

**Texas Commission on Environmental Quality
New Technology Research & Development (NTRD) Program
Monthly Project Status Report**

Contract Number: 582-11-11145-3264

Grantee: The University of Texas at Austin (UT)

Report for the Monthly period: May 2012 **Date Submitted:** June 6, 2012

Section I. Accomplishments

Provide a bulleted list of project accomplishments as well as a description of their importance to the project.

Hydrogen Station Upgrades

- Installed relays and modified programmable logic controller (PLC) code to operate hydrogen parts per million (ppm) analyzer remotely. Installation of the relays also allows nitrogen purge of the analyzers to be accomplished remotely.
- Replaced starter relay for exhaust fan.
- Ran station for 36 hour period unattended. During this run hydrogen (H₂) that was produced was vented because carbon dioxide (CO₂) impurity level was higher than J2719 specification.
- Increased feed flow rate to the pressure swing adsorption (PSA) and ran station for another 36 hour period. During this run the CO₂, carbon monoxide (CO), and methane (CH₄) impurities being measured all fell below specified levels.
- Compressed approximately 5 kilograms of H₂ into the station's storage vessels.

Other

- Completed Amendment 03 which adjusted the Scope of Work schedule due to delays in delivery of the bus and commissioning of the hydrogen station.
- Combined the media ride-along event with the project kick-off event on June 7, 2012, to better accommodate schedules for the media and all partners. Media ride-along will occur after the kick-off event and speeches.
- Completed First Responder training with the Austin Fire Department at the fueling station site and at Capital Metro's North operations facility.
- Proterra completed software upgrades to the bus charger.
- Completed individual driver and fueler training for the bus.
- On May 29, 2012, a trial service day was performed in which a Cap Metro driver operated the bus on the morning shift of the IF route. Afterwards, the bus went through its daily fueling and charging routine.

Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:

- Task 2.1.2: The PERFORMING PARTY will contract with GTI to replace and upgrade components of the hydrogen fueling station as necessary to prepare it for use in the demonstration.
- Task 2.2.2: The PERFORMING PARTY and GTI will provide training for bus personnel, fueling personnel, and on-site personnel for both routine and emergency activities that may need to be performed during the demonstration period.
- Task 2.3: The PERFORMING PARTY will ensure that the Proterra bus, Capital Metro personnel, and support material are prepared for the demonstration. (This task has been completed, and report will be issued in June 2012.)
- Task 2.4: The PERFORMING PARTY will complete pre-service trails with the Proterra bus and ensure that all Capital Metro Personnel are trained in the bus's operation and maintenance. (This task has been completed, and a report will be issued in June 2012.)

Section II: Problems/Solutions

Problem(s) Identified: Report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project

- a) The hydrogen station PSA not removing CO₂ in H₂ product stream to J2719 specified levels.
- b) Due to delay in shipment of check valve, a metal seat ball check valve was installed on hydrogen station compressor discharge line.
- c) The remote input-output (IO) electronics enclosure in the hydrogen station has achieved a temperature greater than 140 Fahrenheit while the reformer is operating.
- d) On May 29, 2012, at the end of the service trial run, the bus experienced a failure with the second fuel cell DC/DC converter. A few days prior, the first DC/DC converter had stopped working. Currently the bus is unable to operate with the fuel cells due to a failure of both DC/DC converters.

Proposed Solution(s): Report any possible solution(s) to the problem(s) that were considered/encountered

- a) The PSA manufacturer recommended an extended run time and higher feed flow rate to increase the performance of the PSA.
- b) The soft seat check valve has arrived at site and can be installed during GTI's next trip or by UT personnel.
- c) GTI recommends installation of a vortex cooler to help keep the remote IO electronics enclosure below 130F.
- d) Proterra and U.S. Hybrid are schedule to arrive in Austin on June 8, 2012, to troubleshoot the converters.

Action(s) Conducted and Results: Describe the action(s) taken to resolve the problem(s) and its effect

- a) The PSA was able to achieve the J2719 levels for CO₂, CO, and CH₄.
- b) The ball check valve currently installed is functioning and no loss of hydrogen from the medium bank has been observed. GTI will replace this valve with the soft-seat valve on their next trip to UT.
- c) Results of the vortex cooler installation will be known in June 2012.
- d) Results of the converter troubleshooting will be known in June 2012.

Section III. Goals and Issues for Succeeding Period:

Provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen

- Finalize fueling station commissioning and preparation with GTI. (Task 2.1)
- Troubleshoot DC/DC converters and begin demonstration phase. (Task 2.5)
- Complete task deliverable reports for Tasks 2.3, and 2.4.
- Begin task deliverable reports for Tasks 2.1 and 2.2.

Date: 6/6/2012

Authorized Project Representative's Signature

NOTE: *Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.*