth measurements of the precursors to ozone and fine particle pollution.

characterization than has been affordable with traditional air monitoring techniques. Field support associated with the primary CAIRSENSE efforts associated with the Atlanta, GA location have concluded with only a few nodel sites operating. The primary Atlanta base station components shall be redeployed to a reference monitor site in Denver, CO. This redeployment will provide ORD the ability to investigate sensor performance under a significantly different environment (temperature/humidity) as that previously encountered in Atlanta.

SCOPE

The Contractor shall conduct laboratory activities as designated by the WA COR onsite at the EPA-RTP campus as needed in support of CAIRSENSE-Denver field deployment efforts. Such laboratory activities shall involve potential refurbishment of NGAM devices in preparation for redeployment to Denver as well as select laboratory evaluation versus reference monitors. The WA COR shall provide technical direction on the NGAM devices to be recovered/refurbished/evaluated under laboratory conditions.

Field efforts involving non-local travel requirements shall be limited to the Atlanta, GA and Denver, CO areas. Local EPA RTP air monitoring platforms (AIRS-EPA RTP campus and/or EPA Triple Oaks Near Road trailer) shall be used as needed to prepare CAIRSENSE sensors for the Denver deployment.

The WA COR shall provide full technical direction on the types, number, and length of deployment involving all NGAM devices. Contractor acquisition of some low cost NGAMs shall be performed under this work assignment with property accounting performed by the Contractor in support of ORD property maintenance requirements. The Contractor shall work with incumbent Contractor (Alion Science and Technology) to ensure a smooth transition of ongoing work effort shall occur with respect to NGAM deployment to the Denver location, especially with respect to NGAM devices and other-related components in the incumbent's possession.

TECHNICAL APROACH/OBJECTIVES

Task #1. CAIRSENSE maintenance and deployment

The Contractor shall maintain data storage (server access) for an existing CAIRSENSE-Atlanta three-node (3) system providing multipollutant readings on a continuous basis, operating on battery and/or solar power, and communicating wirelessly located in Atlanta, GA. Communication with Alion shall be necessary to ensure a smooth transition of this support as the data server they currently provide is secured under a contracted service and maintaining the current data format is a component of the CAIRSENSE QAPP. Data server capability for the CAIRSENSE-Atlanta node system is to be maintained (collecting data) through March 1, 2016 unless it is ended earlier under WA COR technical direction. The Contractor shall estimate a

maximum of two days of technical support associated with electrical engineering personnel skilled with the CAIRSENSE-Atlanta telecommunications protocols in the event troubleshooting is necessary. All such efforts are to be conducted only after approval through technical direction. The stations are designed to operate in environments without cell phone signal, therefore local transmission of data using alternate communications protocols (e.g., ZigBee) and on-site data storage are incorporated into the design, as well as transmission of the multi-site data team via cell modem to a Contractor-supported server at a one minute time resolution.

The Contractor shall make ready the CAIRSENSE Denver, CO deployment site and its primary equipment in advance of field deployment. . The WA COR shall provide assistance in this effort through direct contact with Region 8 officials who have control and access to the planned deployment sites. The Contractor shall install a WA approved "chicken coop" structure supporting field testing of sensors atop a designated reference station in the Denver area (as per the Atlanta example). The structure shall provide space, power, and ventilation for small sensors. The structure shall support pole-mountable sensors as well as sensors that have minimal weather protection in their design. The structure shall provide continuous air ventilation to expose sensors without inlets to ambient conditions. In the event the WA COR provides technical direction on evaluation of new NGAMS previously not operating at the Atlanta site, the contractor shall acquire low cost sensors of interest for testing, with a total expenditure estimated at $5,000. The COR shall approve the selection of all such sensors associated with this task. Any Contractor sensor test shall be performed in full agreement with the CAIRSENSE Quality Assurance Project Plan (QAPP) that has been developed and is in operation by the WACOR.

The Contractor shall install the CAIRSENSE-Denver sensor test bed at the Denver CAMP location in August and on dates approved by the WA COR. The Contractor shall travel to Denver to install the CAIRSENSE test bed and ensure all sensors are working and that data storage/transmission systems are functioning. Ease of use data recovery steps shall be put into practice so that in the event the WA COR or his local Denver collaborator (State of Colorado/Region 8) wishes to recover electronic data the means to do so exist. A number of the CAIRSENSE sensors will be uploading data to proprietary third party webservers. The Contractor will be provided access to these websites and will be responsible for recovering electronic data on a weekly basis from the primary data storage system it will establish at the CAMP station as well as downloads from the third party web servers described above. The Contractor shall review the recovered data to inspect it for potential sensor or other failures on a weekly basis. The Contractor shall estimate that the full recovery (download and transfer) of data as well as a review of initial data quality shall not exceed a maximum of 4 hours per week in labor hours. Data format for these recovered data sets provided to the WA COR shall meet WA COR approved formats in like manner to those defined in the CAIRSENSE QAPP. Access to the CAMP site will occur through an ORD-Region 8 agreement and the Contractor will not be responsible for acquiring the rights to locate any of the sensors. One primary site visit is

