Advanced Technology Safety Initiative - ATSI

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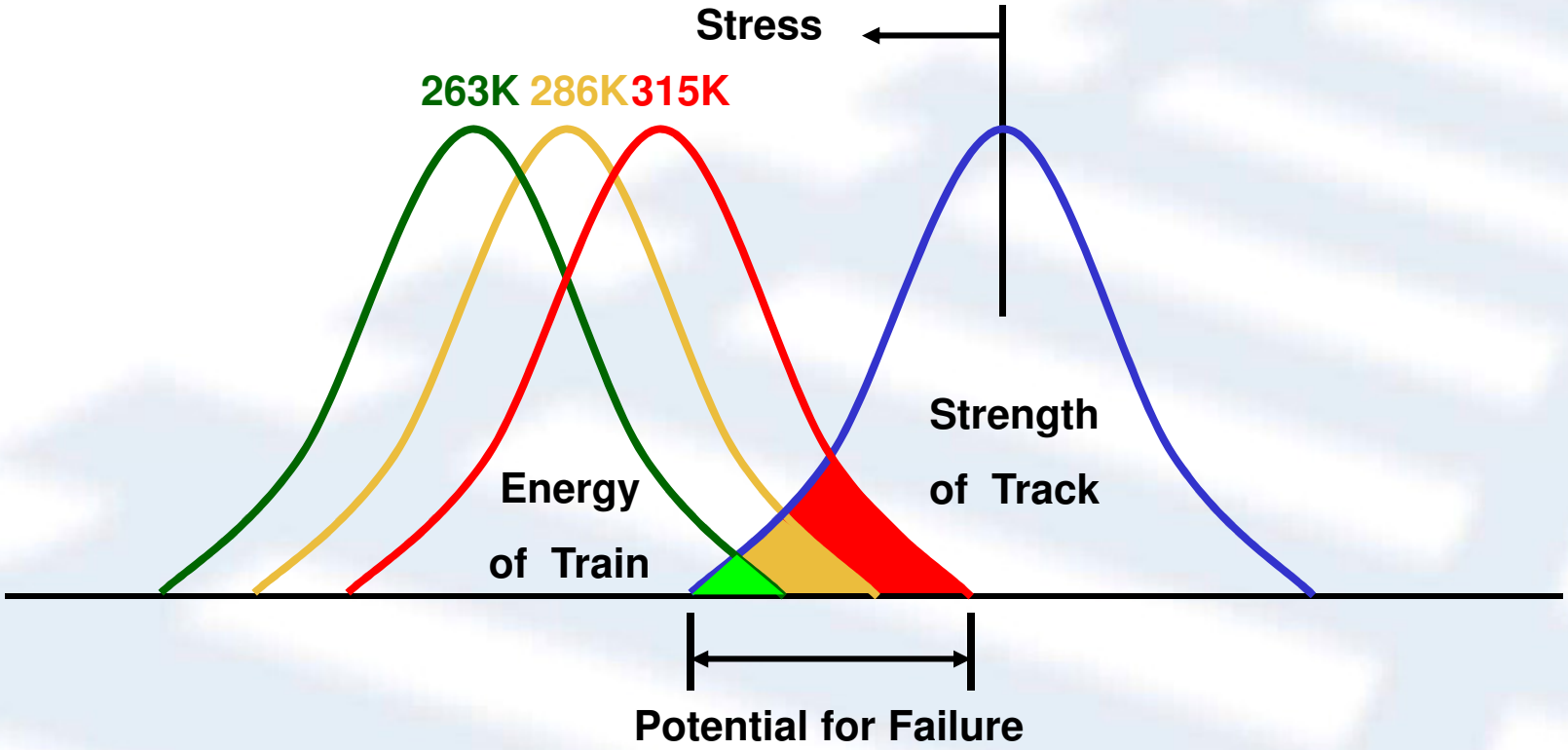
ASSOCIATION OF AMERICAN RAILROADS

TOMORROW. ARRIVING BY TRAIN.

What is “ATSI”?



