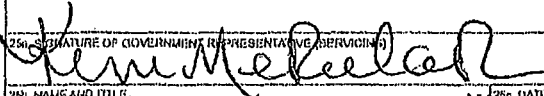
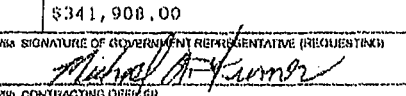


<b>INTERAGENCY AGREEMENT</b>		1 IAA NO NRC-HQ-60-15-T-0013		PAGE OF 1 2	
2 ORDER NO		3 REQUISITION NO. RES-15-0252		4 SOLICITATION NO	
5 EFFECTIVE DATE 05/29/2015		6 AWARD DATE 05/29/2015		7 PERIOD OF PERFORMANCE 05/29/2015 TO 02/28/2016	
8 SERVICING AGENCY BROOKHAVEN NATIONAL LABORATORY ALC: DUNS: 027579460 44: BROOKHAVEN SITE OFFICE PO BOX 5000 BLDG 464 BPTON NY 11973-5000  POC KIM NEKULAK TELEPHONE NO 631-344-7439		9 DELIVER TO US NUCLEAR REGULATORY COMMISSION 11555 ROCKVILLE PIKE ATTN GABRIEL TAYLOR MAIL STOP CSB 4-A07M ROCKVILLE MD 20852-2738			
10 REQUESTING AGENCY ACQUISITION MANAGEMENT DIVISION ALC: 31000001 DUNS: 040535809 44: US NUCLEAR REGULATORY COMMISSION ONE WHITE FLINT NORTH 11555 ROCKVILLE PIKE ROCKVILLE MD 20852-2738  POC MICHAEL TURNER TELEPHONE NO 301-415-6712		11 INVOICE OFFICE US NUCLEAR REGULATORY COMMISSION ONE WHITE FLINT NORTH 11555 ROCKVILLE PIKE MAILSTOP 03-E17A ROCKVILLE MD 20852-2738			
12 ISSUING OFFICE NRC - HQ ACQUISITION MANAGEMENT DIVISION MAIL STOP TWEN-5E03 WASHINGTON DC 20555-0001		13 LEGISLATIVE AUTHORITY Energy Reorganization Act of 1974			
		14 PROJECT ID			
		15 PROJECT TITLE CT TESTING JACQUE-FIRE III			
16 ACCOUNTING DATA 2015-C02C0-FEBASED-60-60D002-11-6-213-1013-253D					
17 ITEM NO	18 SUPPLIES/SERVICES	19 QUANTITY	20 UNIT	21 UNIT PRICE	22 AMOUNT
00001	Master IAA: NRCHQ2514D0002  Issue New Task Order No. NRC-HQ-60-15-T-0013  The NRC and the DOE Lab (BNL) hereby enter into this Agreement Number <del>NRC-HQ-20-15-T-0002</del> for the project entitled: ICT Testing Jacques-Fire III.  The performance period for this agreement shall commence on May 29, 2015 and will expire on February 28, 2016.  Continued ...				341,908.00
23 PAYMENT PROVISIONS		24 TOTAL AMOUNT \$341,908.00			
25a SIGNATURE OF GOVERNMENT REPRESENTATIVE (SERVICING) 		25b SIGNATURE OF GOVERNMENT REPRESENTATIVE (REQUESTING) 			
26a NAME AND TITLE Kim M. Nekulak Contracting Officer		26b DATE JUN 17 2015		26c CONTRACTING OFFICER MICHAEL A. TURNER	
				26d DATE 5/21/2015	

SUNSI REVIEW COMPLETE

MAR 18 2016

ADMM002

TEMPLATE - ADMM001

IAANO  
NRC-HQ-60-15-T-0013

ORDER NO

PAGE OF  
2 2

Consideration and Obligations:

(a) Authorized Cost Ceiling \$341,908.00.  
(b) The amount presently obligated with respect to this DOE Agreement is \$341,908.00. When and if the amount(s) paid and payable to the DOE Laboratory hereunder shall equal the obligated amount, the DOE Laboratory shall not be obligated to continue performance of the work unless and until the NRC Contracting Officer shall increase the amount obligated with respect to this DOE Agreement. Any work undertaken by the DOE Laboratory in excess of the obligated amount specified above is done so at the DOE Laboratory's sole risk.

The Statement of Work (Attachment 1) is hereby made a part of this Agreement.

This agreement is entered into pursuant to the authority of the Energy Reorganization Act of 1974, as amended (42 U.S.C 5801 et seq.). This work will be performed in accordance with the NRC/DOE Memorandum of Understanding dated November 24, 1998. To the best of our knowledge, the work requested will not place the DOE and its contractor in direct competition with the domestic private sector.

