

Michael John Macnabb
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SUMMARY OF WORK QUALIFICATIONS

Transportation and Vehicle Safety Consultant Vernon, BC	2006 - Present
Independent Contractor, Transport Canada Vernon, British Columbia Senior Defect and Collision investigator	1998 - 2005
innovative Vehicle Testing Ltd. Delta, British Columbia Project Engineer	1989 - Present
Road Safety Research, Dept's of Civil and Mechanical Engineering University of British Columbia Vancouver, British Columbia Senior Defect and Collision Investigator	1984 - 1998

EDUCATION

McGill University Montreal, Quebec Bachelor Of Science - Major in Psychology	1976
University of British Columbia Vancouver, British Columbia Bachelor of Applied Science - Civil Engineering	1984
University of Michigan Ann Arbor, Michigan Summer Engineering Course - Mechanics Of Heavy Duty Trucks And Truck Combinations	1987
Okanagan University College, Continuing Education Vernon, British Columbia Air Brake Theory Course	1995
Society of Automotive Engineers Tempe, Arizona Accident Reconstruction TOPTEC, Special Topics	2001

PROFESSIONAL EXPERIENCE

General Scope of Work:

Defect and collision investigations [or Transport Canada, Road Safety Directorate.

Over 1,300 defect investigations carried out for Transport Canada, most required: failure analysis of components; reconstruction of collisions, estimation of vehicle impact speeds using engineering principles; development of test programs related to vehicle dynamics; review of police reports, vehicle damage and occupant injury examinations; data analysis and report generation; extensive public contact through personal interviews often regarding highly emotional issues.

Provision of technical assistance to police agencies, coroner service and provincial transportation groups in the area of vehicle performance and collision reconstruction.

Qualified in **Be** Supreme Court as expert witness in vehicle dynamics and collision investigations.

On-going research in the area of vehicle safety and risk analysis. Development of test programme methodologies, time lines and budgets. Experiment design, execution and publication of results in national and international proceedings.

Specific Projects Undertaken:

December 1984 to September 1985 - organized, hired and trained interviewers to administer Insurance Corporation of British Columbia's (ICBC) Young Driver Study questionnaire. Prepared successful proposal for the University of British Columbia's (UBC) ethics review committee. Collection of data and report to ICBC.

January 1986 to September 1986 - set up methodology to apply injury-coding techniques used in road safety to major loss claims at ICBC. This enabled **ICBC** to match claim payments to specific injuries and more accurately set aside adequate reserve funds. Organized project, hired and trained coders. ~2,000 claims coded during a 4-month period. Provided follow up audits for **ICBC**.

May 1987 - designed and directed construction of a 50 tonne, low speed barrier and tow system ICBC's Material Damage Test Centre, Burnaby, BC. Directed design of pole impact device attached to barrier face. Co-designed a device for towing vehicles sideways into the barrier-mounted pole. Patent applied for through USc.

November 1989 - designed and directed construction of a 100 tonne segmented concrete block barrier for vehicle crash testing. Designed monorail guidance system to tow vehicles into barrier. Set up test protocol for para-transit van crashes, modifications to allow videotaping of vehicle interior during impact. Specified data acquisition requirements for crash test dummy and vehicle. Calculated deceleration values and identified unique vehicle

specific crush/deceleration threshold. Report to BC Transit. This testing was the **first** to look at occupant and mobility aid restraints during barrier crashes. Canadian Standards Association developed new standards (Z604. 2605) based on this seminal research.

June 1990 to 1992 - involved with the initial protocol for testing segmented median and roadside concrete barriers. Assisted with revised tow system to accommodate high speed crashes (100 km/h), defined design requirements of the data acquisition equipment, directed the design of a 15 meter video tower. established safety protocols for test personnel and provided on-sight supervision during testing.

1993 and 1995 (winter) test programme for the BC Ministry of Transportation and Highways winter abrasive application investigation. Involved in extensive road surface friction testing under extreme winter weather conditions.

April 1996 - set up instrumentation to measure sliding friction of the sides of a van trailer and a tractor unit for RCMP. Data analysis and report to RCMP.

October 1996 - set up and supervised ABS testing on gravel surfaces for RCMP and Transport Canada. Authored paper on results.

