



NTSB National Transportation Safety Board

Office of Highway Safety

Glen Rock, Pennsylvania

April 11, 2003



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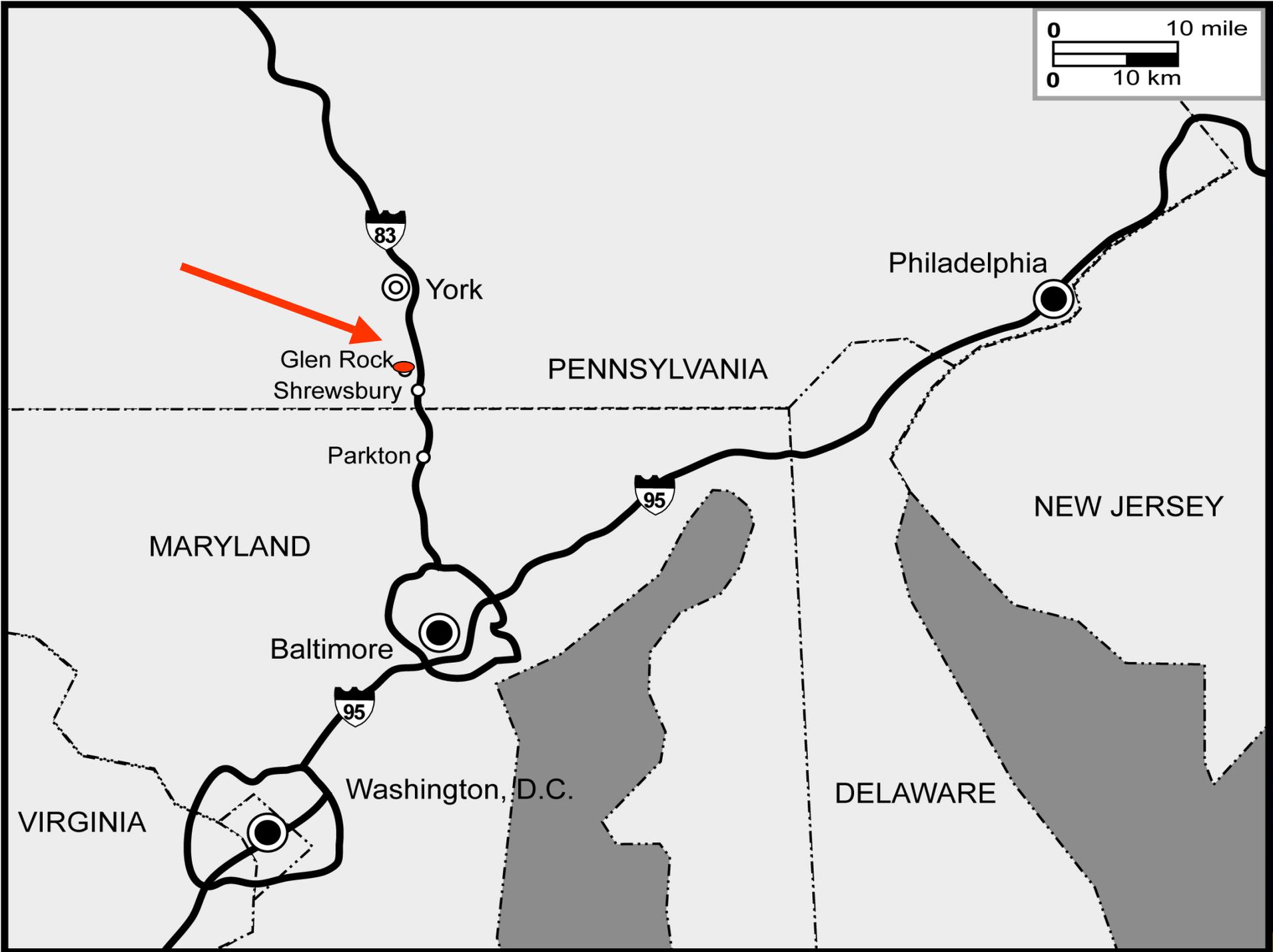
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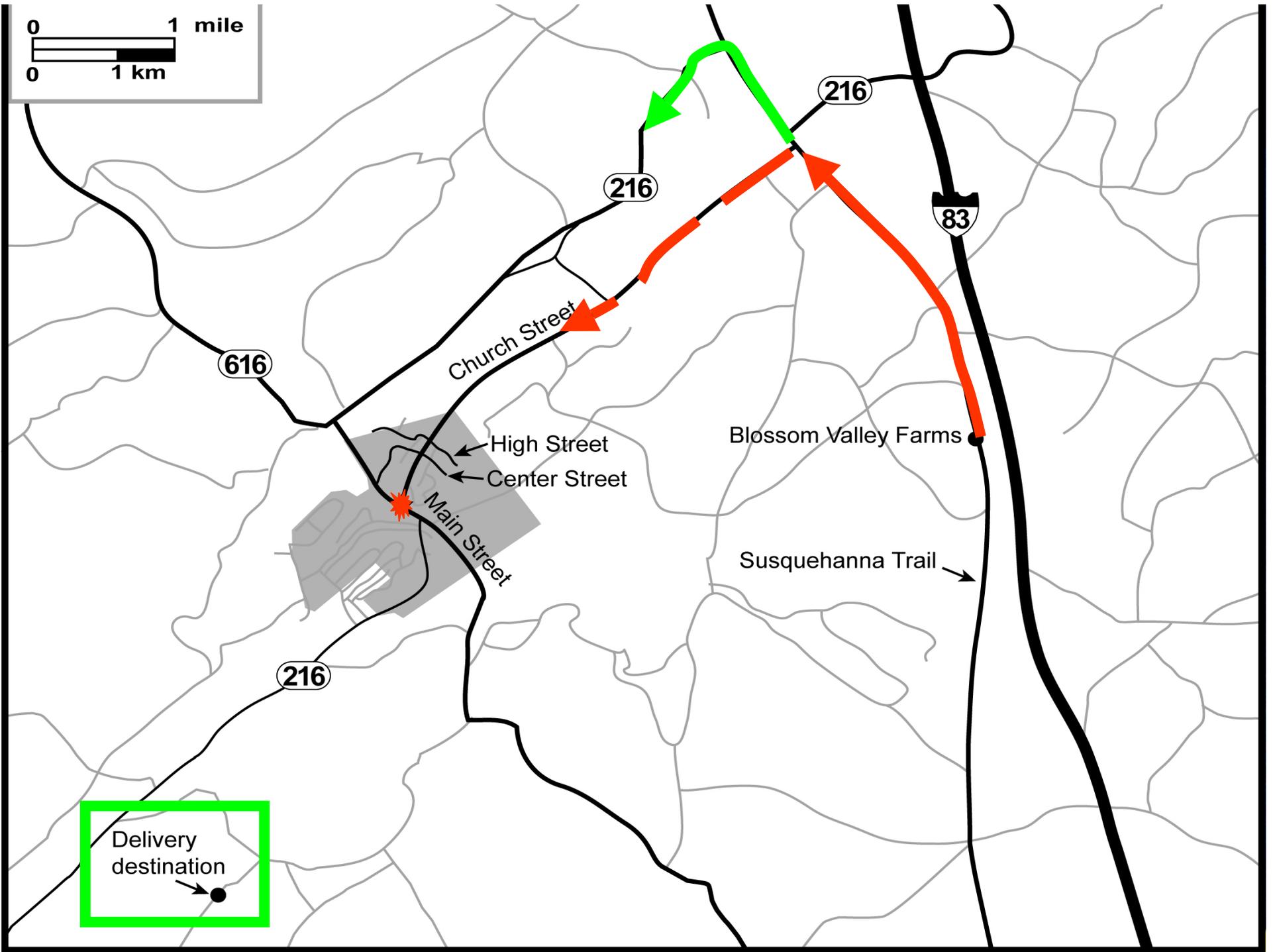
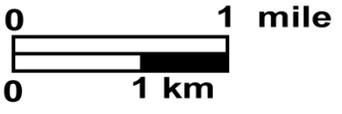
Introduction