☐ Fee Recoverable Work  
☒ Non-Fee Recoverable Work

The total amount of award: \$341,908.00. The obligation for this award is shown in box 24.

## STATEMENT OF WORK

NRC Agreement Number  NRC-HQ-25-14-D-0002	NRC Agreement Modification Number	NRC Task Order Number (If Applicable)  NRC-HQ-60-15-T-0013	NRC Task Order Modification Number (If Applicable)
Project Title CT Testing Jacque-Fire III			
Job Code Number  1013	B&R Number	DOE Laboratory  BNL	
NRC Requisitioning Office RES			
NRC Form 187, Contract Security and Classification Requirements <input type="checkbox"/> Applicable <input type="checkbox"/> Note Applicable		<input type="checkbox"/> Involves Proprietary Information <input type="checkbox"/> Involves Sensitive Unclassified	
<input checked="" type="checkbox"/> Non Fee-Recoverable		<input type="checkbox"/> Fee-Recoverable (If checked, complete all applicable sections below)	
Docket Number (If Fee-Recoverable/Applicable)		Inspection Report Number (If Fee Recoverable/Applicable)	
Technical Assignment Control Number (If Fee-Recoverable/Applicable)		Technical Assignment Control Number Description (If Fee-Recoverable/Applicable)	

### 1.0 BACKGROUND

Current transformers (CTs), also known as instrument transformers, are widely used in electric power industry, including nuclear power plants (NPPs), to monitor the primary current at strategic locations in electrical power distribution systems. These CTs provide isolation from the high voltage primary, and step-down the magnitude of the measured current to a value that can be safely handled by the monitoring instruments. Thus, they are designed to measure primary current in ac power systems (generally three-phase systems) and transform this current into a representative low secondary current for instrumentation.

In a letter to the NRC dated July 21, 1983, a potential concern was raised for fire-induced open circuits on CT's secondary. The letter postulated the scenario in which potentially high voltages induced on the secondary winding of a CT as a result of open circuiting the CT secondary due to a fire ultimately causes the CT or connected components to fail in a manner that could potentially start a secondary fire at a location remote from the initiating fire area.

It has been recognized that as long as current is flowing in the primary circuit, an open-circuit in CT's secondary can cause high voltages on the secondary circuit as the CT attempts to maintain the current relationship dictated by the transformer's winding turns ratio. This condition

can result in CT damage and can also potentially generate voltages that may exceed the dielectric strength of the CT insulating materials and may cause arcing to connected components.

The resulting high voltage condition in the secondary from an open-circuited CT introduces a potential concern that should be addressed in the fire protection strategies in nuclear power plants. The secondary circuit from the CT location in the plant to the main control room instrument indications may consist of very long (e.g., hundreds of feet) instrument wires whose insulations are susceptible to both primary and secondary fires. Since the safe shutdown analysis is based on one fire area at a time, the possibility of a second fire in a separate fire area can significantly impact the final outcome of the fire protection strategies.

## **2.0 OBJECTIVE**

The objective of this task order is to conduct a confirmatory test program is to determine if opening the secondary circuit of a CT operating at rated current in the primary winding results in excessively high voltage sufficient to start a fire in the form of explosion or arcing in the circuit's insulation at the location of the CT itself or at some point in the secondary circuit.

## **3.0 SCOPE OF WORK**

The DOE Laboratory must provide all resources necessary to accomplish the tasks and deliverables described in this statement of work (SOW).

The DOE Laboratory must conduct a confirmatory testing program to evaluate the potential safety concern of a secondary fire due to a fire-induced open circuit of a CT secondary circuit.

## **4.0 SPECIFIC TASKS**

The DOE Laboratory must perform the following tasks:

### **Task 1 – Develop a test plan**

Duration of Task: NLT 1 month after commencement of this agreement

Objective: BNL, in consultation with NRC/Office of Research (RES), will develop a Test Plan. The Test Plan will provide a detailed description of how the testing will be conducted, including what facilities will be used, what configurations will be tested, how the thermal environment will be monitored, data acquisition, and any aspect of the test BNL determines to be important in characterizing the test and/or possible effect on results.

Approach: When developing the test plan, consideration should be taken as to how the sequence of testing will progress. The test plan should include a testing matrix and also delineate whether testing will progress systematically from simple to more complex configurations or by some other means. Development of the test plan should also consider the in-plant configuration and potential combustible sources near the CT or in the compartment with the CT. The test plan should also detail how the measurements from the testing will be used to inform a regulatory decision on the potential of this potential fire hazard.

