SAE TIR J2719/1

Application Guideline for Use of Hydrogen Specification

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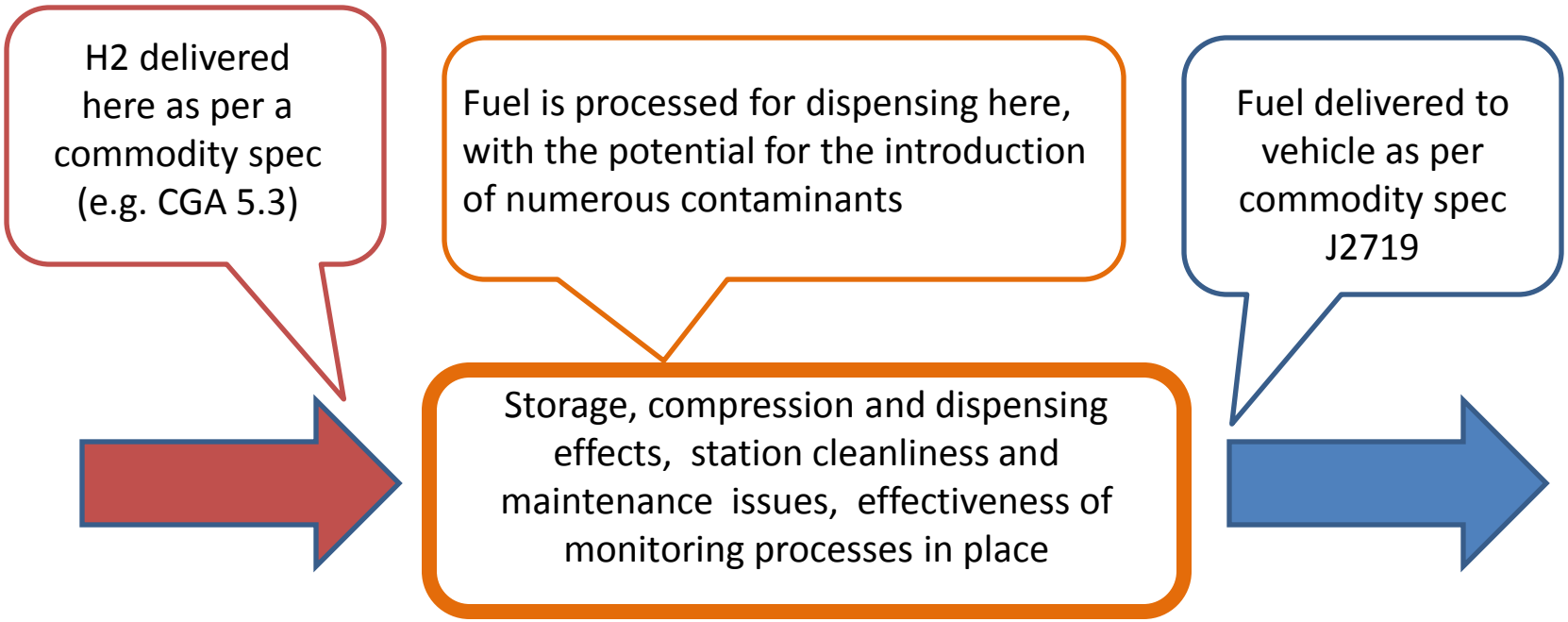
Document Intent

- This TIR is intended to be used to streamline testing by providing guidance as to which impurities within SAE J2719 are possible at a specific refueling station.
- This TIR attempts to identify the most likely contaminants with the presumption that only those contaminants known to be prevalent in that production method will be investigated.
- This should reduce testing requirements to determine conformance with J2719.
- The intent is for this document to be used by both industry and regulators to further define testing for routine (or periodic) monitoring of filling station performance.
- There are no plans to advance this document past the TIR stage.

Simplified fuel flow



- Quality of H2 delivered to the dispensing facility is known
- Storage, compression and dispensing effects known to station operator
- Quality of fuel dispensed to vehicle covered by Standard J2719
- TIR J2719/1 attempts to identify which contaminants may be present at the output to the vehicle given what goes on inside the box

Scope (from proposed draft)

- The purpose of this TIR is to provide guidance for minimizing test requirements based on SAE J2719 while still ensuring fuel quality at hydrogen fueling stations for PEM fuel cell vehicles (FCVs) and ICEVs (to the extent that has been determined).

- This document is intended to be used by both industry and regulators for routine (or periodic) monitoring of filling station performance.

Rationale (from proposed draft)

- SAE J2719, “Hydrogen Fuel Quality for Fuel Cell Vehicles”, was generated to identify impurities that could occur with various hydrogen generation methods and within filling station systems and define limits for these impurities based on acceptable long-term fuel cell performance. While SAE J2719 provides a comprehensive listing of impurities and limits, testing of the complete specification (particularly on a routine basis to monitor filling station performance) is unnecessarily extensive as not all impurities within the specification are possible at any given site.

