

**GRANT REQUEST FORM (GRF)**

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement PIR-15-012 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Avtar Bining	43	916-327-1411

Recipient's Legal Name	Federal ID Number
Institute of Gas Technology dba Gas Technology Institute	36-2170137

Title of Project
Pipeline Safety and Integrity Monitoring Technologies Assessment

Term and Amount	Start Date	End Date	Amount
	6/15/2016	3/30/2018	\$ 1,006,812

**Business Meeting Information**
 ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	6/14/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Avtar Bining	Time Needed: 5 minutes	

Please select one list serve. NaturalGas (NG Research Program)

**Agenda Item Subject and Description**

INSTITUTE OF GAS TECHNOLOGY DBA GAS TECHNOLOGY INSTITUTE (GTI). Proposed resolution approving Agreement PIR-15-012 with Institute of Gas Technology dba Gas Technology Institute (GTI) for a \$1,006,812 grant to conduct a thorough assessment of the current status of transmission and distribution natural gas pipeline safety and integrity management technologies. (Natural gas funding) Contact: Avtar Bining (Staff Presentation: 5 minutes)

**California Environmental Quality Act (CEQA) Compliance**

1. Is Agreement considered a "Project" under CEQA?  
 Yes (skip to question 2)  No (complete the following (PRC 21065 and 14 CCR 15378)):  
 Explain why Agreement is not considered a "Project":  
 Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because because the evaluated technologies and instruments do not produce emissions or cause physical changes to the pipeline system.
2. If Agreement is considered a "Project" under CEQA:  
 a) Agreement **IS** exempt. (Attach draft NOE)  
 Statutory Exemption. List PRC and/or CCR section number: \_\_\_\_\_  
 Categorical Exemption. List CCR section number: \_\_\_\_\_  
 Common Sense Exemption. 14 CCR 15061 (b) (3)  
 Explain reason why Agreement is exempt under the above section:
- b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)  
 Check all that apply  
 Initial Study  Environmental Impact Report  
 Negative Declaration  Statement of Overriding Considerations  
 Mitigated Negative Declaration

**List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)**

Legal Company Name:	Budget
Energy Experts International	\$ 94,635
Carnegie	\$ 8,000
	\$

**List all key partners: (attach additional sheets as necessary)**

Legal Company Name:

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Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
NG Subaccount, PIERDD	14-15	501.001I	\$1,006,812
			\$
			\$
R&D Program Area: ESRO: ETSI		TOTAL:	\$1,006,812
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		Recipient's Project Manager	
Name:	Kate Jauridez	Name:	Khalid Farrag
Address:	1700 S Mount Prospect Rd	Address:	1700 S Mount Prospect Rd
City, State, Zip:	Des Plaines, IL 60018-1804	City, State, Zip:	Des Plaines, IL 60018-1804
Phone:	847-768-0905 / Fax: - -	Phone:	847-768-0803 / Fax: - -
E-Mail:	Kate.Jauridez@gastechnology.org	E-Mail:	khalid.farrag@gastechnology.org

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-506
<input type="checkbox"/> First Come First Served Solicitation	

The following items should be attached to this GRF	
1. Exhibit A, Scope of Work	<input checked="" type="checkbox"/> Attached
2. Exhibit B, Budget Detail	<input checked="" type="checkbox"/> Attached
3. CEC 105, Questionnaire for Identifying Conflicts	<input checked="" type="checkbox"/> Attached
4. Recipient Resolution	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached
5. CEQA Documentation	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached

Agreement Manager \_\_\_\_\_ Date \_\_\_\_\_ Office Manager \_\_\_\_\_ Date \_\_\_\_\_ Deputy Director \_\_\_\_\_ Date \_\_\_\_\_

