Under Pressure: Northern Haulers Are Using TPCS to Save Their Roads and Their Pocketbooks

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November 5, 2009

FOCUS on Forest Engineering 2009

Howick, Kwazulu Natal

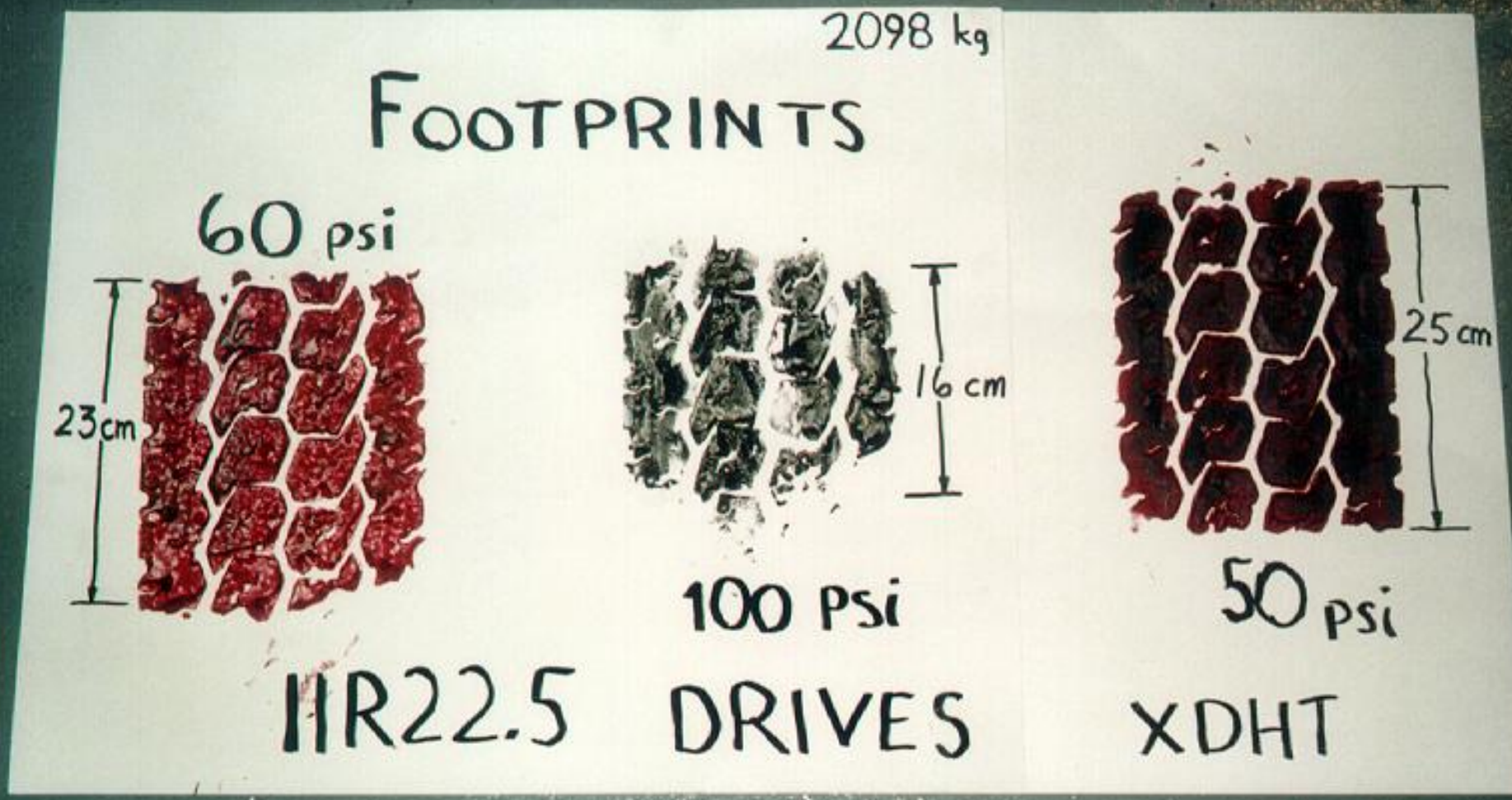
Republic of South Africa

Where We Call Home

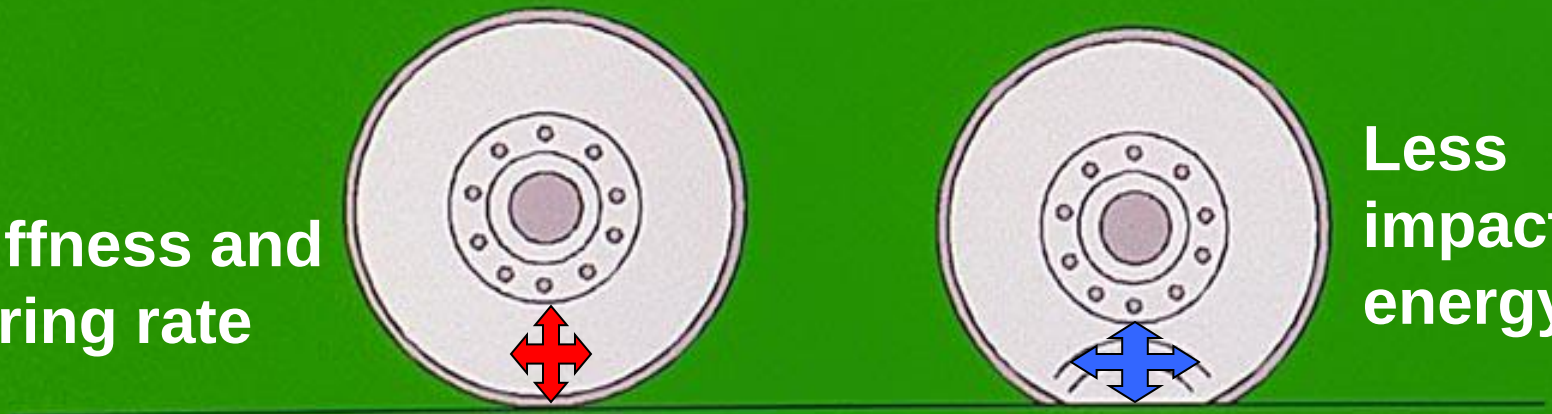
Outline

- Variable Tire Pressure (VTP) principles
- Tire Pressure Control Systems (TPCS) overview
- USDA Forest Service research on forest roads
- Saskatchewan Highways & Transportation (SHT) VTP research on lower standard roads
- VTP programs and research on Seasonal Load Restricted Roads (SLR) in Canada
- Related Scandinavian SLR programs
- TPCS cost benefit tools for implementation strategies

