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Title: ***An Analysis of Motor Vehicle Accidents, Equipment Theft, and Department of Transportation Identified Equipment Violations for Scott Construction Inc.***

The accompanying research report is submitted to the **University of Wisconsin-Stout**,

Graduate School in partial completion of the requirements for the

Graduate Degree/ Major: MS Risk Control

Research Advisor: Dr. Brian Finder, CIH

Submission Term/Year: Fall, 2014

Number of Pages: 70

Style Manual Used: American Psychological Association, 6th edition

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Abstract

This research project focused on analyzing the fleet risk control system currently in use at Scott Construction Inc. Scott Construction Inc. operates a commercial as well as a light duty vehicle fleet. This research project examined the current fleet risk control system in use at Scott Construction Inc. to determine deficiencies which are a contributing factor in tangible and significant monetary losses for the company. This research project examined fleet losses that occurred from the year to 2008 through 2013. Currently the monetary losses from these incidents has resulted in a tangible loss of $613,397, however this number is likely to rise as a result of continuing medical claims. The study determined that the largest monetary losses for Scott Construction Inc. result from vehicle collisions, tool and equipment theft, and backing into other vehicles. An audit was used to analyze the current fleet standards and procedures program in use at Scott Construction Inc. The audit found the program to be incomplete or deficient in 10 of the 45 areas examined. In an effort to reduce future losses it is suggested that Scott Construction Inc. update the current fleet standards and procedures program and develop employee training in various areas.

Acknowledgments

I would like to thank my employer, Scott Construction Inc. for allowing me the time, as well as the opportunity to examine the current fleet risk control program. I would also like to thank my family for supporting me and encouraging me to further my education in the Risk Control field.

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Chapter I: Introduction

The transportation industry is a vital component in the production and distribution of nearly all of the goods and services purchased by customers around the world. The commercial motor vehicle industry accounts for the transportation of 60% of the world's freight and employs approximately 9.6 million people in the United States (FHWA, 2011). Commercial motor vehicles allow goods and materials to be transported great distances quickly and efficiently, however if these vehicles are not operated in a safe and law abiding manner, they may become very dangerous to other motorists and the public. The Federal Motor Carrier Safety Administration reports that in 2011, commercial motor vehicle accidents accounted for 4,018 deaths and 87 billion dollars in monetary losses as a result of these accidents (FMCSA, 2012). Rules and regulations governing the safe operation of the transportation industry have been developed and are enforced by various government agencies in an effort to improve commercial motor vehicle safety (FHWA, 2010). However, it is ultimately the responsibility of each individual commercial motor carrier to be committed to operating a safe vehicle fleet and thus provide a safe work environment for all of its employees.

Scott Construction Inc. was founded in 1926 and started as a small road building company working in south central Wisconsin. Today, Scott Construction Inc. employs approximately 200 employees and completes road construction projects throughout Wisconsin, Iowa, Minnesota, and Michigan. As a road construction contractor and aggregate supplier, a commercial motor vehicle fleet is a vital component for Scott Construction Inc. to be both successful and profitable. As a commercial motor vehicle carrier, Scott Construction Inc. is required to adhere to the rules and regulations which were established by the United States Department of Transportation Federal Motor Carrier Safety Administration, as well as the rules and regulations established by the local Department of Transportation in each state that the fleet

operates within. All drivers of fleet vehicles need to be aware of the various government rules and regulations and must be held accountable for following such, although there is a question with regard to the extent that a thorough and complete motor vehicle fleet policy has been established and communicated to all employees at Scott Construction Inc.

In the period of time from January 2008 through December of 2013, motor vehicle accidents, equipment theft, and Department of Transportation identified equipment violations have resulted in a monetary loss of $613,397 to Scott Construction Inc. While a monetary value can be placed on aspects of losses that have occurred, it is likely these losses have also resulted in reduced productivity and a potentially less favorable perception of the company by the general public. The current fleet risk control system in use at Scott Construction Inc. does not appear to provide drivers with the necessary rules, regulations, and information necessary to perform their job tasks in a low risk manner. This lack of a fleet risk control emphasis on Scott Construction's part jeopardizes the safety of the drivers and places the company at risk for continued and significant monetary losses in the future. The fleet policy does not provide drivers with information regarding hours of service rules, and those who fail to adhere to such rules do not receive disciplinary action. Scott Construction Inc. employs a driver trainer to provide training for new drivers to assist such individuals to obtain a commercial driver's license. Unfortunately, the commercial driver training program provided by the company is very brief and it appears that new drivers are not adequately trained to secure different types of trailers, safely load and secure equipment for transport, complete required vehicle inspection based documentation, or the procedures to follow if a maintenance deficiency is noted. Thus, the occurrence of motor vehicle accidents, equipment thefts, and Department of Transportation identified equipment violations is resulting in tangible and significant monetary losses for Scott Construction Inc.

Purpose of the Study

The purpose of this study was to analyze the extent of losses and the current fleet risk control standards and procedures in place at Scott Construction Inc. in order to determine if opportunities exist to align such with existing governmental standards as well as industry best practices.

Goals of the Study

The following are the goals of the study.

1. Determine the extent that Scott Construction Inc.'s current standards and procedures follow Federal Motor Carrier Safety Administration guidelines as well as preferred fleet risk control practices.
2. Collect and analyze theft, property damage, injury, and regulatory fine based data for losses that have occurred at Scott Construction Inc.

Background and Significance

A cursory review of the current motor vehicle fleet policy in place at Scott Construction Inc. indicates that it is incomplete and is missing numerous components that make up an appropriate motor vehicle fleet policy. An incomplete motor vehicle fleet policy is placing Scott Construction Inc. and their assets at a significant risk for loss. The assets at risk include, people, equipment, the environment, and public perception of the company. Employees of Scott Construction Inc. are placed at risk of sustaining an injury by operating equipment that has not been properly maintained, and this risk is further increased by employees operating equipment who have not been properly trained. Equipment owned by Scott Construction Inc. is placed at risk for theft and vandalism when it is stored in unsecure locations. Hazardous materials including, propane, liquid asphalt, and diesel fuel are commonly transported by the Scott Construction Inc. motor vehicle fleet. In the event that an incident occurs and thus results in the

spill of a hazardous material, it is likely that damage to the environment would occur. Cleaning up a hazardous spill could be very costly and may cause current and future customers to develop a negative perception of the company, and thus result in lost business opportunities in the future.

The entire business at Scott Construction Inc. depends on the commercial vehicle fleet to function efficiently. Without the commercial vehicle fleet, the company would not be able to transport materials, manpower, or the equipment needed to complete road construction projects. The commercial and light duty vehicle fleet at Scott Construction Inc. typically operates 2.6 million miles per year, which places the company at high exposure for a fleet related loss.

Many of the vehicles operated by Scott Construction Inc. are large commercial vehicles, which commonly operate at a gross weight of 80,000 pounds. When operating vehicles this large and heavy, any accident can be very serious and thus result in physical harm to the driver and other motorists. The cost to replace or repair equipment involved in any accident is very costly to the company and may result in higher insurance premiums in the future. Additional costs are incurred by the company while a damaged vehicle or piece of equipment is out of service because replacement equipment must be rented or transported from another jobsite. A unique hazard Scott Construction is faced with is the transportation of hazardous materials and nearly all of the road construction projects completed by Scott Construction Inc. require the use of such substances.

Equipment theft has resulted in significant monetary losses for Scott Construction Inc. In March of 2012, four Bobcat skid loaders and other small tools were stolen from the equipment yard and were not recovered. The equipment theft resulted in a monetary loss to the company of $82,019. However, this loss could have resulted in a much more significant monetary loss to the company if larger and more valuable equipment had been stolen.

Limitations of the Study

The following limitations of the study must be noted.

- All recommendations made to Scott Construction Inc. will be based on the current rules and regulations established by the Federal Motor Carrier Safety Administration and The Wisconsin Department of Transportation.
- Since government based rules and regulations continuously change, any recommendations in this report will need to be continually updated to adhere to the most current standards.

Definition of Terms

Commercial motor vehicle carrier. "Any trade, traffic or transportation within the jurisdiction of the United States between a place in a State and a place outside of such State, including a place outside of the United States" (Federal Motor Carrier Safety Administration, 2011).

Commercial driver's license. "A license issued to an individual by a State or other jurisdiction, which authorizes the individual to operate a class of motor vehicle" (Federal Motor Carrier Safety Administration, 2011).

Chapter II: Literature Review

The purpose of this study was to analyze the extent of losses and the current fleet risk control standards and procedures in place at Scott Construction Inc. in order to determine if opportunities exist to align such with existing governmental standards as well as industry best practices. In order to limit exposure to potential losses, successful motor vehicle fleet operations must develop and implement fleet policies and procedures which include topics to be further discussed in the literature review. The four sections which will be discussed in this chapter include driver qualification, commercial motor vehicle equipment, government regulations that govern commercial motor vehicle carriers, and management responsibilities. Organizations that adhere to the government regulations and best practices discussed in this chapter will likely be able to reduce their exposure to future losses and motor vehicle accidents.

Driver Qualification

Operating a commercial motor vehicle is a difficult task which requires individuals to be properly trained in addition to being physically and mentally healthy. In order to ensure drivers are capable of operating a commercial motor vehicle in a safe manner regulations have been established by the Federal Motor Carrier Safety Administration. The following regulations will be discussed in the driver qualification section of the literature review:

- General CDL licensing requirements
- Defensive driver training
- Hours of service
- Drug and alcohol testing
- USA Patriot Act
- Hazardous materials transport
- Cargo securement

General CDL licensing requirements. Drivers of commercial motor vehicles must possess a valid commercial driver's license, which is often referred to as a CDL (WI DMV, 2011). The Wisconsin Department of Transportation reports that individuals who wish to obtain a commercial driver's license must first pass a physical examination as well as a knowledge test to obtain a commercial driving permit (WI DMV, 2011). After obtaining a permit, an individual must undergo training with a professional driver trainer to become familiar with the safe operation as well as inspection procedures of a commercial motor vehicle. Commercial motor vehicles vary greatly in size and transportation function (WI DOT, 2011). Commercial motor vehicles are categorized into three classes depending on the size, braking system, and function of the vehicle (WI DOT, 2011). Class A commercial vehicles include any vehicle with a trailer with two or more axles with a gross vehicle weight rating greater than 26,000 pounds, provided that the gross vehicle weight rating of the tow vehicle exceeds 10,000 pounds (FMCSA, 2011). A class B commercial driver's license is required to operate any single vehicle with a gross vehicle weight rating greater than 26,000 pounds, or any vehicle towing another vehicle not in excess of 10,000 pounds. Class C commercial vehicles include any vehicle capable of transporting 16 or more passengers (WI DMV, 2011). Individuals who operate specialized types of commercial motor vehicles must obtain an endorsement in addition to a commercial driver's license. Endorsements are required to operate vehicles that will transport hazardous materials, tank vehicles designed to transport liquids, school buses, as well as vehicles with double or triple trailers (WI DMV, 2011). Commercial motor vehicle carriers must ensure that drivers possess the required endorsements for the equipment in which each individual will operate (WI DMV, 2011).

