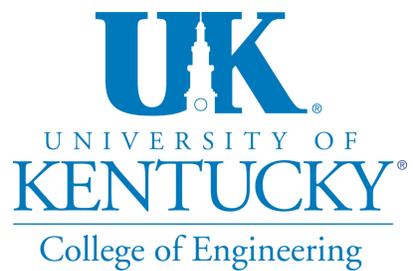




## KENTUCKY TRANSPORTATION CENTER

### MEASURING THE VALUE OF KENTUCKY VEHICLE ENFORCEMENT ACTIVITIES





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Research Report  
KTC-08-03/SPR332-07-1F

**MEASURING THE VALUE OF KENTUCKY  
VEHICLE ENFORCEMENT ACTIVITIES**

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in cooperation with

Kentucky Transportation Cabinet  
Commonwealth of Kentucky

and

Federal Highway Administration  
U. S. Department of Transportation

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## EXECUTIVE SUMMARY

Kentucky Vehicle Enforcement (KVE) is a Department within the Justice and Public Safety Cabinet with the primary responsibility for monitoring commercial vehicle traffic and enforcing laws and regulations applicable to commercial vehicles. The activities of KVE directly impact the mission of the Kentucky Transportation Cabinet (KYTC) by improving highway safety, protecting the highway infrastructure, and maximizing Road Fund revenues. The objectives of this study were to identify, describe, and (where possible) quantify the benefits associated with the activities of KVE. The data for this study was collected by conducting KVE staff and stakeholder interviews, literature reviews, and enforcement studies.

KVE is composed of three divisions: Field Operations, Special Operations, and Administrative Services. The Field Operations Division includes officers and inspectors who patrol Kentucky roadways, operate weigh/inspection facilities, conduct commercial vehicle/driver inspections, and weigh commercial vehicles to determine compliance with legal limits. Kentucky has 14 weigh/inspection facilities in 10 regional posts. The Special Operations Division maintains highly trained officers and special resources to aid in the following activities: follow-up investigation from initial police reports, coordination and enforcement of narcotics and vice-related offenses on Kentucky highways, and collection and preservation of evidence. The Administrative Services Division provides services in operations and administrative support, training, accounting, compliance reviews, safety audits, supply, personnel, and information systems.

KVE employs 251 people in various positions. As of January 31, 2008, there were 175 sworn law enforcement officers in the position of Officer 1, Officer 2, K-9 officer, Sergeant, Lieutenant, Captain, or Major. KVE also employs 28 inspectors trained in the North American Standard Inspection criteria. The Department is led by a commissioner and deputy commissioner and also employs another 46 people in civilian positions.

In 2007, KVE had a budget of \$19.8 million in state and federal funding for their various activities. Approximately 70% of the total funding was state money and came from the Road Fund. The remaining 30% was federal money. They also received an additional \$1.7 million in restricted funds for designated activities. Total funding for 2007 was \$21.5 million.

KVE is involved in a number of activities aimed primarily at commercial vehicle and driver safety as well as proper operating authority. The bulk of their activities are performed by the officers or inspectors at one of Kentucky's 14 weigh/inspection facilities or at the roadside. KVE performed more than 50,000 vehicle and nearly 29,000 driver-only inspections in 2006. They also conducted 370 safety audits and 235 compliance reviews. KVE activities include:

- Commercial Vehicle Safety Inspections
- Commercial Vehicle Hazardous Material Safety Inspections
- Commercial Driver Safety Inspections
- Safety Inspections for Passenger Vans and Buses
- Safety Audits
- Compliance Reviews

- Enforcement of Tax, Registration, Fee, and Insurance Requirements
- Enforcement of Commercial Vehicle Size and Weight Regulations
- Work Zone Enforcement
- Traffic Enforcement
- Holiday Traffic and Special Event Enforcement
- Security Enforcement at Three Points of Entry
- Drug Interdiction Enforcement
- Drug Recognition Training
- Collection of Commercial Vehicle Observation Data
- Collection and Upload of Inspection and Crash Data to MCMIS and SafetyNet
- Traffic Safety Public Service Announcements and Presentations

There are a number of stakeholders who receive benefit from the activities of KVE, including federal and state government agencies, special interest groups, the motor carrier industry, motorists, and the general public. The primary benefits of KVE activities, as identified by stakeholders and the literature review, are: fewer crashes, fatalities, and injuries on roadways; improved safety for highway workers; improved public safety and awareness of safety issues; increased revenue for Kentucky's Road Fund; reduced damage to pavement and infrastructure; decreased availability of illegal narcotics; and a more level playing field for motor carriers.

The data from four special enforcement studies was used in assessing the value of KVE activities. A 48-hour enforcement blitz was conducted at the northbound Laurel County weigh/inspection facility. The main objective of the study was to identify and quantify (where possible) the benefits of increased staffing at the weigh/inspection facility. A secondary objective was to identify actions that would allow KVE to maximize the benefits received from their activities. During this study, KVE conducted 151 inspections, placing three drivers and 19 vehicles out-of-service (OOS). KVE used a variety of methods to select vehicles for inspection, including: the Kentucky's Clearinghouse System, random identification, overweight violations, the Infrared Inspection Systems (IRIS) van, and visual observation. During the 48-hour blitz, vehicles selected for inspection using the IRIS van had the highest percentage of drivers placed OOS with 11.11 percent. Vehicles selected for inspection using the Clearinghouse had the highest percentage of vehicles placed OOS with 38.46 percent.

Data was also collected on US 25 during the 48-hour enforcement blitz. The objective of this study was to monitor this primary bypass route and better understand the effects of increased enforcement at the weigh/inspection facility. There were significant problems with the weigh-in-motion (WIM) equipment used for data collection, but there were two noteworthy findings from the effort. First, the available data indicated that there was a significant increase in traffic on US 25 when the weigh/inspection facility was open versus when it was closed. Second, there were a significant number of "unclassified" vehicles identified during the 48-hour enforcement blitz. This data may indicate vehicles that were attempting to avoid the WIM by straddling the centerline of the roadway.

A thermal imaging study was conducted to evaluate the potential of using the infrared technology for better identification of high-risk vehicles. The data for this study was collected at

two different locations: the southbound Kenton County and the northbound Laurel County weigh/inspection facilities. There were 38 trucks stopped and inspected as part of this effort. Sixty-eight percent of those trucks, or 26, had a brake problem, resulting in 56 brake violations and 86 total violations. Ten trucks, or 26 percent, were placed OOS.

The data from an eastern Kentucky coal-haul focus study was also used as supplemental data for this study. This data, provided by KVE, shows a dramatic decrease in the percentage of coal trucks weighed in eastern Kentucky that were overweight. As KVE's enforcement presence was increased, this percentage dropped from 77.1 percent in 2004 to 2.9 percent in 2006. This effort has also resulted in a general improvement in the overall safety of commercial vehicle operations in eastern Kentucky.

The functions carried out by KVE are critical to protecting the health and safety of Kentucky's citizens, maintaining revenue for Kentucky's Road Fund, and protecting Kentucky's surface transportation infrastructure. The primary benefits provided by the activities of KVE are: reductions in crashes, injuries, and fatalities; protection of the revenue streams that replenish Kentucky's Road Fund; reduced damage to Kentucky's surface transportation infrastructure; and creating a level playing field for Kentucky motor carrier industry. Although many of these benefits are difficult to quantify, it is possible to provide estimates for some of the benefits. Using the best available estimates for crash reductions, revenue protection, and infrastructure protection, KVE activities in these areas are worth approximately \$70 million to \$130 million annually.

Many of the benefits associated with KVE's activities will vary significantly based on several factors. These include: staffing levels; KVE's effectiveness in targeting high-risk motor carriers, vehicles, and drivers for inspection; and the level of cooperation between KVE and the Division of Motor Carriers. There is a need for further research to identify optimum staffing levels and staffing allocation. The study findings indicated that there is substantial room for improvement in inspection selection processes. Increased usage of available tools (such as the Kentucky Clearinghouse system and the thermal imaging technology), combined with an increased management emphasis on vehicle and driver OOS rates, should generate additional benefits beyond those currently being achieved.

Recommendations from this study include providing adequate funding and staffing levels for KVE, improved coordination and communication between KVE and the Division of Motor Carriers, continuation of the special enforcement emphasis on weight limits in eastern Kentucky, adoption of a management strategy to increase driver and vehicle OOS rates, in-depth training on the thermal imaging system, and further research in a few select areas. Areas for further research include: determining optimum KVE staffing levels and allocation; impacts of weigh station open/closed status on bypass route truck volumes; trucks disregarding instructions on weigh station signs; low driver out-of-service rates; and the decline in direct revenue collections.

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## **CHAPTER ONE**

### **INTRODUCTION**

The responsibility for monitoring commercial vehicles on Kentucky's roadways and enforcing the applicable laws and regulations falls primarily on Kentucky Vehicle Enforcement (KVE), a Department within the Kentucky Justice and Public Safety Cabinet. KVE officials are involved in a variety of activities including commercial vehicle size and weight enforcement, work zone speed enforcement, and general traffic monitoring and enforcement. The functions carried out by KVE are critical to protecting the health and safety of Kentucky's citizens as well as Kentucky's surface transportation infrastructure.

#### **1.1 Background**

Prior to 2004, the Kentucky Division of Vehicle Enforcement (now KVE) was under the Department of Vehicle Regulation within the Kentucky Transportation Cabinet (KYTC). The responsibilities for vehicle enforcement were shifted from the Transportation Cabinet to the Justice and Public Safety Cabinet on June 16, 2004 in an effort to streamline state government and bring similar functions within the same Cabinet. However, many of the activities performed by KVE continue to have a direct impact on improving highway safety, protecting the highway infrastructure, and maximizing Road Fund revenues. Clearly, the activities performed by KVE directly impact the mission of the KYTC. As such, KYTC has a vested interest in the activities performed by KVE.

In September of 2006, the Kentucky Transportation Cabinet funded a project to document the various activities performed by KVE personnel and the benefits that are received as a result of these activities. Because much of what KVE does is preventive in nature (i.e., preventing "bad things" from happening), it is easy to take KVE for granted. As a result, the value of KVE activities is not well understood by many decision makers. This project will help KYTC and the Commonwealth of Kentucky better understand and document the benefits received as a result of KVE activities. This effort can also help KYTC and KVE better utilize their resources to maximize the benefits received.

#### **1.2 Objectives**

The objectives of this study are to identify, describe, and (where possible) quantify the benefits associated with the vehicle enforcement activities of KVE. This study will result in a set of recommendations that, when implemented, will help maximize the benefits received from KVE activities.

#### **1.3 Methodology**

The data for this study was collected in four basic ways: interviews with KVE staff, interviews with KVE stakeholders, literature reviews of pertinent information, and an enforcement study. Interviews with KVE staff and stakeholders were primarily conducted over the phone, by email,

or at project meetings. A literature review was conducted to supplement information gathered from KVE staff and stakeholders. The enforcement study, which is discussed in Chapter 4, was used to help identify KVE activities and measure some of the benefits identified in Chapters 2 and 3. More information regarding the collection of the enforcement data is summarized in Chapter 4.

#### **1.4 Structure of the Report**

This report is organized into six sections. Chapter 1 outlines the background and purpose of the project. Chapters 2, 3, and 4 all provide findings from the study. Chapter 2 provides an overview of KVE through a discussion of the department's mission, organization, personnel, funding, and activities. Also included in Chapter 2 is an activities table which summarizes the primary activities of KVE and provides quantity information. Chapter 3 of the report identifies the primary stakeholders and describes the potential benefits of KVE activities. Chapter 3 also includes a table summarizing the benefits and stakeholder information. Chapter 4 summarizes the enforcement studies that were conducted to collect additional data on activities and benefits. Chapter 5 presents the conclusions of the report, and Chapter 6 provides recommendations to maximize the benefits received from KVE.

## CHAPTER TWO

### AN OVERVIEW OF KENTUCKY VEHICLE ENFORCEMENT

Kentucky Vehicle Enforcement (KVE) is a department within the Justice and Public Safety Cabinet. KVE employs sworn law enforcement officers, weight and safety inspectors, and civilians. KVE is the state enforcement agency responsible for enforcing motor carrier laws and regulations.

KVE received accreditation from the Commission on Accreditation for Law Enforcement Agencies (CALEA) in November of 2007. CALEA is a voluntary accreditation program for law enforcement agencies based on a body of standards internationally accepted by the law enforcement community. This program provides a process to systematically conduct an internal review and assessment of KVE's policies and procedures and make adjustments wherever necessary to meet a body of internationally accepted standards (1). KVE is the first CALEA accredited commercial vehicle enforcement agency in the United States and the fifth law enforcement agency in Kentucky to gain such accreditation.

#### 2.1 Mission Statement

The mission of KVE is to encourage and promote a safe driving environment through education and safety awareness while enforcing State and Federal laws and regulations, placing special emphasis on commercial vehicles (2).

#### 2.2 Organization of the Department

There are three divisions within KVE: Field Operations, Special Operations, and Administrative Services. The divisions are staffed with sworn law enforcement officers, regulatory weight and safety inspectors, and civilian administrative staff (3).

##### 2.2.1 Field Operations

The Field Operations Division includes the officers who patrol Kentucky roadways, operate weigh/inspection facilities, and weigh commercial vehicles to determine compliance with legal limits. Officers inspect driver and vehicle records for compliance with licensing, permits, and other vehicle or driver operating laws and regulations. KVE officers also conduct vehicle crash investigations, impound vehicles, and make arrests. Their duties also include gathering and preparing physical evidence for use in court.



Figure 1. Officer Paul Carson checks the brakes on a truck at the Laurel County weigh/inspection facility (4).

