

Possible Electronic Causes



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Toyota Electronic Throttle Control (ETC) Study

- ▶ Joint NHTSA-NASA effort
 - Specific focus on possible Toyota failure mechanisms leading to UA and warrant opening a defect investigation
 - Identified and demonstrated
- ▶ Volpe test plan peer review ~ initiated June 22

ETC Overall Approach

- ▶ Meetings with outside parties
 - Manufacturers and suppliers
 - Individuals
 - Rajkumar, Gilbert, Hubing, Belt, and others
- ▶ Complaint data analysis
 - Scope of problem (vehicle models, types of incidents)
- ▶ Vehicle characterization testing
- ▶ Assessment of ETC System
 - Look for flaws that may be real-world cause of UA
- ▶ Determine whether results support opening defect investigation

Complaint Data Analysis

- ▶ Vehicle Owner Questionnaires (VOQ)
 - Auto Safety Hotline, web site, US mail
- ▶ Alleged UA consumer complaints encompass variety of situations
 - UA, aggressive cruise control resume, transmission shift surge, etc.

Examination Past 10 Years VOQs

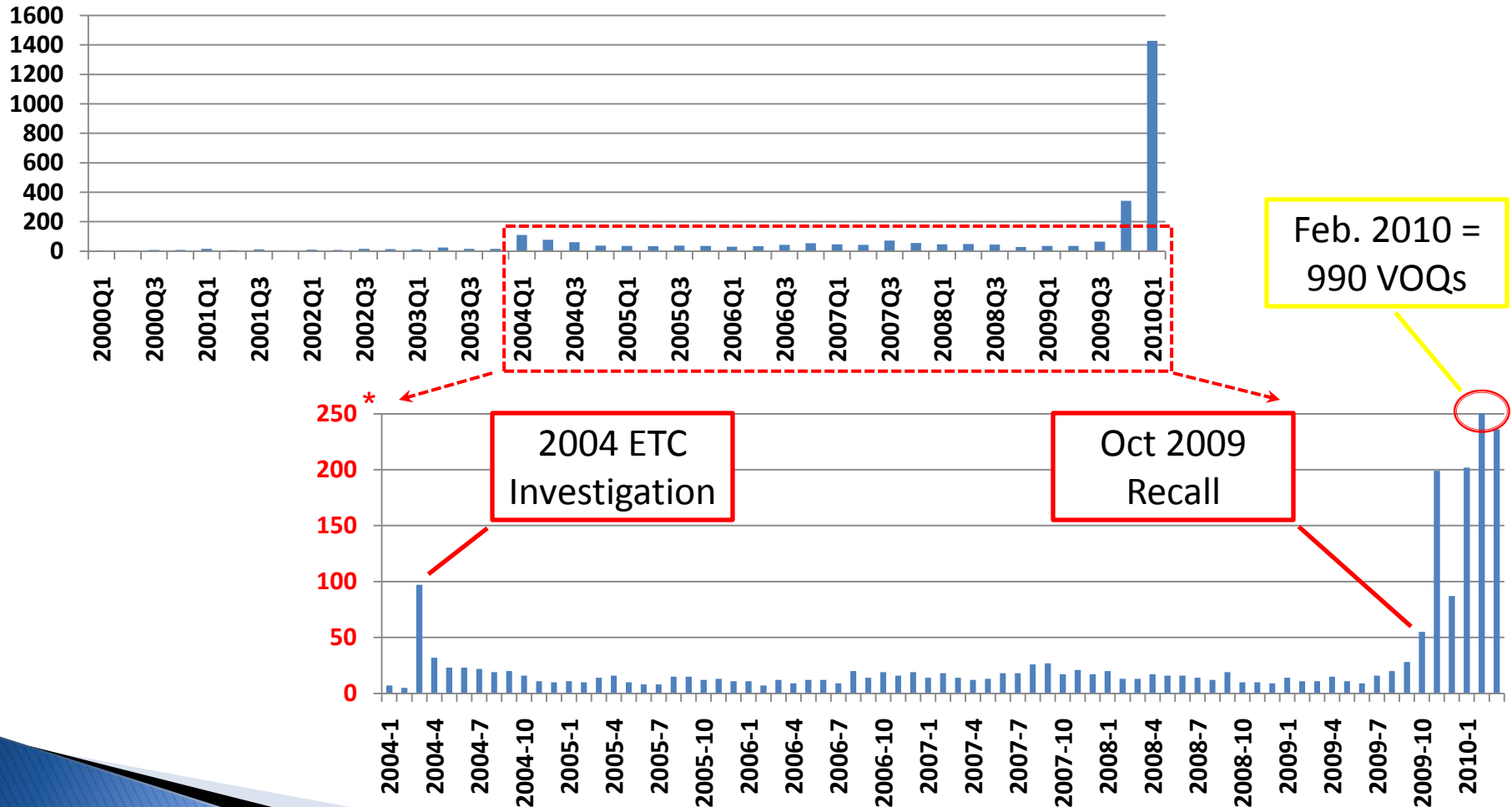
(Mechanical & Electronic Throttles)

