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Traffic Safety
Administration**

Motivation of Employers to Encourage Their Employees to Use Safety Belts (Phase 1)

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This document contains the final project product as Appendix F, "The Profit in Safety Belts: A View for Employers" -- the manual for employers.

16. Abstract

For the purpose of motivating employers to encourage their employees to use safety belts, a manual for employers, "The Profit in Safety Belts: A View for Employers", is developed. The manual brings to the attention of employers the various cost elements, both direct and indirect, which are involved in employee motor vehicle accident-related injuries. Further, it illustrates through cost analysis of five pairs of parallel or similar case histories the potential savings employers can accrue when their employees use safety belts on and off-the-job. The featured cases are drawn from the files of seven participating employers. Finally, the manual features brief synopses of five employer programs which show indications of success/effectiveness in encouraging employees to use safety belts.

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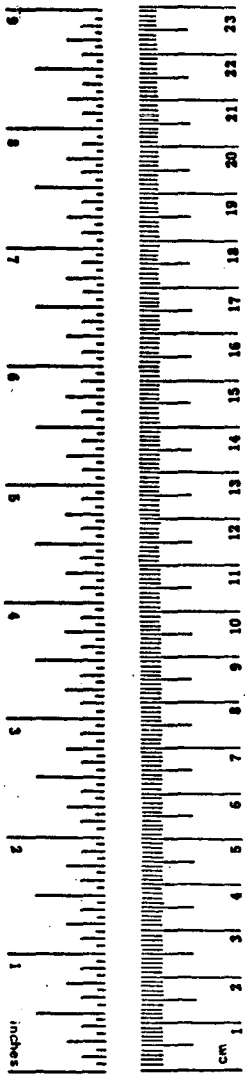
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

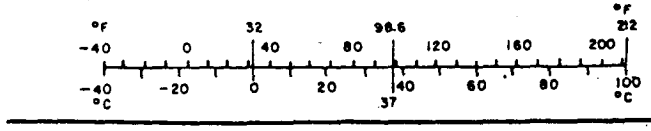
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.6	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Pabon, Sims, Smith and Associates, Inc. wishes to acknowledge the essential assistance of the employers who participated in this project. Their contribution to this effort and, therefore, to the overall NHTSA effort to get the life-saving safety belt message out are exemplary of their interest in the welfare of the American public in general and in the safety of their employees both on and off-the-job in particular. The employers who participated in this effort made a considerable donation to the U.S. public in time, money and other resources. In all cases PSS staff was impressed with the hospitality and high level of cooperation experienced on-site and with the patience and perseverance demonstrated in the collection of comprehensive data. Even when data proved unavailable, the amount of effort expended in making that determination was considerable. Thank you once more for all of your help.

A special acknowledgement is extended to Dr. Christy Hughes and Ms. Barbara Richardson of the National Safety Council for the time they took from their busy schedules to review and offer comments on the employer manual draft.

We wish to extend sincere thanks to the following individuals within the National Highway Traffic Safety Administration for their special and on-going help during the course of this effort: Dr. Bruce Bigelow, Contracts Technical Monitor; Dr. William Scott, Director of the National Center for Statistics and Analysis; and Ms. Grace Hazzard, Data Retrieval Specialist, National Center for Statistics and Analysis. Finally, PSS thanks the entire Safety Belt Task Force for their conscientious review and input as part of the development of the final employer manual.

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INTRODUCTION/SUMMARY

Background and Problem Statement

The National Highway Traffic Safety Administration (NHTSA) has long recognized the importance of the use of active restraint systems (safety belts) in reducing injury and death to occupants of motor vehicles involved in crashes.

Despite the efforts of the National Highway Traffic Safety Administration, the National Safety Council, and others, only an estimated 11 percent of drivers in the U.S. regularly use safety belts. The results is a cost to society of as high as $50-billion annually. One large area of societal cost is borne by the private sector -- the employer.

Increased safety belt usage has been the goal of a large number of past and on-going domestic and foreign programs. The efforts include promotional packages (media programs and printed materials), and educational programs; efforts to obtain legislation mandating safety belt and child safety seat use; speakers' bureaus, and others. The success of these efforts has been limited, largely because the use of safety belts is purely voluntary. Consequently, NHTSA has refocused its activities in order to define and evaluate programs that communicate to the public the importance of safety belt use.

A program setting which is of current interest to NHTSA is the workplace, where it appears that the promotion of safety belt use might be effected through the employer-employee relationship. In recognition of the potential of the work-setting, organizations such as the National Safety Council, the Motor Vehicle Manufacturers' Association, and the Highway Users' Federation for Safety and Mobility encourage the development of a system whereby employers can assess savings that might result from implementation of occupant protection programs. It is believed that such employer programs may have a significant impact on national seat belt use, both becasue of the unique influence employers may have over the behavior of their employees, and because employers are likely to have a genuine interest in keeping employees safe, healthy and able to perform their work. In this connection, one of the principal recommendations of a Congressionally-mandated assessment by a National Academy of Sciences Study Committee was that government and private organizations develop methods of motivating employers to encourage their employees to use safety belts.

Scope of Work

In order to support the efforts of non-government organizations, NHTSA contracted with Pabon, Sims, Smith and Associates, Inc. (PSS) to develop case studies illustrating both the actual cost of a crash in which occupant protection was not used and the savings that would have occurred had it been used. The following primary project objectives were identified for PSS to accomplish its research effort:

1. Investigate, document, and chronicle the case histories and costs of sample vehicle crashes involving non-belted employees from a wide range of employer organizations.

2. Develop a manual for employers to use in assessing the cost benefits of a company belt-use policy.

In order to accomplish these objectives, a series of tasks (including a Pilot study) and activities were undertaken as follows:

Task 1: Project Organization. The objective of this task was to reach agreement between NHTSA and PSS on the activities to be performed and the time-frame of performance. Task 1 included the arrangement/preparation of the following:

- A Project Orientation Meeting
- Detailed Workplan
- Formal Presentation of Workplan

Task 2: Information Gathering. This task involved review of employee safety programs having special emphasis on promoting the use of safety belts.

Pilot Study. A Pilot Study was conducted utilizing one representative employer. The study was undertaken in order to test and refine data collection methodology and to anticipate conditions/problems in the field.

Task 3: Identify Target Employer Categories. PSS identified the types of industries which would comprise the target group of employers for the project. The general categories of industry were selected from the Standard Industrial Classification's (SIC) list of general employer categories.

Task 4: Select Specific Representative Employers. Employer selection criteria were developed. Candidate employers were contacted initially by telephone and subsequently by letter to secure commitment of participation.

Task 5: Select Case Histories from Each Representative Employer. Case selection criteria were developed for cases involving employees where safety belts were not used. Site visits were conducted and employer records were searched for cases meeting selection criteria.

Task 6: Determine Employer Costs for Motor Vehicle Crashes. Utilizing company records and information from company officials, health care professionals, insurance representatives and others, the costs to the employer of each selected crash was determined.

Task 7: Assess Potential Savings if Accident Victims had been Properly Restrained. Assessment was made of the savings (reduction in costs) that would likely have occurred had victims been wearing safety belts.

Task 8: Write Case Histories. Non-safety belt cases were written in a format designed for presentation of the accident, injuries, and costs to the employer.

Task 9: Selection of Case Studies Demonstrating Positive Effects of Using Safety Belts. Similar cases where a safety belt was used were identified in an effort to "match" each selected non-safety belt case and thus compare levels of injury sustained and associated employer costs.

Task 10: Develop Manual that Employers Can Use to Assess the Economic Benefits of Employee Use of Safety Belts. A manual was developed which clearly demonstrates to employers the potential areas of savings when employees experience no injury/less severe injury because they were wearing safety belts in a crash.

Task 11: Assess Acceptance/Usage of Manuals. It was decided that a formal evaluation of the manual would not be undertaken in Phase I of this effort. Rather, the manual will be mailed out during the second phase of the project and will be followed by an evaluation form to be mailed one or two weeks after employers receive the manual. Representative employers will offer feedback regarding whether or not the manual would be influential in changing company policy.

Task 12: Conduct Contract Completion Activities: The objective of this task was to perform activities to complete and summarize the contract effort, including progress reports, a final report and a technical briefing with transparencies.

Conclusions

The project tasks resulted in the employer manual product, "The Profit in Safety Belts: A View for Employers". The nucleus of the manual is comprised of four parallel case histories -- safety belt vs. non-safety belt -- drawn from industry. Costs associated with a non-safety belt case are compared with those incurred by the employer when a safety belt was worn in a similar crash. The major conclusion of the project, based upon the parallel cases, is that employers save money when their employees wear safety belts. Employers save on both direct and indirect costs.

Secondary conclusions involve PSS's experiences with employers during the participant employer identification process and the subsequent data collection processes of the project. These conclusions include the following points:

- Inaccessibility and unavailability of crash, injury and employer cost data is a condition which exists with many employers. It prevents them from having the information which would allow them to know the role that employee motor vehicle accidents plays in their total financial picture. Indirect cost information and data associated with off-the-job crashes are particularly inaccessible/unavailable.

- Employers need to have access to safety belt use data on their accident cases in order to know the role that safety belt use plays in their own employees' accidents.

- Those employers who are tuned in to the savings potential of an employee safety belt use policy/program are generally those who have an overall employee safety program/policy. These companies make poor sources of non-safety belt cases due to the apparent effectiveness of their programs.

- Employee safety belt programs/policies for which there are strong indications of effectiveness/success appear to have certain common elements including management's commitment to employee safety, a written safety belt use policy, and others.

- Getting employers to participate in a study such as the employer safety belt project is both difficult and time-consuming. Those companies which stand the most to gain from a safety belt use program are generally those which do not have the spirit of "employee safety consciousness", keep inadequate recrods, and therefore are the hardest to sell on benefits.

- Employers must be initially sold on the idea that safety belts can save them money before they will look at more comprehensive materials on safety belt programs/policies. The employer manual provides the initial sales tool.

II. APPROACH

Phase 1

This section presents the general approach utilized by PSS for the research and analysis of Tasks 2 through 11.

Those Task 1 activities involving orientation and scheduling processes are not included in this section but are outlined in the Introduction.

Task 2: Information Gathering

- Activity 1: Identify Information to be Collected. To facilitate the identification of prospective participant employers, information was gathered about companies which already had employee safety belt programs/policies. The logic was that those employers with programs would be most likely to participate in the study. Information collected included the following general areas:

  - Organization/agency
  - Type of organization
  - Status of program/policy
  - Key individuals/contacts
  - Elements of program, including target audience, type of incentives, educational/informational materials, costs of implementation (as available), other

Further, PSS identified other areas where information was needed, including:

- Safety belt effectiveness statistics
- Societal costs of motor vehicle crashes
- Categories of cost of motor vehicle crashes incurred by employers
- Cost of absenteeism to employers
- Crash dynamics
- Attitudes toward safety belt use
- Abbreviated Injury Scale (AIS)

- Activity 2: Conduct Literature Review. A literature review was conducted in an attempt to abstract the references which indicated significant trends in the occupant protection field and to highlight cost benefit research studies. The literature review is included in this report as Appendix A.

- Activity 3: Identify/Interview Information Sources. Through leads developed in the course of the literature review and those obtained from NHTSA, PSS identified and interviewed individual informational sources using a format developed for personal/telephone interviews. Organizations contacted included the following:

  - The National Safety Council
  - The Highway Users Federation
  - The Motor Vehicle Manufacturers' Association
  - American Association of Automotive Medicine
  - Transportation Research Board, National Academy of Sciences

- American Seat Belt Council
- Highway Safety Research Institute, University of Michigan
- Highway Safety Research Center, University of North Carolina

At this juncture, the project took a course of action which was unanticipated at the outset of Task 2. In a meeting with the Contract Technical Monitor (CTM) it was agreed that all efforts should turn to finding a single case-study for a pilot test, preliminary to utilizing the planned methodology.

Pilot Study

The Pilot Study involved soliciting the participation of at least one local employer who met minimum selection criteria developed simultaneously in Tasks 3 and 4. A list of target employers was identified from "Principal Employers of the Metropolitan Washington Area", published by the Metropolitan Washington Board of Trade. Then, using a telephone contact sheet developed for that purpose, over thirty employers were contacted before the Pilot Study employer was selected.

Data collection forms were developed for gathering information on the employer, the accident cases, and accident-related costs. A site visit was conducted by PSS staff and a total of four non-safety belt cases were identified. During the visit, and subsequently by telephone, all available case and cost data were obtained from the employer and documented by PSS. The Pilot Study is contained in this report as Appendix B.

Task 3: Identify Target Employer Categories

- Activity 1: Identify and Develop Organizational Categories. The first step in the performance of this activity was to effect a gross classification of employers by type. That is, preliminary groups were identified based upon the nature of the organization. The Standard Industrial Classification (SIC) was a useful starting point in developing the groupings. The major industry divisions of the 1972 edition of the SIC were used as broad categorization of target employers. The major divisions were as follows:

1. Agriculture, forestry and fishing
2. Mining
3. Construction
4. Manufacturing
5. Transportation, communications, electric, gas and sanitary services
6. Wholesale Trade
7. Retail Trade
8. Finance, Insurance, Real Estate
9. Services
10. Public Administration

11. Nonclassifiable Establishments

• Activity 2: Delimit Target Employers. The major target categories were delimited by the exclusion of the following SIC divisions:

1. Agriculture, forestry and fishing

2. Retail Trade

3. Nonclassifiable establishments

PSS sought to secure the participation of a minimum of one employer in the remaining eight categories. Emphasis was placed upon large companies as it was believed that they would yield the most comprehensive data as well as the largest case selection pools for the study. The size standards used by the Small Business Administration were used as a general guideline in identifying large companies.