## EXHIBIT A Scope of Work

### I. TASK AND ACRONYM/TERM LISTS

#### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		General Project Tasks
2		Evaluate Applicable Technical Work
3		Establish Baseline of Applicable Technologies
4	X	Technology Review Workshop
5		Assess Performance of Selected Technologies
6		Categorize the Technologies Readiness Levels
7		Web-Based Database Catalog
8	X	Select Technologies and Coordinate Demonstrations
9		Perform Technologies Field Demonstrations
10		Risk-to-Value Assessment
11		Evaluation of Project Benefits
12		Technology/Knowledge Transfer Activities

#### B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
GIS	Geographic Information System
ILI	In-line Inspection
MFL	Magnetic Flux Leakage
ROW	Right of Way
TRL	Technology Readiness Level
TAC	Technical Advisory Committee

### II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

#### A. Purpose of Agreement

The purpose of this Agreement is to fund a performance-based assessment of close-to-market technologies for improving pipeline prediction and monitoring of threats and reducing operation costs.

#### B. Problem/ Solution Statement

##### Problem

Many of the technologies for the integrity management and damage inspection of pipelines are limited to providing indications of damage without a comprehensive evaluation of combined pipe

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<sup>1</sup> Please see Subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

## **EXHIBIT A Scope of Work**

threats and risk assessment. Internal inspection technologies are currently limited in identifying cracks and weld damages in certain wall thicknesses and pipe sizes.

Additionally, current practices of risk management rely on input from subject matter experts in custom-built formats and commercially-available risk models. Defining the risks associated with pipeline threats requires the assessment of disparate data sources and advanced risk models which are integrated into current utilities Geographic Information System (GIS) systems.

### **Solution**

The Recipient will investigate new pipeline technologies which provide early indications of damage, quantitative measures of improved performance, and reduced operation costs.

### **C. Goals and Objectives of the Agreement**

#### **Agreement Goals**

The goals of this Agreement are to:

- Lower costs, by identifying the cost-effective technologies used in pipeline inspection and rehabilitation.
- Increase safety, by providing improved performance and reduced risk from Right-of-Way (ROW) encroachments, pipe damages, natural forces, and other gas pipeline threats.
- Improve public health and safety, by implementing technologies which prevent catastrophic failures, detect leaks, and reduce gas emissions to the environment.
- Contribute to energy security, by assessing systems which improve the communications protocols, reduce ROW encroachments, and enhance cyber-security.

Ratepayer Benefits:<sup>2</sup> This Agreement will result in the ratepayer benefits of reduced costs and increased safety by implementing technologies which result in reduced operation and rehabilitation time and cost, improved pipeline locating and leak detection, and reduced risks of damage.

#### Technological Advancement and Breakthroughs:<sup>3</sup>

This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by:

- Implementing alternative inspection technologies, primarily directed at material and weld internal inspection technologies such as Magnetic Flux Leakage (MFL) and Electromagnetic-Acoustic Transducers.
- Inspecting corrosion damage to steel pipes and evaluating remaining strength during external assessment of pipelines.

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<sup>2</sup> California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, [http://docs.cpuc.ca.gov/PublishedDocs/WORD\\_PDF/FINAL\\_DECISION/167664.PDF](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF)).

<sup>3</sup> California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

## **EXHIBIT A**

### **Scope of Work**

- Detect ROW encroachments and enhance excavation damage prevention through the application of technologies such as infrared laser differentiation, Light Detection and Ranging, and fiber optics.
- Risk assessment of natural forces and outside forces damage through implementation of data management and risk modeling systems.

#### **Agreement Objectives**

The objectives of the Agreement are to:

- Assess current status of transmission and distribution natural gas pipeline safety and integrity management technologies.
- Prioritize the various emerging technologies by implementing industry-wide metrics such as technology readiness Levels.
- Identify development gaps and estimate the cost and time resources needed to make these technologies commercially available.
- Provide California natural gas operators with a web-based program and database to access the status and applicability of the technologies.
- Help in the implementation and commercialization of the close-to-market technologies through field demonstrations of these technologies at utility sites.

