

US Department of Commerce  
 NIST-NATL INST OF STDS & TECHN  
 100 BUREAU DRIVE  
 GAITHERSBURG, MD 20899-0001

ACCEPTANCE NOTIFICATION

Date  
 16 SEP 2009

Your Reference Number  
 MOD 02

To

CONSUMER PRODUCT SAFETY COMMISSION  
 CONTRACT BRANCH  
 CONTRACT SPECIALIST, RM 517  
 4330 EAST WEST HWY  
 BETHESDA, MD 20814

Agency Reference No  
 CPSC-I-08-0008-001-000

Please refer to this number in future communication with this agency

The Agreement referenced above is:

Accepted  
 Rejected

Estimated costs this order/modification

\$ 175,000.00

Period of Performance  
 20-JUL-2009 To 30-SEP-2010

Advance Required: Yes

Fiscal Year and Amount

2009 \$	350,000.00
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Total Agreement Amount: \$ 350,000.00

Remarks and Attachments:

THIS ORDER IS ACCEPTED IN ACCORDANCE WITH NIST STATUTORY AUTHORITY (15 USC 271-278E). THE AMOUNT STATED IS THE ESTIMATED COST. FINAL CHARGES WILL BE BASED ON ACTUAL COSTS INCURRED WHICH INCLUDE DIRECTLY RELATED EXPENSES AND APPROPRIATE CHARGES FOR INDIRECT AND ADMINISTRATIVE EXPENSES (15USC278b(e)). AS DETERMINED THROUGH THE NIST COST ACCOUNTING SYSTEM. IN THE EVENT THE ESTIMATED AMOUNT IS NOT SUFFICIENT TO COMPLETE THE WORK OR IF EXCESS FUNDS APPEAR TO BE AVAILABLE FOR RETURN, YOU WILL BE ADVISED AS EARLY AS POSSIBLE.

PLEASE ADVANCE FUND TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY WORKING CAPITAL FUND (13X4650). NIST IS AUTHORIZED TO REQUIRE AN ADVANCE TO ITS WORKING CAPITAL FUND BY 15 USC 275a.

NIST IS BILLING THRU THE IPAC SYSTEM.

ATTN: DODIE B KESSLER

Customer Approval:

Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

Phone: \_\_\_\_\_

NOT APPLICABLE

Performing Agency Approval:

Name: John Quirk

Title: Finance Operations Manager

Date: 9/17/09

Phone: \_\_\_\_\_

**CPSC-I-08-0008; MOD #2**  
**INTERAGENCY AGREEMENT**  
**BETWEEN THE**  
**U.S. CONSUMER PRODUCT SAFETY COMMISSION**  
**AND THE**  
**NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY**

I. INTRODUCTION

The U.S. Consumer Product Safety Commission, hereinafter referred to as CPSC, and the National Institute of Standards and Technology, hereinafter referred to as NIST, hereby agree that NIST, subject to the terms and conditions herein, shall perform the necessary research to develop the technical basis for determining and quantifying if nanoparticles are released from foam or barrier fabrics, of mattresses and upholstered furniture, under normal conditions and determine if the fire performance of these components are impacted by the nanoparticle release.

II. TITLE

*Exposure and Fire Hazard Assessment of Nanoparticles in Fire Safe Consumer Products*

III. BACKGROUND

There is a growing use of compounds or materials that have been produced using technologies (i.e., nanotechnologies) that directly manipulate matter at the atomic level and fabricate molecules and materials that could not have been produced in the past. Nanomaterials are defined as materials/particles that range from 1 to 100 nanometers (nm) in at least one dimension. Although they may have the same name as a material currently in use, because of their small size, these nanomaterials may demonstrate different physical and chemical properties. Some of these new nanomaterials are reportedly being used in consumer products with the stated purpose of improving the flammability performance of these products.

Nanomaterials represent a wide range of compounds that may vary significantly in their structure, physical and chemical properties, and potentially in their behavior in the environment and in the human body. Because of the wide variation in potential health effects and the dearth of data on release rates, exposure, and toxicity of specific nanomaterials, there is currently little information about the potential consumer exposures to, or the health effects that may result from, exposure to nanomaterials during consumer use and disposal.