Within each major category companies were sought whose fleets reflected the basic characteristics of fleets within their type of business. The function of transportation was required to be representative of its role within other companies involved in similar work. For example, a telephone company would not be selected which did not have a substantial workforce on the road daily in such functions as installation of telephones, servicing existing accounts, etc., as these are normal functions of on-the-job driving in most telephone companies.

Existence of an employee safety belt use program was not a prerequisite for employer selection, although for several reasons PSS concentrated upon those with programs:

1. Existence of a program was believed to be an indication that the company might be willing to cooperate with the effort.

2. Existence of a program offered an opportunity to collect program data as well as accident/cost data.

3. Existence of a program was believed to be an indication that case and cost records vitally necessary to the study might exist and be available for use by PSS.

Task 4: Select Representative Employers

• Activity 1: Develop Criteria for "Representative" Organizations.

While statistically valid national representativeness would have been desirable and useful for the study, the preponderance of variables that would have to have been considered made the magnitude of such an undertaking out of proportion to the scope of this effort. For example, while a set of criteria such as size, nature of its business, and fleet composition formed a basis from which to work, variations of internal structure, available documentation, and other factors precluded so-called "representativeness".

A more useful approach was to develop criteria that would allow comparisons within groups to be made. Trade-offs were made among criteria, with willingness to cooperate serving a major role in employer selection. The final set of selection criteria was as follows:

1. Employer is within one of the following industrial classifications:

   a. Mining
   b. Construction
   c. Manufacturing
   d. Transportation, communication, electric, gas, and sanitary services
   e. Wholesale Trade
   f. Finance, Insurance, Real Estate
   g. Services
   h. Public Administration

2. The company is large enough to have adequate case selection pools and comprehensive data available for the study. The size standards used by the Small Business Administration were used as general guidelines in selecting companies. The purpose was not to strictly define "large" or "small" business as such definitions are highly subjective and dependent upon the purpose for classifying them. Rather, this criterion was used to delimit the large number of companies within each industrial category to those most likely to have the type of information sought.

3. The employer has a fleet of company-owned or leased vehicles or requires that employees utilize their own vehicles for business purposes.

4. Transportation is a vital part of the employer's operation and representative of its function in similar companies. For example, a manufacturing company would consider its marketing force to be a vital part of its operation. Marketing representatives who drive on-the-job are representative of the use of transportation across a number of manufacturing operations.

5. Predominant vehicles utilized by the employer are in the auto, passenger van, and/or pick-up truck categories.

6. The company records safety belt use as part of its accident record-keeping for on-the-job motor vehicle accidents.

7. The employer keeps comprehensive records of employee motor vehicle accidents and related employee bodily injuries and/or has access to such records.

8. The employer has knowledge that significant employee motor vehicle accidents have taken place in the past few years. Significant accidents are those involving "totaled" or heavily damaged vehicles and/or "lost time accidents" of at least a week's duration.

9. Employees are actually employed by the firm -- not independent workers or under contract.

10. The employer (i.e., the company as a whole) is willing to cooperate fully as a participant in the effort.

• Activity 2: Select Employers. This activity involved selecting employers for initial telephone contact, ascertaining by telephone the

appropriateness of the employer as a candidate for participation, ascertaining by telephone the initial willingness of appropriate employers to participate; initiating final selection process through a letter explaining the project; maintaining contact through the various stages of corporate decision-making throughout the agreement-to-participate process; and setting up site visit appointments with those employers selected in the final analysis.

Telephone contact sheets were filled out for employers with whom it appeared contact would be ongoing. After initial telephone contact, an individualized form letter developed by PSS and a letter from NHTSA guaranteeing anonymity and confidentiality at corporate and individual levels were sent to each employer under consideration for participation. The letter generally initiated a corporate process whereby the employer decided whether or not to participate based upon the requirements/requests enumerated in the letter and upon in-house considerations. PSS generally contacted and/or was initially referred to the Corporate Safety Officer, the Risk Management Director, the Claims Department, etc. Attempts to initiate contact at a higher level did not meet with enough success to continue in that vein. Generally, a promising company required a minimum of three telephone contacts and one letter before final agreement to participate and a site visit date could be achieved.

PSS contacted approximately 100 companies in the effort to secure a maximum of 12 participating employers for the effort. The names of employers for initial contact were drawn from various sources, including:

- Companies identified as part of Task 2 or from ongoing information gathering activities as having a safety belt program/policy and/or as being "employee-safety conscious".

- Companies identified by Dr. Della Gustina of West Virginia University's Safety Studies Department.

- Companies which showed initial interest in the safety belt study conducted by Opinion Research Corporation, Safety Belt Education Program for Employees - An Evaluation Study (Contract No. DOT-HS-7-01707).

- Companies listed as under contract for services/goods with the U.S. General Services Administration.

- Companies located in the general vicinity of an already selected employer.

After contacting approximately 80 companies, the following companies were identified as participants and site-visits were scheduled to collect company, crash and cost data:

- Property and casualty insurance company
- Manufacturer of duplicating equipment
- Manufacturer of chemical products
- Telephone company
- Telephone company
- General insurance company
- State department of transportation
- Manufacturer of electronic components
- Construction company

- Coal mining company
- Brewery
- Electronics manufacturer

It should be borne in mind that earlier stages of the employer selection process were often conducted for some companies concurrently with the conduct of site visits for other companies. The results of this were, for example, that one telephone company had already "washed out" after a site visit had been conducted, prior to the selection of the second telephone company as a participant.

Task 5: Select Case Histories

• Activity 1: Develop Case Selection Criteria. A set of criteria was developed for the selection of non-safety belt cases. Criteria were as follows:

1. The crash had significant financial impact upon the employer and/or repercussions of the crash included disruption of normal company operations. Generally the crash resulted in employee absence of one or more weeks' duration.

2. A safety belt was available in the crash vehicle.

3. The employee did not wear the available safety belt at the time of the crash.

4. The case is of a type for which a parallel safety belt use case can conceivably be identified.

5. The conveyance utilized by the employee was an automobile, pick-up truck, or passenger van.

6. The severity of injury and/or the nature of the crash would appear to have been affected significantly by utilization of the safety belt.

7. The case reflects one of the following situations:

   - worker on-the-job in company vehicle
   - worker on-the-job in private vehicle
   - worker off-the-job in private vehicle
   - worker off-the-job in company vehicle

   The emphasis was placed upon identifying non-safety belt cases which occurred on-the-job in company vehicles primarily, and off-the-job in private vehicles secondarily.

• Activity 2: Identify Parallel Case Selection Variables. PSS's use of the concept of "parallelism" for purposes of this study was of necessity a rudimentary one. The constraints of the project indicated that identifying truly parallel cases -- cases matched in all variables under the broad categories of accident characteristics, vehicle characteristics, and occupant characteristics -- was quite beyond the scope of the project.

Those variables related to injury severity which appeared to account most significantly for variations in the level of injury were identified as criterion variables. While such variables as age, sex, weight, etc. certainly do come into play in the variance of injury level, PSS eliminated them as criterion variables due to the scope of the project. The criterion variables thus enabled a gross matching between safety belt and non-safety belt cases. Variables were as follows:

1. Type of accident
   - number of vehicles involved in crash

2. Vehicle characteristics
   - vehicle types
   - vehicle sizes
   - vehicle speeds
   - type/point of impact
   - object contacted
   - fire occurrence

3. Occupant characteristics
   - number of occupants
   - whether employee was driver or passenger
   - employee seating position(s)
   -

- Activity 3: Identify Preliminary Case Selection Information Sources. For each participating employer at least one main informational contact was identified by the referring source or by initial telephone contact with the company. In general the main contact was located in one of several related areas: Risk Management, Corporate Safety Office, Claims, etc.

- Activity 4: Conduct Initial Meeting/Consultation with Organizational Officials. An interview was scheduled and held on-site (by telephone in one case) with officials of each selected organization. At the meeting, company officials were asked to aid PSS in identifying relevant accident cases and sources of information about the case, the cost, and necessary company data. In several instances the company "washed out" after the initial interview, either because it lacked appropriate information or for other reasons noted below. The companies which were valid for inclusion in the study were as follows:

1. Electric utility company
2. Property and casualty insurance company
3. Manufacturer of duplicating equipment
4. Manufacturer of chemical products
5. Telephone company
6. State department of transportation
7. Manufacturer of electronic components
8. Telephone company
9. State Police
10. City government
11. Gas utility company
12. Automobile manufacturer
13. U.S. military operation with private contractor

• Activity 5: Identify Other Sources: At the consultation with company contact(s), PSS sought information regarding sources of case, cost, and company data which would yield the most complete case studies possible. For example, it was ascertained which departments would have information regarding hospital/medical payments for off-the-job injury, which would know about Workers' Compensation payments for on-the-job motor vehicle accidents involving personal injury to employees, etc. If an outside insurance carrier was a valid source of information for case studies in a company, PSS obtained the name of the insurance company and requested the name of appropriate contact(s).

• Activity 6: Obtain Individual Case Data. Data were collected about crash cases which initially appeared to meet case selection criteria. Initial data collection was accomplished on-site in most cases, with follow-up and additional data collection completed by mail and/or telephone

Sources of information included:

- company accident records/reports
- police accident records/reports
- Workers' Compensation claims records
- insurance company records
- contacts identified prior to Activity 6

Data were collected on the following variables:

- severity of injury and/or days lost (severity of injury was designated by codes from the Abbreviated Injury Scale).
- safety belt use
- parallel case selection variables
- ownership of vehicle (company or employee)
- reason for the trip
- whether employee was driver or passenger

The accident information form developed as a guide for data collection on employee motor vehicle crashes is included as Appendix C to this report. The "Injury Classification" method featured on the form was changed to a simple AIS rating.

• Activity 7: Select Cases Meeting Criteria for Non-Safety Belt Crashes. The case selection criteria for non-safety belt crashes were applied to the pool of cases for which comprehensive data were available. Those cases which best met the criteria were selected.

• Activity 8: Match Non-Safety Belt Cases with Safety Belt Cases. Case matching involved three phases:

1. General scanning of safety belt/non-safety belt cases to identify candidate pairs.
2. Application of case-specific criteria -- matching of case selection variables.

3. Further analysis of those cases which emerged as "parallel" from the pool of cases.

For those cases for which no parallel was found, PSS sought a parallel through the use of the Calspan Level II and Multidisciplinary Accident Investigation (MDAI) files. Both of these files are maintained by the Highway Safety Research Institute at Ann Arbor and are accessible through NHTSA's computer terminal. Both files contain for each case the injury level on the Abbreviated Injury Scale (AIS) as assessed by a medically trained reporter. The Calspan file is primarily comprised of tow-away accidents in a nine county area adjacent to Buffalo, New York. The MDAI is composed of intensive accident investigation reports by multidisciplinary teams throughout the country.

Task 6: Determine Employer Costs for Motor Vehicle Crashes

• Activity 1: Determine Cost Informational Resources. The first step in the performance of this task was to establish the sources of economic data for measurement. The sources identified were generally comprised of the state law on Workers' Compensation, company policy, and union agreements covering payments to and for employees injured in the course of work; salary levels of employees whose cases were under study; payments actually made under Workers' Compensation and company agreement; and records of payment from insurance carriers. Where appropriate, company officials were also utilized as sources of cost information on an individual case basis.

• Activity 2: Identify Measures of Employer Costs. This activity involved identification of the specific areas of cost associated with employee involvement in motor vehicle crashes. PSS divided the cost considerations into two major categories -- direct costs and indirect costs. PSS generally sought data across the following identified categories of direct cost:

- wage compensation
- medical expenses
- physical and vocational rehabilitation
- survivor benefits for fatal injuries

The following indirect cost categories were identified for study:

- cost of supervisor's time
- cost of rescheduling staff
- overtime pay
- temporary replacements of personnel
- absence of unique employees
- employee re-entry and retraining
- hiring permanent replacements
- administrative expenses

No account was taken of cost arising from property damage, including damage to the vehicle(s) involved. Safety belt use may have an impact upon these costs because a restrained driver may maintain control of the vehicle and thus prevent the initial or ricochet crashes. However, measurement and comparison within this cost category was beyond the scope of the study.

• Activity 3: Collect Cost Informational Data. For each selected case, available/applicable data were collected across the cost categories listed above.

Information was recorded regarding company policies which affected the various cost considerations, and additional information was collected about employer safety belt programs/policies of participating employers. Appendix D contains the data collection guidelines used in extracting employer/cost data for the cases under study.

The methodology for arriving at an estimate of employer costs for selected cases did not involve all the considerations listed in the technical proposal, since employers could not point to any lost output or replacement of workers necessitated by a crash involving an employee. Thus, the estimate of employer costs was based on an approximation of the injured employee's productivity as derived from his/her individual salary level.