1996 - developed methodology of a multidisciplinary truck collision programme for Transport Canada in conjunction with RCMP, Be Coroner's Office, Motor Vehicle Branch, and Ministry of Transportation and Highways. As investigator, sampled commercial vehicle crashes and provided in-depth collision investigations. This was the first such collaborative programme in North America.

October 1998 - lectured to RCMP on rollover stability of different truck combinations under various loading conditions, rollover calculations and sensitivity analysis.

July 1999 - with RCMP and BC tested heavy vehicles on a brake dynamometer and then full-scale road brake tests for comparison. Study was designed to evaluate predictive capability of dynamometer testing for braking effectiveness.

July 2000 - as experiment design engineer designed full-scale truck rollover tests as part of RCMP and SAE TOPTEC demonstration. These tests were the first in North America, outside a restricted facility, to test a loaded tractor semi-trailer combination in a free rolling condition. Extensive video and acceleration data were captured of the rollover event and now used by RCMP for training.

1999 to present - through IVT involved with 'due diligence' testing of heavy vehicle commercial combinations for dynamic stability as requirement for provincial permitting and approval.

July 2001 – completed rollover investigation and design review for a BC trailer manufacturer of ore-haul trailer combinations. Identified design areas for improving roll stability performance.

October 2001 - design experiment engineer for roll stability tests on heavy vehicles October 1-5, 2001. Involved examination of over 25 different truck configurations for static tilt-table roll threshold, parametric stability review and ISO 14791 – Dynamic Lateral Stability Testing. Authored report on findings.

April, June 2004 - design performance and crash testing programme of Be Transit buses for use in standards development. Authored report on selected areas of research findings.

September 2004 - hale bale tie-down testing of existing and proposed North America load securement standards as part of review for Oregon Department of Transportation.

April 2005 - review of tie-down requirements and field-testing for transportation of paper roll product for major paper manufacturer in northern **BC**.

May 2006 – Engineering assessment of modified van for wheelchair and hand control operation for provincial agency WorkSafe **BC**, Kelowna, **BC**.

March 2007 – reviewed seat geometry and friction of public transit buses for BC Transit, **Victoria**, **BC**.

2007 - co-owner: design and build high speed track facility for motor vehicle compliance, standards evaluation and research testing in Hanna, Alberta.

PUBLICATIONS

1. **Navin, F.P.D., Macnabb, M.**, "Unit Cost Models of Log Transportation along British Columbia Coastal Waters", Transportation Planning And Technology, Vol. 15, No.3, 1987.
2. **Navin, F.P.D., Macnabb, M., Navin, N.**, "Crash III and Canadian Test **Data**", Society of Automotive Engineers, International Congress, Detroit, Michigan, February 1987, SAB 870449 In Accident Reconstruction, **P-193**, pp. 49-56.
3. Miyasaki, G., Navin, F.P.D., Macnabb. M., "A Crash Test Facility to Determine Automobile Crush Coefficients", Society of Automotive Engineers, Lntemational Congress, Detroit, Michigan, February 1988, SAE 880224 in Accident Reconstruction, State of the Art, SP733, pp.119-126.
4. Navin, F.P.D., Miyasaki, G., Macnabb, M., "Elastic Properties of Selected Automobiles", Society of Automotive Engineers, International Congress, Detroit, Michigan, February 1988, SAE 880223, in Accident Reconstruction, State of the Art, SP733, pp. 107-118.
5. Romilly, D., Thomson, R., Navin, F.P.D., Macnabb, M., "Low Speed Rear Impact and the Elastic Properties of Automobiles", 12th International Congress on Experimental Safety Vehicles, Gothenburg, Sweden, May 1989.