Introduction

- Sequence of events
- Investigative staff
- Parties
- Safety issues









Source: Southern Regional Police Department



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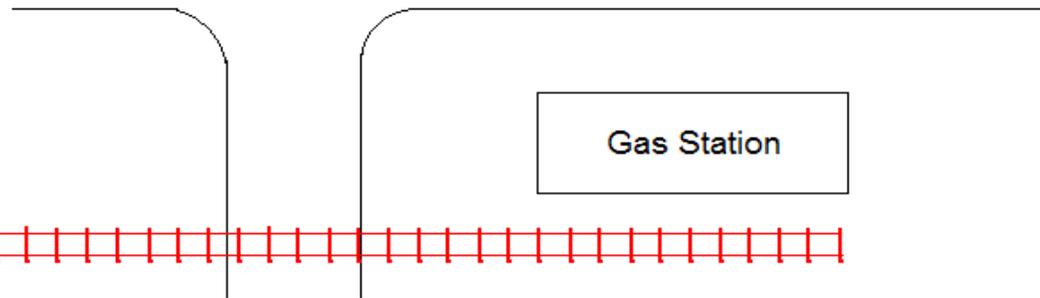
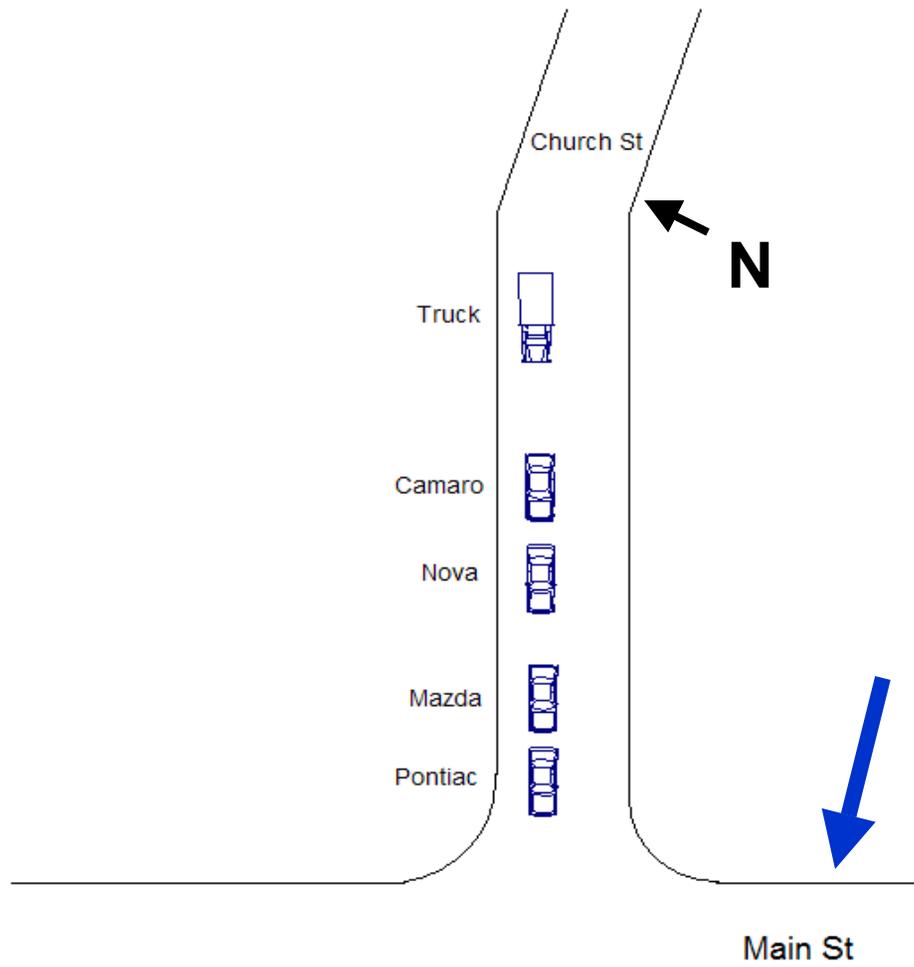