anticipated to be required in support of the field deployment in Denver. The contractor shall maintain the CAIRSENSE site and Contractor-held database for the duration of testing. The database, updated every minute by the CAIRSENSE site, shall be web-available for restricted viewing by EPA during testing. The Contractor shall maintain the Denver test site through February 2016 with the provision that all materials located at the Denver site be recovered and then returned (EPA-RTP campus), and accounted for by the conclusion of the performance period (by March 31, 2016. It is anticipated that the Contractor will have minimal travel to the CAMP location once the initial deployment has been performed. The Contractor shall estimate a total of three (3) trips to occur for any maintenance/troubleshooting of the deployed systems at the CAMP location. To the greatest extent possible the WA COR will rely upon local Region 8 collaborators to conduct any initial investigation of instrument failure. All travel to the CAMP location shall first be reviewed and approved by Technical Direction of the WA COR.

Task #2 EPA-RTP Laboratory/Field site NGAM Evaluation of Select Sensors

While the majority of NGAM evaluations shall take place through the CAIRSENSE test platform, technical direction from the WA COR shall require select laboratory and/or field evaluations under variable test conditions to be performed. These would be in like manner to those reported on the Citizen Science Air Toolbox website involving nitrogen dioxide, ozone, and volatile organic compound chamber evaluations. Discovery of new NGAMs by the WA COR shall be the primary means by which such evaluations are to be considered. The Contractor shall not be required to conduct such opportunities without direct technical direction of the WA COR. For estimating purposes, the Contractor shall estimate a maximum of 5 (five) sensor devices being identified by the WA COR with their individual costs being no greater than $2500 each. The Contractor shall be required to acquire all identified NGAMS not provided directly by the WA COR. Field collocation evaluations at local EPA facilities shall typically be performed for 30 days. The EPA WA COR will provide all necessary reference data. The Contractor shall be responsible for development of all standard operating procedures and to their approval by the WA COR prior to any evaluation efforts. The Contractor shall summarize findings between test NGAMS and reference monitoring data as directed by the WA COR at the conclusion of each test period.

Similarly, discovery of new NGAM devices may provide for the opportunity for select laboratory scale evaluations. These might consist of direct challenge conditions for such pollutants as nitrogen dioxide, ozone, carbon monoxide, and select volatile organic compounds. Any and all such devices would be tested under technical direction provided by the WA COR. For estimating purposes, the Contractor shall consider that the aforementioned acquisition of five NGAM devices would be inclusive of any laboratory-based device and therefore no additional expense to the work assignment. The Contractor shall consider that a maximum of 45 days of labor would be needed to meet all expected laboratory-based NGAM evaluations.

QUALITY ASSURANCE (QA)

Quality Assurance Project Plans (QAPPs) and their associated Research/Standard Operating Procedures (ROPs/SOPs) that define a majority of the expected work are already in existence (NERL QAPPS QAPP-RM-13-01 (1) "Quality Assurance Project Plan – PM and VOC Sensor Evaluation" and QAPP-AB-12-03 "Quality Assurance Project Plan - ORD Sensor/Application Test Bed Challenge: Investigation of App/Sensor Response under Controlled Laboratory Conditions". In addition, the existing NRMRL/NERL CAIRSENSE Regional Monitoring QAPP (QTRAK No. 14012) is in effect. QA guidelines associated with these three previously approved documents will be maintained under the new Contractor and their quality assurance structure has been fully identified. A QAPP amendment is in place that has integrated all of the previous individual QAPPs (and Contractor efforts) to cover the tasks associated with this SOW. The WA COR will amend that document as needed in support of SOPs added to the study protocol. SOPs will be developed as stated in Deliverable 2.1 in the "Deliverables and their Schedule" section below.

DELIVERABLES and their Schedule

Task 1 CAIRSENSE

Deliverable 1.1. The contractor shall maintain the CAIRSENSE-Atlanta web-available database through the end of the performance period (3/31/2016) and share said data with the WA COR on a monthly basis.

Deliverable 1.2. The Contractor shall complete refurbishment/preparation of all NGAMS associated with the CAIRSENSE-Denver field site and deploy said hardware no later than August 31, 2015.

Deliverable 1.3. Data shall be recovered from all NGAM devices deployed in Denver every week and inspected for operational status of all devices and evidence of instrument malfunction. The Contractor shall provide electronic copies of field data from the Denver CAIRSENSE site once per month in a WA COR approved manner defined by the CAIRSENSE QAPP. A COR-approved version of an Excel workbook is an acceptable means of Contractor submission of both raw and processed data. The processing steps has been defined in the CAIRSENSE QAPP.

Deliverable 1.4. The contractor shall provide a two-page summary per sensor of the sensor field set-up, data logging process, and observations of utility for routine data collection, within 30 days of sampling completion for any sensor not previously defined by the Atlanta CAIRSENSE effort (Denver only).

