

# **Motor Vehicle Fire Research Institute Awarded Contracts**

**Title:** Survey of the State-Of-The-Art in Fuel System Fire Safety - Phase 2

**Contractor:** Biokinetics and Associates Ltd.

**Duration:** September 5, 2002 – May 08, 2003

**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 2 would comprise the in-depth evaluation of the fuel systems from vehicles selected in Phase 1. Phase 2 carries on with the actual review of the suggested 71 vehicles/fuel systems, with the testing of fuel system components, and with expansion of the search for fuel system fire safety technologies to include the aviation industry or the military.

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

- **Task 1 – Update Microsoft Access® Database Fields**

The vehicle checklist database will be updated to include additional fields as requested by MVFRI. Included will be provisions for:

- General size and shape of a tank.
- Measured distance from exhaust components to the tank.
- Photo of tank height above the ground (with scale in photo).
- Photo of the distance from possible intrusive components.

- Photo of the closest aggressive component.
- Drive shaft clearance in rear-wheel-drive vehicles.
- Grounding of fuel system components.
- Freeform comments on safety features.

- **Task 2 – Vehicle Fuel System Inspection**

The 71 vehicles to be included in the fuel system survey will be inspected with the purpose of documenting the components of the fuel system and their placement within the vehicle. Vehicle specifications, fuel system specifications, linear distance measurements and digital photographic documentation will be recorded for this purpose. A review of each vehicles' shop manual will also be performed to aid in identify any fuel system safety feature that may not be evident from a visual inspection alone. All of the data, including the photographs, will be entered into the Access database.

- **Task 3 – Tank System Component Evaluation And Inspection**

The components of each vehicle's fuel system will be reviewed with the aid of the Mitchell PartsPoint® database to determine the complexity and fuel system safety strategies that may be employed by the various manufactures. From this review, a selection of 16 complete tanks systems will be identified for purchase and further in-depth review. Each system will be evaluated and it particulars will be recorded as per a pre-determined checklist. The information gathered will also be entered into the electronic database.

- **Task 4 – Continued Assessment of the State-of-the-Art**

Biokinetics will continue to investigate and assess the state-of-the-art in fuel system technologies. This will also include interactions and discussions of testing underway at Southwest Research Institute (SwRI) under separate MVFRI contract. Additionally, this task will include an investigation of potential fuel system fire safety technologies or standards that may be used in the aviation industry or by the military.

- **Task 5 – Project Report**

A report will be prepared containing the information gathered in Phase 2 of the review of the state-of-the-art in fuel system technologies. It will summarize the information gathered in the vehicle survey and it will highlight the use of fuel tank safety features as they pertain to the prevention of vehicle fires. Any pertinent aviation, military technologies or standards will be discussed. Additionally, the results of all tank specific component inspections will be included.