6. Navin, F.P.D., Macnabb, M., Rornilly, D., Thomson, R., "Investigation into Vehicle and Occupant Responses Subject to Low Speed Rear Impacts", Canadian Multidisciplinary Road Safety Conference, Fredericton, New Brunswick, June 1989.
7. Macnabb, M., "Evolving Safety Standards", Part I - August 1990, Part 2 - December 1990, Part 3 - June 1991; "Real World Performance", Winter 1994, Recovery, Insurance Corporation of British Columbia.
8. Navin, F.P.D., Thomson, R., Macnabb, M., Romilly, D., "Reliability of Crash Tests into Segmented Concrete Barriers", international Conference on Strategic Highway Research, Transportation Research Board and Swedish Road Research, Gothenburg, Sweden, September 1991.
9. Navin, F.P.D., Macnabb, M., Thomson, R., Romilly, D., "Reliability of Segmented Concrete Barriers", Canadian Society for Civil Engineers, Annual Congress, Quebec, Quebec, May 1992.
10. Tomson, R., Romilly, D., Navin, F.P.D., Macnabb, M., "Dynamic Requirements of Automobile Seatbacks", Society of Automotive Engineers, International Congress, Detroit, Michigan, February 1993, SAE 930349.
11. Macnabb, M., Baerg, R., Sanderson, S., Chafe, B., Navin, F.P.D., "Tire/Ice Friction Values", Society of Automotive Engineers, International Congress, Detroit, Michigan, February 1996, SAE 960652.
12. Navin, F.P.D., Macnabb, M., Nicolletti, C., "Vehicle Traction Experiments on Snow and Ice", Society of Automotive Engineers, International Congress, Detroit, Michigan, February 1996, SAE 960959 in Current and Future Developments In ABSrrCS and Brake Technology, SP-1 142, pp. 49-57.
13. Macnabb, M., Ribarits, S., Mortimer, N., Chafe, 8., "ABS On Gravel Roads", 16th International Technical Conference on The Enhanced Safety of Vehicles, Windsor, Ontario, June 1998.
14. Macnabb, M., Waters, W., "A Century of Attempts To Re-Solve Vehicle Safety Issues", 16th International Technical Conference on The Enhanced Safety of Vehicles, Windsor, Ontario, June 1998.
15. Macnabb, M., Brewer, E., Mortimer, N., "ABS Tests on Dry Pavement With and Without Steer **Input**", Canadian Multidisciplinary Road Safety Conference XI, Halifax, May 9-12, 1999.
16. Macnabb, M., "Vehicle Acceleration Project"; "Vehicle Acceleration Project - 24 Foot Gate", Report Number R99H0009 Appendix B, Transportation Safety Board, Onawa, Ontario, 2000.

17. Macnabb, M., Baerg, R., Brewer, E., "Static and Dynamic Roll Stability of Various Commercial Vehicles", Society of Automotive Engineers. International Truck and Bus Meeting and Exhibition, Detroit, Michigan, November 2002.
18. Macnabb, M., Baerg, R., Brewer, E., "Potential Roll Stability Improvement of Commercial Vehicles with Wide Based Tires". Canadian Multidisciplinary Road Safety Conference XIII, Banff, Alberta, June 2003.
19. Macnabb, M., Baerg, R., Little, A., Rutenberg, U., Zaworski, J., "Transit Bus Dynamic Performance and Crash Test Accelerations for Use in Standards Development", Canadian Multidisciplinary Road Safety Conference XV, Fredericton, New Brunswick, June 2005.

ADDITIONAL PROFESSIONAL ACTIVITIES

Canadian Standards Association

Pas, Sub-Commitee Member, Transportable Mobility Aids (Z604-95).

Society of Automotive Engineers

Full member since 1987.

Sessional Instructor, University of British Columbia, Civil Engineering, Vancouver, BC
Applied Science Courses 261 and 262, 1990 – 1992.

Instructor

Level III RCMP Accident Investigation Course - Vehicle Restraint Seminar, Vancouver, BC,
December 1996.

Instructor

ReMP Commercial Vehicle Reconstruction Course - Truck Rollover Seminar, Kamloops,
BC, April 1997 and October 1998.

Instructor

Level III RCMP Accident Investigation Course - Event Data Recorders and Crash
Information Retrieval, Kamloops, BC, March 2002.

Instructor

Level III RCMP Accident Investigation Course – Introduction to Commercial Heavy Freight
Vehicles, Regina, Saskatchewan, August 2002.

Instructor

RCMP Advanced Collision Analysis Course - Commercial **Vehicles**; Vehicle Mechanical
Defects; Vehicle Design and Nomenclature, PRTC, Chilliwack, BC, July 2004 and
September 2005.

