



## GRANT REQUEST FORM (GRF)

### A. New Agreement Number

**IMPORTANT:** New Agreement # to be completed by Contracts, Grants, and Loans Office.

**New Agreement Number:** PIR-22-004

### B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Jeffrey Sunquist
3. MS-:43
4. Phone Number: 916-776-0816

### C. Recipient's Information

1. Recipient's Legal Name: BioVind, LLC
2. Federal ID Number: 08-7367473

### D. Title of Project

Title of project: Understanding of Microbiologically Influenced Corrosion (MIC) in Gas System and Development of Detection Methods

### E. Term and Amount

1. Start Date: 2/1/2023
2. End Date: 9/30/2026
3. Amount: \$999,970

### F. Business Meeting Information

1. Are the ARFVTP agreements \$75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 1/25/2023 .
3. Consent or Discussion? Consent
4. Business Meeting Presenter Name: Jeffrey Sunquist
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: NaturalGas (NG Research Program).

#### **Agenda Item Subject and Description:**

BioVind, LLC.

Proposed resolution approving Agreement PIR-22-004 with BioVind, LLC for a \$999,970 grant to develop a test kit and field-testing guide for detecting microbial species associated with microbiologically influenced corrosion (MIC) in gas pipelines and storage facilities, and adopting staff's determination that this action is exempt from CEQA. The innovative test kit will help lower the risk of MIC-related leakages and reduce costs associated with MIC detection, mitigation, and control. (Gas R&D Funding) Contact: Jeffrey Sunquist

California Environmental Quality Act (CEQA) Compliance

#### **1. Is Agreement considered a "Project" under CEQA?**

Yes

If yes, skip to question 2.



If no, complete the following (PRC 21065 and 14 CCR 15378) and 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:

**2. If Agreement is considered a "Project" under CEQA answer the following questions.**

a) Agreement **IS** exempt?

Yes

Statutory Exemption?

No

If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

PRC section number: None

CCR section number: None

Categorical Exemption?

Yes

If yes, list CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

CCR section number: Cal. Code Regs., tit. 14, § 15306

Common Sense Exemption? 14 CCR 15061 (b) (3)

No

If yes, explain reason why Agreement is exempt under the above section. If no, enter "Not applicable" and go to the next section.

Cal. Code Regs., tit. 14, Section 15306 provides that projects which consist of basic data collection, research, experimental management, and resource evaluation activities, and which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the provisions of the California Environmental Quality Act. This project involves computer modeling and paper studies to conduct a corrosion risk assessment of gas pipelines.

The field test kit will be developed and tested at a laboratory in San Diego. Field work (sampling and testing) will take place at existing Southern California Gas Company (SoCalGas) facilities, such as, but not limited to, pipelines and ancillary equipment, located in Los Angeles County. Field work is limited to existing SoCalGas facilities, and trenching, if necessary, is limited to SoCalGas-controlled property which has no sensitive environmental resources. The project will be managed at an office in Cerritos. This work will not result in a serious or major disturbance to an environmental resource. For these reasons, the proposed project will have no significant effect on the environment and is categorically exempt under section 15306.

The project will not impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies; does not involve any cumulative impacts of



successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project site is not included on any list compiled pursuant to Government Code section 65962.5; and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project, and this project will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.

**IMPORTANT:** consult with the legal office to determine next steps.

No

If yes, answer yes or no to all that applies. If no, list all as “no” and “None” as “yes”.

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

### G. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter “No subcontractors to report” and “0” to funds.

**Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
ENHANCECO, LLC	\$ 266,690	\$163,950

### H. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous.

Insert additional rows if needed. If no vendors or sellers to report, enter “No vendors or sellers to report” and “0” to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
BioLabs San Diego LLC – Lab Space Rental	\$ 39,360	\$ 26,240
TBD – Lab Consumables	\$ 19,200	\$ 12,800
TBD – Sample Preparation	\$ 12,000	\$ 8,000
TBD – Cartridge Prototypes	\$ 27,000	\$ 18,000



TBD – Engineering Services and Materials	\$ 54,000	\$ 36,000
TBD – Software Services	\$ 6,000	\$ 4,000
TBD – Test Kit Materials	\$ 56,640	\$ 37,760
TBD – Vacuum Pump System	\$ 0	\$ 12,000

**I. Key Partners**

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter “No key partners to report.” **Delete** any unused rows from the table.