Inspectors staff the weigh/inspection facilities, weigh trucks for compliance, and inspect driver and vehicle records. Safety inspectors are trained in the North American Standard Inspection criteria and examine commercial vehicles for compliance with those standards. Vehicles not meeting certain standards may be placed out-of-service (OOS) until repaired. Other violations are reported on the vehicle safety report and forwarded to a national database. Some civilians are also utilized at the weigh facilities. Their duties include clerical, secretarial, computer operations, data entry, data analysis, bookkeeping, purchasing, record keeping, and other general finance work. There are 14 weigh/inspection facilities located in 10 regional posts (2). Table 1 below is a listing of the KVE regions and weigh/inspection facilities. Figure 2 is a map displaying the location of these facilities.

Table 1. KVE Regions and Weigh/Inspection Facilities (2).

<b>Post</b>	<b>Weigh Facility</b>	<b>Route / Direction</b>
Region 1	Lyon County	I-24 (mm 36) / EB & WB
	1A – Fulton	US 51 (Exit 0) / NB
	1B – Wickliffe	US 62 (mm 4) / SB
Region 2	Simpson County	I-65 (mm 4) / NB
Region 3	Hardin County	I-65 (mm 90) / SB
Region 4	Shelby County	I-64 (mm 38.5) / EB
Region 5	Scott County	I-75 (mm 130) / NB
Region 6	Rowan County	I-64 (mm 148) / WB
Region 7	Laurel County	I-75 (mm 33) / NB & SB
Region 8	Henderson County	US 41 (mm 21) / SB
Region 9	Boone County	I-71 (mm 76) / SB
	9B – Kenton County	I-75 (mm 168) / SB
Region 10	Pike County - Office only	N/A

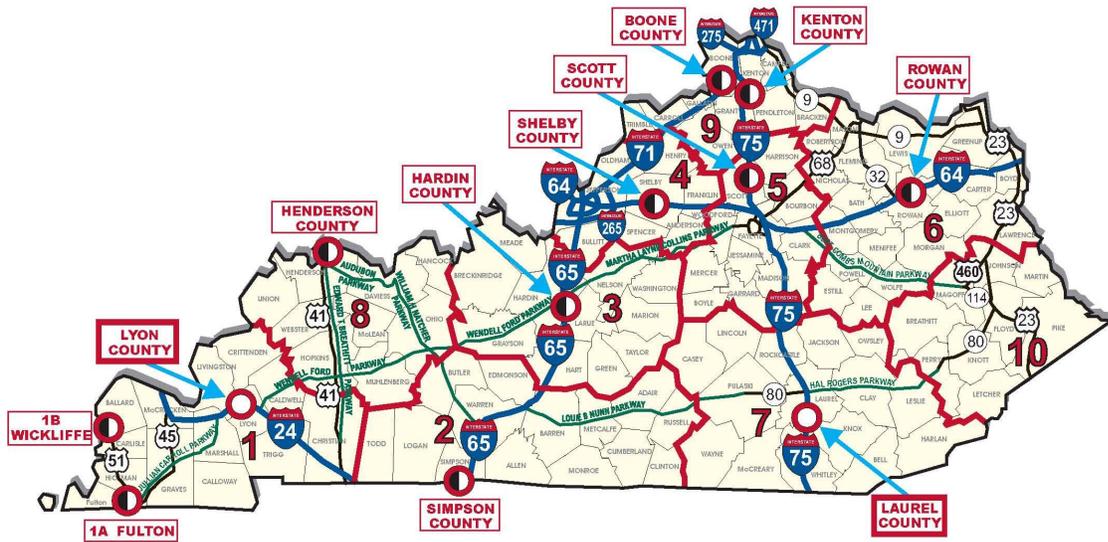


Figure 2. Map of KVE Posts and Weigh/Inspection Facilities (2).

### 2.2.2 Special Operations

The mission of the Special Operations Division is to provide a coordinated response to significant policing concerns through the application of highly trained and specialized resources, placing special emphasis on commercial vehicles. Responsibilities of this division include: follow-up investigation from initial police reports, the coordination and enforcement of narcotics and vice-related offenses on Kentucky highways, and collection and preservation of evidence. KVE's Canine Unit is within this division and is composed of interdiction officers and their assigned narcotic detection canines. All dogs are trained in drug-sniffing and are dedicated to full-time vice and narcotics activity. A newly established Aviation Section is available to assist officers from the air when needed. Special Operations Command is led by a Lieutenant who reports directly to a Major in charge of Field Operations. This section employs 11 sworn officers and 1 civilian administrative aid (2).



Figure 3. Sgt. Tony Wilson and his canine partner, Ben, check for illegal narcotics (4).

### **2.2.3 Administrative Services**

This division employs 29 people and includes the responsibilities of operations and administrative support, training, accounting, compliance reviews, safety audits, supply, personnel, and information systems.

## **2.3 Personnel**

KVE employs a total of 251 people in various positions. One Commissioner directs the department, and is assisted by one Deputy Commissioner. There are 175 sworn officers. To qualify for an officer position, applicants must follow Kentucky Law Enforcement's Peace Officer Professional Standards Act (POPS) and have the equivalent of 54 hours of college credit.<sup>1</sup> As a substitute for the college requirement, applicants may have two years of experience as a full-time sworn law enforcement officer, two years experience in military duty, or two years experience as a commercial vehicle inspector under the North American Standard requirements. Once hired, officers must, at a minimum, successfully complete 18 weeks of basic training, two weeks of North American Standard Driver/Vehicle Inspection training, one week of radar training, and one week of hazardous material training. Officers are also required to successfully complete a minimum of 40 hours of in-service training annually (2) New officers start in an Officer I position and may, upon promotion, progress into an Officer II, K-9 Officer, Sergeant, Lieutenant, Captain, or Major position – with Major being the highest sworn officer distinction.

There are 28 safety inspectors employed by KVE. Applicants for an inspector position must be 21 years of age, a high school graduate, and possess a valid driver's license. They must also pass a background check, physical agility test, and State Personnel Cabinet administered test for placement as a state employee. The entry level inspector is classified as an Inspector I. Promotions may lead to an Inspector II position. Inspectors may also be promoted into an officer position once they meet the appropriate requirements. There are 46 civilian positions, nearly half of which are located at the weigh/inspection facilities. The remaining civilian employees work at headquarters in various positions related to supply, information systems, general administrative tasks, training, and other areas.

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<sup>1</sup> For a brief summary of POPS please see Appendix A.

Table 2. Number of KVE Personnel

<b>KVE Personnel*</b>	
<b>Commissioner</b>	<b>1</b>
<b>Deputy Commissioner</b>	<b>1</b>
<b>Sworn Officers</b>	<b>175</b>
Officer 1	133
Officer 2	10
K-9**	4
Sergeant	10
Lieutenant	8
Captain	7
Major	4
<b>Safety Inspectors</b>	<b>28</b>
Inspector I	7
Inspector II	21
<b>Civilians</b>	<b>46</b>
<b>TOTAL EMPLOYEES</b>	<b>251</b>

\*As of January 31, 2008

\*\*One K-9 officer has the rank of Sergeant and is also counted in this category.

In addition to KVE staff, a limited number of officers in other agencies conduct commercial vehicle inspections. Those agencies include the Lexington and Louisville police departments, the Boone County Sheriff's Office, and the Kentucky State Police. These partner agencies are valuable in creating a stronger commercial vehicle enforcement presence, particularly in urban areas, thus allowing more efficient deployment of limited KVE resources in other areas of the Commonwealth.

## 2.4 Funding

In 2007, KVE received \$19,824,000 in state and federal funding for various activities. Approximately 70 percent (\$13,974,900) of the funding is state money and comes from Kentucky's Road Fund. The remaining funding (\$5,849,100) is federal money. The federal money is provided through two grants. One grant is for the Safety Audit Program (described in Section 2.6) and is 100 percent federal money. The second grant is for the Motor Carrier Safety Assistance Program (MCSAP). This money is 80 percent federal and requires 20 percent matching state funds. In addition to the \$19.8 million, KVE also received a total of \$1,666,300 in restricted funds from KYTC (for work zone activities), the Kentucky Law Enforcement Foundation Program Fund (for training stipends for officers), and state and federal forfeitures. KVE's total funding (including state, federal, and restricted monies) for 2007 was \$21,490,300.

## 2.5 Activities

KVE focuses on safety on the highways of the Commonwealth with the primary emphasis on commercial vehicles. Vehicle and driver safety as well as proper operating authority are key elements of commercial vehicle enforcement. The bulk of these activities are performed by officers and inspectors at one of Kentucky's 14 weigh/inspection facilities or on the roadside. Inspectors spend 100 percent of their time at the weigh/inspection facilities, while officers spend the majority of their time on the roadway.

In addition to commercial vehicle and driver safety enforcement, KVE officers and inspectors participate in a number of different activities. For example, KVE personnel participate in Kentucky's Drive Smart Program, seat-belt challenges, holiday traffic patrols, child restraint education, and other joint programs with agencies such as the Kentucky State Police, Sheriff's Departments, and other police and safety-oriented groups. KVE recently received a federal grant to kick-off a safety campaign entitled, "Ticketing Aggressive Cars and Trucks" (TACT). The goal of this program is to reduce fatalities caused by aggressive driving by both commercial and noncommercial drivers. The campaign is currently focused on specific segments of I-75 and I-65.

Table 3 was compiled with input from KVE staff and stakeholders in an effort to summarize the various activities performed by KVE personnel. Following the table, a more in-depth discussion of each of the activities is provided.

Table 3. Kentucky Vehicle Enforcement Activities

<b>KVE Activity</b>		<b>Description</b>	<b>Quantity*</b>
1	Commercial Vehicle Safety Inspections	Physical examination of commercial vehicles for the enforcement of State and Federal laws and regulations regarding vehicle safety	<b>50,637</b> Vehicle Inspections (Levels I, II, V)
2	Commercial Vehicle Hazardous Material Safety Inspections	Physical examination of hazardous material commercial vehicles for the enforcement of State and Federal laws and regulations regarding hazardous material vehicle safety	<b>9,174</b> Hazardous Material Inspections
3	Commercial Driver Safety Inspections	Physical examination of commercial drivers' credentials and records for the enforcement of State and Federal laws and regulations regarding driver safety	<b>28,627</b> Driver Inspections (Level III only)
4	Safety Inspections for Passenger Vans and Buses	Physical examination of passenger vans and buses for the enforcement of State and Federal laws and regulations regarding van and bus safety	<b>1,884</b> Van/Bus Inspections
5	Safety Audits	Audit conducted on new motor carriers to assess safety operational readiness and provide educational information	<b>370</b> Safety Audits
6	Compliance Reviews	On-site examination of a motor carrier's records and operations to investigate potential safety violations or complaints, or to review a request for a change in the carrier's safety rating	<b>235</b> Compliance Reviews
7	Enforcement of Tax, Registration, Fee, and Insurance Requirements	Enforcement of State and Federal laws and regulations regarding the requirements for vehicle insurance and the payment of taxes, registration, and other fees	<b>\$199,474,514</b> Collected for taxes, registrations, etc. <b>\$266,600</b> Collected from Impounds
8	Enforcement of Commercial Vehicle Size and Weight Regulations	Enforcement of State and Federal laws and regulations regarding the size and weight of commercial vehicles	<b>8,306,463</b> WIM weights <b>74,595</b> Static weights <b>9,083</b> Portable weights <b>1,561</b> Size Contacts
9	Work Zone Enforcement	Enforcement of State and Federal laws and regulations in highway work zones--specifically focusing on work zone speed limits	<b>560</b> Commercial Vehicle Violations <b>4,038</b> Non-Commercial Vehicle Violations
10	Traffic Enforcement	Enforcement of State and Federal laws and regulations on highways--specifically focusing on commercial vehicles	<b>39,997</b> Commercial Vehicle Violations <b>12,736</b> Non-Commercial Violations
11	Holiday Traffic and Special Event Enforcement	Enforcement of State and Federal laws and regulations on highways during high traffic volume periods and events	<b>2,037</b> Commercial Vehicle Violations <b>17,654</b> Non-Commercial Violations
12	Security Enforcement at Three Points-of-Entry	Monitoring of commercial vehicles potentially carrying radioactive materials at three points-of-entry	Every Commercial Vehicle passing through the Weigh/Inspection Facilities

\*2006 data

Table 3, continued

<b>KVE Activity</b>		<b>Description</b>	<b>Quantity*</b>
13	Drug Interdiction Enforcement (DIE)	Enforcement of State and Federal laws regarding the transport of illegal narcotics by commercial vehicles. Includes the use of narcotic-sniffing canines	<b>1,100</b> DIE stops (783 included a Safety Inspection)
14	Drug Recognition Training	Training of officers to detect drug impaired commercial vehicle drivers	<b>33</b> Drug Recognition Experts (DREs) <b>35</b> individuals trained by KVE to date
15	Collection of Commercial Vehicle Observation Data	Observe and record the presence of commercial vehicles as they pass through a weigh/inspection facility, including the USDOT or KYU number and the Unit number of each passing vehicle	<b>1,721,558</b> Vehicle Observations Recorded
16	Collection and Upload of Inspection and Crash Data to MCMIS and SafetyNet	Upload inspection reports, compliance reviews and crash reports to MCMIS and SafetyNet	<b>79,264</b> Total Inspections Uploaded <b>2,868</b> Crash Data Information Uploaded
17	Traffic Safety Public Service Announcements and Presentations	Provide traffic information to the Kentucky's Traffic Operations Center and present and promote public safety campaign information at events	No information available

\*2006 data

#### *Commercial Vehicle Safety Inspections*

The primary duty of KVE officers and inspectors is to perform commercial vehicle safety inspections. As commercial vehicles pass through the weigh/inspection facility, KVE officers and inspectors select trucks for inspection. KVE officers also select commercial vehicles for inspection on Kentucky's roadways. Once a truck is selected for inspection purposes, the KVE officer has the option to choose what level of inspection (I-V) to perform<sup>2</sup>. If a violation is discovered during the safety inspection process the offending company has 15 days to correct the problem. However, if there are multiple violations, or a single violation that poses an immediate danger to other motorists on the highway, then the truck is placed OOS until the problem is corrected.

