Side Air Bags

Administrator's Briefing

December 2001

People Saving People
Http://www.nhtsa.dot.gov

Outline

- **Background**
  - Definition, Types, and Trends
- **Chronology of Events Related to Side Air Bag Systems (SABs)**
- **NHTSA Evaluation**
- **Agency Options to Address SABs OOP Risk**

Background

All Side Air Bags Not the Same ...

- **Thorax Bags**
  - Seat Mounted
  - Door Mounted
- **C ... Bags for Head /Chest**
  - Seat Mounted
- **Head Bags**
  - Roof Rail Mounted

Audi A6 seat mounted (thorax)

Volvo S80 seat mounted (thorax)

Cougar seat mounted (head & thorax)

Saab 9-5 seat mounted (head & thorax)

BMW Roof rail mounted (head)

Mercedes roof rail mounted (head)

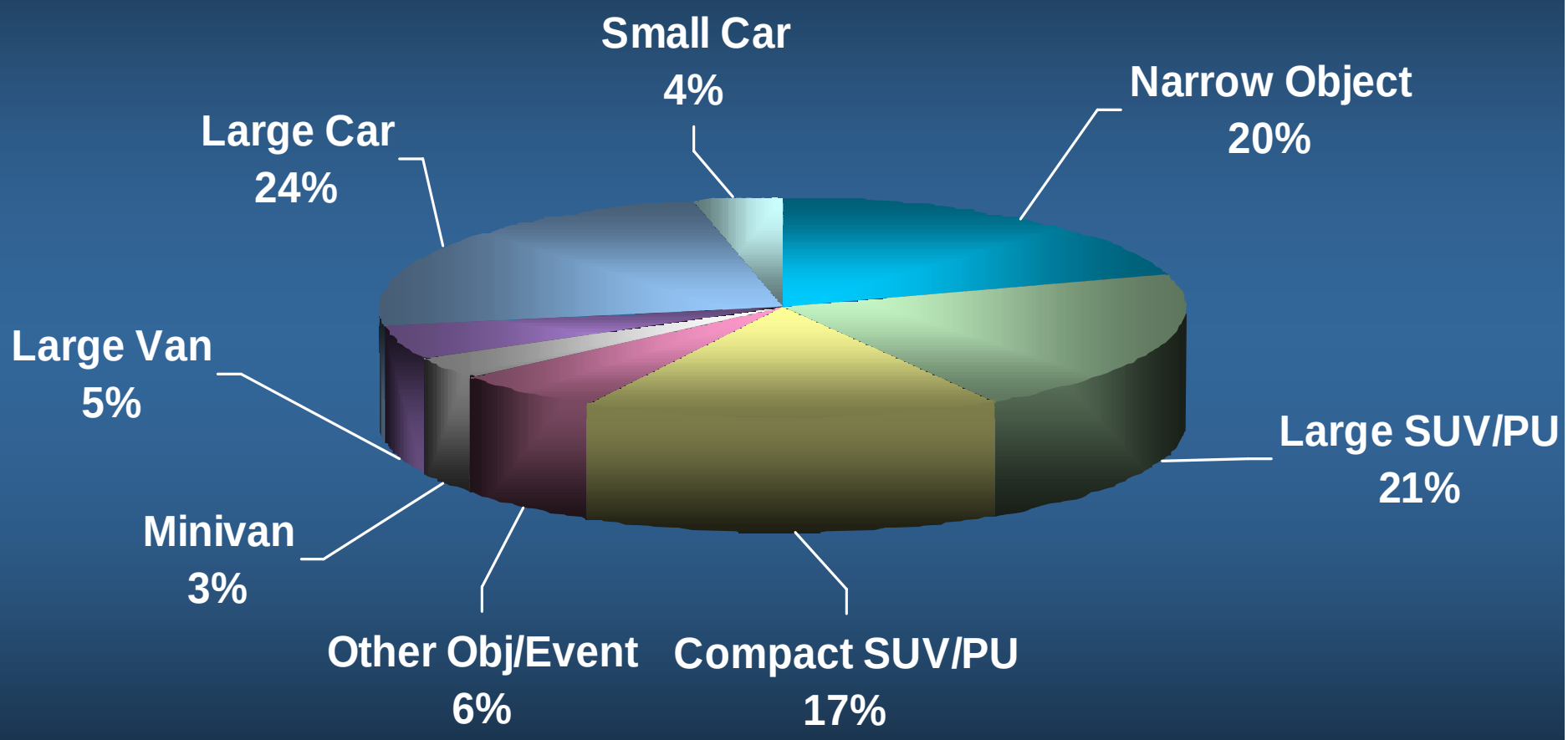
Mercedes door mounted (thorax)