Concerns about the use of FR chemicals in consumer products are growing, and countries in the European Union and states such as California have banned the use of certain FR's due to their perceived health effects. Nanomaterials are being tested and used as flame retardant (FR) chemicals in a number of applications, and may be used to meet the existing and proposed CPSC mattress and upholstered furniture flammability standards. In 2007, CPSC and NIST signed a memorandum of understanding (MOU) that outlined the mutual interest

in the flammability performance and potential human exposure to nanomaterials used as flame retardants.

#### IV. PURPOSE AND OBJECTIVES

The purpose of this research is to determine if nanoparticles that are traditionally used to improve the fire performance of foam and barrier fabrics are released during simulated normal conditions; i.e., mechanical compression and saliva. In addition, to determine if the release of nanoparticles also creates a decrease in the fire performance of these components.

#### V. STATEMENT OF WORK

This project will proceed as described in this section, however, because of the exploratory nature of this study, the CPSC and NIST PIs will exercise the ability to jointly approve changes to the project details based on new information obtained during the study. Such deviation from the original plan only requires verbal approval by the PI's of CPSC (Treye Thomas) and NIST (Rick Davis). However, if the changes impact deliverables outlined in section V of this IAG, then an email or some other form of written approval by the PIs will be required.

##### 1. Sample Preparation

- a. NIST will provide two commercially available substrates (polyurethane foam and a barrier fabric) for Texas A&M to coat with three different nanoparticle based fire retardants (multiwall nanotube, organoclay, and carbon nanofiber) at one nanoparticle loading (5 % mass fraction). The six nanoparticle treated substrates and two untreated substrates (controls) will be referred to as specimens. These specimens will be exposed to two types of stresses (solution extraction and mechanical) and the amount of nanoparticles released will be quantified.

##### 2. Solution Extraction Stressing

- a. The solution extraction stressing involves agitating the specimen in a solution that simulates saliva, urine, or sweat, and measuring the quantity of nanoparticles released into the solution. NIST will conduct solution extraction on all eight specimens using only the saliva simulate solution. The agitation conditions will be 30 min to 60 min at room temperature in a head-over-heels shaker provide by CPSC. NIST will quantify nanoparticles extracted from the specimens using Absorbance spectroscopy, Light Scattering, ICP, or another quantitative analytical technique.
- b. If the nanoparticle release from solution extraction is significant, the PI's will discuss the option to proceed with conducting a more passive method to extracting the nanoparticles. The passive method involves placing a wet filter paper on the specimen and applying 1 lbs/in<sup>2</sup> pressure for 8 hr.

##### 3. Mechanical Stressing

- a. The mechanical stressing involves using a mechanical pounder, provided by CPSC, to physically stress the specimen. The nanoparticles released in the air will be collected on a filter by way of using a cyclone or vacuum. NIST will conduct the mechanical stressing on all eight specimens for 100,000 pounding cycles (~20 hours) at room

temperature. NIST will quantify air borne nanoparticles collected on a filter using thermal gravimetric analysis, or another quantitative analytical technique. For example, NIST will consider solution extracting the nanoparticles from the filter and quantifying the nanoparticles using the same methodology as described in the solution extraction stressing.

#### 4. Fire Testing

- a. ASTM E662 Smoke Box is used to follow the decompositions of plastics and is integral to standard testing (ASTM E663, ASTM F814, and NFPA 258). This experiment provides mass loss rate during combustion, which is directly correlated to heat release rate from the standard Cone Calorimeter and is a typical measure of material flammability. NIST's Smoke Box has been modified to allow for sampling the smoke during specimen combustion.
- b. NIST will conduct Smoke Box tests on the sixteen specimens (eight mechanically stressed and eight not stressed). NIST will collect and quantify nanoparticles in the smoke using a method similar to what is described for mechanical stressing. NIST will also provide mass loss rate data from the experiments.

#### VI. NIST FURNISHED MATERIALS/EQUIPMENT

NIST agrees to furnish all necessary personnel (except as noted in VII), equipment, materials, services, and facilities to complete the objectives listed in Section IV.

#### VII. CPSC FURNISHED MATERIALS/EQUIPMENT

CPSC staff will provide the mechanical pounding device developed for miniature mattresses and one head-over-heels extraction apparatus.