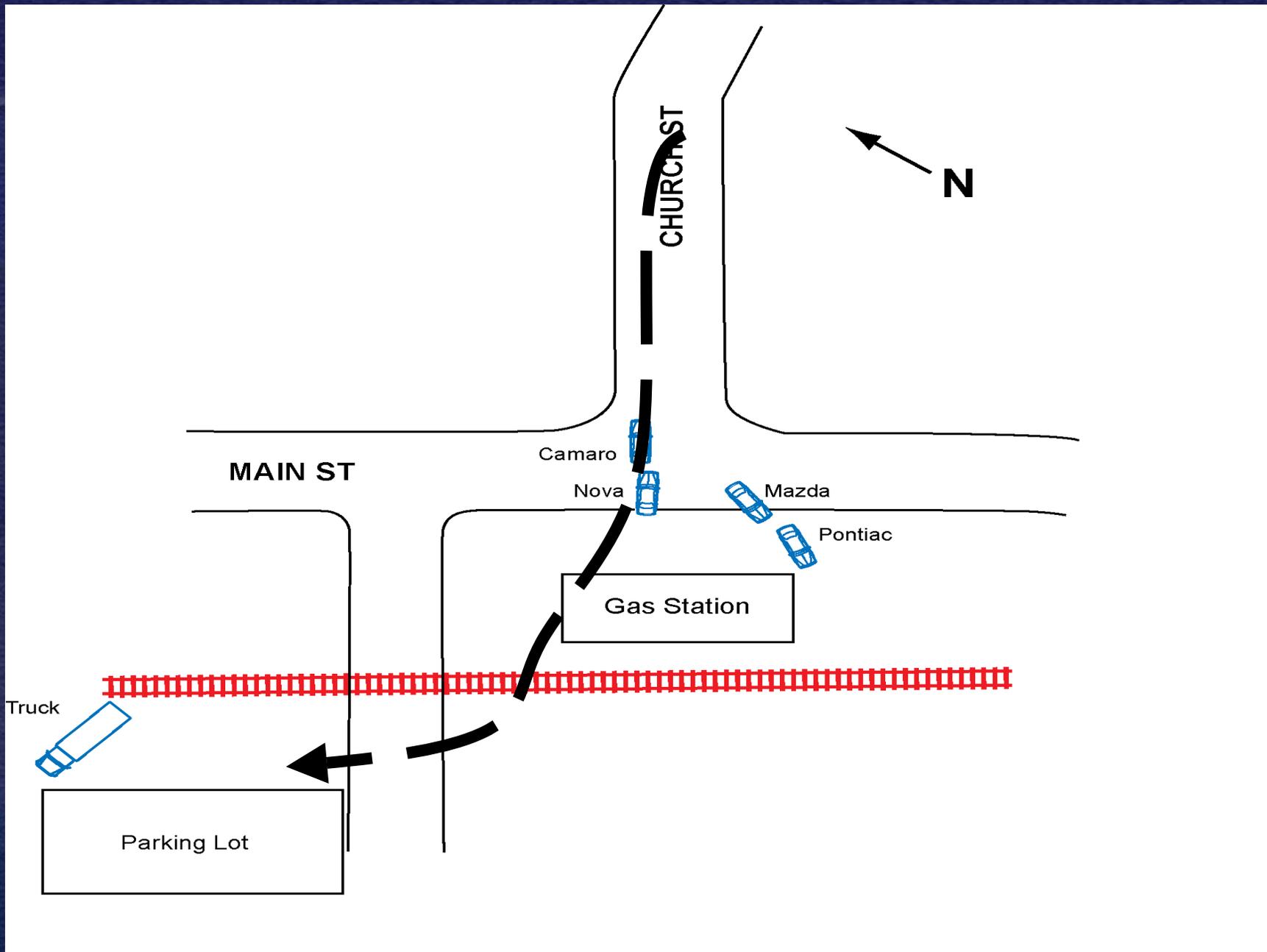














Source: Southern Regional Police Department



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Parties to the Investigation