As a best practice, numerous commercial motor vehicle carriers prefer to hire individuals over the age of 21 with prior commercial driving experience (Swift, 2014). A 2009 study

conducted by the Federal Motor Carrier Safety Administration reports that young commercial motor vehicle drivers, defined as individuals age 18 to 21, were more likely to receive a moving violation as compared to drivers age 30-49 (FMCSA, 2010). When hiring a commercial driver, a motor carrier must be aware of age restrictions that regulate the area in which an individual can operate. Drivers under the age of 21 are not permitted to operate a commercial vehicle across state lines and thus may only operate in one state (WI DMV, 2011). Fleet managers can monitor the behavior of drivers and become aware of traffic citations by utilizing a motor vehicle record (MVR) check (MVR, 2013). An individual's motor vehicle record will list any citations, moving violations, severity of moving violations, accidents, history of driving under the influence, and license suspensions that have occurred (American National Standard, 2012).

Truck driving is considered by many medical professionals to be an unhealthy career, as drivers are permitted to drive up to 11 hours in a day and many are unable to conduct enough physical exercise to remain physically healthy (Aleccia, 2009). Prior to obtaining a commercial driver's license, individuals must undergo a Department of Transportation physical examination. The exam will check the individual's vision, blood pressure, issues with drug and alcohol abuse, lung disease, liver disease, head/brain injuries, digestive problems, and muscular disease (FMCSA, 2013). If an individual is unable to pass a Department of Transportation mandated physical examination the driver will not be permitted to operate a commercial motor vehicle (FMCSA, 2013). Many commercial motor carriers require potential drivers to complete an additional physical examination, as well as pass a physical skill test prior to securing employment. Schneider National, one of the largest commercial trucking fleets in the United States, requires all prospective drivers to complete a pre-employment physical work screen (Schneider, 2014). The work screen requires drivers to complete various tasks they will likely encounter each day as a commercial driver (Schneider, 2014.). While completing the work

screen, the prospective driver's heart rate is monitored and if it exceeds a specified level, or if the individual is unable to complete the assigned tasks, the driver will no longer be eligible for employment (Schneider, 2014). Commercial motor vehicle carriers recognize that drivers must be physically and mentally healthy to safely perform job tasks (Schneider, 2014.).

A major health concern of commercial motor vehicle carriers is drivers who have been diagnosed with sleep apnea (Aleccia, 2009). Sleep apnea is a medical disorder which causes an individual's airways to collapse numerous times while sleeping. Each time the airway collapses the individual will awake, which results in a poor quality of sleep and may result in drowsiness throughout the day (Aleccia, 2009). Swift Transportation is one of a growing number of commercial motor vehicles carriers that screens drivers at risk for sleep apnea (Aleccia, 2009). The screening process requires a prospective driver to first complete a survey and if the applicable responses indicate the driver may be at risk for sleep apnea, a sleep study is conducted on the individual (Aleccia, 2009). Individuals who suffer from sleep apnea are often unable to be fully rested which can lead to being drowsy at the wheel. Driving fatigued is a major safety concern which results in more than 100,000 traffic accidents each year (OSHA, 2014).

The Federal Motor Carrier Safety Administration requires all commercial motor carriers to maintain a driver qualification folder for each employed driver (FMCSA, 2014). At a minimum, an individual's driver qualification folder must contain the application for employment, a copy of the driver's motor vehicle record, a copy of the completed road test, a list of driving violations, a copy of a medical exam certification, and notice of an annual driver review (FMCSA, 2014). Referencing an individual's driver qualification folder can allow commercial motor vehicle carriers to avoid hiring individuals who have violated rules and regulations in the past (American National Standard, 2012).

Defensive driver training. Commercial vehicles and the materials transported are very expensive, as the cost to replace an average semi tractor and trailer can be nearly $260,000 dollars (Truckers Report, 2014). During 2006, commercial motor vehicles were involved in nearly 368,000 accidents which resulted in an average loss of $91,112 (FMCSA, 2010). As a result of the high rate of occurrence and costs of commercial motor vehicle accidents, many carriers require drivers to attend defensive driver training. Defensive driving is defined as operating a vehicle in a manner that allows one to defend against possible collisions, drunk drivers, and poor weather (Drivers Ed, 2012). Defensive driver training courses assist drivers to identify potentially hazardous situations in advance to allow the driver to avoid or maneuver around a hazard. Individuals who complete defensive driver training learn to assume that other drivers will make mistakes, and are better able to plan ahead for the unexpected. A defensive driver respects other users of the roadway, and is able to adjust speed, position, direction and attention to react safely to changing conditions. Defensive driver training stresses the importance of avoiding distractions while driving. Defensive drivers only drive when alert and calm, if an individual is fatigued the person should not operate a vehicle. A defensive driver training course stresses the importance of continually scanning each side and rearview mirror for approaching vehicles and changing conditions (FMCSA, 2010). Other topics addressed in defensive driver training courses include emergency maneuvers to utilize when brakes fail or if a tire blows out. In a situation where the brakes of the vehicle do not work, a defensive driver can try to pump the brakes. If pumping the brakes does not improve the function of the brakes, the driver should make contact with a curb or guardrail to slow the vehicle and avoid a head on collision with another vehicle (Drivers Ed, 2012).

Many commercial motor vehicle carriers understand the benefit of requiring drivers to attend defensive driver training courses. Roehl Transport of Marshfield, Wisconsin was named

one of the top three safest commercial carriers in the United States (Roehl, 2007). John Spiros, the Vice President of Safety at Roehl Transport, attributes much of the company's safe driving success to the use of effective defensive driver training (Roehl, 2007). The defensive driver training program developed by Roehl Transport instructs individuals to not only try to avoid an accident, but also to actively help protect others by taking action to keep accidents from happening (Roehl, 2007).

Professor Fred Mottola has developed driving techniques that can be beneficial to drivers by teaching zone control driving (Mottola, 2010). Zone control driving is a technique that teaches drivers how to be sensitive to changes in the driving environment and how to react in a positive way (Mottola, 2010). Mottola's driving philosophy focuses on controlling the zones that surround the vehicle by keeping the zones open while at the same time checking the line of sight and path of travel for hazards (Mottola, 2010). The key to Mottolla's system is the development of driving habits that allow a driver to recognize a change in a zone and take initiative to address the zone change (Mottola, 2010). Professor Mottola's techniques demonstrate the importance of using reference points on the vehicle to allow a driver to identify the lane position of the vehicle while travelling (Mottola, 2010). A vehicle reference point on a vehicle may include the steering wheel, hood emblem, or an item on the windshield or dash of the vehicle which assists the driver in determining the lane position of the vehicle (Mottola, 2010). Another technique recommended by Motolla is to monitor the area approximately 15 seconds ahead of the current to vehicle position, as this will allow ample time to avoid and react to potential problems the driver may encounter (Mottola, 2010).

Hours of service. The ability for a driver to safely and efficiently operate a commercial motor vehicle requires an individual to be alert and well rested while at the wheel (FMCSA, 2013). Commercial motor vehicle drivers who operate in interstate commerce are required to

adhere to hours of service regulations which are stated in 49 CFR part 395.1 (FMCSA, 2013). The United States Department of Transportation defines interstate commerce as transporting goods that have, or will travel through another state or country from the original location to reach the final destination (FMCSA, 2013). All commercial drivers who are required to follow hours of service regulations must adhere to the three maximum duty limits as prescribed by the United States Department of Transportation. The limits include the 14 hour on duty limit, the 11 hour driving limit, and the 60/70 hour duty limit (FMCSA, 2013).

The 14 hour on duty limit allows an individual to be on duty for a period of 14 hours after the driver has been off duty for 10 or more consecutive hours (FMCSA, 2013). The 14 hour duty period begins when a driver completes any work which includes inspecting or fueling the vehicle (FMCSA, 2013). After an individual has been on duty for a period of 14 hours, the driver must be off duty for 10 consecutive hours before reporting back to duty (FMCSA, 2013). A second limit commercial drivers must adhere to is the 11 hour driving limit, which permits an individual to drive for a maximum of 11 hours before receiving 10 hours off prior to driving again (FMCSA, 2013). Drivers must also follow the 60/70 hour duty limit, which is often referred to as a weekly limit (FMCSA, 2013). The 60/70 hour duty limit permits a driver to operate a commercial motor vehicle a maximum of 60 hours in 7 day period, or 70 hours in a 8 day period before a mandatory 34 hour restart period (FMCSA, 2013). During the restart period a driver must be given a minimum of 34 consecutive hours off duty before the individual may begin the next 60/70 hour duty cycle (FMCSA, 2013).

The development of electronic driver hours of service logs has made it both easier and more efficient for drivers and commercial motor vehicle carriers to monitor hours of service limits (Omnitracs, 2014). The electronic hours of service logs use information from a global positioning system in the vehicle to accurately complete an hours of service log which is

communicated to the driver as well as the motor carrier (Omnitracs, 2014).The use of an electronic hours of service log can make it difficult for drivers to falsify their log books and may potentially make public roadways safer for other motorists (Omnitracs, 2014).

