

Fire Safety Performance of Motor Vehicles in Crashes

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(MVFRI)

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www.mvfri.org

Presentation Outline

- Who is MVFRI?
- Selected Research Projects
- Selected Results
 - Frequency of fires
 - Plastic Fuel tank test results
- Conclusions
- Future Research

MVFRI - Charter

- The Motor Vehicle Fire Research Institute (MVFRI) is an independent, nonprofit, organization specializing in automobile fire safety research.
- MVFRI performs objective research to develop and implement successful technology to reduce the incidence of injuries and death resulting from post-collision fuel fed fires in existing and future designs of passenger vehicles.

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Background of Research

- From 1995-2000 GM funded \$10 million in fire research in a GM/DoT Settlement of an investigation of an alleged defect in C/K pickup trucks
- Beginning in 2001 GM began funding \$4.1 million in fire related research as result of a judicial settlement of the alleged defect
- This research is being administered by MVFRI

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Selected MVFRI Projects

- Statistical analysis of field data
- Evaluation of US **fuel** tanks to ECE & other standards

Analysis of Field Data

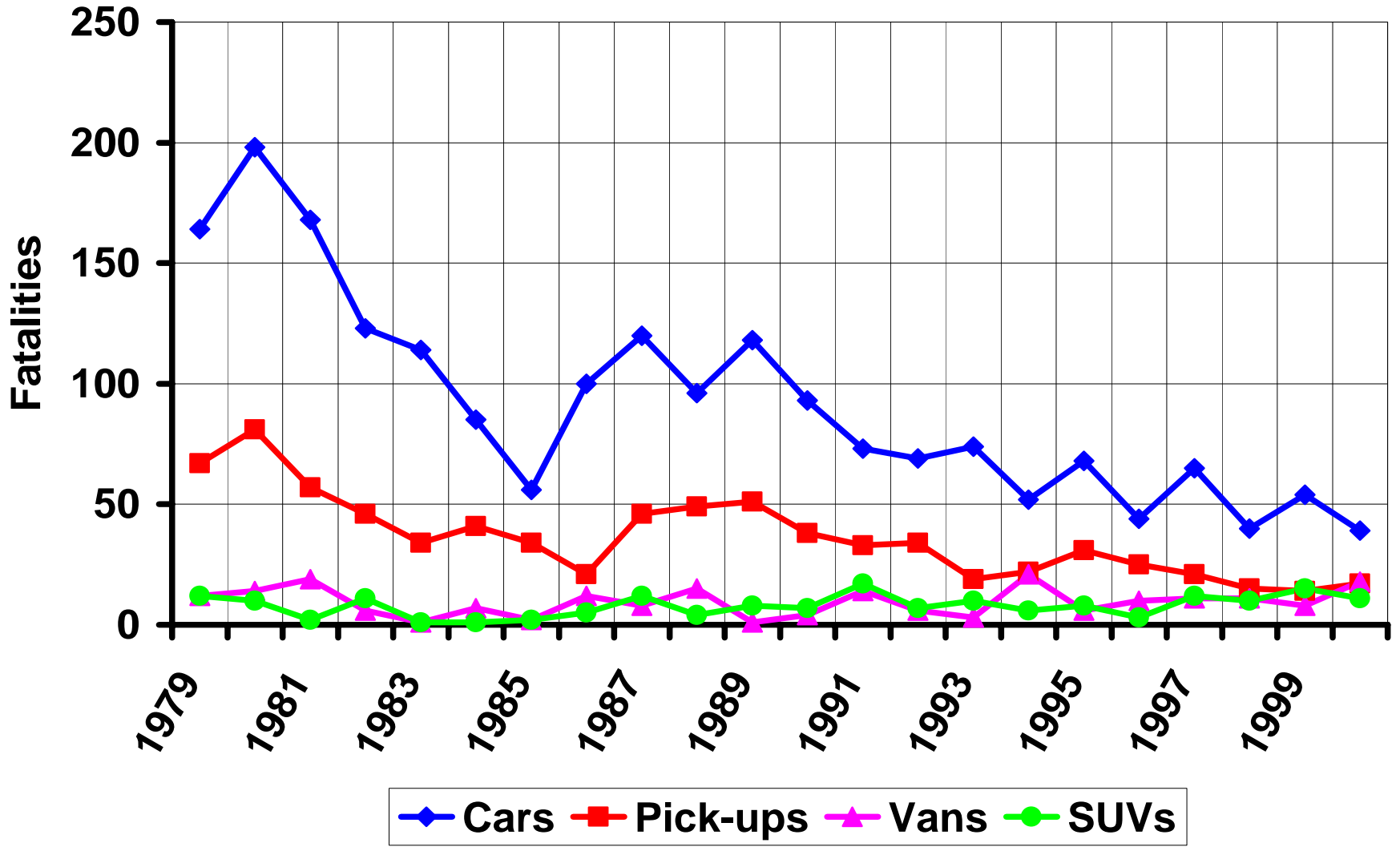
- FARS 1979-2000
- Vehicle age 0-4 years
- Occupants of vehicles where fire/explosion was most harmful event