Due to uniform unavailability of indirect cost data across employer sites, PSS utilized a 1:1 ratio of indirect to direct costs to represent an estimate of indirect costs to the employer. The 1:1 ratio is extremely conservative. The Transportation Research Board's report to Congress quotes indirect costs as being up to 4 times as great as direct. The National Safety Council uses a 3:1 ratio of indirect to direct costs as a general rule. For each case under study a computation was made of all direct cost elements; an equal amount was assigned to an indirect cost estimate. The total amount was computed -- direct + indirect -- to arrive at a total cost to the employer for each case. Again, no consideration was given to the issue of vehicle/property damage costs.

Task 8: Write Case Histories

- Activity 1: Develop Case History Format. In this activity the format for the case histories was developed. The format included a brief overview description of the firm/organization describing its size, nature of activity, fleet size, fleet involvement, and other pertinent information. Information regarding the employee and accident case was presented so that cost/savings data were evident. The format was submitted to the Contract Technical Monitor for approval before case histories were written in order to insure consistency.

- Activity 2: Write and Submit Draft Case Histories. Drafts were developed and submitted for 16 case histories (8 parallel pairs) taken from the organizational, crash, and cost data obtained in the previous tasks. These were submitted to the CTM for approval.

- Activity 3: Develop Final Case Histories. Changes/revisions were incorporated from the drafts and final versions of the case histories were prepared.

Task 9: Select Case Studies Demonstrating Positive Effects of Occupant Protection

- Activity 1: Develop Case History Format. A format was developed for case pairs -- one case where a safety belt was not used and a parallel case where the belt was used with positive results. Final case selection was subject to CTM approval.

- Activity 2: Write and Submit Draft Case Histories. Draft case histories were written and submitted for CTM approval. Initial parallel case presentation and case history format can be seen in Appendix E of this report, "Preliminary Draft Manual".

- Activity 3: Develop Final Case Histories. The final case histories were developed. The finalized case histories are presented as part of the final employer manual, Appendix F of this report. An additional case "pair" was developed which did not appear in the initial case drafts -- a case which is contained in Appendix G of this report for possible use by NHTSA.

Task 10: Develop Manual for Employers

- Activity 1: Determine Focus of Manual. It was determined that the focus of the manual would be on how employers could save money if their employees wore safety belts on and off-the-job. The various categories of cost would be discussed; employee parallel case histories would be presented as a basis of cost comparison between safety belt and non-safety belt cases; examples would be featured of employers who have successfully implemented employer safety belt programs/policies.

- Activity 2: Prepare Manual Outline. An outline of the manual was presented and submitted for CTM approval.

- Activity 3: Prepare Draft Manual. A draft was prepared of the employer manual and submitted for CTM approval.

- Activity 4: Revise Draft Manual. A change in the scope of work at this juncture of the project encompassed several iterations of the "prepare draft/ revise draft" process. The change also included the writing of several editorials about the employer safety belt effort and other NHTSA safety belt work. The manual went through the following draft and review stages:

1. Initial/preliminary draft -- CTM and Safety Belt Task Force review
2. Second draft -- CTM and Safety Belt Task Force review
3. Third draft -- CTM and Safety Belt Task Force review
4. Fourth draft -- CTM/Safety Belt Task Force and National Safety Council review

Task 11: Assess Acceptance/Usage of Manual

- Activities 1-3: Develop Evaluation Form; Mail Manual to Employers; and Incorporate Comments. Due to the protracted draft and review process noted above, it was decided that if activities 1-3 were to be included in the project, they would take place in Phase 2 along with the development of Volume 2 of the manual mentioned below.

- Activity 4: Prepare/Submit Final Manual. PSS prepared and submitted the final version of the manual which incorporated the CTM's comments, the suggestions of the Safety Belt Task Force, and the input of the National Safety Council. The final manual, "The Profit in Safety Belts: A View for Employers", is featured in this report as Appendix F. PSS has recommended layout and art guidelines to NHTSA for the printing of the manual.

Task 12: Conduct Contract Completion Activities

- Activity 1: Prepare Progress Reports. Monthly progress reports have been submitted throughout the course of the project.

- Activity 2: Prepare Final Report. A final report was prepared to summarize the project.

- Activities 3 and 4: Prepare and Conduct Technical Briefing. A technical briefing was prepared and conducted at the request of the CTM and Safety Belt Task Force. A final briefing for Phase 1 was conducted; it summarized the tasks, activities, conclusions, recommendations, and final product of Phase 1.

III. FINDINGS AND ANALYSES

The research findings and their analyses are generally embodied in the Preliminary Draft Manual (Appendix E) and the Final Manual, "The Profit in Safety Belts: A View for Employers" (Appendix F). Within these two documents are featured the parallel cases and their cost-analyses within the framework of their respective companies -- the employer participants of this study. Table 1, "Participant Employers: Their Fleets and Their Employees", features the participating companies. An asterix indicates the employers whose cases are featured in the final employer manual.

The final manual includes the cost elements identified as potential areas of employer expense in the event of employee injury due to motor vehicle crashes both on and off-the-job. Indirect costs are identified and a conservative ratio of indirect-to-direct costs provided as a means of estimating the total impact of motor vehicle crash related costs -- not including vehicle or other property damage costs. Further, findings and analyses regarding employer safety belt programs are featured in the final manual. Appendix G to this report is comprised of a non-crash case in which a non-belted employee fell out of a truck he was driving on-the-job. A theoretical parallel is constructed based upon the assumption that had he worn his safety belt, the employee would have remained in the vehicle and escaped all injury.

Employer Participation. Employer recruitment/selection proved to be a tremendously time-consuming task which assumed unforeseen proportions in the scope of the total effort. PSS believes that findings in this area are of interest. There appeared to be a number of reasons for difficulties -- employers were often:

- Unwilling to discuss proprietary information
- Unwilling to devote time/personnel to the effort -- did not see the topic area as being of vital concern

Other employers, regardless of their willingness to participate, were inappropriate for inclusion as participating employers, primarily due to one or more of the following conditions discovered in the telephone contact(s):

- Insufficient fleet involvement in day-to-day operations
- Inapplicable fleet type
- Inaccessibility/unavailability of key data
  - Insufficient record-keeping for needs of the project
  - Highly decentralized records
  - Non-availability of safety belt use information
- Known paucity of applicable accident cases

After an employer had agreed to participate and it appeared that data conditions were acceptable for collection of the crash, injury, employer cost, and other relevant data, site visits were conducted for all of the employer sites except for one. While employers had initiated case selection procedures prior to PSS's visit, in most instances the surface had been barely "scratched" by the time the data collection team arrived.

TABLE 1. PARTICIPANT EMPLOYERS: THEIR FLEETS AND THEIR EMPLOYEES

PARTICIPANT COMPANY	TOTAL EMPLOYEES	FLEET VEHICLES	EMPLOYEES WHO DRIVE/RIDE ON THE JOB
Manufacturer of Chemical Products	105,000	2,603	Marketing Representatives (2,600+)
Property/Casualty Insurance Carrier**	67,000	891	District Sales Agents (19,500)
Manufacturer of Copier Equipment	60,000	10,000	Technical and Sales Representatives (17,000)
Electric Utility Company	10,706	2,990	Meter Readers/Collectors (5,000)
Telephone Company**	8,000	2,227	Service, Repair, and Installation Personnel (4,000)
State Department of Transportation**	4,200	1,711	Maintenance, Construction, and Administrative Personnel (3,000)
Manufacturer of Electronic Equipment**	3,500	143	Sales/Service Engineers (143)
Automobile Manufacturer**	200,000	36,000	District/Sales Personnel (Not Known)
Gas Utility Company**	2,230	1,180	Customer Service, Meter Readers Construction Workers (1,500)
City Government	10,000	1,300	Police, Public Works Employees, Administrative Workers (5,000)
Manufacturer of Ammunition Under Contract with U.S. Military**	3,200	262	Safety, Security, and Fire Department Employees (1,500)
State Police Patrol	550	460	State Troopers and Supervisors (375)
Telephone Company	36,000	8,000	Service, Repair, and Installation Personnel (8,000)

*Numbers in parentheses represent the estimated number of employees who regularly drive on-the-job.

**Companies from whose records exemplary cases were drawn for final employer manual.

Data Collection Constraints. Many of the employers who thought that their data were accessible were surprised to see how difficult a complete case history was to obtain for just one employee motor vehicle crash. The availability/accessibility factor contributed heavily to the difficulties of data collection; however, the very nature of employers who agreed to participate in the study comprised another very important factor in constraints of data collection. The following problems, repeatedly encountered, represent various aspects of the two factors noted above:

1. Lack of record-keeping of key data elements -- especially safety belt use.

2. Incompleteness and inaccessibility of records for on-the-job accidents. Decentralization and lack of data access contributed to the difficulties of data collection across all data categories. For example, a Loss Control department would record totaled vehicles (an indicator of a crash where an employee was possibly hurt or, if he wore his safety belt, saved from bodily injury/death) with no note of the disposition of occupants; Workers Compensation claims would record money dispensed with no cross-reference of cause of illness or injury, etc.

3. Unavailability of data from which indirect elements of injury-related costs could be extracted. Employers did not in many cases appear to grasp the concept of indirect costs. They believed that if all the workers, for example, "covered" for a missing employee, no money would be lost in the process. Employers were unable and/or unwilling to address indirect estimates for selected employee cases. Only one employer had developed a form to trace indirect costs of on-the-job accidents; however, the system was too recent for application to the selected crash cases.

4. Lack of information on off-job accidents. Employers for the most part did not have a means of determining why an employee had been absent from the job -- even for substantial periods of time. Further, even when a motor vehicle accident was the known cause of absence, crash, injury, and safety belt information were very difficult to obtain. Many of the employers used outside insurance carriers who handle claims but give the employer no feedback concerning the reasons for the claims.

5. Confidentiality of Information. Employers were not willing to involve their employees or employees' supervisors in interviews with project staff. Salary information was also problemmatic in several companies. The pervasive feeling was that "company participation" was to be limited to one or two areas of the corporation -- usually safety and/or claims.

6. Paucity of non-safety belt case data/participant bias. If safety belt use was recorded by a participating company, most likely the company was "safety conscious" with a safety belt program/policy. In fact, willingness to participate as well as capability of participating, were highly correlated with existence of a safety belt use program/policy.

In those companies which have a safety belt program -- particularly a mandatory use policy -- rarely does an employee report non-use. One official joked that in his company an employee who was knocked semi-conscious in a crash would probably be trying to buckle the belt! PSS was faced with a double-bind in the collection of non-safety belt cases -- those who would/could participate had mostly belted cases; those employers who would most likely have high cost, non-belted cases could not (due to lack of or inaccessible data) or would not participate.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

PSS has drawn the following conclusions as a result of the study undertaken:

1. The "parallel" or similar cases included in the final employer manual appear to support the hypothesis that employers save money when their employees wear safety belts. The data were insufficient to draw any conclusions regarding projection of costs per case or type of accident.

2. Both direct and indirect costs come into play when an employee is injured to the extent that he requires treatment and/or misses work. The types of cost categories and an explanation of each one is contained in the employer manual.

3. Getting employers to participate in a study such as the employer safety belt project is both difficult and time-consuming for the following reasons:

   - Employers are unwilling to discuss "proprietary" information
   - Employers do not see the topic area as being of vital concern to them and are, therefore, unwilling to devote time/personnel to such an effort.
   - Employers willing to participate may not have accessible or available the key data elements needed for study.
   - Employers may not have knowledge of applicable cases
   - Employers may be ineligible because of other considerations such as employee-type (e.g., independent taxi drivers), fleet type, etc.

4. Inaccessibility and unavailability of crash, injury and employer cost data is a condition which exists with many employers. It prevents them from having the information which would allow them to the role that employee motor vehicle accidents plays in their total financial picture. This is particularly true in the case of off-the-job accidents.

5. If direct cost data can be considered difficult to obtain through a given employer, indirect data can be considered nearly impossible to obtain. Employers cannot provide estimates because many of them do not think in terms of there being any indirect costs associated with accidents.

6. Employers must have access to safety belt use data on their accident cases in order to know the role that safety belt use plays in their own employees' accidents.

7. Those employers who are tuned in to the savings potential of an employee safety belt use policy/program are generally those who have an overall employee safety program/policy. These companies make poor

sources of non-safety belt cases as the programs appear to be very effective if self-report of safety belt use is an indicator.

8. Those companies who stand the most to gain from a safety belt use program/policy are generally those who do not have the spirit of "employee safety consciousness", keep inadequate records, and therefore are the hardest to sell on the benefits.

9. Employer safety belt programs/policies for which there are strong indications of effectiveness/success appear to have certain elements in common. Among them is management's commitment to employee safety; a written safety belt use policy; positive and negative incentives to use and non-use; an employee safety education program, and others.

10. Originally the manual was envisioned as a comprehensive guide for employers to assess the cost-benefit to them of an employee safety belt use program. As the project evolved, it became apparent that what was needed was more of a "sales" tool to get employers to initially consider the implications of safety belt use and potential financial savings. An employer who does not yet consider employee safety issues as of financial importance is not going to look at a comprehensive manual on employee safety belt use! Interest must first be secured through efforts such as the final employer manual and other media efforts sponsored by NHTSA and such groups as the National Safety Council, Highway Users' Federation, and the Motor Vehicle Manufacturers' Association.