Drug and alcohol testing. The Department of Transportation established mandatory drug and alcohol testing regulations that must be followed by all commercial carriers as indicated in 49 CFR part 382 (FMCSA, 2014). Research has indicated a direct correlation between the occurrence of drug and alcohol use and an increase in motor vehicle accidents (American National Standard, 2012). The regulations established in 49 CFR part 382 require all commercial drivers to successfully pass a pre-employment drug and alcohol screen prior to operating a commercial motor vehicle on public roadways (FMCSA, 2014). A pre-employment drug screen must test for the following substances:

- Marijuana
- Cocaine
- Opiates
- Amphetamines
- Phencyclidine (FMCSA, 2014).

Drug tests are administered by first obtaining a urine sample from the individual, the urine sample is then split into two samples (FMCSA, 2014). One urine sample is then analyzed in a medical laboratory for concentrations of drugs (FMCSA, 2014). If an individual's urine sample tests positive for drugs, the driver must not be permitted to perform any safety sensitive functions. An individual who tests positive for drugs may request to have the second urine sample tested in a different medical laboratory to confirm or deny the positive test (FMCSA, 2014). An alcohol concentration test must be conducted by utilizing a breath testing device (FMCSA, 2014). Upon testing positive for drugs or alcohol, the driver must be referred to a

substance abuse professional. A substance abuse professional is a person who responsible for evaluating individuals who have failed a drug or alcohol test (FMCSA, 2014). A substance abuse professional is not an advocate for either the employer or the affected individual. The substance abuse professional is responsible for formulating recommendations for education, treatment, and follow up testing for an individual who failed the drug or alcohol test. After completing the program developed by the substance abuse professional, the driver must successfully a drug and alcohol screening prior to performing any safety sensitive functions (FMCSA, 2014). After returning to duty, the individual must complete a follow up drug and alcohol testing program established by the substance abuse professional. The follow up testing must at a minimum subject the individual to 6 random screenings in a 12 month period (FMCSA, 2014). Many commercial motor vehicle carriers have developed zero tolerance policies for drug and alcohol screenings (Bendickson, 2010). The zero tolerance drug and alcohol policy developed by J.F. Ahern immediately terminates the employment of an individual that tests positive for concentration of drugs or alcohol while at work (Ahern, 2014).

Federal regulations require commercial motor vehicle carriers to establish a random testing program in which all drivers are subject to random alcohol and drug testing (FMCSA, 2014). The number of random drug tests conducted by the motor carrier must be equal to 50% of the commercial driver population (FMCSA, 2014). Random alcohol testing must conduct tests equal to 10% of the driver population (FMCSA, 2014). For example, a motor carrier that employs 100 drivers must conduct 50 drug tests and 10 alcohol tests each year (FMCSA, 2014). After each random test all drivers in the organization must be added back into the random testing pool for the next cycle of tests, which can allow individuals to be selected numerous times each year (FMCSA, 2014). A drug and alcohol test must also be administered anytime an individual exhibits signs of drug or alcohol use, or if reasonable suspicion of use is exhibited by any

employee in the organization (FMCSA, 2014). Commercial motor vehicle carriers are required to administer a drug and alcohol screen to any employee returning to work after an absence of at least 90 days (FMCSA, 2014). An employer is required to drug and alcohol any driver after a fatal traffic or after receiving a traffic citation which results in any injury or a vehicle disabling accident (FMCSA, 2014).

USA Patriot Act. In an effort to guard against potential acts of terrorism, the United States Patriot Act was developed and signed into law on October 26, 2001 (Justice, 2014). The Patriot Act acknowledges that vehicles transporting hazardous materials could potentially be used to commit acts of terrorism, and thus establishes regulations to regulate the transport of such products (Justice, 2014). The regulations developed in the Patriot Act require all commercial motor vehicle drivers to undergo a thorough background check and finger printing prior to transporting hazardous materials (Justice, 2014). Individuals with past legal problems or possible ties to terrorist activities will not be permitted to operate a vehicle transporting hazardous materials (Justice, 2014). Individuals who have charged with the following crimes are banned for transporting hazardous materials:

- Sedition
- Treason

An individual who has been convicted of the following crimes may be granted an exemption to transport hazardous materials:

- Bomb threats
- Murder
- Improper hazardous materials transportation
- Conspiracy
- Rape

- Assault
- Extortion
- Bribery
- Smuggling
- Arson

The rules and regulations established in the Patriot Act were developed to protect the safety of all citizens by ensuring safe transport of hazardous materials.

Hazardous materials transportation. The transportation of hazardous materials is a dangerous task that must be safely completed to allow the modern way of life to exist. Commercial motor vehicles carry common hazardous materials which include gasoline to power cars, propane to heat homes, oil, cleaning products, pesticides, asphalt products, and numerous other common products (FMCSA, 2014). Transporting hazardous materials in a safe manner requires drivers to be knowledgeable about the products to be transported and what precautions and laws must be followed when transporting hazardous products (FMCSA, 2014). Prior to transporting hazardous materials, drivers must obtain a hazardous materials endorsement in addition to a commercial driver's license (WI DMV, 2011). The training to obtain a hazardous material endorsement may be completed at a driver instructional school or by studying a hazardous material training manual published by the Department of Motor Vehicles (WI DMV, 2011). In addition to requiring drivers to have a hazardous materials endorsement, commercial transportation companies are required to annually provide drivers additional training specific to an individual's job tasks (FMCSA, 2014).

H.G. Meigs is a Wisconsin based company that produces and transports liquid asphalt which is used in road building projects. All new and current drivers at H.G. Meigs are required to attend an annual training session to reinforce the importance of safely transporting hazardous

materials (H.G. Meigs, 2013). The annual training covers topics pertaining to loading and unloading product for transport, safe parking areas, product identification, vehicle placarding, and procedures to follow in an emergency situation (H.G. Meigs, 2013). The use of the annual hazardous material training program has provided H.G. Meigs with a reduction in employee injuries caused by asphalt burns and fewer vehicle accidents (H.G. Meigs, 2013). As a result of the success of the annual training session, H.G. Meigs plans to continue the use of the training in an effort to educate drivers and further reduce exposure to potential losses (H.G. Meigs, 2013).

The Federal Motor Carrier Safety Administration provides regulations that transporters of hazardous materials must follow under 49 CFR parts 100-185 (FMSCA, 2014). Commercial motor vehicle carriers who transport hazardous materials must provide drivers with training in the areas of general awareness, function specific training, safety, security, and modal specific training. General awareness training is intended to increase driver awareness to the hazards which are inherent when working with hazardous materials (FMCA, 2014). Function-specific hazardous material training is designed to teach individuals the knowledge, skills, and abilities necessary to complete their job tasks (FMCSA, 2014). Examples of function specific hazardous materials training include the following:

- Identification of the material
- Proper vehicle placarding
- Proper personal protective equipment to wear when handling materials
- Required documentation (FMCSA, 2014).

All hazardous material transport drivers must also complete security training which is intended to inform individuals of the risks inherent with transporting certain materials (FMCSA, 2014). Modal specific training is provided to new drivers to help them become familiar with the

equipment and hazards specific to transporting hazardous materials using a specific mode of transportation (FMCSA, 2014). Modal specific training will include the following topics:

- Proper use of equipment used to load and unload materials
- Proper parking locations for hazardous material containing vehicles
- Areas restricted to hazardous material transport (FMCSA, 2014).

Cargo securement. Properly securing cargo is vital for not only protecting the materials being transported, but also for ensuring the safety of other motorists on the roadways. Improperly secured loads are a major hazard and can cause vehicle accidents, loss of life, materials, damage to cargo and other vehicles, citations, as well as higher insurance rates (JJ Keller, 2008). Materials transported by commercial motor vehicles vary greatly in size, shape, weight, and texture, thus individuals who are responsible for securing cargo must be properly trained and knowledgeable on the subject of cargo securement requirements and the various types of equipment used to secure cargo (FMCSA, 2011). Individuals who possess a commercial driver's license receive brief cargo securement training while working with a driver trainer, however commercial motor vehicle carriers must provide additional training to all new commercial drivers (JJ Keller, 2008). The regulations prescribed in 49 CFR 392.9 require drivers to receive cargo securement training in the areas of cargo inspection, device selection, periodic securement inspections, and requirements for different types of cargo (FMCSA, 2011). As part of the new driver cargo securement training course, many companies use hands on demonstrations to teach the prospective drivers by allowing them to demonstrate proper skills with a driver trainer (JJ Keller, 2008).

Gerke Transport is a commercial motor vehicle carrier that transports large excavation equipment, construction equipment, and aggregate in southwest Wisconsin. The cargo securement training course developed by the company requires all drivers to demonstrate proper

securement of the various types of cargo the company transports. All individuals in the annual training course must properly demonstrate cargo securement skills by securing a front end loader, an excavator, skid loader, grader, bulldozer, and a dump truck to a flatbed trailer (Gerke Transport, 2014). Prospective dump truck drivers must demonstrate how to properly load and secure various types of aggregates for transport. (Gerke Transport, 2014).

Properly securing cargo must start by first identifying which of the three conditions the cargo will be transported in. Condition 1 is defined as cargo which will be fully contained by structures of adequate strength. Condition 2 materials are immobilized by structures and tie downs, while the third type is secured by tie downs (JJ Keller, 2008). After identifying which condition the cargo will be transported in, the load must be loaded evenly and in a manner to prevent tipping and sliding (JJ Keller, 2008). Materials that will be transported in a condition 2 or condition 3 manner will need to be properly tied down prior to transport (FMCSA, 2011). The number of tie downs required varies depending on the following conditions:

- The cargo is prevented from moving forward or backward.
- The length and weight of the cargo.
- The strength rating of the tie downs (FMCSA, 2011).

When securing materials for transport all tie downs are to be positioned as symmetrically as possible over the load to prevent possible damage to cargo (FMCSA, 2011). Whenever possible, all tie downs should be attached at an angle less than 45 degrees (JJ Keller, 2008). Cargo securement devices which are installed at angles in excess of 45 degrees are more susceptible to breaking (JJ Keller, 2008). Prior to installing any tie downs, the securement equipment must be inspected for damage, wear, and the working load limits (FMCSA, 2011). As the saying goes, a chain is only as strong as its weakest link and drivers must remember this when selecting the appropriate cargo securement equipment. The working load limit of a device

is used to specify the maximum strength of cargo securement equipment, and is the greatest load that may be placed on any component of a cargo securement system (FMCSA, 2011). The working load limit of cargo securement devices used to secure freight must at a minimum be equal to 50% of the weight of the materials to be transported (FMCSA, 2011).