Key Partner Legal Company Name
Southern California Gas Company

**J. Budget Information**

Include all budget information. Insert additional rows if needed. If no budget information to report, enter “N/A” for “Not Applicable” and “0” to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
NG Subaccount, PIERDD	20-21	501.001O	\$ 999,970

**TOTAL Amount: \$ 999,970**

R&D Program Area: ESRB: ETSI

Explanation for “Other” selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

**K. Recipient’s Contact Information**

**1. Recipient’s Administrator/Officer**

Name: Josephine (Joe) Iyoha-Nwani

Address: 17102 Horst Ave

City, State, Zip: Cerritos, CA 90703-2743

Phone: 916-549-4322

E-Mail:

**3. Recipient’s Project Manager**

Name: Marc Tiegel

Address: 17102 Horst Ave

City, State, Zip: Cerritos, CA 90703-2743



STATE OF CALIFORNIA  
CALIFORNIA ENERGY COMMISSION

Grant Request Form  
CEC-270 (Revised 9/2022)

Phone: 512-217-3077

E-Mail: PM\_GFO-21-506@biovind.com

**L. Selection Process Used**

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-21-506
First Come First Served Solicitation #	Not applicable
Other	Not applicable

**M. Attached Items**

1. List all items that should be attached to this GRF by entering “Yes” or “No”.

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes.
4	Recipient Resolution	No.
5	Awardee CEQA Documentation	Yes.

**Approved By**

Individuals who approve this form must enter their full name and approval date in the MS Word version.

**Agreement Manager:** Jeffrey Sunquist

**Approval Date:** 12/21/2022

**Office Manager:** Reynaldo Gonzalez

**Approval Date:** 12/21/2022

**Deputy Director:** Reynaldo Gonzalez

**Approval Date:** 12/21/2022

**Exhibit A  
Scope of Work  
BioVind, LLC**

**I. TASK ACRONYM/TERM LISTS**

A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		General Project Tasks
2	X	Preliminary Assessments and Field Visits with Gas IOU
3		Development of Test Kit Assay
4		Development of Sample Preparation Protocol and Device
5		Amplification Device and Cartridge Optimization and Refinement
6	X	Development and Analytical Laboratory Testing of Complete Test Kit
7		Pilot Demonstration of the Test Kit
8		Development of Field Testing Guide
9		Evaluation of Project Benefits
10		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
Assay	A combination of reagents and conditions for identifying microbial targets
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
DNA	Deoxyribonucleic Acid
LAMP	Loop-Mediated Isothermal Amplification
LOD	Limit of Detection
MIC	<i>Microbiologically Influenced Corrosion</i> , metal loss influenced by exposure of the metal surface to microbial activity
IOU	Investor-owned Utility
PCR	Polymerase chain reaction
TAC	Technical Advisory Committee

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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**  
**BioVind, LLC**

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

**A. Purpose of Agreement**

The purpose of this Agreement is to fund the development of a test kit and field testing guide for detecting microbial species associated with MIC in gas pipelines and storage facilities.

**B. Problem/ Solution Statement**

**Problem**

Microbiologically influenced corrosion (MIC) is an area of increasing concern in the integrity and safety of gas processing, storage and distribution. As a result of their ability to survive and thrive in a variety of field conditions, microorganisms such as bacteria, fungi and archaea accelerate corrosion of metal and alloys through their presence and activities. Consequently, MIC has been linked to the rapid emergence of leaks that hamper the efficiency of the gas distribution system. However, there are several challenges to adequately predicting, preventing and addressing the risks posed by MIC to the gas system:

- Microbial species are very heterogeneous in their response to various environmental conditions, which limits the applicability of one-size-fits-all solutions given the differences in field conditions across facilities and pipelines
- Understanding the ideal treatment approach for a facility or pipeline typically requires knowledge of the specific microbial species of concern present in that location at that time.
- Current lab cultures that can identify species often require samples to be sent to off-site labs and take days to return results.
- Some microorganisms linked to MIC such as methanogens cannot be cultured in labs
- Rapid on-site tests can only yield general microbial counts that do not contain any information about which harmful bacteria may be present.
- Testing often requires specialized labs, equipment and protocols that can only be undertaken by highly skilled personnel, which creates a bottleneck for frequent testing and data collection
- Broad-spectrum biocides that are used without knowledge of the targeted microbes are environmentally harsh, but environmentally benign alternatives require knowledge of the specific causative organisms.