Safety Problem

- **1999 FARS/NASS Light Vehicle Side Crashes**
  - Over 9,100 Fatalities
  - 729, 000 Injured Occupants
- **Many Crashes Results in Rollover**

Near Side Belted Fatalities by Crash Partner

1999 FARS Side Crashes – Model Year 1995+ (light vehicles ≤10,000lbs, no rollover)



N~1,450 fatalities (total)

N= 805 fatalities (belted)

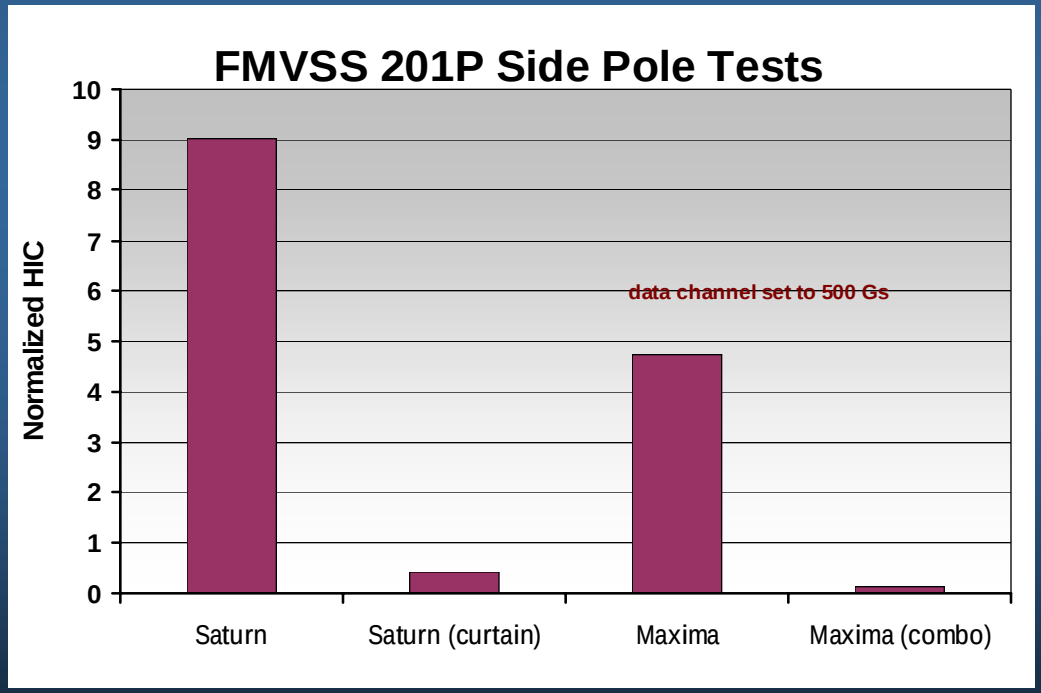
Improved Thoracic Protection NCAP Star Rating

Why Side Air Bags?