Potential for Failure Where a Car Places Stress on the Track at a Level Higher than the Localized Track Strength

ATSI Objectives

- Reliably detect cars that exhibit high levels of stress
  - Reduce derailments
- Develop methods to proactively predict cars that will place high stress on the track in the future
  - Reduce delays and service interruptions
- Work with car owners to develop efficient methods to proactively maintain the fleet
  - Keep switching and out-of-service time to a minimum

Current Detector Technology

- Wheel Impact Load - high impact wheels
- Truck Performance - stiff or poorly steering trucks
- Trackside Acoustic Bearing - internal bearing defects
- Truck Hunting - detects “hunting” at the detector site
- Wheel Temperature - hot and cold wheel
- Weigh-in-Motion - overloads, shifted loads
- Warm Bearing Trending - temperature increases over time
- Wheel Profile - flange and tread measurements
- Ultrasonic Wheel Inspection - internal defects
- Low Airhose - pairs of cars with low hanging air hoses

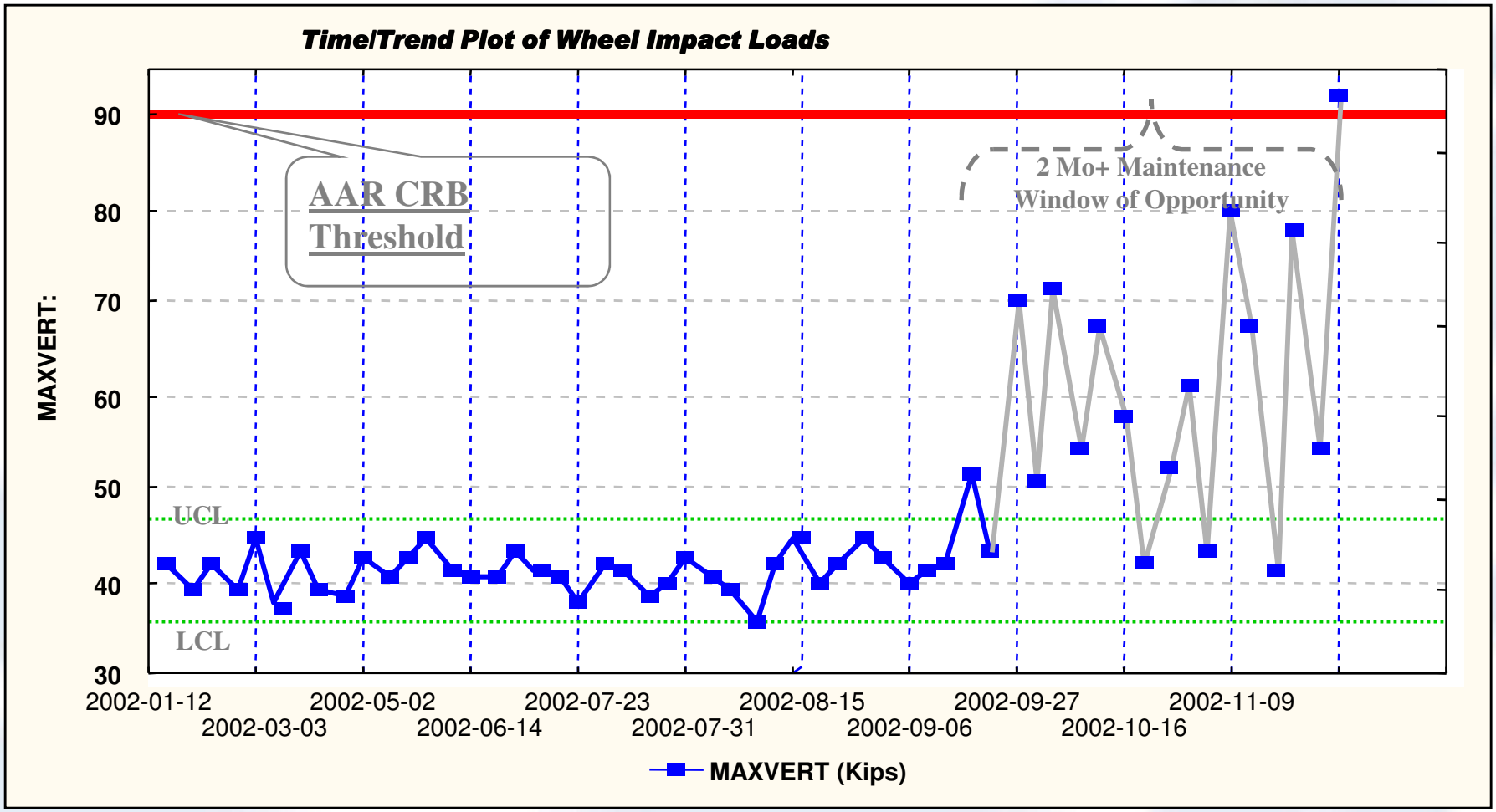
Future Detector Technologies

- Vision Systems
  - Brake shoes
  - Safety appliances
  - Coupler / draft gear systems
  - Outlet doors
  - Handbrakes
  - Axles
  - Wheels
- Cracked Wheel / Axle Detection

We Can't Manage What We Don't Know

- New technologies such as wayside equipment defect detectors are providing us with data that describe the loading environment.
