

NCAP Tests for Fire Safety

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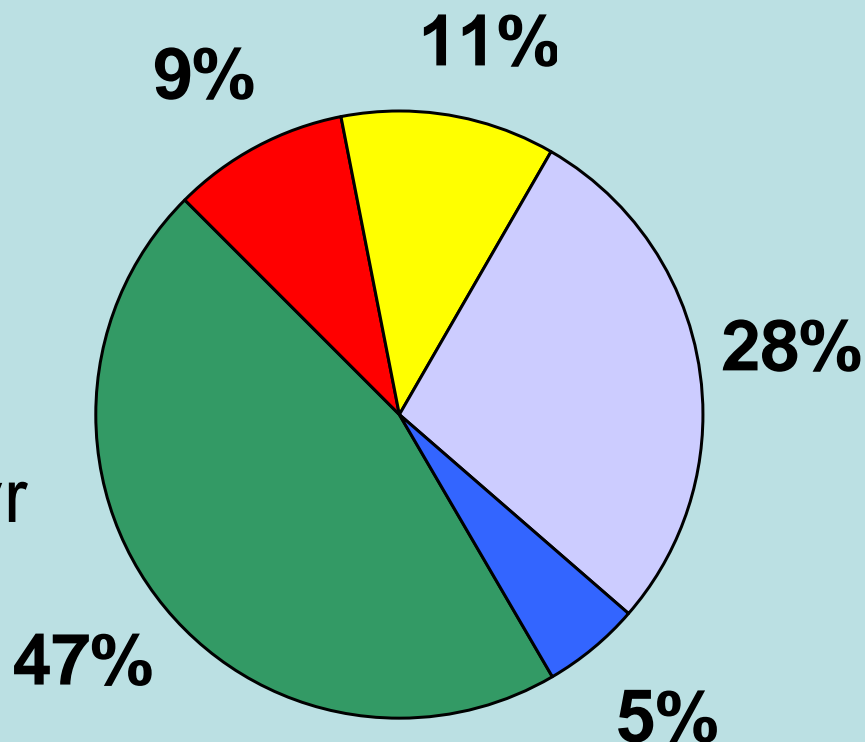
MVFRI

Distribution of Fatalities with Fire as MHE by Location of Vehicle Damage – FARS 2000-2005