Task #2 EPA- RTP Laboratory/Field site NGAM Evaluation of Select Sensors

Deliverable 2.1. The Contractor shall provide a WA COR approved standard operating procedure for any NGAM device a minimum of 14 (fourteen) days prior to field deployment or initiation of any laboratory-based effort.

Deliverable 2.2. The Contractor shall provide full release of all data collected from laboratory and field evaluations within 90 days of said completion effort. An Excel data format is required unless specific technical direction by the WA COR is provided in advance.

Deliverable 2.3. The Contractor shall provide an initial report-based summary of test conditions and findings of all evaluations by March 1, 2016. The WA COR shall provide an example of an acceptable format and content in advance of this date. A WA COR approved final report(s) shall be provided by March 31, 2016.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-119

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-119 Wind Tunnel Page Road

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2, 4, 6

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name David Heist	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-1199 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Statement of Work

WA Title: Fluid Modeling Facility Wind Tunnel Studies

WA #: 119 WACOR: David Heist

Contract #: EP-C-15-008 Alternate WACOR: Val Garcia

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

The purpose of this work assignment is to support the Fluid Modeling Facility's experimental research of flow and dispersion within the laboratory wind tunnel. Projects include the modeling of building downwash and flow around tiered buildings and multiple buildings. The goals are to develop a characterization of dispersion of steady state emissions of pollutants for various source configurations and an examination of the effects of individual, multiple and tiered buildings.

BACKGROUND

Air emissions in urban areas and near buildings contribute significantly to overall exposure from air pollutants in many areas of the country. Pollutant monitoring alone cannot provide the temporal and spatial detail generally needed for regulatory work, exposure assessments and health studies. Therefore, air quality models are critical for providing reliable estimates of exposure and risk. The development and evaluation of such models require relevant laboratory and/or field measurements of flow and dispersion in the vicinity of buildings. The EPA's Fluid Modeling Facility has a long history of wind tunnel studies of flow around individual structures and arrays of model buildings and is well suited for developing databases of flow and dispersion for use in model building and testing. The databases generated in this work assignment will be critical to the enhancement of building downwash algorithms and urban dispersion algorithms.

SCOPE

This task is intended to provide an experimental data base from which dispersion model algorithms for simulating building downwash phenomena can be developed and evaluated. The scope of this work assignment includes the design of wind tunnel experiments, the construction and installation of the scale models into the tunnel, the collection of velocity and concentration data and the analysis and documentation of the experiments and the results. The experimental measurement scheme shall be designed to provide a description of downwash phenomena in the

vicinity of multi-tier and multiple generic model buildings as well as that in the vicinity of a scale-model of an actual industrial facility.

TECHNICAL APROACH/OBJECTIVES

Task 1: With the goal of providing physical modeling data for dispersion model algorithm evaluation, the WACOR will specify the geometry of a model of an actual operational industrial facility (e.g. scale model of the Millstone Nuclear Power Station) at a complex industrial site with operational source parameters.

The contractor shall design a measurement scheme and collect concentration and velocity data to describe building downwash phenomena around the model station. Ground-level, longitudinal, lateral, and vertical profiles of concentrations shall be measured downwind of the stack.

In all model scenarios, the contractor shall perform measurements using Hydrocarbon Analyzers and Laser Doppler Anemometry. This work shall include tracer concentration and velocity measurements in and around the stack/building combinations comprising the models. Model configurations shall make use of a boundary layer developed to simulate onshore flow in a coastal area with a roughness length of 0.08m (at a scale of 1:400). The contractor shall process and document the data and store it in spreadsheet format. The contractor shall review for quality, graph, and analyze the data and document the results. The contractor shall additionally document the experimental design and setup, the measurement protocol, and the resulting data file structure.

Task 2: With the goal of providing physical modeling data for dispersion model algorithm development, the WACOR will specify model geometry for generic building combinations and locations of neutrally buoyant tracer releases.

The contractor shall design a measurement scheme and collect concentration and velocity data to describe building downwash phenomena for single and multiple buildings with and without tiers. Ground-level, longitudinal, lateral, and vertical profiles of concentrations shall be measured downwind of the stack.

In all model scenarios, the contractor shall perform measurements using Hydrocarbon Analyzers and Laser Doppler Anemometry. This work shall include tracer concentration and velocity measurements in and around the stack/building combinations comprising the models. Model configurations shall make use of a boundary layer developed to simulate flow over suburban and light industrial areas with a roughness length of 0.27m (at a scale of 1:150). The contractor shall process and document the data and store it in spreadsheet format. The contractor shall review for quality, graph, and analyze the data and document the results. The contractor shall additionally document the experimental design and setup, the measurement protocol, and the resulting data file structure.

Task 3: In the process of performing the wind tunnel experimental program, the contractor shall diagnose operational problems with the meteorological wind tunnel

and its velocity, turbulence, pressure, and tracer concentration measurement systems as well as the support equipment in the machine shop and recommend repairs as required.