**Solution**

The Recipient will address the current limitations to microbial testing for MIC detection and control by developing a test kit and field testing guide. The test kit will be simple, rapid, and portable and will enable technicians in the gas system to easily identify the precise species of corrosion-related microbes present in pipelines and storage tanks. The solution will significantly lower the risk of MIC-related leakages, reduce the excessive and expensive use of harmful broad-spectrum biocides and significantly shorten the time and cost associated with MIC detection, mitigation and control.

The test kit will have three components:

## **Exhibit A Scope of Work BioVind, LLC**

- A simple, automated, universal sample preparation protocol that can be used with a wide variety of raw samples, including crude oil, waxes and paraffins, solids and coupon swabs.
- Stable cartridge assays with lab-level specificity and sensitivity that can detect DNA and identify microbial species commonly associated with MIC.
- An isothermal nucleic acid amplification device that can run multiple reactions on a single sample.

After the test kit is developed and piloted, data collected from the field demonstration will be used to develop a field testing guide that includes actionable insights on MIC control based on microbial resurgence rates post-treatment.

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

#### **Agreement Goals**

The goals of this Agreement are to:

- Increase the understanding of the microbial species involved in microbial corrosion under different field conditions and their response to specific mitigation methods.
- Build the foundation for the development of new approaches for the detection, monitoring, prediction, and control of microbial corrosion in California's gas pipeline systems.
- Advance improvements in biocide application to control microbial growth in gas infrastructure in the State of California, and the resulting environmental impacts.
- Reduce the time and cost associated with MIC detection, mitigation, and control.
- Lower the risk of MIC-related leakages

#### **Ratepayer Benefits**

This Agreement will result in the ratepayer benefits of improved infrastructure resiliency and reliability, lowered costs due to improved MIC control, reduced greenhouse gas emissions and reduced environmental impact of MIC treatment.

By providing corrosion management teams with the ability to quickly detect the presence of specific corrosion-related microbes in the field, the proposed solution will facilitate increased precision in the timing of biocide re-application and more tailored treatments that take into account the specific microbial communities present in each facility.

#### **Technological Advancement and Breakthroughs**

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 making molecular methods for microbial identification broadly accessible and practical for MIC detection and control. The proposed solution is innovative because it would achieve a combination of speed, specificity, ease-of-use, portability and multiplexing that is not currently available in MIC testing, and which can open up new avenues for improving MIC management practices.

Culture-based methods can deliver specificity but often require days to return results and cannot be used to detect non-culturable microbes such as methanogens. Live microbial count methods like adenosine triphosphate (ATP) are rapid but unable to identify which specific microbes are present. Most molecular methods such as qPCR are complicated and require highly specialized

## Exhibit A Scope of Work BioVind, LLC

equipment and personnel, and samples to be sent to laboratories. BioVind aims to develop a test kit that brings together the advantages of each method in a broadly accessible and user-friendly system, which opens up opportunities to explore alternative corrosion control methods such as microbiologically influenced corrosion inhibition (MICI) strategies.

### **Agreement Objectives**

The objectives of this Agreement are to:

- Development of a portable test kit capable of identifying up to 18 species of corrosion-related microbes in the field, from a single raw sample, using a simple, universal sample preparation protocol.
- Performance of field pilot demonstrations of the test kit on a range of sample types under various environmental conditions at the project site, and demonstrate the test kit performance:
  - speed <= 60 minutes average result time
  - sensitivity and specificity - comparable or superior to results generated through polymerase chain reaction (PCR) or microbial culture based testing methods.
  - usability - hands-on time of about 3 minutes.
- Development of a field test guide using data from piloting the test kit, and training for field technicians on use of the kit.
- Demonstration of potential cost savings and environmental benefits to the California ratepayers, utilities, government entities and other stakeholders.

### **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)**. All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations. All technical tasks should include product(s). 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.

## **Exhibit A Scope of Work BioVind, LLC**

- 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:
  - **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 California Energy Commission's (CEC) 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.

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

- 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.
  - 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).

## Exhibit A Scope of Work BioVind, LLC

- Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the CEC'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 CEC 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;
- Invoicing and auditing procedures;
- 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.