Tire inflation changes footprint size and shape



Reducing tire pressure causes fundamental changes to tire-road impacts



Stiffness and spring rate

Less impact energy

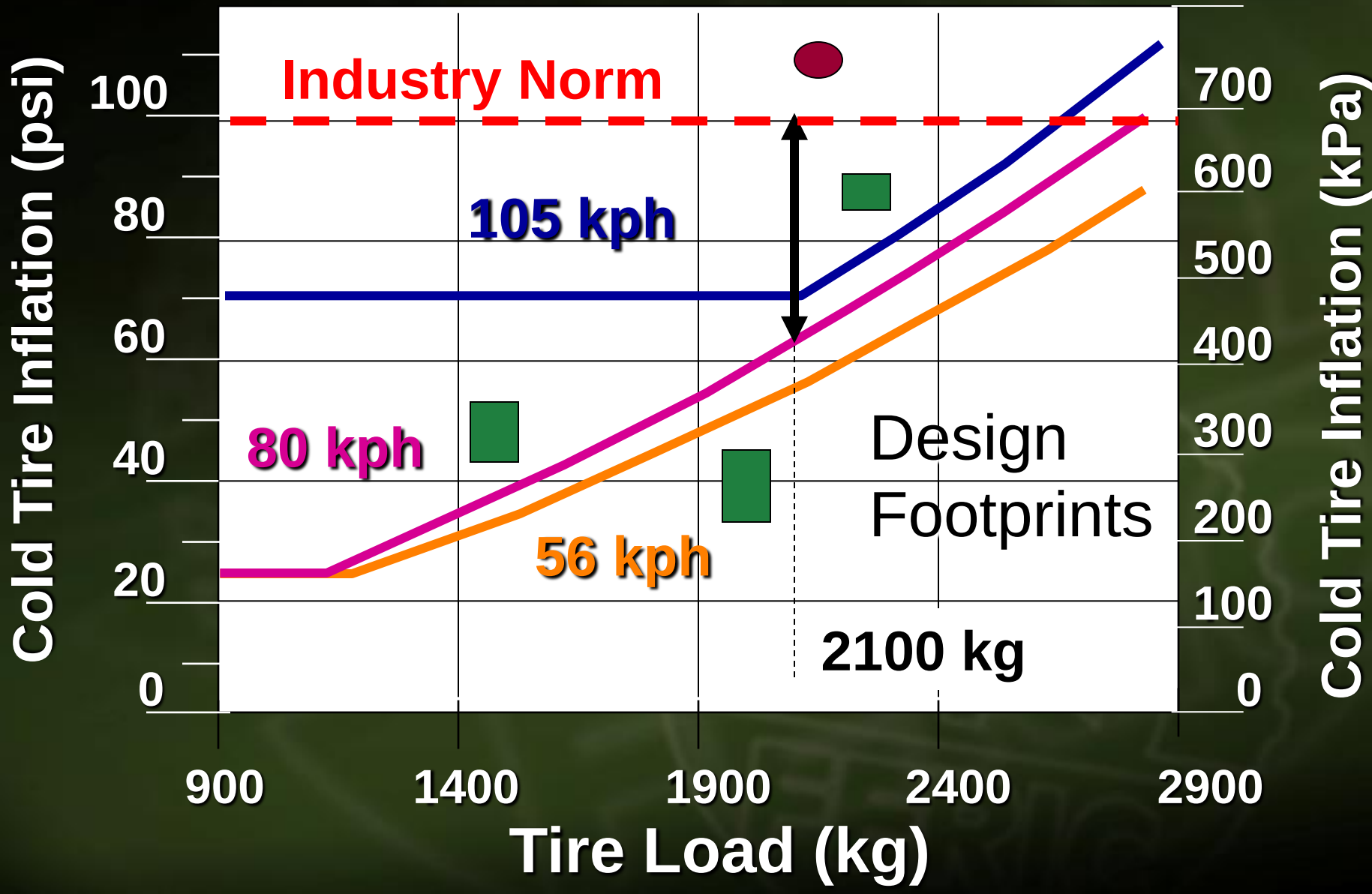
Contact area

Contact stress distribution

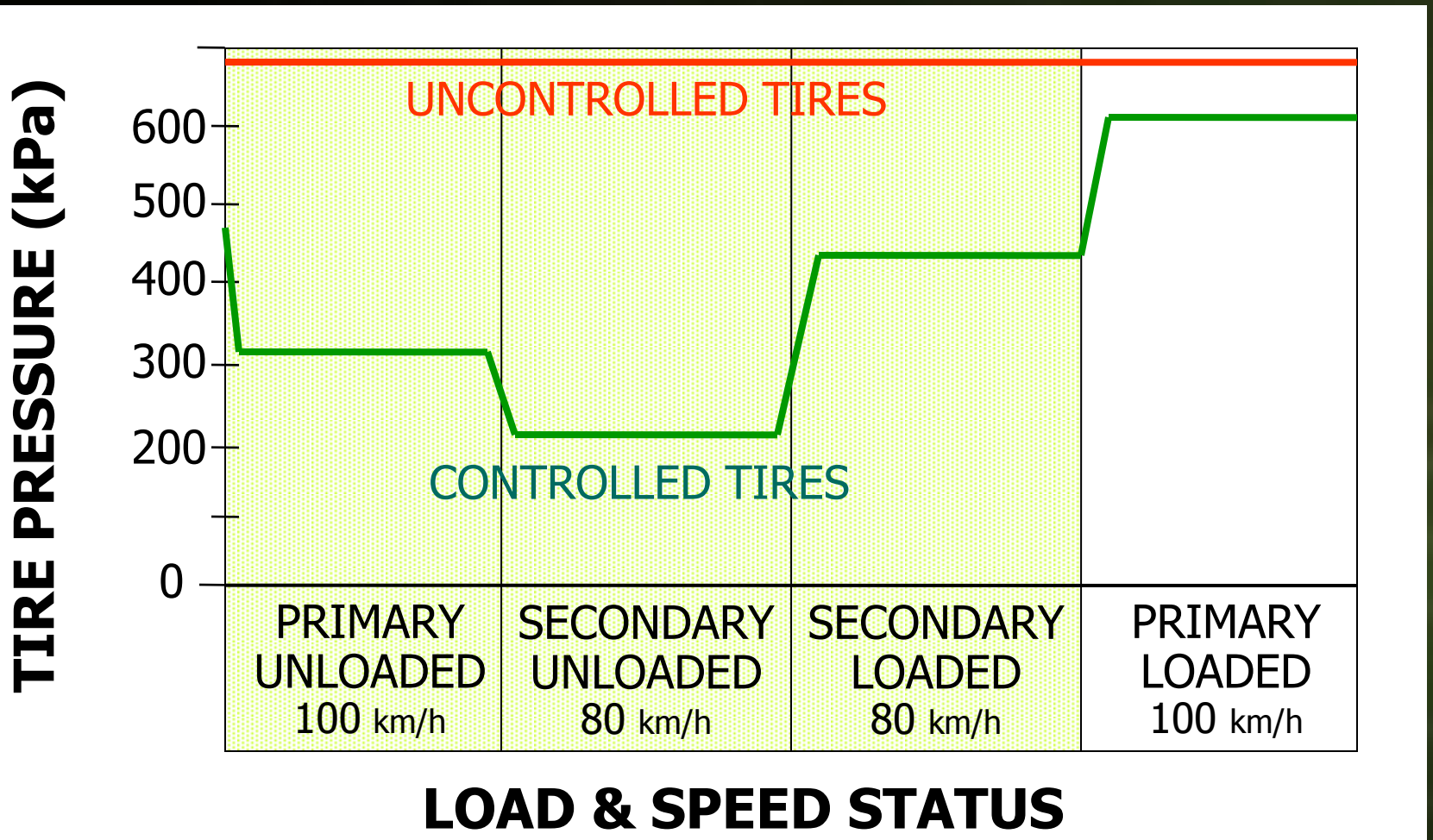
Lighter footprint, more tread

Truck tire load/ speed/ inflation

Tire & Rim Association (North America)