- The objective of this TIR is to streamline testing by providing guidance as to which impurities within SAE J2719 are possible at a specific filling station. By so doing, test requirements can be more reduced and the use of J2719 becomes more practical.

Initial Proposed Table 4.1
Likely Impurities and Contaminants

Source of Hydrogen		Liquefied Hydrogen Delivered to Site		Compressed Gas Delivered to Site	On-Site Electrolysis		On-Site Reformation			
					Alkaline	PEM	Natural	Methanl	Ethanol	Gasoline
Dispensed Fluid State		**Liquid**	**Compressed Gas**							
Impurity Contam.										
Ammonia	N	n/a	n/a	**X**	n/a	n/a	**X**	**X**	n/a	n/a
Carbon Monoxide	C	**X**	**X*?**	**X**	n/a	n/a	**X**	**X**	n/a	n/a
Carbon Dioxide	C	n/a	**X*?**	**X**	**X?**	n/a	**X**	**X**	**X**	**X**
Formaldehyde	H	n/a	n/a	**X**	n/a	n/a	n/a	**X**	n/a	n/a
Formic Acid	H	n/a	n/a	**X**	n/a	n/a	n/a	**X**	n/a	n/a
Oxygen	O_2	n/a	**X?**	**X**	**X?**	**X**	**X**	**X**	**X**	**X**
Sulfur	S	n/a	**X*?**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Total Hydrocarbons	T	n/a	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Water	H_2	**n/a**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Potassium Ions	K	n/a	n/a	n/a	**X**	n/a	n/a	n/a	n/a	n/a
Sodium Ions	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inert gases		**X**	**X***	**X**	n/a	**X**	**X**	**X**	**X**	**X**
Particulates		n/a	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Notes for Table 4.1

X Likely to occur if there is a fault or contamination

X* Likely to occur if there is a fault or contamination but will diminish

NA Not Applicable

Current revised Table 4.1

Table 4.1 Hydrogen Quality vs Station Impurity Matrix										
Fuel Dispensed at Station		**Compressed Gas (CG)**								**Liquid**
Fuel Storage at Station		**Compressed Gas (CG)**							**Liquid / CG**	**Liquid**
Process/Purification		**Electrolysis/Dehydration**			**Reformation/PSA**				**Liquified Hydrogen**	
Feedstock		**Alkaline**	**PEM**	**Chloralkali**	**Natural Gas**	**Methanol**	**Ethanol**	**Gasoline**	*Not Necessary to Specify*	
Impurity Constituents										
Water	H_2O	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**n/a**
Potassium Ions	K+	**(3)**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sodium Ions	Na+	n/a	n/a	**(3)**	n/a	n/a	n/a	n/a	n/a	n/a
Total Hydrocarbons	THC	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	n/a
Oxygen	O_2	**X**	n/a	**n/a**	**(1)**	**(1)**	**(1)**	**(1)**	n/a	n/a
Helium	He	n/a	n/a	n/a	**(1)**	**(1)**	**(1)**	**(1)**	n/a	n/a
Nitrogen, Argon	N_2, Ar	**(2)**	**(2)**	**(2)**	**(2)**	**(2)**	**(2)**	**(2)**	**(2)**	**(2)**
Carbon Dioxide	CO_2	**(2)**	**(2)**	**(2)**	**(1), (2)**	**(1), (2)**	**(1), (2)**	**(1), (2)**	**(2)**	**(2)**
Carbon Monoxide	CO	n/a	n/a	n/a	**(1)**	**(1)**	n/a	n/a	n/a	n/a
Sulfur	S	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	n/a
Formaldehyde	HCHO	n/a	n/a	**n/a**	n/a	**(1)**	n/a	n/a	n/a	n/a
Formic Acid	HCOOH	n/a	n/a	n/a	n/a	**(1)**	n/a	n/a	n/a	n/a
Ammonia	NH_3	n/a	n/a	n/a	**(1)**	**(1)**	n/a	n/a	n/a	n/a
Total halogenates		n/a	n/a	**X**	n/a	n/a	n/a	n/a	n/a	n/a
Particulates		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	n/a

Revised Table 4.1 notes

- X Likely to occur if there is a fault or contamination, should always be tested.
- (1) These contaminants need not be tested if compliance data/documentation is available for the output of the purification stage or with a product delivery.
- (2) Contamination is likely to occur after commissioning/maintenance and is expected to diminish with use.
- (3) These contaminants need not be tested if the water limit is not exceeded.

Path Forward

- TIR to be worked at the June meeting
- Comments will determine schedule
- Intent is to refine the table to an acceptable form as soon as possible
- All inputs welcome