RESEARCH PERFORANCE PROGRESS REPORT

1) COVER PAGE DATA ELEMENTS: Mandatory

Federal Agency and Organization Element	U.S. Department of Energy (DOE)							
to Which Report is Submitted	National Energy Technology Laboratory							
	(NETL)							
Federal Grant or Other Identifying Number	DE-FE0029085							
Assigned by Agency								
Project Title	Long-Term Methane Emissions Rate							
	Quantification and Alert System for Natural							
	Gas Storage Wells and Fields							
PI Name, Title and Contact Information	Ann P. Smith, Vice President							
	apsmith@gsi-net.com							
	512-346-4474							
Submission Date	January 31, 2017							
DUNS Number	181780776							
Recipient Organization	GSI Environmental Inc.							
	9600 Great Hills Trail, Suite 350E							
	Austin, Texas 78759							
Project Period	October 1, 2016 to May 31, 2019							
Reporting Period End Date	December 31, 2016							
Report Term or Frequency	Quarterly							
Signature of Submitting Official	andi							

2) ACCOMPLISHMENTS: Mandatory

a) What are the major goals of the project?

The primary goals of the project is to employ a novel combination of complementary measurement methods and technologies to detect and accurately quantify average annual methane emissions from an underground natural gas storage facility, including from above-ground equipment leaks plus seepage at the ground surface from underground leaks.

b) What was accomplished under these goals?

All project goals for the first quarter (Q1) reporting period of October 2016 – December 2016 were met. A summary of the activities performed to achieve project goals during Q1 is included below.

Planning: During Q1, GSI developed and submitted to DOE NETL a Project Management Plan (PMP), a Technology Transfer Implementation Strategy document, and a Work Plan (WP). The WP includes a project overview, detailed description of the field sampling and analysis plan, and health and safety procedures to be implemented in the field.

Kickoff Meeting: A kick-off meeting was held on October 21, 2016 with attendees from GSI, DOE NETL and DOE Headquarters to discuss project objectives, sampling methodologies, and data analysis procedures. In attendance from DOE were Gary Covatch, Jared Ciferno, Christopher Freitas, Richard Hammack, and David Cercone. In attendance from GSI were Susan Stuver, Ric Bowers, Ann Smith, and Steve Richardson.

Data Source Status Assessment: GSI developed and submitted to DOE NETL a Data Source Status Assessment report, which summarizes key information and data sources relating to the frequency and magnitude of overall methane emissions from U.S. underground natural gas storage facilities.

Development of TASC: Effort was undertaken during Q1 to recruit Technical Advisory Steering Committee (TASC) members. This included telephone calls, electronic mailers and personal email requests. Representatives from industry, academia, non-governmental organizations, government organizations and regulators were solicited.

c) What opportunities for training and professional development has the project provided?

Not Applicable during this reporting period.

d) How have the results been disseminated to communities of interest?

Not Applicable during this reporting period.

e) What do you plan to do during the next reporting period to accomplish the goals?

During the next reporting period, GSI will perform the following activities:

- Finalize sampling protocols
- Conduct TASC calls
- Prepare for field activities
- Initiate field sampling activities (Field-wide Leak Detection and Measurement, Event 1)

3) PRODUCTS: Mandatory

a) Publications, conference papers, and presentations

i) Journal publications.

Not Applicable during this reporting period.

ii) Books or other non-periodical, one-time publications.

Not Applicable during this reporting period.

iii) Other publications, conference papers and presentations.

Not Applicable during this reporting period.

b) Website(s) or other Internet site(s)

Not Applicable during this reporting period.

c) Technologies or techniques

Not Applicable during this reporting period.

d) Inventions, patent applications, and/or licenses

Not Applicable during this reporting period.

e) Other products

Not Applicable during this reporting period.

4) PARTICIPANTS & OTHER COLLABORATING ORGNIZATIONS: Optional

a) What individuals have worked on the project?

Name: Richard L. Bowers

Project Role: co-Principal Investigator **Nearest person month worked:** 2

Contribution to the Project: Developed project deliverables and coordinated field

activities with project partners. *Funding Support:* None

Collaborated with individual in foreign country: No

Travelled to foreign country: No

b) What other organizations have been involved as partners?