- Federal Motor Carrier Safety Administration (FMCSA)
- Pennsylvania Department of Transportation
- Pennsylvania State Police
- Southern Regional Police Department
- Gunit Corporation

Safety Issues

- Knowledge and skills needed to drive air brake-equipped vehicles
- Maintaining air brakes equipped with automatic slack adjusters
- Motor carrier oversight



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Simulations

Introduction

- Two sets of simulations
 - Collision
 - Truck braking condition

Purposes of The Simulations

- Calculate the speed of truck at collision
- Evaluate braking capabilities of the truck
- Aid in the evaluation of the truck driver's statement

Strategy to Simulate Collisions

- Calculating the truck's collision speed
- EDSMAC4
 - Based on SMAC
 - Used to simulate collision
- Results
 - Truck speed was 35 mph

Simulations

- Simulations depict the best fit to the physical evidence
- Simulations will be shown at real time
- Simulations show only the collision portion of the accident
- Simulations do not represent weather and lighting conditions

Collision Simulations

Braking Simulations

Accident Truck Brakes

- Post accident brake inspection
 - Front brakes were in adjustment and functioning properly
 - Rear brakes were out of adjustment and would have provided little braking

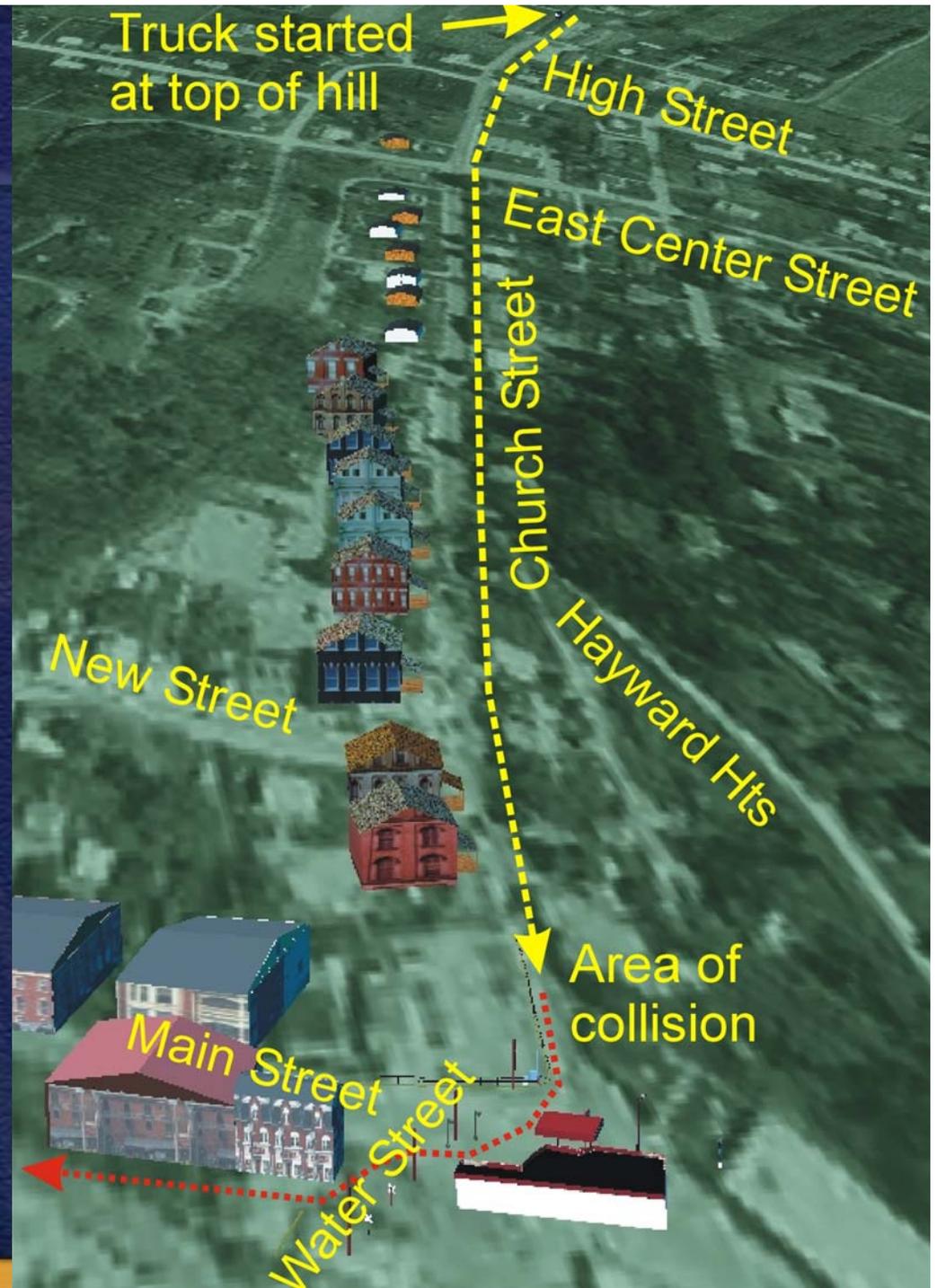
Concerns

- Increased brake applications could
 - Deplete the system's air
 - Further increase the front brake temperature

Strategy to Simulate Truck's Braking Capabilities

- SIMON with HVE Brake Designer
 - Calculate brake temperatures
 - Calculate brake capabilities
 - Evaluate different braking strategies
 - Target speed used in the simulation was 35 mph at impact

The truck approach modeled in SIMON



Simulation Results

- The driver would not have been able to stop if he
 - Pumped the brakes rapidly and depleted the systems air
 - Applied the brakes too late in the descent
 - Allowed speed of the truck to exceed 38 mph during the descent
- The lowest brake temperatures were achieved by “snubbing” the brakes

Summary

- Based on
 - The truck driver's statements about pumping the brakes
 - Postaccident examination of the brakes
 - Computer simulations
- Accident truck did not have sufficient braking capability to stop before the stopped cars.



