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**Compendium of
Motor Carrier Projects**

Brenda Lantz

Staff Paper No. 141

August 1998

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TABLE OF CONTENTS

Compendium of Motor Carrier Projects

Development of the National Job Development Network for Career Paths for UTR Drivers 1

Job Training Program Performance Substudy -- General Comments, Enhancements and
 Recommendations 3

Compendium of Motor Carrier Projects 3

Challenges and Management of MCMAP 4

1996 North Dakota Motor Carrier Directory 7

An Evaluation of Capacity of Vehicle Inspectors and Safety Inspectors' Opinions
 Regarding the MCMAP 8

2000 Pilot Exchange of Educated and Technical Assistant (ETA) 7

Does MCMAP Address Specific and Performance Evaluation Training 6

The Justification of the MCMAP's Restructure and Development Efforts 7

How Motor Carrier Safety Plans Fit In 5

Full Review of Status of the Upper Great Plains Transportation Institute
 North Dakota State University 10

Inspection and Test of Features of Motor Carrier Equipment 20

The Economic Inspection Network System (EINS) for Commercial Vehicles 31

The Dakota's DSCVD (Automated) Test Bed 37

Commercial Vehicle Driver Assessment Facility Design Assessment 31

Programs of the MCMAP: Motor Carrier Management and State Administration 13

Highway Regulatory Checklist for Permit Equipment Operations 14

MCO North Dakota Motor Carrier Directory 35

Implications of Economic Changes for Regulatory Enforcement of the Trucking Industry 30

Evaluation of the Differences Between Sporadic and Anticipated Roadside
 Inspections of Motor Carriers 16

A Study of the Feasibility of a North Dakota Regional Traffic Safety Center 32

Development of a Pre-Policy Model for Assessment Probable Safety Ratings for
 Motor Carrier Exits: A Nationwide Perspective 17

Motor Carrier Industry Perspectives of UTR and August 1998 35

TABLE OF CONTENTS

Evaluation of the Potential for Developing Meaningful Career Paths for OTR Drivers	1
<i>Aspen</i> Driver/Vehicle Inspection Software — Second Generation Enhancement and Development of a Unified Carrier Safety Algorithm for Use in the ISS	3
Performance-Based Management of MCSAP	6
1998 North Dakota Motor Carrier Directory	7
An Evaluation of Commercial Vehicle Drivers' and Safety Inspectors' Opinions Regarding the MCSAP	7
National Peer Exchange on Education and Technical Assistance (ETA)	7
State MCSAP Problem Identification and Performance Evaluation Testing	8
An Assessment of the MCSAP's Research and Development Efforts	9
State Motor Carrier Safety Plan Pilot Project	9
Peer Review of Hours of Service Compliance	10
Optimism and Trust as Predictors of Work-Related Behaviors	10
The Roadside Inspection Selection System (ISS) for Commercial Vehicles	11
The Dakota's ITS-CVO Institutional Issues Study	13
Commercial Vehicle Driver Associate Family Issues Assessment	13
Perceptions of the MCSAP: Motor Carrier Management and State Administrators	14
Highway Regulatory Guidelines for Farm Equipment Operators	14
1995 North Dakota Motor Carrier Directory	15
Implications of Electronic Clearance for Regulatory Enforcement of the Trucking Industry	15
Evaluation of the Differences Between Spontaneous and Anticipated Roadside Inspections of Motor Carriers	16
A Study of the Feasibility of a North Dakota Regional Traffic Safety Center	17
Development of a Predictive Model to Ascertain Probable Safety Ratings for Motor Carrier Firms: A Nationwide Perspective	17
Motor Carrier Industry Perceptions of IFTA and IRP	18

Job Satisfaction of U.S. Commercial Drivers	18
Analysis of Roadside Inspection Data and Its Relationship to Accident and Safety/Compliance Review Data	19
Evaluation of the Impact of Changes in the Hours of Service Regulations on Efficiency, Drivers, and Safety	20

... of 39-100 percent. Some companies have had turnover rates of 150 percent and more. Turnover rates with average turnover rates in the single digit or even low double digits.

Such a high turnover rate has several negative impacts on the firm as well as the industry and society. The firm incurs increased costs and reduced performance as a result of turnover. Costs increase as a result of increased training, recruiting, and insurance costs. Lower turnover leads to decreased safety performance from new and inexperienced drivers. Additionally, operational inefficiencies result from drivers unfamiliar with a firm's operations and equipment. Performance is also affected by turnover. This is most apparent in the service provided to customers (customers and carriers may view drivers as not as familiar with the service requirements necessary to remain profitable in an industry which is already extremely competitive. This is especially true of a firm which depends on repeat business.