Output:

- Fatality counts and
- Fatality rates per million vehicle registered years

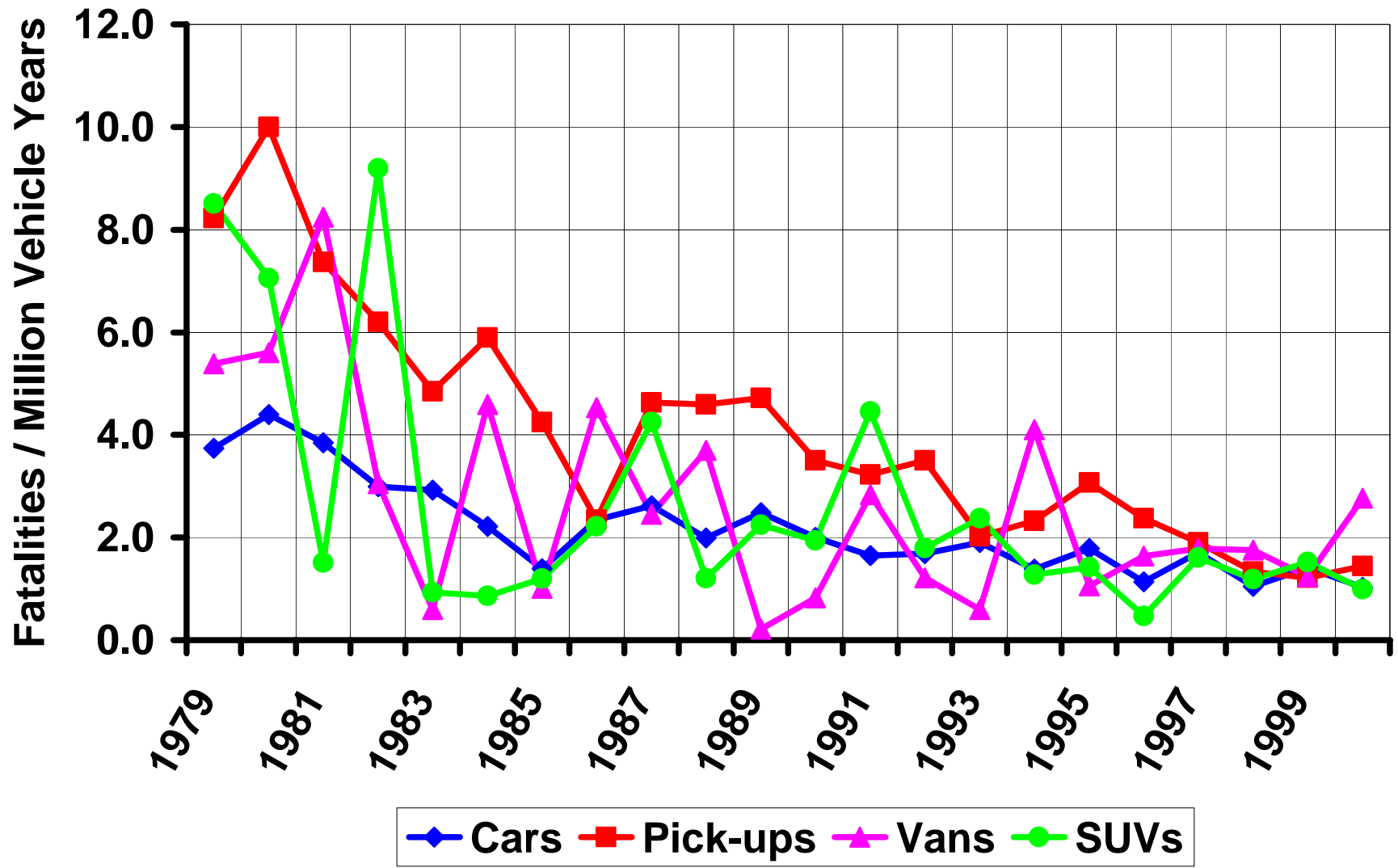
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Fatality Counts - Fire/Explosion as Most Harmful Event



