INTERAGENCY AGREEMENT	1. IAA NO. NRC-HQ-60-12-I-0011/M0008	PAGE 1 OF 2

2. ORDER NO.	3. REQUISITION NO. RES-18-0046	4. SOLICITATION NO.

5. EFFECTIVE DATE	6. AWARD DATE	7. PERIOD OF PERFORMANCE
05/21/2018	05/21/2018	09/24/2012 TO 09/30/2020

8. SERVICING AGENCY

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY NIST
ALC: 13060001
DUNS: +4:
DUNS 929956050
US DEPARTMENT OF COMMERCE
GAITHERSBURG MD 20899

POC Ami Carbaugh
TELEPHONE NO. (301) 975-6746

9. DELIVER TO

DARRELL MURDOCK
US NUCLEAR REGULATORY COMMISSION
11555 ROCKVILLE PIKE
ROCKVILLE MD 20852

10. REQUESTING AGENCY

ACQUISITION MANAGEMENT DIVISION
ALC: 31000001
DUNS: 040535809 +4:
US NUCLEAR REGULATORY COMMISSION
ONE WHITE FLINT NORTH
11555 ROCKVILLE PIKE
ROCKVILLE MD 20852-2738

POC Jeffrey R. Mitchell
TELEPHONE NO. (301) 415-5074

11. INVOICE OFFICE

US NUCLEAR REGULATORY COMMISSION
ONE WHITE FLINT NORTH
11555 ROCKVILLE PIKE
MAILSTOP O3-E17A
ROCKVILLE MD 20852-2738

12. ISSUING OFFICE

US NRC - HQ
ACQUISITION MANAGEMENT DIVISION
MAIL STOP TWFN-5E03
WASHINGTON DC 20555-0001

13. LEGISLATIVE AUTHORITY

Energy Reorganization Act of 1974

14. PROJECT ID

V6265

15. PROJECT TITLE

ASSESSMENT OF CONDITION MONITORING METHODS OF ELEC

16. ACCOUNTING DATA

2018-X0200-FEEBASED-60-60D001-11-6-119-1007-252A

17. ITEM NO.	18. SUPPLIES/SERVICES	19. QUANTITY	20. UNIT	21. UNIT PRICE	22. AMOUNT
	Master IAA: N/A Project Title: Assessment of Condition Monitoring Methods of Electrical Cables Attachment No. 1: Agreement Changes Attachment No. 2: Treasury Account Symbol (TAS) in Central Accounting System (CARS) format Attachment No. 3: Statement of Work Rev 2 [redacted] NIST PI: [redacted] Continued ...				

23. PAYMENT PROVISIONS	24. TOTAL AMOUNT $613,756.00

25a. SIGNATURE OF GOVERNMENT REPRESENTATIVE (SERVICING)	26a. SIGNATURE OF GOVERNMENT REPRESENTATIVE (REQUESTING) Jeffrey R Mitchell

25b. NAME AND TITLE	25c. DATE	26b. CONTRACTING OFFICER	26c. DATE
		JEFFREY R. MITCHELL	06/11/2018

NRC COR: [redacted]

ADVANCE PAYMENT IS AUTHORIZED
NRC REQUIRES MONTHLY FINANCIAL STATUS REPORTS

Notwithstanding the agreement effective dates and period of performance start dates stated elsewhere in the agreement, the effective date of the agreement and start date of the period of performance are the last date of signature by the parties.

NRC-HQ-60-12-I-0011
Modification No. 8
Attachment No. 1

The purpose of this modification is to:

(1) Revise the Statement of Work to add Task 2e, which will require NIST to perform the electrical condition monitoring techniques that are based on Frequency Domain Reflectometry (FDR) technology,

(2) As a result of adding Task 2e, Task 4 is hereby increased by $613,756.00 from $2,309,991.00 to $2,923,747.00.