Impacts of driver turnover on the industry are probably more difficult to measure significantly. The industry competes with other modes of transportation and different forms of motor carrier transport (e.g., rail and intermodal). Increased costs and reduced performance will have a negative impact on the competitive relationship. Additionally, it will result in reduced global competitiveness of the firms that the truckload industry serves. This will result in a loss of business for the industry as a whole.

Although the causes of a high turnover rate are generally agreed upon, the causes of such a high turnover rate have been debated and discussed at length by the industry, government, and academia. Although there does not seem to be total agreement on the causes, it is probably fair to say that the cause is very complex in nature. What is obvious is that job satisfaction has a significant influence on turnover.

EVALUATION OF THE POTENTIAL FOR DEVELOPING MEANINGFUL CAREER PATHS FOR OTR DRIVERS

Driver turnover for over-the-road (OTR) truckload carriers is exceedingly high in both an absolute sense and when compared to other industries. Many truckload companies experience annual turnover rates of 50-100 percent. Some companies have been known to have turnover rates of 150 percent and greater. This compares with average turnover rates in the single digits or teens for most industries.

Such a high turnover rate has several negative impacts on the firm as well as the industry and society. The firm incurs increased costs and reduced performance as a result of turnover. Costs increase as a result of increased training, recruiting, and insurance costs. Losses increase due to decreased safety performance from new and inexperienced drivers. Additionally, operational inefficiencies result from drivers unfamiliar with a firm's operations and equipment. Performance is also affected by turnover. This is most apparent in the service provided to customers (shippers and receivers). New drivers are not as familiar with the service requirements necessary to remain profitable in an industry which is intensely competitive. This is especially true of a firm which depends on repeat business.

Impacts of driver turnover on the industry are probably more subtle but nonetheless significant. The industry competes with other modes of transportation and different forms of motor carrier transport; e.g., rail and intermodal. Increased costs and reduced performance will have a negative impact on this competitive relationship. Additionally, it will result in reduced global competitiveness of the firms that the truckload industry serves. This will result in a loss of business for the industry in the long run.

Although the results of a high turnover rate are generally agreed upon, the causes of such a high turnover rate have been debated and discussed at length by the industry, government, and academe. Although there does not seem to be total agreement on the causes, it is probably fair to say that the issue is very complex in nature. What is known is that job satisfaction has a significant influence on turnover.

Job satisfaction is closely related to an employee *thinking of quitting* and their *intention to search* for a new job. Both of these actions are correlated with turnover.¹

The general objective of this study is to evaluate the perceived desire by drivers for a career path and the challenges for implementing a system which would fulfill the needs for such a career path. This evaluation will be conducted by considering existing operating conditions of the truckload industry as well as assumed hypothetical conditions that may be necessary to develop such a system. This work will be conducted within the context of accepted understanding of career path as identified in the discipline of industrial/organizational psychology. The specific objectives of the study are to:

- (1) Identify and determine an acceptable definition of a career path within the context of accepted principles of human resource management and industrial psychology.
- (2) Determine drivers' perceptions of their desire for a career path and what they perceive constitutes a rewarding career path that would contribute to their overall job satisfaction as an OTR driver.
- (3) Determine management's perceptions of drivers' desire for a career path and their sense of what a career path should consist of.
- (4) Determine if there are any differences between drivers' perceptions of the need for a career path and what the characteristics of a career path are and managers' perceptions of the career path needs of drivers and what managers think a good career path would consist of.
- (5) Evaluate the challenges, costs, and benefits (if possible) of implementing a career path system in a typical truckload company.
- (6) Synthesize this information into a report with recommendations for the industry.

¹Frank J. Landy, *Psychology of Work Behavior*, Fourth Edition, Brook/Cole Publishing Company, Pacific Grove, CA, 1989, p. 478.

The basic methodology used to conduct this study will be survey research in combination with a standard literature review and basic statistical/analytical techniques. Additionally, a *Project Technical Advisory Committee* will be created to advise the project investigators and provide the necessary cost inputs to conduct the study. The industrial/organizational psychology literature on career paths will be reviewed by the project investigators or an industrial psychologist under contract for this project. A brief description of the characteristics of an ideal generic career path will be developed from this literature review. This will provide the context for conducting the remainder of the study.

Principal Investigators: Gene Griffin, Lynn Kalnbach, Julie Rodriguez

Beginning Date: January 1998

Expected Completion Date: January 1999

**ASPEN DRIVER/VEHICLE INSPECTION SOFTWARE — SECOND GENERATION
ENHANCEMENT AND DEVELOPMENT OF A UNIFIED CARRIER SAFETY ALGORITHM
FOR USE IN THE ISS**

Aspen is a computer software package that is used to assist State and Federal law enforcement agencies in the safety inspection of commercial vehicles. *Aspen* is part of a developing National safety information system that monitors safety performance of the Nation's motor carrier industry. The *Aspen Driver / Vehicle Inspection Software* includes several inter-related programs such as *Aspen*, *Avalanche*, the Inspection Selection System (ISS), and access to the Commercial Driver License Information System (CDLIS). This system was developed by the Federal Highway Administration's (FHWA) Field Systems Group (FSG) with several partners and contractors including the Upper Great Plains Transportation Institute (UGPTI) at North Dakota State University (NDSU). The second generation system has now reached production and will soon replace the older first generation system and will be installed in over 35 states.