The contractor shall upgrade the existing Laser Doppler Anemometry hardware (specifically the digital burst correlator – FSA 3500) to be compatible with the new Windows 7 compatible FlowSizer 64 software provided by the WACOR.

QUALITY ASSURANCE

A Quality Assurance Project Plan (QAPP) shall be prepared by the contractor and submitted to the WACOR within 30 days of receipt of this work assignment. Calibrations of scientific instruments shall be performed under existing Standard Operating Procedures. Standard "good laboratory practices" for maintaining notebooks shall be employed.

DELIVERABLES

Unless otherwise specified in the tasks, all documents required under this Work Assignment shall be delivered to the WACOR and Contracting Officer's Representative (COR), both in hard copy and electronic format (Word).

Work Plan. A work plan containing a cost estimate shall be provided to the Contracting Officer (CO), COR and WACOR within 20 days of the Contracting Officer's signature.

The contractor shall supply reports documenting the work performed under the tasks in this work assignment, including the experimental design and setup, the measurement protocol, the resulting data file structure, the analysis results, and the data on files.

SCHEDULE of DELIVERABLES

Target Delivery Date of Task 1 report: 1/15/16

Target Delivery Date of Tasks 2 & 3 report: 3/31/16

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-150

☐ Other ☐ Amendment Number:

Contract Number: EP-C-15-008

Contract Period: 04/01/2015 To 03/31/2016

Base X Option Period Number

Title of Work Assignment/SF Site Name

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name: Leroy Mickelsen
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-1356
FAX Number:

Project Officer Name: Kevin Sudderth
(Signature) (Date)
Branch/Mail Code:
Phone Number: 919-541-3670
FAX Number:

Other Agency Official Name
(Signature) (Date)
Branch/Mail Code:
Phone Number:
FAX Number:

Contracting Official Name: Mark Cranley
(Signature) (Date)
Branch/Mail Code:
Phone Number: 513-487-2351
FAX Number: 513-487-2109

PERFORMANCE WORK STATEMENT (PWS)

Cary Test House Low-Concentration Hydrogen Peroxide Vapor Decontamination Tests

OEM CBRN CMAD
APPCD ON-SITE CONTRACT EP-C-15-008 WA# 150

I. PERIOD OF PERFORMANCE

The period of performance for this work assignment (WA) shall be from August 1, 2015 to March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work will involve evaluating the sporicidal efficacy of low-concentration hydrogen peroxide vapor (Low-C HP) utilizing a house, the Cary Test House. Low-C HP will be generated in the Cary House using room or house vaporizers or humidifiers. The number, size, placement, and run times of the vaporizers will be the parameters of interest. Tests will be conducted utilizing bacterial spores, the dependent variables (such as *Bacillus atrophaeus* or *Geobacillus stearothermophilus,* surrogates for *Bacillus anthracis*) placed on coupons and those coupons placed into the Cary House. A report shall be drafted of the methods and results.

III. BACKGROUND

Work will build upon (but not duplicate) similar tests conducted in the COMMANDER. Hydrogen peroxide vapor will be disseminated through the use of either off-the-shelf room or house vaporizers or humidifiers.

IV. TECHNICAL APPROACH

In the Cary House, decontamination efficacy will be determined based on inactivation of bacterial spores disseminated on coupons and those coupons placed throughout the Cary House. This work assignment covers the efforts related to conducting the decontamination tests as well as all microbiological preparation and analyses work done by the on-site Biolab.

V. AFFORDABILITY

This effort is labor/time intensive, which is where the bulk of the funding is required. Normal expendable laboratory items are also required for this project.

VI. FACILITIES AND MATERIALS

All tasks described in this PWS shall be performed in-house, at the rented Cary House facilities at McDonald Woods, Cary, NC.

VII. TASKS

No work conducted under this WA shall duplicate work conducted under previous work assignments, unless directed by the WA manager (WAM), and in order to troubleshoot problems from previous work and to assess repeatability (precision) of the data gathered previously. All microbiological preparation and analyses work will be conducted by the on-site Biolab under this work assignment.

The Contractor shall perform the following tasks:

1. Review a previously prepared quality assurance project plan (QAPP), which shall cover the experiments as described in Task 2 of this PWS. To the extent feasible, the QAPP shall be consistent with and based upon existing QATPs, developed under other similar work assignments from previous or current APPCD contracts.

2. Conduct microbiological tasks including the inoculation of coupons, analyze coupons, etc. Estimated at 100 sample coupons per run, for a total estimate of 500 coupons. And an estimate at 50 biological indicators per run, for a total estimate of 250 BIs.

3. Conduct up to five tests in the Cary House utilizing Low-C HP. Tests will determine the log reduction in viable bacterial spores on coupons placed in the Cary House. Subtasks for conducting tests shall include the following:

    - Maintain security of house?
    - Prepare house, set up vaporizers, monitor and record HP concentration in air and ambient meteorological data,
    - Place coupons in house, collect coupons after test,

4. Provide general support for maintaining the field equipment and collecting data such as HP air monitoring, temperature, and relative humidity inside and out of the test house; and weather parameters such as wind velocities and precipitation. This support shall include assembly, maintenance, troubleshooting, and configuration for any equipment used for testing. Support shall also include the purchase of any expendable materials, with prior approval from the WAM, for use in this project.

