# Evaluation of Hydrogen Sensors

## Cooperative Research and Development Final Report

## CRADA Number: CRD-14-547

NREL Technical Contact: William Buttner

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In accordance with Requirements set forth in Article XI, A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

**Parties to the Agreement**: KPA Services, LLC

**CRADA Number:** CRD-14-547

**CRADA Title**: Evaluation of Hydrogen Sensors

**Joint Work Statement Funding Table Showing DOE Commitment**:

| Estimated Costs | NREL Shared Resources |
|---|---|
| Year 1 | $ 25,000.00 |
| TOTALS | $ 25,000.00 |

**Abstract of CRADA Work**:

In preparation for the projected 2015 release of commercial hydrogen fuel cell vehicles, KPA has been contracted by Toyota Motors to develop a hydrogen safety system for vehicle repair facilities. Repair facility safety designs will include hydrogen sensors. KPA will identify critical sensor specifications for vehicle repair facilities. In collaboration with NREL, KPA will select and purchase commercial hydrogen sensors that meet or nearly meet requirements for deployment in vehicle repair facility. A two-phase field deployment plan to verify sensor performance has been developed.

**Summary of Research Results**:

The use of sensors is explicitly specified in the International Fire Code for repair facilities servicing hydrogen vehicles. To address the sensor requirement, NREL in partnership with KPA, performed a qualification project assessing the ability of select commercial hydrogen sensors to perform in a repair facility environment. Four different sensor models were used in the study representing a variety of sensing element platforms (e.g., electrochemical, metal oxide, and combustible gas sensors), identified in the attached report as Model 1 through 4. Three units of each model type were acquired; two units were to be deployed in the Toyota vehicle repair facility, the third was to be deployed at NREL in a clean regulated environment. The sensors were evaluated prior to and following deployment. Based on the Laboratory and Field performance data, it was concluded that Model 1 qualified for use in hydrogen vehicle repair facilities. No other tested sensor met the necessary performance requirements.

**Subject Inventions Listing**: None

**Report Date**: 7/16/15

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