**GLOBAL TECHNOLOGY CONFERENCE 2016**

**ABSTRACT SUBMISSION TEMPLATE FOR GTC ISTANBUL**

**RETURN TO MS CAMILLE PIERON (**[**cpieron@wlpga.**](mailto:cpieron@wlpga.)**org) BEFORE 6th MAY 2016**

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| **Abstract Number** | For Office Use |
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| **Abstract Title** | LPG Sampling and Analysis Study |
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| **Abstract Summary**  (150 words max)  Please describe in summary the submission and its most important features |
| The purpose of the project was to perform a national survey of LPG composition to aid manufacturers in designing LPG utilization equipment. In addition, there is interest in the level of sulfur and odorant in the fuel. LPG samples were collected from 100 cities across the continental U.S. and subjected to specification tests drawn from ASTM D1835 and other advanced analytical methods. This fuel quality data will help identify fuel quality trends that may affect the performance and reliability of LPG fueled appliances and engine based products. The data will support PERC’s primary strategic goal of increasing LPG usage. |
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| **Key advantages/ benefits**  Please describe in bullet points why the proposal is superior to existing alternatives and practices |
| * There currently is minimal data on LPG composition at the point of use. * Manufacturers will design to maximum allowable components in LPG, rather than actual. Having actual data will ease the design process. * Using lab instruments are more accurate than field instruments, such as stain tubes. |
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| **Potential impact**  Please describe in bullet points what impact the proposal may have in the area of its application. |
| * Consistent fuel quality data will enable manufacturers to refine their products. * Fuel composition data will help with future regulations on components such as sulfur. * The data may convince more manufacturers to design LPG utilization products. |

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| **Abstract Submission**  (1200 words max)  This is the full submission text.  Please ensure it is clear and highlights the key aspects of the innovation, commercial or other potential, operational efficiency, safety and environmental impact, including background, why it was developed, objectives, expectations, etc. Additional data, drawings, photos, links, documents as support can also be forwarded if needed separately. |
| Liquefied Petroleum Gas’s (LPG) main component is propane and has the useful characteristics of environmentally clean burning, low price and high-energy density. This has led to the development of a diverse set of LPG utilization equipment such as furnaces, water heaters, patio heaters, and a variety of engine-based products.  To properly design an engine that gives the customers expected performance and still meet environmental concerns, manufacturers must understand the average and range of fuel composition. The liquid fuel industry (i.e. petrol, diesel, and aviation fuel) has extensive quality control programs that monitor the quality of fuel from the point of production to the point of purchase for the customer to ensure a consistent product. In the U.S., LPG does not have mandated sampling program at the point of use. The lack of information on LPG composition has caused concern over the quality of fuel for engine performance.  Due to regulations in the U.S., the allowable amount of sulfur in petrol (10ppm in 2017) is lower than LPG (123 ppm). However, because of safety concerns, odorants still need to be added to LPG. One purpose of the study was to determine the actual level of sulfur in LPG to ensure that level would work on vehicles that contain catalysts formulated for 2017 petrol.  One of PERC’s primary goals is to increase propane consumption in the marketplace. To accomplish this, PERC’s R&D program includes the development of new technologies and products, and improving the operational performance of propane (i.e. fuel quality). Many of the new markets (e.g. on-road engines) are sensitive to fuel contamination. To support these efforts, the fuel quality information obtained by this project will help to determine overall propane fuel quality in the marketplace thus providing a positive impact to the strategic goals.  The intent of this National Propane Survey is to determine the variability of LPG constituents in the US. This includes hydrocarbon composition and water, sulfur, and residue content.  Southwest Research Institute obtained samples from 100 sites across the continental U.S. based on population. The samples were subjected to specification tests drawn from ASTM D1835. In addition to ASTM D1835, more advanced analytical techniques were applied to the samples to obtain detailed information concerning the amount and composition of contaminants. Heavy-ends (D2158 residues) were speciated through GCxGC-MS analysis to provide a break-down of contaminants. Sulfur speciation was also carried out to determine the types of odorants being used.  The results indicate that the majority of the LPG samples met and exceeded the HD5 specification with nearly 95 percent propane. Nine percent of samples were marginally off specification, mostly due to excess ethane. Three percent of the samples did not meet the HD5 specification due to high sulfur and/or residue. The average sulfur and residue level for the sample set was significantly less than the specification. |