# EXHIBIT A

## Scope of Work

### III. TASK 1 GENERAL PROJECT TASKS

#### PRODUCTS

##### Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

##### The Recipient shall:

###### For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

###### For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

###### For all products

- Submit all data and documents required as products in accordance with the following:

###### Instructions for Submitting Electronic Files and Developing Software:

###### o **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission’s software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

## **EXHIBIT A**

### **Scope of Work**

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
  - Text documents will be in MS Word file format, version 2007 or later.
  - Documents intended for public distribution will be in PDF file format.
  - The Recipient must also provide the native Microsoft file format.
  - Project management documents will be in Microsoft Project file format, version 2007 or later.
- **Software Application Development**
- Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

## **MEETINGS**

### **Subtask 1.2 Kick-off Meeting**

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

#### **The Recipient shall:**

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

## EXHIBIT A Scope of Work

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Technical products (subtask 1.1);
  - Progress reports and invoices (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

### **The CAM shall:**

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

### **Recipient Products:**

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*if applicable*)

### **CAM Product:**

- Kick-off Meeting Agenda

### **Subtask 1.3 Critical Project Review (CPR) Meetings**

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

### **The Recipient shall:**

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).

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- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

#### **The CAM shall:**

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

#### **Recipient Products:**

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

#### **CAM Products:**

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

#### **Subtask 1.4 Final Meeting**

The goal of this subtask is to complete the closeout of this Agreement.

#### **The Recipient shall:**

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
  - Disposition of any state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
  - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).

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- Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
  - Prepare a *Schedule for Completing Agreement Closeout Activities*.
  - Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

### Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

## REPORTS AND INVOICES

### Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

#### The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions. In addition, each invoice must document and verify:
  - Energy Commission funds received by California-based entities;
  - Energy Commission funds spent in California (*if applicable*); and
  - Match fund expenditures.

### Products:

- Progress Reports
- Invoices

### Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

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## Scope of Work

### Subtask 1.6.1 Final Report Outline

#### The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)
- Submit a draft of the outline to the CAM for review and comment **at least nine months before the Agreement end date.**
- Once agreement has been reached on the draft, submit the final outline to the CAM. The CAM will provide written approval of the final outline within 10 days of receipt.

#### Recipient Products:

- Final Report Outline (draft and final)

#### CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

### Subtask 1.6.2 Final Report

#### The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.
    - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
    - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.

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- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

### Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

### CAM Product:

- Written Comments on the Draft Final Report.

## MATCH FUNDS, PERMITS, AND SUBCONTRACTS

### Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

### The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
  - The amount of cash match funds, their source(s) (including a contact name,

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address, and telephone number), and the task(s) to which the match funds will be applied.

- The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
- A copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

### Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

### Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

#### The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
  - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
  - The schedule the Recipient will follow in applying for and obtaining the permits.

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.

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- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

#### **Products:**

- Permit Status Letter
- Updated List of Permits (*if applicable*)
- Updated Schedule for Acquiring Permits (*if applicable*)
- Copy of each Approved Permit (*if applicable*)

#### **Subtask 1.9 Subcontracts**

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

#### **The Recipient shall:**

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

#### **Products:**

- Subcontracts (*draft if required by the CAM*)

### **TECHNICAL ADVISORY COMMITTEE**

#### **Subtask 1.10 Technical Advisory Committee (TAC)**

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.

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- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

#### **The Recipient shall:**

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

#### **Products:**

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

#### **Subtask 1.11 TAC Meetings**

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

#### **The Recipient shall:**

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.

## EXHIBIT A Scope of Work

- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

### Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

## IV. TECHNICAL TASKS

*Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

### Phase-1 Tasks

#### **TASK 2 - EVALUATE APPLICABLE TECHNICAL WORK**

The goal of this task is to communicate with the California natural gas industry to address their needs in the areas of pipeline safety, integrity monitoring, and management.