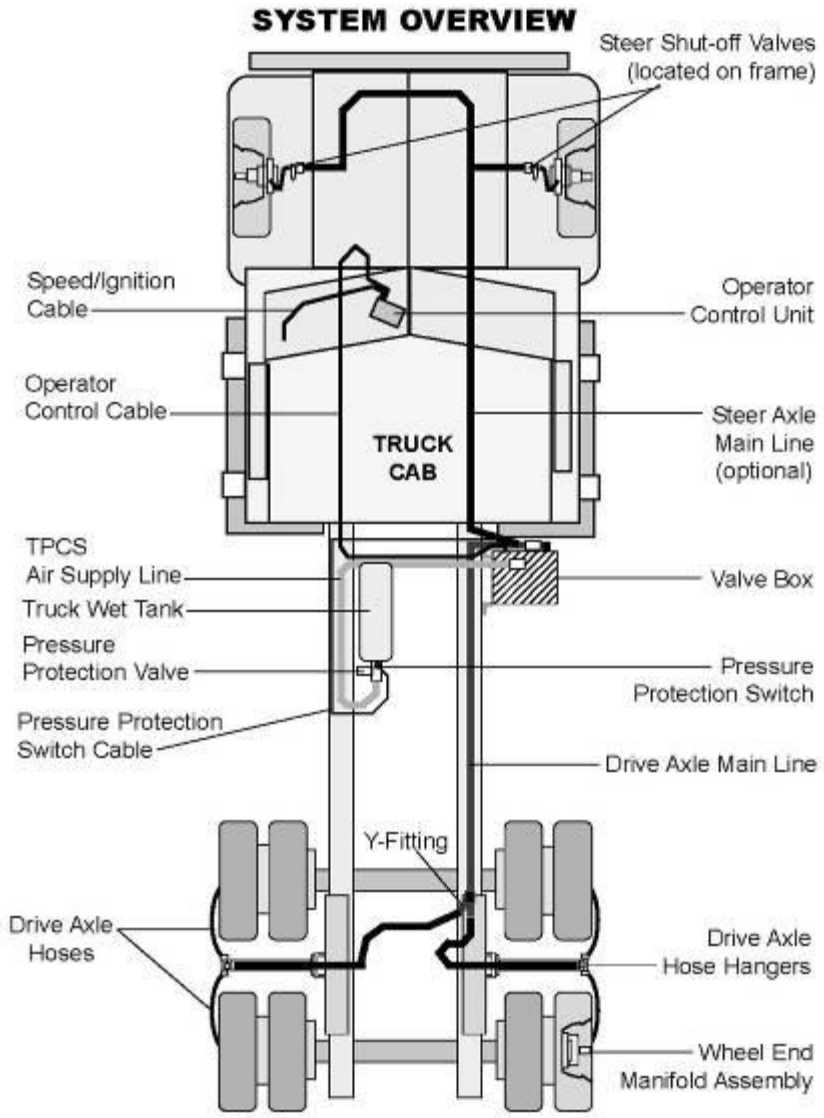
Typical Resource Road Hauling



Uncontrolled tires are over-inflated for 75% of the trip

TPCS is a convenient way to monitor and vary tire pressures

TIREBOSS TPCS is a well proven dependable product operating in more than 15 countries worldwide