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Knowledge and Skills Needed to Drive Air Brake-Equipped Vehicles

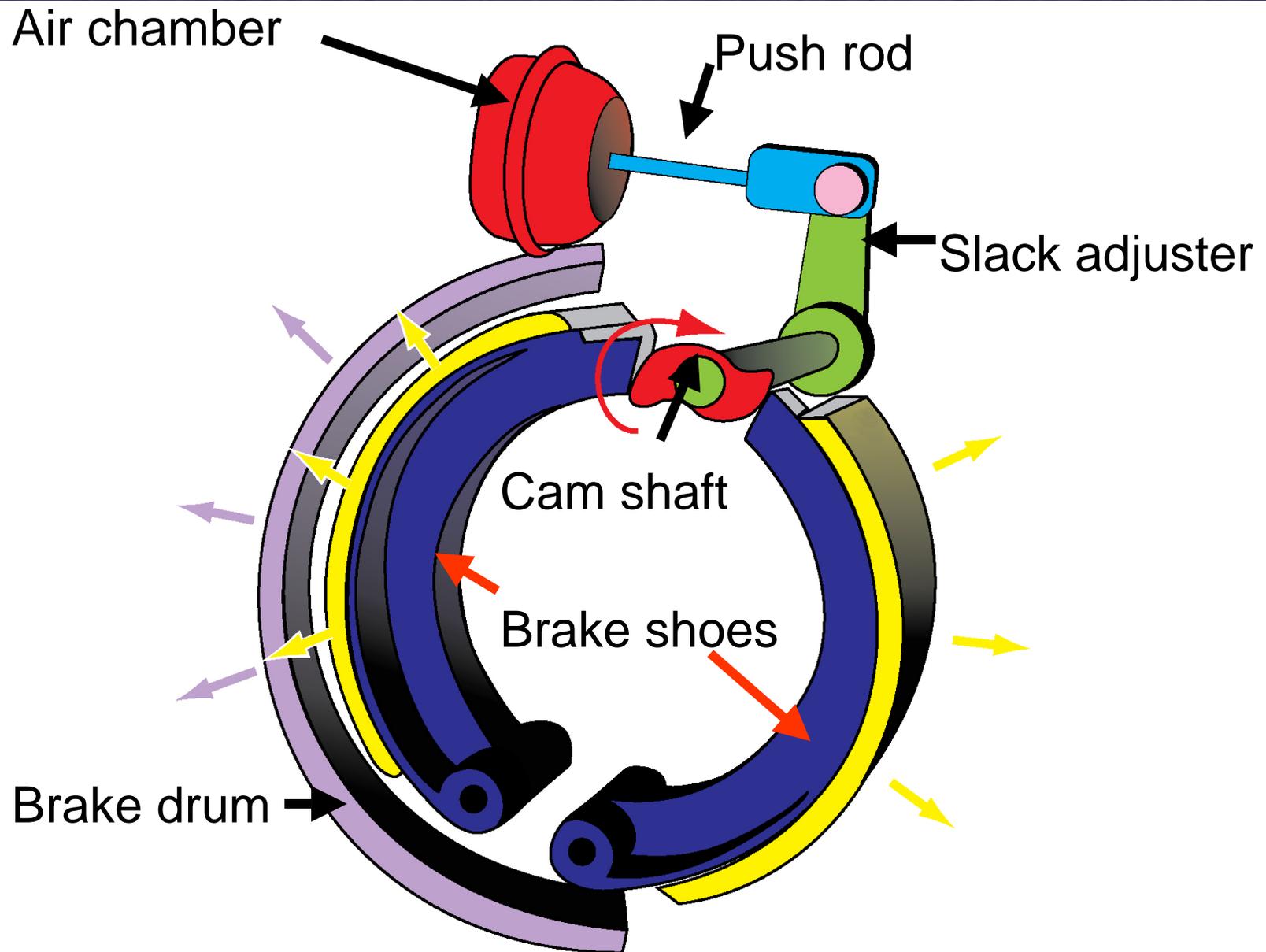
Introduction

- Differences between air and hydraulic brake systems
- How they work
- Licensing requirements

Hydraulic Brake Systems

- Applied with hydraulic pressure
- No discernible brake lag time
- Brake pedal released
- Force is released
- Brakes are released
- No depletion of the hydraulic brake fluid

Air Brake System



Commercial Driver's License (CDL) Drivers

- A CDL is required for all drivers of commercial motor vehicles 26,001 pounds or more
- Air brake knowledge and proficiency testing is required for all CDL drivers of air brake equipped commercial motor vehicles 26,001 pounds or more
- CDL drivers that do not pass tests are restricted from driving air brake equipped commercial motor vehicles

Non CDL Drivers

- May drive vehicles weighing 26,000 pounds or less
- These include passenger cars, SUVs, pickup trucks, RVs, light-duty trucks
- No air brake proficiency is required