Recommendations

1. One of PSS's major recommendations at the end of Phase 1 was for the creation of a second volume of the current manual which would encompass program guidelines, possibly in the form of a model drawn from factor analysis of variables contributing to the success of existing programs. This work will take place as Phase 2 of the project.

2. A truly comprehensive manual should be developed after the current product and its companion piece have received adequate exposure to gain the interest of target employers. The more comprehensive manual should deal with how employers can track and compute indirect costs of employee absence and how to set up record systems so that case, injury and cost data are readily accessible. Such a manual would not only be of aid in employer safety belt program implementation, but for overall employee safety. The manual would contain cost-benefit analysis guidelines for employers along with program implementation process guidelines tailored to various employer, fleet, and employee situations.

3. Employers should be encouraged to approach their carriers of employee health and hospitalization insurance to devise a plan of reporting to the employer the nature of injury/illness causing related expenditures. Employers need to receive vital feedback so that they will see the extent to which their employees (and their families) are involved in costly motor vehicle crashes off-the-job. With the true financial picture in front of them, employers would be more likely to address employee safety belt use as an important issue.

APPENDIX A: LITERATURE REVIEW

The purpose of conducting a comprehensive literature review was two-fold:

- familiarize the project team with State-of-the-Art of Seat Belt Safety
- later use by the National Highway Traffic Safety Administration (NHTSA)

The literature review has been done in an attempt to abstract the references which indicate the significant trends in the occupant restraint field and to highlight cost-benefit research-oriented studies. An effort was made to identify past research developments and point out future research needs.

Hopefully, this brief literature summary will provide the project team a working outline of these critical issues and will be a useful guide in developing the employer manual. Also, the literature review should prove useful to NHTSA in the future when responding to public inquiries for information on this subject area.

The literature review covers two general areas which will be addressed by the employer manual and is organized under the following categories:

- Attitudinal and Social Factors Associated with Use of Seat Belts
- Societal Costs of Motor Vehicle Accidents

The major reference sources used to identify relevant literature include:

- Smithsonian Science Information Exchange (SSIE) computerized abstracts of government-funded research
- Educational Research Information Center (ERIC) computerized abstracts of the educational literature
- NHTSA literature abstracts
- Major literature reviews, state-of-the-art studies, and DOT/NHTSA contract research
- Key references in reviewed works
- Sources recommended by the Contract Technical Manager (CTM) and other NHTSA personnel

Literature review abstracts follow the format outlined below:

- Citation listing in a standard form
- Summary of the study
- Conclusions derived from the study, including:

- methodological evaluation
- significance of study as a contribution to the literature
- direct applicability to the current project

As stated before, an attempt was made to abstract only the major research studies which are indicative of the developmental trends in the area. The purpose of the abstracts is to include the following types of research:

- Research-oriented studies
- Brainstorming articles which put forth good research ideas
- Studies which show the significant thought in the field
- Studies in areas where little research has been done

Several other studies reviewed which provided additional proof of previous findings or expanded on other research were included as citations for use as additional references and background information.

ATTITUDINAL AND SOCIAL FACTORS ASSOCIATED WITH USE OF SEAT BELTS

- Fhaner, Gunilla and M. Hane. Seat belts. Factors influencing their use. A literature survey. Pergamon Press, 15 p. 1973.

Summary

This review was done with the aim of getting a clearer picture of what is important for seat belt use. Several studies from Sweden, England, Finland, and the U.S.A. were discussed. Specifically the intent of this study was to identify variables, or the pattern of variables involved in influencing seat belt usage.

Conclusions

Methodological Summary

The authors of this report organized their results in terms of the variables that have been most frequently studied. The variables have been grouped into broader categories covering:

(1) General use level - the number of persons using seat belts in their automobiles.

(2) Situational variables - temporary factors tied to a specific situation, on seat belt use.

(3) Demographic variables - the difference between seat belt users and non-users in rural and urban areas.

(4) Attitudinal and personality variables - attitudinal factors influencing the use of seat belts.

Significance as a Contribution to the Literature

The results of this study directs attention to specific problems in the area of seat-belt usage and in suggesting hypotheses to be tested regarding variables involved in seat belt use.

Direct Applicability to the Current Project

This study does not provide any data on the economic issues involved in this research effort. It may have an indirect benefit in the preparation of the manual. The factors influencing seat belt use could be discussed in the manual to be produced by PSS.

- Geller, Scott E.; R.P. Johnson, and S.L. Pelton Community-based interventions for encouraging safety belt use. Virginia Polytechnic Institute. p.39 (In Press).

Summary

This study provides the finding of two field experiments which were conducted to evaluate the behavioral impact of community-based intervention for encouraging seat belt use.

Conclusions

Methodological Summary

Two field experiments were conducted to evaluate the behavioral impact of community-based intervention for promoting seat belt wearing. For the first study 1287 fliers which prompted safety belt use were handed to drivers at a pedestrian crosswalk on a university campus. The first handbill given to each driver announced that a prize would be awarded to those who collected each of the six different handbills. Of 180 drivers who received two handbills, 17.2% were wearing a lap and/or shoulder belt during the first handbill receipt whereas 42.2% of these drivers were wearing their safety belt when given a second handbill.

For the second study, seat belt use was recorded at the drive-in window at a bank. After nine week days of baseline (two hours per day), handbills urging safety belt use were distributed for 17 weekdays. The baseline was reeinstated for 13 days, followed by 11 days of a prompting/reinforcement intervention which gave bank patrons a chance to win a bingo game if they were wearing their safety belt. These interventions were accepted by the community and appeared to influence marked increased in safety belt usage.

Significance as a Contribution to the Literature

This study provides the evaluation of a successful seat-belt intervention program. The feasibility of applying these interventions on a large scale are also examined.

Direct Applicability to the Current Project

This study provides the insight into the type of intervention procedures that might be effective in getting people to use safety belts in their automobiles. These intervention procedures could be recommended to employers in the project manual.

Opinion Research Corporation. Safety belt education program for employees: An evaluation study. U.S. Department of Transportation, NHTSA, p.17 June 1980.

Summary

This evaluation study was conducted to determine the effectiveness of a nine-month safety belt educational program. This program utilized various informational materials developed by NHTSA in an effort to increase safety belt usage among corporate employers.

Conclusions

Methodological Summary

Safety Directors of two major U.S. corporations implemented the program over a nine-month period. An evaluation of the program's effectiveness in increasing safety belt usage, was accomplished by observing employee's use or non-use of safety belts as they entered/exited company parking areas. The observation studies were conducted before, during and after the program was implemented.

The observation studies were conducted at two "experimental plants" and at one "control plant."

In one experimental plant, the before, during, and after usage scores averaged 5.2%. It was a net gain in usage of 2.2% between the before and after studies, but was statistically non-significant.

In the other experimental plant, the before, during, and after usage scores averaged 9.6%. It was a net gain in usage of 1.1% between the before and after studies but also was statistically non-significant.

In the control plant, where employees were not exposed to the educational program, the comparable usage scores averaged 6.4%. It was a net gain in usage of 1.3%. This net gain was also statistically non-significant.

Significance as a Contribution to the Literature

This report is considered a major study in the usage of seat belts because employee groups lend themselves well to experimental design and can be reached by structured educational programs and observed for belt usage.

Direct Applicability to the Current Project

This study reports the findings of a seat-belt educational program that was unsuccessful. Indirectly this information can be of some value to the present research effort.

- Protecting your assests: A program for government and industry to reduce losses from auto accidents by increasing the use of safety belts. Michigan Office of Highway Safety Planning, Lansing, 40 p. No date.

Summary

This manual was developed by the Michigan Traffic Safety Information Council and the Office of Highway Safety Planning as a project of the Michigan Motor Vehicle Occupant Protection Program. The program is a long-term effort by the state to reduce highway fatalities and injuries by increasing the use of safety belts and child restraint devices.

This manual has the following objectives:

- It reinforces and expands existing informational activities on safety restraints within government, industry, the schools, the communities, and the health-care professions.
- It encourages and facilitates the involvement of all possible organizations and individuals in new informational activities and special projects; and
- it identifies safety belt use policies adopted by state governments and private industry as they exist.

Conclusions

Methodological Summary

Not applicable.

Significance as a Contribution to the Literature

This manual is important because it identifies organizations (state governments and private industries) that have adopted policies on seat belt use for their employees.

Direct Applicability to the Current Project

This manual will provide PSS with background information on safety belt policies for both state governments and industry, and the selection of organizations for the purposes of this study.

- Helsing, Knod J. and G.W. Comstock, MD, Dr PH.. What kinds of people do not use seat belts. American Journal of Public Health. 67:1043-1050, 8p. 1977. vol. 67, No. 11

Summary

In the course of a community mental health epidemiology study conducted in Washington County, Maryland between December, 1971 and July 1974, interviews were conducted with randomly selected adults in a weekly systematic sampling of households. In a subsequent re-interview of 1009 respondents who had family cars with seat belts, nearly 47 per cent said they did not use them; non-use of seat belts was found to be significantly higher among females and among persons with less than high school education or low income. Non-use of seat belts was also higher among those who felt that their situation in life as measured by the Cantril ladder was unsatisfactory. Among young adults the tendency seemed to be for marriage to increase the non-use of seat belts among females but to decrease non-use among males.

Conclusions

Methodological Summary

Washington County, Maryland, was one of two sites for an on-going study of community attitudes on seat-belt use. Samples of dwelling units were selected weekly at first and dates at monthly intervals from an updated listing of all dwelling units in the country. The procedure was designed to yield weekly samples of 30 or monthly samples of 90 occupied dwellings. An individual to be interviewed was randomly chosen from persons 18 years of age or older in the selected residence.

Significance as a Contribution to the Literature

This study, in addition to confirming the findings of a number of other researchers as to the association of sex, age, and education with use or non-use of seat belts, adds some other significant relationships:

1. Non-users of seat belts are more commonly found among people with lower incomes and among those who consider themselves low on the Cantril ladder; and

2. Individuals who are infrequent church attenders, and among those who feel themselves to be lacking in power to influence their lives.

Direct Applicability to the Current Project

This study report is partially applicable to the current project because of the discussion of economic incentives as a motivating factor to encourage increase belt use.

- U.S. Department of Transportation, National Highway Traffic Safety Administration. Study of methods for increasing safety belt use - Study report. 9 p. March 1980.

Summary

This report summarizes the recommendations and suggestions of a special committee convened to assess methods that have been or could be used to induce people to wear their safety belts.

Conclusions

Methodological Summary

Not applicable.

Significance as a Contribution to the Literature

This report summarizes a review of previous studies which evaluate the effectiveness of programs designed to promote safety belt use. The contressional committee examines prescriptive approaches involving legislation and regulations. The report also contains a discussion of economic incentives as a motivating factor to encourage increased belt use.

Direct Applicability to the Current Project

This report is not directly applicable to this research effort because it does not address to motivational-psychological research, the two areas this current project is concerned with.

SOCIETAL COSTS

OF MOTOR VEHICLE ACCIDENTS

- Callaway, Donald and C. Drucker. Social Consequences of Accidents. U.S. Department of Transportation, NHTSA. 21 p. January 1979.

Summary

The goal of this study was to interview seriously injured traffic accident victims and their families in order to assess the long term personal and social consequences of serious traffic accidents. Taped interviews were conducted to describe financial psychological and family consequences of their injuries.

Conclusions

Methodological Summary

The authors obtained 1200 collision reports from the California Highway Patrol of which 200 were analyzed. The sampling pool was made up of accidents that occured during 1976 and 1977 in Alameda and Contra Costa California. Accidents involving school buses or emergency vehicles, collisions with trains, bicycles, animals and pedestrians were excluded. No restrictions were made as to weather, lighting, roadway surface conditions, right of way controls, movement preceding collision or sobriety assessments.

Significance as a Contribution to the Literature

This study attempted to measure and catalogue the long-term psychological and social consequences of serious traffic accidents. Additionally, this study does not find the much talked about overall abbreviated injury scale (OAIS) to be a valid or reliable indicator of the long-term personal and familial consequences of serious traffic injuries.

Direct Applicability to the Current Project

This study is directly applicable to this project because it reports findings in the case-study format which will also be used in the "Seat-Belt Motivation" project.

- The Comptroller General of the United States: "Need to improve benefit-cost analyses in letting motor vehicle safety standards," 35p. July 22, 1974

Summary

This report discusses the National Highway Traffic Safety Administration's capability for making benefit-cost analyses of motor vehicle safety standards. It compares the Safety Administration's estimate of accident costs with the estimates of the National Safety Council and the ad hoc committee of the Office of Science and Technology.

Conclusions

Methodological Summary

This report deals in three areas. The first two areas are combined to obtain the benefits from safety standards.

1. Cost of Accidents

   There is a complete description of three different cost of accidents estimates. These estimates have been made by the Safety Administration, the NSC and the RECAT Committee. The chapter describes the reasons for the discrepancies between the estimates which are due to the differences in statistical bases used, and that one study (RECAT) uses undiscounted costs while the other uses discounted costs.

2. Effects of Safety Standards in Reducing Accidents

   This chapter is a summary of the available data on safety standard effectiveness. The conclusion drawn is that the available data is insufficient to make any projections.