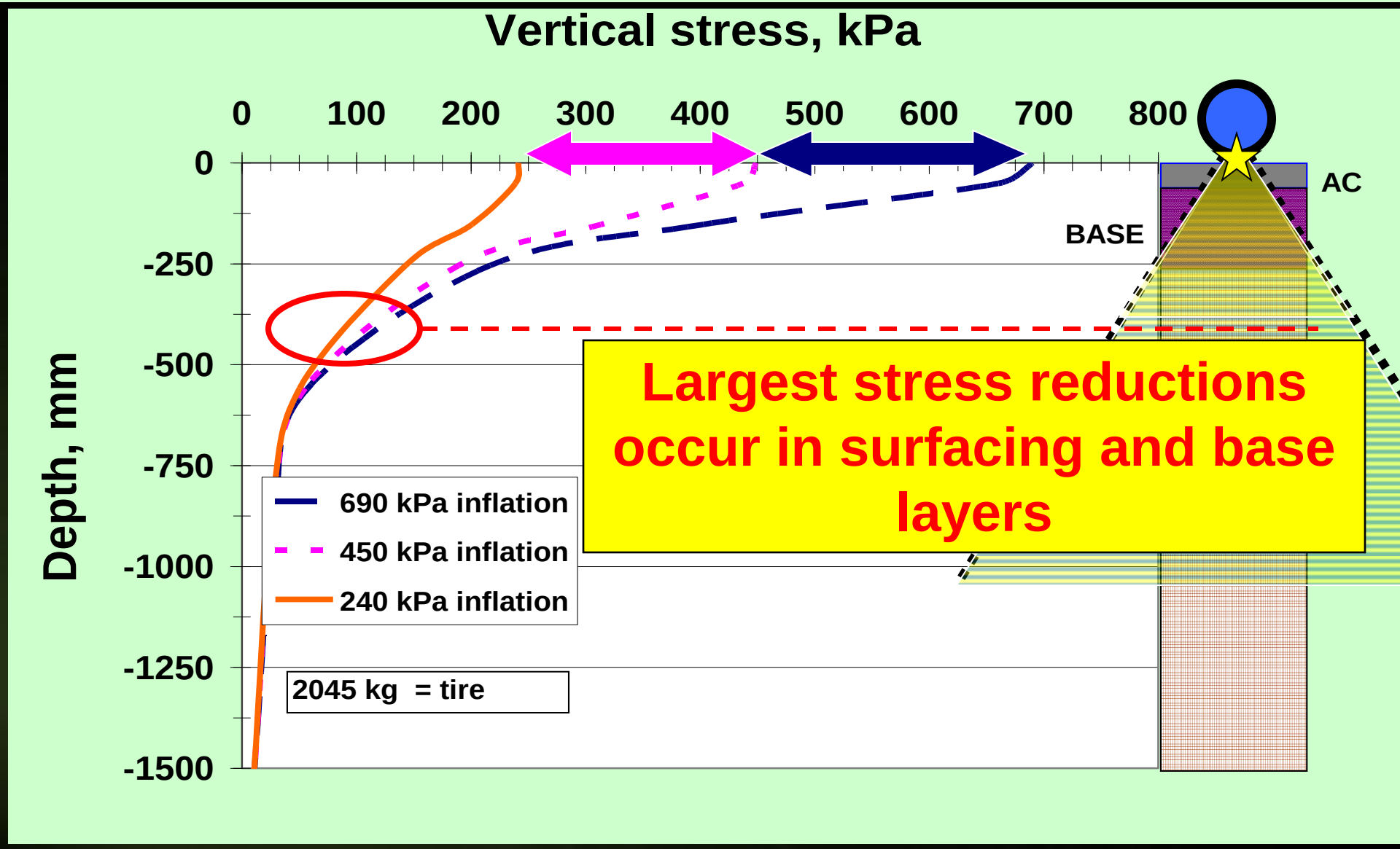
TIREBOSS™ System Overview

Example Settings

Company:	Mondi - South Africa	*TIREBOSS™ Tire Pressure Control*				
SETTING #	SETTING DESCRIPTION	Steer kPa	Drive kPa	Trailer kPa	MAX Kph	MAX TIME
1	Highway Empty		415	415	none	NO LIMIT
2	Off Highway Empty		275	350	80	NO LIMIT
3	Access Road Loaded		240	240	50	NO LIMIT
4	Main Route Loaded		517	517	80	NO LIMIT
5	Highway Loaded		690	690	none	NO LIMIT
6	Emergency Traction		207	240	10	5 MIN

TIREBOSS provides easy solution for optimizing tire pressures to match vehicle loads and speeds

Vertical stress distribution in a low standard road using layered elastic theory



Summary of USFS findings (1982-2002) on variable tire pressures & roads

- Slower rutting – especially on very weak roads and for low traffic volumes & wider, shallow ruts
- Less gravel loss (less dust control & re-gravelling)
- Reduce pot holing and washboard
- Healing of existing damage (ruts and washboard)
- Reduce (or eliminate) maintenance grading
- Less sediment & erosion
- Enhanced traction and mobility under steep or slippery conditions

Saskatchewan Highways and Transportation Low Tire Pressure Initiative (1995)

- Several field demonstration projects and a full-scale experiment
- Focused on low standard roads (gravel, earth, Thin Membrane-Surfaced (TMS))
- Evaluated both VTP (with TPCS) and Constant Reduced tire Pressure (CRP)

Sask Hwys CTI Experiment (2000)