(3) Provide incremental funding for the increase in Task 4, thereby providing funding in the amount of $613,756.00 from $2,309,991.00 to $2,923,747.00

(4) Incorporate Task 2 Deliverable entitled Test Plan [[redacted]]
    a. Task 2 Deliverable is hereby accepted by the NRC and shall not be changed.

(5) Task 5 is not being funded at this time. Task 6 was funded prior to task 5 to allow for input into the table that summarizes and recommends the applicable condition monitor test for each insulation material and any correction factors, in addition to document additional research areas.

(6) Increase the Agreement Ceiling By $613,756.00 from $4,122,312.00 to $4,736,068.00.

All other terms and conditions remain unchanged including the period of performance from 09/24/2012 through 09/30/2020.

The following represents the revised schedule:

Task	Task Cost Estimate	Full Funding Provided	Deliverable Due Dates	
1	$160,419	$160,419	03/17/2017	
2	$215,164	$215,164	03/17/2017	
3	$189,249	$189,249	03/17/2017	
4	~~$2,309,991~~ $2,923,747	~~$2,309,991~~ $2,923,747	03/15/2020	
5	$950,936		06/30/2020	
6	$296,553	$296,553	09/30/2020	
Total	~~$4,122,312~~ $4,736,068	~~$3,171,376~~ $3,785,132		

ACCOUNTING INFORMATION

	NIST	***NRC***
Agency Location Code (ALC)	13 06 0001	31000001
Funding Expiration Date (requesting agency)		No –Year Funds
Business Event Type Code (BETC)	COLL	DISB
Business Partner Network Number (BPN)	929956050	040535809
Additional Accounting Classification /Information (Optional)	Funding Agency Code: 1341	Funding Agency Code: 3100

Treasury Account Symbol (TAS) in Central Accounting System (CARS) format:

Component TAS	**SP**	**ATA**	**AID**	**BPOA**	**EPOA**	**A**	**Main**	**Sub**
NIST			013			X	4650	000
NRC			031			X	0200	000

STATEMENT OF WORK
REV **2**

PROJECT TITLE: ASSESSMENT OF CONDITION MONITORING METHODS OF ELECTRICAL CABLES

JOB CODE: V6265

SERVICING AGENCY: National Institute of Standards and Technology

PRINCIPAL INVESTIGATOR: NAME: Stephanie Watson
PHONE: 301-975-6448

BACKGROUND

Electrical cables are important for nuclear safety since they are used to 1) mitigate the effects of an accident, 2) monitor critical parameters to ensure safety, 3) monitor emergency core cooling, and 4) monitor, gauge, and prevent the potential for a containment breach and offsite release of radiation. In addition, electrical cables are significant for operations since cable failures could cause a plant trip or power transient.

There are a variety of environmental stressors in nuclear power plants that can influence the aging of electrical cables, such as temperature, radiation, moisture/humidity, vibration, chemical spray, and mechanical stress. Exposure to these stressors over time can lead to degradation that may go undetected unless the aging mechanisms are identified, and electrical, mechanical, or physical properties of the cable are monitored. Since some electrical cables never receive inspection, maintenance, condition monitoring tests, or periodic replacement, the degraded conditions in electrical cables could go undetected over time, which could lead to abrupt failures and prevent various components from performing their safety function. Cable failures have resulted in plant transients and shutdowns, loss of safety redundancy, entries into limiting conditions for operation and challenges to plant operators.

The NRC confirmed in its review of Generic Letter (GL) 2007-01, “Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients,” that electrical cables are often overlooked or ignored in aging analyses and condition monitoring evaluations, since they are passive components that are generally considered to require no inspection and maintenance. However, electrical cables are very important safety components since they provide power to safety-related equipment, and are used for instrumentation and control of safety functions. GL 2007-01 showed that a significant number of failures occurred under normal service conditions within the service interval of 20-30 years, which is before the renewed license period and before the end of the expected life span of the cables. The staff’s evaluation of the licensee responses to GL 2007-01 concluded that licensees should have a program for using available diagnostic cable testing methods to assess cable condition. The staff finds that condition monitoring is essential for assessing the health and aging degradation of electrical cables to ensure reliable operation of safety-related equipment, instruments, and controls during normal operations and design basis events.