Drilldown to Toyota UA VOQs	No. of VOQs
Total VOQs received from 1/1/2000 to 3/5/2010	426,911
UA related VOQs ID'd by key-word search	19,269
VOQs remaining after manual review	11,454
MY1998-MY2010 - only	9,698
Toyota - only	3,054

Publicity Effects of Toyota UA VOQs

Note: Vehicle-based cause of UA from VOQ statements not confirmed by NHTSA

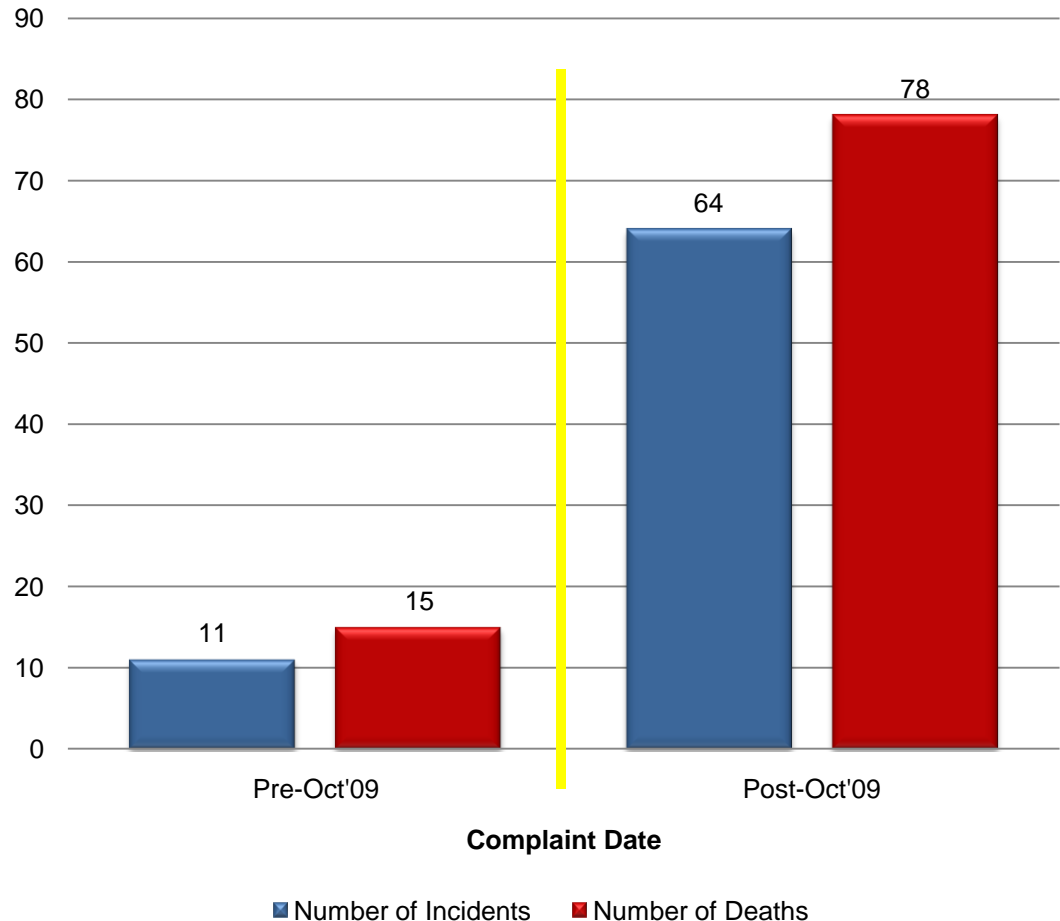
3,054 Toyota VOQs by Date of Report



Fatal Incidents Allegedly Involving UA in Toyota Vehicles Since 2000

**Post Oct'09 VOQ increase due to recall publicity effect
Vehicle-based cause of UA from VOQ statements not confirmed by NHTSA***