Organization Name: Utah State University **Location of Organization:** Vernal, Utah

Partner's contribution to the project: Subcontractor leading effort to collect gas

emission samples during field trials.

Financial support: None In-kind support: None

Facilities: Labs at Bingham Research Center, Utah State University, Vernal, UT

Collaborative research: None Personnel exchanges: None

More detail on partner and contribution: None

Organization Name: Houston Advanced Research Center (HARC)

Location of Organization: The Woodlands, Texas

Partner's contribution to the project: Assisted with efforts to coordinate TASC

participation.

Financial support: None In-kind support: None

Facilities: HARC Labs in the Woodlands, Texas

Collaborative research: None **Personnel exchanges:** None

More detail on partner and contribution: None

Organization Name: Colorado State University **Location of Organization:** Fort Collins, Colorado

Partner's contribution to the project: Subcontractor assisting in effort to design

underground sensor network for high resolution leak monitoring.

Financial support: None In-kind support: None

Facilities: CSU Labs in Fort Collins, Colorado

Collaborative research: None **Personnel exchanges:** None

More detail on partner and contribution: None

c) Have other collaborators or contacts been involved?

Not Applicable during this reporting period.

5) IMPACT: Optional

a) What is the impact on the development of the principal discipline(s) of the project?

Not applicable during this reporting period.

b) What is the impact on other disciplines?

Not applicable during this reporting period.

c) What is the impact on the development of human resources?

Not applicable during this reporting period.

d) What is the impact on physical, institutional, and information resources that form infrastructure?

Not applicable during this reporting period.

e) What is the impact on technology transfer?

Not applicable during this reporting period.

f) What is the impact on society beyond science and technology?

Not applicable during this reporting period.

g) What dollar amount of the award's budget is being spent in foreign country(ies)?

None, \$0.00.

6) CHANGES/PROBLEMS: Mandatory

a) Changes in approach and reasons for change

Not applicable during this reporting period.

b) Actual or anticipated problems or delays and actions or plans to resolve them

Not applicable during this reporting period.

c) Changes that have a significant impact on expenditures

Not applicable during this reporting period.

d) Significant changes in use or care of human subjects, vertebrate animals, and/or Biohazards

Not Applicable to this Award.

e) Change of primary performance site location from that originally proposed

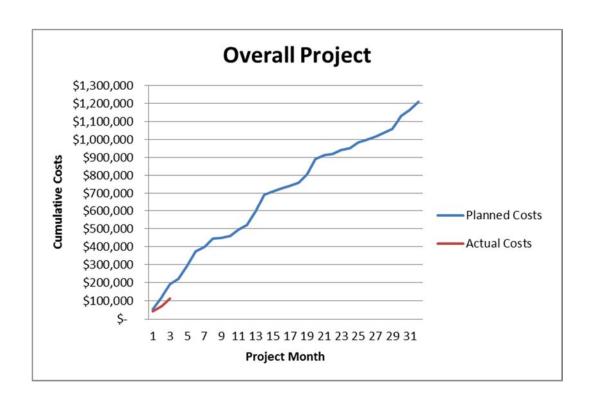
Not applicable during this reporting period.

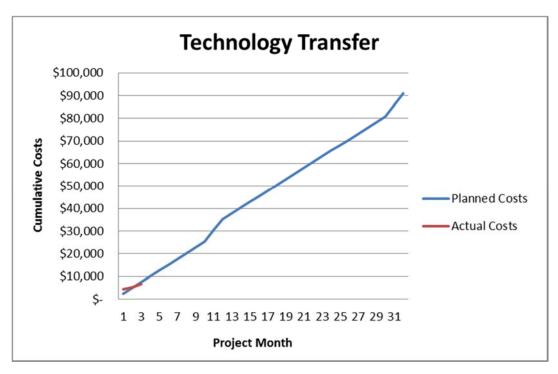
7) SPECIAL REPORTING REQUIREMENTS: Mandatory

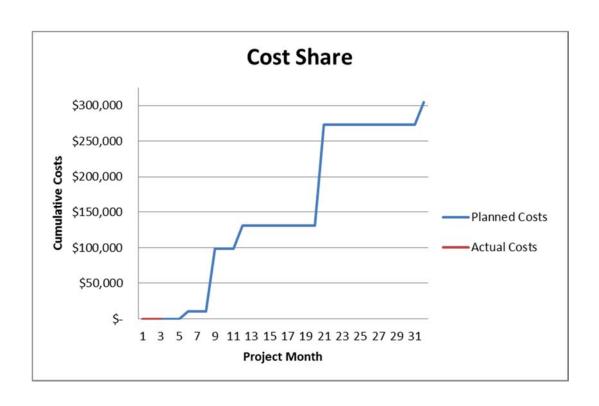
Not applicable during this reporting period.