3. Industry or Consumer Costs of the Safety Standards

   The discussion of safety standard costs (including leadtime costs) shows that relatively little systematic analysis has been done in this area.

Significance As A Contribution To The Literature

The importance of this report lies in its summaries and comparisons of the cost estimates described above, and in its pointing out the lacunae in the data on safety standards effectiveness and industry costs arising from safety standards.

Applicability to Current Project

This report has only limited applicability to the current project. While it lists many categories of costs and shows the problems involved in measuring them, it does not deal with the costs faced by employers, which is the focus of the current project. In addition, the data given are for totals and averages, rather than individual cases.

- Faigin, Barbara. 1975 societal costs of motor vehicle accidents. U.S. Department of Transportaiton, NHTSA. Office of Program Planning: December 1976 p.35

Summary

This report, is an update and revision of a societal cost study published in 1972. The study assess basic loss to society from motor vehicle accident.

Conclusions

Methological Summary

The study derives cost estimates that adequately reflect certain losses to society and to individuals. The two basic criteria for identifying loss components are (1) resources consumed in the repair of damage to people and vehicles that could be shifted in the long run to welfare-producing activities and (2) the consumption losses of individuals and society at large caused by losses in production and the ability to produce.

Significance as a Contribution to the Literature

This report will provide PSS staff with basic insight into variables in quantifying employer dollar losses in employee related automobile accidents.

Direct Applicability to the Current Project

If benefit-cost analysis is to continue to play a major role in safety decisions, cost-based accident data sources must be developed and maintained on a continuing basis. This study provides information on the economic consequences of motor vehicle cost-based accidents, which is a major thrust of our current project.

- Faigin, B.M. "Societal costs of motor vehicle accidents for beneift-cost analysis: A perspective of the major issues and some recent findings" in Proceedings of the International Congress on Aumotive Safety. 17 p. July 1975.

Summary

This paper discusses the conceptual and methodological issues related to the development of measurements of societal costs of motor vehicle accidents. The author describes two elements -- medical costs and productivity loss - and provides current revision of societal costs which can be applied to future National Highway Traffic Safety Administration benefit-cost analysis.

Conclusions

Methodological Summary

After reviewing and critiquing the earlier literature, the author, proposes a definition of societal costs, and then proceeds to offer preliminary estimates based on this definition. While this definition and measurement are useful, the disadvantages of the earlier methods are certinly not as great as she indicates. Thus the paper, and the study on which it is based should be viewed as a supplement, rather than a replacement, for the existing studies.

Significance as a Contribution to the Literature

The study seeks to place in perspective the various attempts that have been made to estimate motor vehicle accident costs, and to demonstrate the different concepts that underly the various studies. It also describes and presents preliminary estimates of two new measures -- medical costs and productivity loss.

Direct Applicability to the Current Project

This study has only partial applicability to this project. It is concerned with total societal costs; whereas this project focuses on cost to employees alone. In addition the study is aimed at compiling a total of average statistics; whereas our project will describe statistics for actual cases. However, it is useful as a summary and a review of other literature dealing with the measurement losses arising from automobile related accidents.

- Flora, Jairus D., J. Bailey and J. O'Day. "The Financial Consequences of Auto Accidents", Highway Safety Research Institute, the University of Michigan, 7 p. June 1975.

Summary

This article presents the design and results of a 1974 HSRI pilot study of personal and financial costs to automobile accident victims. The study was designed to determine the feasibility of obtaining data from a defined sample of a population of accident victims through telephone interviews and mail questionnaires, and to assess the quality of the information obtainable from such a survey.

The types of costs included are: total medical costs; wages lost; property damage costs; and length of period of activity restriction. A figure is also presented for total costs. These figures are shown for three categories of injury on the Abgreviated Injury Scale, and the median, mean and range are given for each figure.

Conclusions

Methodological Summary

This study utilizes far too small a sample to be of direct use. In addition, there are certain poor features, both in the results gathered and the manner of their display. The results gathered for AIS categories 2 and 3, are unreliable, on the author's own admission. Respondents misunderstood some questions and failed to answer others, owing to a mistake in the type of questionnair used.

As far as the display of results is concerned, the tables do not show how many respondents in each case had zero costs in the various categories. This information lies buried in the text. In addition, there is a piece of sloppiness: total median cost for AIS is given as "none" on the table, but $53.00 in the text. One assumes that the latter figure is correct. Finally, it would seem that with the small number of respondents, it would have been possible to present all the data and calculations, and not merely the final result.

Significance as a Contribution to the Literature

This study does perform a useful service, in showing the type of information to be sought on costs of accident victims, and in highlighting the questionnaire approach and the summary of relevant data. However, it does suffer from the defects described above, and these are presumably corrected in subsequent studies.

Direct Applicability to the Current Project

The study is concerned with costs to victims: our project is concerned with costs to employers. However, there is some overlap, i.e. certain categories of costs are in both groups. Thus medical costs, or some components of them, are often the responsibility of employers; wages lost give a measure of the loss in value to the employer of the employee's

absence; vehicle costs can be suffered by employers (although since our study focuses on savings from seat-belt use, it is not clear that this cost should be included). Thus the study is useful in identifying and measuring some, though not all, of the costs our project will encompass.

- Marsh, Joseph C. IV; R.J. Kaplan; and S.M. Kornfield, Financial consequences of injuries in automotive accidents. (Preliminary report) HSRI Research Bulletin, The University of Michigan, p.40 1974.

Summary

This study was conducted to collect data via personal interviews on the financial consequences of serious, critical and fatal traffic injuries. The objectives of the study were to assess the effectiveness of the methodology and to collect illustrative injury costs.

Conclusions

Methodological Summary

A sample of 120 case occupants was randomly drawn from a population of 241 Washtenan County, Michigan. These occupants had sustained serious injuries resulting from automobile accidents. The major methodological issue was whether or not retrospective investigations are adequate to establish the costs of serious injury.

The personal interview method allowed the authors to check for consistency of responses, and in a few cases outside information was available to confirm the validity of the patients' responses. The interview responses were judged by the authors to be valid and thus this method is suggested for use. Three to four years will be required for follow-up in some cases before the bindings of this study are complete.

Significance as a Contribution to the Literature

This paper is a significant contribution to the literature because it developed a feasible methodology for collecting data by means of personal interviews with accident victims.

Direct Applicability to the Current Project

The methodology used in the development of survey instruments and personal interview techniques will be of assistance in this current research project.

- Fleischer, G.A., and G.P. Jones. Cost-benefit and cost-effectiveness analysis in determining priorities among motor vehicle safety standards programs and projects. Presented before the Fourth International Congress on Automotive Safety. 18p. July 14-16, 1975.

Summary

The paper reviews the implementation and application of cost-benefit/effectiveness analysis in the Federal Traffic Safety Program, with special emphasis on the California experience. The primary issue of this paper is the proper note of both cost-benefit and cost-effectiveness analysis techniques with regard to their application to the determination of priorities among motor vehicle safety standards, programs and projects.

Conclusions

Methodological Summary

This paper reviews the differences between cost-effectiveness and cost-benefit analysis. The authors position is that cost-effectiveness analysis differs from cost-benefit analysis in that effectiveness measures generally are stated in other than monetary dimensions. Examples of this are reliability, aesthetic quality, time saved etc.

Cost-benefit analysis identifies an unambiguous, optimal solution since costs and benefits of alternatives are specified in a single monetary dimension. No such unique solution obtains for cost-effectiveness analysis unless one alternative is dominant across all dimensions.

Significance as a Contribution to the Literature

This paper is a significant contribution to the literature because it addresses the proper role of both cost-benefit and cost-effectiveness analysis, especially with regard to the application of these techniques to the determination of priorities among motor vehicle safety standards, programs and projects.

Direct Applicability to the Current Project

This project is directly concerned with the economic-benefit to employers when an employee is involved in an automobile accident and that employee is not wearing a safety belt. This is precisely the issue PSS is examining in its seat-belt motivation study.

- Jones, R.K., R.L. Franson, and B.J. Kent. The economic cost of non-use of occupant restraints in the United States: A Preliminary Analysis, Highway Safety Research Institute. The University of Michigan, Ann Arbor. 91 p. June 1980.

Summary

The objective of this study is to estimate the cost of non-use of occupant restraints in motor vehicles. The published study is supposed to represent the first phase of a larger study. It uses published injury and cost data to produce preliminary individual and nationwide estimates of both direct and societal costs of non-use of restraints.

For the occupant as defined in the study, the estimates per year are as follows:

	Direct Costs	Societal Costs
Per occupant	$500	$2,500
Nationwide	$1.6 Billion	$8.4 Billion

The study also indicates areas of research that have not been adequately covered, such as the incidence of such costs.

Conclusions

Methodological Summary

The basic methodology of the study is to combine the results of two kinds of statistics from earlier reports:

1. The distribution of injury severity;
2. Costs of injuries for different AIS.

The statistics on the distribution of injuries between different AIS were used to derive the reduction in probability of a crash of given severity, resulting from the use of a restraint.

The unit cost figures for different AIS were then adjusted upward for inflation and multiplied by the probability reduction figure, to give an average cost of not using restraints. Finally, these average cost figures were multiplied by the number of relevant occupants in applicable crashes nationwide to give the nationwide cost figures.

The problems with this approach are manifold, and a number of them are actually pointed out by the author.

1. The estimates ofinjury distribution cover only occupants of passenger cars involved in crashes so severe that the vehicles had to be towed from the crash scene.

2. The estimates of injury distribution are not representative of the whole nation.

3. Arbitrary assumptions are used to derive the number of relevant occupants in applicable crashes.

4. It is not clear that the previous studies of injury distribution used here always use the same assumptions as the studies of unit costs, so that the legitimacy of combining the two sets of results is open to question.

Significance as a Contribution to the Literature

The study defines important areas of research and gives a useful review of existing articles. The limitations of its own are given above.

Direct Applicability to the Current Project

This study has limited applicability to the current project. It is concerned with average and total nationwide costs - both direct and societal - whereas we are concerned with employer costs on a case-by-case basis. However, it may prove useful in defining some categories of costs and pointing out pitfalls in their measurement.

- Wuerdeman, H. and H.C. Joksch. "National indirect costs of motor vehicle accidents", prepared for the Federal Highway Administration, U.S. Department of Transportation. 88 p. June 1973, Vol. II.

Summary

This study estimates the indirect costs of motor vehicle accidents during 1969 for the 48 contiguous states and the District of Columbia. Indirect costs are defined as costs incurred for overhead, accident prevention, and the consequences of accidents, by insurance companies (including workmen's compensation agencies), police departments, courts, prosecutors and probation officers, jails, coroners, motor vehicle and highway departments welfare and other public assistance agencies, including Social Security offices. Annual indirect costs of motor vehicle accidents for these agencies are estimated to vary between $5.5 billion and $6.4 billion.

Conclusions

Methodological Summary

The study was conducted in three phases:

Phase 1 - Problem Analysis and Data Collection Planning

A preliminary survey was conducted on a nationwide basis to obtain rough estimates of the cost components, these estimates were reported in Phase 2.

Phase 2 - Information Acquisition

400 agencies in each Census Region were directly contacted, and published (and other) data sources were identified, to obtain data estimates.

Phase 3 - Data Reduction, Evaluation and Analysis of Results

The field data were summarized according to agency classification and Census Region, and national estimates of traffic accident costs were developed. Regional estimates were developed for courts and police agencies. Information from other sources was analyzed and synthesized with the field data.

A number of problems were identified and analyzed in the course of the study: definition of indirect costs, incompleteness of available data, comparability of information between agencies, and allocation of total agency costs to accident-related costs.

Significance as a Contribution to the Literature

This study presents the detailed aspects of regional cost estimates. It is directed primarily to those researchers who intend to utilize

the cost estimates.

Direct Applicability to the Current Project

This study will assist the current research team in the formulation of more realistic and precise estimates of indirect costs related to motor vehicle accidents.

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APPENDIX B: PILOT STUDY

General Introduction

Pabon, Sims, Smith and Associates is engaged in a study for the National Highway Traffic Safety Administration to investigate, analyze and report a sample of case histories and costs of vehicle accidents suffered by employed persons. The aim is to obtain estaimtes of the costs that employers must bear, which arise from the fact that the employee is not wearing a seatbelt at the time of the accident. The estimation of such costs will be made by a comparison of pairs of accidents, in which one accident involved a victim using a belt, the other without a belt. These pairs will be selected so as to be as similar as possible in all other respects, so as to permit a legitimate cost comparison to be made.

It was agreed that a pilot project would be undertaken, using the data gathered thus far in the study, in order to exemplify the principles to be used in the entire study. The cases to be discussed use the data obtained from a single company, which keeps reasonably complete records of the accident histories of its employees. These records were studied by the staff of PSS and Associates engaged in the study, and the relevant data recorded were extracted and collated. It was found, however, that certain data, highly pertinent to the study, were not recorded in the accident documentation of the company, and these had to be obtained from the claims manager orally.

Four cases are described in this pilot project. In addition to the description of the cases, and the use of the data to develop cost estimates, there is given a methodological discussion to justify the method of computation used. It will be seen that to some extent the methodology itself will vary with the company and the accident, since certain principles can only be applied completely when the nature of the accident and the quality of data available permit this.

