

# Motor Vehicle Fire Research Institute Awarded Contracts

**Title:** Survey of the State-Of-The-Art in Fuel System Fire Safety - Phase 1

**Contractor:** Biokinetics and Associates Ltd.

**Duration:** December 20, 2001 – April 19, 2002

**Purpose:**

Post crash fires are the result of the ignition of flammable materials or fuels that may be expelled during a collision. In the automotive environment gasoline is the most volatile of such fuels and in the presence of an ignition source it poses the greatest risk of rapid conflagration. In a collision, gasoline may leak directly from a damaged fuel tank or from a torn or severed fuel line with possible sources of ignition resulting from:

- Hot vehicle components such as the exhaust system.
- Sparks generated from steel vehicle components scrapping the ground.
- Sparks generated from metal to metal contact with an opposing vehicle.
- Heat and sparks generated by the crush of a vehicle's structure.
- Electrical arcing from broken or exposed wires.
- Electrical heat generated from short circuits of primary and secondary wiring.
- Electrical heat generated from internal shorting of battery plates.

An investigation of the state-of-the-art in fuel systems has been undertaken with a focus on identifying fuel system fire safety technologies for preventing and/or mitigating post crash fuel fires that may be in use today. An extensive survey will be conducted with in-vehicle evaluation and documentation of the various systems. Additionally, major fuel system components, such as the fuel tank itself, will be evaluated.

This project has been proposed to occur in multiple phases. This award for Phase 1 defines the overall scope of the investigation and establishes procedures for carrying out the more specific review of individual tank systems. Included is a review of existing automotive fuel system standards.

The project has been divided into the following Tasks with associated Deliverables:

- **Task 1 – Review of Standards**

A review of available fuel system performance standards was conducted, including both component standards and vehicles standards. The features of the various standards that were identified are summarized. When not restricted by copyright, a full text of the standard was included.

- **Task 2 – Review of Fuel System Fire Safety Technology**

Various design strategies or technologies associated with the fuel system, which includes the evaporative emissions hardware, have been identified as potential

countermeasures for preventing or mitigating the likelihood of post crash vehicle fires. Most strategies have been implemented to some degree in the field, with many vehicles having a combination of strategies or technologies. These strategies or technologies have been summarized for this task.

- **Task 3 – Vehicle Database Selection Criteria, Inspection Protocol, and Documentation**

With over three hundred makes and models of vehicles available to the consumer an inspection of each vehicle is beyond the intended scope of this task. At this time is intended to obtain a cross section view of the best practices in use in the North American fleet of vehicles, therefore, the fuel systems of only a subset of all the makes and models of vehicles will be inspected in detail. The selection criteria are reported along with selected vehicles. The survey of the fuel system of each vehicle consists of three components: vehicle inspection, tank system component inspection and tank component testing. The inspection protocol is described along with the documentation content and process. This process is further demonstrated with a sample inspection of the Honda Odyssey minivan. Documentation is delivered in the form of a Microsoft Access database.

- **Task 4 - Project Report**

A final project report will be generated. Although this final report will largely be an assembly of the reports from previous tasks, we will attempt to bring them all together. An overall discussion of the findings will be made with final conclusions and recommendations for future work.