This research is a natural follow-up to two recent projects. First, NRC published NUREG/CR-7000, “Essential Elements of an Electric Cable Condition Monitoring Program” in January 2010 and developed Regulatory Guide 1.218, “Condition Monitoring Techniques for Electric Cables Used in Nuclear Power Plants.” Second, NRC, in collaboration with Sandia National Laboratories, performed an evaluation of current equipment qualification methodologies in assessing the service life prediction for cables subject to a harsh environment. This literature review will assess whether environmental qualification requirements for electrical equipment are adequately addressing holistic aging phenomena and suitably ensuring sufficient margin under renewed license periods. Information from this project will provide confirmatory assessments on the adequacy of the margins available in the current and renewed license periods.

EPRI has issued a report, which when used in conjunction with other published EPRI guidance, provides the industry with methods for assessing cable aging. This research effort will focus on confirming the adequacy of those condition monitoring methods/techniques suggested in EPRI Report 1022969, "Electrical Cable Test Applicability Matrix for Nuclear Power Plants" [2011] (Proprietary). Currently, EPRI is focusing on monitoring and assessing the aging of submerged cables. However, memorandums of understanding with EPRI and the Department of Energy are in development to collaborate on expanding their long-term operation cable research into areas of concern highlighted through this research effort.

OBJECTIVE

This project will confirm the adequacy of the EPRI condition-monitoring methods, including: (1) mechanical condition indicators (e.g., elongation, indenter methods, recovery time); (2) dielectric condition indicators (e.g., insulation resistance, dielectric loss, time domain reflectometry, line resonance analysis, partial discharge); and (3) chemical indicators (e.g., oxidation time/temperature, Fourier transform infrared spectroscopy).

Condition monitoring tests should be conducted on a variety of cables, including various insulation types, low and medium voltage cables, power and instrumentation and control cables, naturally aged cables, and new cables. Naturally aged cable samples, including those from the decommissioned Zion nuclear plant, as well as new cables should be tested. Certain anonymous samples from current plant installations will also be tested for applicability to the current fleet of plants.

The first phase of the project will focus on assessing condition-monitoring techniques during normal operational aging. Thus, cables should be subjected to normal operating conditions (temperature, radiation, humidity) in both mild and harsh environments to simulate 40, 60, and 80 years of operation. For better estimates of cable performance, simultaneous thermal and radioactive aging should be performed to produce homogeneous degradation in the samples (i.e. appropriate acceleration factors under oxidative conditions). Depending on the insulation material and its sensitivity to acceleration factors, aging of the samples could take as long as nine months or more based on the type of insulation and known characteristics.

The second phase will focus on cables subject to accident conditions in harsh environments. The intention is to focus on pressurized water reactors only but later plans will include testing cables under boiling water reactor accident conditions. These cables should be exposed to simulated accident (temperature, pressure, humidity, radiation, chemical/steam spray) conditions. The condition-monitoring techniques should be evaluated for the capability to predict proper operation of cables during and after the accident (post-accident period). The post-accident period may vary and could be up to 45 days.

A test plan for the two phases of the project will outline in detail the accelerated aging methodology (time, temperature, pressure, voltage, dose rate, total dose, acceleration factors, etc.) and condition monitoring (tests, intervals, acceptance criteria, etc.). The test plan is key in establishing homogenous aging of the samples and ensuring that the samples are exposed to sufficient oxygen to prevent diffusion-limited oxidation effects.

Changes in cable properties should be monitored at intervals during the exposure times to quantitatively characterize cable aging and cable degradation mechanisms. Condition monitoring methods should be assessed and evaluated for each insulation material. As a result, with improved simulation of accelerated aging (pre-aging), this research will confirm which condition monitoring techniques track aging for each insulation material under normal operating conditions.

