Gel Systems Canada Inc.
Prepared for The Standing Senate Committee on Agriculture and Forestry
Re: (AGFO) Study on the impact of wildfires in Canada
November 3, 2025

Introduction

We are writing this document in response to AGFO's request for information on our company, Gel Systems Canada Inc. (GSC).

GSC is a Saskatchewan-based company that developed state-of-the-art direct mixing and loading systems engineered to deploy a premixed gel solution called FG-2 for direct and indirect attack applications. FG-2 is a superabsorbent polymer powder (SAP) that can absorb up to 400x of its weight in water, also known as a water enhancer. GSC mixes FG-2 with water to improve its fire-suppression characteristics, providing a ready-to-use gel for aid in wildfire suppression and values protection. In its gel form, FG-2 is considered a medium-term fire retardant and has proven to be an effective tool, becoming more common in the fight against wildfires in Saskatchewan. For the remainder of this document, we will refer to FG-2 in its blended gel form.

Many firefighting Agencies around the world have found water enhancers very effective during testing but faced challenges when incorporating them in their strategic operations. Remote locations, inadequate blending equipment, and irregular water quality and sources have made it difficult to provide a consistent output. Since 2016, GSC has committed to understanding and overcoming the logistical hurdles that have plagued the implementation of water enhancers, developing precision equipment to deliver a high-quality product in large volumes. As wildfires increase in intensity, size, and duration, our systems approach and operational tactics are showing promise in the evolving challenge of wildfire protection.

Methodology

GSC's portable precision blending technology was designed to address the issues historically faced by other Agencies. FG-2 can be custom blended for a range of viscosities, or "thickness". Operational tactics drive FG-2's required viscosity, and the ability to accurately tailor viscosity is critical for success. For example, during preventative application for values protection (communities, power grid infrastructure, bridges, etc.) GSC recommends a high viscosity, whereas a low viscosity is preferred during direct attack to better penetrate fuels.

GSC works hard to build a collaborative relationship with the incident command team to understand their needs and customize FG-2's viscosity and volume requirements to maximize resource effectiveness. FG-2 can be used by ground crews, cannon trucks, and rotary-wing aircraft in both preventative and direct attack applications. This flexibility is essential for crews managing resources in remote locations while facing ever-changing conditions.

When added to water at the correct dosage, FG-2 dramatically increases water's efficiency as an extinguishing agent. Water alone evaporates rapidly and has a strong surface tension, causing it to roll off most fuels without ever being absorbed. With the addition of SAPs, that same water has a higher viscosity, allowing more of it to stick to fuels and create a thermal barrier that lasts for an extended period of time.

In the case of preventative applications, FG-2 can be applied ahead of an impending fire or ember storm. An ember storm occurs when a fire's embers float for many kilometers, starting new fires once they land and threatening communities. A preventative application of FG-2 significantly reduces the risk of ignition during an ember storm, providing extended protection of values and allowing fire personnel to focus resources on other high-priority areas.

Societal, environmental, and economic benefits

Traditional tactics and products are not as effective as wildfires increase in frequency and intensity, resulting in lost lives, communities, and billions of dollars of buildings and infrastructure. Industry personnel and equipment are stretched beyond their limits, creating impossible situations to manage. Severe stress and mental health impacts among firefighters and those affected by wildfires are real and escalating with the fire threat. New technologies such as water enhancers are needed to combat the ever-changing realities of modern wildfire management. Their use in wildfire control has created new strategies previously not available to wildfire agencies in protecting remote communities, traditional lands, and forests. The efficient use of water enhancers will have immeasurable positive impacts on society, and GSC is devoted to contributing to these positive impacts by providing a highly effective firefighting product with FG-2.

The SAPs used in FG-2 have been approved by the United States Forest Service (USFS) for wildfire applications for over 20 years under various trade names. These polymers are frequently used in consumer products like diapers and personal hygiene products, while food grade versions are used as thickeners in common foods. They are even used in skin care products and cosmetics and listed in the Government of Canada's Natural Health Products Ingredients Database. The environmental impacts of SAPs are negligible as they are classified as inert, unlike some foam products and long-term retardants (LTRs).

The most common extinguishing agents used in firefighting are water, water/foam mix, and LTRs. LTRs are chemical concentrates mixed with water that alter fuels so they do not combust. LTRs were developed and tested in the early 20th century and have been widely used since their introduction in the 1950s, but there are some concerns with the product itself. The global LTR market is dominated by one company, essentially limiting all Agencies to a single supplier. LTRs are made with high salt index ingredients like high phosphate fertilizers and anti-corrosion chemicals. High phosphate products are known to cause eutrophication in lakes and streams and in some cases, fish populations have been negatively impacted by improper application of them. In comparison, FG-2 does not contain any phosphate-based ingredients. Although gel, plain water, and LTR's require different strategies for different objectives, there is growing evidence of the economic benefits of increasing use of water enhancers that include:

- Precise application: FG-2 is available in blue, making it visible and reducing over or under application. Water, in comparison, is not visible. Water can leave gaps in coverage, allowing a fire to burn through a treated area, or water can be overapplied, wasting time and resources unnecessarily treating the same area multiple times.
- Increased resource utilization: FG-2 increases the efficiency of water in direct attack and pre-treatment, allowing users to be more effective while using less water overall. This improves resource utilization, allowing crews to accomplish more with the same personnel and equipment.
- Situational adaptability: GSC's highly portable mixing system and flexible application methods fit a wide range of operational plans. Our commitment to collaboration allows us to create new and innovative tactics in the field to complement existing incident command strategies and take advantage of available equipment.