#### *Commercial Vehicle Hazardous Material Safety Inspections*

KVE officers and inspectors are required to perform a certain number of commercial vehicle safety inspections per year. There are also requirements for how many of those inspections must be performed on commercial vehicles that transport hazardous materials. Vehicles transporting hazardous materials are categorized differently from other commercial vehicles due to their unique inspection requirements and more severe crash impacts. In 2001, the Federal Motor Carrier Safety Administration found that the average cost of a crash was higher for hazardous materials vehicles than for non-hazardous material vehicles, although hazardous material shipments make up only four to eight percent of all shipments (5). Given the greater impact of a

<sup>2</sup> For a brief summary of the North American Standard Inspection Levels please see Appendix B.

hazardous material incident, safety inspections on hazardous material vehicles are an important function performed by KVE officers.

#### *Commercial Vehicle Driver Safety Enforcement*

KVE officers and inspectors are responsible for helping to ensure that driver paperwork is in compliance with the current governing laws. This includes verifying that the driver's commercial vehicle license and medical evaluations are valid, the driver's logbook is up-to-date, and the driver has observed the proper rest hours as mandated by federal law. Driver receipts are also checked to validate the information provided by the driver logbook. Driver safety checks are often conducted in conjunction with a full (i.e., Level I) vehicle inspection, but they may be done without a full vehicle inspection. A safety inspection that focuses solely on the driver is categorized as a Level III inspection. Level I and Level II inspections also have a driver component. If the driver has a violation or violations that pose an immediate danger to other motorists on the highway, then the driver is placed OOS for a specific time, depending on the violation.

#### *Safety Inspections for Passenger Vans and Buses*

KVE officers are responsible for performing safety inspections on passenger vans and buses. Drivers responsible for the vans or buses go to their local weigh/inspection facility and request a safety inspection from either a KVE officer or inspector. Every van or bus safety inspection requires the KVE official to inspect the vehicle's lighting systems, tires, wheels, brakes, fuel systems, and other important vehicle safety components. If the van or bus fails its safety inspection, the vehicle must either be repaired at the weigh/inspection facility or re-inspected after the proper repairs have been made. If the van or bus passes the inspection a state decal (for 9 to 15 passenger vans) or a Commercial Vehicle Safety Alliance (CVSA) decal (for buses) is placed on the vehicle indicating that it passed the yearly inspection. All inspections follow the criteria established by the North American Standard Guidelines.

#### *Safety Audits*

When a new motor carrier begins operations, they are required to undergo a safety audit within the first 18 months, in order to receive permanent registration. KVE officials are responsible for conducting safety audits on new commercial motor carriers to assess the operational readiness of the carrier and to provide educational information to both commercial vehicle drivers and owners. Safety audits evaluate three areas. The first area concerns the drivers' and owners' knowledge and application of current safety regulations. The second area concerns safety management systems. The third area concerns the drivers' and owners' safety readiness.

#### *Compliance Reviews*

KVE officers are responsible for conducting on-site compliance reviews. Compliance reviews involve the examination of a motor carrier's records and operations to determine whether the carrier meets the FMCSA safety fitness standards. The intent of a compliance review is to educate motor carriers about safety regulations. It is assumed that through a heightened awareness of safety regulations and the potential of enforcement, carriers will improve the safety of their commercial vehicle operations and ultimately reduce the number and severity of crashes in which they are involved (6)

### *Enforcement of Commercial Vehicle Tax, Registration Fees, and Insurance Requirements*

KVE officers are responsible for ensuring that commercial vehicle companies are up-to-date on all taxes, registration fees, and insurance requirements. All requirements are checked when drivers are stopped at either the weigh/inspection facility or during a roadside inspection. Ensuring that commercial vehicle owners and operators have paid their taxes and registration fees helps provide a more level playing field for all commercial vehicle owners and operators. Insurance requirements are also vitally important to all commercial vehicle owners and operators in addition to non-commercial highway users. Enforcing proper credentialing is crucial to ensuring that laws and regulations in the commercial vehicle industry are followed and that the state road fund is properly replenished.

### *Enforcement of Commercial Vehicle Size and Weight Requirements*

For most of Kentucky's weigh/inspection facilities, as trucks enter the facility they pass over weigh-in-motion detectors<sup>3</sup>. Commercial vehicles that are approaching or exceeding the gross or axle weight limits are directed to a separate lane where they are weighed on a static scale to determine if they are within legal limits. For a vehicle that is overweight, a KVE officer or inspector will issue a citation. Enforcing truck weight laws is a vitally important activity, as overweight trucks cause substantial damage to the public highway infrastructure and are more dangerous to other vehicles on the road. Previous research has shown that enforcement activities do reduce the amount of overweight truck traffic and thus reduce damage to highway infrastructure (7). KVE also monitors the dimensions of vehicles to ensure they do not exceed height, width, or length restrictions. For the most part, this monitoring is visual and manual, although some weigh/inspection facilities are equipped with automatic over-height detectors on the ramp. For vehicles that have permits for overweight or over-dimensional loads, KVE checks to see that the permit is valid and the load is in compliance with the permit.

### *Work Zone Enforcement*

Like many other states around the country, the aging highway infrastructure in Kentucky has led to more frequent maintenance activities on Kentucky's highways. Previous research has shown that crash rates increase as speed variance increases in work zones and that law enforcement presence is the best available deterrent for reducing work zone speed (8). Therefore, to help reduce the number of work zone crashes caused by speeding, KVE officers are stationed in work zones across the state to enforce speed limitations for both commercial and non-commercial vehicles.

### *Traffic Enforcement*

KVE officers provide enforcement for state and federal traffic laws and regulations. Commercial vehicles can be stopped for speeding, aggressive driving, and/or other dangerous activities. If a commercial vehicle is stopped along the highway, the KVE officer also has the option to perform a driver and/or vehicle safety inspection. The primary focus of KVE's traffic enforcement activity is ensuring that commercial vehicles are following traffic rules and regulations.

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<sup>3</sup> This description applies to nine of Kentucky's 14 weigh/inspection facilities. The exceptions are Fulton, Wickliffe, Hardin County, Shelby County, and Rowan County, which have no sorting capability and only a static scale. The Hardin, Shelby, and Rowan County static scales can be operated in a "slow rollover" mode.

However, they are also authorized to stop non-commercial vehicles for roadway violations and do so as needed.

#### *Holiday Traffic and Special Event Enforcement*

KVE officers provide additional enforcement during holidays and for special events around the state. Research has shown that there is more traffic on the highways in the days before and after holidays (9). As traffic increases on the highways, so does the number of incidents, which requires additional police presence. KVE officers provide the additional presence required during these holiday periods.

#### *Security Enforcement at Three Points-of-Entry*

As trucks enter Kentucky from Tennessee (on I-65 or I-75) or from Ohio (on I-75), they must pass through a radiation detection system at the Simpson County, Laurel County, or Kenton County weigh/inspection facility. The radiation detectors identify cargo shipments that emit gamma and/or neutron radiation that exceeds preset thresholds. KVE officers monitor the radiation detection system and determine the appropriate response for each alarm. Not all alarms require the vehicle to be stopped, since the alarms are often activated by naturally occurring radioactive materials (such as bricks, porcelain fixtures, kitty litter, etc.) Clearly, radiation detection technology is an extremely useful tool for ensuring homeland security, and this technology depends on KVE officers to monitor the system and determine the appropriate response to each alarm.

#### *Drug Interdiction Enforcement*

A large number of KVE officers are trained to identify and safely intercept individuals who are transporting and/or using illegal narcotics. These officers are familiar with drug trafficking trends and smuggling patterns and are trained to recognize indicators of drivers using, possessing, selling, or hauling drugs. KVE currently has four interdiction officers with drug-sniffing canines. The majority of their work tends to be in eastern Kentucky, but these specialized officers and their canine partners are used all over the state and by other law enforcement agencies. In 2006, KVE had 681 drug cases. In those cases, they seized 36 guns, \$185,993.29 in drug money, and over \$1.8 million dollars worth of drugs.

#### *Drug Recognition Training*

This three-week training course enhances the ability of officers to recognize a driver under the influence of illegal narcotics. It is available to any police officer whose department is willing to purchase the necessary equipment, make changes to agency policies to conform to drug recognition expert (DRE) requirements, and allow the officer to attend the initial training and periodic events to maintain certification. This training is typically offered twice per year by the Department of Criminal Justice Training and is primarily taught by KVE officers. KVE has five individuals who are certified to teach the course. KVE also provides a two-day course in drug recognition to teachers, school resource officers, school nurses, and administrators. This training aids school staff in the identification of a child that may be under the influence of drugs.

### *Collection of Observation Data*

Collecting observation data through Kentucky's Clearinghouse System is an extremely important activity performed by KVE employees. As commercial vehicles pass through the weigh/inspection facility, a KVE data specialist enters each commercial vehicle's USDOT (United States Department of Transportation) or KYU (Kentucky Use) number, and if possible, the unit number. Once the information is entered, it is instantaneously checked against a database containing safety, credentialing, and licensing information. If there is a problem with the licensing or registration, or the vehicle is chosen for a safety inspection, the data specialist is immediately notified. The data specialist can then direct the truck to pull in for an inspection, depending on his or her judgment and the availability of an officer or inspector. The data entered by the data specialist is also used by the KYTC's Division of Audits to ensure that each commercial motor carrier has registered all trucking units for tax purposes and has reported the appropriate mileage for Kentucky's fuel tax and weight-distance tax.

### *Collection and Upload of Inspection and Crash Data to MCMIS and SAFETYNET*

The inspection data collected by KVE officers and inspectors is uploaded to both the Motor Carrier Management Information System (MCMIS) and to SAFETYNET. SAFETYNET is a data collection system designed to manage and provide appropriate access to crash and roadside inspection data for the motor carrier industry. These systems allow for a central repository of safety and inspection information on motor carriers and are valuable to the Federal Motor Carrier Safety Administration and commercial vehicle enforcement agencies throughout the country. This data is generated directly from the inspection reports prepared by KVE officers and inspectors (along with their counterparts in other states) during inspections at weigh/inspection facilities and at the roadside.

### *Public Service Announcements and Educational Presentations*

KVE is one of several public agencies that provide important traffic safety information and educational presentations to the public. The purpose of these announcements and presentations is to provide the public with important information so that they can make better traffic safety decisions. These presentations may include information on the dangers of drinking and driving, the benefits of wearing a seatbelt, safely driving around commercial vehicles, and child passenger safety. KVE also provides current traffic conditions to Kentucky's Transportation Operations Center. This information is distributed through Kentucky's traffic and traveler information system and the media and is used to inform highway users of possible delays they may encounter. Previous research has shown that public education programs may help to reduce highway crashes and fatalities (10).

## **CHAPTER THREE**

### **IDENTIFICATION OF KENTUCKY VEHICLE ENFORCEMENT BENEFITS**

#### **3.1 Stakeholders**

One of the steps in identifying the benefits resulting from the activities of Kentucky Vehicle Enforcement was to identify the stakeholders associated with each of KVE's activities. Once the stakeholders were identified, these agencies could provide feedback on the benefits received. The stakeholders identified for this study included:

- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Highway Administration (FHWA)
- Kentucky Transportation Cabinet (KYTC)
  - Department of Vehicle Regulation
    - Division of Motor Carriers
    - Division of Motor Vehicle Licensing
  - Department of Highways
    - Division of Maintenance
    - Division of Construction
  - Office of Budget and Fiscal Management
    - Division of Audits
  - Department of Transportation Safety
- Kentucky Office of Homeland Security
- Kentucky Department for Environmental Protection
- International Registration Plan (IRP), Inc.
- International Fuel Tax Agreement (IFTA), Inc.
- Special Interest Groups
- Motor Carrier Industry
- Contractors and their Personnel
- Motorists
- General Public
- Other States

In addition to the benefits identified through stakeholder discussions, other potential benefits were identified through the literature review process.

#### **3.2 Benefits**

A listing of the potential benefits, along with their corresponding activities, is presented in Table 4. Table 4 also identifies the stakeholders associated with each of the benefits. A description of each benefit along with the quantification of benefits (where applicable) is presented immediately following the table.