CDL Manual

- Slow or stop and utilize a lower gear before descending a hill
- Apply brakes at intervals to reduce speed by 5 mph and release
- Low air pressure warning device

Driver's Manual

- No information on descending a hill
- No information about gear selection or brake application procedures
- No air brake information

Canadian Air Brake Endorsement

- Since 2001, Canada has required an air brake endorsement to drive a vehicle with air brakes
- 25 percent reduction in out-of-service rates for air brakes

Glen Rock Accident Driver

- Did not have a CDL
- Was not required to pass an air brake proficiency test
- Lacked knowledge and skills required to safely operate an air brake-equipped vehicle
 - Did not select a lower gear
 - Pumped the brakes

Scope of the Problem

More than a half million air braked vehicles under 26,001 pounds



No specialized air brake training required to drive them

Summary

- Air brake-equipped vehicles are different
- Air brake-equipped vehicles require special training
- Glen Rock accident driver did not have special training
- Many air-braked vehicles may be operated by drivers not trained to use air brakes



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Automatic Slack Adjusters

Introduction

- Dangers of manually adjusting automatic slack adjustors
- Out-of-adjustment brakes in this accident
- Education of drivers, mechanics, and inspectors about the proper maintenance of air brakes equipped with automatic slack adjusters

Automatic Slack Adjusters (ASAs)

- Were required in 1994 to improve brake adjustment
- Should **NOT** be manually adjusted
 - Masks the true problem
 - Gives operator a false sense of security about the effectiveness of the brakes, which are likely to go out of adjustment again soon
 - Causes abnormal wear

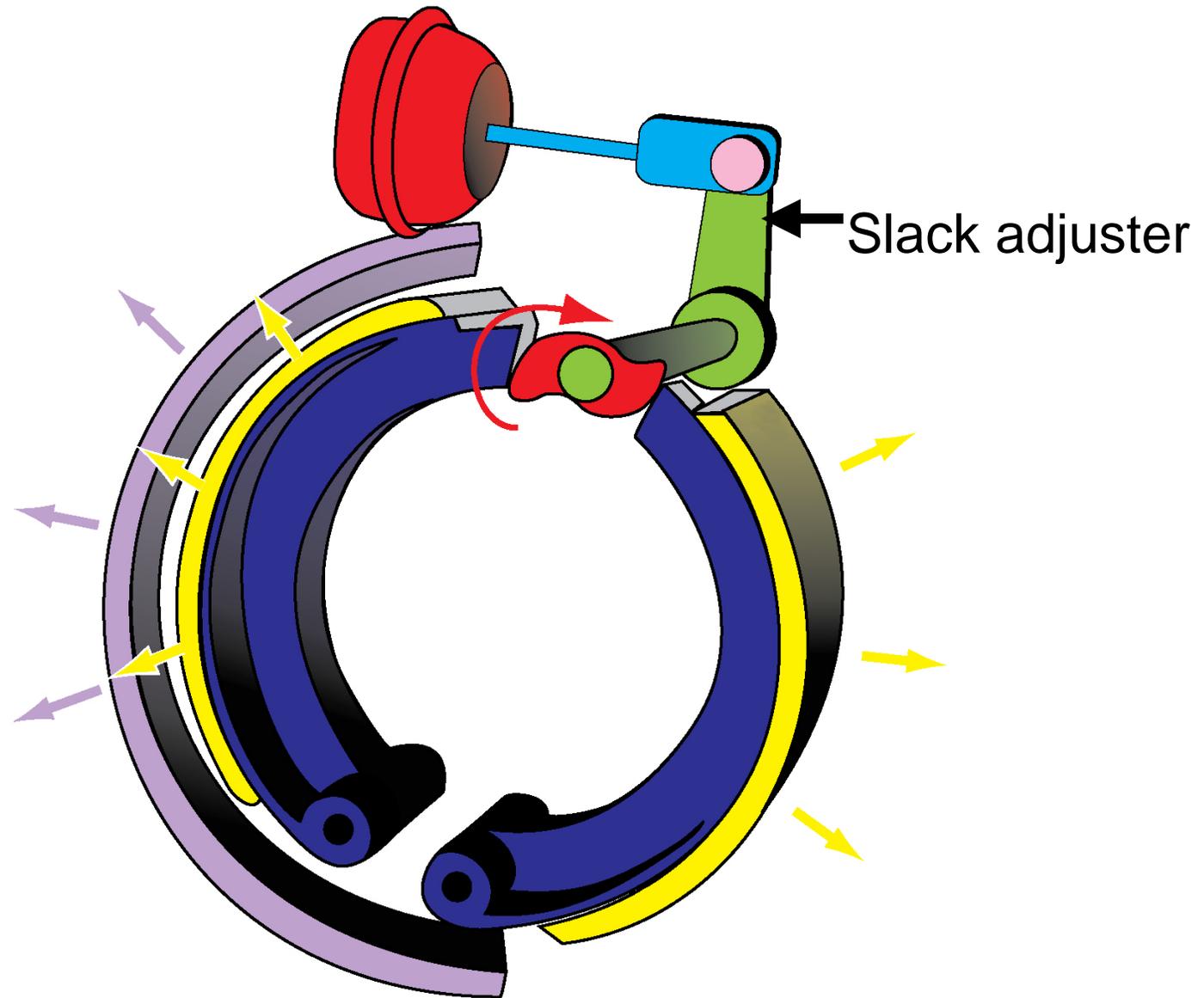
Accident Truck

- 1995 Ford, F-800 series, 2-axle dump truck
- Gross vehicle weight rating of 26,000 pounds
- Air brake system, with common S-cam foundation brakes
- All four brakes had ASAs