#### **The Recipient shall:**

- Identify the regulations and operations requirements of pipeline and utility companies in California.
- Survey and identify California natural gas industry needs.
- Solicit industry participation from natural gas pipeline companies that operate in California such as:
  - California Gas Transmission, a subsidiary of Pacific Gas & Electric Company
  - El Paso Natural Gas
  - Questar Southern Trails
  - Sempra International
  - Southwest Gas Corporation
- Solicit participation from natural gas distribution companies in California operating high pressure pipelines such as:
  - Pacific Gas & Electric Company
  - San Diego Gas & Electric Company (SDG&E)
  - Southern California Gas Company
  - Southwest Gas Corporation
- Review current research and development.
- Prepare and submit a *California Natural Gas Industry Report* on the current practices, regulations, and development needs for California gas pipelines and utility companies.

### Products:

- California Natural Gas Industry Report

## **EXHIBIT A**

### **Scope of Work**

#### **TASK 3 - ESTABLISH BASELINE OF APPLICABLE TECHNOLOGIES**

The goal of this task is to provide a preliminary assessment of the current status of natural gas pipeline safety and integrity monitoring and management technologies.

##### **The Recipient shall:**

- Identify the various emerging pipeline safety and integrity management technologies for their potential to improve or enhance pipeline safety and integrity.
- Specify commercial and close-to-market equipment, sensors, systems and processes. Specific technologies to be evaluated may include, but not be limited to:
  - In-line inspection (ILI) pigs and sensors to detect cracks, galvanic corrosion, stress corrosion cracking, dents, gouges, wall thickness and pitting.
  - MFL sensors, Remote Field Eddy Current sensors, ultrasonic sensors, deformation tools, and internal pipeline robotic crawlers.
  - Tools, equipment and procedures to conduct external and internal corrosion direct assessments.
  - Sensors and systems to detect earth and pipeline movement.
  - Sensors and systems to detect encroachment by heavy equipment on the pipeline ROW.
  - Systems and procedures used for data management and risk analysis of pipelines.
- Communicate with developers and inspection providers.
- Evaluate inspection technologies under development by independent research and development organizations such as Southwest Research Institute, the National Laboratories and the Recipient.
- Prepare and submit a *Technology Baseline Report* on the preliminary selection of the close-to-market technologies and development needs.

##### **Products:**

- Technology Baseline Report

#### **TASK 4 - TECHNOLOGY REVIEW WORKSHOP**

The goal of this task is to conduct a technology review workshop in California with the TAC group and selected technology providers and developers.

##### **The Recipient shall:**

- Communicate with the TAC group, industrial and professional organizations and technology developers.
- Coordinate, organize, and conduct a 1-or 2-day workshop in California.
- Prepare and present the results of Task 3, including the preliminary assessment of pipeline inspection technologies at the workshop.
- Select and finalize the technologies that will be the subject of the Task 5 technology assessment and evaluation.
- Prepare and submit a *Technology Review Report* of the workshop presentations and conclusions.
- Prepare a *CPR Report #1* and participate in a CPR meeting per Subtask 1.3.

## **EXHIBIT A**

### **Scope of Work**

#### **Products:**

- Technology Review Report
- CPR Report #1

#### **TASK 5 - ASSESS PERFORMANCE OF SELECTED TECHNOLOGIES**

The goals of this task are to identify and categorize the technologies addressing pipeline threats into different stages based on their current status of development, deployment, and commercial availability.

#### **The Recipient shall:**

- Evaluate the technology scopes and limitations. The evaluation will address the technologies advantages and disadvantages, reliability, performance, projected cost of implementation and use, operation requirements, and status of their commercial availability.
- Perform the assessment in the four main areas considered to be of high immediate values to gas transmission pipelines and utilities:
  - Alternative inspection technologies, primarily directed at material and weld inspection and estimation of pipeline fitness for service.
  - Corrosion damage inspection of steel pipes and evaluation of the remaining strength. This category includes ILI and non-destructive evaluation.
  - Right-of-way encroachment and excavation damage prevention. These technologies include remote sensing, data management, and integration into pipeline GIS systems.
  - Natural force and outside force damage and risk assessment.
- Perform laboratory tests on available prototypes as applicable to complete the required data for further performance evaluation in Task 6.
- Prepare and submit a *Technology Categories Report* categorizing and describing the technologies based on the above categories.