The development of the roadside Inspection Selection System (ISS) has been completed and testing of the system has revealed that it appears to be extremely effective in meeting its main goals. These goals, as outlined early on in the development process, were to target those carriers with the worst

past safety performance and to reduce the over-sampling of some carriers and the under-sampling of others at the roadside.

As the ISS has undergone development, another related project has also been evolving. This project involves the creation of a Commercial Vehicle Information System (CVIS) to identify unsafe carriers and encourage them to improve their safety performance or have their registration privileges revoked. As a brief summary, when a carrier is found to be operating unsafely, they are entered into the Motor Carrier Safety Improvement Process (MCSIP) which regularly evaluates them to see if they are improving. The initial step in the process is to assign a SafeStat score using data obtained from roadside inspections, compliance reviews, accidents, etc. Depending on this score, it will either lead to a warning letter stating the carrier will be evaluated over a six-month period for improvement and/or an on-site audit. The ISS currently supports CVIS/SafeStat by assigning an ISS inspection value of 100 to carriers currently in the MCSIP sanctioning process to prioritize them for roadside inspections.²

Several enhancements to *Aspen* are needed for it to realize its full potential as an aid to commercial vehicle inspectors and overall highway truck safety. These enhancements, that are planned as the major part of this project, include:

1. Integrate the system with a National wireless communications network and data access system called SAFER.
2. Add additional system features to create a truly "paperless" inspection system.
3. Add vehicle and driver level targeting systems to enhance the ISS.
4. Allow creation of a wireless client/server *Aspen & Avalanche* environment at certain high-volume ports of entry.
5. Build 32-bit versions of both *Aspen* and *Avalanche* (a fairly easy task since programming was done in Borland's Delphi RAD system).

² For more information regarding CVIS/SafeStat, please contact the Volpe National Transportation Systems Center, Economic Analysis Division, Kendall Square, Cambridge, MA 02142.

6. Coordinate another contractor's efforts to add voice-recognition to the *Aspen* and ISS software.

In addition, it would be beneficial if the ISS and CVIS/SafeStat programs could work together on a greater level than they do currently. Although they have different goals, they both try to define what is a "safe" carrier. It is not known for certain, but the possibility may exist that a carrier might be defined as "safe" in one algorithm, but "unsafe" in another.

Once a comparison analysis is run, specific conflicts will be identified. It will then be useful to determine which specific component of either algorithm contributed to the discrepancy, and discuss possible ways of adding information from the SafeStat algorithm into the ISS base safety algorithm to alleviate any discrepancies and improve the effectiveness of the ISS. In addition, it is possible that during this procedure ideas may arise to also improve the effectiveness of a future version of the SafeStat algorithm.

Once it has been decided how to best use components of the SafeStat algorithm in the ISS in order to make the two systems compatible, information will then be added concerning the number of previous inspections a carrier has had (or has not had) in order for the ISS to make its inspection recommendation. In order for the ISS to be effective, every carrier needs some type of rating at the roadside.

Once this new algorithm for the ISS has been developed, it will be useful to pilot test it in two or three states. The main reason for this would be to test its effectiveness against that already realized by the current ISS algorithm. It would be anticipated that the new algorithm will be even more effective, but if not, an evaluation will need to be conducted.

When the pilot testing and consequent evaluation are completed, a final report detailing the above procedures will be released for comment. Once there is general agreement that the final product is optimal, it can then be implemented in the remainder of the states using the ISS. It may be useful for a follow-up evaluation to occur some time after this point, as well as a continuous evaluation of the algorithm itself.

Principal Investigators: Brenda Lantz, Douglas Benson, and the Field Systems Group
Beginning Date: October 1996
Expected Completion Date: September 1998

PERFORMANCE-BASED MANAGEMENT OF MCSAP

Under the Motor Carrier Safety Assistance Program (MCSAP), the Federal Highway Administration's Office of Motor Carriers (OMC) has been working with the states to develop comprehensive Commercial Vehicle Safety Plans (CVSPs). These plans include driver and vehicle inspections, compliance reviews, traffic enforcement, industry education, public outreach, and other commercial vehicle safety activities. As MCSAP approaches reauthorization, the OMC is working with the states to encourage and assist them to adopt a performance-based approach in the implementation of the state MCSAP. The overarching goal of this effort is to improve commercial motor vehicle safety. The state CVSPs will be guided by data analysis and performance-based measures which identify and define problems within each state. The data that will be used for analysis are in the federal/state motor carrier databases such as SAFETYNET and MCMIS. It imperative that OMC has training services in place to ensure that state commercial vehicle enforcement agencies that manage MCSAP grants have a basic knowledge of data analysis to identify problems and thoroughly understand the principles and application of performance-based systems. The product of this understanding will be performance-based CVSPs which will be developed and implemented by each state.