In this pilot, it will be quite evident that anonymity is being strictly observed, both in regard to the names of the employees and also to the name of the company. This is a reflection of the fact, much discussed before the study was begun, that there would be a very natural reluctance by both employers and employees to discuss involving employees and to provide data on them. This reluctance has been amply borne out by experience. It has been necessary, in order to obtain any data at all, to promise strict secrecy. In order to keep to this, the notes that were taken by PSS and Associates at the company made no mention of any name of an employee in an accident. Instead, a file number was noted down. This has made it possible to make subsequent inquiries from the company by giving the file number, without our knowing the name of the employee involved. We also had to give an assurance that the company would not be mentioned by name in any of our reports, and it is for this reason that this report contains no mention of any company name, but only a description of its function as it is relevant to the study.

The Company: Information and Background

The company used in the study is a large electric utility company. It is involved in all stages of the supply of electric power: generation, transmission and distribution. It maintains a fleet comprised of 874 automobiles and 2,116 pick-up trucks. There are 10,706 employees, and it is estimated that nearly 50 percent of total employees are engaged in business-related

activities requiring them to drive or ride with other employee-drivers. In 1980, approximately 36 million miles were covered by employees of the company in business-related driving. The company has plant and employees in four different states, although all the four cases involved in this pilot project took place in one state.

Workers' Compensation and Insurance Coverage

Crucial to this study are the payments that have to be made by an employer to an employee as a result of a work-related accident, and a minimum floor for such payments is set by the workers compensation law of the state in question. In addition, the laws of the state also set forth the methods of insurance that are permitted to the employer, and the methods by which the laws are to be administered. The latter includes the requirements of the employer to keep records of accidents and provide reports of them.

The relevant details of the workers' compensation laws for the state in question are as follows. Cash benefits must be provided by the employer to replace employee loss of income due to an occupational injury amounting to two-thirds of wages, and not exceeding $199.00 per week. (The latter figure is for 1980, the year in which the accidents took place.) Medical benefits must be paid for necessary treatment resulting from a work-related accident, and where there is no permanent impairment, there is no limit to the amount.

The employers in this state are required to carry insurance for workers' compensation, but are permitted to be self-insured. The company in question avails itself of this opportunity, i.e., it has an insurance department, is required to post bond with the appropriate state board, so that in the event of a company default workers are protected, and must pay those benefits and claims required under workers' compensation laws to the workers from this department.

It was explained to PSS that the company finds it cheaper and more efficient to be self-insured than to pay premiums to an outside insurance company which would then make the payments in the event of an injury or accident. The company is large enough to be able to spread risks itself, and also finds that it can save the administrative and loading cost that an outside insurer requires. In addition, it has its own staff of doctors, who, one presumes, will not err on the side of exaggerating the inability of an employee to return to work after an accident.

Supplementary Payments and Benefits

The workers' compensation laws set a floor to the coverage and benefits that employees receive in the event of a work-related disability. The company is, of course, free to add to these as it wishes, and as required by agreement with the union.

The company in our pilot has concluded an agreement with the union which requires it to make up the difference between the income compensation required under state law, and the wages the employee would receive in full employment with the company. Thus, since the state law requires a two-thirds payment of wages during the period of absence of work caused by the injury (subject to certain limits), the agreement means that the company must pay an additional third to the worker during this period. Although not all the workers are union members, the agreement is observed for non-union members as well. The same goes for supervisory staff.

When such additional payments are made, they come, not from the insurance department, but from the department employing the worker. Thus a worker absent from work because of a work-related injury will receive two payments in income compensation: two-thirds of his former wage from the insurance department of the company, and one third from the department which employs him.

There is an exception to this provision. Where the employee is deemed to have been responsible for the accident, he receives only the income compensation required by the law, i.e., two-thirds of his former wage, from the insurance department.

Treatment and Measurement of Different Cost Categories

Although this section discusses issues which are methodological in nature, and might thus have come in a general introduction, it also involves issues particular to the cases examined, and is therefore placed here, preceeding the treatment of the cases themselves.

Measuring the costs to the meployer of the absence of a particular employee involves several difficulties which were mentioned in the original proposal. It might be added that an accident of the kind we are discussing involves an absence from work which is sudden and unexpected. This may have quite different consequences from one which is predicted in advance.

We can think of the economic relationship between an employer and an employee as involving a flow of payments from the employer to the employee (payment can be interpreted broadly to include non-monetary benefits as well), and a corresponding flow of services from the employee to the employer. When the employee is incapacitated for a period, his services to the company are interrupted. The payments by the company do not stop completely, however, due to the requirements of the law, union agreements and company practices listed above. In fact, for the majority of accidents, company payments for income compensation will actually be unchanged. The fact that two-thirds of the payments are now coming from the insurance department, and only one-third from the department in which the worker is employed, instead of the entire payment coming from the latter department as before the accident, makes no difference. The company itself is still making the entire payment.

The company must also make medical payments for drugs, hospital treatment, doctors's fees, and so forth.

Thus, apart from the medical payments, the payments made by the company, in the majority of cases, do not change. They continue as if the worker were still on the job, except that the payments are shared differently between the departments.

What has ceased are the services of the worker to the company. The company will have to make arrangements for these services to be done by others. Sometimes this will be impossible, as, for example, when the employee was so unique or specialized that no replacement can be found. In other cases, the employee will be replaced by new personnel, who may have to be trained. None of the cases we studied involved either of these phenomena.

Instead, the tasks previously carried out by the employee injured in the accident were shared by other employees, whose schedules had to be rearranged as a result. Thus there are no obvious payments that the company had to make to replace the employee. No training staff were needed; no additional wages had to be paid.

How, then, are we to evaluate the loss of services suffered by the company as a result of the absence of the employee? At first blush, it appears as though there is no loss of service at all. The functions appear to have been carried out; no additional employees had to be hired and paid for. This argument, however, is fallacious. It ignores the fact that the company, however progressive, is not a charitable institution. It employs and pays a worker presumably because his services are valuable and the loss of them deprives the company of some value.

Why, then, did the company not hire additional workers during his absence? During the short term it may indeed be possible for other workers to "pitch in" and carry out the function of the missing employee, and this will be less costly to the company than searching for a part-time replacement. But this does not mean that the absence of the worker imposes no costs. It is literally impossible to trace through all the ramifications of the rearrangement of the work schedule. If it were, one might well find that certain mistakes, slow-downs in work-rate, necessity for task-repetition and the like, which would normally be attributed to random factors, were actually due to the additional load on the other workers. Thus, the absence of the worker and the withdrawal of his services does deprive the company of value and thus impose on it a cost.

How are we to value these services? In a competitive market for labor, one in which employers compete with each other for workers and workers with each other for jobs with little restriction, the wage would be an exact valuation of the value of an employee to the company, and thus of the cost to the company of his absence. This follows from the assumptions of a competitive market for labor and the seeking of maximum returns by employers and employees. If the wage were less than the additional services provided by the worker, then some other company would offer him a higher wage, and he would accept. Similarly, there would be no reason for this firm to hire the worker in the first place if his wage exceeded the value of his services to the company, and if the firm had so hired him, it would dismiss him at the first opportunity.

In our world, of course, there are a number of impediments to this free market competition, so that the wage paid to the worker is not exactly equal to the value of services he provides to the company. Thus unions may impose certain restrictions on the company's ability to set wages and to hire and fire. Information about job opportunities may be incomplete, and labor's ability to move to different locations may be imperfect.

But even with these impediments to competition in the labor market, it still remains true that the level of the wage is the best possible estimate of the value of worker services to the company. Most of the obstacles mentioned above tend to disappear or at least diminish over time. Union power is certainly affected by market forces even in the best organized industries. In the state involved in our study, there are right-to-work laws, which restrict still further the power of unions.

Thus in estimating the value of services lost to the company, where there are no obvious and measurable repercussions from the loss of the worker, we shall use the level of the wage as the measure of this loss.

It is important not to fall into the error of double-counting, and add the payment made by the company for income compensation to the value of worker

services which are lost. The payment made by the company continues just as though the worker were still on the job; it is the services provided by the worker which cease. Therefore, only the latter can be counted.

To these costs must be added any other expenses that the company has, such as medical expenses as mentioned earlier. And from these costs must be subtracted any payment reductions or awards that the company receives. In the event of a lawsuit against another driver, the company may win an award which reduces its cost of the accident.

Employee Vehicular Accident Cases

Four accident cases are featured in summary form below. Three of the cases represent accidents in which the seat belt was not used by the company employee-driver. The fourth case is one in which the driver allegedly wore his seat belt.

Case 1

Employee: Meter reader/collector

Drives to buildings supplied by company with electricity, and takes meter readings.

Accident: Head-on collision by company employee's vehicle with other vehicle. The former was a 1978 Dodge pick-up truck; the latter was a Ford Pinto.

Vehicle driven by company employee was travelling North at 25-30 mph. At small crescent in road, Pinto appeared on his side of the road travelling the opposite direction. Employee braked and Pinto ran into vehicle driven by employee.

Vehicle driven by employee was owned by company.

Employee was on company business.

No passengers in company vehicle.

Driver not trapped; not ejected.

Seatbelt available; seatbelt not used.

Injuries/
Treatment:

Tightness of left lumbar dorsal paravertebral muscles. Saw company doctor and specialist. The latter prescribed strict bed rest until subsequent visit.

Days lost
from work: September 9, 1980 to September 23, 1980

Total Costs to Firm

Medical	$ 104.00
Worker services lost (valued at wages)	$ 505.50
Total	$ 609.50

Case 2

Employee: Operations Supervisor

Accident: Side collision between vehicle driven by company employee and single other vehicle. The former was a 1980 Dodge Aspen; the latter was a 1977 Plymouth.

Other vehicle ran off right side of road, then fish-tailed and came back onto the hard surface. When company employee saw car cross over into the inbound lane, he applied brakes. Other vehicle struck left side of vehicle driven by employee and caused extensive damage. Other driver given summons for reckless driving.

Vehicle driven by employee was owned by company.

Employee was on company business.

No passengers in company vehicle.

Driver not entrapped; not ejected.

Seatbelt available; seatbelt not used.

Injuries/
Treatment:

Four broken ribs, 3 inch laceration on left side of head, broken femur on left leg.

Hospitalized for unknown length of time

Days lost
from work: 7 months

Total Costs to Firm

Medical	$ 1,892.89
Hospital	$ 10,040.50
Worker services lost	$ 16,391.67
Total	$ 28,325.06

Case 3

Employee: Assistant Building Maintenance Man

Maintains corporate facility -- electrical, plumbing, heating.

Accident: Rear-end collision. Company vehicle struck other vehicle from behind. The former was a 1976 Dodge B200 Passenger Van; the latter was a 1972 Dodge truck.

The 1972 Dodge truck had stopped in the road and was not visible to the company driver as it had no lights on. The company driver could not avoid collision although he hit his brakes and tried to steer to the left. The truck was struck in the left rear.

Vehicle driven by employee was owned by the company.

Employee was on company business.

No passengers in company vehicle.

Driver not trapped; not ejected.

Seatbelt available; seatbelt not used.

Injuries/
Treatment:

Abrasion to right elbow; laceration of chin requiring four sutures; fractures to leg near ankle and knee; laceration, right medial malleolus; avulsion fracture involving base of proximal phalanx of fourth finger, left hand. Hospitalized for two days.

Days lost
from work: May 6, 1980 to June 23, 1980

Total Costs to Firm

Medical	$ 542.00
Hospital	$ 725.62
Worker services lost	$1,267.68
Total	$2,535.30

Case 4

Employee: Meter reader/collector

Drives to buildings supplied by company with electricity, and takes meter readings.

Accident: Head-on collision by company employee vehicle with other vehicle. The former was a 1974 Dodge Pick-up truck; the latter was a 1978 Chevrolet dump truck.

Vehicle driven by company employee was travelling East at 45 mph and hit the front of the dump truck as company vehicle rounded a curve. Supervisor's report stated that company driver lost control of his vehicle, skidded sideways in the curve, and hit the front of the dump truck.

Vehicle driven by employee was owned by company.

Employee was on company business.

No passengers in company vehicle.

Driver not trapped; not ejected.

Seatbelt available; seatbelt reported used.

Injuries/ treatment:

Cerebral concussion; laceration of left wrist and forehead. Treated in emergency room and released.

Days lost from work: August 12, 1980 to November 9, 1980

Total Costs to Firm

Medical.	$ 95.44
Worker services lost	$ 3,795.44*
Reduction in company payment	$ 1,265.15**
Total	$ 2,625.73

*Although medical treatment was minimal, this employee was out for such a long period of time due to recurring dizzy spells allegedly due to the head injury sustained in the crash.

**Due to the charge of reckless driving on the part of the employee, the company paid no differential on the basic Workers' Compensation. Therefore, the company's loss was reduced by $1,265.15.

APPENDIX C: ACCIDENT INFORMATION

Case Identification _____

Employee Position _____

Employer _____

Date of Accident _____
(Month) (Day) (Year)

Time of Accident _____

Location of Accident

_____
(Nearest Intersection)

_____
(City/Town)

_____
(County)

_____
(State)

ACCIDENT AND VEHICLE CHARACTERISTICS

Number of Vehicles Involved _____

Accident Type _____

Accident Sequence _____

_____

_____

_____

Model Year and Type of Vehicle _____

Weight _____

Is the Vehicle

_____ Owned by the company

_____ Leased by the company

_____ Owned by the employee

_____ Leased by the employee

_____ Other

Was the employee on company business at the time of accident?