5. Report the results of all tests, including data received from the Biolab (work conducted under the Biolab WA, in support of this WA) to the WAM as soon as possible via email and through other agreed upon means. The WAM shall be notified immediately of any problems encountered with field equipment, the Cary Test House, or in the laboratory or with the results obtained.. These data shall include any generated data files (i.e., logged data) properly annotated, reports of the experimental conditions, calibration checks, measured variables, and a listing of the samples awaiting further analysis.

6. Analyze the data per the requirements in the QATP and in consultation with the WAM, and report the results of these analyses as soon as possible via email and through other agreed upon means. The expected data analyses would be in the form of Excel spreadsheets or other appropriate software.

7. Meet with the WAM at least every week to provide a project status update. The update shall include a synopsis of activities taking place the past week, problems encountered, and work planned for the next week.

8. Update the health and safety research protocols, as needed, as required by the EPA Facility and APPCD safety personnel. Updates to these protocols shall be approved by the EPA WAM and safety personnel prior to the commencement of any testing. The contractor shall provide a copy of the health and safety plan to the WAM and the ORD-Safety Office for discussion.

9. Prepare monthly reports to EPA that summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

VIII. DELIVERABLE SCHEDULE

The following table outlines the expected schedule that the contractor shall meet for the period covered by this PWS. The schedule assumes a start date of August 1, 2015. Dates dependent upon completion of specific tasks shall be updated based on discussions between the contractor WAL and EPA WAM during the development of the test plans to cover the work specified herein.

Suggested Deliverable Schedule

Deliverable	**Completion Date**
Submit work assignment plan	8/15/15
Submit first draft of test/QA Project Plan (review & concur)	8/21/15
Revise test/QA Plan amendment per WAM comments	2 weeks after comments received
Submit draft report	10/30/15
Submit final report based on comments from WAM	2 weeks after comments received

IX. REPORTING REQUIREMENTS

- The Contractor shall prepare a brief memorandum to the WAM which discusses how well various measurements described in the QA plan were met.

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.

- All data and analyses worksheets generated as discussed in Section VII shall be provided in electronic format in Excel and/or other appropriate software, in consultation with the WAM.

X. QUALITY ASSURANCE

The awardee shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action, see attachment #1 and #2. The contractor shall prepare a QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the type of research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided at www.epa.gov/guality. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Note: Leroy Mickelsen and Shannon Serre will be the WAMs for this work.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-150

☐ Other ☒ Amendment Number: 000001

Contract Number: EP-C-15-008	Contract Period 04/01/2015 To 03/31/2016 Base X Option Period Number	Title of Work Assignment/SF Site Name: 150 Cary Test Amend 1

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code
1										
2										
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4										
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Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee LOE:

Cumulative Approved: Cost/Fee LOE:

Work Assignment Manager Name: Leroy Mickelsen (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-1356 FAX Number:	
Project Officer Name: Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name: Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

AMENDMENT #1 TO (SEE RED ADDITIONS)
PERFORMANCE WORK STATEMENT (PWS)

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Cary Test House Low-Concentration Hydrogen Peroxide Vapor Decontamination Tests

OEM CBRN CMAD
APPCD ON-SITE CONTRACT EP-C-09-027 WA# 150

I. PERIOD OF PERFORMANCE

The period of performance for this work assignment (WA) shall be from April 1, 2015 to July 31, 2015. The period of performance shall be from April 1, 2015 to March 31, 2016.

II. SUMMARY OF OBJECTIVES

This work will involve evaluating the sporicidal efficacy of low-concentration hydrogen peroxide vapor (Low-C HP) utilizing a house, the Cary Test House. Low-C HP will be generated in the Cary House using room or house vaporizers or humidifiers. The number, size, placement, and run times of the vaporizers will be the parameters of interest. Tests will be conducted utilizing bacterial spores, the dependent variables (such as *Bacillus atrophaeus* or *Geobacillus stearothermophilus,* surrogates for *Bacillus anthracis*) placed on coupons and those coupons placed into the Cary House. A report shall be drafted of the methods and results. In addition to the above objective, an additional test beyond the original scope will be added. During this test, Test #5, there are additional objectives that include placement of both mold coupons and bed bug tubes with the objective to determine alternative uses for this new technology. And there will be the need for additional BIs to test the ability of Low-C HP to penetrate into hard to reach areas.

III. BACKGROUND

Work will build upon (but not duplicate) similar tests conducted in the COMMANDER. Hydrogen peroxide vapor will be disseminated through the use of either off-the-shelf room or house vaporizers or humidifiers. There is reason to believe that this technology will also be effective on mold and bed bugs. And there is a need to evaluate the penetration of Low-C HP.