>> **Equal axle loading test**

- Compared damage rates of a TPCS 9-axle B-train TPCS fleet trafficking the test road on alternate days at 690 kPa (100 psi) and 415 kPa (60 psi)

>> **Equal payload test**

- Compared damage rates of two fleets carrying equal payloads - TPCS 9-axle B-train fleet at 415 kPa (60 psi) vs. a fleet of conventional 6- and 8-axle trucks at 690 kPa (100 psi)

9-axle B-train test truck

Gravel-surfaced test section at end of trafficking

Low tire pressure-lane after 721 passes

High tire pressure-lane after 200 passes

TMS test section after twice as many LP passes

Low tire pressure-lane after 400 passes

High tire pressure-lane after 200 passes

Sask Hwys 2000 CTI Test road results

Equal axle weights test

- Use of 415 kPa dramatically slowed shear failure (by about 80% - 90%), significantly slowed rutting, and reduced peak surface deflections

Equal payload test

- Use of 415 kPa more than compensated for extra weight of larger, more efficient, trucks (in terms of shear failure, rutting and deflection)

Saskatchewan Transportation Partnership Program recognizes benefit of reduced tire pressure

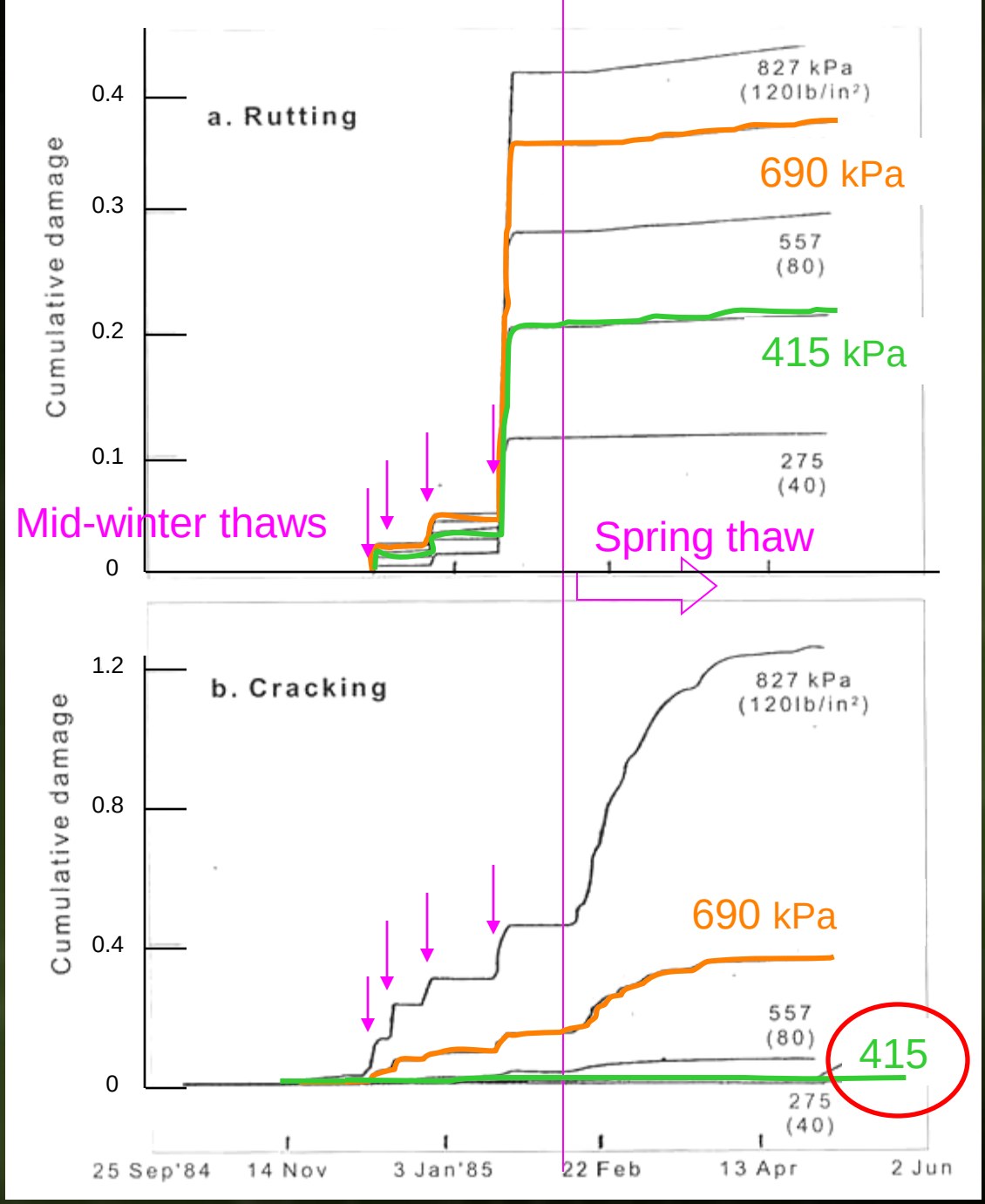
- First jurisdiction in the world to promote TPCS use on secondary highways
- TPCS trucks can haul primary highway weights on secondary highways with no incremental road damage fees (*for approved routes and with applicable monitoring*). SLR increases apply too