After the cargo has been properly secured for transport the driver must properly inspect the load prior to departing (FMCSA, 2011). During transport, materials can shift or move and securement devices can become loose or damaged. To ensure the cargo remains properly secured throughout the journey periodic inspections of securement devices are required. The driver must stop the vehicle and inspect all cargo securement devices within the first 50 miles of the trip (JJ Keller, 2008). To ensure the securement devices are working properly the driver must continue to check the devices every 3 hours or 150 miles until the transport has reached the desired destination (JJ Keller, 2008).

Equipment

Commercial motor vehicles perform a variety of functions and transport numerous materials to a destination. The safe operation of commercial motor vehicles is vital to ensure the safety of all motorists. The following topics will be discussed in the equipment portion of the literature review:

- Vehicle inspection
- Maintenance intervals
- Fleet theft protection
- Vehicle accident reporting
- Fleet motor vehicle accident and loss analysis
- New equipment purchasing
- Vehicle replacement schedule

Vehicle inspection. Commercial motor vehicles are typically large and may carry hazardous materials. In order to keep drivers and other motorists safe commercial motor vehicles must be properly maintained and inspected. The U.S. Department of Transportation requires every commercial vehicle to undergo both a thorough annual inspection as well as a pre and post trip inspection each day the vehicle is operated (WI DOT, 2011). Commercial motor vehicle carriers are required to provide training to all new drivers on how to properly inspect a commercial vehicle (FMCSA, 2007). Each commercial vehicle, including trailers and dollies, must receive an annual inspection by a competent, licensed individual (WI DOT, 2011). An individual must undergo extensive training on commercial vehicle function and successfully pass an examination to become a certified vehicle inspector (WI DOT, 2011). Proof of an annual inspection must be documented by the motor carrier and an inspection sticker must be affixed to the vehicle after successfully passing inspection (FMCSA, 2007). At a minimum the following items must be inspected during an annual vehicle inspection:

- Vehicle service brake
- Parking brake
- Steering mechanism
- Lights and reflectors
- Tires
- Horn
- Windshield wipers
- Mirrors
- Coupling devices
- Wheels and rims
- Emergency equipment

Documentation of the annual inspection must be retained by the commercial motor carrier for 14 months from the date of the inspection (FMCSA, 2007).

Individuals who wish to become a commercial motor vehicle driver must undergo training with a certified driver trainer. One component of this training requires the prospective driver to properly conduct a pre-trip inspection of the vehicle and trailer (WI DOT, 2011). A thorough pre-trip inspection is required before operation to ensure the vehicle is safe to operate and can help avoid potential breakdowns (FMCSA, 2007). In an effort to ensure new drivers are able to accurately complete a complete pre-trip inspection, many commercial motor vehicle carriers, including Schneider National, require new drivers to demonstrate this process prior to the start of employment (Schneider, 2014). A proper pre-trip inspection requires drivers to examine the vehicle's emergency equipment, coupling device, mirrors, fluid levels, tires, horn, reflectors, lights, steering components, service brakes, and parking brake function (FMCSA, 2007). Any deficiencies discovered during a pre-trip inspection must be documented and corrected before the vehicle can be operated (FMCSA, 2007). Upon completion of a transport or at the end of the work day, a driver must complete and document a post-trip inspection of the vehicle and trailer. A post-trip inspection must examine the same items a pre-trip inspection covers (FMCSA, 2007). Any deficiency discovered in the post-trip inspection must be noted on the form and be properly repaired prior to further operation of the vehicle (FMCSA, 2007).

Maintenance intervals. Properly maintaining vehicles that operate on public roadways is not only required by federal regulations, but it also ensures a long and productive service life of the equipment (FMCSA, 2014). As specified by the United States Department of Transportation in regulation 396.11, all commercial vehicles must be annually inspected by a competent individual (FMCSA, 2014). Proper maintenance of equipment is vital to ensure optimum performance and reduce the occurrence of equipment breakdowns (Selectrucks, 2013).

The manufacturers of various types of commercial motor vehicles provide customers with recommended maintenance intervals for proper operation of the vehicle throughout its serviceable life (Selectrucks, 2013). However, the maintenance intervals specified by a vehicle manufacturer are unable to predict the exact usage of a vehicle which can drastically change maintenance intervals for the vehicle (Selectrucks, 2013). Vehicles that are operated at high speeds, transport heavy loads, operate in dusty off road environments will require the fleet manager to develop more frequent maintenance intervals to ensure proper maintenance and operation of the vehicle (Selectrucks, 2013). Maintenance intervals developed by vehicle manufacturers specify fluid and filter replacement, replacement of belts and hoses, replacement of suspension and driveline components, replacement and maintenance for braking systems, and suggested tire replacement schedules (Selectrucks, 2013). Proper maintenance of vehicles must meet or exceed the recommendations established by the manufacturer to ensure safe and dependable service (American National Standard, 2012).

Fleet theft protection. Commercial motor vehicle carriers rely on vehicles and equipment to provide a service to customers and if the assets are not properly secured, theft or vandalism may occur. Schneider National is one of the largest commercial carriers in the United States and has developed a proactive approach to securing assets and training drivers which has resulted in a 40% decline in thefts from 2006 to 2012 (Schneider, 2014). Walter Fountain of Schneider National attributes much of the company's success to the use of global position systems which are installed on each truck and trailer owned by the company (Schneider, 2014). The global positioning system allows the company to monitor the location of each unit, and if a theft is reported, the location of the vehicle can be provided to law enforcement to aid in recovery of the unit (Schneider, 2014). Schneider National requires all new drivers to complete a security training course in which they receive information on securing cargo and how to choose

appropriate parking areas (Schneider, 2014). In an effort to further protect the company's assets, many of Schneider National's storage facilities and equipment yards are now secured by perimeter fencing and entry gates which are protected by guards (Schneider, 2014).

Advancements in technology have resulted in various new products which are available to commercial motor vehicle carriers to secure assets. One such product is a security ignition password device. This product requires an individual to not only have the keys in the vehicle ignition, but the driver must also enter a security password into a key pad before the vehicle will operate (LoJack, 2012). Other measures that can be utilized to protect assets include hood locks which prevent unauthorized entry to protect the engine against potential acts of vandalism (LoJack, 2012). Many commercial vehicles utilize manual transmissions and therefore a security device to lock the clutch and brake pedal together can be installed on the vehicle which makes the vehicle impossible to operate (LoJack, 2012).

Vehicle accident reporting. Regulations established by the Federal Motor Carrier Safety Administration require all commercial motor vehicle carriers to maintain records of any accident that results in a fatality, an injury requiring medical attention, or if a vehicle is disabled and must be towed away from the scene of the accident (FMCSA, 2014). All reportable accidents must be reported onto the commercial motor vehicle carrier's accident register. The accident report must contain the following information pertaining to the accident:

- Date
- Location
- Date and time
- Weather conditions
- Type of loss
- Vehicle identification number

- Drivers name
- Number of injuries
- Number of fatalities
- Type and approximate quantity of any hazardous materials released (FMCSA, 2014).

In addition to following the applicable Federal Motor Carrier Safety Administration accident reporting regulations, many commercial motor vehicle carriers establish company procedures that must be followed when an accident occurs. J.F. Ahern is a mechanical contractor headquartered in Fond Du Lac, Wisconsin and provides services throughout the United States. Any accident involving a J.F.-Ahern owned vehicle must be immediately reported to the safety department as required by company policy. The company defines an accident as an event in which a vehicle or its contents makes contact with another vehicle, object, or person resulting in damage (Ahern, 2014). Any J.F. Ahern employee involved in a motor vehicle accident must immediately complete a drug and alcohol screening to determine if the employee was under the influence of any prohibited substances at the time of the accident. The company requires law enforcement to be notified of any accident that involves damage resulting in excess of $500 (Ahern, 2014). Upon reporting of an accident, a member of the safety department will travel to scene of the accident and obtain as much information pertaining to the accident as possible including the employee(s) involved, date and time of the accident, location of the accident, name of other parties involved, weather conditions, number of injuries or fatalities, and insurance information (Ahern, 2014). A common practice in industry is to utilize a review committee to analyze an accident to identify any factors that may have contributed to the cause of the accident (Schneider, 2014).

Fleet motor vehicle accident and loss analysis. The ultimate goal of every motor vehicle fleet safety program is to reduce or eliminate losses. In order to achieve this goal

management must be able to develop an understanding of the underlying causes of each accident or loss to establish corrective measures to prevent recurrence of similar losses (Fleet Risk, 2010). When a fleet loss occurs, it is vital for management to obtain as much information pertaining to the loss as possible. Members of management must analyze the information obtained to reconstruct how the loss occurred, and determine if the driver could have acted differently to prevent the occurrence of the loss (American National Standard, 2012). Upon conclusion of an accident or loss analysis, management must determine if changes or additional employee training need to be amended into the fleet program in an effort to prevent recurrence of similar losses in the future (Fleet Risk, 2010).

New equipment purchasing. Commercial vehicles are used to in various environments to complete many tasks; thus purchasing the correct equipment is vital to the successful operation and productivity within a commercial motor vehicle fleet. A commercial fleet may consist of pickup trucks, multi passenger vans, delivery trucks, semi tractors, various types of trailers, tank vehicles, and numerous types of custom vehicles for various applications. In order to purchase the correct vehicle, the first step is to determine the intended purpose of the machine (Government Fleet, 2009). A fleet manager must then determine the capabilities and capacities the vehicle must be able to accommodate in order to accomplish the required tasks (Government Fleet, 2009). The fleet manager must take into account what type of materials the vehicle will transport, the quantity and weight to be transported, number of passengers, desired service life, vehicle operation environment, budget, as well as any additional equipment to be added to the vehicle (American National Standard, 2012). Purchasing the correct vehicle for a given application will maximize production and allow the vehicle to be utilized in a safe manner.