In addition, this research will confirm the adequacy of condition-based qualification methodology, as described in Section 5.3 of IEEE Std. 323-2003, “IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations” by performing condition monitoring measurements throughout the licensed period and in addition, before, during and after the simulated accident. This research will support the revision of Regulatory Guide 1.89, “Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants” to endorse condition-based qualification methodology. Condition-based qualification is an improved method of equipment qualification that provides improved confidence in equipment performance. This qualification process differs from the early processes in that it requires condition monitoring technique(s) to be utilized following each step in the qualification process that could identify degradation in any of the cable characteristics. Condition monitoring activities measure and record the level of cable degradation to keep track of the degradation of the cable being tested. These values are then used to determine the Qualified Level of Degradation (QLD) that can be monitored for installed cables. The QLD is the value of insulation degradation identified through the condition monitoring test(s) that a specific type of cable can withstand while retaining its capability to withstand an accident environment. Once the QLD established, this will be the value of degradation that can be allowed to progress during the service life of the cable.

Thus, the objectives of this research are: 1) to confirm the adequacy of condition monitoring methods, 2) confirm the condition-based qualification methodology, 3) confirm acceleration factors for the accelerated aging process, and (4) validate service life prediction.

A NUREG/CR report will be developed to summarize the research methodology and findings and in addition, provide in-depth discussions on the above objectives.

TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

Technical personnel should include a senior scientist and junior scientists, as needed. Technical personnel engaged in the project shall have expertise in materials science, polymer aging, and electrical cable testing. Technical personnel shall be knowledgeable in health physics and the effects of radiation exposure.

Site access at the decommissioned Zion Nuclear Power Plant may be needed.

Handling and storage of electrical cables contaminated with low levels of radioactivity may be needed.

SCOPE OF WORK

Task 1: Acquisition of Materials
Materials should be selected that are representative of cables used in nuclear power plants, as specified below. This includes a variety of cables, including various insulation types, low and medium voltage cables, power and instrumentation and control cables, naturally aged cables, and new cables. A representative set of samples should be chosen from various manufacturers (Rockbestos, Okonite, Kerite, Anaconda, and Boston Insulated Wire). Cable insulation polymers should include crosslinked polyethylene (XLPE), ethylene propylene rubber (EPR), silicone rubber (SiR), butyl rubber, chlorinated polyethylene, neoprene, and cholosulphonated polyethylene (CSPE).

The following cables should be acquired or purchased:

Task 1a: New Cables
New cables are expected to last 60 years and manufacturers are qualifying these cables for 60 years. New safety-related cables should be purchased with relevant qualification documentation for testing. Cables that are to be used in new nuclear power plant designs should be purchased. New cables should meet the specifications in Task #1b.

Task 1b: Zion Cables
Naturally aged cables from the decommissioned Zion nuclear power plant will be provided by NRC. These cables will be from harsh and mild environments and may be contaminated with low levels of radioactivity.

Specific characteristics of the cables are as follows:
Safety-related cables in harsh environment (located in containment, environmentally qualified) –

- 120 V - 4160 V AC
- 250 V DC,
- Single conductor cables - 8-12 AWG,
- Multi-conductor cables with a cross sectional diameter of 1.5 in.,
- Instrumentation & control (I&C) cables, power cables,
- Any available brands (Rockbestos, Okonite, Kerite, General Cable, Eaton, Samuel Moore, etc.), and
- All insulation types (EPR, PE, XLPO/XLPE, SiR, CSPE, etc.)

Storage of these cables will be required, per ANSI N45.2.2-1978, “Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants” or equivalent. These cables should be stored away from direct sunlight at temperatures between 40˚F and 100˚F and at less than 50% humidity.

Task 1c: Other naturally-aged cables
NRC will potentially obtain naturally-aged cables from the current fleet of nuclear power plants and the international community, to meet the specifications in Task #1b. NRC will attempt to obtain the age, environment and relevant documentation for these cables. It is estimated that NRC will obtain approximately 10 30 foot sections of naturally-aged cables. NIST will store these cables.