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Fatality Rates - Fire/Explosion as Most Harmful Event

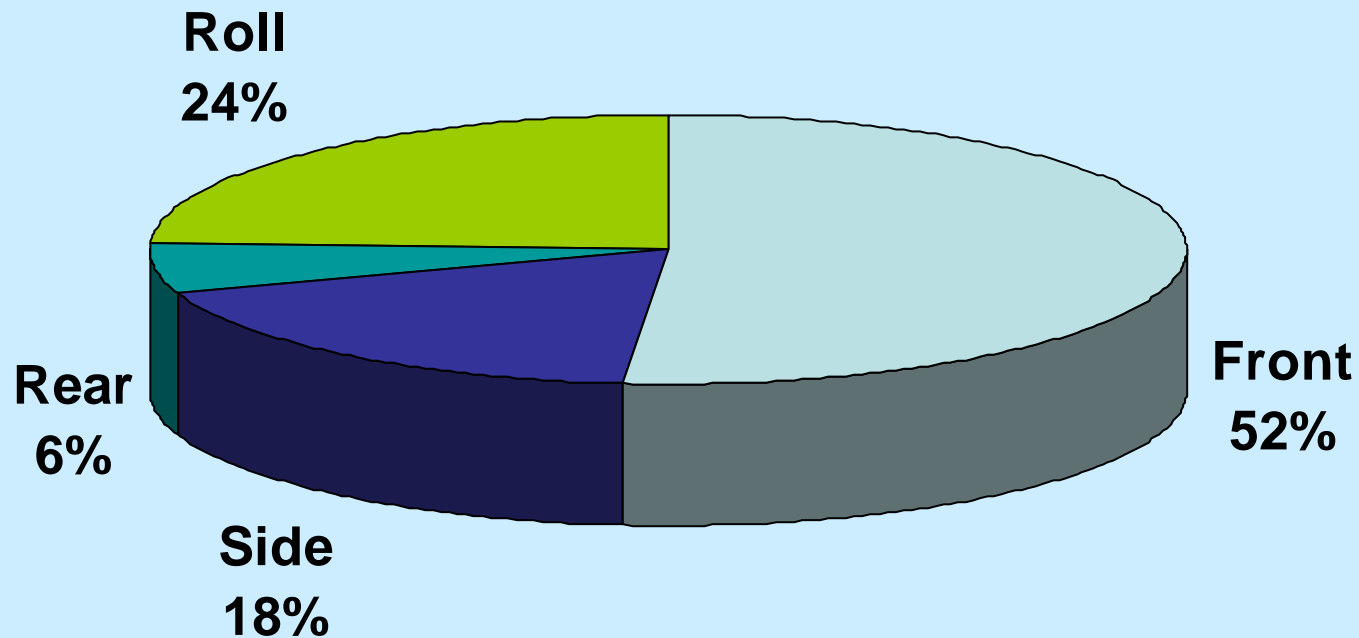


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Observations

- Number of fatalities from fire/explosion decreased by 65% since 1979
- Overall fatality rate from fire/explosion decreased by 72 % since 1979.
- Average fatality rate, (all vehicle classes) for last 5 years > 2.0 per million vehicle years