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 (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.
- Provide *Kick-off Meeting Presentation* to include but not limited to:
    - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
    - Project schedule that identifies milestones
    - List of potential risk factors and hurdles, and mitigation strategy
  - Provide an Updated Project Schedule, Match Funds Status Letter, and Permit Status Letter, as needed to reflect any changes in the documents.

## **Exhibit A Scope of Work BioVind, LLC**

### **The CAM shall:**

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

### **Recipient Products:**

- Kick-off Meeting Presentation
- Updated Project Schedule (*if applicable*)
- Match Funds Status Letter (subtask 1.7) (*if applicable*)
- Permit Status Letter (subtask 1.8) (*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 CEC 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 CEC 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 CEC.

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 CEC, 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 and submit 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.
- 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* with 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

## **Exhibit A Scope of Work BioVind, LLC**

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)

### **CAM Products:**

- CPR Agenda
- 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 CEC 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 procured equipment.
  - The CEC's request for specific "generated" data (not already provided in Agreement products).
  - 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 copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

### **Products:**

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

**Exhibit A**  
**Scope of Work**  
**BioVind, LLC**

**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, including a financial report on Match Funds and in-state 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. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

**Subtask 1.6.1 Final Report Outline**

**The Recipient shall:**

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

**Recipient Products:**

- Final Report Outline (draft and final)

**CAM Product:**

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

**Subtask 1.6.2 Final Report**

## Exhibit A Scope of Work BioVind, LLC

### The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission 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)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
  - Comments the recipient proposes to incorporate.
  - Comments the recipient does propose to incorporate and an explanation for why.
- 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.
- Incorporate all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised Final Report electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

### Products:

- Summary of TAC Comments
- Draft Final Report
- Written Responses to Comments (*if applicable*)
- Final Report

### CAM Product:

- Written Comments on the Draft Final Report

## **MATCH FUNDS, PERMITS, AND SUBCONTRACTS**

### Subtask 1.7 Match Funds

## Exhibit A Scope of Work BioVind, LLC

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 CEC 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 CEC 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 CEC 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, 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.
  - If different from the solicitation application, provide 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**

## Exhibit A Scope of Work BioVind, LLC

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.
- 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 each executed subcontract.

## **Exhibit A Scope of Work BioVind, LLC**

- 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.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

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;

## **Exhibit A Scope of Work BioVind, LLC**

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

### **The TAC shall:**

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.

## **Exhibit A Scope of Work BioVind, LLC**

- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

### **Products:**

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

### **Subtask 1.12 Project Performance Metrics**

The goal of this subtask is to identify key performance targets for the project. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

### **The Recipient shall:**

- Complete and submit the draft *Project Performance Metrics Questionnaire* to the CAM prior to the Kick-off Meeting.
- Present the draft *Project Performance Metrics Questionnaire* at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
  - TAC comments the recipient proposes to incorporate into the final *Project Performance Metrics Questionnaire*.
  - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final *Project Performance Metrics Questionnaire* with incorporated TAC feedback.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the recipient met each of the performance metrics in the final *Project Performance Metrics Questionnaire*.
- Discuss the final Project Performance Metrics Questionnaire and Project Performance Metrics Results at the Final Meeting.

### **Products:**

- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

**Exhibit A**  
**Scope of Work**  
**BioVind, LLC**

**IV. TECHNICAL TASKS**

**TASK 2 PRELIMINARY ASSESSMENTS AND FIELD VISITS WITH GAS IOU**

**Subtask 2.1 Meet with California Gas IOU Corrosion Control Team**

The goals of this subtask are to work with a California Gas IOU at project onset to (1) understand their specific existing approaches to detecting and mitigating MIC, (2) identify the microorganisms most commonly associated with MIC in their field sites and additional microbial species of concern, (3) identify the top challenges/barriers in detecting and controlling microbial corrosion including the advantages and disadvantages of current technology, as well as relevant local, state, and federal agencies and regulations, (4) select demonstration site(s).

**The Recipient shall:**

- Prepare *Meeting Materials* including:
  - List of invited participants
  - Meeting agenda
  - Presentation materials
- Conduct a meeting with Gas IOU Corrosion Control team to understand current approaches and challenges.
- Refine and finalize a list of specific microbial target species for assay development.
- Identify sample types typically tested in Gas IOU field sites.
- Select potential demonstration sites.
- Prepare an *Initial Assessment Report* that includes information on:
  - Current Gas IOU MIC control approaches and challenges
  - List of target species for the test kit
  - List of sample types typically tested in Gas IOU field sites
- Prepare a *CPR Report #1* in accordance with Subtask 1.3.
- Participate in a CPR Meeting.