Task 1d: Provide a summary of the cables to be used for testing. Cable data (insulation material, manufacturer, voltage rating, etc.), age, and environmental conditions should be included in the summary.

Task 2: Develop a test plan.
A detailed test plan should be developed for aging and condition monitoring tests. As the NIST Cobalt-60 chambers are too small to accommodate the cable samples (several feet) around a mandrel under accelerated aging conditions, a subcontractor would be needed for the simultaneous radiation and thermal aging. The cables’ minimum allowable bend radius should not be exceeded when cables are bent around a mandrel for the accelerated aging.

Task 2a: For the new cables, develop a test plan for simultaneous aging to simulate normal operating conditions (temperature, radiation, humidity) for the current licensed period (40 years) and the periods of extended operation (additional 20 years, from 40 to 60 years of operation) and the subsequent period of extended operation (additional 20 years, from 60 to 80 years of operation). The simulated aging should ensure homogenous aging of the samples, which could be as long as nine months, depending on the material and acceleration factors. Define the number and length of samples, taking into account any destructive tests. Specify the condition monitoring tests, intervals for condition monitoring tests, acceleration methodology, acceleration factors, and acceptance criteria for condition monitoring tests. Ensure that the samples are exposed to sufficient oxygen to prevent diffusion-limited oxidation effects. Indicate any references used in developing the test plan.

Task 2b: For the Zion cables, develop a test plan for simultaneous aging to simulate normal operating conditions (temperature, radiation, humidity) for the current licensed period (40 years) and the periods of extended operation (additional 20 years, from 40 to 60 years of operation) and the subsequent period of extended operation (additional 20 years, from 60 to 80 years of operation). The simulated aging should ensure homogenous aging of the samples, which could be as long as nine months, depending on the material and acceleration factors. Define the number and length of samples, taking into account any destructive tests. Specify the condition monitoring tests, intervals for condition monitoring tests, acceleration methodology, acceleration factors, and acceptance criteria for condition monitoring tests. Ensure that the samples are exposed to sufficient oxygen to prevent diffusion-limited oxidation effects. Indicate any references used in developing the test plan.

Task 2c: For the other naturally-aged cables, develop a test plan for simultaneous aging to simulate normal operating conditions (temperature, radiation, humidity) for the current licensed period (40 years) and the periods of extended operation (additional 20 years, from 40 to 60 years of operation) and the subsequent period of extended operation (additional 20 years, from 60 to 80 years of operation). The simulated aging should ensure homogenous aging of the samples, which could be as long as nine months, depending on the material and acceleration factors. Define the number and length of samples, taking into account any destructive tests. Specify the condition monitoring tests, intervals for condition monitoring tests, acceleration methodology, acceleration factors, and acceptance criteria for condition monitoring tests. Ensure that the samples are exposed to sufficient oxygen to prevent diffusion-limited oxidation effects. Indicate any references used in developing the test plan.

Task 2d: Develop a test plan for cables exposed to harsh environments and exposed to accident conditions (temperature, pressure, humidity, radiation, chemical/steam spray). The condition-monitoring techniques should be evaluated for the capability to predict the remaining service life of cables. These cables should be functional at the end of the post-accident period. Specify the condition monitoring tests, intervals for condition monitoring tests, acceleration methodology, acceleration factors, and acceptance criteria for condition monitoring tests. Indicate any references used in developing the test plan.

Task 2e: NIST will hire two subcontractors to perform the electrical condition monitoring techniques that are based on Frequency Domain Reflectometry (FDR) technology. The first subcontractor that NIST hires to perform the FDR test on the cable samples included in the project will employ the use of Analysis and Measurement Systems (AMS) Corporation's CHAR package. The second subcontractor NIST hires to perform the FDR test on the cable samples included in the project will employ the use of WIRESCAN's latest LIRA technology that is capable of performing the FDR test on the cable samples of 10' in length.