IV. TECHNICAL APPROACH

In the Cary House, decontamination efficacy will be determined based on inactivation of bacterial spores disseminated on coupons and those coupons placed throughout the Cary House. This work assignment covers only the efforts related to conducting the decontamination tests. All microbiological preparation and analyses work will be conducted by the on-site Biolab under a separate work assignment on this same contract. In a separate QAPP the mold coupons will be prepared. In Test #5 the additional coupons and the bed bug tubes will be placed and retrieved for analysis under this WA. And additional BIs will be placed in furniture, under rugs, in drawers, and other hard to reach places to evaluate the penetration of Low-C HP.

V. AFFORDABILITY

This effort is labor/time intensive, which is where the bulk of the funding is required. Normal expendable laboratory items are also required for this project. Additional expendable supplies will be needed to complete Test #5.

VI. FACILITIES AND MATERIALS

All tasks described in this PWS shall be performed in-house, at the rented Cary House facilities at McDonald Woods, Cary, NC.

VII. TASKS

No work conducted under this WA shall duplicate work conducted under previous work assignments, unless directed by the WA manager (WAM), and in order to troubleshoot problems from previous work and to assess repeatability (precision) of the data gathered previously. All microbiological preparation and analyses work will be conducted by the on-site Biolab under is work assignment.

The Contractor shall perform the following tasks:

1. Prepare a quality assurance project plan (QAPP), which shall cover the experiments as described in Task 2 of this PWS. To the extent feasible, the QAPP shall be consistent with and based upon existing QATPs, developed under other similar work assignments from previous or current APPCD contracts. The QAPP will be amended to include this Test #5.

2. Conduct microbiological tasks including the inoculation of coupons, analyze coupons, etc. Estimated at 100 sample coupons per run, for a total of 500 coupons. The number of coupons will be increased by 120 and the number of BIs will also be increased by 75 to cover Test #5. In addition, the analysis of the extra coupons will be needed as well as the extra quantitative (normally it is only qualitative) analysis of an estimated 20 BIs.

3. Conduct up to five tests in the Cary House utilizing Low-C HP. Tests will determine the log reduction in viable bacterial spores on coupons placed in the Cary House. Subtasks for conducting tests shall include the following:

    - Maintain security of house?
    - Prepare house, set up vaporizers, monitor HP concentration in air
    - Place coupons in house, collect coupons after test, The coupon count will increase for Test #5 in that mold coupons and bed bug tubes will be distributed and collected.

4. Provide general support for maintaining the field equipment and collecting data such as HP air monitoring, temperature, and relative humidity inside and out of the test house; and weather parameters such as wind velocities and precipitation. This support shall include assembly, maintenance, troubleshooting, and configuration for any equipment used for testing. Support shall also include the purchase of any expendable materials, with prior approval from the WAM, for use in this project. Due to the extended time that

Test #5 will require (increase in overall project completion time) there will be a post-experiment hydrogen peroxide monitor calibration needed.

5. Report the results of all tests, including data received from the Biolab (work conducted under the Biolab WA, in support of this WA) to the WAM as soon as possible via email and through other agreed upon means. The WAM shall be notified immediately of any problems encountered with field equipment, the Cary Test House, or in the laboratory or with the results obtained. These data shall include any generated data files (i.e., logged data) properly annotated, reports of the experimental conditions, calibration checks, measured variables, and a listing of the samples awaiting further analysis. The addition of Test #5 will add very little to the reporting burden but will result in extra lab analysis.

6. Analyze the data per the requirements in the QATP and in consultation with the WAM, and report the results of these analyses as soon as possible via email and through other agreed upon means. The expected data analyses would be in the form of Excel spreadsheets or other appropriate software.

7. Meet with the WAM at least every week to provide a project status update. The update shall include a synopsis of activities taking place the past week, problems encountered, and work planned for the next week.

8. Update the health and safety research protocols, as needed, as required by the EPA Facility and APPCD safety personnel. Updates to these protocols shall be approved by the EPA WAM and safety personnel prior to the commencement of any testing. The contractor shall provide a copy of the health and safety plan to the WAM and the ORD-Safety Office for discussion. The Health and Safety Plan will be updated to include the handling of mold coupons and bed bugs.

9. Prepare monthly reports to EPA that summarize work activities (accomplished and planned) in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges. The ODC charges shall be documented in the report in a way that the items purchased, vendor, and cost are clearly indicated.

VIII. DELIVERABLE SCHEDULE

The following table outlines the expected schedule that the contractor shall meet for the period covered by this PWS. The schedule assumes a start date of May 1, 2015. Dates dependent upon completion of specific tasks shall be updated based on discussions between the contractor WAL and EPA WAM during the development of the test plans to cover the work specified herein.

Suggested Deliverable Schedule

Deliverable	Completion Date
Submit work assignment plan	5/15/15

Submit first draft of test/QA Project Plan	5/21/15
Revise test/QA Plan amendment per WAM comments	2 weeks after comments received
Submit draft report	~~9/31/15~~3/15/16
Submit final report based on comments from WAM	2 weeks after comments received

IX. REPORTING REQUIREMENTS

- The Contractor shall prepare a brief memorandum to the WAM which discusses how well various measurements described in the QA plan were met.