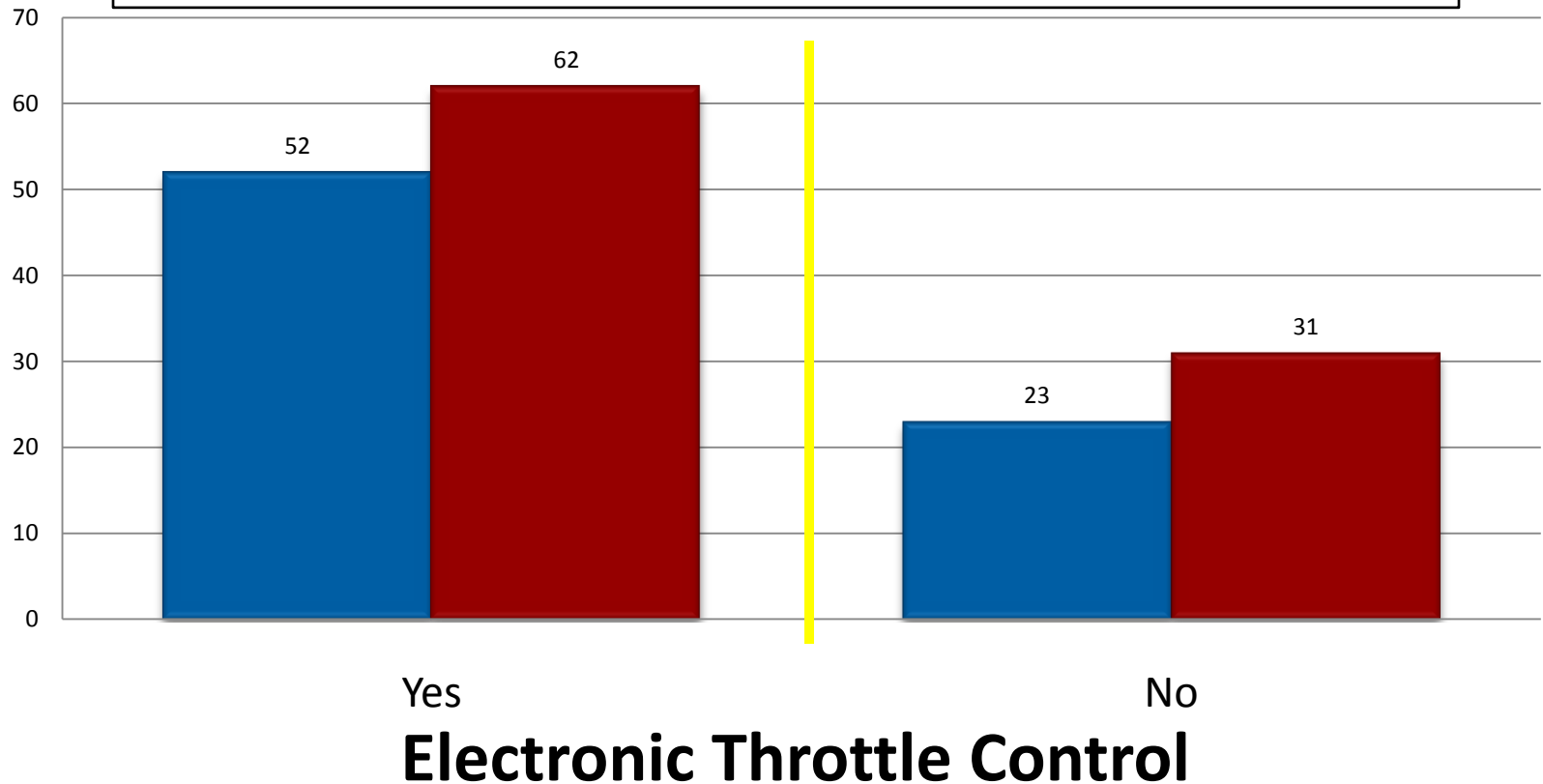
- ▶ 75 complaint incidents involving fatality reported
 - 11 prior to Oct'09
 - 64 since Oct'09
- ▶ 93 fatalities in these events
 - 15 prior to Oct'09
 - 78 since Oct'09
- ▶ *NHTSA confirmed 1 incident of vehicle based cause
 - Involved 4 deaths