Hauling on Seasonally Load Restricted (SLR) pavements

Cumulative damage at the end of one winter/spring season as a function of tire pressure

(USACE study for USFS)

Kestler and Berg (1993)

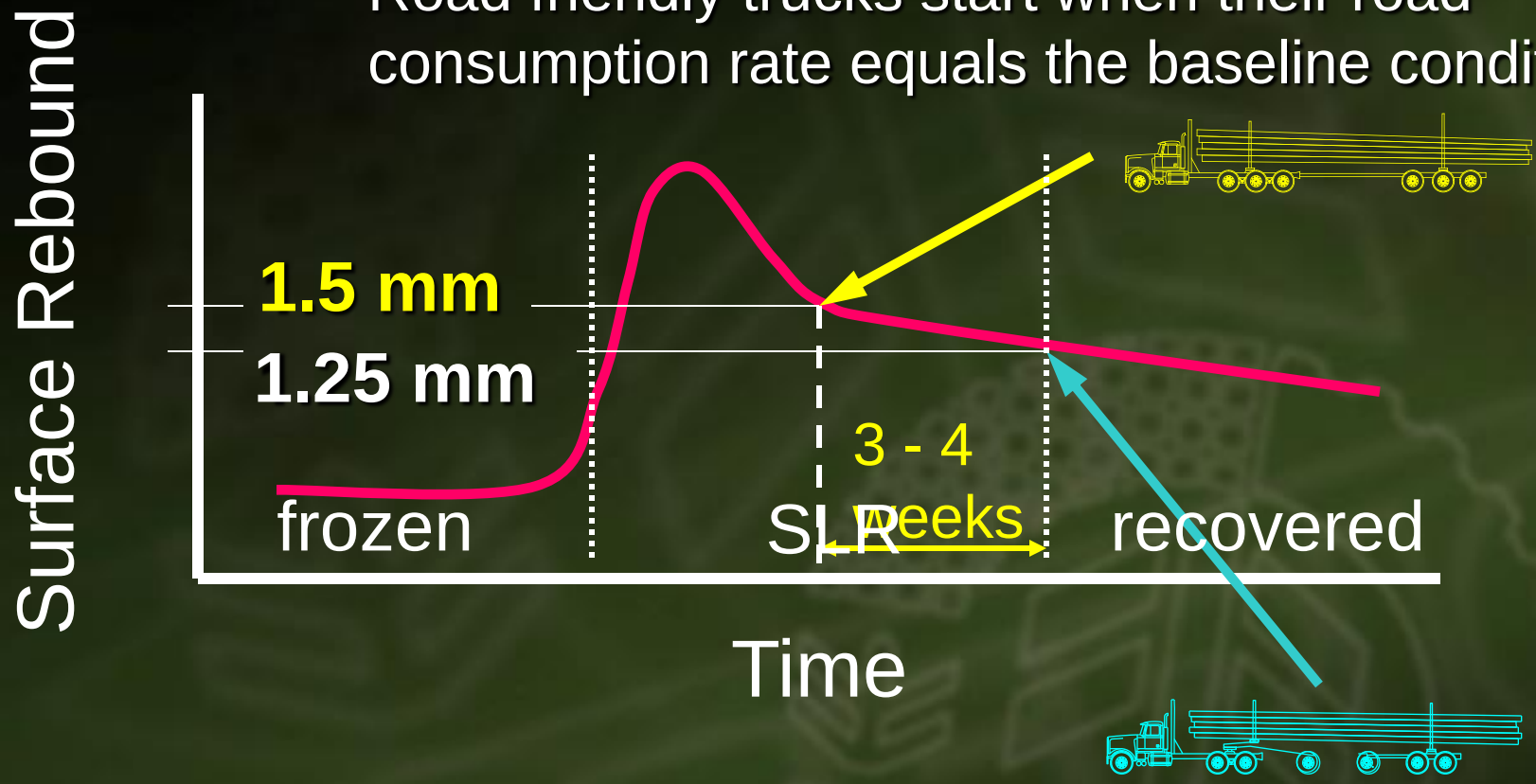


FERIC's BC field trials (2000-04)