Not required in FMVSS 214…

- **Better Side Impact NCAP Scores**
- **Offer Better Protection in Aggressive Vehicle and Narrow Object Crashes**
- **Safety Sells**
- **Rollover Protection (Ejection Mitigation)**

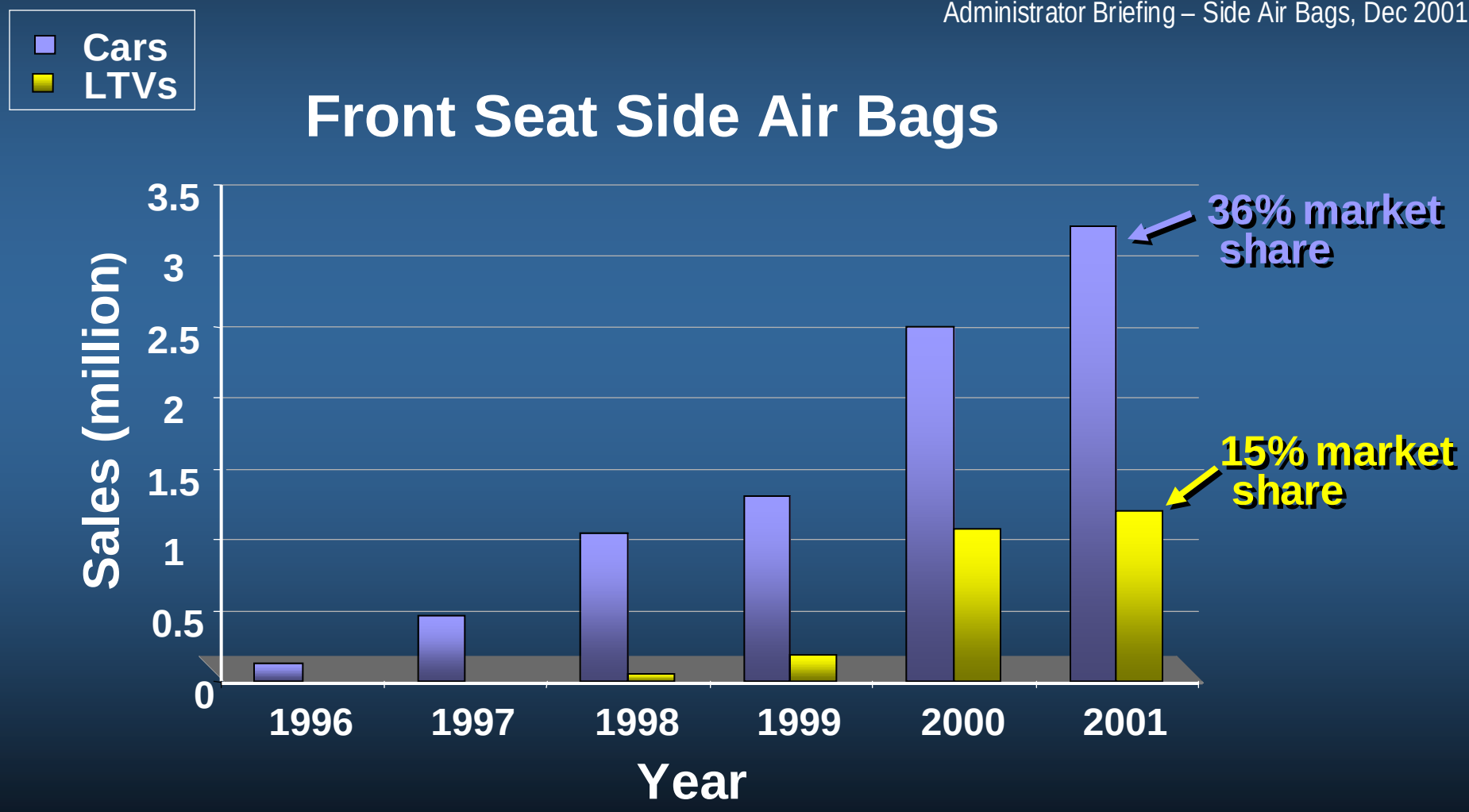
Address Increased Risk of Head Injuries From Crashes Involving LTVs and Narrow Object