An industry best practice used by many fleet managers is to consult with the users of the vehicle to gather their feedback and suggestions that may be beneficial in specking the

appropriate vehicle (Government Fleet, 2009). After the necessary capabilities and capacities the vehicle must possess have been determined, a fleet manager can examine equipment manufacturer's vehicle specifications to select the appropriate vehicle chassis (Government Fleet, 2009). Upon selecting the appropriate vehicle chassis the drivetrain for the vehicle must be chosen. The appropriate engine for the vehicle must be capable of transporting the required weight, as well as provide power for additional equipment installed on the vehicle. However if the engine specked for the vehicle is too large for the given application, the vehicle may suffer reduced fuel efficiency and the initial and long term costs of the vehicle may be higher (Caterpillar, 2004).

When a fleet manager purchases a vehicle, particular attention should be paid to selecting an appropriate transmission. The transmission is responsible for transferring power from the engine to wheels (Caterpillar, 2004). In recent years the automatic transmission has gained popularity in commercial vehicles as it is easier for new drivers to operate and may result in lower maintenance costs (Government Fleet, 2009). Many commercial vehicles used for custom applications are purchased with manual transmissions to allow drivers to select the optimum vehicle speed and engine rotations per minute for certain applications (Government Fleet, 2009). After the transmission has been selected, any additional equipment for the vehicle must be specked and deemed appropriate for the chosen chassis (Caterpillar, 2004). Additional axles and axle spacing may need to be considered to comply with weight regulations or requirements of the vehicle (Caterpillar, 2004). Any additional or specialty equipment necessary to perform the intended tasks of the vehicle must also be selected and be deemed compatible with the chosen chassis (Caterpillar, 2004). After the vehicle specifications have been developed and prior to ordering the equipment, the applicable information should be reviewed by the manufacturer to

ensure the chosen vehicle will meet the customers' expectations and be safe for the assigned tasks (Caterpillar, 2004).

Vehicle replacement schedule. The act of replacing commercial motor vehicles is an important decision that all fleet managers will encounter throughout their career. Many different approaches to vehicle replacement schedules are chosen depending on the goals and function of the company, available budget, and the effect of vehicle downtime (Selectrucks, 2013). One approach used to determine vehicle replacement is known as the life cycle cost approach. The life cycle cost approach suggests replacing a vehicle when the principal, interest, maintenance, and operating costs of the current vehicle are higher than the costs to own a newer vehicle (Selectrucks, 2013). The life cycle cost approach is based on the idea that as the principal and interest payments on an older vehicle decrease, the cost of maintenance and operating costs will increase (Selectrucks, 2013). Other vehicle replacement schedules used by commercial motor vehicle carriers replace vehicles when the equipment has reached a specified age or exceeded a pre-determined number of hours or miles (American National Standard, 2012). Many commercial motor vehicle fleets prefer to operate only late model equipment and may choose to lease vehicles for a number of years (Selectrucks, 2013). As the cost of equipment has increased many companies are only able to replace vehicles when financial resources become available (Selectrucks, 2013). Every fleet manager must develop a vehicle replacement schedule which is financially responsible and only permits safe and functional vehicles on public roadways.

Management Commitment and Support

Developing a successful safety focused culture in any company must include the continuous commitment and support of all members of management. The management commitment and support section of the literature review will discuss the following topics:

- Safety culture

- Driver behavior promotion
- CSA 2010
- Benchmarking/performance measurement

Safety culture. Members of management must be involved in the formation, communication and enforcement of the company safety program and also be held responsible for complying with policies established in the program (National Insulation Association, 2012). In order to develop a successful fleet safety program management must become aware of the regulations that govern the industry and incorporate these regulations into the fleet safety program. After a safety program has been developed, the program must be effectively communicated to all employees within the organization. Management must support the safety program by allocating adequate financial resources and manpower to ensure the success and enforcement of the safety program (National Insulation Association, 2012). Members of management must also periodically discuss issues with the safety program and update the program to address any issues, and any new regulations and standards put into place (American National Standard, 2012). All safety programs must be continually updated and communicated to all individuals within an organization.

Driver behavior promotion. Commercial motor carriers rely on drivers to maintain a positive company image by driving in a courteous and responsible manner while also providing reliable service to various customers (Trucking Jobs, 2014). Monitoring the driving behavior of drivers and promoting safe vehicle operation techniques is important to the success of any commercial carrier (Driver Behavior, 2004). One of the most common methods used by commercial carriers to monitor the behavior of drivers is to install a safety hotline phone number on the vehicle to allow motorists to provide feedback on the driver's operation (Fleet Safety, 2014). A safety hotline program includes involves a decal on the vehicle that provides motorists

with company contact information to provide feedback pertaining to the operation of a vehicle (Fleet Safety, 2014). While credible resources which identify the extent that this driver based feedback system improves performance could not be located, it would be logical to surmise that such would hold vehicle operators more accountable for their actions while out on the road.

Electronic vehicle monitoring is another popular strategy which is used by commercial motor vehicle carriers to promote appropriate driver behavior. An electronic vehicle monitoring system utilizes a global positioning system that is installed on the vehicle to track the location, travel direction, and speed of the vehicle (Fleet Director, 2014). The system allows members of management to ensure drivers are utilizing assigned routes and are obeying speed limits and traffic regulations (Fleet Director, 2014). Manufacturers of electronic vehicle monitoring have also developed software to track driver's hours of service by utilizing information obtained from the global positioning system.

CSA 2010. The CSA 2010 initiative was developed by the United States Department of Transportation in an effort to increase compliance, safety, and accountability in the United States transportation industry (FMCSA, 2014). The initiative was developed to help monitor and evaluate the safety and compliance records of commercial motor vehicle carriers and commercial drivers (FMCSA, 2014). The initiative also develops measures to take action against motor carriers and drivers with safety issues (FMCSA, 2014). The CSA 2010 program establishes a point value for various equipment violations. Each equipment violation identified in a documented Department of Transportation vehicle inspection will add points to the motor vehicles carriers score (FMCSA, 2014). If a commercial motor vehicle driver receives too many violations, his/her license may be lost and thus the individual will be prohibited from operating on public roadways (FMCSA, 2014). A complete Department of Transportation vehicle

inspection examines the overall maintenance of the vehicle, the health of the driver, as well as an inspection of the vehicles cargo and cargo securement (FMCSA, 2014).

Safe operation of a commercial motor vehicle requires proper vehicle maintenance and periodic vehicle inspections. While conducting a maintenance inspection a member of law enforcement will examine the vehicle for tire defects, suspension defects, frame defects, correct and operational lighting devices, steering defects, worn or defective brakes, fluid leaks, emergency equipment, and complete the necessary inspection documentation (FMCSA, 2014). The most common maintenance violations identified during vehicle inspections include, inoperative lighting, improper reflective devices, worn or kinked brake hoses, worn tires, brakes out of adjustment, and no proof of prior vehicle inspections (FMCSA, 2014).

Under the CSA 2010 initiative, each commercial motor vehicle driver will possess his/her own CSA score (FMCSA, 2014). The score of a driver is negatively affected when an individual is cited for operating a commercial vehicle in an unsafe manner (FMCSA, 2014). A number of the most common unsafe driving violations include speeding, reckless driving, inattentive driving, improper lane changes, using a radar detector, and smoking within 25 feet of vehicle transporting hazardous materials (FMCSA, 2014). Each CSA 2010 violation issued to a driver will add a specified number of points to the individuals score. Thus, drivers with a lower score are considered to be more responsible and safe operators (FMCSA, 2014). The most severe violations a driver can be cited for add 10 points to the individuals score (FMCSA, 2014). A number of the most severe violations include reckless driving, texting while operating a commercial motor vehicle, use or possession of drugs, operating under the influence of alcohol, fatigued driving, violating hours of service rules, and speeding in excess of 15 miles per hour over the posted speed limit (FMCSA, 2014).

The cargo-related portion of a commercial motor vehicle inspection examines the cargo for proper securement, proper cargo packaging and labeling, vehicle weight, hazardous material violations, as well as proper vehicle placarding if applicable (FMCSA, 2014). Proper cargo securement is vitally important to ensuring a safe delivery of the cargo and the safety of other motorists on the roadway (FMCSA, 2014). Cargo securement violations carry a large penalty, and thus these violations are considered the most severe CSA 2010 violations a commercial motor vehicle carrier may receive (FMCSA, 2014). Various violations which carry a CSA 2010 value of 10 points include leaking and falling cargo, release of hazardous materials, and improperly secured freight (JJ Keller, 2012). A commercial vehicle which transports hazardous materials is required to display the proper placard in order to identify the contents in which the vehicle is transporting. The driver of a commercial motor vehicle must be aware of the combined weight of the vehicle and cargo, vehicles that are overweight can be unsafe to operate and may result in receiving a citation (JJ Keller, 2012).

The CSA 2010 initiative can provide beneficial information to both commercial vehicle drivers and motor carriers. An industry best practice is to reference a prospective driver's CSA score to determine any past violations or accidents an individual was involved in (JJ Keller, 2012). Referencing an individual's CSA score can allow a commercial motor vehicle carrier to hire drivers that have proven their ability to operate in a safe and responsible manner and avoid hiring individuals with previous violations (FMCSA, 2014). Commercial vehicle drivers may benefit from the CSA 2010 initiative by referencing a commercial carrier's score to determine the number of accidents and violations in which the motor carrier has been involved (JJ Keller, 2012).