#### VIII. CONFIDENTIALITY REQUIREMENTS

- a. All information reported to or otherwise obtained by CPSC or its agents under the Consumer Product Safety Act (CPSA) and provided to or shared with NIST, which contains or relates to a trade secret or other matter referred to in section 1905 of title 18, United States Code, or subject to section 552(b)(4) of the title 5, United States Code, shall be held in confidence by NIST personnel.
- b. To the extent permitted by law, including the Freedom of Information Act, NIST agrees not to release the identity of any manufacturer of any product being tested or reviewed in conjunction with this IAG. These restrictions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by Executive Order No. 12958; section 7211 of title 5, United States Code (governing disclosures to Congress); section 1034 of title 10, United States Code, as amended by the Military Whistleblower Protection Act (governing disclosure to Congress by members of the military); section 2302(b)(8) of title 5, United States Code, as amended by the Whistleblower Protection Act (governing disclosures of illegality, waste, fraud, abuse or public health or safety threats); the Intelligence Identities Protection Act of 1982 (50 U.S.C. 421 *et seq.*) (governing disclosures that could expose confidential Government agents); and the statutes which protect against disclosure that

may compromise the national security, including sections 641, 793, 794, 798, and 952 of title 18, United States Code, and section 4(b) of the Subversive Activities Act of 1950 (50 U.S.C. 783(b)). The definitions, requirements, obligations, rights, sanctions, and liabilities created by said Executive Order and listed statutes are incorporated into this Agreement and are controlling. Nothing in this Agreement bars disclosures to Congress or to an authorized official of an executive agency or the Department of Justice that are essential to reporting a substantial violation of law.

- c. All documents and other materials developed pursuant to this IAG shall have appropriate statements to indicate that the work was performed pursuant to the IAG by NIST; that the documents and other materials produced are the views of the staff or members (present or past) of NIST; and that although the documents and other materials may have been developed in conjunction with CPSC staff, the documents and other materials do not necessarily represent the views of the Consumer Product Safety Commission.
- d. Any publications of or publicity pertaining to the work performed under this Agreement shall include the following:

“This project was funded by CPSC. The content of this publication does not necessarily reflect the views of the Commission, nor does mention of trade names, commercial products, or organizations imply endorsement by the Commission.”

**IX. REPORTING REQUIREMENTS.**

NIST will provide preliminary test reports documenting the test protocols and resulting data at the completion of each task. Within 60 days of completion of the testing, NISU will issue a draft final report for CPSC staff review. Following CPSC staff review, NIST will have an additional 30 days to deliver the final report summarizing the test data.

DELIVERY ITEM	QUANTITY	PERFORMANCE
A. All recorded test data and findings	2 copies	Within 7 days of completion
B. Representative photographs	2 copies	Within 7 days of completion

**X. PERIOD OF PERFORMANCE**

The period of performance for this agreement is from the last date of signature by both parties through September 30, 2010, and shall not extend beyond 2 years. This agreement may be modified or cancelled by mutual consent of CPSC and NIST.

## **XI. DELIVERY OR PERFORMANCE**

All deliverables required under the terms and conditions of this IAG shall be provided to the CPSC. The activities planned under this agreement are expressly subject to the availability of funds and other necessary resources to the parties. NIST neither commits nor makes any obligation of funds pursuant to this agreement. The following items shall be performed or delivered in accordance with the following schedule:

In the first 6 months, NIST will complete the sample preparation, stressing and fire testing of the controls and multiwall nanotube (MWNT) treated substrates. In the second 6 months, NIST will complete the same activities on two additional nanoparticle treated substrates (organoclay and carbon nanofiber).

### **Phase 1 (month 1)**

1. Obtain safety approval and materials for this study.

### **Phase 2 (month 3):**

1. Complete sample preparation of the controls (untreated barrier fabric and foam).
2. Complete sample preparation of MWNT treated barrier fabric and foam.

### **Phase 3 (month 6):**

1. Report quantity of nanoparticles released from stressing activities (solution extraction and mechanical) of specimens prepared in Phase 2. (4 specimens)
2. Report Smoke Box results from the mechanically stressed and unstressed specimens prepared in Phase 2. (8 specimens)
3. Complete sample preparation of carbon nanofiber treated barrier fabric and foam.

### **Phase 4 (month 9):**

1. Complete sample preparation of organoclay treated barrier fabric and foam.

### **Phase 5 (month 12):**

1. Report quantity of nanoparticles released from stressing activities (solution extraction and mechanical) of specimens prepared in Phase 3 and 4. (4 specimens)
2. Report Smoke Box results of the mechanically stressed and unstressed specimens prepared in Phase 3 and 4. (8 specimens)
3. Submit final report to CPSC PI.