Implementation and use

GSC's mission is to drive innovation and change in wildland firefighting practices. In support of this goal, we:

- Participated in a three-year study conducted by the Colorado Center of Excellence for Advanced Technology Aerial Firefighting from 2017-2019. The study focused on evaluating the effectiveness of water enhancers for use in Single Engine Air Tankers (SEATS) in Colorado and concluded favorable results for water enhancers as a firefighting tool, specifically noting GSC's patented mixing equipment, describing it as "the fastest, cleanest, and most precise system we used for mixing these products during this study... and should be considered for use where multiple loading pits might be used and or when loading large airtankers since this device is specifically designed to accommodate those operations."
- Tested and demonstrated the capabilities of gel-based products at the USFS SEATS base in Ronan, Montana in 2018 and for the California Department of Forestry and Fire Protection (CAL FIRE) in Chico, California in 2019.
- Began working with the Saskatchewan Public Safety Agency (SPSA), loading heavy air tankers out of the Prince Albert, La Ronge, and Meadow Lake air tanker bases for use in direct attack applications from 2017-2019.
- Continued working with SPSA in 2021, utilizing gel for ground application for the first time on the BELL fire near Carrot River, Sask. This experience was a breakthrough for GSC, indicating that gel products are effective in ground-based applications. In the following years, GSC worked with SPSA on various fires and developed a system that overcomes logistical hurdles, enabling tactics previously not available to any agency.

After years of research and development and collaboration with the SPSA, 2025 became a pivotal year for GSC. Our products and services were deployed to various locations across Saskatchewan including:

Waitville	Montreal Lake Cree Nation
Lower Fishing Lakes	La Ronge
Smeaton	Napatak
Choiceland	Beauval
Candle Lake	La Loche
Creighton	Jans Bay
Piprell Lake	Canoe Lake Cree First Nation
Whiteswan Lake	Clearwater River Dene Nation
Little Bear Lake	

Throughout the fire season, FG-2 was used to protect homes, critical infrastructure, and aid direct attack operations by ground and helicopter. In 2025 alone, GSC mixed and delivered over 4.5 million liters of ready-to-use FG-2 water enhancing gel without any reports of property or environmental safety issues. 2025 focused on proof of concept, developing a foundation from which the industry can build, and highlighting that GSC's technologies, services, and products can have a significant impact in the fight against increasing wildfire threats.

Challenges and opportunities

While there is a need for advancements in the wildfire system, barriers exist that make it very difficult for both contractors and agencies to implement change.

Challenges

- Participating in the firefighting industry requires an extremely high capital outlay, requiring significant upfront investment to develop and deploy new wildfire technologies, hire staff, and finance inventory with **no guaranteed revenue or adoption by agencies**.
- Dependence on foreign product qualification standards. The USFS Qualified Products List is the benchmark for Canadian operations. However, the qualification process is lengthy, expensive, and poses a barrier for Canadian companies, making it very difficult to introduce new products. Because of this, innovation in the wildfire industry has focused on improving aircraft and application systems, and less on the products they apply.
- Agencies are often hesitant to trial new products or tactics during active wildfire events. The absence of live forest fire simulation environments further limits opportunities for testing and training.
- High turnover in firefighting personnel creates a lack of operational experience, reducing the effectiveness of new product implementation and tactical innovation.
- The underperformance of past contractors and products has eroded the trust of agency staff, creating a lack of willingness to implement new products due to past failures.

Opportunities

- **Establish a Canadian Product Qualification System** that is independent of foreign governance, tailored to Canadian wildfire conditions and operational needs.
- **Reduce barriers to product testing** by streamlining and subsidizing the testing process to make qualification more accessible for innovative companies.
- **Improve adoption with incentive programs** for Agencies that encourage the trial and integration of new technologies. This could include performance-based funding, pilot project grants, or operational support to reduce risk during implementation.
- **Invest in training for logistics and application** by implementing structured training programs focused on the logistics and tactical application of new products. This will ensure frontline personnel are equipped to use innovative tools effectively and efficiently.
- **Support data collection and evaluation** by providing funding to agencies for the systematic collection and analysis of performance data on emerging wildfire suppression products.

Summary

As fire behavior changes and intensifies, industry and governments are trying to adapt and adopt new technologies to combat this new reality. After nearly a decade, GSC has developed advanced mixing technology, making FG-2 gel a legitimate and strategic option in the field. Although there are barriers, Gel Systems Canada has proven that there are legitimate and effective alternatives. We see an opportunity to integrate water enhancer applications in standard wildfire protection protocols and are committed to driving innovation to protect people, traditional lands, communities, and forests.