Deliverable: A written test plan that is submitted to the NRC COR for review and approval.

### **Task 2 - Conduct testing**

Duration of Task: NLT 6 months after commencement of this agreement

Objective: Conduct the CT testing.

Approach: The details of each test will be included in the NRC COR reviewed and approved Test Plan developed in Task 1. The testing may deviate from the Project Test Plan subject to approval by the NRC COR.

Deliverable: The unprocessed experimental data for the purpose of consulting with NRC COR about the appropriate presentation of results.

### **Task 3 - Document the results**

Duration of Task: NLT 9 months after commencement of this agreement

Objective: Data and observations obtained from all tests conducted during this program will be documented. The report will present the information in an appropriate manner and format that will satisfy the Objective of this project. Comments on the draft report will be incorporated into a final program report.

Deliverable: A draft report that has been reviewed by both BNL and NRC.

## **5.0 DELIVERABLES AND/OR MILESTONES SCHEDULE**

<b>Task Number</b>	<b>Deliverable/Milestone Description</b>	<b>Due Date</b>
1	Provide draft test plan to NRC	1 month after commencement of agreement
1	Provide final test plan to NRC	No Later than 20 days after receipt of NRC comments
2	Provide experimental data to NRC COR	No later than 6 months after final test plan provided to NRC
3	Draft Report	No later than 9 months after commencement of agreement
3	Final Report	No Later than 30 days after receipt of NRC comments

## **6.0 TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED**

Specialized experience must include expertise in such areas as high speed data acquisition (voltage and current), experimental testing using high current equipment, fundamental electromagnetic theory, and ability to clearly communicate research findings to support regulatory decision making.

## **7.0 MEETINGS AND TRAVEL**

### Domestic

One, 2 person, 3 day trip to NRC HQ to facilitate testing program.

All travel requires written Government approval from the CO, unless otherwise delegated to the COR.

Foreign travel for the DOE laboratory personnel requires a 60-day lead time for NRC approval. For prior approval of foreign travel, the DOE laboratory shall submit an NRC Form 445, "Request for Approval of Official Foreign Travel." NRC Form 445 is available in the MD 11.7 Documents library and on the NRC Web site at: <http://www.nrc.gov/reading-rm/doc-collections/forms/>. Foreign travel is approved by the NRC Executive Director for Operations (EDO).

## **8.0 REPORTING REQUIREMENTS**

The DOE Laboratory is responsible for structuring the deliverable to follow agency standards. The current agency standard is Microsoft Office Suite 2010. The current agency Portable Document Format (PDF) standard is Adobe Acrobat 9 Professional. Deliverables must be submitted free of spelling and grammatical errors and conform to requirements stated in this section.

### ***Monthly Letter Status Reports***

In accordance with Management Directive 11.7, NRC Procedures for Placement and Monitoring of Work with the U.S. Department of Energy, the DOE Laboratory must electronically submit a Monthly Letter Status Report (MLSR) by the 20<sup>th</sup> day of each month to the Contracting Officer Representative (COR) with copies to the Contracting Officer (CO) and the Office Administration/Division of Contracts to [ContractsPOT.Resource@nrc.gov](mailto:ContractsPOT.Resource@nrc.gov). If a project is a task ordering agreement, a separate MLSR must be submitted for each task order with a summary project MLSR, even if no work has been performed during a reporting period. Once NRC has determined that all work on a task order is completed and that final costs are acceptable, a task order may be omitted from the MLSR.

The MLSR must include the following: agreement number; task order number, if applicable; job code number; title of the project; project period of performance; task order period of performance, if applicable; COR's name, telephone number, and e-mail address; full name and address of the performing organization; principal investigator's name, telephone number, and e-mail address; and reporting period. At a minimum, the MLSR must include the information discussed in Attachment 1. The preferred format for a MLSR can also be found in Attachment 1.

## **9.0 PERIOD OF PERFORMANCE**

The estimated period of performance for this work is 9 months from date of agreement award.

## **10.0 CONTRACTING OFFICER'S REPRESENTATIVE**

The COR monitors all technical aspects of the agreement/task order and assists in its administration. The COR is authorized to perform the following functions: assure that the DOE Laboratory performs the technical requirements of the agreement/task order; perform inspections necessary in connection with agreement/task order performance; maintain written and oral communications with the DOE Laboratory concerning technical aspects of the agreement/task order; issue written interpretations of technical requirements, including Government drawings, designs, specifications; monitor the DOE Laboratory's performance and notify the DOE Laboratory of any deficiencies; coordinate availability of NRC-furnished material and/or GFP; and provide site entry of DOE Laboratory personnel.