Instructor

RCMP Special Topics in Advanced Collision Reconstruction - Collision Deformation Classification and Truck Deformation Classification, Kelowna, BC, February 2005.

Instructor

RCMP Advanced Collision Analysis Course - Commercial Vehicles; Vehicle Mechanical Defects; Vehicle Design and Nomenclature, PRTC, Chilliwack, BC, September 2007..

Director and Co-owner

Innovative Vehicle Testing Ltd.

PROFESSIONAL MEMBERSHIPS

Association of Professional Engineers and Geoscientists of the Province of British Columbia
Registered Professional Engineer - member in good standing since 1993.

Association of Professional Engineers, Geologists and Geophysicists of Alberta
Registered Professional Engineer - member in good standing, registered May 2006.

PRESENTATIONS

FERIC Log Truck Technical Seminar, "Transport Canada's Regulatory Role and Review of New Standards", Jasper, Alberta, October 22, 1993.

Western Canadian Auto Extrication Symposium. "Post Crash Occupant Protection in Relation to Current CMVSS and Future Trends in Vehicle Design", Vancouver, BC, May 27-28, 1994.

Faculty of Law, UBC, Consumer Protection Lecture for Prof. S. Wexler, "Transport Canada, Defect Investigations and the Motor Vehicle Safety Act", Vancouver, BC, November 17, 1994.

SAE- BC Section 27th Annual Spring Seminar, "Field Experience with New Technology for Trucks: Safety Related Defects, Implication in Accidents and Reliability", Vancouver, BC, March II, 1995.

Centre For Transportation Studies, UBC. Workshop. "Improving Road Safety Through Data Analysis With Multi-Agency Expertise of Collisions Involving Commercial Vehicles", Vancouver, BC, March 31, 1996.

Commercial Vehicle Safety Seminar, ICBC, RCMP, MVB, "Air Brake Adjustment and Performance", Kelowna, BC, November 5, 1996.

Yukon Workers Compensation and Safety Board, Tire Failure Investigation Seminar,
Whitehorse, Yukon, February 26, 1997.

SAE - BC Section 29th Annual Spring Seminar, "MDAI Truck Study; Where Does It Hurt?",
Vancouver. BC. March 7, 1997.

Canadian Multidisciplinary Road Safety Conference X, "MDAJ Approach To Road Safety-
Heavy Freight Vehicle Pilot", Toronto, Ontario, June 9 - II, 1997.

BC Trucking Association. Monthly Meeting, "Transport Canada Defect And Collision
Investigations", Vancouver, BC, January 12, 1999.

BC Motor Vehicle Inspection Group, Annual Meeting, Seminar, "Heavy Vehicle Anti-Lock
Brakes", Vancouver, BC, March 23, 1999.

RCMP - Commercial Vehicle Safety Conference. "Truck Rollovers: Causes, investigation,
Prevention". Golden, BC, May 3, 1999.

Vehicle Maintenance Management Conference, "Light Duty Hydraulic Brakes and Anti-lock
Brake Systems", Seattle, WA, March 20 - 23, 2000.

Invited speaker to ABS Workshop, Transport Canada, Road Safety Directorate. Ad hoc
member of ASS task force for regulation assessment, Ottawa, Ontario, May 8, 2000.

SAE Heavy Vehicle Rollover TOPTeE: Steering Committee, Workshop Co-Leader "Scene
Evidence Collection and Reliability", Vancouver, BC, July 11, 2000.

Heavy Vehicle Rollover Demonstration - Project Experiment Engineer, Vancouver, BC. July
14, 2000.

Canadian Transportation Equipment Association - 37th Annual Manufacturers' Conference,
Co-chair and presenter, ABS Technical Seminar, Toronto, Ontario, September 12 - 13, 2000.

RCMP - Commercial Vehicle Safety Conference, "Truck Rollovers" and "Discussion of
TOPTeC 2000 Rollover Tests", July 2000 and May 2001, Golden, BC.

Steering Committee Member and Project Engineer, Roll Stability Test Program -
Ashcroft, BC, October 1-5, 2001.

Western Professional Truckers Association – presentation of truck stability testing from
October 2001 Ashcroft vehicle dynamic tests, October 18, 2003, Kamloops, Be.