Table 4. Benefits and Associated Stakeholders for KVE Activities

<b>Benefit</b>	<b>Activity Number* (as described in Table 3)</b>	<b>Associated Stakeholder(s)</b>
Fewer Crashes, Fatalities, and Injuries on Roadways	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 17	<ul style="list-style-type: none"> <li>• General Public</li> <li>• Motorists</li> <li>• Motor Carrier Industry</li> <li>• KYTC</li> <li>• FHWA</li> <li>• FMCSA</li> </ul>
Improved Safety for Highway Workers	9	<ul style="list-style-type: none"> <li>• KYTC</li> <li>• Contractors and Personnel</li> </ul>
Improved Public Safety and Awareness of Safety Issues	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 16, 17,	<ul style="list-style-type: none"> <li>• General Public</li> <li>• Motorists</li> <li>• Motor Carrier Industry</li> <li>• KYTC</li> <li>• FHWA</li> <li>• FMCSA</li> </ul>
Increased Revenue for Kentucky's Road Fund	7, 8, 13, 15	<ul style="list-style-type: none"> <li>• General Public</li> <li>• KYTC</li> <li>• FHWA</li> <li>• IRP</li> <li>• IFTA</li> </ul>
Reduced Damage to Pavement and Infrastructure	8	<ul style="list-style-type: none"> <li>• General Public</li> <li>• Motorists</li> <li>• Motor Carrier Industry</li> <li>• KYTC</li> <li>• FHWA</li> <li>• FMCSA</li> </ul>
Decreased Availability of Illegal Narcotics	13, 14	<ul style="list-style-type: none"> <li>• General Public</li> </ul>
More Level Playing Field for Motor Carriers	1, 2, 3, 5, 6, 7, 8, 10, 15	<ul style="list-style-type: none"> <li>• Motor Carrier Industry</li> </ul>

**\*Quick Reference for Activity Numbers**

1 CMV Safety Inspections	7 Enforcement of Tax, Registration, Fee, and Insurance Requirements	13 Drug Interdiction Enforcement
2 CMV HazMat Safety Inspections	8 Enforcement of CMV Size and Weight Regulations	14 Drug Recognition Training
3 Commercial Driver Safety Inspections	9 Work Zone Enforcement	15 Collection of CMV Observation Data
4 Safety Inspections for Vans and Buses	10 Traffic Enforcement	16 Inspection and Crash Data to MCMIS and Safetynet
5 Safety Audits	11 Holiday / Special Event Enforcement	17 Traffic Safety PSA and Presentations
6 Compliance Reviews	12 Security Enforcement at POEs	

*Fewer Crashes, Fatalities, and Injuries on Roadways:*

According to the USDOT, highway crashes caused 95 percent of all transportation-related fatalities and 99 percent of transportation injuries in 2003. Transportation-related fatalities are the leading cause of death in the United States for people between the ages of 2 and 33 (11). In a 2003 study, the USDOT determined that approximately 11 percent of transportation-related fatalities were caused by incidents involving large truck traffic, despite the fact that large trucks only represent 3 percent of registered vehicles and 7 percent of vehicle miles traveled (11). Previous research has shown that higher levels of police enforcement activities reduce highway crashes by removing unsafe drivers and vehicles from highways (7).

One of the most important benefits resulting from KVE's activities is a reduction in the number of crashes, fatalities, and injuries on Kentucky's highways. Clearly, quantification of these benefits is a challenging task. Since this benefit is preventive in nature, there is no direct measure of events that "would have occurred" but did not. These reductions must be estimated based on the best available research on the relationships between enforcement activity and crash reduction. FMCSA, Volpe National Transportation Center, and Battelle have developed methods to estimate the reduction in crashes, fatalities, and injuries from commercial vehicle activities. These methods are summarized in the following paragraphs.

FMCSA, in cooperation with the Volpe National Transportation Systems Center, has developed an analytical model to measure the effectiveness of roadside inspections and traffic enforcements in terms of crashes avoided, injuries avoided, and lives saved. The Intervention Model is based on the premise that interventions (roadside inspection and/or traffic enforcement stops) contribute to crash reduction. The model assumes that the identification of a single violation implies a certain degree of crash risk. So inspections or traffic enforcement stops that lead to at least one violation are interpreted as reducing the likelihood of a crash. The probability that a crash will occur varies depending on the number of violations, type of violations, and the OOS indicator. National averages for fatalities per crash and injuries per crash are used to calculate the reduction in fatalities and injuries. This model was last applied to Kentucky's inspection data in 2004. At that time, Kentucky had a total of 81,637 interventions (inspections and/or traffic enforcement stops), translating into an estimated 286 crashes avoided, 208 injuries avoided, and 11 lives saved (12).

FMCSA and Volpe also worked together to develop the Compliance Review (CR) Effectiveness Model. This model is based upon the before and after changes in the safety performance of carriers who have had a CR. The model compares the crash rate of the carrier following the CR to the crash rate in the 12 months prior to the CR. This model was last applied to Kentucky's 2003 CR data. The results show that Kentucky conducted 192 CRs in 2003 which translated into an estimated 84 crashes avoided during the 12 month period following the CR (6). Using methods established within the CR Effectiveness Model, an estimated 61 injuries were avoided and three lives were saved.

Assuming similar conditions would apply from year to year, an estimated number of crashes avoided, injuries avoided, and lives saved per year can be attributed to KVE's efforts in the area

of inspections, traffic enforcement stops, and compliance reviews. This data is summarized in Table 5.

Table 5. Estimation of Kentucky Crashes Avoided, Injuries Avoided, and Lives Saved Per Year

	<b>Crashes Avoided</b>	<b>Injuries Avoided</b>	<b>Lives Saved</b>
Inspections / Traffic Enforcement Stops	286	208	11
Compliance Reviews	84	61	3
<b>Totals</b>	<b>370</b>	<b>269</b>	<b>14</b>

Another model outlined by Battelle in the Kentucky Commercial Vehicle Safety Applications Evaluation Technical Report, estimated crashes and injuries avoided and lives saved using a slightly different method. That model assumed that crashes are avoided when vehicles and drivers with safety violations are placed OOS. That model was applied to Kentucky's 2005 inspection data and estimated that 126 crashes were avoided, 33 injuries avoided, and two lives saved. The Battelle report goes on to say that as high-risk carriers are better targeted for inspection, more crashes are prevented and more economic savings are generated. If thermal imaging and driver OOS rate were fully taken into consideration in screening vehicles, 776 crashes and 201 injuries could be avoided and 9 lives saved each year (13).

Another challenge is calculating the economic impact associated with these estimated numerical reductions (in crashes, fatalities, and injuries). A 2006 report by the Kentucky Transportation Center demonstrates the calculable costs of all motor vehicle collisions in Kentucky (14). The report estimates both economic and comprehensive costs for crashes, fatalities, and injuries. The economic costs would include wage loss, medical expense, administration costs, property damage, and employer costs. Comprehensive costs include the economic cost components and also a measure of the value of lost quality of life associated with deaths and injuries. Estimated costs per injury and fatality were provided by the National Safety Council, and show a savings of \$21.7 million to \$68.8 million for the injuries and fatalities avoided based upon the FMCSA and Volpe models. Table 6 summarizes the cost savings as a result of fewer injuries and fatalities. There would also be a saving associated with the 370 crashes avoided, but it would be minimal in comparison to the savings associated with the injuries avoided and lives saved (14).

Table 6. Summary of Estimated Kentucky Cost Savings for Injuries and Fatalities Avoided

<b>Event</b>	<b>Economic Cost Per</b>	<b>Economic Cost Total</b>	<b>Comprehensive Cost Per</b>	<b>Comprehensive Cost Total</b>
269 Injuries	\$20,881	\$5,616,989	\$56,060	\$15,080,140
14 Fatalities	\$1,150,000	\$16,100,000	\$3,840,000	\$53,760,000
<b>Totals</b>		<b>\$21,716,989</b>		<b>\$68,840,140</b>

*Improved Safety for Highway Workers:*

Highway workers are at risk of being struck or killed by a passing motorist while performing their duties. Typically, accidents in work zones are caused by inattentive drivers and excessive speed. One of the keys to improving safety for highway workers is providing proper traffic control. In addition, studies have shown that the mere presence of law enforcement officers helps to reduce the speed of motorists. A survey conducted by the Kentucky Transportation Center revealed that the presence of a law enforcement officer (with blue lights flashing), when supplementing proper traffic control devices, is the most effective way to reduce speeds within a work zone (15). This reduction in speed also translates into a reduced number of crashes and improved safety for workers.

*Improved Public Safety and Awareness of Safety Issues:*

By removing dangerous drivers and vehicles from Kentucky's roadways, KVE officer activities improve public safety. Public safety improvements are important due to the economic and social costs that dangerous drivers and vehicles pose to other Kentucky roadway users. Public safety can also be improved through the provision of safety information. Providing information to the public through the use of Public Service Announcements (PSA) and through educational presentations around the state helps promote awareness of public safety issues. Previous research (focused on rail-highway grade crossings) has found that improving awareness of safety issues can lead to decreases in accidents and fatalities (10). If these findings hold true for a broader application, then alerting motorists to potential traffic hazards and other traffic-related issues should aid in the ability to make better and safer decisions.

*Increased Revenue for Kentucky's Road Fund:*

Enforcement activities by KVE officers (along with the perceived threat of such enforcement) have a direct impact on revenues for the State of Kentucky. The primary agency responsible for revenue collection in the motor vehicle industry in Kentucky is the Division of Motor Carriers. In 2006, nearly \$200 million or approximately 16 percent of Kentucky's Road Fund was collected in revenue through motor vehicle taxes, registrations, permits, authorities, passenger carriers, and usage taxes. KVE has direct responsibility for enforcing these taxes and fees and ensuring they are paid. The enforcement activities carried out by KVE provide a mechanism for catching non-compliant motor carriers and collecting taxes and fees that are due. They also provide an incentive for motor carriers to remain compliant, to avoid the fines and disruptions associated with getting caught in a non-compliant status.

Of the \$200 million in revenue mentioned above, it is difficult to determine exactly how much can be directly attributed to the activities of KVE. It is well known that some motor carriers operate in Kentucky without paying their fair share of taxes and fees. Motor carrier officials estimate that revenues would be approximately 5 to 7 percent higher than current levels if all members of the commercial vehicle industry complied with the current tax laws. This equates to a current loss of approximately \$10 to \$14 million each year. It is unknown how much higher this loss would be if there were no enforcement activities being conducted by KVE, but it is reasonable to assume that more motor carriers would try to avoid paying taxes and fees if the threat of enforcement was removed. Using a conservative estimate that the current level of

losses would double without KVE’s presence, Kentucky would lose an additional \$20 to \$28 million each year if not for the activities of KVE.

Since not all members of the motor vehicle industry comply with the current tax laws, enforcement and the threat of enforcement are vital components in the collection effort. In some cases, KVE directly generates revenue by stopping non-compliant trucks and placing them OOS until appropriate taxes and fees have been paid. The table below (Table 7) depicts the recorded amount of revenue that was directly collected by KVE on behalf of the Division of Motor Carriers between 1999 and 2006.

Table 7. Direct Revenue Collected by KVE on Behalf of the Kentucky Division of Motor Carriers

Year	Direct Revenue
1999	\$ 454,660.91
2000	\$ 572,126.62
2001	\$ 632,780.48
2002	\$ 483,948.18
2003	\$ 481,331.49
2004	\$ 516,169.68
2005	\$ 297,422.99
2006	\$ 266,600.03

It is noteworthy that this revenue peaked in 2001 and has declined by more than 50 percent since then. The cause of this decline is currently unknown. An attempt was made to correlate it to KVE staffing levels and to weigh station hours of operation, but no such correlation could be found. An attempt was also made to correlate this decrease to the use of the Kentucky Clearinghouse system or weigh station observations. As Figure 4 indicates, there does appear to be some correlation between the decreased use of the Kentucky Clearinghouse system (or number of observations) and the direct revenue collected by KVE. This finding appears worthy of further investigation.

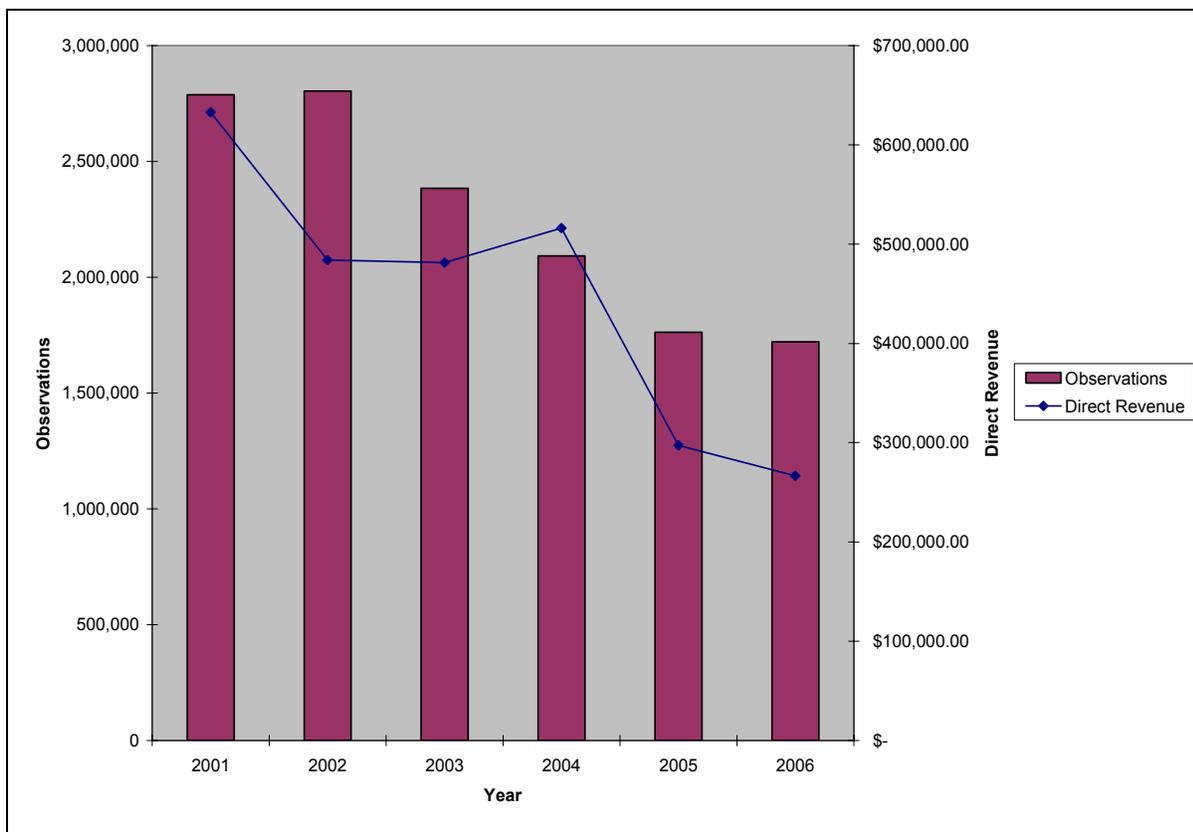


Figure 4: Number of Observations and Direct Revenue Collected by KVE from 2001 to 2006

Clearly, the revenue collected directly through KVE activities (\$250,000 to \$600,000 per year) is minimal when compared to the overall revenues generated by the motor carriers industry (\$200 million per year). These direct revenues are only the tip of the iceberg when considering the true impact of KVE’s activities on state revenues. As discussed above, without KVE’s presence, it is likely that the number of non-compliant commercial motor carriers in Kentucky would rise dramatically.