Preference given to rollovers

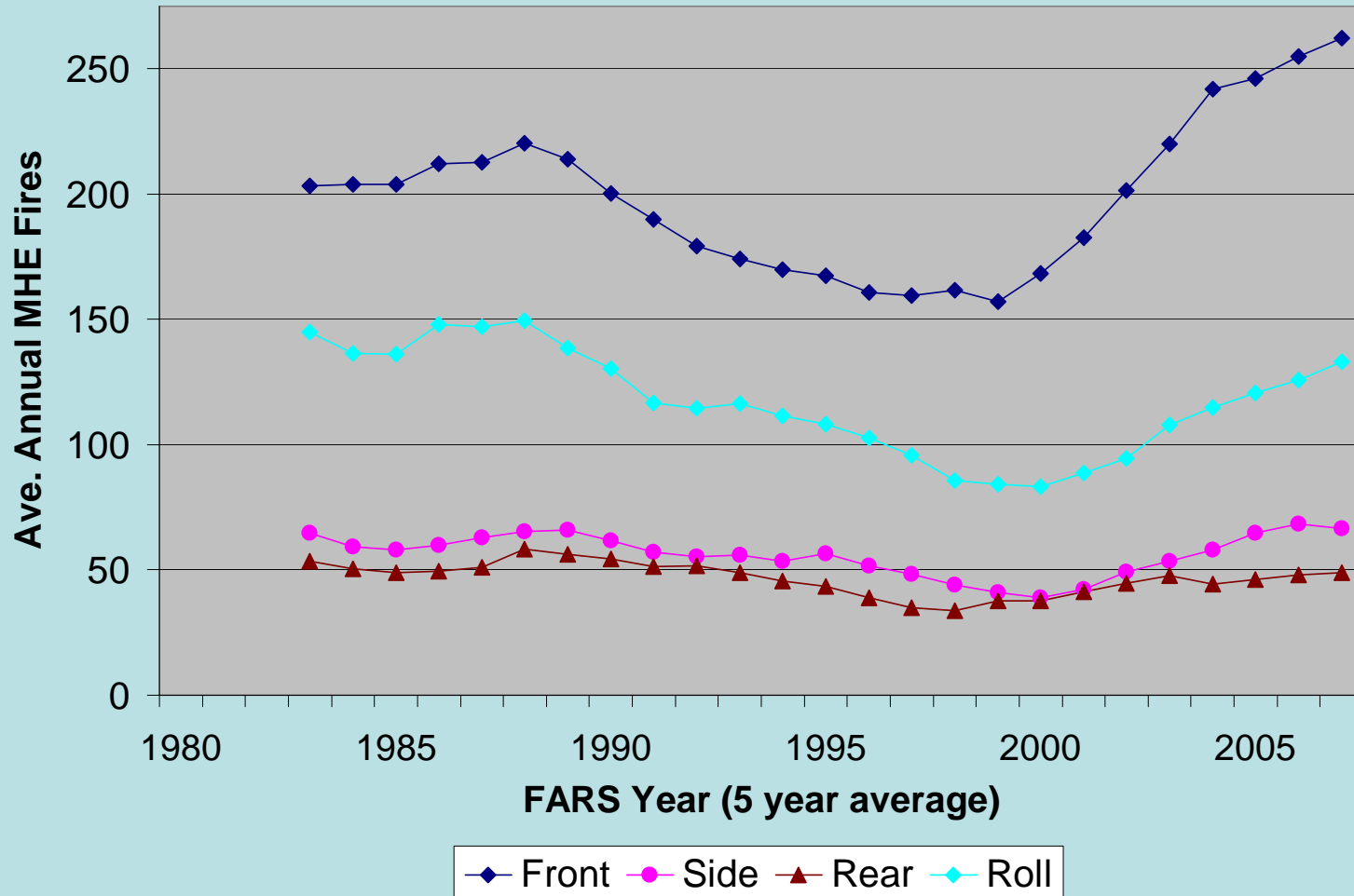
Entrapment ~ 25%

N ~ 500 deaths per yr

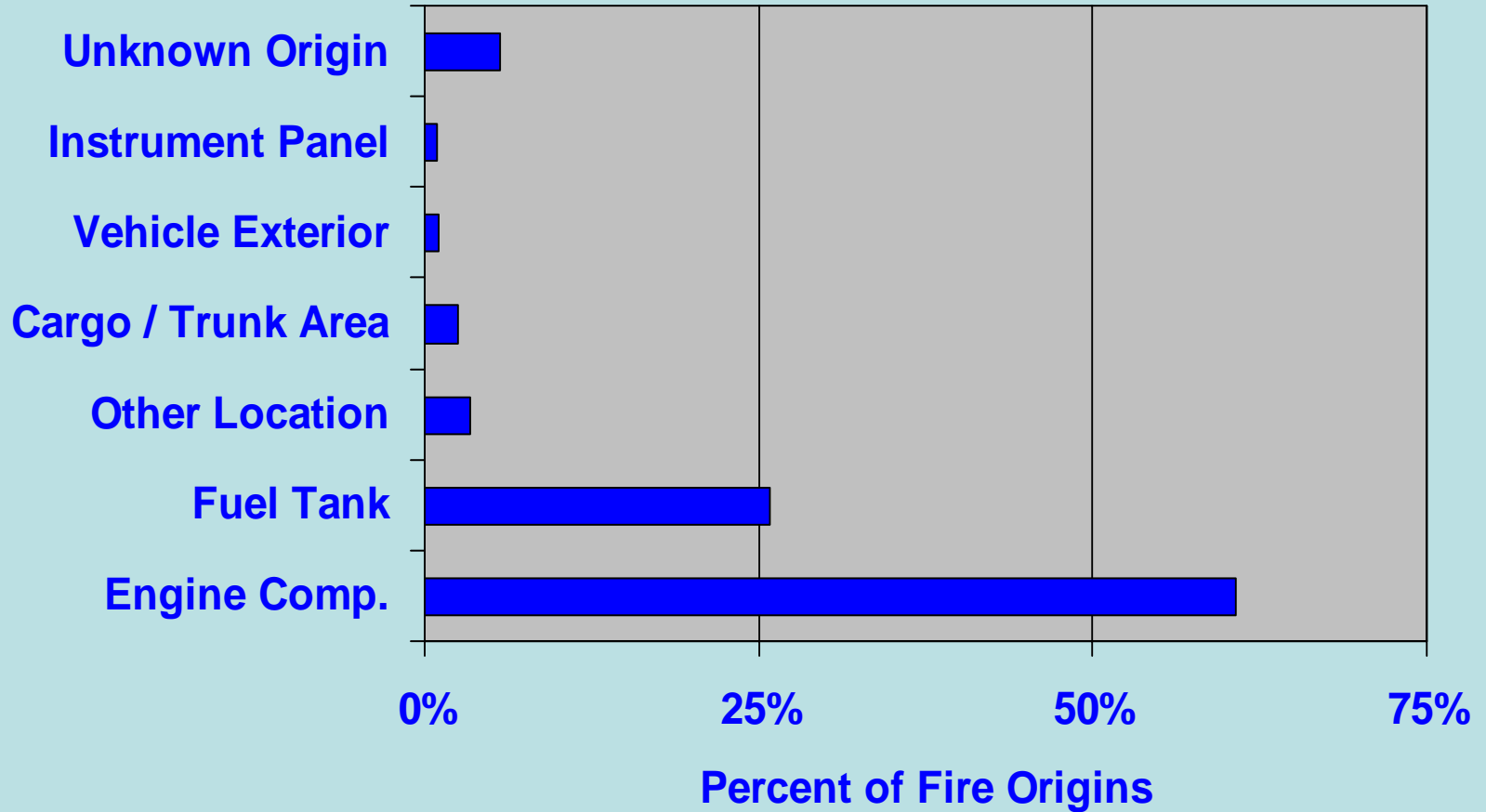


■ Front ■ Rear ■ Side ■ Roll ■ Other

Fatalities with Fire as MHE in FARS



Origin of NASS Major Fires Weighted Data



Engine Compartment Fire (from Test in Japan)