The role of the UGPTI in this project will be to serve as a resource of information and expertise for state and federal personnel that are implementing the new performance-based system. A workbook and training sessions will be developed by the UGPTI . These materials will help in defining the concepts and terminology used by OMC in the performance-based system. The UGPTI will also coordinate the FHWA workgroup and provide training to the FHWA trainers.

Principal Investigators: Julie Rodriguez, Ayman Smadi, Brenda Lantz, Gene Griffin and the FHWA workgroup
Beginning Date: February 1997
Expected Completion Date: June 1998

1998 NORTH DAKOTA MOTOR CARRIER DIRECTORY

This directory contains a listing of motor carriers operating in North Dakota. The information contained in the directory was gathered by survey from the individual firms, and includes the amount and type of equipment, type and scope of operation, as well as the primary cargo carried. A separate listing of grain haulers is also provided.

Principal Investigator: Julie Rodriguez
Expected Completion Date: Spring 1998

AN EVALUATION OF COMMERCIAL VEHICLE DRIVERS' AND SAFETY INSPECTORS' OPINIONS REGARDING THE MCSAP

The UGPTI has evaluated and analyzed the opinions of commercial vehicle drivers and safety inspectors regarding the MCSAP. Roadside safety inspectors and commercial vehicle drivers were identified nationwide to form the study's sample frame. A separate survey instrument has been developed, in cooperation with the OMC, and used to question a representative sample from each of these groups on their perceptions of the MCSAP and motor carrier safety.

In addition to a complete report detailing the results from each survey individually and in comparison to each other, results from this study were compared and contrasted with those from a previous study of state administrators and motor carrier management. Notable differences were identified.

Principal Investigator: Brenda Lantz
Beginning Date: September 1996
Expected Completion Date: May 1998

NATIONAL PEER EXCHANGE ON EDUCATION AND TECHNICAL ASSISTANCE (ETA)

The focus of the ETA Peer Exchange is to identify ETA activities benefitting commercial motor vehicle drivers, motor carriers, and the enforcement community. Technical assistance and training to the drivers and industry is aimed at achieving voluntary compliance and may be the most cost-effective

strategy to reduce crashes and improve highway safety. The peer exchange will identify best ETA practices in the following areas:

1. State, Industry and OMC innovative outreach and training programs
2. Outreach opportunities during roadside enforcement contacts and compliance reviews,
3. Informational material (e.g., brochures, handouts, manuals, pamphlets, fact sheets)
4. New and innovative technologies used to provide training deliver information (e.g., Internet)
5. Partnerships and coordination among State, Federal and Industry
6. Outreach programs targeted at shippers or transportation brokers.

The Utah Department of Transportation is the host state agency for the peer exchange which was kicked off in April 1997. The peer exchange team includes representatives from the states of Alabama, Connecticut, California, Minnesota, Iowa, Nevada, New Mexico, Tennessee, and Utah. The team also includes two representatives from the trucking industry, a representative from the Commercial Vehicle Safety Alliance, and four representatives from the FHWA-OMC headquarter and field staff. The team has completed all of the site visits and will hold the final meeting in the end of April 1998. The final report for the peer exchange is expected in Fall 1998.

Principal Investigator: Ayman Smadi

Project duration: January 1997 to September 1998

STATE MCSAP PROBLEM IDENTIFICATION AND PERFORMANCE EVALUATION TESTING

Under the Motor Carrier Safety Assistance Program (MCSAP), the Office of Motor Carriers (OMC) has been working with the states to develop comprehensive commercial vehicle safety programs. These programs include driver and vehicle inspections, compliance reviews, traffic enforcement, industry education, public outreach, and other commercial vehicle safety activities. As MCSAP approaches reauthorization, state commercial vehicle safety programs will be guided by data analysis and performance-based measures which identify and define problems within each state. The data used for

analysis are in the Federal/State motor carrier databases, SafetyNet and MCMIS. It is imperative that the OMC has training services in place to ensure that state commercial vehicle enforcement agencies that manage MCSAP grants have a basic knowledge of data analysis to identify problems and performance-based systems. The product of this understanding will be the performance-based State Enforcement Plan (SEP) which will be developed and implemented by each state.