*Reduced Damage to Pavement and Infrastructure:*

As truck weights increase, the damage to pavement increases exponentially. KVE plays a vital role in monitoring the weights of trucks on Kentucky’s roadways and removing overweight trucks from the roadway. Quantifying this benefit is challenging, because it is primarily preventive in nature. There is no direct measure of how severe the overweight truck problem would be if KVE were not present. In eastern Kentucky, a special emphasis on coal trucks by KVE resulted in a drastic drop in the number of overweight vehicles, from 77 percent in 2004 to less than 3 percent in 2006 (refer to section 4.4 of this report for more information). A primary benefit associated with reducing damage to pavement and infrastructure is the reduction in funds needed to maintain those highways and bridges. Findings from the KTC research report, “Impacts of the Extended-Weight Coal Haul Road System”, indicated that the heavier weights of coal trucks added approximately \$9 million annually to pavement overlay costs in eastern Kentucky (16). A recent study in Arizona on pavement damage due to commercial vehicles

estimates that overweight vehicles impose somewhere between \$12 million and \$53 million per year in uncompensated damages to Arizona roadways (17). A Minnesota report finds that overweight vehicles produce an estimated \$30 million per year in damage to pavement, bridges, and rail crossings (18).

Although these estimates can not be directly applied to determine a cost of pavement and infrastructure damage for the roadway system in Kentucky, it is obvious there is a substantial cost associated with this problem. Making the assumption that the overall damage in Arizona and Minnesota would be similar to the damage in Kentucky and taking into consideration a \$9 million estimate from 1995 in eastern Kentucky alone, an estimate of \$30 million in damage to all roadways and infrastructure in Kentucky seems reasonable. As with revenue, it is unknown how much higher this damage figure would be if there were no weight enforcement activities being conducted. However, it is well known that the presence of weight enforcement has a substantial effect on truck weights<sup>4</sup>. It is also known that pavement damage varies exponentially with truck weights. Using an extremely conservative estimate that damage from overweight trucks would double if there were no KVE presence, it can be concluded that KVE activity helps to prevent an estimated \$30 million in pavement damages each year.

The Arizona study went on to discuss the benefit-to-cost ratio of increasing mobile commercial vehicle enforcement efforts in that particular state (17). The findings showed that, at worst, the expansion of the mobile enforcement efforts would be a little better than a “break-even” proposition. At best, for every dollar invested in motor carrier enforcement efforts, there would be \$4.50 in pavement damage avoided. Minnesota estimates that a 10 percent reduction in the equivalent single axle loads (ESALs) due to overweight vehicles has the potential of saving MnDOT approximately \$3 million annually (18).

#### *Decreased Availability of Illegal Narcotics:*

One of the benefits gained through KVE officer activities is a reduction in the availability of illegal narcotics in Kentucky. Both I-65 (from Texas to Chicago) and I-75 (from Miami to Detroit) are major north/south corridors that are used for drug smuggling. KVE officers have made a large number of drug busts, and in the process have seized large amounts of cash from suspected drug runners. In 2006, KVE officers participated in 681 drug cases removing more than \$1.8 million dollars worth of drugs from our communities. Those drugs included: cocaine, oxycontin, marijuana, morphine, methamphetamines, and others. In 2007, KVE made two of its largest drug busts ever, removing \$2.8 million worth of marijuana and \$1.5 million of cocaine in two separate incidents (19). The availability of illegal narcotics creates significant social and economic problems in communities across the Commonwealth. By cutting directly into the supply of illegal narcotics, KVE officers are helping to improve our communities.

#### *More Level Playing Field for Motor Carriers*

Through the enforcement of the Kentucky Highway Use License (KYU), the International Registration Plan, the International Fuel Tax Agreement License (IFTA), and driver and vehicle

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<sup>4</sup> This was borne out by the results of the special KVE enforcement emphasis in eastern Kentucky (as described in Section 4.4). Data from that study showed that KVE activity had a dramatic impact on the percentage of overweight trucks.

safety requirements, KVE officers help provide a more level playing field for all commercial vehicles. As commercial vehicle companies seek to gain competitive advantage over other rival companies, they may choose to avoid paying the proper taxes and fees and/or choose to take shortcuts with regard to vehicle and driver safety. The cost advantages gained through their illegal activities may put safe and legal companies at a competitive disadvantage. KVE enforcement activities help to ensure that all motor carriers are paying the same fees, meeting safety standards, and “playing by the same rules.”

The ability to “level the playing field” is an extremely important benefit to the motor carrier industry. The following quote is from David W. Bose, who is a member of Kentucky’s Motor Carrier Advisory Committee, a board member of the Kentucky Motor Transport Association (KMTA), and the Corporate Safety Director for the Castellini Group of Companies, which includes its long-haul produce and general commodity carrier, RWI Transportation LLC:

*“With all state scales open and maintained by enforcement personnel, we can help assure that trucking companies play by the same set of rules, thus encouraging all to remain in compliance and operate in a more uniform, safe environment. A majority of trucking companies in this state promote full enforcement to help keep unsafe and illegal operators off our roads. By having KVE active and in full force, this can be accomplished with more continuity, efficiency, and consistency. Legitimate trucking companies operate with very narrow margins these days, and the last thing this industry needs is to have carriers operating at an unfair competitive advantage. Someone who chooses to operate outside the scope of the law can, for example, lower their rates to our existing customer base and steal freight that they would normally not transport. Everyone should be made to pay their taxes, plates, and permits, along with safely maintaining their equipment instead of running after hours when they know the scales are closed and enforcement is not checking credentials. The prudent trucking companies in our industry want KVE to help secure a level and consistent playing field with safety at the forefront. Our industry and all of society deserves at least that when they traverse our state roads.”*

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## CHAPTER FOUR

### ENFORCEMENT STUDIES

A few enforcement studies (or small data collection efforts) were conducted as part of this research project or as part of the ongoing efforts of KVE and were used to supplement the information on activities and benefits within this report.

#### 4.1 48-Hour Enforcement Blitz

The main objective of this enforcement study was to identify and quantify (where possible) the benefits of increased staffing at the weigh/inspection facility. A secondary objective was to identify actions that would allow KVE to maximize the benefits received from their activities. This study was conducted at the northbound Laurel County weigh/inspection facility. This location is a port-of-entry into the state for commercial vehicles traveling northbound on I-75.

The study began at 6:00 am on Wednesday, September 5, 2007 and concluded at 6:00 am Friday, September 7<sup>th</sup>. The weigh/inspection facility was open and staffed for the full 48-hours, with the exception of a brief period where the station had to be closed due to an incident involving the arrest of a truck driver. Daytime staffing included two to five officers, two inspectors, and one data specialist. Evening and overnight staffing included one to two officers, one to two inspectors, and one data specialist. Personnel from the Division of Motor Carriers within the Kentucky Transportation Cabinet were available by phone throughout the 48-hour period to assist KVE with registration and permit information.

There were approximately 9,500 vehicles that passed through the weigh/inspection facility during the 48-hour enforcement blitz. This is an approximation, because the total count was not collected at the time of the study and had to be obtained later. (Volumes for eight hours of the 48-hour period had to be estimated based on weigh/inspection facilities reports for those dates.) There were 4,635 observations recorded during the 48-hour enforcement blitz.

The efforts of the KVE staff were focused on checking credentials, registration, taxes, weight, and safety of both commercial vehicles and their drivers. There were 151 inspections completed on 143 different companies over the 48-hour period. Officers performed 106 of the inspections, while inspectors performed 45. Table 7 below shows the types of inspections that were performed during the 48-hour enforcement blitz.

Table 8. Types and Number of Inspections Performed During the 48-Hour Enforcement Blitz

Type of Inspection	Number	Percent of Total
Level I – Full Vehicle & Driver	55	36.42%
Level II – Walk-around Vehicle & Driver	28	18.54%
Level III – Driver Only	68	45.03%
<b>Total</b>	<b>151</b>	

Of these inspections, 148 were performed within the station, two were performed on US 25, and one was performed on I-75 after a vehicle disregarded the weigh/inspection facility sign to pull in. (The two inspections performed on US 25 are included in the discussion below, but are also discussed separately in section 4.1.2.) Of the 151 inspections, 108 (71.5 percent) resulted in at least one violation. In total, there were 282 violations documented, resulting in three drivers placed OOS for a 1.99 percent driver OOS rate and 19 vehicles placed OOS for a 22.89 percent vehicle OOS rate. There were also 77 citations written.

#### 4.1.1 Inspection Selection Sources

The following methods or sources were used to identify vehicles for inspection at the weigh/inspection facility: the Kentucky Clearinghouse system, random selection, overweight violation, the Infrared Inspection Systems (IRIS) van, and visual observation of a problem. There were also a few inspections where the source had not been identified at the time of inspection and therefore was unknown. Once a vehicle was chosen for inspection, the individual officer or inspector decided what type of inspection would be performed. Table 8 shows the various sources used to identify a vehicle or driver for inspection and the numbers and types of inspections completed for each source.

Table 9. Number and Type of Inspections by Source

Source	Level I	Level II	Level III	Total
Clearinghouse	23	3	32	58
Random	14	23	12	49
Overweight	5	1	18	24
IRIS	9	0	0	9
Visual Observation	3	1	0	4
Unknown	1	0	6	7
<b>Totals</b>	<b>55</b>	<b>28</b>	<b>68</b>	<b>151</b>

Violation, OOS, and citation information was summarized for all sources. In 2006, nearly 72 percent of all inspections nationwide led to at least one violation. For Kentucky during that same time period, nearly 50 percent of all inspections led to at least one violation (20). The Kentucky Clearinghouse, IRIS, and visual observation sources led to at least one violation 75 percent or more of the time. (Obviously overweight vehicles had a violation 100 percent of the time since they were stopped due to an overweight violation.) Random inspections and those where the source was unknown resulted in at least one violation only 43 percent and 29 percent of the time, respectively. The national driver OOS rate for 2006 was 7.08 percent and 4.53 percent for Kentucky (20). The IRIS van was the source that produced the highest driver OOS with 11.11 percent, but it should be noted that this was just one driver placed OOS. All other methods produced a driver OOS rate that was below both the national and Kentucky's average for 2006. For the vehicle OOS rate in 2006, the national average was 22.89 percent and Kentucky's average was 15.48 percent (20). During the 48-hour enforcement blitz, vehicles chosen using the

Kentucky Clearinghouse system produced the highest vehicle OOS with 38.46 percent. Visual observation and the IRIS van produced vehicles OOS rates of 25 percent and 22.22 percent, respectively. See Table 9 for a summary of this information for sources of selection.

Table 10. Summary of Violations, OOS Rates, and Citations for all Sources

Source	% with One Violation	Violations	Driver OOS	DOOS Rate	Vehicle OOS	VOOS Rate	Citations	Citation Rate
Clearinghouse	88%	164	1	1.72%	10	38.46%	37	63.79%
Random	43%	47	0	0.00%	6	16.22%	12	24.49%
Overweight	100%	46	1	4.17%	0	0.00%	24	100.00%
IRIS	78%	16	1	11.11%	2	22.22%	1	11.11%
Visual Observation	75%	7	0	0.00%	1	25.00%	2	50.00%
Unknown	29%	2	0	0.00%	0	0.00%	1	14.29%
<b>Totals</b>	<b>72%</b>	<b>282</b>	<b>3</b>	<b>1.99%</b>	<b>19</b>	<b>22.89%</b>	<b>77</b>	<b>50.99%</b>

#### *Kentucky's Clearinghouse System*

The largest number of inspections, 58 (38 percent) resulted from using Kentucky's Clearinghouse system to identify potential problems or good candidates for inspection. The Kentucky Clearinghouse is a state database with carrier-specific safety and credentialing information. To use the system, a data specialist keys the KYU and/or USDOT number and also the unit number (if possible) into the Observation System at a weigh/inspection facility computer. The KYU or USDOT number is immediately checked against Kentucky's Clearinghouse database. The system will return a "hit" if there is a problem with the registration or licensing information or if the carrier is deemed to be a good candidate for a safety inspection. The indication to inspect a vehicle for safety is based upon the company's driver and vehicle OOS rates, the carrier's PRISM status, and the number of times the company has been observed in Kentucky since their last inspection. When there is a "hit", the data is immediately sent to the printer and displayed on the computer screen. The data specialist makes the decision to stop the vehicle for inspection or to let it proceed.

During the 48-hour blitz, approximately 100 vehicles were allowed to proceed through the weigh/inspection facility even though they had received a "hit" from the Clearinghouse system. Many of these were allowed to proceed simply because there was no one available to investigate the problem. However, there were a significant number that were allowed to proceed because the data specialist felt the information had been keyed incorrectly. In many instances the USDOT and/or KYU were difficult to read due to the speed of the vehicle and the location and/or appearance of the identifying numbers. There was a significant problem, however, with the system returning a KYU "hit" for small trucks that didn't need a KYU and leased vehicles that did in fact have the proper operating authority. Eventually it was determined that this problem could be avoided if the data was keyed in properly for these types of vehicles. During the 48-hour blitz, there were approximately 50 vehicles that were directed to stop by the data

specialist but disregarded (either deliberately or unintentionally) the in-station signage. Figure 5 graphically displays the action taken from each “hit” on the Clearinghouse system.