**Products**

- Meeting Materials
- Initial Assessment Report
- CPR Report #1

**Subtask 2.2 Initial and Intermittent Demonstration Site Visits to Obtain Field Samples and Understand Existing MIC Detection and Control Strategies**

The goals of this subtask are to (1) obtain field samples for tasks 3, 4, 5 and 6, (2) observe and document existing MIC detection and control strategies for incorporation into the Field Testing Guide, identify the top challenges and barriers to detecting the causes of MIC in gas storage and distribution facilities, highlighting the relationship between testing limitations and mitigation solutions, and assessing solutions not in use by the Gas IOU.

**The Recipient shall:**

- Conduct at least 3 site visits to collect a variety of field samples for tasks 3, 4, 5, and 6, including contaminated samples that will serve as a positive control. Field work is limited to existing SoCalGas facilities, and trenching, if necessary, is limited to SoCalGas-controlled property which has no sensitive environmental resources.

## **Exhibit A Scope of Work BioVind, LLC**

- Document existing MIC detection and control strategies for incorporation into the *Field Testing Guide*.
- Prepare a brief *Field Sample Collection Report* for each set of field samples collected (3 or more) that includes collection date, site information, and procedure.
- Conduct a literature review to identify challenges and barriers to detecting the causes of MIC and the relationship between testing limitations and mitigation solutions.
- Assess commercially available testing and mitigation solutions not in use by the Gas IOU based on their adoption in the industry, and technical capabilities including time to results, hands-on time, portability, simplicity (ease-of-use), price, and multiplexing capabilities.
- Prepare *MIC Detection and Mitigation Challenges Report* that includes information from the Gas IOU, literature reviews and research on commercially available solutions.

### **Products**

- Field Sample Collection Reports (3 or more)
- MIC Detection and Mitigation Challenges Report

### **TASK 3 DEVELOPMENT OF TEST KIT ASSAY**

The goals of this task are to (1) define LAMP assays reagents and conditions for all identified microbial targets, including target specific primers and reagent concentrations, (2) test and optimize the specific LAMP assays with purified target DNA (3) test and optimize the specific LAMP assays with microbial culture samples, and (4) test and optimize the specific LAMP assays with lyophilized reagents on microbial culture samples

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

- Identify target nucleic acid sequences for microbial species to be detected.
- Develop primer sets for specific targets.
- Develop standardized LAMP protocol and reagent list.
- Test and optimize LAMP assays on purified target DNA.
- Test and optimize LAMP assays on live microbial culture samples.
- Test and optimize the LAMP assays with lyophilized reagents on live microbial culture samples.
- Establish limits of detection (LODs) for each assay.
- Confirm LODs meet or exceed sensitivity requirements in the literature and existing methods.
- Develop detailed LAMP assay protocols for each target species.
- Prepare *Microbial Targets Assay Development Report* that includes information on assays developed and their respective LODs.

### **Products**

- Microbial Targets Assay Development Report

### **TASK 4 DEVELOPMENT OF SAMPLE PREPARATION PROTOCOL AND DEVICE**

#### **Subtask 4.1 Develop Sample Preparation Protocol**

## **Exhibit A Scope of Work BioVind, LLC**

The goals of this task are to (1) develop a sample preparation protocol for preparing live microbial samples for amplification, and (2) develop a protocol to prepare a variety of field sample types such as packing fluid, corrosion coupon swabs and emulsions for amplification.

### **The Recipient shall:**

- Obtain and culture live microbial samples of target species for lab testing.
- Assess the need for DNA extraction and compare the efficacy of extraction methods on microbial culture samples.
- Conduct lab tests and analyses to construct a minimal sample preparation protocol that can prepare live microbial samples for amplification without loss of sensitivity.
- Draw up a list of sample types typically tested in Gas IOU field sites.
- Obtain all sample types from the Gas IOU demonstration site.
- Evaluate the relative efficacy of filtration methods to remove contaminants from field samples.
- Construct a detailed sample preparation protocol that can accommodate a range of field samples.
- Prepare *Sample Preparation Protocol Report* that details sample preparation efficacy for each sample type.