Fatal Incidents Allegedly Involving UA in Toyota Vehicles Since 2000

Electronic vs. Mechanical Throttle

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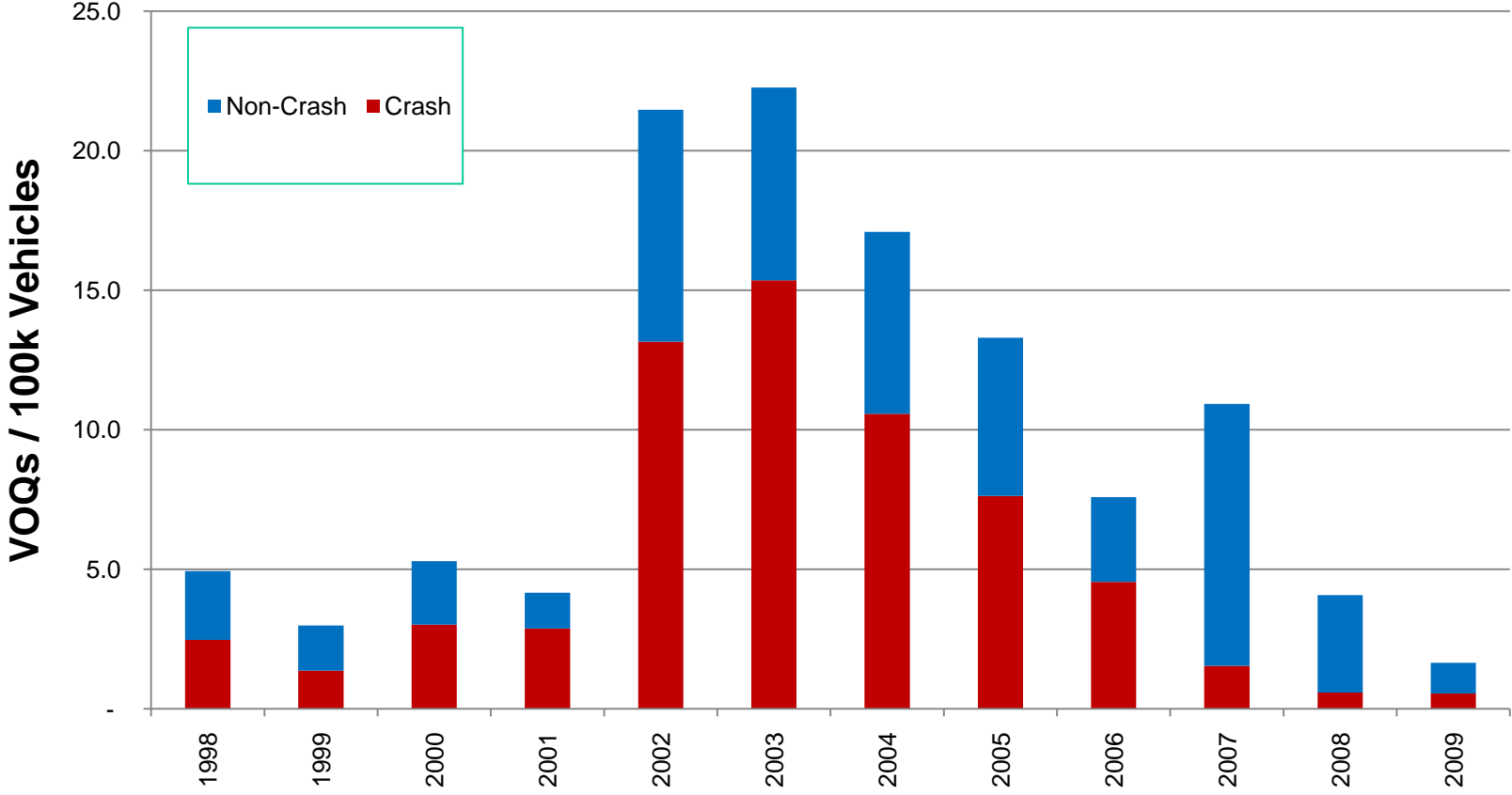