The main objectives of this project are: (1) to develop educational and training materials that can be used by trainers to train state MCSAP personnel in motor carrier safety problem identification and state program performance evaluation; (2) conduct train-the-trainer sessions at an agreed to off-site location; and (3) assist the trainers in conducting workshops at the annual MCSAP Grant Conference (March 1997).

Principal Investigators: Gene Griffin, Julie Rodriguez, Brenda Lantz, and Jason Barber
Completion Date: March 1997

AN ASSESSMENT OF THE MCSAP'S RESEARCH AND DEVELOPMENT EFFORTS

In this project, the UGPTI assessed the effectiveness of the research and development component of the Motor Carrier Safety Assistance Program (MCSAP). This assessment was conducted in two parts. Phase I focused on how effective the results of projects conducted since 1991 using MCSAP funds were, and how well these results were disseminated. In Phase II, a plan for effectively disseminating future research results was developed.

Principal Investigators: Brenda Lantz and Jason Barber
Beginning Date: July 1996
Completion Date: June 1997

STATE MOTOR CARRIER SAFETY PLAN PILOT PROJECT

The UGPTI participated in the Region 8 *State Motor Carrier Safety Plan Pilot Program* by assisting the participating states of Colorado, Montana, and Utah. This assistance took place throughout the entire duration of the project from conceptualization of the plan through evaluation. The UGPTI added value to

the process by assisting the participating Region 8 states in: (1) Problem identification, (2) Formulation of targeted actions addressing the problem, (3) Identification and selection of performance measures in assessing the degree of problem mitigation achieved, (4) Interim and final evaluation of program efficacy, and (5) Comparative evaluation among the states.

Principal Investigators: Gene Griffin, Julie Rodriguez, Brenda Lantz, and Ayman Smadi

Beginning Date: June 1996

* Expected Completion Date: December 1997

PEER REVIEW OF HOURS OF SERVICE COMPLIANCE

This project involved a peer review of selected state practices of enforcing hours of service compliance of commercial vehicle drivers. Federal safety regulations restrict a commercial vehicle driver's daily on-duty time to 15 hours, which includes a maximum of 10 hours driving, followed by a minimum eight hours off-duty. In addition, no more than 70 hours of on-duty time may be worked in any given eight-day period and drivers are required to keep log books.

It is believed that a peer review of state practices of enforcing these hours of service regulations will greatly help to improve motor carrier safety. The review identified best practices related to roadside enforcement, new technologies (Intelligent Transportation Systems), data analysis, training, program management, and industry outreach. This information will be shared with other states and will enhance communications among motor carrier safety agencies.

Principal Investigators: Ayman Smadi, Brenda Lantz, Gene Griffin, and Julie Rodriguez

Beginning Date: November 1995

Completion Date: June 1997

OPTIMISM AND TRUST AS PREDICTORS OF WORK-RELATED BEHAVIORS

This project helped determine whether certain individual differences among commercial truck drivers influenced work-related behaviors and attitudes. Results of this study are expected to provide the carrier with evidence to support hypotheses about greater performance-related outcomes of drivers who

are grouped on particular personality and attitudinal factors. More specifically, the goals are: (1) to determine whether individual differences such as optimism and trust can predict turnover, job satisfaction, and other work-related behaviors of new drivers and (2) to investigate potential changes in these individual characteristics up to the first six months with a national commercial trucking company.

Principal Investigators: Lynn Kalnbach, Brenda Lantz, Julie Rodriguez, and Gene Griffin
Completion Date: June 1997

THE ROADSIDE INSPECTION SELECTION SYSTEM (ISS) FOR COMMERCIAL VEHICLES

The Inspection Selection System (ISS) was developed as part of the *Aspen* roadside inspection software system, in response to a 1995 Congressional mandate calling for the use of prior carrier safety data to guide the selection of vehicles and drivers for roadside inspections. The *Aspen* system includes software to help conduct roadside commercial vehicle/driver inspections with portable microcomputers, including hand-held pen-computers. *Aspen* includes electronic transfer of inspection results, and electronic access to carrier safety performance data and commercial driver license status data.

The ISS algorithm was designed at the Upper Great Plains Transportation Institute, North Dakota State University, in cooperation with a ten-state Roadside Technology Technical Working Group and the Federal Highway Administration's Office of Motor Carriers (OMC). The OMC's Field Systems Group managed the overall project and completed the ISS and *Aspen* software development.

The main objectives of the ISS are to recommend roadside inspections for those commercial vehicles and drivers with:

1. Poor prior safety performance as evidenced by an unsatisfactory safety compliance fitness rating and/or higher than average vehicle/driver out-of-service rates, and/or,
2. Very few or no roadside inspections in the previous two years relative to the carrier's size.