- The monthly invoice reports for this work assignment shall provide a detailed description of any equipment or expendables that have been purchased by the contractor for use on the projects discussed herein.

- All data and analyses worksheets generated as discussed in Section VII shall be provided in electronic format in Excel and/or other appropriate software, in consultation with the WAM.

X. QUALITY ASSURANCE

The awardee shall comply with all requirements as delineated on the "Quality Assurance Planning Requirements Form (QARF)" included with this extramural action, see attachment #1 and #2. The contractor shall prepare a QAPP in accordance with http://www.epa.gov/quality/qs-docs/r5-final.pdf or based on the type of research that is being conducted. For guidance on preparing a research-specific QAPP, the preparer should refer to the project specific requirements provided at www.epa.gov/guality. The QAPP must be approved prior to the start of any laboratory work. Additional information related to QA requirements can be found at www.epa.gov/quality.

Note: Leroy Mickelsen and Shannon Serre will be the WAMs for this work.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-175

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	0-175 OAQPS Ambient Monitor...

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Lewis Weinstock (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-3661 FAX Number:	
Project Officer Name Kevin Sudderth (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Mark Cranley (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109	

Performance Statement of Work

WA Title: Ambient Monitoring Precursor Gas Methods Support

WA #: 0-175 WACOR: Lewis Weinstock

Contract #: EP-C-15-008 Alternate WACOR: Solomon Ricks

PERIOD OF PERFORMANCE

The period of performance detailed in the Performance Statement of Work (SOW) shall be from August 1, 2015 through March 31, 2016.

SUMMARY OF OBJECTIVES

Contractor support is required to assist the OAQPS Ambient Air Monitoring Group (AAMG) with the on-going operation, maintenance, and troubleshooting of trace level analyzers, meteorological equipment, PM monitors and samplers, and supporting calibration and data acquisition equipment at AIRS station. Programmatic objectives include support for ambient methods research, evaluation of standard operating procedures and quality assurance practices, training of federal and state monitoring agency personnel, and support for on-site and national research field studies with partners.

BACKGROUND

Revisions to the ambient monitoring regulations have established requirements for operation of multi-pollutant NCore and near-road stations to support NO2, NOy, CO, O3, and PM including fine particles, coarse particles, black carbon, and ultra-fines. AAMG evaluates many of these new methods at the AIRS monitoring station to support state/local/tribal training and network operational needs and to ensure the introduction of new technology into the national monitoring inventory.

SCOPE & TECHNICAL APPROACH/OBJECTIVES

Task 1: The contractor shall provide technical support on an as-needed basis for the operation and maintenance of trace level gas analyzers, data acquisition components, continuous and intermittent PM monitors/samplers, and other supporting equipment at the EPA's AIRS facility necessary to maintain research progress in NCore and near-road developmental work and to support the evaluation of new methods for speciated and continuous PM2.5, PM10-2.5, and ultra-fines. The contractor shall perform troubleshooting and repair, as necessary, on the research equipment located at AIRS, and coordinate with EPA staff to ensure completion of regularly scheduled quality control (precision) checks, flow checks, and calibrations. The contractor shall follow established standard operating procedures and other guidance detailed in latest TAD and approved QAPP in the completion of all activities.

Task 2: The contractor shall provide technical support for quality assurance activities including assisting with gas cylinder certifications, ozone standard recertification, mass flow controller certifications, and provide on-site support for

EPA and non-agency QA personnel performing audit activities supporting the NPAP and PEP programs.

Task 3: The contractor shall provide hands-on training, as needed, on the monitoring equipment at AIRS to representatives from State and local regulatory agencies and EPA staff, with particular emphasis on routine and non-routine maintenance procedures and troubleshooting, operation of the data management system, and configuration of automated calibration sequences.

QUALITY ASSURANCE

Contractor shall follow the latest version of the applicable QAPP: Quality Assurance Project Plan for Training in and Evaluation of Ambient Air Monitoring Technologies at the Burdens Creek NCore Monitoring Station, January, 2008.

DELIVERABLES/SCHEDULE

Contractor shall provide AIRS site progress reports through regular monthly reporting mechanisms. Additionally, bi-weekly meetings will be scheduled to discuss progress, technical issues, training needs, and coordinate site visits with EPA staff; to be scheduled by the WACOR.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-200

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-15-008	04/01/2015 To 03/31/2016 Base X Option Period Number	200 ACE Analytical Support

Contractor: JACOBS TECHNOLOGY INC.