#### **Products:**

- Technology Categories Report

#### **TASK 6 - CATEGORIZE THE TECHNOLOGIES READINESS LEVELS**

The goal of this task is to rank the technologies based on their performance and readiness level for further testing and demonstration in Phase-2 of the project.

#### **The Recipient shall:**

- Select the technologies with the close-to-market applications based on the assessment performed in Task 5.
- Evaluate the selected technologies based on quantifiable measures related to their probabilities of detection. The analysis is based on published data and previous evaluation and research.
- Establish the Technology Readiness Level (TRL) and cost effectiveness.
- Perform preliminary cost requirements and value analysis of the technologies based on the anticipated benefits to California utilities and pipeline companies.

## **EXHIBIT A**

### **Scope of Work**

- Rank the technologies based on their performance, TRL level, and quantitative measures of improved performance and reduced risk from the various natural gas pipeline threats.
- Conduct a web conference with the TAC group to identify and select the qualified technologies for further evaluation in Phase-2.
- Prepare and submit a *Technology Assessment Report* which includes a thorough assessment of the new and close-to-market technologies for transmission and distribution natural gas pipeline safety and integrity management.

#### **Products:**

- Technology Assessment Report.

#### **TASK 7 - WEB-BASED DATABASE CATALOG**

The goal of this task is to catalog the status and applicability of the available technologies in a web-based program and database for the regulators and operators.

#### **The Recipient shall:**

- Prepare a summary of each technology, its applicable conditions and scope, implementation gaps, and further development needs.
- Build a database management system of the above items with key search options.
- Build a web-based program for the access and search of the database. Establish the web security and search requirements.
- Launch a beta version of the program and distribute to the TAC for testing and evaluation.
- Perform web conference meeting with the TAC and obtain the users' feedback.
- Modify and finalize the program.
- Prepare and submit a *Web-Based Database Catalog Report* on the status and applicability of the available technologies

#### **Products:**

- Web-Based Database Catalog Report

#### **Phase-2 Tasks:**

#### **TASK 8 - SELECT TECHNOLOGIES AND COORDINATE DEMONSTRATIONS**

The goal of this task is to identify the technologies and coordinate field demonstrations at the selected utility sites.

#### **The Recipient shall:**

- Finalize the selection of the technologies for field demonstration.
- Coordinate the delivery and operation with developers and suppliers (e.g., shipment of the equipment and prototypes, operation and staff requirements).
- Match the pipeline companies' and utilities' needs with the selected technologies for field evaluation.
- Coordinate the selection of the test sites with the utilities considering the characteristics of the sites, locations, and operations and safety requirements.

## **EXHIBIT A**

### **Scope of Work**

- Coordinate the tests during routine pipeline inspection and integrity management activities.
- Prepare and submit a *Technology Selection Report* identifying a list of the technologies and associated sites for field demonstration.
- Prepare a *CPR Report #2* and participate in a CPR meeting per Task 1.3.

#### **Products:**

- Technology Selection Report
- CPR Report #2

### **TASK 9 - PERFORM TECHNOLOGIES FIELD DEMONSTRATIONS**

The goal of this task is to implement the selected technologies into pipeline and utilities practices in real field applications.

#### **The Recipient shall:**

- Finalize the dates and coordinate of activities between the technology suppliers and the utilities.
- Perform a safety meeting with the participants before each of the field demonstrations.
- For each of the field demonstrations, perform the following:
  - Record the site and infrastructure attributes which may influence the performance of the demonstration (e.g., pipeline material type and size, operating pressure, soil and infrastructure conditions, coating type and condition, and type and size of flaws).
  - Record the standard procedures used by the utility and the required modifications for the use of the selected technology.
  - Record the steps of the operation and establish a new procedure. Identify the variables required for using the new technology (e.g., required resources, new skills of the field crew and new safety requirements).
  - Evaluate the operational benefits of using the technology (e.g., cost of operation, time, noise level, space requirements, new tools, and outcome of the procedure).
  - Provide questionnaires and survey the operators and field crew for their feedback
  - Prepare and submit a *Field Demonstration Report* for all field demonstrations along with analysis of the application and procedure.