■ Number of Incidents

■ Number of Deaths

Camry UA VOQ Rate by Model Year

Pre- 5-Oct-09*



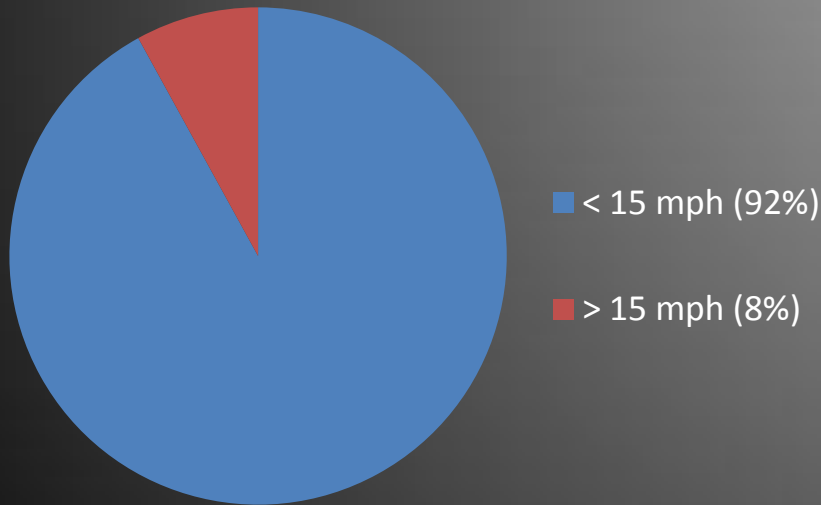
Camry MY

← Gen 5 → ← Gen 6 → ← Gen 7 →

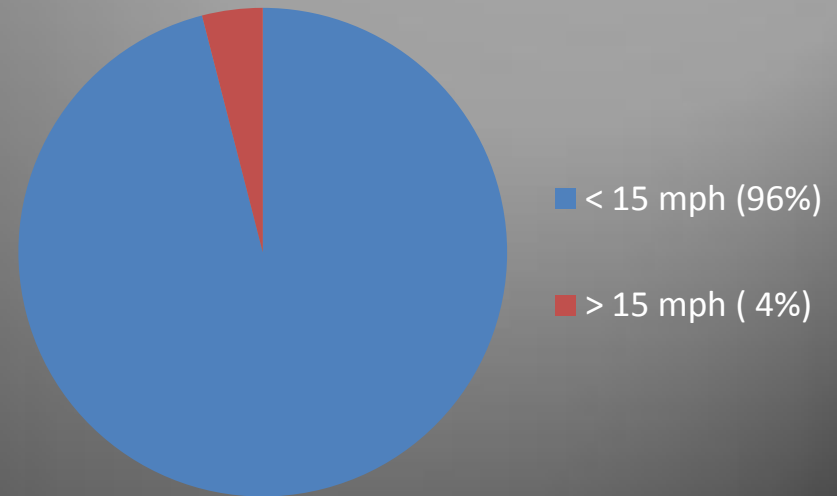
*Post 10/5/2009 data biased due to recall publicity

MY 2002 - 2006 Camry UA VOQ's Consumer Complaints by Initiation Speed; Pre- 5-Oct-09

VOQs
(Initiation Speed)



Crashes
(Initiation Speed)



Test Vehicle Characterization Effort

- ▶ Purpose: To document vehicle features and capabilities that may contribute to instances of unintended acceleration
 - Conducted at NHTSA Vehicle Research and Test Center in Ohio
- ▶ Vehicle selection
 - Gen 6 Camry designs + Gen 5 & Gen 7
 - Complaint vehicles
- ▶ Documentation & characterization
 - Electronic interrogation ~ repair history, TSB servicing, etc.
 - Brake & acceleration assessment
 - Gearshift pattern documentation
 - Pedal design and placement