HIC=9000, 2001 Saturn L200 no curtain

HIC=435, 2001 Saturn L200 with curtain

Fleet Penetration of SABs

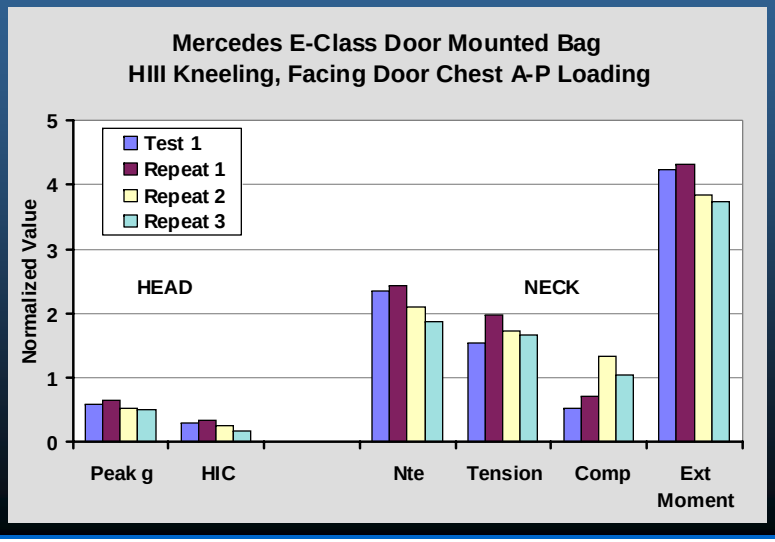


Real World Experience

- **55 special crash investigations with SABs … the bags work so far!**
  - No fatalities attributed to side bag deployment
  - One seriously injured 76 y/o male (AIS 3 rib fractures due to cover flap, Deville no longer in production with door mounted SAB)
  - The two cases with kids: the SAB provided protection (AIS 1 injuries)
  - The head side air bag has been successful in reducing head injury
  - Passenger compartment intrusion is the primary contributor to the fatal injury mechanism
- **Several anecdotal cases of side air bags saving lives and preventing injuries**

Early Assessment of Side Air Bag Risks

Insert Chart



Chronology of Events

- Fall 1998 – Early NHTSA/TC OOP tests
- December 1998 – NHTSA's letter to manufacturers
- Feb 1999 GM Issues Press Release on Side Air Bag risks
- Feb 1999 – ISO draft test procedures
- April 1999 – Center for Auto Safety (CAS) petition
- April 1999 – NHTSA Public Meeting
- May 1999 – NHTSA's letter to industry
- July 1999 – Formation TWG & Development of Test Procedures
- August 1999 – Joint letter from Public Citizen and CAS
- October 1999 – NHTSA issues consumers advisory
- June 2000 – TWG public meeting
- Aug 2000 – TWG procedures and submission to NHTSA
- October 2000 – Transport Canada MOU
- June 2001 – NHTSA published results in ESV
- October 2001 – TWG public meeting

NHTSA/Transport Canada/Consumer Groups Role in TWG

- **NHTSA**
  - Participated as observer
  - Shared SCI findings
  - Shared test results
- **Transport Canada**
  - Participated as member
  - Developed test procedures
  - Shared test results
- **Consumer Groups**
  - Invited to public meetings but declined

TWG Activities

- Identified Population at Risk
- Selected Available Test Dummies
- Established Dummy Injury Measures and Thresholds
- Set Associated Injury Risks for Children 3-5% for AIS 3 & 4
- Drafted Test Procedures
- Hold Public Meetings