### **Products**

- Sample Preparation Protocol Report

### **Subtask 4.2 Develop Sample Preparation Device**

The goal of this task is to develop an automated device for rapid automated sample preparation that is suitable for a range of field samples identified in subtask 4.1.

### **The Recipient shall:**

- Design a sample preparation device that can perform all steps identified in the *Sample Preparation Protocol Report* in subtask 4.1.
- Build an *Automated Sample Preparation Device Technical Data Package* to manufacture the device for onsite sample preparation.
- Conduct analytical tests of the sample preparation device on live microbial samples.
- Conduct analytical tests of the sample preparation device on field samples.
- Iteratively refine and update the prototype design to improve its effectiveness and user-friendliness.

### **Products**

- Automated Sample Preparation Device Technical Data Package

## **TASK 5 AMPLIFICATION DEVICE AND CARTRIDGE OPTIMIZATION AND REFINEMENT**

The goals of this task are to (1) optimize the design of the amplification device for reliability and manufacturability, and (2) to incorporate an internal control into the device.

## **Exhibit A Scope of Work BioVind, LLC**

### **The Recipient shall:**

- Build prototypes of the amplification device and compatible cartridges according to current technical specifications, in order to address the known issues that exist with the current prototype.
- Produce a refined *Amplification Device and Test Cartridge Technical Data Package* for manufacturing that includes:
  - An updated design of the amplification device with an internal control for each well
  - Modified materials specifications to balance manufacturability and durability
  - Updated the design of the amplification device to improve reliability using field and lab test results
  - Incorporated and tested data transmission capabilities including SIM, Wi-Fi, and USB connections
- Refine and test Amplification Device Software including:
  - Software backend for data transmission and collection
  - Software frontend for data access and analysis, and test for usability and reliability
- Prepare *Amplification Device Software Technical Documentation* describing the software functionality, parameters, inputs, and outputs.
- Conduct initial lab tests to establish baseline reliability in lab conditions. Reliability will be determined by the assay's limit of detection (LOD) and rate of false positive or false negative test results as compared to expected positive and negative test results.
- Conduct initial field tests to establish baseline reliability in field conditions.
- Prepare a *Baseline Reliability Report* with the results of the initial lab and field tests.

### **Products**

- Amplification Device and Test Cartridge Technical Data Package
- Amplification Device Software Technical Documentation
- Baseline Reliability Report

### **TASK 6 DEVELOPMENT AND ANALYTICAL LABORATORY TESTING OF COMPLETE TEST KIT**

The goals of this task are to (1) combine all elements of the test kit into a cohesive and ruggedized bundle (2) create a user manual for using the test kit, including safety precautions and troubleshooting, (3) establish the efficacy of the complete test kit through analytical laboratory testing by comparing results to those obtained from PCR and culture based testing.

### **The Recipient shall:**

- Build a complete Test Kit for MIC-related Microbial Species Detection including the automated sample preparation device, cartridges containing lyophilized reagents, and the refined amplification device prototype.
- Ruggedize the test kit to ensure durability under field conditions.
- Evaluate the reliability, specificity and sensitivity of the test kit on live microbial samples.
- Evaluate the reliability, specificity and sensitivity of the test kit on field samples.

## **Exhibit A Scope of Work BioVind, LLC**

- Compare specificity and sensitivity results from the test kit to PCR and culture-based tests.
- Evaluate usability of the test kit and accompanying software.
- Create a draft *Test Kit User Manual* that includes safety precautions and troubleshooting.
- Prepare a *Test Kit Laboratory Efficacy Report* that includes information on test kit reliability, specificity, sensitivity and usability.
- Participate in a TAC Meeting to present Task 5 and Task 6 findings.
- Prepare a *CPR Report #2* in accordance with Subtask 1.3.
- Participate in a CPR Meeting.

### **Products**

- Test Kit Laboratory Efficacy Report
- CPR Report #2

### **TASK 7 PILOT DEMONSTRATION OF THE TEST KIT**

The goals of this task are to (1) demonstrate the specificity and sensitivity of the LAMP assays developed in task 3, (2) demonstrate the effectiveness and usability of the automated sample preparation device developed in task 4, (3) demonstrate the reliability and usability of the amplification device refined in task 5, (4) document differences in test kit performance under field conditions compared to laboratory testing in task 6, and (5) prove the speed, specificity, sensitivity and usability advantages of the test kit relative to existing solutions used by the Gas IOU.