Benchmarking/performance measurement. Benchmarking and performance measurement are important tools to utilize when establishing fleet safety goals and to measure

the effectiveness of the safety program in use (Mooren, 2007). Members of management must establish benchmarks that are achievable, measurable, and meaningful to the organization (American National Standard, 2012). At the conclusion of a specified period of time, members of management must compare the actual fleet loss data with the previously established benchmarks to examine gaps in performance (Mooren, 2007). An example of an achievable benchmark could include a goal of 5 or less reportable accidents per 1,000,000 miles of total fleet mileage (Mooren, 2007). The American National Standard Institute has developed numerous performance measurement calculations fleet managers can utilize to determine the effectiveness of a fleet safety program. The incident rate calculation can be utilized to determine the number of incidents per vehicle operated by the organization. The calculation is specified as:

$$\text{Incident rate} = \frac{\text{number of incidents} \times 100}{100}$$

Fleet managers may determine the number of incidents based on vehicle mileage with the following calculation:

$$\text{Incident mileage rate} = \frac{\text{number of incidents} \times 1{,}000{,}000}{\text{Total fleet mileage}}$$

The injury incident rate specifies the number of injuries which result from each incident. The calculation is specified as:

$$\text{Injury incident rate} = \frac{\text{number of incidents with injuries} \times 1{,}000{,}000}{\text{Total fleet mileage}}$$

After comparing the actual fleet loss data with the previously established benchmarks management can determine if the current fleet program is working as intended or if changes to the program must be made to make it more effective (Fleet Safety, 2014). If the established benchmarks have not been met, members of management must develop and implement new strategies to reduce exposure to future losses (American National Standard, 2012).

Summary

Operating a safe and productive commercial motor vehicle fleet requires the commitment of all members within an organization. The Federal Motor Carrier Safety Administration is responsible for establishing the regulations commercial motor vehicle carriers must comply with to operate in a legal and safe manner (FMCSA, 2014). Members of management are responsible for developing a thorough and complete motor vehicle safety program which must provide employees with appropriate policies and procedures (Fleet Risk, 2010). All new and current commercial motor vehicle drivers must be made aware of the fleet safety program, and receive training to comply with the regulations that govern the transportation industry (FMCSA, 2014). Federal regulations require all commercial motor vehicle carriers to provide training for all new employees pertaining to the following topics, hazardous materials, cargo securement, vehicle inspection, hours of service, and proper accident reporting (FMCSA, 2014). Safe fleet operation depends on properly maintained vehicles that are appropriately specked for a given application. Federal regulations require any injuries or accidents that occur to be properly reported to members of management. In an effort to ensure the current fleet safety program is appropriately controlling risks, members of management must continually collect data to determine the effectiveness of the program. An effective fleet safety program must reduce an organization's exposure to losses and provide a safe workplace for all employees. If losses and injuries continue to occur members of management must develop and implement changes to the fleet safety program to limit further loss exposure.

Chapter III will cover the methodology used to determine the effectiveness of the current fleet safety program in use at Scott Construction Inc. An audit will be developed and completed to determine if the current fleet safety program adheres to all current federal regulations, and determine if employees are provided with the appropriate training to safely perform job tasks.

Chapter III: Methodology

The occurrence of motor vehicle accidents, equipment theft, and Department of Transportation identified equipment violations is resulting in tangible and significant monetary losses for Scott Construction Inc. Therefore, the purpose of this study was to analyze the current fleet risk control standards and procedures in place at Scott Construction Inc. in order to determine if opportunities exist to align such with existing governmental standards as well as industry best practices. In addition, a loss analysis will be conducted to determine more information pertaining to the possible causes of previous motor vehicle accidents, equipment theft, and department of transportation identified equipment violations.

Instrumentation

The current fleet standards and procedures in place at Scott Construction Inc. will be examined through the use of an audit and loss analysis which were developed by the researcher. The information contained within the current fleet program will be compared with the regulations and industry best practices presented in the previous literature review. The loss analysis will be conducted by examining data the researcher obtained from previous motor vehicle accidents, equipment thefts, and department of transportation identified equipment violations that have occurred to the Scott Construction Inc. motor vehicle fleet from 2008 through 2013.

Data Collection Procedures

The data source used to analyze the current fleet risk control standards and procedures was a Scott Construction Inc. employee safety manual. A copy of the Scott Construction Inc. employee safety manual was obtained by researcher at commencement of employment with the organization. At the time the following research was conducted, the Scott Construction Inc. employee safety manual was not available online and is only available to all employees through

a paper copy. The researcher stored the safety manual in a secured office filing cabinet while reviewing the content within the manual. Upon completion of the audit form the researcher examined the information contained in the employee safety manual with the regulations and best practices indicated on the audit. The results of the analysis were collected on the following audit form.

Category #1: Driver Qualification Regulation or best practice:	Contained in current safety program
1. All drivers are required to possess a valid license for the equipment an individual is operating.	Yes No Incomplete
2. All drivers possess the required endorsements for any vehicle operated.	Yes No Incomplete
3. Any commercial driver who operates outside of Wisconsin must be at least 21 years old.	Yes No Incomplete
4. Each commercial driver's motor vehicle record (MVR) is monitored on an annual basis for citations, violations, and accidents.	Yes No Incomplete
5. Each commercial driver's CSA score is monitored and referenced prior to an offer of employment.	Yes No Incomplete
6. All commercial drivers must provide proof of a valid department of transportation physical examination.	Yes No Incomplete
7. Drivers are monitored for sleep apnea through the physical examination process.	Yes No Incomplete
8. A driver qualification folder is maintained for each individual.	Yes No Incomplete
9. Commercial drivers receive training on hours of service regulations.	Yes No Incomplete
10. Drivers who do not adhere to hours of service	Yes No Incomplete

regulations receive disciplinary action.

11. All drivers must pass a drug and alcohol test prior to the start of employment.	Yes	No	Incomplete
12. Commercial drivers receive random drug and alcohol tests in accordance with FMCSA regulations. Annually, the number of random drug tests is equal to 50% of the driver population, and the number of random alcohol tests are equal to 10% of the driver population.	Yes	No	Incomplete
13. Drivers are required to complete a drug and alcohol screening after an accident.	Yes	No	Incomplete
14. Drivers are required to complete a drug and alcohol screening after an extended period of time off duty.	Yes	No	Incomplete
15. A medical review officer (MRO) is utilized to receive and review drug and alcohol tests.	Yes	No	Incomplete
16. A substance abuse professional (SAP) evaluates employees who have failed a drug or alcohol test.	Yes	No	Incomplete
17. Drivers responsible for transporting hazardous materials are provided with proper training to safely perform required job tasks.	Yes	No	Incomplete
18. Commercial drivers receive training annually.	Yes	No	Incomplete
19. Commercial drivers are provided with cargo securement training.	Yes	No	Incomplete
20. Commercial drivers receive training to properly inspect a commercial vehicle.	Yes	No	Incomplete
21. Drivers receive training to complete daily inspection documentation.	Yes	No	Incomplete
22. Drivers are required to submit daily vehicle inspection reports to the maintenance department to be retained for documentation.	Yes	No	Incomplete

23. Equipment deficiencies identified in daily reports are corrected before a vehicle is permitted back into service.	Yes No Incomplete
24. Employees receive training on what action must be taken if a maintenance deficiency is discovered.	Yes No Incomplete
25. Drivers receive defensive driver training.	Yes No Incomplete
26. Drivers receive training on CSA 2010 regulations.	Yes No Incomplete
27. Drivers receive training on how to protect equipment and assets from theft and vandalism.	Yes No Incomplete
28. Drivers receive cargo securement training.	Yes No Incomplete
29. Drivers transporting hazardous materials receive proper training.	Yes No Incomplete
30. Drivers receive training on accident reporting procedures.	Yes No Incomplete

Category #2: Equipment Regulation or best practice.	Contained in current safety program.
1. All vehicles and equipment receive a documented annual inspection performed by a licensed individual.	Yes No Incomplete
2. Annual inspections are documented and retained for a minimum of 14 months.	Yes No Incomplete
3. Annual vehicle inspection stickers are installed on commercial trucks and trailers in accordance with FMCSA regulations.	Yes No Incomplete
4. A safety feedback hotline is in use.	Yes No Incomplete
5. Global positioning equipment is utilized to monitor the location and travel speed of vehicles.	Yes No Incomplete
6. Drivers are permitted to drive vehicles home.	Yes No Incomplete

7. Drivers are permitted to use company owned vehicles for personal travel.	Yes No Incomplete
8. A vehicle specification process is in place to ensure that equipment is appropriately specked for the applicable tasks.	Yes No Incomplete
9. Maintenance intervals meet or exceed the equipment manufacturer's requirements.	Yes No Incomplete
10. Vehicles are replaced at appropriate intervals to ensure equipment is reliable and safe.	Yes No Incomplete
Category #3: Management Responsibilities Regulation or best practice.	Contained in current safety program.
1. Accidents are analyzed by an accident review board and appropriate action is taken.	Yes No Incomplete
2. Members of management meet periodically to discuss and update the safety program.	Yes No Incomplete
3. Adequate time is dedicated to provide new employees with the appropriate training prior to the start of employment.	Yes No Incomplete
4. Adequate financial resources are dedicated to ensure equipment is properly maintained and in good repair.	Yes No Incomplete
5. Appropriate benchmarks are established to monitor the effectiveness of the safety program.	Yes No Incomplete

Figure 1. Audit form.

Data Analysis

The data analyzed by the preceding audit compared regulations and best practices to the rules and procedures contained within the current Scott Construction Inc. employee safety manual. Each regulation or best practice on the audit which is both thoroughly and accurately detailed within the safety manual was designated as “yes” on the audit form. If the statement on the audit was not contained in the current employee safety manual the answer “no” was selected.

Each statement found within the safety manual that does not meet the current regulation or best practice was designated as “incomplete” on the audit.

The researcher completed a loss analysis by examining incident reports completed on previous vehicle accidents, equipment thefts, and department of transportation identified losses which occurred from 2008 through 2013. The data was examined to determine possible causes of past losses, which will allow safety efforts to focus on controlling these risks. The loss analysis completed by the researcher will examine statistical data to determine the number and severity of previous losses. The statistical data which was examined included the accident incident rate, incident mileage rate, and the incident injury rate.

Limitations

The data analyzed in the audit includes the information printed within the April 2014 Scott Construction Inc. employee safety manual. Therefore, any revisions to the employee safety manual after August 2014 will not be reflected in the previous audit. The audit developed to analyze the current fleet safety program in use at Scott Construction Inc. is based on the current rules and regulations established by the Federal Motor Carrier Safety Administration and the Wisconsin Department of Transportation. Government rules and regulations continuously change and receive updates, therefore the previous will need to be periodically reviewed and updated for future use to ensure compliance with current regulations and standards.