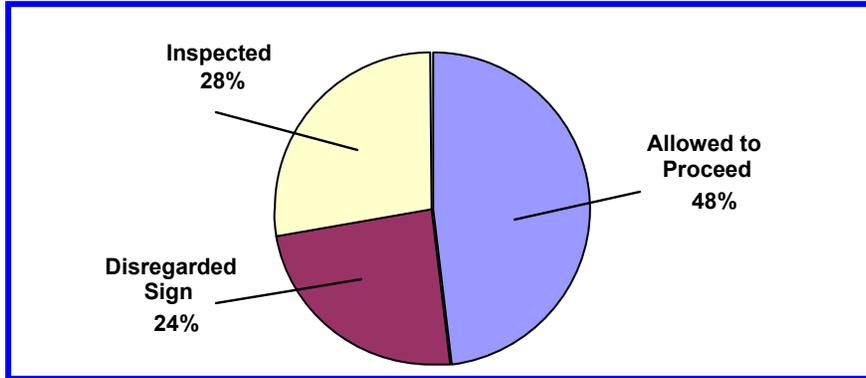


Figure 5. Action taken on "Hits" from the Kentucky Clearinghouse

For those trucks selected for inspection based on the Kentucky Clearinghouse, 23 Level I inspections were performed, three Level II inspections were performed, and 32 Level III inspections were performed. Of the 58 inspections performed, 51 (88 percent) had at least one violation. There were 164 violations documented for these inspections, resulting in one driver being placed OOS for a 1.72 percent driver OOS rate and ten vehicles being placed OOS for a 38.46 percent vehicle OOS rate. Thirty-seven citations and one warning were issued as a result of these inspections.

It should also be noted that the Kentucky Clearinghouse was the only source that led to direct revenue generated for the Kentucky Road Fund. The Clearinghouse stops resulted in the issuance of 13 permits, totaling \$530, and eight impounds, totaling more than \$4,200 in fees. (It should also be noted that there were only four other impounds statewide during this same period.)

*Random*

Forty-nine vehicles, or 32 percent, were chosen for inspection based on random selection or at the discretion of the officer or inspector. If an officer or inspector was free to perform another inspection, they would often simply choose the next vehicle in line. Other times, the decision was based upon some preference of the officer or inspector (i.e., past experience with the carrier, etc.). Fourteen of these inspections were Level I, 23 were Level II, and 12 were Level III inspections. Twenty-one or 43 percent, of these inspections had at least 1 violation. The 49 random inspections resulted in 47 violations and 6 vehicles being placed OOS for a 16.22 percent vehicle OOS rate. There were no drivers placed OOS with these inspections. Twelve citations were written as a result of the random stops.

*Overweight*

Twenty-four, or 16 percent, of the identified vehicles were overweight. All of these vehicles were inspected further based upon this problem. The majority of these vehicles (18) were given

a Level III inspection. Five vehicles were given a Level I inspection, and one was given a Level II inspection. This source of inspections resulted in 46 violations and one driver being placed OOS for a 4.17 percent driver OOS rate. There were no vehicles placed OOS with these inspections. Twenty-four citations were written to these overweight vehicles.

#### *IRIS Van*

Another means of identifying vehicles for inspections was the Infrared Inspection Systems (IRIS) van. The in-station thermal imaging system had been struck by lightning the previous week, and was therefore not available for use. In lieu of the in-station system, the IRIS van was positioned on the weigh/inspection facility ramp and used periodically throughout the 48-hour period. IRIS is a mobile thermal imaging system that is used by KVE to identify potential brake problems on trucks. There was some difficulty finding experienced personnel available to use the system at the time of the study. In addition, the heat from mid-day until evening made use of the system difficult. It was the decision of the research team that additional data on the in-station thermal imaging system would be collected at a different time and used to supplement this report. (Refer to section 4.3 for more information on the data collected from the thermal imaging system.)

Nine vehicles, or just less than 6 percent, were stopped for inspection based upon the findings of the IRIS van. All these vehicles were given a Level I inspection. Seven of the nine vehicles, or 78 percent, had at least one violation. Sixteen violations were documented on inspections generated from the IRIS van, resulting in one driver being placed OOS for an 11.11 percent driver OOS rate and two vehicles being placed OOS for a 22.22 percent vehicle OOS rate. One citation was written as a result of these stops.

#### *Visual Observation*

A small portion of vehicles, four or less than 3 percent, were specifically chosen for inspection based on visual observation. These vehicles were observed to have a problem when they drove through the weigh/inspection facility. Three Level I inspections and one Level II inspection were performed on these vehicles. Three of the four inspections, or 75 percent, resulted in at least one violation. These inspections led to seven violations and one vehicle being placed OOS for a 25 percent vehicle OOS rate. There were no drivers placed OOS with these inspections. Two citations were written as a result of these four stops.

#### *Unknown*

There were a few inspections, seven or less than 5 percent, for which the source was not recorded. The source of an inspection is not typically noted by the officers and inspectors, and there were some inspections during the blitz for which the source was not noted. Six Level III inspections and one Level I inspection were performed. Two out of seven, or 29 percent, had at least one violation. These inspections led to two violations and no driver or vehicle being placed OOS. One citation was written as a result of these stops.

#### 4.1.2 Baseline Data Collection

Specifically for the establishment of a baseline for the 48-hour enforcement study, inspection data was collected starting at 6:00 a.m. on Wednesday, August 22, 2007, and continuing through 6:00 a.m. on Friday, August 24, 2007 at the northbound Laurel County weigh/inspection facility. The purpose of the collection of this data was to provide baseline data to measure the benefit received from the change in resources and staffing during the 48-hour blitz.

KVE personnel were not given any extra duties or told to do anything out of the ordinary for the collection of the baseline data. Regular operating hours for this particular facility were 20 hours per day, from 6:00 a.m. to 2:00 a.m. Staffing at the facility included at least one officer assigned to the weigh/inspection facility during the day, evening, and overnight. One to two inspectors were assigned to the weigh/inspection facility for day and evening shifts. Administrative assistants were assigned to the weigh/inspection facility, but there were no data specialists entering data into the Kentucky Clearinghouse system.

A total of 7,939 vehicles passed through the weigh/inspection facility during the baseline period. This number came from the facility's ramp weigh-in-motion scale and included all vehicles passing through the station, even when it was closed. (The facility also serves as a rest haven for commercial vehicles, so truckers may enter the station and park without being monitored by weigh/inspection facility personnel.) There were zero observations recorded for this period since no data specialist was recording any of the USDOT and/or KYU information.

Typical procedures at the northbound Laurel County weigh/inspection facility are that trucks are chosen for inspection randomly, or at the discretion of the officer or inspector. Due to lack of resources at the weigh/inspection facility, the Kentucky Clearinghouse and the thermal imaging system are not typically used as a source to screen vehicles. So, most inspections are based on random selection or the discretion of the officer. Exceptions would include an overweight vehicle, a visible problem, or a driver request for an inspection. The data collected through this effort included 50 inspections on 50 different companies at the weigh/inspection facility and on US 25. Twenty-seven inspections were performed by officers and twenty-three by inspectors. Table 10 below shows the types of inspections performed for the baseline.

Table 11. Type and Number of Inspections for the Baseline Study

Type of Inspection	Number	Percent of Total
Level I – Full Vehicle & Driver	23	46.00%
Level II – Walk-around Vehicle & Driver	9	18.00%
Level III – Driver Only	18	36.00%
<b>Total</b>	<b>50</b>	

Forty-two inspections were performed at the station, while eight inspections were performed on US 25. Officers are typically assigned to patrol roadways throughout the region. As such, additional inspections were performed on various roadways in the region. These inspections are

not included as part of this baseline data since the focus of the 48-hour blitz was on the weigh/inspection facility and US 25. The eight inspections on US 25 were all performed on the morning of August 23<sup>rd</sup> and resulted in 0 percent driver and vehicle OOS rates. For all 50 inspections, there was a 2.00 percent driver OOS rate, and a 6.25 percent vehicle OOS rate.

There were 15 citations written during the baseline period at the northbound Laurel County weigh/inspection facility and on US 25. Two of the citations were issued to commercial vehicles on US 25.

#### **4.1.3 Comparing Baseline Data to 48-Hour Enforcement Blitz Data**

There were three significant differences in the way business was conducted during the 48-hour enforcement blitz compared to the baseline data collection effort. First, staffing was significantly increased at the station. Second, the weigh/inspection facility remained open for 48 uninterrupted hours, and third, the Kentucky Clearinghouse and thermal imaging (the IRIS van) were used to select vehicles for inspection.

##### *Increased Staffing*

KVE officers and inspectors were able to conduct three times more inspections during the 48-hour enforcement blitz as compared to the number of inspections that are performed during a normal 48-hour shift. This was due to a significant increase in the number of personnel at the station, but it is important to note that this increase required shifting officers from the roadside to the station. This allowed for more productivity at the station, but reduced enforcement coverage on surrounding roadways.

Data specialists were utilized during the 48-hour enforcement blitz to enter data into the Kentucky Clearinghouse system. This data is also entered in Kentucky's Observation File and used by the Division of Audits to ensure motor carriers are paying the appropriate taxes. The number of observations went from 0 during the baseline period to 4,635 during the enforcement blitz.

##### *Extended Weigh/Inspection Facility Hours*

Members of the commercial vehicle industry typically know when weigh/inspection facilities are open and when they are closed. Therefore, companies or drivers that are not following state or national regulations are more likely to transport goods when they know weigh/inspection facilities are closed. The northbound Laurel County weigh/inspection facility typically open 20 hours each day (6:00 a.m. until 2:00 a.m.). Many of Kentucky's weigh/inspection facilities are closed (or at best have limited resources) during nighttime hours. In addition, the Division of Motor Carriers typically closes its offices at 4:30 p.m. and does not reopen until 8:00 a.m. These factors combine to make enforcement more difficult during the overnight period.

During the 48-hour enforcement blitz, 37 inspections were performed between 11:00 p.m. and 7:00 a.m. Table 11 compares the inspections performed overnight (from 11:00 p.m. to 7:00 a.m.) to the inspections performed during the day and evening. The percentage of inspections resulting in at least one violation was similar for night versus day. The driver OOS rate,

however, was much higher during the day, while the vehicle OOS rate was significantly higher at night. It also appears that the rate at which citations were issued was higher during the overnight hours.

Table 12. Comparison of Inspections Overnight to Inspections during the Day (7a.m. – 11p.m.)

<b>Time of Inspection</b>	<b>Number of Inspections</b>	<b>Percent w/ at least 1 violation</b>	<b>DOOS</b>	<b>VOOS</b>	<b>Number of Citations</b>	<b>Percent Receiving a Citation</b>
11p.m. – 7a.m.	37	67.6%	0.00%	30.77%	23	62.16%
7a.m. – 11p.m.	114	72.8%	13.16%	21.43%	54	47.37%

From a credentials standpoint, the hours of 4:30 p.m. to 8:00 a.m. are worth examining since these are times when the Division of Motor Carriers is typically closed. Of the \$530 collected in permits during the blitz, 45 percent or \$240 was collected from 4:30 p.m. to 8:00 a.m. Of the \$4200 collected in impounds, approximately \$3160 (or 75 percent) was collected from 4:30 p.m. to 8:00 a.m.. Under the normal operating hours of the Division of Motor Carriers, this revenue would not have been collected.

*Inspection Selection Criteria*

For the 48-hour blitz, when compared to the baseline period, the main difference with regard to the method of inspection selection was the use of the Kentucky Clearinghouse and the IRIS van. Both these sources produced much higher vehicle OOS rates and citation rates than inspections that were done randomly. This resulted in a much higher vehicle OOS rate and citation rate for the 48-hour blitz. The driver OOS was almost exactly the same for both the baseline and 48-hour blitz. Table 12 compares the driver and vehicle OOS rates and the citation rates for the enforcement blitz and the baseline.

Table 13. Driver and Vehicle OOS Rates and Citation Rates for 48-Hour Blitz and Baseline

	<b>Driver OOS</b>	<b>Vehicle OOS</b>	<b>Citation Rate</b>
48-hour Enforcement Blitz	1.99%	22.89%	51.66%
Baseline Data	2.00%	6.25%	30.00%

The data clearly indicates that the Kentucky Clearinghouse system and thermal imaging can be used to better identify vehicles in need of inspection. This finding regarding the Kentucky Clearinghouse system is supported by findings in the Kentucky Commercial Vehicle Safety Applications Evaluation Technical Report. This report concludes that using the OOS algorithm within the Clearinghouse would result in the inspection of three times as many high-risk carriers as compared to picking the trucks randomly. Battelle researchers estimated that normally there

is a 27 percent chance of picking a high-risk carrier, but with the Clearinghouse, there is an 85 percent chance.

#### 4.1.4 Comparing Driver and Vehicle OOS Rates to National Rates

In 2006, the national driver OOS rate was 7.08 percent while Kentucky's rate was 4.53 percent (20). Figure 6 depicts the driver OOS rates for Kentucky compared to the national average. Both the baseline and 48-hour blitz produced similar driver OOS rates with 2.00 percent and 1.99 percent, respectively. These rates are extremely low compared to the national average. This could indicate that high-risk drivers are not being identified for inspection, or it could indicate that OOS violations are being overlooked during inspections. Surprisingly, additional resources (and increased use of the inspection selection tools, such as the Kentucky Clearinghouse) during the 48-hour enforcement blitz did not help to increase the driver OOS rate above the baseline rate. The rates for the baseline and 48-hour blitz are also significantly lower than Kentucky's state average, thus indicating that the driver OOS rates for other locations within the state are higher than at the northbound Laurel County facility.