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

- Conduct field tests on a variety of samples during at least 4 visits to the demonstration site(s). Field work is limited to existing SoCalGas facilities, and trenching, if necessary, is limited to SoCalGas-controlled property which has no sensitive environmental resources.
- Validate results of field tests with other technologies such as PCR and culture based tests.
- Validate results of field tests compared to tests run in a controlled lab environment to determine conservation of test sensitivity and specificity in various settings and across iterative prototypes.
- Document differences in test kit performance under field conditions compared to laboratory testing in task 6.
- Prove the speed, specificity, sensitivity, and usability advantages of the test kit relative to existing solutions used by the Gas IOU.
- Create a draft *Test Kit User Manual* that includes a step-by-step process for collecting and analyzing samples, safety precautions, and troubleshooting. Incorporate recommendations from the end-users of the test kit in the final *Test Kit User Manual*.
- Prepare a *Test Kit Pilot Demonstration Report* that includes information on test kit performance under field conditions.

### **Products**

- Test Kit User Manual (Draft and Final)

**Exhibit A  
Scope of Work  
BioVind, LLC**

- Test Kit Pilot Demonstration Report

**TASK 8 DEVELOPMENT OF FIELD-TESTING GUIDE**

The goal of this task is to develop a draft *Field Testing Guide* that documents the advantages and limitations of the test kit, techniques for evaluating data collected during testing, and best practices for incorporating the test kit into a cohesive MIC detection and control strategy. The Field-Testing Guide will use data from the Pilot Demonstration and input from the Gas IOU about the practical incorporation of the test kit into their operations.

**The Recipient shall:**

- Document advantages and limitations of the test kit.
- Enumerate techniques for evaluating data collected during testing.
- Outline best practices for incorporating the test kit into a cohesive MIC detection and control strategy.
- Conduct additional field tests as needed and incorporate feedback from end-users into the guide.
- Prepare a draft *Field-Testing Guide* that includes advantages and limitations of the test kit, techniques for evaluating generated data and best practices for use in MIC detection and control.
- Share the draft *Field-Testing Guide* with the Gas IOU.
- Request input on the guide about practical applicability within current operations.
- Produce a version the *Field-Testing Guide* that incorporates feedback from the Gas IOU.

**Products**

- Field Testing Guide (Draft and Final)

**TASK 9 EVALUATION OF PROJECT BENEFITS**

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

**The Recipient shall:**

- Complete the *Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by December 15th of each year. The Annual Survey includes but is not limited to the following information:
  - Technology commercialization progress
  - New media and publications
  - Company growth
  - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and

## Exhibit A Scope of Work BioVind, LLC

provide *Documentation of Project Profile on EnergizeInnovation.fund*, including the profile link.

- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

### Products:

- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

### TASK 10 TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
- Technology verification testing, or application to a test bed program located in California.
- Legal services or licensing to secure necessary intellectual property to further develop the technology
- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California

### The Recipient Shall:

- Develop and submit a *Technology Transfer Plan (Draft/Final)* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Technology Transfer Plan*. This document will identify:
  - TAC comments the recipient proposes to incorporate into the *Final Technology Transfer Plan*.
  - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in *Final Technology Transfer Plan*.
- Develop and submit a *Technology Transfer Summary Report (Draft/Final)* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.

**Exhibit A**  
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**BioVind, LLC**

- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on 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.

**Products:**

- Technology Transfer Plan (Draft/Final)
- Summary of TAC Comments
- Project Case Study (Draft/Final)
- High Quality Digital Photographs

**V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet (Attachment 6).

STATE OF CALIFORNIA  
STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: BioVind, LLC

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

**RESOLVED**, that the CEC approves Agreement PIR-22-004 with BioVind, LLC for a \$999,970 grant to develop a test kit and field-testing guide for detecting microbial species associated with microbiologically influenced corrosion (MIC) in gas pipelines and storage facilities. The innovative test kit will help lower the risk of MIC-related leakages and reduce costs associated with MIC detection, mitigation, and control; and

**FURTHER BE IT RESOLVED**, that the Executive Director or their designee shall execute the same on behalf of the CEC.

**CERTIFICATION**

The undersigned Secretariat to the CEC 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 CEC held on January 25, 2023.

AYE:  
NAY:  
ABSENT:  
ABSTAIN:

Dated:

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Liza Lopez  
Secretariat