Chapter IV: Results

The occurrence of motor vehicle accidents, equipment theft, and Department of Transportation identified equipment violations is resulting in tangible and significant monetary losses for Scott Construction Inc. Therefore, the purpose of this study was to analyze the current fleet risk control standards and procedures in place at Scott Construction Inc. in order to determine if opportunities exist to align such with existing governmental standards as well as industry best practices. In order to achieve the purpose of the study, the following two goals were developed:

1. Determine the extent that Scott Construction Inc.'s current standards and procedures follow Federal Motor Carrier Safety Administration guidelines as well as preferred fleet risk control practices.
2. Collect and analyze theft, property damage, injury, and regulatory fine based data for losses which have occurred at Scott Construction Inc.

The following chapter will include a presentation of the data collected by the researcher utilizing the data collection procedures discussed in chapter III. Data was collected through the use of an audit as well as a loss analysis.

Presentation of Collected Data

The researcher developed an audit which contained transportation industry regulations and best practices which were presented in Chapter II. Each component of the audit form was compared to the information contained within the Scott Construction Inc. employee safety manual and the results were recorded on the following audit.

Table 1

Completed Audit

Category #1: Driver Qualification Regulation or best practice:	Contained in current safety program
1. All drivers are required to possess a valid license for the equipment an individual is operating.	Yes
2. All drivers possess the required endorsements for any vehicle operated.	Yes
3. Any commercial driver who operates outside of Wisconsin must be at least 21 years old.	No
4. Each commercial driver's motor vehicle record (MVR) is monitored on an annual basis for citations, violations, and accidents.	Yes
5. Each commercial driver's CSA score is monitored and referenced prior to an offer of employment.	No
6. All commercial drivers must provide proof of a valid department of transportation physical examination.	Yes
7. Drivers are monitored for sleep apnea through the physical examination process.	No
8. A driver qualification folder is maintained for each individual.	Yes
9. Commercial drivers receive training on hours of service regulations.	No
10. Drivers who do not adhere to hours of service regulations receive disciplinary action.	No
11. All drivers must pass a drug and alcohol test prior to the start of employment.	Yes

12. Commercial drivers receive random drug and alcohol tests in accordance with FMCSA regulations. Annually, the number of random drug tests is equal to 50% of the driver population, and the number of random alcohol tests are equal to 10% of the driver population.	Yes
13. Drivers are required to complete a drug and alcohol screening after an accident.	Yes
14. Drivers are required to complete a drug and alcohol screening after an extended period of time off duty.	Incomplete
15. A medical review officer (MRO) is utilized to receive and review drug and alcohol tests.	Yes
16. A substance abuse professional (SAP) evaluates employees who have failed a drug or alcohol test.	No
17. Drivers responsible for transporting hazardous materials are provided with proper training to safely perform required job tasks.	Yes
18. Commercial drivers receive training annually.	Yes
19. Commercial drivers are provided with cargo securement training.	Yes
20. Commercial drivers receive training to properly inspect a commercial vehicle.	Yes
21. Drivers receive training to complete daily inspection documentation.	Yes
22. Drivers are required to submit daily vehicle inspection reports to the maintenance department to be retained for documentation.	Yes
23. Equipment deficiencies identified in daily reports are corrected before a vehicle is permitted back into service.	Yes

24. Employees receive training on what action must be taken if a maintenance deficiency is discovered.	Yes
25. Drivers receive defensive driver training.	No
26. Drivers receive training on CSA 2010 regulations.	Yes
27. Drivers receive training on how to protect equipment and assets from theft and vandalism.	No
28. Drivers receive cargo securement training.	Yes
29. Drivers transporting hazardous materials receive proper training.	Yes
30. Drivers receive training on accident reporting procedures.	Yes

Category #2: Equipment Regulation or best practice.	Contained in current safety program.
1. All vehicles and equipment receive a documented annual inspection performed by a licensed individual.	Yes
2. Annual inspections are documented and retained for a minimum of 14 months.	Yes
3. Annual vehicle inspection stickers are installed on commercial trucks and trailers in accordance with FMCSA regulations.	Yes
4. A safety feedback hotline is in use.	No
5. Global positioning equipment is utilized to monitor the location and travel speed of vehicles.	Incomplete
6. Drivers are permitted to drive vehicles home.	Yes
7. Drivers are permitted to use company owned vehicles for personal travel.	Yes

8. A vehicle specification process is in place to ensure that equipment is appropriately specked for the applicable tasks.	Yes
9. Maintenance intervals meet or exceed the equipment manufacturer's requirements.	Yes
10. Vehicles are replaced at appropriate intervals to ensure equipment is reliable and safe.	Yes
Category #3: Management Responsibilities Regulation or best practice.	Contained in current safety program.
1. Accidents are analyzed by an accident review board and appropriate action is taken.	Yes
2. Members of management meet periodically to discuss and update the safety program.	Yes
3. Adequate time is dedicated to provide new employees with the appropriate training prior to the start of employment.	Yes
4. Adequate financial resources are dedicated to ensure equipment is properly maintained and in good repair.	Yes
5. Appropriate benchmarks are established to monitor the effectiveness of the safety program.	No

A loss analysis was completed by examining incident reports completed on previous vehicle accidents, equipment thefts, and department of transportation identified losses which occurred from 2008 through 2013. The results of the loss analysis are detailed in Table 2.

Table 2

Loss Analysis

Date	Loss Description	Total Loss	Avoidable	Cause of Loss	Injuries
4/14/08	Animal collision	$3,212	No	Natural causes	No
5/17/08	Backing into fixed object	$21,768	Yes	Unaware of surroundings	No
6/2/08	Object flying from vehicle	$4,858	Yes	Improper cargo securement	No
7/2/08	Tools stolen from vehicle	$3,938	Yes	Property left unsecured	No
7/29/08	Backing into own vehicle	$39,802	Yes	Unaware of surroundings	No
8/19/08	Animal collision	$5,381	No	Natural causes	No
12/6/08	Vehicle slid off road	$2,714	Yes	Driving too fast for conditions	No
2/10/09	Cargo securement devices stolen from trailer	$1,963	Yes	Property left unsecured	No
4/3/09	Object flying from vehicle	$2,851	Yes	Improper cargo securement	No
7/6/09	Backing into fixed object	$24,270	Yes	Unaware of surroundings	No
10/14/09	Vehicle driven off road to avoid collision	$52,609	Uncertain	Driving too fast for conditions	Yes
11/20/09	Animal collision	$4,779	No	Natural causes	No
3/8/10	Vehicle collision	$93,439	Yes	Driving too fast for conditions	Yes
6/9/10	Equipment theft	$3,619	Yes	Property left unsecured	No

7/21/10	Animal collision	$2,480	No	Natural causes	No
8/17/10	Vehicle collision	$16,756	Yes	Vehicle overloaded, not using the correct vehicle for the task Vehicle overloaded, not using the correct vehicle for the task	Yes
9/6/10	Vehicle collision	$8,704	Yes	Inattentive driving	Yes
1/18/11	Vehicle slid off road	$6,214	Yes	Driving too fast for conditions	Yes
4/2/11	Object flying from vehicle	$1,914	Yes	Improper cargo securement	No
5/14/11	Vehicle collision	$36,184	Yes	Brakes out of adjustment, tires excessively worn, driving too fast for conditions Brakes out of adjustment, tires excessively worn, driving too fast for conditions	Yes
7/30/11	Vehicle in ditch	$47,438	Yes	Driver did not follow hours of service regulations and fell asleep at the wheel	Yes
10/27/11	Animal collision	$7,406	No	Natural causes	No
11/21/11	Animal collision	$1,483	No	Natural causes	No
3/14/12	Equipment and tool theft	$82,019	Yes	Property left unsecured	No
4/6/12	Backing into fixed object	$8,480	Yes	Unaware of surroundings	No
6/22/12	Equipment fell off trailer	$40,489	Yes	Improper cargo securement, driving too fast Improper cargo	No

				securement, driving too fast	
8/3/12	Vehicle collision	$18,854	Yes	Driving too fast	No
3/12/13	Animal collision	$6,777	No	Natural causes	No
4/23/13	Vehicle fire	$14,203	Yes	Brakes improperly adjusted, improper storage of hazardous materials Brakes improperly adjusted, improper storage of hazardous materials	No
6/28/13	Vehicle collision	$4,800	Yes	Inattentive driving, driving too fast for conditions Inattentive driving, driving too fast for conditions	Yes
7/18/13	Vehicle rollover	$10,176	Yes	Brakes improperly adjusted, driving too fast Brakes improperly adjusted, driving too fast	Yes
8/9/13	Backing into fixed object	$1,165	Yes	Unaware of surroundings	No
8/10/13	Backing into own vehicle	$18,170	Yes	Unaware of surroundings	No
8/21/13	Object flying from vehicle	$1,177	Yes	Improper cargo securement	No
8/29/13	Animal collision	$4,557	No	Natural causes	No
12/1/13	Animal collision	$8,748	No	Natural causes	No

Table 3 below illustrates which type of loss most commonly occurred during the period of time from January 2008 through December 2013. During this period of time a total of 36 motor vehicle fleet related losses occurred at Scott Construction Inc.

Table 3

Areas of Loss

Type of Loss	Number of Losses	Percentage of Losses
Animal collision	9	25%
Vehicle collision	6	17%
Object flying from vehicle	5	14%
Backing into a fixed object	4	11%
Tool/equipment theft	4	11%
Backing into own vehicle	2	6%
Vehicle slid off road	2	6%
Vehicle driven off road to avoid collision	1	3%
Vehicle in ditch	1	3%
Vehicle fire	1	3%
Vehicle rollover	1	3%

Table 4 below illustrates the total financial loss by each loss category. The total financial loss incurred from all motor vehicle fleet related accidents from January 2008 through December 2013 was $613,397. Vehicle collisions resulted in the highest total financial loss category.