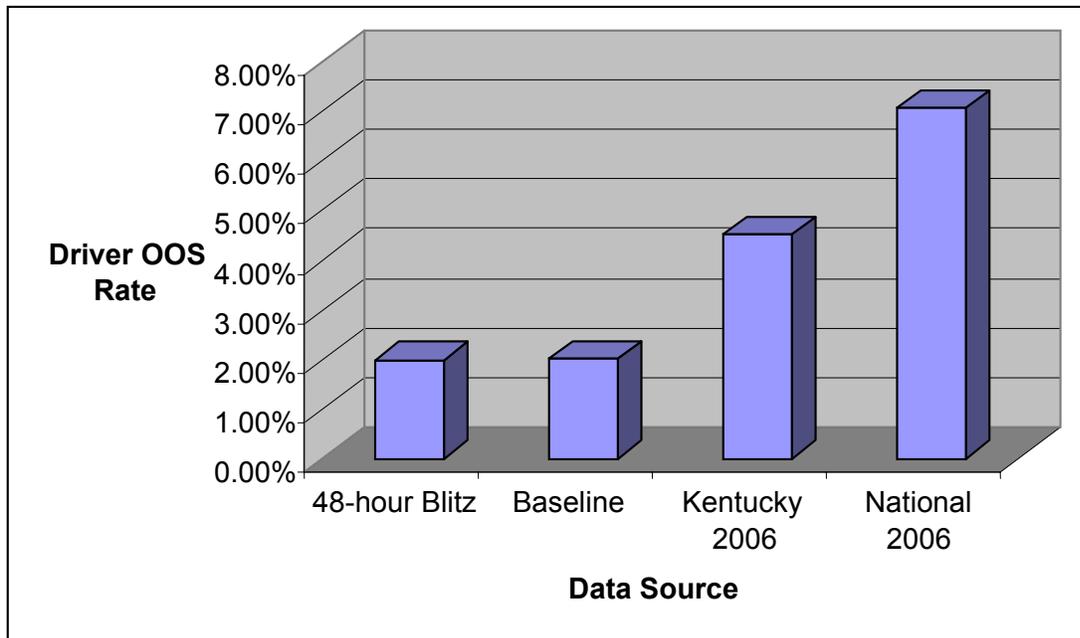


Figure 6. Comparison of Driver OOS to the National Average

The national average for vehicle OOS rate in 2006 was 22.89 percent, while Kentucky's rate was 15.48 percent (20). Figure 7 illustrates the vehicle OOS rates for Kentucky compared to the national average. The baseline period showed a vehicle OOS rate of 6.25 percent while the 48-hour blitz yielded a vehicle OOS rate of 22.89 percent. Both Kentucky's 2006 average and the baseline data show that the vehicle OOS rate in Kentucky is much lower than the national average. As with the driver OOS rate, this could indicate that high-risk vehicles are not being

effectively identified for inspection. Or, it could mean that OOS violations are not being effectively identified when inspections are performed. It is apparent that the vehicle OOS rate varies by location, since the baseline rate is significantly lower than the statewide 2006 average. The 48-hour blitz resulted in a vehicle OOS rate that was equivalent to the national average, which seems to indicate that resources used during the 48-hour blitz helped to effectively identify high-risk vehicles for inspection.

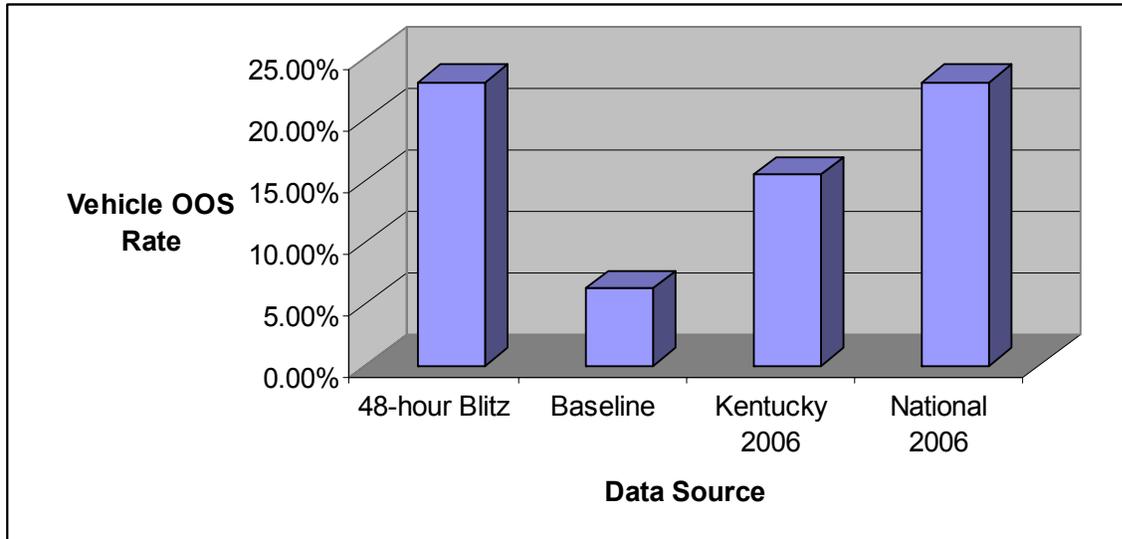


Figure 7. Comparison of Vehicle OOS to the National Average

In an effort to better understand Kentucky’s driver and vehicle OOS rates and possible causes, project staff conducted a detailed analysis of these rates by region, by type of inspection, by inspection location (weigh station versus roadside), by inspector job classification (inspector versus officer), and by inspector experience level. This analysis was provided to KVE management for their use in developing strategies to maximize the efficiency of driver and vehicle inspections in Kentucky.

#### 4.2 US 25 Data

US 25, which runs parallel to Interstate 75, is the primary bypass route for commercial vehicles wanting to avoid the Laurel County weigh/inspection facility. A secondary objective of the 48-hour enforcement blitz study was to monitor US 25 to better understand the effects of increased enforcement at the weigh/inspection facility. The intent was to monitor US 25 through the installation of weigh-in-motion (WIM) equipment and periodic inspections of vehicles.

The Kentucky Transportation Cabinet, Division of Planning, installed WIM equipment on September 4, 2007, and it stopped functioning 13 days later on September 17, 2007. Unfortunately, the equipment was not calibrated for weight data and only volume data was collected. There were significant gaps in the data and large numbers of unclassified vehicles that made data analysis difficult, but there were two noteworthy findings from this effort.

First, a small amount of data did show a significant increase in traffic when the weigh/inspection facility was open versus when it was closed. The only valuable data for comparison purposes was from 7:00 a.m. to 1:00 p.m. on September 9<sup>th</sup> and September 16<sup>th</sup>. On the September 9<sup>th</sup>, the weigh/inspection facility was open during this time and 104 trucks were identified on US 25. During that same time period on the 16<sup>th</sup>, when the weigh/inspection facility was closed, the volume of truck traffic was 77. Although this is a very small amount of data to compare, it is significant to note that the volume of truck traffic was 35 percent higher when the weigh/inspection facility was open versus when it was closed. Although these findings are interesting, additional data would need to be collected to draw any solid conclusions regarding the change in volume of truck traffic on US 25 with the opening and closing of the weigh/inspection facility.

Second, there were significant amounts of “unclassified” vehicles beginning September 5<sup>th</sup> after 10:00 a.m. and ending on September 7<sup>th</sup> around 11:00 a.m. Since no one was stationed on US 25 to observe the traffic, it is impossible to say exactly what these unclassified vehicles represent. It is interesting to note that these times correspond very closely with the start and end of the 48-hour enforcement blitz. Very few of these “unclassified” vehicles show up at any other time during the data collection period. It is possible that these vehicles represent trucks that were avoiding the weigh/inspection facility and also attempting to avoid the WIM in the roadway (perhaps by straddling the centerline), but it is also possible that these vehicles simply represent a malfunction of the system.

Weigh / inspection facility personnel chose to utilize most of their personnel solely at the weigh/inspection facility, so a very limited number of inspections were performed on US 25 during the 48-hour enforcement blitz. Two inspections were performed on US 25 late in the morning of the first day and none were performed on the second day. These inspections resulted in 0 violations, a 0 percent vehicle and driver OOS rate, and 0 citations written.

### **4.3 Thermal Imaging Study**

The objective of this study was to collect additional information on the in-station thermal imaging equipment. The thermal imaging system uses heat signatures to help weigh/inspection facility personnel identify apparent defects or malfunctions on commercial vehicles. The system is primarily used to detect brake defects, as malfunctioning brakes tend to emit less heat than those that are functioning properly. The thermal imaging system is a useful tool for KVE personnel since it aids in the identification of vehicles that warrant additional inspection. However, the value gained from the thermal imaging system is entirely dependent upon the person monitoring the system. For example, the first data collection period (Table 13) was conducted during a training seminar when KVE officers and researchers were being introduced to the thermal imaging software system. Though data was recorded during this observation period, the primary focus of the thermal imaging trainers was to provide training for the KVE officers. During the second day, the thermal imaging staff member and researchers from the Kentucky Transportation Center were directly focused on identifying trucks with brake issues—

as opposed to training. The results from August 1, 2007 (Table 14) demonstrate how effective the thermal imaging system can be when personnel have sufficient training and experience using this system.

Two separate field sites were utilized to generate the data used to evaluate the effects of the thermal imaging system. The first data collection site was at the Kenton County weigh/inspection facility on I-75 in northern Kentucky. Over a two-day period (July 31<sup>st</sup> and August 1, 2007), a research team from the Kentucky Transportation Center utilized the thermal imaging technology to identify potential safety violations on trucks that passed through the weigh/inspection facility. The second data collection site was the northbound Laurel County weigh/inspection facility where the research team spent one day (September 26, 2007) collecting data.

On July 31<sup>st</sup>, the thermal imaging technology revealed approximately 45 commercial vehicles that warranted additional inspection over a nine hour period. Due to personnel constraints, the number of inspections that could be performed was severely limited. Ten inspections were performed based on the information gathered from the thermal imaging system. Although observations identified 45 vehicles, due to personnel constraints, only 10 of these vehicles were inspected.

Table 14. Thermal Image Data (July 31, 2007)

<b>Category</b>	<b>Raw Number</b>	<b>Percentage</b>
Number of Trucks Stopped	10	
Number of Trucks Stopped with Brake Problem Correctly Identified	7	70%
Number of Brake Violations	10	
Total Number of Violations	21	
Number OOS	1	10%

On August 1<sup>st</sup>, the thermal imaging technology again revealed approximately 45 commercial vehicles that warranted additional inspection over a seven hour period. Of these commercial vehicles that potentially had a safety defect, nine commercial vehicles were parked for inspection. Several other vehicles were instructed to park for inspection but did not observe or ignored the park signal. Other vehicles were allowed to proceed due to a lack of available personnel to conduct inspections.

Table 15. Thermal Image Data (August 1, 2007)

<b>Category</b>	<b>Raw Number</b>	<b>Percentage</b>
Number of Trucks Stopped	9	
Number of Trucks Stopped with Brake Problem Correctly Identified	9	100%
Number of Brake Violations	30	
Total Number of Violations	38	
Number OOS	6	67%

On September 26, 2007, two researchers were stationed at the northbound Laurel County weigh/inspection facility to operate the weigh/inspection facility thermal imaging system. Observations were collected from 7:45 a.m. to 4:30 p.m. During the observation period, 19 Level I inspections were conducted on commercial vehicles that were identified through the use of the thermal imaging system as having a potential brake problem. This was an average of one inspection every 25 minutes. Table 15 presents the results, and Table 16 summarizes the results from all three days of observations.

Table 16. Thermal Image Data (September 26, 2007)

<b>Category</b>	<b>Raw Number</b>	<b>Percentage</b>
Number of Trucks Stopped	19	
Number of Trucks Stopped with Brake Problem Correctly Identified	10	53%
Number of Brake Violations	16	
Total Number of Violations	27	
Number OOS	3	16%

Table 17. Thermal Image Data from all Observation Days

<b>Category</b>	<b>Raw Number</b>	<b>Percentage</b>
Number of Trucks Stopped	38	
Number of Trucks Stopped with Brake Problem Correctly Identified	26	68%
Number of Brake Violations	56	
Total Number of Violations	86	
Number OOS	10	26%

#### 4.4 Eastern Kentucky Coal Haul Focus

Starting in 2004, KVE undertook an effort to bring overweight coal trucks into compliance with Kentucky's weight laws. In addition to regular patrols of these roadways, each year KVE sets up

a special enforcement blitz to monitor weight compliance in eastern Kentucky. Table 17 below shows the results of the special emphasis for each year from 2004 to 2006 as documented by KVE. When KVE started this effort in April of 2004, 77.1 percent of the coal-hauling trucks weighed were in violation of the laws. The percentage in violation has dropped drastically since that first year, with the 2006 violation percentage at 2.9 percent.

Table 18: Results of the Coal Haul Focus 2004-2006

<b>Month/Year</b>	<b>Coal Trucks Weighed</b>	<b>Overweight Violations</b>	<b>Percent in Violation</b>
April 2004	340	262	77.1%
April 2005	1167	44	3.8%
April 2006	1840	54	2.9%

This effort has resulted in a drastic reduction in overweight commercial vehicles and a general improvement in the overall safety of commercial vehicle operations in eastern Kentucky. KVE analyzed CRASH data using the Kentucky Open Portal System (KYOPS) in November 2007 for the past four state fiscal years. The data included injury and fatal crashes involving commercial vehicles on state roads in highway districts 10, 11, and 12. These criteria were used since KVE’s efforts have been mainly on state routes in eastern Kentucky. The analysis did not solely focus on coal trucks since the enforcement presence would likely influence all commercial vehicle traffic. As Figure 7 shows there has been a steady decline in the combined number of injury and fatal crashes in this area. Although it is unlikely that this decline can be attributed solely to the increased enforcement presence, it appears that the increased KVE presence and overweight enforcement has improved safety on these roadways.