#### **Products:**

- Field Demonstration Report

### **TASK 10 - RISK-TO-VALUE ASSESSMENT**

The goal of this task is to compare the implementation and commercialization costs of the technologies with the anticipated benefits in a quantifiable scale.

#### **The Recipient shall:**

- Estimate current average costs of current procedures and utilities practices. Identify the variables and controlling parameters which affect the application.
- Identify the impact of not using the technology (i.e., doing nothing option): This analysis includes identifying the costs, risks, and liabilities of the current procedures and the consequences if failure occurs.

## **EXHIBIT A**

### **Scope of Work**

- Determine the possible alternatives to the technology (i.e., alternatives option): This includes the technical and functional concepts of alternatives, their cost, and associated risks.
- Quantify the cost of developing the technology. These costs include the development and acquisition costs, and the cost of commercialization for close-to-market technologies.
- Determine the life-cycle cost of the technology. This analysis includes determining the operating, maintenance, improvements, training, and staffing needs.
- Identify the tangible benefits of the selected technologies. These benefits include reduced labor and time costs, reduction of resources, and reduced injuries and properties damage.
- Identify intangible benefits including improved productivity, public opinion, and increasing management responsibility.
- Identify disadvantages including the risks of using the technology and plans to control and mitigate these risks.
- Quantify the Return of Investment. Perform comparison of the benefits, performance, and productivity gains for dollars spent over doing nothing or using alternative approach.
- Prepare and submit a *Risk-to-Value Assessment Report* including the cost analysis and values of the selected technologies.

#### **Products:**

- Risk-to-Value Assessment Report.

#### **TASK 11- EVALUATION OF PROJECT BENEFITS**

The goal of this task is to report the benefits resulting from this project.

#### **The Recipient shall:**

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
  - For Product Development Projects and Project Demonstrations:
    - Published documents, including date, title, and periodical name.
    - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
    - Greenhouse gas and criteria emissions reductions.
    - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
    - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.

## **EXHIBIT A**

### **Scope of Work**

- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Additional Information for Product Development Projects:
  - Outcome of product development efforts, such copyrights and license agreements.
  - Units sold or projected to be sold in California and outside of California.
  - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
  - Investment dollars/follow-on private funding as a result of Energy Commission funding.
  - Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
  - Outcome of demonstrations and status of technology.
  - Number of similar installations.
  - Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
  - Outcome of project.
  - Published documents, including date, title, and periodical name.
  - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
  - The number of website downloads.
  - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
  - An estimate of energy and non-energy benefits.
  - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

#### **Products:**

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

#### **TASK 12- TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES (*Mandatory task*)**

The goal of this task is to develop a plan to make the knowledge gained, experimental results,

## **EXHIBIT A**

### **Scope of Work**

and lessons learned available to the public and key decision makers.

#### **The Recipient shall:**

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - The number of website downloads or public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

#### **Products:**

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

## **V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: GAS TECHNOLOGY INSTITUTE

**RESOLVED**, that the State Energy Resources Conservation and Development Commission (Energy Commission) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

**RESOLVED**, that the Energy Commission approves Agreement PIR-15-012 from GFO-15-506 with Institute of Gas Technology dba Gas Technology Institute for a \$1,006,812 grant to conduct a thorough assessment of the current status of transmission and distribution natural gas pipeline safety and integrity management technologies; and

**FURTHER BE IT RESOLVED**, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

**CERTIFICATION**

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on June 14, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

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Cody Goldthrite,  
Secretariat