In short, the ISS is designed to help better distribute roadside inspections among motor carriers, and target those with prior poor safety performance.

It is anticipated that in the future, the ISS will be used to screen transponder-equipped vehicles at mainline speeds. Currently, however, the roadside inspector simply enters the DOT (Department of Transportation) or ICC (Interstate Commerce Commission) number displayed on the commercial vehicle into a microcomputer running the ISS software. An "inspection value" and recommendation are then displayed for that particular carrier. The system is *not* vehicle-specific, so the "inspection value" is based on the carrier's safety performance history, not the specific vehicle's history. The ISS also provides specific recommendations based on previous regulatory problems in the carrier's history. For example, driver hours-of-service problems or hazardous materials shipping papers problems might be highlighted. The idea is to suggest the inspector focus on those areas based on a known history of violations.

It should be emphasized that the ISS, either within *Aspen* or as a stand alone system, is simply a tool for the inspector. The final decision whether to inspect the vehicle/driver is always made by the inspector.

Ten states were involved with the initial testing of the ISS, but currently a majority of states throughout the United States are using the system. Results from the testing show that as inspectors use the ISS to a greater degree, the desired impacts described above will be achieved. Specifically, out-of-service rates are substantially higher when an inspection is recommended by the ISS. An analysis of data from 39,819 inspections conducted in ten states the first eight months of 1996 revealed the vehicle out-of-service rate was 33.7 percent for those ISS recommended to inspect versus 20.0 percent for those it did not. For driver out-of-service, the rate was 13.5 percent for those recommended versus 9.9 percent for those not recommended. Clearly, the ISS will help to target relatively unsafe carriers (as well as those for which there is insufficient data) and reduce the inspection burden on proven safe carriers. This means more efficient use of scarce resources by focusing on less safe vehicles/drivers.

Based on an evaluation survey completed by inspectors and presentations of the system, the ISS also appears to be well accepted by both inspectors and the motor carrier community. More than 70 percent of inspectors surveyed stated that they would recommend the ISS for use in other states. Additionally, there

are very substantial benefits to society in terms of safety and to “safe” motor carriers in terms of cost-savings to be realized from use of the ISS. A conservative estimate of these benefits amounts to approximately \$60 million per year. The testing and refinement of the ISS will be continued for some time as new data and technologies become more widely available. It is hoped that this will even further enhance its effectiveness at focusing inspections to achieve maximum value while causing minimum disruption to the flow of commerce.

Principal Investigator: Brenda Lantz
Completion Date: September 1996

THE DAKOTA’S ITS-CVO INSTITUTIONAL ISSUES STUDY

The purpose of this project was to investigate institutional issues and barriers to implementing Intelligent Transportation Systems for Commercial Vehicle Operations (ITS-CVO) in North Dakota and South Dakota. The study team facilitated dialogue among users (motor carriers) and public agencies which administer, regulate, or enforce motor carrier operations. Outputs included recommendations for changes to procedures, rules, and regulations to enhance motor carrier operations.

A review of states’ regulations and administrative procedures was also included. A steering committee of representatives from state agencies and motor carriers in the two states provided insight on critical regulation and operational issues in the two states, and potential technological solutions.

Principal Investigators: Ayman Smadi and Julie Rodriguez
Completion Date: November 1996

COMMERCIAL VEHICLE DRIVER ASSOCIATE FAMILY ISSUES ASSESSMENT

This project examined the dissatisfaction of truck drivers associated with issues relating to the family. This dissatisfaction is seen as one major reason for high turnover rates in the trucking industry. The study determines the nature of the trucking family environment through questions asked of both the driver and their spouse/partner. Questions address work concerns, family concerns, decision-making,

informational needs, communication, and leisure time. In addition, respondents were asked for tips they might give a new driver and his/her family about handling personal and family issues while the driver is away from home. This information will then be used to help determine programs of intervention and support useful for trucking companies.

Principal Investigators: Gene Griffin, Brenda Lantz, Melinda Hill, and Nancy Hudson
Completion Date: January 1997

PERCEPTIONS OF THE MCSAP: MOTOR CARRIER MANAGEMENT AND STATE ADMINISTRATORS

This project identified the perceptions of the Motor Carrier Safety Assistance Program (MCSAP) by those who administer the program and by those whom the program applies to. Questions were asked of these two groups concerning roadside inspections, safety/compliance reviews, objectiveness/fairness of inspectors, safety, funding, and Intelligent Transportation Systems for Commercial Vehicle Operations (ITS-CVO) concepts.

Analyzing and comparing answers to these questions revealed suggestions for methods of gaining support for the MCSAP by client groups to increase its effectiveness and improve motor carrier safety.