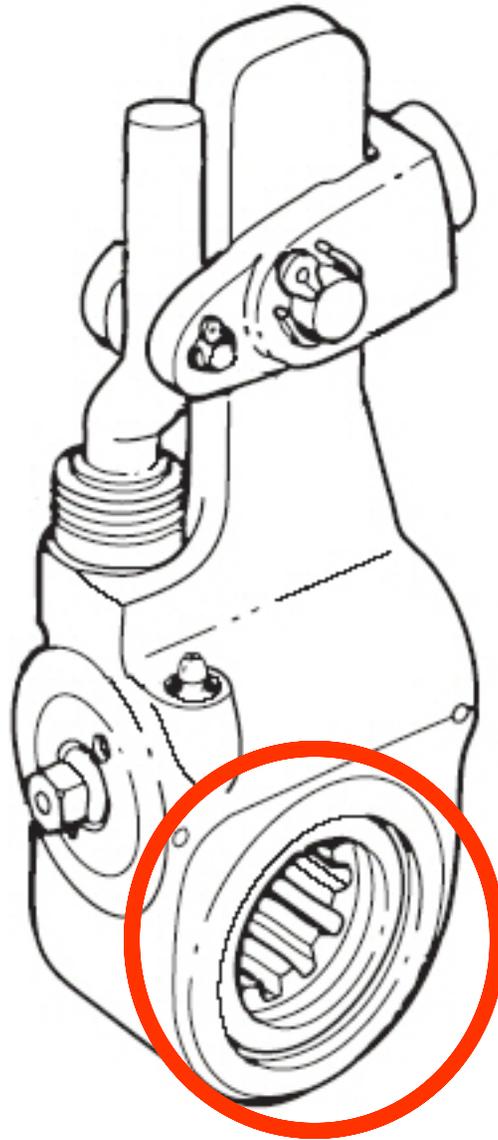
Out-of-Adjustment Rear Brakes

- Provided little or no brake force
- A brake goes out of adjustment through the normal wear of the brake lining and drums
- ASAs adjust the brakes without any action by the driver or mechanic

Air Brake System

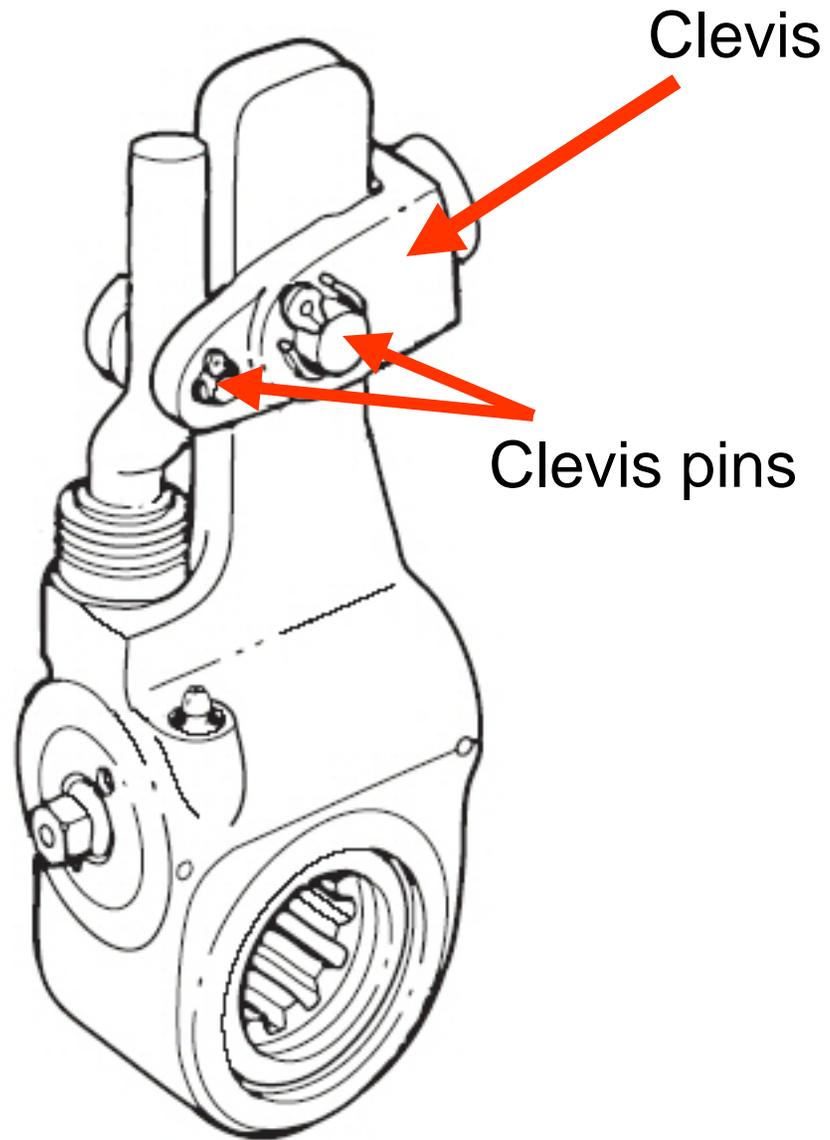


Automatic Slack Adjuster





Automatic Slack Adjuster



Inspection History

- April 10, 2002, Maryland Commercial Vehicle Safety Alliance (CVSA) Level I inspection
 - Both rear brakes found out-of-adjustment, truck placed out-of-service
 - Driver, also a mechanic and certified Pennsylvania State inspector of heavy vehicles, **manually** adjusted the brakes
 - He did this several times that year

Inspection History (Cont'd.)