### Contracting Officer's Representative

Name: Gabriel Taylor  
Agency: U.S. Nuclear Regulatory Commission  
Office: Office of Nuclear Regulatory Research  
Mail Stop: CSB 4-A07m  
Washington, DC 20555-0001  
E-Mail: Gabriel.Taylor@NRC.gov  
Phone: (301) 251-7576

### Alternate Contracting Officer's Representative

Name: Tammie Rivera  
Agency: U.S. Nuclear Regulatory Commission  
Office: Office of Nuclear Regulatory Research  
Mail Stop: CSB 4-A07m  
Washington, DC 20555-0001  
E-Mail: Tammie.Rivera@NRC.gov  
Phone: (301) 251-7598

## **11.0 MATERIALS REQUIRED (TYPE N/A IF NOT APPLICABLE)**

N/A

## **12.0 NRC-FURNISHED PROPERTY/MATERIALS (TYPE N/A IF NOT APPLICABLE)**

12 current transformers (6 – 2000:5 turns ratio, 6 – 4000:5 turns ratio)

## **13.0 RESEARCH QUALITY (TYPE N/A IF NOT APPLICABLE)**

The quality of NRC research programs are assessed each year by the Advisory Committee on Reactor Safeguards. Within the context of their reviews of RES programs, the definition of quality research is based upon several major characteristics:

Results meet the objectives (75% of overall score)

Justification of major assumptions (12%)

Soundness of technical approach and results (52%)

Uncertainties and sensitivities addressed (11%)

Documentation of research results and methods is adequate (25% of overall score)

Clarity of presentation (16%)

Identification of major assumptions (9%)

It is the responsibility of the DOE Laboratory to ensure that these quality criteria are adequately addressed throughout the course of the research that is performed. The NRC COR will review all research products with these criteria in mind.

#### **14.0 STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS (TYPE N/A IF NOT APPLICABLE)**

The U.S. Nuclear Regulatory Commission (NRC) began to capture most of its official records electronically on January 1, 2000. The NRC will capture each final NUREG-series publication in its native application. Therefore, please submit your final manuscript that has been approved by your NRC Project Manager in both electronic and camera-ready copy.

The final manuscript shall be of archival quality and comply with the requirements of NRC Management Directive 3.7 "NUREG-Series Publications." The document shall be technically edited consistent with NUREG-1379, Rev. 2 (May 2009) "NRC Editorial Style Guide." The goals of the "NRC Editorial Style Guide" are readability and consistency for all agency documents.

All format guidance, as specified in NUREG-0650, "Preparing NUREG-Series Publications," Rev. 2 (January 1999), will remain the same with one exception. You will no longer be required to include the NUREG-series designator on the bottom of each page of the manuscript. The NRC will assign this designator when we send the camera-ready copy to the printer and will place the designator on the cover, title page, and spine. The designator for each report will no longer be assigned when the decision to prepare a publication is made. The NRC's Publishing Services Branch will inform the NRC Project Manager for the publication of the assigned designator when the final manuscript is sent to the printer.

For the electronic manuscript, the Contractor shall prepare the text in Microsoft Word, and use any of the following file types for charts, spreadsheets, and the like.



File Types to be Used for NUREG-Series Publications	
File Type	File Extension
Microsoft® Word®	.doc
Microsoft® PowerPoint®	.ppt
Microsoft® Excel	.xls
Microsoft® Access	.mdb
Portable Document Format	.pdf

This list is subject to change if new software packages come into common use at NRC or by our licensees or other stakeholders that participate in the electronic submission process. If a portion of your manuscript is from another source and you cannot obtain an acceptable electronic file type for this portion (e.g., an appendix from an old publication), the NRC can, if necessary, create a tagged image file format (file extension.tif) for that portion of your report. Note that you should continue to submit original photographs, which will be scanned, since digitized photographs do not print well.

If you choose to publish a compact disk (CD) of your publication, place on the CD copies of the manuscript in both (1) a portable document format (PDF); (2) a Microsoft Word file format, and (3) an Adobe Acrobat Reader, or, alternatively, print instructions for obtaining a free copy of Adobe Acrobat Reader on the back cover insert of the jewel box.

## 15.0 OTHER CONSIDERATIONS (TYPE N/A IF NOT APPLICABLE)

N/A

### References (Type N/A if not applicable)

N/A

### Access to Non-NRC Facilities/Equipment (Type N/A if not applicable)

N/A

### Applicable Publications (Type N/A if not applicable)

N/A

### Controls over document handling and non-disclosure of materials (Type N/A if not applicable)

N/A