Specify Section and paragraph of Contract SOW: 5.0

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 04/01/2015 To 03/31/2016

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 04/01/2015 To 03/31/2016 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name David Davies	(Signature)	(Date)	Branch/Mail Code: Phone Number 919-541-4700 FAX Number:
Project Officer Name Kevin Sudderth	(Signature)	(Date)	Branch/Mail Code: Phone Number: 919-541-3670 FAX Number:
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name Mark Cranley	(Signature)	(Date)	Branch/Mail Code: Phone Number: 513-487-2351 FAX Number: 513-487-2109

13. Performance of Work Statement (PWS)

Contract # EP-C-15-008
WA # 0-200
Period of Performance: August 1, 2015 through March 31, 2016
WA Title: "ACE Analytical"

(A) ***Goal/Purpose:*** To provide High Resolution Magnetic Sector Field Inductively Coupled Plasma Mass Spectrometry (HR-ICPMS) and Inductively Coupled Plasma/Optical Emission Spectrometry (ICP-OES) analytical support for toxicology and source apportionment studies. Support includes analysis of sample extracts provided by NHEERL, data workup for reporting elemental results in units of ug/m3 and ug/g, and performing source apportionment analysis.

(B) ***Background/Objectives:*** ICP analyses will directly support ACE FY15-16 deliverables for the EPHD division of NHEERL. ICP results will be used to calculate ug/m3 and ug/g concentrations of elements in the ambient PM samples, and identify / quantify the particulate sources. Correlation of PM sources to observed clinical effects is the desired end result of these research projects.

(C) Tasks:

Task 1 – HR-ICPMS Analytical Support for Analysis of PM Sample Digests. The contractor shall analyze extracts provided by EPA on the EPA HR-ICPMS instrument and provide (i) a final data report and (ii) concentration and uncertainty datasets. The estimated number of sample extracts is 600. The contractor shall analyze the extracts following approved multielement analysis EPA ECAB HR-ICPMS SOP 098.1 (Operation and Maintenance of the Element 2 High Resolution Inductively Coupled Plasma Mass Spectrometry Instrument). EPA will provide extraction matrix for calibration standard matching and all required laboratory supplies.

Task 2 – ICP-OES Analytical Support for Analysis of PM Sample Digests. The contractor shall analyze extracts provided by EPA on the EPA ICP-OES instrument and provide (i) a final data report and (ii) concentration and uncertainty datasets. The estimated number of samples is 200. The contractor shall analyze the extracts following approved multielement analysis EPA ECAB ICP-OES SOP 140.1 (Inductively Coupled Plasma Optical Emission Spectroscopic (ICP-OES) Analysis of Elements). EPA will provide extraction matrix for calibration standard matching and all required laboratory supplies.

Task 3 – Convert ICP-MS and ICP-OES Data to ug/m3 and ug/g Units for Source Apportionment and Toxicology Workup. The contractor shall take final data reports from Tasks 1 and 2, and convert the ng/mL units into: 1) ug element/m3 air sampled for source apportionment analysis, and 2) ug element/g PM for toxicology study workup. The estimated number of samples is 800 (600 from Task 1, 200 from Task 2). EPA will provide PM sample collection data and sample prep data for ICP analysis to calculate conversion factors for ug/m3 and ug/g.

Task 4 – Perform Source Apportionment Analysis on Task 1 Samples. The contractor shall take ug/m3 data from Task 3 along with previously determined ion chromatography and carbon fraction analysis ug/m3 data, and generate a source apportionment analysis using EPA Chemical Mass Balance Model (CMB 8.2).

Task 5 – Reporting. The contractor shall provide the WACOR with monthly reports summarizing progress to date on Tasks 1-2 as well as any problems experienced.

(D) Deliverables and Project Schedule, Acceptance Criteria: The contractor shall complete analysis of all samples in Tasks 1 and 2 by October 15, 2015 to meet project milestones.

(E) QA/QC Requirements for WA: The work carried out under this WA is covered by the project specific QAPP entitled "QUALITY ASSURANCE PROJECT PLAN CLEVELAND MULTIPLE AIR POLLUTION STUDY (CMAPS) REVISION NO. 4". Standard "good laboratory practices" for maintaining notebooks shall be employed.

(F) Special Requirements: The contractor shall prepare a full work plan to cover the tasks through the WA end date. The hours and costs shall be broken down by tasks.

(G) Reports and Meetings: The contractor shall provide the WACOR with monthly reports summarizing to date on Tasks 1 and 2 as well as any problems experienced.

(H) Travel/Training Requirements: Travel ☐ is ☒is not anticipated to be charged under this work assignment. If travel is anticipated, the dates and circumstances necessitating travel chargeable to this work assignment will be specified by Technical Directive. Travel will be reviewed and approved by the WACOR. Requests for travel shall include: (1) name of traveler(s) and job duties, (2) description of circumstances necessitating travel, (3) location of travel, and (4) estimated cost breakdown by categories.

(I) Management Controls: See Contract Management Controls.

(J) Staffing Requirements: Contractor(s) must have 10 years of specialized experience analyzing, reporting, and performing source apportionment analysis of ambient PM2.5 environmental samples for trace level metals analysis using ICP methods (must have publication history demonstrating experience in analytical chemistry) and instrument-specific training from the manufacturer.