Task 3: Establish baseline values for cable properties using condition monitoring methods, as described in the test plan.
The cable samples should be tested to establish baseline values of condition monitoring methods that will used for comparison after simulating aging. These baseline values will measure mechanical, dielectric, and chemical properties of the cables. Provide a summary of the condition monitoring tests and resulting baseline values for the cable samples.

Task 4: Simulated operational aging and condition monitoring testing

Task 4a: For the new cables, perform accelerated aging to simulate normal operational aging in mild and harsh environments and perform condition monitoring tests at regular intervals, in accordance with the test plan. Test samples should be aged to simulate 40, 60, and 80 years of operation. Provide the condition monitoring test data upon completion of the testing.

Task 4b: For the Zion cables, perform accelerated aging to simulate normal operational aging in mild and harsh environments and perform condition monitoring tests at regular intervals, in accordance with the test plan. Test samples should be aged to simulate 40, 60, and 80 years of operation. Provide the condition monitoring test data upon completion of the testing.

Task 4c: For the other naturally-aged cables, perform accelerated aging to simulate normal operational aging in mild and harsh environments and perform condition monitoring tests at regular intervals, in accordance with the test plan. Test samples should be aged to simulate 40, 60, and 80 years of operation. Provide the data upon completion of the testing.

Task 4d: Provide a summary of the assessment of condition monitoring methods for normal operational aging. Provide a table that summarizes the applicable condition monitoring tests for each insulation material. Discuss methodology of aging and any limitations for acceleration factors.

Task 5: Simulated accident and condition monitoring testing

Task 5a: Expose cables from Task #4 to accident conditions for a duration of 30 days and perform condition monitoring tests at regular intervals, as specified in the test plan. Provide the data upon completion of the testing. Test samples should be aged to simulate 40, 60, and 80 years of operation. At the end of the storage time, uncontaminated samples should be returned to the NRC and contaminated samples will be shipped to a facility, as directed by the NRC.

Task 5b: Provide a summary of the assessment of condition monitoring methods under accident conditions. Provide a table that summarizes the applicable condition monitoring tests for each insulation material. Discuss the applicability of condition-based qualification and qualified level of degradation. Discuss whether environmental qualification requirements for electrical equipment are adequately addressing aging phenomena and suitably ensuring sufficient margin under renewed license periods.

Task 6: Develop NUREG/CR
Develop a publicly available NUREG/CR delineating the assessment of condition monitoring techniques and confirming the adequacy of tests outlined in EPRI report 1022969. Provide a table that summarizes and recommends the applicable condition monitoring tests for each insulation material and any correction factors, in light of the uncertainties known in the accelerated aging process. In addition, discuss accelerated aging limits, if any. Discuss the results in light of condition-based qualification methodology. Identify any areas for additional research.

DELIVERABLES/SCHEDULES AND/OR MILESTONES

Deliverables should be itemized with schedule or milestone due dates included. Due dates or milestones for NRC-required actions should be included. For instance, the Servicing Agency laboratory shall deliver a draft document for review as one milestone, with the due date for NRC's review and comment on the draft document as a second milestone. As a minimum, monthly letter status reports (MLSRs) and a final report must be included in the list of project deliverables.

Attached is a graph depicting the progress of the tasks.

Task #	Deliverables		Additional Comments (if any)
	Draft	Final	
MLSR		monthly	
1a		6	
1b		12	
1c		12	
1d	10	15	
2a	15	18	
2b	15	18	
2c	15	18	
2d	23	27	
2e	**23**	**27; 18 mo. after completion of Task #2a**	**In addition to the contracting aspect, this subtask is a condition monitoring test like in 4a, 4b, and 4c.**
3	18	21	
4a		18 mo. after completion of Task #2a	
4b		18 mo. after completion of Task #2a	
4c		18 mo. after completion of Task #2a	
4d	2 mo. after completion of Task #4a	5 mo. after completion of Task #4a	
5a		8 mo. after completion of Task #4a	
5b	2 mo. after completion of Task # 5a	6 mo. after completion of Task #5a	
6	4 mo. after the completion of Task #5b	10 mo. after the completion of Task #5b	

REPORTING REQUIREMENTS

Draft reports, as indicated in the tasks, should be submitted by the dates specified above. Project Manager will provide a distribution list at a later date.