_____ Yes _____ No

If "Yes", specify business _____

_____

If "No", specify particulars _____

_____

Estimated Impact Speed

_____ Stopped _____ Less than 5 m.p.h.

_____ Actual speed (in increments of 5 m.p.h.)

_____ Not applicable _____ Unknown

Object Contacted

_____ Motor vehicle

_____ Guardrail

_____ Ditch

_____ Ground

_____ Tree

_____ Pole

_____ Pedacyclist

_____ Pedestrian

_____ Other

_____ Unknown

Vehicle Impact Location

_____ Front

_____ Right side

_____ Left side

_____ Top

_____ Undercarriage

_____ Other

_____ Not applicable

_____ Unknown

Fire Occurrance

_____ Yes _____ No

Occupant Characteristics

Age _____ Sex _____ HT. _____ WT. _____

Occupant Role

_____ Driver _____ Passenger _____ Unknown

Seat Position

_____ Front seat - left side

_____ Front seat - middle

_____ Front seat - right side

_____ Second seat - left side

_____ Second seat - middle

_____ Second seat - right side

_____ Third seat - left side

_____ Third seat - middle

_____ Third seat - right side

_____ Front seat - additional passenger

_____ Second seat or beyond - additional passenger

_____ Truck - tractor sleeping section

_____ Other _____

_____

Entrapment/Ejection

_____ Not entrapped

_____ Entrapped

_____ Unknown

_____ No ejection

_____ Complete ejection

_____ Partial ejection

_____ Ejection, unknown degree

_____ Unknown

Treatment/Mortality

_____ Fatal

Non fatal

_____ Hospitalization

_____ Transported and released

_____ Treatment - other:

_____

_____ No treatment

_____ Unknown

If hospitalized, name and address of hospital: _____

_____

If hospitalized, number of days in hospital _____

Injury Classification

	ISS Body Region	OIC Body Region	Aspect	Lesion	System Organ	AIS Severity	Injury Source	Data Source
1.	_____	_____	_____	_____	_____	_____	_____	_____
2.								
3.								
4.								
5.								
6.								

MIS Rating _____

Restraint System Availability

_____ None available - vehicle occupant

_____ Shoulder belt

_____ Lap belt

_____ Available, type unknown or other _____

_____ Unknown

Restraint System Use

_____ None used - vehicle occupant

_____ Should belt

_____ Lap belt

_____ Lap and shoulder belt

_____ Restraint used - type unknown or other _____

_____ Unknown

APPENDIX D: EMPLOYER INFORMATION AND CASE-SPECIFIC COSTS

Employer Information

Company Name _____

Address _____
(Street Address) (City) (State) (Zip)

Telephone _____
(Area)

Contact Name _____

Position _____

1. What are the major products/services manufactured or provided by the company?

_____

_____

2. Does the company (or some of its subsidiaries/division have a fleet of vehicles? (Check One)

_____ Yes _____ No

IF ANSWER IS "YES", PLEASE ANSWER ITEMS A & B BELOW:

A. How many vehicles are in the company fleet? _____

B. What percent of vehicles are:

_____ Automobiles _____ Pick-Up Trucks _____ Vans

_____ Other (Please Specify) _____

3. Do employees utilize their own automobiles for business purposes? (Check One)

_____ Yes _____ No

4. How many people does the firm currently employ? _____
(Make certain that "Employees" are <u>not</u> self-employed or contractors)

5. What percentage of firm's employees are engaged in business related activities which require that they drive and/or ride with other employee-drivers? (Check One)

_____ 1-10 percent _____ 11-25 percent _____ 26-50 percent

_____ Over 50 percent

5a. What business function is primarily served by employees who travel by car, van or pick-up truck?

_____ Sales/Marketing _____ Management _____ Other

_____ Service _____ Pick-up/Delivery

6. Considering all employees in the company, what is the approximate average of man-hours per month that is spent in on-the-raod business related driving? _____

7. Does the company have subsidiaries or divisions in locations other than this address? (Check One)

_____ Yes _____ No

8. List other locations:

_____

_____

_____

9. Where do employee vehicular accident reports ultimately end up within the administrative network?

_____

10. What type of insurance policies does the company pay premiums (full or partial) which could conceivably come into play concerning an employee vehicular accident?

_____

_____

11. Is the company self-insured?

_____ Yes _____ No

12. If the answer is "NO" to item 11, what company or companies provide coverage?

(Company	(Insurance Type)
(Company)	(Insurance Type)
(Company)	(Insurance Type)

13. Where are employee related insurance claims handled within the company?

_____

By Whom? _____

14. Who could we talk to regarding changes in insurance rates/premiums?

_____

_____
(Location)

15. Who would we talk to regarding number of days an employee missed from work due to an accident?

_____

_____
(Location)

16. Who could tell us about replacement, retraining, and rehabilitation costs for a particular employee?

_____

_____

17. Does the company have a seat belt use policy for employees?

_____ Yes _____ No

18. If the answer to item 17 is "YES" please provide the particulars of the program and any written policy/program available.

_____

_____

_____

_____

_____

_____

19. Provide any other company-specific information relevant to this effort.

_____

_____

_____

_____

CASE-SPECIFIC COSTS

Case Identification _____

Employee Position _____

Employer _____

Date of Accident _____
(Mon.) (Day) (Year)

Job Data

1. Description of employee's primary area of function(s):

_____

_____

1a. In relation to total company operations and goals, what is the relative importance of the employee's functional area?

____Highest ____High ____Average ____Less Than Average ____Low

1a1. What set of criteria or rationale was used for this designation?

_____

_____

1b. Within his functional area, of what relative value is this individual employee?

___Highest ___High ____Average ___Less Than Average ____Low

1b1. What set of criteria or rationale was used for this designation?

_____

_____

2. Describe employee's primary skill(s):

_____

3. Employee's annual salary or hourly rate:

$_____/_____

4. Number of years employed with this firm: _____Yrs.

5. Is the employee a member of a union?

_____YES _____NO

5a. If the answer to #5 is "YES", what is the name of the union, its local address, phone number and representative?

_____

_____

Accident Costs

6. Total (including partial) days lost from work due to this accident:

_____ Computed cost to employer _____

7. Total medical and/or hospital charges accumulated by employee due to this accident (if known):

_____Medical

_____Hospital

_____Other related _____
(Detail)

_____Total

8. Direct hospital costs paid by employer: _____

9. Direct medical costs paid by employer: _____

10. Insurance deductibles paid by employer:

Amount	Insurance
_____	_____
_____	_____
_____	_____

11. Hospital/Medical Costs paid by employer health plan:

Type of Cost/Benefit	Amount	Insurance
_____	_____	_____
_____	_____	_____
_____	_____	_____

12. Accident related costs paid by insurance policies (such as disability, life (death and/or dismemberment, etc.):

Type of cost	Amount	Insurance (Specify if self-insured.)
_____	_____	_____
_____	_____	_____

13. Other Direct Costs: _____

Explanation of cost elements: _____

_____

14. Have insurance rates/premiums been raised (attributable to this accident)?

_____YES _____NO _____DO NOT KNOW

If the answer to this item is "YES", fill in the matrix below:

Insurance	Amount of Increase	Percent of Increase
_____	_____	_____
_____	_____	_____

14a. What is the rationale for assigning increase(s) to this particular incident?

_____

_____

15. Cost of replacement personnel:

_____Recruiting _____Employing _____Training

_____Total

Explanation of cost elements: _____

_____

_____

16. Upon return from accident related absence, did the employee perform at less than his normal level of effectiveness/productivity?

_____YES _____NO

16a. If the answer to #18 is "YES", what percentage less effective, productive, etc. was the employee?

_____estimated percentage of decrease in level of performance.

Length of time this was so_____ Estimate of cost _____

Rationale for this judgement:

_____

_____

17. Were there business repercussions which occurred due to employee's absence and/or decreased productivity/effectiveness to which an arbitrary monetary amount can be assigned (e.g., decrease in company sales, contracts cancelled, schedules delayed, etc.)?

_____YES _____NO

17a. If the answer to #17 is YES, list the elements involved and arbitary estimates of cost.

Indirect cost elements	Estimated cost
_____	_____
_____	_____

18. List any further indirect losses or elements for further consideration in the indirect category, such as cost of Supervisor's time spent filing reports, reassigning workers, etc., due to the crash.

_____

_____

ATTACH COLLATERALS AS AVAILABLE

APPENDIX E: PRELIMINARY DRAFT MANUAL

INTRODUCTION

Every year in the U.S. over 50,000 people die in motor vehicle accidents and two-million suffer disabling injuries. The number of motor vehicle fatalities is two-and-one-half times greater than all fatalities caused by accidents in the home, and ten times greater than fatalities caused by all other forms of transportation. In addition to the enormous personal tragedy resulting from highway accidents, the cost to the country in lost wages, medical costs, cost of insurance administration, and property damage is a staggering annual 39-billion.

These figures only tell part of the story. What of the cost to employers?

Motor vehicle accidents are the number one cause of on-the-job fatalities -- fully one-third of work related deaths are due to motor vehicles. The leading cause of death of American workers on and off-the-job is motor vehicle accidents. Each on-the-job motor vehicle fatality is estimated to cost an employer $120,000 in direct costs, and the total cost of injuries and deaths to employers is put at more than $1.5 billion.

These figures are estimates of direct costs -- medical, property damage, and wages paid to absent employees. They do not include such indirect costs as additional overtime wages at higher rates to cover for missing employees, supervisors and others overloaded with work and the resultant loss of productivity; the cost of rearranging work schedules; and hiring temporary help. Most employers may be unaware of these costs, but they are true economic costs which at least equal the direct cost.

Clearly motor vehicle accidents exact a tragic toll on American homes and commerce. The overriding question, then, is how can we cut our losses?

There is a simple solution, and it can be found in virtually every motor vehicle on the road. It is the safety belt. Half of all people who die in passenger cars, light trucks, or vans could have been saved if they had been wearing

their safety belts. The severity of injuries would have been reduced by a corresponding percentage. That 50 percent reduction may mean the difference between life and death, bruises and broken bones, and continued productivity or wage and profit loss.

Getting people to wear safety belts is not easy. In 1979 the usage rate was a meager 10.9 percent. People resist safety belts for a variety of reasons, and many myths have arisen around safety belts. But because of the significant cost savings to be gained, a growing number of employers, both large and small, have instituted safety belt programs and policies with great success.

This manual has been designed to show exactly what cost -- both direct and indirect -- is involved in motor vehicle accidents. Actual case histories drawn from U.S. industry are used to illustrate the great difference in severity of injury and the resulting cost to the employer of use and non-use of safety belts by employees. Additional case studies of successful safety belt campaigns by businesses of various size are included to show how employers are saving significant numbers of lives and costs, while at the same time boosting their public image through such programs.

CHAPTER 1 -- ACCIDENT COSTS TO EMPLOYERS

How much does a motor vehicle accident actually cost an employer? Most do not know. Records of safety-related costs are often scant, incomplete or non-existent. Many managers are unaware of the indirect or "hidden cost" of business disruptions caused by motor vehicle accidents. These indirect costs have been estimated at from 1 to 10 times greater than the more obvious direct costs.

For that reason, the following general classifications of cost are separated into direct and indirect cost categories to show the full impact of motor vehicle accidents. The cost of property damage is excluded because the use or non-use of safety belts does not affect this cost. All costs listed result from personal injury sustained by employees.

DIRECT COSTS

I. Wages

State Workers' Compensation laws require employers to pay part of all of an employee's wages while he is off the job due to a work-related accident. If an employee suffers permanent bodily impairment, which is assumed to affect his future earnings, he must be compensated. When the employee is permanently, totally disabled in an on-the-job accident, most States require the employer to make compensatory payments for his lifetime.

Many companies now have enriched programs where coverage and payment levels exceed State Workers' Compensation requirements. Some companies continue payment of wages in part or completely even for an off-the-job accident.

For self-insured firms or those carrier insured "in name only," that is, their insurance coverage has such a large deductible that the policy is rarely activated, wage payments to injured employees may be extremely expensive. And these payments offer no return whatever.

Where an outside insurance carrier is used, it may appear that the employer faces no burden for any direct costs. But there is a direct correlation between the degree of risks and the amount of insurance premiums, and high risks mean high premiums. It should also be noted that indirect costs are seldom covered by insurance, and these costs can more than equal those borne by insurance.

II. Medical Expenses

Injuries from motor vehicle crashes usually require some kind of medical treatment. In an age of soaring medical costs, this can be extremely expensive, requiring the payment of doctors and hospital charges, the purchase of medicines, special equipment to assist the patient to recover, and initial first aid. These expenses are also covered by the Workers' Compensation laws. The employer is required to pay for them, or to carry insurance for them.

III. Physical and Vocational Rehabilitation

Employers are required to pay employee rehabilitation benefits under the Workers' Compensation laws of all States. Physical rehabilitation expenses may be included as part of medical treatment costs or handled as a category by itself. Vocational rehabilitation benefits are generally treated as a separate category; however, not every State requires that employers provide vocational rehabilitation benefits.