## **XII. DISAGREEMENTS**

In the event that CPSC and NIST have a disagreement arising under this interagency agreement, the parties shall cooperatively seek to resolve the disagreement by themselves. If the disagreement cannot be resolved between them, the dispute shall be resolved pursuant to the Business Rules for Intragovernmental Transactions delineated in the Treasury Financial Manual, Vol.1, Bulletin 2007-03, Section VII (Resolving Intragovernmental Disputes and Major Differences).

If CPSC cancels this interagency agreement, NIST is authorized to collect costs incurred prior to cancellation.

**XIII. SCHEDULE OF TASK COST AND PERFORMANCE**

CPSC agrees to allow NIST to make adjustments as needed in the distribution of resources, as long as the total cost of the project is not increased and the project objectives are all met.

This agreement is funded in the amount of \$175,000 for Phases 4-5 of this proposal which should be fully completed with the deliverables described in Section XI of this IAG. →

These funds will be used to provide resources for this project. The resource list provided is not intended to be extensive, but rather an example of resources typically needed to complete this type of project. The resources for this project may include: support for NIST staff and associates (e.g., guest researchers, post-docs, contractors, etc.), support of activities outside of NIST (e.g., microscopy, etc.), purchase of materials and chemicals (e.g., barrier fabric, clay, etc.), purchase of and modifying equipment, and any other resources needed to achieve the deliverables of this project.

**XIV. LIAISON OFFICERS**

a. NIST PROJECT OFFICER

**Rick Davis, Ph.D.**  
National Institute of Standards and Technology  
Building and Fire Research Laboratory  
Polymers Building, Building 224  
Gaithersburg, MD 20899-8664  
Phone: (301) 975-5901  
[Rick.Davis@NIST.gov](mailto:Rick.Davis@NIST.gov)

b. CPSC PROJECT OFFICER

**Trey A. Thomas, Ph.D.**  
U.S. Consumer Product Safety Commission  
Directorate for Health Sciences  
4330 East West Highway,  
Bethesda, MD 20814  
Phone: (301) 504-7738  
[tthomas@cpsc.gov](mailto:tthomas@cpsc.gov)

c. CPSC FINANCIAL OFFICER

Consumer Product Safety Commission  
Directorate for Administration  
Accounting Operations, Room 522  
Washington, D.C. 20207

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d. AGENCY PAYMENT OFFICER:

30-2  
Ms. Deborah Peebles Hodge  
U.S. Consumer Product Safety Commission  
4330 East West Highway,  
Bethesda, MD 20814  
Phone: (301) 504-7130

**XV. COST AND TRANSFER OF FUNDS**

The total estimated cost for the initial phase of this IAG is estimated at \$175 K, provided with CPSC FY- 2009 funds.

NIST Administrative Point of Contact:  
Ms. Sharon Rinehart  
Administrative Officer, 866  
Building and Fire Research Laboratory  
226, B206 / MS8602  
Gaithersburg, MD 20899  
email: sharon.rinehart@nist.gov  
Telephone: (301) 975-5876

**XVI. FUNDING AND ACCOUNTING DATA**

The transfer of advance funds shall be from CPSC to NIST through the On-Line Payment Collection (OPAC) system using the following accounting data:

**Transfer From:**

**CPSC**

Taxpayer ID Number (TIN): 520978750

Agency Location Code (ALC): 61000001

DUNS 069287522

US Treasury Code: 6190100

AMOUNT: \$ 175,000.00

ACCOUNTING DATA: 09 PS EXHR 4500 23704 253A

**To:**

**NIST**

Taxpayer ID Number (TIN): 530-20-5706

Agency Location Code (ALC): 13-06-0001

DUNS 929956050

US Treasury Code: 13X4650

Upon request, at least quarterly, NIST will reconcile balances related to revenue and expenses for work performed under the agreement.

**XVII. AUTHORITIES**


FOR CPSC:

- Section 29(d) of the Consumer Product Safety Act, (15 U.S.C. 2078(d))

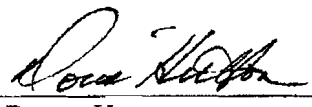
FOR NIST

- Title 15 United States Code Sections 272 et seq.

Approved and Accepted for  
National Institute of Standards and Technology

BY:   
TITLE: JOHN QUICK  
Finance Operations Manager  
DATE: 9/17/09

Approved and Accepted for  
Consumer Product Safety Commission.

BY:   
TITLE: Donna Hutton  
Contracting Officer  
DATE: 9/14/09