  - Many detectors have already been installed, and more are coming
- Our job is to utilize the data to guide us on our road to reduce the stress from rolling stock
  - Predictive maintenance
  - Overall car health

Trend Analysis for Predictive Maintenance



ATSI Actions Since October 2004

- EHMS Implementation
- Opportunistic Repair Implemented
- Appendix F – WILD Detector Calibration

WHAT IS EHMS?

Equipment Health Management System

- An Industry-wide Communication Mechanism Supporting ATSI
- Leverages The Integrated Network Of WILD Data Through InteRRIS® and Railinc's Products (UMLER, EMIS, Early Warning)

EHMS – What Does It Do?

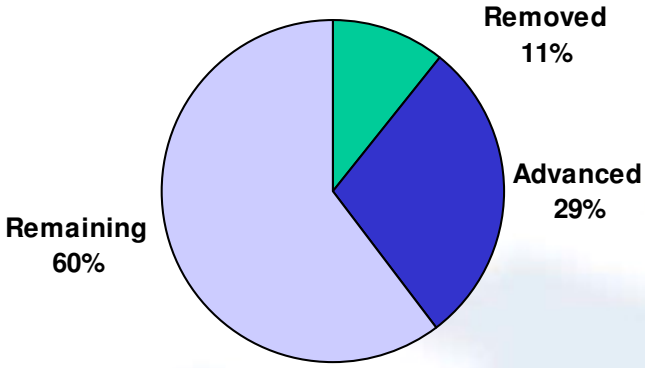
- Interfaces To Interris® For WILD Detector Information
- Identifies Maintenance Responsible (MR) Party
- Daily Interris® Reports To MR Party By Email
- Communicates “Alert Windows” Using Maintenance Advisories In The Early Warning System
- Allows Reporting Of Car Repair History

EHMS – Alert Levels

- "*Window Open*"
  - WILD readings from *65 KIPS* to less-than 80 *KIPS*
  - Advance notice to start monitoring car
- "*Opportunistic Repair Window*"
  - WILD readings from *80 KIPS* to less-than *90 KIPS*
  - Allow for proactive maintenance
- "*AAR Condemnable Window*"
  - WILD readings from *90 KIPS* to less-than *140 KIPS*
  - Remediated per Rule 41 and 44
- "*Final Alert Window*"
  - WILD readings over *140 KIPS*
  - Remediated per Rule 41 and 44