TWG Injury Assessment

- For 3 YO, 6 YO: Head, Neck, Chest
- For 5th %tile: Head, Neck, Chest, abdomen, pelvis, and arm
- Includes both injury criteria and injury research values
- Limits based on industry biomechanical expertise
- Minimizes risks for children

SAB OOP
Test Positions – Examples for 3 and 6 year old HIII dummies

3 yr Hybrid III

6 yr Hybrid III

Comparison of TWG & NHTSA OOP Test Position

TWG - 3 yr old leaning sideways on a foam booster block

NHTSA variation - gets head closer to seat back & places head at different location along the seatback (resulted in high upper neck twist)

Rear Door Side Air Bags OOP Testing

NHTSA variation 3yo – high HIC

NHTSA variation 3yo– high N_{ij}, bending

NHTSA Evaluation of TWG Procedures

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Front Seat Side Air Bag Static Deployment Performance

		TWG		NHTSA Variations	
	SAB Type	3yr old	6yr old	3 yr old	6 yr old
99 Geo Prizm	seat				
99 VW jetta	seat				
00 Audi A6	seat				
99 Volvo S80	seat				
99 Ford Windstar	seat combo				
99 Mercury Cougar	seat combo				
00 Nissan Maxima	seat combo				
99 Saab 9/5	seat combo				
99 Cadillac Deville	door				
00 Mercedes S430	door				
00 BMW 528i	door				

Note: to date, using TWG IARV

DETAILS.ppt

General Comments on TWG Procedures

- IIHS Did an Outstanding Job Both Politically and Technically
- The TWG Procedures Are Quite Comprehensive and Are Successful at Discriminating Aggressive SABs
- The TWG Addressed Dummy Sizes, Positions, and Expanded Traditional Injury Assessment
- Generic Worse Case Position Can Not Be Absolute Worst Case

NHTSA Options to Address OOP Risks

- **OPTION 1: Voluntary Compliance to Industry Established Requirements**
  - Agency plans to disclose available information in 2002 edition of buying a safer car
- **OPTION 2: Request Industry to Submit Data**
  - Spot Check for Compliance
  - Test for Other Worst Case Positions
  - Make Test Results Public
- **OPTION 3: Establish Requirements for OOP Testing in FMVSS No. 214**

NHTSA Options

- **OPTION 1: Voluntary Compliance to Industry Established Requirements**
- **Pros:**
  - Minimal Real World Risk to Date
  - Minimal Agency Resources Required
  - No Need for Agency Test Procedures
- **Cons:**
  - Could be anouther “Frontal Air Bag” Experience
  - No Guarantee of Full Adherence to TWG
  - Consumer Groups Will Object
- **Requirement**
  - Close Monitoring of Real World Data

NHTSA Options

- **OPTION 2: Request Industry to Provide Data; Agency Performs Spot Check and Worst Case Tests, and Make Test Results Public**
- **Pros:**
  - Promotes Adherence to TWG Established Requirements
  - Less Objectionable to Consumer Groups
  - Can Be Implemented in a Timely Manner
- **Cons:**
  - Important to Establish Safety Need
  - Significant Agency Resources Necessary

NHTSA Options

- **OPTION 3: Establish Requirements for OOP Testing in FMVSS No. 214**
- **Pros:**
  - Will Be Viewed As NHTSA's Traditional Approach
  - Ensures Adherence to OOP Test Requirements
- **Cons:**
  - Minimal Real World Risk To-Date
  - Substantial Research Required (Injury Criteria and Dummy Evaluation, Test Repeatability and Reproducibility)
  - Substantial Agency Resources Required
  - Delayed Implementation (5+ Years)
  - Rule Amendment Required With Changing Technologies

SAB Model
(Industry Voluntary Standards)

- **Could Be Adopted for Other Emerging Technologies**
- **Telematics**
  - Significant Potential for Distractions
  - Establishing Generic Requirements Will Need Substantial Research
  - Quantifying Safety Benefits Is Difficult
- **Advanced Crash Avoidance**