- January 20, 2003, during a Pennsylvania State inspection
 - Rear brakes found out of adjustment
 - Mechanic **manually** adjusted the brakes to bring them into compliance

ASA Manufacturers' Manuals

- Five ASA manufacturers in U.S.
- None of their service manuals recommend manual adjustment as a corrective action
- One explicitly states that manual adjustment should **NOT** be used as corrective measure for an out-of-adjustment brake
- All provide guidelines for troubleshooting the brakes as cause could be any of a multitude of brake problems

El Cerrito, California, Accident

- August 26, 2003
- Seven injuries, seven vehicles damaged, and a home destroyed by fire resulting in \$1 million damage
- Dump truck down a steep grade, lost braking
- Driver **manually** adjusted ASAs twice a week

Scope of the Problem

- NTSB random survey of mechanics
- Majority would simply adjust an out-of-adjustment brake

Study Manuals for Mechanic Certification Tests

- One states “automatic slack adjusters may require periodic adjustment”
- Wrong information in an authoritative source

Groups to Educate about ASAs

- Drivers
- Mechanics
- Inspectors
 - State Periodic
 - CVSA Roadside

Materials Used to Educate

- Manufacturers' service manuals
- CDL manuals
- CVSA pamphlet *Air Brake Adjustment – Why is it so important?*
- ASE study guides
- Inspector training materials

New Model CDL Manual Language

- ASA manufacturers' submission to the American Association of Motor Vehicle Administrators
- ASA should never be adjusted as a means to correct an out-of-adjustment brake,
- Only masks the problem and the brake is likely to go out of adjustment soon

Operation Air Brake Pamphlet

- If you have a brake with ASAs that is out of adjustment, you have a problem with the brake or the adjuster
- If you readjust it, you are not really fixing the problem
- A manual adjustment may bring the brake into compliance and improve the way the brake operates, but it will only be temporary

ASA Summary

- Manual adjustment of ASAs is a dangerous practice
- It has serious consequences
- It gives the operator a false sense of security about the effectiveness of the brakes, and
- Brakes can go out of adjustment again soon



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Motor Carrier Oversight

Introduction

- Blossom Valley's oversight operations
- Federal Motor Carrier Safety Administration(FMCSA) educational programs
- FMCSA safety rating systems
- Previous recommendations issued in Tallulah, Louisiana and Victor, New York, investigations

Blossom Valley

- Employed a driver with no CDL, and no experience with air-braked vehicles
- Permitted him to operate an air brake-equipped vehicle
- Permitted him to operate an improperly maintained truck with out-of-adjustment brakes
- Routed him in an overloaded truck on a weight restricted road

Blossom Valley

- Did not have a drug alcohol testing program
- Did not maintain driver qualification files
- Did not maintain driver time records

Oversight Summary

- Blossom Valley did not exercise proper oversight
 - Drivers
 - Vehicles
 - Operations

FMCSA Motor Carrier Education Programs

- Motor Carrier Identification Report Form 150
 - Motor carrier certifies understanding of the Federal Motor Carrier Safety Regulations (FMCSRs)
- New Entrant Program
 - Effective January 2003
 - Entrant is required to demonstrate basic safety management

FMCSA Motor Carrier Education Programs (Cont'd.)

- Compliance Review
 - Initial compliance review
- *A Motor Carrier's Guide to Improving Highway Safety*

FMCSA Motor Carrier Education Programs (Cont'd.)

- Blossom Valley
 - Indicated understanding of FMCSRs on Form 150
 - Operated for about 16 yrs without FMCSA review or guidance
 - Was not subject to New Entrant Program
 - No compliance review conducted
 - No safety rating, was an Unrated Carrier

FMCSA Motor Carrier Education Programs Summary

- FMCSA education programs
 - Do not reach small, private, unrated carriers (non-traditional carriers)
- Tallulah Recommendation H-05-02
Recommends FMCSA
 - Develop and distribute educational materials to non-traditional carriers

FMCSA Safety Rating System

- Inspection Selection System (ISS-2)
 - Inspect ISS-2 value 75-100
 - Optional ISS-2 value 50-74
 - Pass ISS-2 value 1-49

FMCSA Safety Rating System (cont'd.)

- Blossom Valley History
 - April 2002, ISS-2 value 65
 - September 2003, ISS-2 value 82
 - September 2005, ISS-2 value 73

FMCSA Safety Rating System (Cont'd.)

- Blossom Valley's ISS-2 value reduced over 2-year period even though it had
 - A 100% Out-of-service rate and a
 - Conditional safety rating

FMCSA Safety Rating System Summary

- ISS-2
 - Inaccurate and untimely view of carrier's safety posture
 - Ineffective screening program
 - Blossom Valley's FMCSA safety rating underscores concerns expressed in Victor, New York, report about the limitations of the FMCSA's safety rating system for motor carriers



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