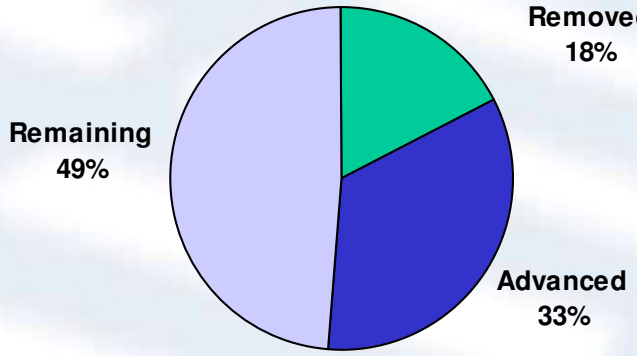
EHMS Statistics

Window of Opportunity



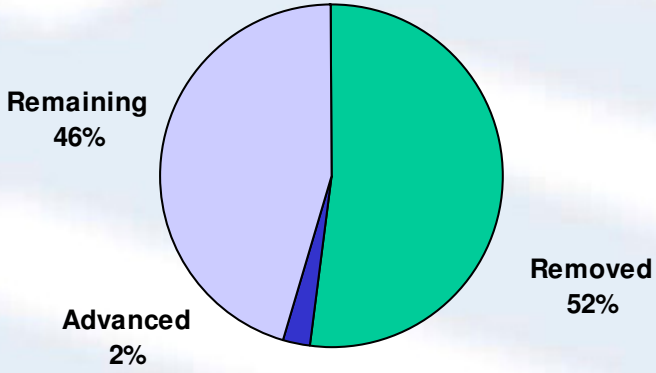
822,000 Alerts

Opportunistic Repairs



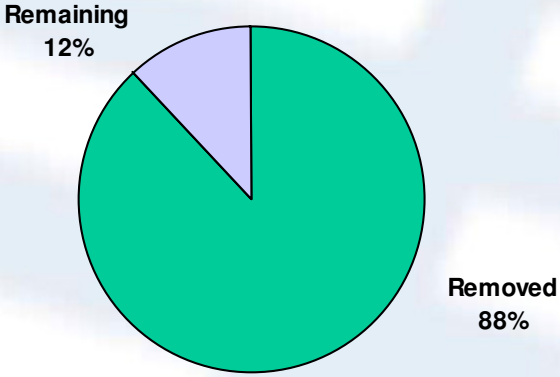
319,000 Alerts

AAR Condemnable



269,000 Alerts

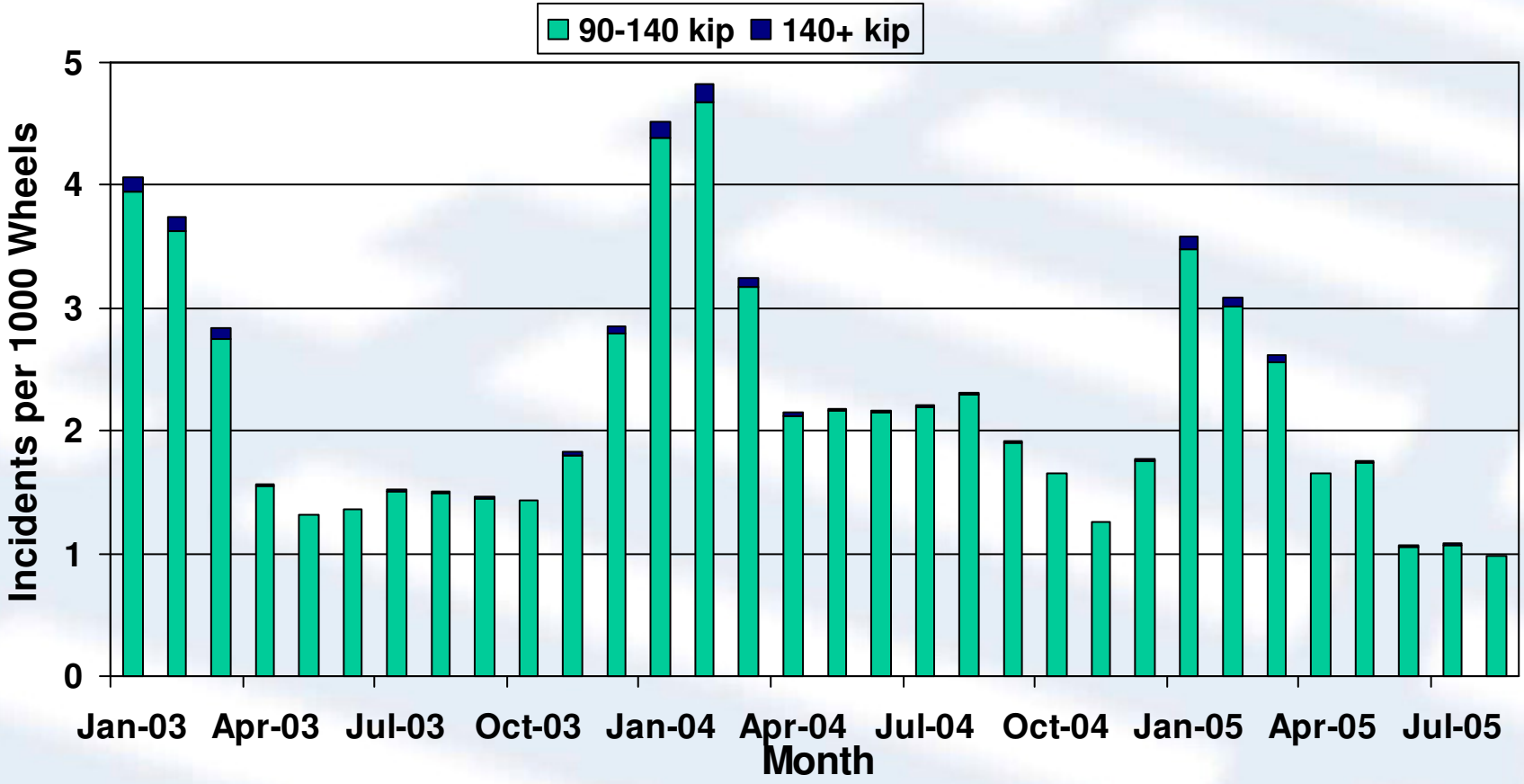
Final Alert



7,800 Alerts

High Impact Wheels

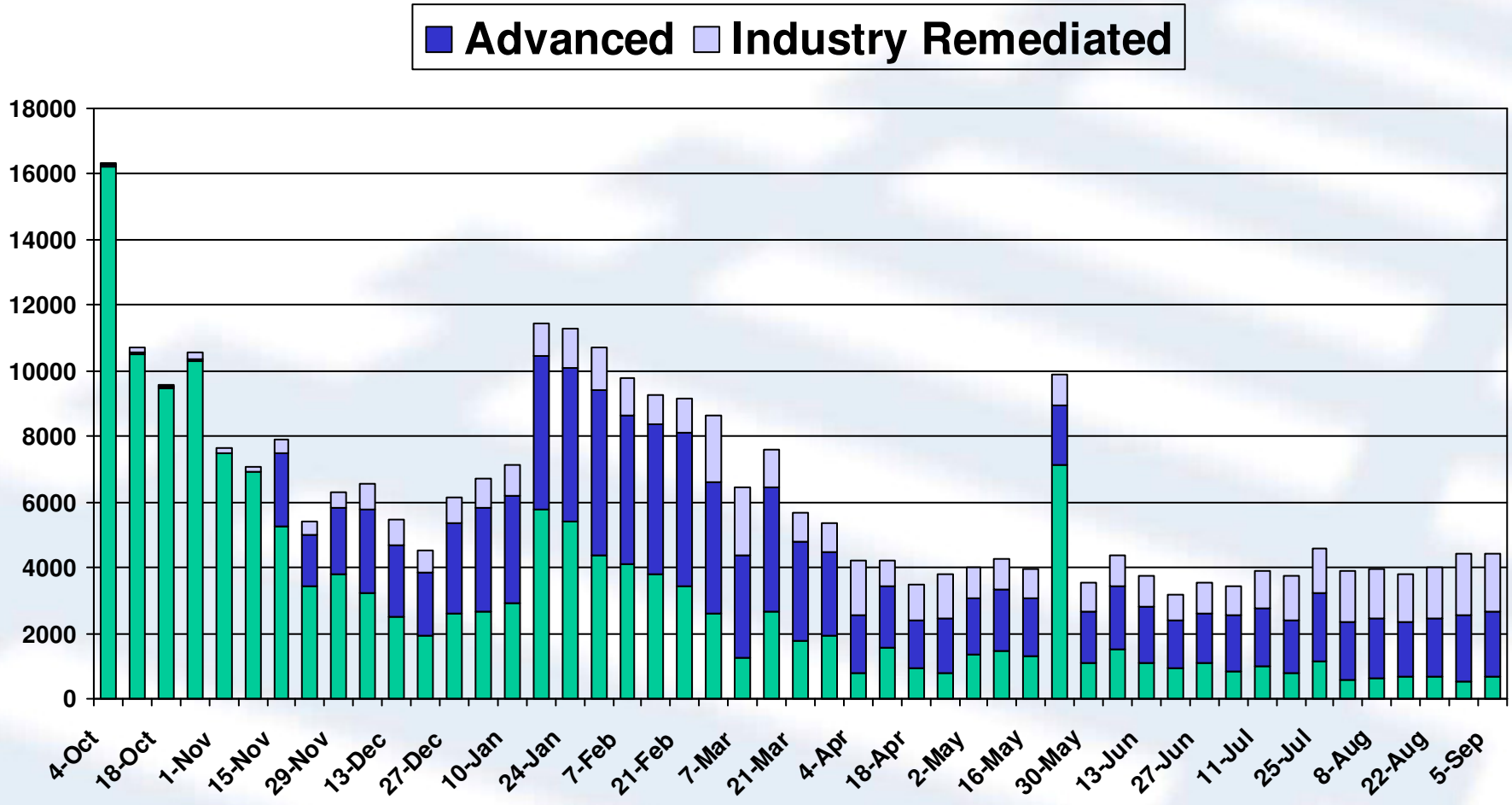
Per 1000 Wheels Past a Detector



Opportunistic Repairs

- Effective July 1, 2005
- Rule 4, Section 2 – Condemnable When Car Is On Repair Track for Any Reason
- I. Detected by a wheel load impact detector reading from 80 kips to less than 90 kips for a single wheel. The detector used must have been calibrated per Appendix F. The detector must reliably measure peak impact and must provide a printable record of such measurements. Device calibration records must be maintained. Wheels with condemnable slid flat spots are handling line responsibility and must not be billed otherwise. This will be considered an Opportunistic Repair for the repairing party.

Opportunistic WILD Alerts and Repairs



Appendix F WILD Calibration

A. Calibration Requirements

1. Static calibration must be done in accordance with the manufacturer's procedures at installation and, at a minimum, once every three years thereafter.