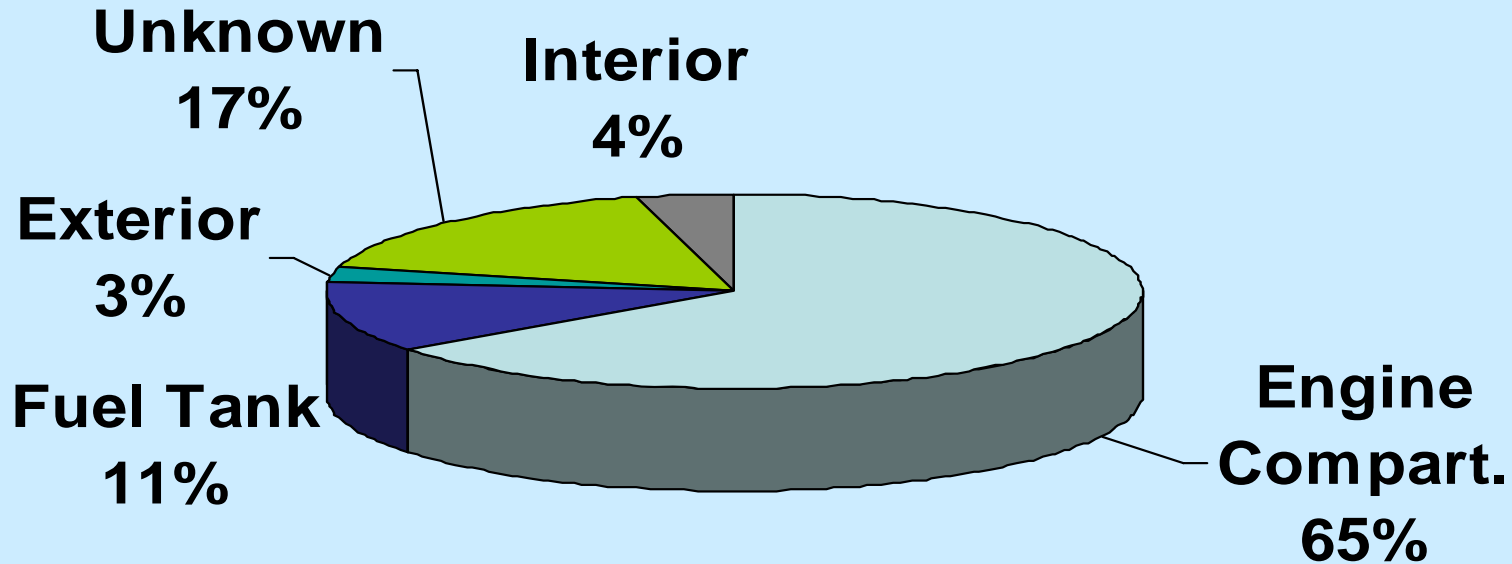
NASS Fires by Impact Direction



Frontal impact is most frequent mode
Rollover is Number 2

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NASS Fires by Fire Origin



Engine compartment fires are most frequent

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Evaluation of Plastic Tanks

Tanks subjected to tests from 3 standards:

- ECE R 34 – 2 minute pool fire
- ECE R 34 – -40°C impact test
- CFR 393.67 – 30 ft. drop test

Evaluation of Plastic Tanks

3 Shapes

Long narrow



Square



Pancake



New tanks
and
“conditioned”
tanks were
tested

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ECE R34 – Pool Fire Test



Requirement: No leakage during
1 minute high intensity fire
1 minute of low intensity fire

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Test Results

- ECE – Cold Impact
 - All Satisfactory
- ECE – Pool Fire
 - Generally Satisfactory
- CFR 393 – Drop Test
 - New Tanks OK
 - Seasoned Tanks
 - 2 of 3 leaked at pinchoff



Long Tank Post Fire Test



Long Tank Post Drop Test

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Other Ongoing Research

- Tests of seasoned tanks at pinch-off joint
- State-of-the-art of fire safety technology
- Carbon tracking properties of insulators for 42 volt systems (with USCAR)
- Toxicity of under-hood materials (supplement to NHTSA project)

Conclusions – Accident statistics

- Deaths and death rates from fires in new vehicles decreased by about 2/3 since 1979
- Rates have remained fairly constant during the past five years
- Fires most frequently occur in frontal crashes, followed by rollovers
- The most frequent fire source is the engine compartment

Conclusions – Plastic Tank Tests

- The new and seasoned plastic tanks tested to date performed reasonably well in ECE pool fire and cold impact tests
- Seasoned tanks may have a weakness at the pinch-off that is not exhibited in new tanks

Future Research

- Summary and synthesis of \$10 million GM/DOT Fire Research Projects
- Benefits of selected technologies to reduce vulnerability to fires
- Optimum fuel tank location and protection
- Component tests for fuel tanks
- Benefits of delayed fire penetration time

Future Research (Continued)

- Ignition properties of automotive materials exposed to 42 volt arcing
- Safety issues for hydrogen fueled vehicles.

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RECOMMENDATION: We propose that
there be a Fire Safety Session at the
2005 ESV Conference

The End

Questions?

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