Monthly Letter Status Report

A Monthly Letter Status Report (MLSR) is to be submitted to the NRC Project Manager by the 20th of the month following the month to be reported with copies provided to the following:

RESDEMLSR.Resource@nrc.gov
ContractsPOT.Resource@nrc.gov

The MLSR will identify the title of the project, the job code, the Principal Investigator, the period of performance, the reporting period, summarize each month's technical progress, list monthly spending, total spending to date, and the remaining funds and will contain information as directed in NRC Management Directive 11.8, Exhibit 5 (dated March 2, 2007). Any administrative or technical difficulties which may affect the schedule or costs of the project shall be immediately brought to the attention of the NRC project manager.

MEETINGS AND TRAVEL

One trip to the decommissioned Zion Nuclear Power Plant near Chicago, IL may be necessary to collect data on the location and environment of the naturally-aged cable samples. This information is crucial in developing the test plan for aging the cable samples. This trip would be for two people for up to three days. The dates of this trip will be determined at a later date.

Two trips to Paris, France, to present test results at the CADAK PHASE 2 NRC research results and findings will be shared during the CADAK Project with the international community. Furthermore, new developments in condition monitoring techniques will be ascertained. Research efforts should be coordinated with representatives from the international community. Dates for these meetings are to be determined but each trip is anticipated to be five days in length.

NRC-FURNISHED MATERIAL

The following reports will be provided at the initiation of the project:

1. The NRC will provide EPRI Report 1022969, "Electrical Cable Test Applicability Matrix for Nuclear Power Plants" [2011] (Proprietary), which is not to be distributed and used only for this project.

2. The NRC will provide EPRI Report TR-104075, "Evaluation of Cable Polymer Aging through Indenter Testing of In-Plant and Laboratory-Aged Specimens" that contains indenter results of cables from Zion.

3. The NRC will provide a DRAFT NUREG/CR report entitled, “Nuclear Power Plant Cable Materials: Review of Qualification and Currently Available Aging Data for Margin Assessments in Cable Performance.” This report is not to be distributed and used only for this project.

The NRC will furnish naturally-aged cables from the decommissioned Zion Nuclear Power Plant, to be used for accelerated aging and condition monitoring testing. These materials will be provided upon acquisition of the materials.

SUBCONTRACTING/CONSULTANT INFORMATION/STUDENTS OR US CITIZENS WORKING UNDER A NIST FINANCIAL ASSISTANCE AWARD

“NIST contractors and their employees may perform work under this agreement. Intellectual property developed by such contractors/employees is governed by the FAR clauses contained in the NIST contract, which include the right of the contractor to elect to retain ownership of inventions under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), and possible contractor ownership of data rights. NIST expects that approximately **[$1,214,978.00]** will be transferred to contractors to perform work under this agreement, and the parties agree that should this estimate change, the estimate will be revised through an exchange of emails which will be retained in the official agreement file.”

No students or U.S. citizens working under a NIST financial assistance award made under the authority of 15 U.S.C. § 278g-1 will perform work under this agreement.

No employees or agents of recipients working under a NIST financial assistance award will perform work under this agreement.

TECHNICAL DIRECTION

Technical direction will be provided by the Project Manager, [redacted] who can be reached at:

Mail Stop: T10A12
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001
[redacted]

Express mail should be sent to:
U. S. Nuclear Regulatory Commission
Mail Stop: T10A12
11545 Rockville Pike
Rockville, MD 20852-2738

Technical direction includes interpreting technical specifications, providing needed details, and suggesting possible lines of inquiry. Technical direction must not constitute new work or affect overall project cost or period of performance.