Table 4

Total Incurred Loss

Type of Loss	Total Loss Incurred
Vehicle collision	$178,737
Tool/equipment theft	$91,539
Backing into own vehicle	$57,972
Backing into a fixed object	$55,683
Vehicle driven off road to avoid collision	$52,609
Object flying from vehicle	$51,289
Vehicle in ditch	$47,438
Animal collision	$44,823
Vehicle fire	$14,203
Vehicle rollover	$10,176
Vehicle slid of road	$8,928

The researcher calculated the incident mileage rate, and the incident injury rate for the Scott Construction Inc. motor vehicle fleet during the period of time from January 2008 through December 2013. During this 6 year period of time the total fleet mileage by all vehicles in the Scott Construction Inc. motor vehicle fleet was 12,137,490 miles. The following calculated rates are the result of 36 fleet related incidents which occurred from 2008 through 2013.

Table 5

Vehicle Incident Rate and Driver Injury Rate 2008 Through 2013

	Calendar Year					
	2008	2009	2010	2011	2012	2013
Vehicle Incident rate per million miles	3.86	2.86	2.52	2.96	2.96	4.24
Driver injury rate per million miles	0	0.53	1.51	1.48	0	0.86

Discussion

Upon completion of the audit and the loss analysis it was noted that a number of deficiencies in the Scott Construction Inc. fleet safety program are likely to be contributing to tangible and significant monetary losses to the organization. The current Scott Construction Inc. fleet safety program is adequate in a number of areas, however the program does not contain all of the necessary information employees require to safely perform all job tasks.

The current fleet safety program wisely requires the human resources department to reference an individual's motor vehicle record (MVR) before an offer of employment is made. Before operating a commercial motor vehicle Scott Construction Inc. requires all commercial drivers to successfully complete a drug and alcohol screening. All drivers are also required to complete cargo securement training, daily vehicle inspection training, and if applicable hazardous material training. As required by FMCSA regulations, Scott Construction Inc. maintains a driver file for each commercial driver. The driver file includes a copy of each individual's license, proof of physical examination, motor vehicle driving records, CSA violations, drug and alcohol screening results, and proof of required trainings. Scott Construction Inc. continuously monitors that motor vehicle record (MVR) and CSA score of

each commercial driver to identify problem drivers and implement changes to avoid potential losses.

The motor vehicle fleet program in use at Scott Construction Inc. only contains a portion of the information commercial drivers must adhere to work in safe manner. However, the current program is missing many crucial components which are resulting in tangible and significant monetary losses for Scott Construction Inc. After analyzing the losses which occurred to the Scott Construction Inc. motor vehicle fleet from 2008 through 2013, numerous trends become apparent. The most common type of loss occurred as a result of animal collisions. Upon review of the completed accident reports from animal collision accidents, it is noted that members of management determined these losses were not avoidable and were a result of natural causes. Vehicle collisions resulted in the highest amount of monetary losses from all accidents. A significant number of losses occurred as a result of drivers backing into objects and other vehicles. Numerous losses were caused by theft and objects being released while traveling and thus causing damage to equipment and other motorist's vehicles. The number of losses which occurred as a result of vehicle backing, theft, and objects flying from vehicles is particularly concerning as these incidents are avoidable with proper employee training and appropriate policies and procedures in place. The motor vehicle fleet program must be updated to provide employees with standards and procedures which must be followed to properly secure cargo and equipment for safe transport. Through the development of proper employee training and the addition of back up cameras to commercial vehicles, losses which occur from backing accidents can be greatly reduced or eliminated. Members of management found that fatigued driving was the cause for one accident during the period of time from 2008 through 2013. However, it is quite likely that fatigued driving may have contributed to many of the other losses which occurred. Fatigued driving can be caused by violating hours of service regulations, or as a result

of poor quality sleep due to sleep apnea. Scott Construction Inc. currently does not provide drivers with training on hours of service regulations, and individuals who do not follow these standards do not receive disciplinary action. Defensive driver training can assist drivers in avoiding accidents and help provide safer roadways for the travelling public. Commercial drivers at Scott Construction Inc. currently do not receive any form of defensive driver training. Chapter V will provide recommendations to assist Scott Construction Inc. in creating a safer workplace for employees, and limit the organization's exposure to further motor vehicle related losses.

Chapter V: Conclusions and Recommendations

The occurrence of motor vehicle accidents, equipment theft, and Department of Transportation identified equipment violations is resulting in tangible and significant monetary losses for Scott Construction Inc. Therefore, the purpose of this study was to analyze the current fleet risk control standards and procedures in place at Scott Construction Inc. in order to determine if opportunities exist to align such with existing governmental standards as well as industry best practices. In order to achieve the purpose of the study, the following two goals were developed:

- Goal 1: Determine the extent that Scott Construction Inc.'s current standards and procedures follow Federal Motor Carrier Safety Administration guidelines as well as preferred fleet risk control practices.
- Goal 2: Collect and analyze theft, property damage, injury, and regulatory fine based data for losses which have occurred at Scott Construction Inc.

The methodology used to reach the goals of this study included the use of an audit and the completion of a loss analysis on the losses which occurred from 2008 through 2013 to the Scott Construction Inc. motor vehicle fleet. The following chapter will present the conclusions of the study, provide recommendations based on the conclusions, and identify areas which require further research.

Conclusions

The conclusions of the study are listed below in bullet format under each goal followed by a summary drawn from the completed audit and loss analysis.

Goal 1. Determine the extent that Scott Construction Inc.'s current standards and procedures follow Federal Motor Carrier Safety Administration guidelines as well as preferred fleet risk control practices.

- The current fleet standards and procedures program in use at Scott Construction Inc. was determined to be incomplete or deficient in 10 of the 45 areas analyzed by the audit. The areas in which the Scott Construction Inc. fleet standards and procedures program was determined incomplete or deficient include the following:
    - Commercial drivers who operate outside of Wisconsin are not required to be at least 21 years old.
    - The company does not reference an individual's CSA score prior to an offer of employment.
    - Drivers are not monitored for sleep apnea as part of the physical examination process.
    - Commercial drivers do not receive training on hours of service regulations.
    - Drivers who do not adhere to hours of service regulation do not receive disciplinary action.
    - Drivers who fail a drug or alcohol test are not evaluated by a substance abuse professional.
    - Vehicle operators do not receive defensive driver training.
    - Drivers are not trained on how to protect equipment and assets from theft or vandalism.
    - Scott Construction Inc. does not utilize a safety feedback hotline.
    - Management has not established appropriate loss and or activity based benchmarks to evaluate the effectiveness of the safety program.

The above deficiency areas indicate that the current fleet standards and procedures program in use at Scott Construction Inc. must be reviewed and updated by members of

management to provide drivers with the necessary information to comply with Federal Motor Carrier Safety Administration regulations and transportation industry best practices.

Goal 2. Collect and analyze theft, property damage, injury, and regulatory fine based data for losses which have occurred at Scott Construction Inc.

- 36 incidents occurred during the period of time from 2008 through 2013. The total financial loss at this time from these incidents is $613,397.00.
- 9 injuries were sustained as a result of fleet incidents from 2008 through 2013.
- Department of Transportation violations were issued in 8 of the 36 incidents which occurred from 2008 through 2013.
- The incident mileage rate during the 6 year period was 2.96 incidents per 1 million miles driven.
- The incident injury rate during this period of time was 0.74 injuries per 1 million miles driven.
- 4 losses occurred as a result of theft, the financial loss incurred by these events was $91,539.
- 6 losses occurred from vehicle collisions resulting in a financial loss of $178,737.
- 6 incidents were a result of backing into a fixed object or another vehicle.
- 5 losses occurred due to not properly securing cargo to a moving vehicle.

Recommendations

Implementing the following recommendations would create a safer workplace for the employees of Scott Construction Inc. and will help reduce the occurrence of fleet related losses to the company.

Members of management must revise and update the current fleet standards and procedures manual to include the following information:

- All commercial drivers must be at least 21 years old to operate a vehicle outside of an individual's home state. FMCSA regulations require all drivers involved in intrastate travel to be at least 21 years old.
- A member of Human Resources should reference a prospective driver's CSA score prior to an offer of employment. An industry best practice is to reference an individual's CSA score to identify problem drivers and those with past violations.
- All commercial drivers diagnosed with sleep apnea should be evaluated by a medical professional to determine if it is safe for the affected individual to operate a commercial motor vehicle. Individuals diagnosed with sleep apnea have a difficult time sleeping and are never fully rested. A lack of quality sleep can lead to daytime sleepiness and falling asleep while operating a vehicle.
- Scott Construction Inc. utilizes a zero tolerance policy for drug and alcohol use. Any employee who tests positive for drugs or alcohol while at work is terminated and the individual is not evaluated by a substance abuse professional. An industry best practice is to have individuals who test positive for drugs or alcohol evaluated by a substance abuse professional to determine a course of action.
- All commercial drivers must adhere to FMCSA hours of service regulations. The Federal Motor Carrier Safety Administration (FMCSA) has developed regulations which limit the number of hours drivers may work in a given timeframe. Drivers who do not adhere to hours of service regulations are in violation of the law and may become fatigued while operating a vehicle.
- All employees are required to check the securement of equipment and objects before operating a vehicle. Cargo which is not properly secured may be released from a vehicle while traveling and could strike other motorists resulting in injuries and

damage to property. Improper cargo securement is a Department of Transportation violation which results in citations and negatively affects the driver's and the motor carrier's CSA score.

Members of management must be develop and hold annual training sessions for all new and current employees. Training must be developed to further address the following topics:

- Hours of service regulations and compliance.
- Defensive driver training.
- Theft and vandalism prevention.
- Vehicle backing and maneuvering.
- Load securement.

At the time of this study, Scott Construction Inc. has not established any benchmarks to measure and evaluate the performance of the motor vehicle fleet. It is recommended that members of management collaborate and establish appropriate motor vehicle fleet safety benchmarks to monitor the safety of the organization. Members of management should establish monthly meetings to discuss fleet related safety issues and update the fleet safety program to implement any necessary changes and to comply with changing federal regulations.

Areas of Further Research

A number of areas of further research were identified during this study. These areas include the following:

- Study the use of back up cameras to help reduce or eliminate backing incidents.
- Examine methods to help avoid vehicle collisions with wildlife.
- Determine if global positioning system (GPS) equipment could be utilized to monitor vehicle travel speed, determine vehicle location in the event of a theft, and monitor hours of service.

- Conduct further research on the implementation of a safety hotline on company owned vehicles.

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