2. The calibration procedure by the OEM will be stored with the calibration record.
3. Calibration records will be made available upon request from InterRISS

B. Validation Requirements

1. Individual Train Data Validation – The average vertical weight for all wheels measured must be calculated for each active circuit. The range (maximum-minimum) of these average weights for a rail must be less than 15 kips for any train set containing 50 or more axles. If the range is greater than 15 kips, then data from that rail does not meet the validation requirements.
2. Minimum Functionality – Wheel impact load detectors must be maintained such that each rail has at least 70% of the circuits active. If less than 70% of the circuits are active on a rail, then the data from that rail does not meet the validation requirements.

C. Data Requirements

1. The range of average weight variation for each rail of each train must be provided with the data set. The percent of active circuits per rail must be provided with the train data set.

Root Cause Analysis
High Impact Wheels

- Wheel Defect Prevention Research Consortium
  - Representatives from railroads, suppliers, TTX and TTCI
  - Research has been self-funded
  - Terms of Participation
    - Sign a data sharing agreement
    - Underwrite the cost of future research.
  - Research is on-going
  - Interested parties should contact TTCI for more information

Next Technology for Consideration

- Technologies Considered
  - Acoustic Bearing Detector
  - Hot Wheel Detector
  - Truck Hunting Detector
  - Truck Performance Detector
  - Wheel Profile
- Selected Technology – Truck Hunting

Truck Hunting Rationale

- Truck Hunting Detectors Exist Today in Multiple Locations
  - Over 40 detectors throughout US and Canada
- Data Available in InteRRIS
  - Leverage existing / proposed IT solutions
- Net Cost Avoidance Possible for Both Railroads & Car Owners
  - Primary benefit in avoiding further equipment damage

Truck Hunting Rationale

- Once A Truck Starts Hunting, the Truck Will Deteriorate Very Quickly
  - Most trucks can be remediated with minor repairs
- By Repairing Truck At Low-level, Major Repair Or Replacement Can Be Prevented
  - Trucks with higher levels of hunting require major repairs or truck replacement
- Low Quantity of Identified Cars Anticipated

ATSI Next Steps

- Continue to seek natural opportunities for car owners to perform appropriate car remediation
- Work with AAR Technical Committees to consider additional opportunity with existing and new detector technology
- Refine / enhance EHMS in 2006