Principal Investigators: Gene Griffin, Brenda Lantz, and Matthew Titus
Completion Date: October 1995

HIGHWAY REGULATORY GUIDELINES FOR FARM EQUIPMENT OPERATORS

This guidebook was developed at the Upper Great Plains Transportation Institute (UGPTI) as a result of a cooperative agreement with the Transportation Marketing Division of the United States Department of Agriculture (USDA). The agreement provided funding to the UGPTI to compile relevant federal and state regulations pertaining to operations of farm equipment in a single easy to use reference.

The guidebook is divided into three regulatory sections which cover operator, vehicle, and hazardous materials requirements, in addition to a directory of state agencies. The information in the guidebook was compiled from federal and state regulations. State vehicle size and weight legal limits and allowable

exemptions were collected through a survey of state permitting agencies and are included in the chapter on Vehicle Guidelines.

Principal Investigators: Ayman Smadi, Mike Saewart, Kevin Andres, and Brenda Lantz
Completion Date: October 1995

1995 NORTH DAKOTA MOTOR CARRIER DIRECTORY

This directory contains a listing of motor carriers operating in North Dakota. The information contained in the directory was gathered by survey from the individual firms, and includes the amount and type of equipment, type and scope of operation, as well as the primary cargo carried. A separate listing of grain haulers is also provided.

Principal Investigators: Brenda Lantz and Matthew Titus
Completion Date: January 1995

IMPLICATIONS OF ELECTRONIC CLEARANCE FOR REGULATORY ENFORCEMENT OF THE TRUCKING INDUSTRY

The transparent borders concept of the Federal Highway Administration's Intelligent Transportation System for Commercial Vehicle Operations (ITS-CVO) program could enhance regulatory efficiency by improving motor carrier compliance while reducing costs of compliance.

In evaluating motor carrier regulations, understanding the structure, conduct, and performance of the industry is necessary. From this analysis, insight into regulatory reform as well as compliance strategies can be gained.

Following the analysis of the industry, this report focuses on the cost of enforcement for motor carriers, a component of compliance cost. Motor carrier regulations are typically enforced concurrently during weight and safety enforcement efforts. To determine the burden, the amount and value of time spent by motor carriers on enforcement activities was estimated. Recognizing that differences among trucking firms exist, burdens were estimated separately for truckload and less-than-truckload carriers.

Values were based on labor and opportunity costs. Time requirements were taken from existing literature.

Current weight enforcement efforts cost the industry between \$167 and \$283 million annually. Further, over 99.4 percent of the burden is borne by compliant carriers. Technologies and enforcement strategies are currently available and should be pursued that would greatly reduce the proportion of compliant vehicles subjected to enforcement.

Complying with current safety enforcement efforts costs the industry between \$14 and \$25 million annually. Compliant carriers bear over 44 percent of this cost. Analysis of safety data indicates that a statistical relationship exists between out-of-service rates and accident rates. Therefore it is possible to develop a system that would increase the proportion of non-compliant vehicles subjected to inspection relative to compliant vehicles.

Principal Investigator: Matthew Titus

Completion Date: October 1994

EVALUATION OF THE DIFFERENCES BETWEEN SPONTANEOUS AND ANTICIPATED ROADSIDE INSPECTIONS OF MOTOR CARRIERS

The goal of this study was to improve the effectiveness of highway safety inspections of motor carriers. These inspections can be broadly classified as anticipated or spontaneous. Anticipated inspections are defined as those in which the driver is usually aware that there is a high probability that an inspection will take place. These would normally occur at fixed sites, such as highway weigh stations. Conversely, spontaneous inspections are those in which the driver may be unaware that an inspection will take place. These would usually be conducted at roadside facilities, such as rest areas, check points, or even by a highway patrol or truck regulatory officer on the shoulder of the road.

This project evaluated the differences, if any, between violations found during the two broad classifications of inspections as described above. This was conducted in order to provide the Office of Motor Carriers management staff with the information to improve the roadside inspection procedures

and to allocate Motor Carrier Safety Assistance Program funds as efficiently as possible. This should, in turn, result in the maximum removal of unsafe equipment and drivers from service.

The study found very little notable differences between violations found during “spontaneous” versus “anticipated” inspections which were conducted in 1993 in North Dakota. Considering overall out-of-service rates, the author recommended that fixed sites continue to concentrate on Level I inspections while roadside sites concentrate on Level III, as these are the areas they are each best suited for.

Principal Investigator: Brenda Lantz
Completion Date: August 1994

A STUDY OF THE FEASIBILITY OF A NORTH DAKOTA REGIONAL TRAFFIC SAFETY CENTER

This study surveyed potential users of a proposed Regional Traffic Safety Center to ascertain demand for the center. The survey also identified potential users, potential training uses and topics, and evaluated current practices for this training.