Figure 8. KVE on overweight enforcement detail in eastern Kentucky.

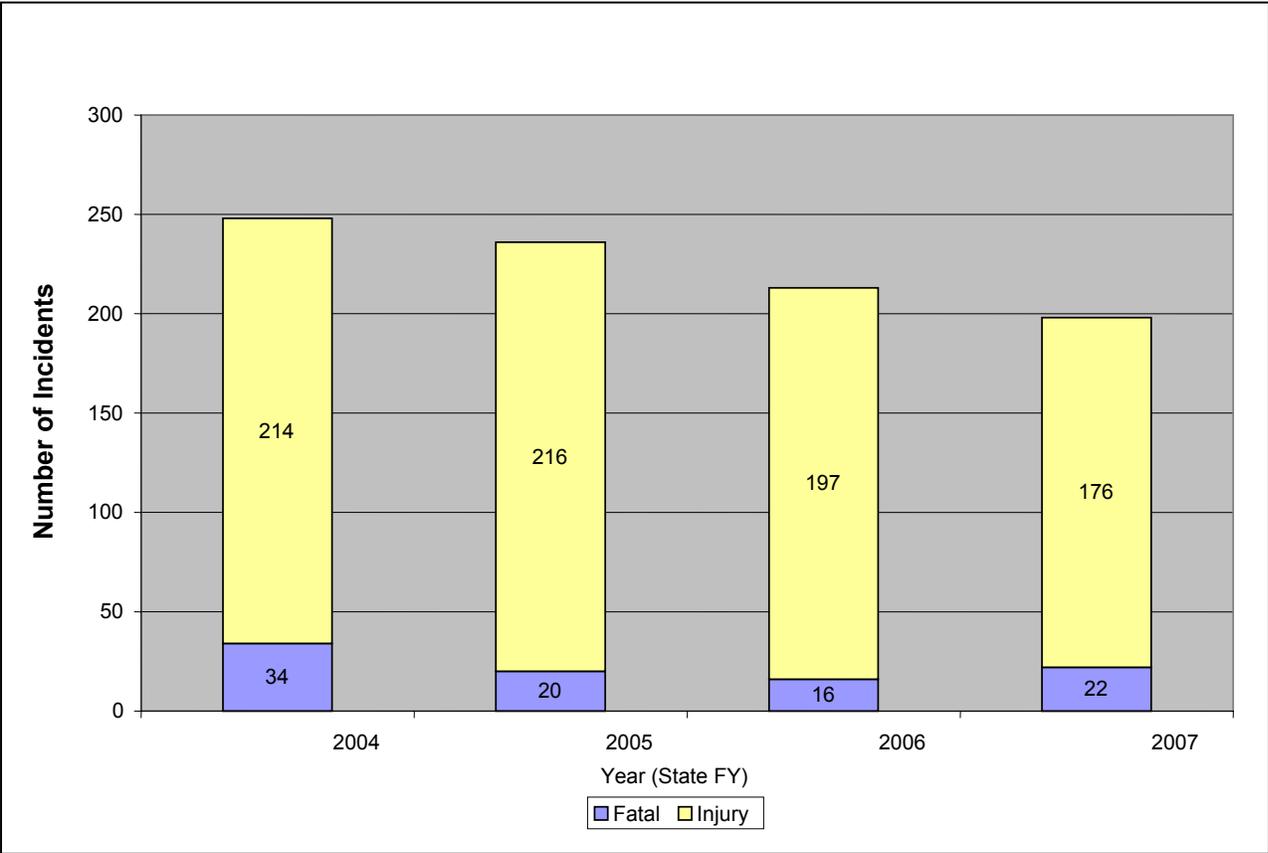


Figure 9. Commercial Vehicle Injuries and Fatalities in Eastern Kentucky 2004-2007

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## CHAPTER FIVE

### CONCLUSIONS

The functions carried out by KVE are critical to protecting the health and safety of Kentucky's citizens, maintaining revenue for Kentucky's Road Fund, and protecting Kentucky's surface transportation infrastructure. Because much of what KVE does is preventive in nature (i.e., preventing "bad things" from happening), it is easy to take KVE for granted. The value of KVE activities is not well understood by many decision-makers.

The activities carried out by KVE personnel are many and varied. The majority of these activities are focused on commercial motor carriers, vehicles, and drivers, but KVE also assists with traffic enforcement, homeland security, and drug interdiction. These activities benefit multiple stakeholders, including federal and state agencies, the motor carrier industry, all highway users, and the general public.

The primary benefits provided by the activities of KVE are: reductions in crashes, injuries, and fatalities; protection of the revenue streams that replenish Kentucky's Road Fund; reduced damage to Kentucky's surface transportation infrastructure; and creating a level playing field for Kentucky's motor carrier industry by monitoring conformance with fees and taxes. Because much of KVE's focus is preventive in nature (i.e., preventing "bad things" from happening, many of the benefits that KVE provides are difficult to quantify. However, it is possible to provide estimates for some of the benefits. Using the best available data for crash reductions, revenue protection, and infrastructure protection, the benefits of KVE activities in these areas are estimated at approximately \$70 million to \$130 million annually.

With regard to weight enforcement, KVE's efforts in eastern Kentucky have resulted in a dramatic reduction in the number of overweight trucks. This reduction has been accompanied by a corresponding decrease in fatalities and injuries related to commercial vehicle crashes in eastern Kentucky. Reduced truck weights should also result in increased longevity of the roadway infrastructure.

KVE's overall effectiveness (and the magnitude of benefits generated through KVE's activities) depends heavily on the following factors:

- **Staffing Levels and Allocation** – Appropriate staffing is essential to keep weigh/inspection facilities open and to patrol the state's primary and secondary roads. When weigh/inspection facilities are closed, or when roadways are not monitored, significant safety problems may go undetected and substantial quantities of taxes and fees may go uncollected. The benefits resulting from KVE activities will be maximized when optimum staffing levels are identified and maintained. The optimum level of KVE staffing is currently unknown, as is the optimum allocation of staff between fixed weigh stations and mobile enforcement. Also unknown is the optimum schedule for weigh station operations (24/7 versus alternative schedules). Further research is needed to determine the staffing levels, staff allocation, and weigh station schedules that produce the maximum benefit.

- Inspection Selection – KVE needs to make optimum use of available tools to improve the selection of trucks for inspection. Driver and vehicle OOS rates are key indicators of how well enforcement resources are being focused on high-risk motor carriers, vehicles, and drivers. Kentucky’s OOS rates, when compared to national averages, show significant room for improvement. Data from the 48-hour blitz showed that using available tools (such as the Kentucky Clearinghouse and the thermal imaging technology) can result in substantially higher vehicle OOS rates. KVE can make greater utilization of these tools to increase the effectiveness of driver and vehicle inspections. There is also an issue with trucks being selected for inspection but disregarding the in-station signage that directs them to stop for inspection. This issue warrants further investigation.
- Cooperation with Division of Motor Carriers – Because KVE has enforcement responsibility for the Division of Motor Carriers, it is essential that the two agencies work closely together to collect all funds that are due. Direct revenue collected by KVE for the Division of Motor Carriers has declined substantially since 2001. This decline may be related to the decreased use of the Kentucky Clearinghouse system, but further investigation is warranted.

Weigh-in-motion data collected for this study gave a preliminary indication that the status of the weigh/inspection facility (open or closed) has a significant impact on the volume of truck traffic on US 25. However, inconsistent operation of the WIM equipment made it impossible to fully validate that indication. Further investigation of this relationship is warranted.

## CHAPTER SIX

### RECOMMENDATIONS

The presence and activities of KVE produce great value for the Commonwealth of Kentucky. Because of this, (or, alternatively, because of the great cost associated with a lack of adequate commercial vehicle enforcement), KVE should be sufficiently funded and staffed to ensure a consistent level of enforcement at weigh stations and on other roadway segments. As noted below, further research is needed to determine the optimum level and allocation of KVE staffing.

Improved cooperation and discussion between the Division of Motor Carriers and KVE is needed. KVE staff should be provided with training on the use of the Kentucky Clearinghouse system, and registration and credentials support should be available from the Division of Motor Carriers on a 24/7 basis.

KVE's special enforcement emphasis on weight limits in eastern Kentucky should continue.

KVE should adopt a management objective to raise driver and vehicle OOS percentages to at least equal the national averages. This strategy should make maximum usage of available tools (like the Kentucky Clearinghouse) to target noncompliant or high-risk trucks for inspection.

KVE should provide in-depth training to selected personnel on the use of the infrared imaging systems. This technology should then be used on a continuous or periodic basis to target trucks with apparent brake defects.

Further research is recommended in several areas, including:

- the optimum staffing levels for KVE, optimum allocation of staff, and optimum hours of weigh station operations (as noted above);
- the relationship between weigh/inspection facility open-closed status and the volume of trucks on available bypass routes;
- the problem of trucks disregarding weigh/inspection facility signage;
- the causes of (and potential solutions for) Kentucky's low driver OOS rates; and
- the decline in direct revenue collections by KVE for the Division of Motor Carriers.

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## **APPENDIX A**

### **PEACE OFFICER PROFESSIONAL STANDARDS ACT**

The 1998 Omnibus Crime Bill (HB 455) legislation that made it possible for sheriffs and university police to participate in KLEFPF is also responsible for other sweeping changes in requirements for Kentucky law enforcement, including the Peace Officer Professional Standards Act (POPS).

POPS dictate what the minimum standard is for becoming a peace officer in Kentucky. The law requires applicants to law enforcement agencies in Kentucky to meet 16 pre-employment standards prior to becoming a peace officer in the state.

The standards include five physical fitness measures. To pass this component of POPS, applicants must be able to bench press 64 percent of their body weight, complete 18 sit-ups within one minute, finish a 300-meter run in 65 seconds, perform 20 push-ups and run 1.5 miles within 17 minutes and 12 seconds.

The POPS law also requires that applicants be U.S. citizens, be at least 21 years old, have obtained a high school diploma or its equivalent, possess a valid driver's license, submit fingerprints for a criminal background check, not convicted of a felony offense, not prohibited by federal or state law from possessing a firearm, have read the Code of Ethics, and have not received a dishonorable discharge or general discharge under other than honorable conditions.

Applicants also must not have not had certification as a peace officer permanently revoked in another state, have a medical examination, have a background investigation, be interviewed by their potential employing agency's executive or designee, take a written suitability screener, pass a drug screen test and take a polygraph examination.

Results of a 2002 survey of the Department of Criminal Justice Training clients reflect that police chiefs, sheriffs and other law enforcement agency directors strongly agreed that POPS standards were responsible for advancing the Kentucky law enforcement community.

Law enforcement leaders across the state have been involved with POPS from the start. The standards were developed in 1997 by a 68-member committee organized and facilitated by DOCJT executive staff. The committee included representatives from all Kentucky law enforcement professional associations, every size department, ECU's College of Justice & Safety, the Southern Police Institute, the Justice Cabinet, state law enforcement, legislators and community leaders.

The committee, led by executive staff of DOCJT, was formed to develop by consensus, statewide uniform standards that peace officers would have to meet in the hiring and selection process. The process took 10 months.

The goals of the POPS standards included improving the quality of people entering law enforcement, thus providing improved services to the citizens of Kentucky.

Prior to POPS, Kentucky only required peace officer applicants to be at least 21 years old, not convicted of a felony offense and hold a valid operator's license.

## APPENDIX B:

### NORTH AMERICAN STANDARD INSPECTIONS LEVELS

#### LEVEL I

**North American Standard Inspection:** An inspection that includes examination of driver's license, medical examiner's certificate and waiver, if applicable, alcohol and drugs, driver's record of duty status as required, hours of service, seat belt, vehicle inspection report, brake system, coupling devices, exhaust system, frame, fuel system, turn signals, brake lamps, tail lamps, head lamps, lamps on projecting loads, safe loading, steering mechanism, suspension, tires, van and open-top trailer bodies, wheels and rims, windshield wipers, emergency exits on buses and HM requirements, as applicable.

#### LEVEL II

**Walk-Around Driver/Vehicle Inspection:** An examination that includes each of the items specified under the North American Standard Inspection. As a minimum, Level II inspections must include examination of: driver's license, medical examinee's certificate and waiver, if applicable, alcohol and drugs, driver's record of duty status as required, hours of service, seat belt, vehicle inspection report, brake system, coupling devices, exhaust system, frame, fuel system, turn signals, brake lamps, tail lamps, head lamps, lamps on projecting loads, safe loading, steering mechanism, suspension, tires, van and open-top trailer bodies, wheels and rims, windshield wipers, emergency exits on buses, and HM requirements, as applicable. It is contemplated that the walk-around driver/vehicle inspection will include only those items which can be inspected without physically getting under the vehicle.

#### LEVEL III

**Driver-Only Inspection:** A roadside examination of the driver's license, medical certification and waiver, if applicable, driver's record of duty status as required, hours of service, seat belt, vehicle inspection report, and HM requirements, as applicable.

#### LEVEL IV

**Special Inspections:** Inspections under this heading typically include a one-time examination of a particular item. These examinations are normally made in support of a study or to verify or refute a suspected trend.

#### LEVEL V

**Vehicle-Only Inspection:** An inspection that includes each of the vehicle inspection items specified under the North American Standard Inspection (Level I), without a driver present, conducted at any location.

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