8) BUDGETARY INFORMATION: Mandatory

Per the request of the DOE NETL project manager, graphs depicting the status of the budgeted versus cumulative costs of the overall project, technical transfer and cost share are included below. In addition, a Cost Status Report is included in the attached Excel spreadsheet.







Research Performance Progress Report

Attachment 1: Cost Plan/Status

DE-FE0029085: Long-Term Methane Emissions Rate Quantification and Alert System for Natural Gas Storage Wells and Fields

	Budget Period 1									Budget Period 2									Budget Period 3					
Ţ	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4		Q1		Q2		Q3			
Baseline Reporting Quarter	r 10/01/2016 - 12/31/2016		01/01/2017 - 03/31/2017		04/01/2017 - 06/30/2017		07/01/2017 - 09/30/2017		10/01/2017 - 12/31/2017		01/01/2018 - 03/31/2018		04/01/2018 - 06/30/2018		07/01/2018 - 09/30/2018		10/01/2018 - 12/31/2018		01/01/2019 - 03/31/2019		04/01/2019 - 06/30/2019			
		Cumulative		Cumulative		Cumulative																		
	Q1	Total	Q2	Total	Q3	Total	Q4	Cumulative Total	Q1	Cumulative Total	Q2	Cumulative Total	Q3	Cumulative Total	Q4	Cumulative Total	Q1	Cumulative Total	Q2	Cumulative Total	Q3	Cumulative Total		
Baseline Cost Plan																								
Federal Share	\$ 173,000.00	\$ 173,000.00	\$ 28,000.00	\$ 201,000.00	\$ 151,000.00	\$ 352,000.00	\$ 169,000.00	\$ 521,000.00	\$ 188,645.00	\$ 709,645.00	\$ 49,986.00	\$ 759,631.00	\$ 152,089.00	\$ 911,720.00	\$ 42,367.00	\$ 954,087.00	\$ 63,582.00	\$ 1,017,669.00	111,628.00	\$ 1,129,297.00	\$ 79,152.00	\$ 1,208,449.00		
Non-Federal Share		\$ -	\$ 10,500.00	\$ 10,500.00	\$ 88,000.00	\$ 98,500.00	\$ 32,500.00	\$ 131,000.00	\$ -	\$ 131,000.00	\$ -	\$ 131,000.00	\$ 142,000.00	\$ 273,000.00		\$ 273,000.00	\$ -	\$ 273,000.00 \$	-	\$ 273,000.00	\$ 32,000.00	\$ 305,000.00		
Total Planned	\$ 173,000.00	\$ 173,000.00	\$ 38,500.00	\$ 211,500.00	\$ 239,000.00	\$ 450,500.00	\$ 201,500.00	\$ 652,000.00	\$ 188,645.00	\$ 840,645.00	\$ 49,986.00	\$ 890,631.00	\$ 294,089.00	\$ 1,184,720.00	\$ 42,367.00	\$ 1,227,087.00	\$ 63,582.00	\$ 1,290,669.00	111,628.00	\$ 1,402,297.00	\$ 111,152.00	\$ 1,513,449.00		
Actual Incurred Cost																								
Federal Share	\$ 113,409.00	\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		\$ 113,409.00		
Non-Federal Share		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		
Total Incurred Cost	\$ 113,409.00	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00	\$ -	\$ 113,409.00 \$	-	\$ 113,409.00	\$ -	\$ 113,409.00		
Variance																								
Federal Share	\$ 59,591.00	\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		\$ 59,591.00		
Non-Federal Share	\$ -	\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		
Total Variance	\$ (59,591.00)	\$ (59,591.00)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ - \$	-	\$ -	\$ -	\$ -		