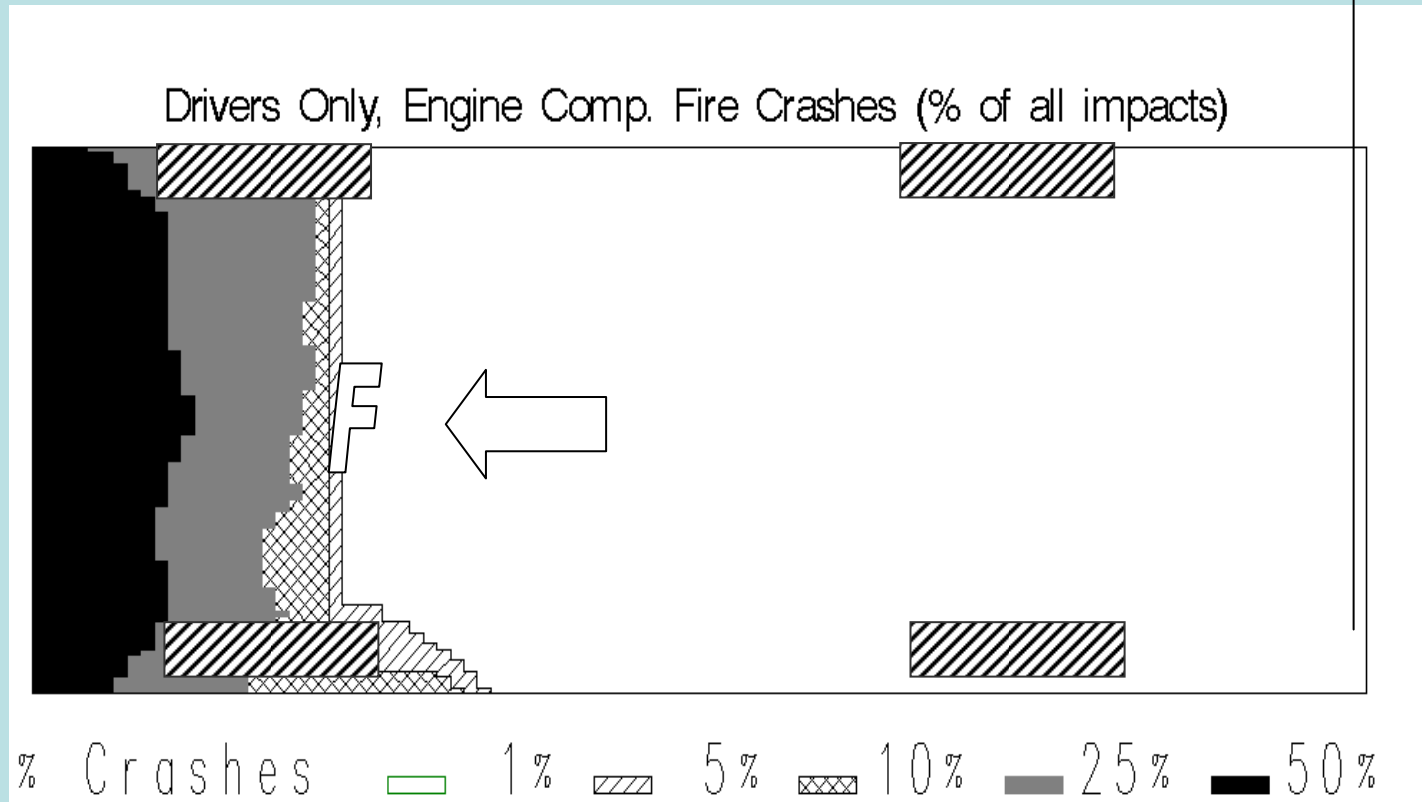


20 Minutes after fire initiation

30 Minutes after fire initiation

Escape time for underhood fires: 10 to 24 minutes
(Based on GM crash and burn tests)

Damage Patterns for Engine Compartment Fires (NASS)



~50% of vehicles with engine compartment fires have damage less severe than NCAP damage

Engine Compartment Post-fire



Fire Source difficult to detect.
Crash tests with fires gives indication of fire sources

Sources of Engine compartment Fires – Based on Crash Tests

- GM crash and burn tests: *electrical fault*
(GM/DoT Program; SAE 2006-01-0551)
- GM fire suppression tests: *fluid leakage*
(GM car-to-car offset tests; SAE 2005 -01-1788)

Under-hood Fluids as a Fire Source

- T_{flash} and T_{hot} measured for *under-hood fluids* were:
 - T_{flash} – 110 to 188 °C
 - T_{hot} – 310 to 506 °C
- Maximum *exhaust manifold temperatures* measured on four vehicles ranged from 241 °C to 550 °C

Conclusions

- Most MHE Fire fatalities are in frontal crashes and rollovers
- The frequency of MHE fatalities in frontal crashes and rollovers has been increasing
- Engine compartment fires are the most frequent fire origin in NASS major fires
- Most NASS vehicles with engine compartment fires have less damage than in the NCAP 35 mph test
- Crash tests have produced fires from under-hood fluid leakage and electrical faults
- Crash tests indicate 10 to 20 minute escape time for engine compartment fires

Observations

- Currently no safety standards deal with countermeasures for engine compartment fires.
- NCAP tests would provide a first step.

Fire Safety Countermeasures to be Measured by NCAP

Measure What?

- Integrity (leakage) of all flammable fluids
- Electrical isolation after the crash
- Minimum door opening force after the crash

Measure When?

FMVSS 301 - Fuel Leakage Post-crash Static Rollover Test



Fire Safety Countermeasures to be Measured by NCAP

Measure What?

- Integrity (leakage) of all flammable fluids
- Electrical isolation after the crash
- Minimum door opening force after the crash

When?

- Measure in rollover rig before the crash
- Measure immediately after the crash
- Measure in rollover rig after the crash

Final Comment

- Many vehicles (including entry level vehicles) already have fire safety features.
(ESV 07-0480)
- Should not manufacturers get NCAP credit for their safety features?

Thanks to
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The Motor Vehicle Fire Research Institute

Please visit our website: mvfri.org

See also our written only ESV paper for
further results and recommendations.

Questions?