Principal Investigators: Brenda Lantz, Gene Griffin, Julie Rodriguez, and Matthew Titus
Completion Date: June 1994

DEVELOPMENT OF A PREDICTIVE MODEL TO ASCERTAIN PROBABLE SAFETY RATINGS FOR MOTOR CARRIER FIRMS: A NATIONWIDE PERSPECTIVE

In every industry, safety is a top priority. This is particularly true in the trucking industry as evidenced by the increases in roadside inspections and safety reviews conducted each year and new legislation implemented. However, some costs to the industry, and ultimately society, from these requirements may be able to be diminished. Safety reviews, in particular, can be very time consuming. Previous research has shown, however, that many other data items that the Federal Highway Administration collects are highly correlated with the outcome of these reviews. Therefore, this project examines the feasibility of developing a model from this other data to ascertain the probable likelihood

of a certain safety rating. This would enable efforts to be concentrated on the motor carrier firms with the least probability of achieving a Satisfactory rating and reduce the need to visit every firm. A preliminary analysis is conducted using only information from North Dakota to get a feel for the data, then a comprehensive analysis is performed utilizing all motor carriers in the data base. In addition, reviews of other related research are given.

Principal Investigator: Brenda Lantz
Completion Date: May 1994

MOTOR CARRIER INDUSTRY PERCEPTIONS OF IFTA AND IRP

This study examined the problems arising from the lack of uniformity in state laws and regulations concerning motor carriers. It also assessed the effectiveness and progress of the programs, such as the International Fuel Tax Agreement (IFTA) and the International Registration Plan (IRP), which have been set up to alleviate these problems.

Principal Investigators: Gene Griffin, Brenda Lantz, Julie Rodriguez, and Matthew Titus
Completion Date: April 1994

JOB SATISFACTION OF U.S. COMMERCIAL DRIVERS

The 100 percent driver turnover rate common in the truckload segment of the trucking industry is extremely high in an absolute sense and especially high when compared with other industries. Turnover results in additional training costs, safety problems, lost business, increased insurance rates, idle equipment, and a host of other business problems. Turnover is related to overall job attitude; therefore this study looks at factors contributing to job satisfaction and dissatisfaction. Herzberg's "Two-Factor Theory of Job Satisfaction," an industrial psychology theory of motivation in the work place, provided the basis for this study.

This study was designed primarily around company drivers, as a similar study also conducted at the Upper Great Plains Transportation Institute by the same authors, and focused strictly on owner-operators. A total of 13 truckload firms throughout the nation participated in the study. Results are based on

responses to a 20-page questionnaire by 3,174 company drivers who drove for the participating firms. Although not random, the sample was intended to be representative of the truckload industry. A similar questionnaire was used to survey truckload carrier managers to find out their perceptions of drivers' attitudes.

Specific findings of the study covered several aspects of the driver's job including the work itself, the working environment, integration into the company, training to be a professional, communication with the company, job expectations, and career advancement. These findings, combined with the analysis of the managers' perceptions of the drivers' opinions, point to the conclusion that the industry is underutilizing its largest and most important resource—drivers. A variety of reasons were cited for disillusionment with the industry and any plan developed by individual trucking firms to retain drivers must be comprehensive and long-range.

It is believed that management can use the information provided in this study to improve the job satisfaction of their drivers and, in turn, reduce turnover.

Principal Investigators: Gene Griffin, Julie Rodriguez, and Brenda Lantz
Completion Date: May 1993

ANALYSIS OF ROADSIDE INSPECTION DATA AND ITS RELATIONSHIP TO ACCIDENT AND SAFETY/COMPLIANCE REVIEW DATA

The main objective of this study was to analyze roadside inspection data and its relationship to safety / compliance review and accident data. Data used for this analysis were provided by the Office of Motor Carriers and included a sample of larger carriers with the most recent inspection information and safety ratings. In addition, summaries of past work in this area and in other related areas is given, as well as reviews of on-going research. The study finds strong support for a relationship between the aforementioned data sets and the findings are compared to the earlier work reviewed.

Principal Investigator: Brenda Lantz
Completion Date: January 1993

EVALUATION OF THE IMPACT OF CHANGES IN THE HOURS OF SERVICE REGULATIONS ON EFFICIENCY, DRIVERS, AND SAFETY

This study was conducted in an effort to add knowledge to the issue of hours of service rules that regulate commercial truck drivers. Drivers, carriers, and society in general would appear to experience positive net gains from a change in the cumulative hours of service rules from the current 70-in-8 day rule to a 24-hour restart provision. These positive gains would consist of increased driver income, improved scheduling flexibility, a potential for increased time at home, increased economic efficiency, and improved safety, as well as gains in other areas.

Principal Investigators: Gene Griffin, Julie Rodriguez, and Brenda Lantz
Completion Date: October 1992