- 5 springtime trials on variety of SLR road types (chip sealed, thin AC, cold mix, gravel, earth) using fully loaded TPCS log trucks
- Haul resumption based on FERIC modeling
- Rutting and cracking rates were not increased beyond normal springtime levels
- Haul season increased 2 to 4 weeks
- Results, plus FERIC sensitivity analysis, used in TPCS SLR haul program regulations

FERIC modeling of when to resume hauling on BC SLR roads

Road friendly trucks start when their road consumption rate equals the baseline condition



Road consumption rate from least friendly legal truck at end-of-SLR period is the baseline condition

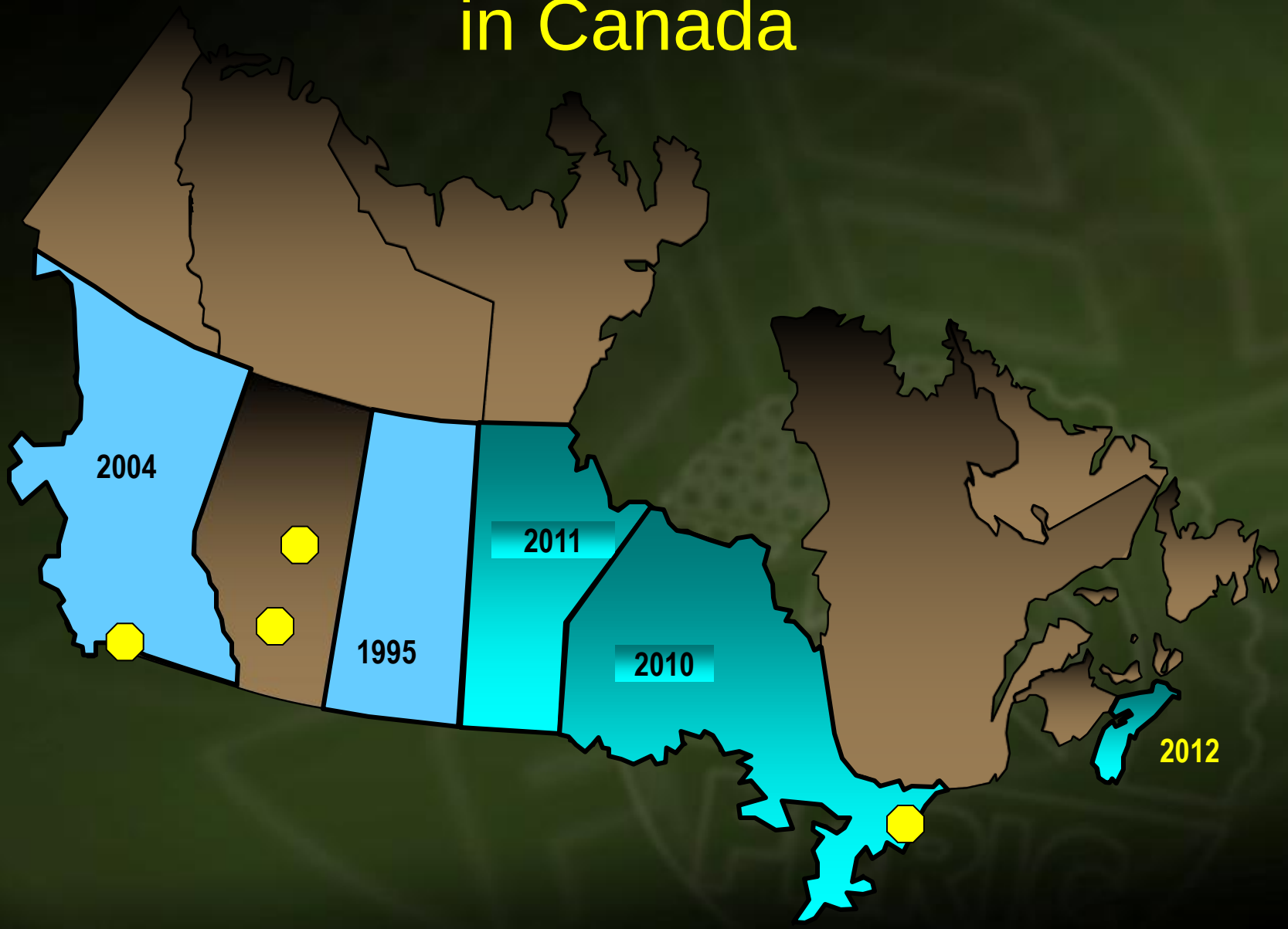
British Columbia TPCS SLR hauling initiative (2004)

- TPCS Spring Hauling Initiative exempts TPCS-equipped trucks from spring load restrictions on approved routes
- Truck-based data logger gathers route, speed and tire pressure info that is reported with measured axle weights. Trip info is decrypted, summarized in compliance report, and posted to a secure website within 3 minutes
- Program is open to all industries with forestry leading this initiative

Future TPCS SLR haul initiatives in Canada

- Ontario government and forest industry starting a TPCS SLR Haul Program in spring 2010
- Ongoing research in Manitoba 2009-2010 Targeting introduction of policy in 2011
- Modeling of road impacts and economic benefits in Nova Scotia 2009-2010. Pilot program planned for spring 2011

TPCS SLR policy progression in Canada



Swedish Road Authority introducing TPCS initiatives in Fall 2006/ Spring 2007

- TPCS-equipped trucks are permitted to haul 60 t (full weight) on SLR roads, at pressures associated with 30 km/h travel
- TPCS-equipped trucks permitted to haul 60 t on 38 t and 52 t weight-restricted gravel roads during the summer months, at pressures associated with 50 km/h travel

ROADEX III "The Implementation Project"

- The partners in ROADEX III are comprised of public road administrations and forestry organizations from across the European Northern Periphery
- A full scale trial has been completed in Scotland with demonstrated savings in resource road maintenance and truck operating costs
- Implementation has begun with forest companies in northern UK and early introduction in Finland and Baltic States

Northern Periphery Area & ROADEX III Partners

http://www.uleaborg.com/roadex_elearning/

Implementation Strategies are key to success

- All stakeholders can benefit:
  - vehicle owners/ contractors/ drivers
  - forestry companies
  - traveling public and road regulators
- Strategies and tools have been created to assist with successful implementation
- Develop champions and address stakeholder resistance, optimize TPCS use, identify and quantify costs & benefits, change operations and policies to capitalize on new abilities

Operational Savings Analysis Program

TIREBOSS Tire Pressure Control Systems - Operational Savings Analysis

TIREBOSS Savings Estimated For: ABC Logging
Date: March 15, 2006
Contact: Joe Trucker
Truck Configuration: 8 axle B-Train

TIREBOSS-related savings from increased truck use — Go to Increased Hours

Anticipated increase in annual operating hours per TIREBOSS-equipped truck		120 Hours
Increase in net annual revenue due to haul season extension	$	3,066

TIREBOSS-related fuel savings — Go to Fuel Savings

Total fuel savings per year for each of your TIREBOSS-equipped trucks	$	6,204

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For more information, please contact Tire Pressure Control International Ltd. Toll free 1-888-338-3587 website: www.TIREBOSS.com

Operational Savings Analysis Program

Do Tire Pressure Control Systems (TPCS) make sense for your log hauling operation? Find out with the new tool for estimating economic benefits from TPCS

Brian Spreen, Tire Pressure Control International

1. Why this tool?

TPCS-related benefits are numerous and diverse. Truck owners considering investing in this technology need to estimate these benefits to make an informed decision.

2. Program components

- TIREBOSS TPCS cost estimate
- Tire related savings
- Traction related savings
- Fuel consumption savings
- Increased operating hours calculation
- Payback period calculation
- Internal Rate of Return calculation
- References for default values
- Savings summary

3. Program inputs

- General information about vehicle and hauling operations
- The program offers default % improvements with TPCS (based on published research) that may be used in lieu of specific data

4. Program outputs

- Estimated cost of TPCS
- Estimated annual benefit of operating TPCS
- Estimated investment payback period and internal rate of return
- Tool available in C$, US$, GBP and Euro

5. Sample results from an actual TPCS fleet in Canada

ABC Logging, is a Western Canadian logging company that operates a fleet of 8 axle B- train logging trucks.

Installed cost for 1 truck-trailer with TIREBOSS = **C$ 22,550**

Total annual vehicle operational savings = **C$ 14,476**

Payback Period = **1.6 years**

IRR on TPCS Investment = **31%**

Road Related Savings Program

Estimated road-related savings from utilising TPCS timber haulage trucks

(adapted from the USDA Forest Service Surfacing Thickness Program)

Prepared for UK Forest Industry

last update: 18-Oct-07

	defaults		user specified values	
Reduction in aggregate thickness with TPCS	25%			
Reduction in aggregate surfacing wear with TPCS	25%			
Reduction in grading frequency with TPCS	75%			
Other Savings				
Increase in haul rate for TPCS-equipped trucks	£ 30.00	per trip		per trip

Savings summary and details

Estimated savings in aggregate base course	£90,000
Estimated savings in road surfacing replacement	£32,400
Estimated savings in grading maintenance	£29,250
Estimated savings in hauling	-£36,000
Total savings with TPCS	£115,650

Recap

- Contact footprint, contact stresses and sidewall suspension (i.e., traction, mobility, ride performance) are optimized when tires are inflated properly
- TPCS are a convenient technology to manage VTP and systems like TIREBOSS allow monitoring for compliance
- Numerous trials have demonstrated that optimized tire inflation reduces road impacts – especially on weak, lower standard roads
- Industry and Regulators in Canada, Sweden & Northern Europe recognize the beneficial impact of reduced tire pressures in current or anticipated initiatives
- Analysis programs have been developed for fleets and road managers to assist with implementation

An opportunity exists

- The global forest community is *Under Pressure* to remain competitive and react to rapidly changing market forces
- TPCS offers a way to help manage some of that pressure
- Proven, dependable TPCS systems are now being introduced into the South African forest industry
- An opportunity exists for the industry to coordinate research and/or implementation efforts within their own operations, and with other road user groups (e.g., Roading Authorities)

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Thanks for your attention

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