Vocational and physical rehabilitation provisions may include the costs of board, lodging and travel in addition to the costs of the rehabilitation itself.

IV. Survivor Benefits for Fatal Injuries

Workers' Compensation laws generally require that benefits be paid to an employee's spouse and children in the event of his fatal injury while on the job. Some companies may have a program for life insurance benefits which provide the employee's family with a lump sum payment in the event of death, with special provisions for on-the-job fatal injury. In a recent case, a large self-insured corporation in the Northeastern United States had to pay over $200,000 as the result of a single accident because their employee was killed while driving his company car on the job.

A 1978 study estimates the average cost of an on-the-job fatality to the employer at approximately $120,000 (1978 dollars).

INDIRECT COSTS -- HIDDEN LOSSES

Direct cost components all involve some payment of money -- to the employee, the doctor, the hospital, or some other recipient. As such, employers are aware of them, even if they may not be aware of their collective magnitude.

There are costs, however, which are not so obvious. But they are true economic costs, nonetheless. They use up valuable resources of the employer, and they are costs not covered by insurance. These are referred to as indirect costs. Some examples of these costs are:

I. Supervisor's Time

Sudden, unexpected absence by an employee will call for extra work on the part of his supervisor. This work may consist of schedule rearrangement, special instructions to coworkers and colleagues, and arrangements with personnel and payroll departments. Other work may suffer as a result, and productivity may fall.

II. Rescheduling

The existing staff may be called upon to cover for the absent worker. This may, however, cause them to neglect their own tasks or perform them less efficiently. In addition, their performance of the absent workers' tasks will necessarily be less efficient, since they are less familiar and practiced than he was.

III. Overtime Pay

It may be necessary to pay other employees overtime pay in order to insure that the missing employee's job is adequately covered.

IV. Temporary Replacements

Where injury causes a relatively prolonged absence, a temporary replacement will have to be hired. This entails additional administrative work and a period during which the new worker operates at less than full productivity. Often union rules may forbid very short-term hiring and the temporary replacement will have to be

carried on the payroll beyond the company's real needs.

V. Unique or Special Employees

Most employees are not indispensable. They can usually be replaced. But there are those rare employees who are unique, because of their accumulated knowledge, skill, or personal contacts, and they are very difficult to replace. Even a temporary loss of such employees can impose catastrophic costs on the employer.

VI. Employee Re-entry and Retraining

An employee returning to the job after an accident may need a period of readjustment, both physical and psychological. His productivity may be reduced during this period. If job requirements have changed during his absence, particularly a long absence, the employee will need to be retrained at additional expense, and the adjustment period will lengthen. The larger such costs, the greater the incentive for the employer to hire a permanent replacement.

VII. Hiring a Permanent Replacement

In cases where a former employee cannot return to work due to permanent disability or death incurred in a motor vehicle accident, the cost of hiring a permanent replacement will be greater than that of hiring a temporary replacement due to more extensive recruitment and search procedures and additional training requirements. The permanent loss of an exceptional or unique employee may not be recoverable.

VIII. Administrative Costs

Injuries, medical treatments, and absence must be documented and claims procedures initiated under the provisions of the State Workers' Compensation laws and other State and federal regulations. Other accident investigation, review, and record-keeping processes may also be activated by an employee accident. The employer pays for all paper-work, processing, review and analysis associated with the incident.

CHAPTER 2 -- SAFETY BELTS SAVE LIVES, TIME, AND MONEY: EMPLOYER EXPERIENCES

All major studies agree that safety belts reduce the incidence of death and injuries from motor vehicle crashes. Lap-and-shoulder belts were found to be 46 to 52 percent effective in the prevention of moderate to maximum injuries and 55 percent effective in the prevention of fatalities in a study performed by the North Carolina Highway Research Center.

In a study of frontal and rollover crashes, lap-and-shoulder belts reduced deaths by 77 to 91 percent, respectively, and incidence of severe to critical injuries by roughly 50 percent. The study also showed that those wearing lap-and shoulder belts would have an increase of no injuries of approximately 50 percent.

Since there is a direct relationship between the severity of injury to an employee and the cost to the employer, it is easy to see how lives, time, and money can be saved through the use of safety belts. The following table is based upon a model developed by the National Highway Traffic Safety Administration. It clearly illustrates the relationship between the level of injury and days spent in the hospital and work days lost.

TABLE 1

Days in the Hospital and Work Days Lost by Level of Injury

Level of Injury	Days in Hospital	Work Days Lost
Critical	42.28	78.40
Serious	20.98	68.76
Severe	8.50	37.19
Moderate	2.38	13.75
Minor	.27	2.51

In broad terms, an estimated 11 million work days, or 42,000 person-years, are lost annually to motor vehicle accidents. The total dollar cost of on-the-job motor vehicle related injuries and death, excluding indirect cost, was an estimated $1.5 billion in 1978.

INDIVIDUAL EMPLOYER EXPERIENCE

To boil these figures down to where it counts -- the individual employer -- the following real-life case studies are offered as examples of the savings possible to companies whose employees use safety belts. Each case includes a break-down of costs between two parallel, or as closely similar accidents as possible, in which one employee was wearing a safety belt and the other was not.

As mentioned earlier, indirect costs have been estimated by various studies to be between 1 and 10 times the direct (insured) cost. Because the exact amount of indirect cost is difficult to quantify, the most conservative one-to-one ratio of indirect to direct cost has been used here. It is important to remember, however, that these costs can easily go higher.

Costs of vehicle repairs or replacement are not included since property damage is unaffected by safety belt usage.

As a basis for comparison of employee injury levels, the following Abbreviated Injury Scale (AIS) in Table 2 is used with its corresponding level of injury codes.

TABLE 2

Abbreviated Injury Scale (AIS) Codes

Level of Injury	AIS Code
Minor	1
Moderate	2
Severe	3
Serious	4
Critical	5
Maximum (unsurvivable)	6

TEST CASE I

Employer: Once owned by an individual, the company with 3,500 employees world-wide is now part of a large corporation. The company manufactures electronic components and sells them to major applicance, computer and tele-communications industries. It employs 1100 persons and maintains a company fleet of 143 cars.

Most driving consists of local (30-40 miles) trips by sales/service engineers and managers, but many engineers may travel up to 1500 miles on round-trip visits to corporate headquarters. In 1980, 2.2 million miles were logged on company business.

Workers' Compensation and Insurance Coverage: The employer is self-insured for Workers' Compensation benefits, so it is a direct expense to the company. The company pays full salary for absence arising from work-related injury.

Supplementary Payments and Benefits: Health and major medical insurance is purchased from an outside carrier for coverage of off-job illness and injury. The premium is based upon company accident experience and claims are paid by the carrier.

Each employee is insured for one times his annual salary in a company life insurance benefit. The company handles a life insurance claim as a direct payment, and no outside carrier is used.

For off-job accidents or illnesses employees receive disability pay for up to six months directly paid by the employer.

Employee: The employee was a 20 year old press operator for the company. His wage was approximately $10 per hour.

Accident: The press operator was off-the-job at the time of the accident. He was driving his 1978 Datsun Pick-up truck at approximately 45 miles per hour when he lost control of the vehicle. The truck rolled over the guard rail where it came to rest against a tree on the passenger side.

Injuries: The employee suffered multiple cuts and bruises, severe strain to the neck, and a fractured vertebrae (AIS-2). The truck was equipped with a safety belt but it was not being used at the time of the accident.

Categories of Cost to the Company

Medical and Hospital: The employee was transported to a local hospital where he was treated for injuries and fitted with a back and neck brace. Medical and hospital bills amounted to $1,300 and were paid by the outside carrier.

Lost Time: The press operator was off the job for a total of 29 days.

Total Costs to the Company

Medical and Hospital	$ 1,300*
Salary Continuation	2,320
Total Direct Costs	$ 2,320
Indirect Cost Estimate**	$ 3,620
Total Direct + Indirect Cost	$ 5,940

* Medical/Hospital expenses were paid by the outside insurance carrier; therefore, this expense is only included in the total employer cost figure in that it is used in calculation of the indirect estimate.

COMPARATIVE EXAMPLE I

In this unusual pair of cases, the comparative example is a case of the same employee as in the test case driving the same vehicle and being involved in a highly similar accident. In the comparative example, however, the driver had learned from experience and was wearing his safety belt. The accident happened almost exactly six months following the test case accident.

Accident: The press operator was off-the-job, driving his 1978 Datsun pick-up truck at approximately 45 miles per hour. He lost control of the vehicle and rolled it completely. The truck came to rest on the driver's side.

Injuries: The employee was mainly bruised and shaken as a result of the accident. He sustained a head laceration which required 5 stitches (AIS-1).

Categories of Cost to the Company

Medical and Hospital: The emergency room bill was approximately $50 and was covered by the outside insurance carrier policy.

Lost Time: The employee lost one day of work time as a result of the accident.

Total Costs to the Company

Medical and Hospital	$ 0
Salary Continuation	$ 80
Total Direct Costs	$ 80
Indirect Cost Estimate	$ 80
Total Direct + Indirect Cost	$ 160

OFF-JOB ROLLOVER

TEST CASE -- NO SAFETY BELT		COMPARISON CASE -- SAFETY BELT	
Driver:	Male Press Operator	Driver:	Male Press Operator
Vehicle:	1978 Datsun Pick-Up	Vehicle:	1978 Datsun Pick-Up
Accident:	Driving 45 mph. Lost control of vehicle Rolled over guardrail onto passenger side	Accident:	Driving 45 mph. Lost control of vehicle Rolled down embankment onto passenger side
Injuries:	Fractured vertebrae, multiple cuts/bruises, severe neck strain	Injuries:	Bruised and shaken*
Injury Level:	Moderate	Injury level:	Minor
Time Off Work:	29 days	Time Off Work:	1 day
Employer Costs:		Employer Costs:	
Medical/Hospital	$1,300**	Medical/Hospital	$ 0
Salary continuation	$2,320	Salary Continuation	$ 80
Indirect Estimate	$3,620	Indirect Estimate	$ 80
Direct + Indirect	$5.940	Direct + Indirect	$ 160

*State Police remarked that the safety belt had saved driver's life.

**Medical/Hospital expenses were paid by the outside insurance carrier.

TEST CASE II

Employer: The employer is a major automobile manufacturing company which employs some 200,000 employees in the U.S. and its domestic subsidiaries. The company has a total fleet of approximately 36,000 vehicles nationally, comprised of lease cars/trucks, pool cars, test, and sales cars. Most business driving is done by district and sales people who drive from zone office to zone office, dealership to dealership. At corporate headquarters, the facility is spread out and management personnel may drive 20 minutes twice per day on business within the complex.

Workers' Compensation and Insurance Coverage: The employer is self-insured for Workers' Compensation where allowable under State law. Workers' Compensation is administered by an outside carrier who charges the employer an experience-based rate for administrative services. Employees receive full salary for lost time due to work-related injuries under a comprehensive company policy. Sick leave must be used up before Workers' Compensation comes into play. The employer pays all medical expenses associated with on-the-job injury.

Supplementary Payments and Benefits: The company is self-insured for life and accidental death or dismemberment on and off the job. Disability insurance is also self-insured.

Employees are covered by medical insurance for off-the-job illness/injury. The employer pays an annual fee based on experience to cover administration by an outside carrier -- the employer is self-insured for medical coverage.

Employee: The employee was a __ year old design engineer. His salary at the time of the accident was $3,795 per month.

Accident: The design engineer was driving his company-lease vehicle, a two-door compact, along a straight city thoroughfare when he lost control of the car. The front-end of his vehicle struck a utility pole at an estimated speed of

30 mph. The design engineer was on personal business at the time of the accident, and he was travelling alone.

Injuries: The design engineer suffered broken ribs, contusions, cuts, bruises, and a broken finger. His level of injury is estimated at AIS-2. His company-lease vehicle had a safety belt available, but the design engineer was not wearing it at the time of the crash.

Categories of Cost to the Company

Medical and Hospital: The employee was hospitalized for a total of five days at a cost to the company of $1,577.00.

Days of Lost time: The design engineer was off work for a total of 12 days which was covered by his sick leave.

Total Costs to the Company

Medical and Hospital	$ 1,577.00
Salary Continuation	$ 2,070.27
Total Direct Costs	$ 3,647.27
Indirect Cost Estimate	$ 3,647.27
Total Direct + Indirect Cost	$ 7,294.54

COMPARATIVE EXAMPLE II

Employer: The same employer as in Test Case II.

Employee: A structural analysis engineer. His salary at the time of the crash was $3,310 per month.

Accident: The engineer was driving a 1980 two-door compact leased from the company. As he moved along a slight curve to the right at approximately 25 mph., a child passenger distracted him, and he lost control of the car. The front end of his vehicle struck a pole at the edge of the roadway. The engineer was on personal business and was driving with at least one passenger. He was wearing his safety belt at the time of the crash.

Injuries: The engineer sustained no injury as a result of the crash.

Categories of Cost to the Company: There were no direct or indirect costs associated with the accident due to employee injury.

OFF-JOB FRONTAL CRASH

TEST CASE -- NO SAFETY BELT		COMPARISON CASE -- SAFETY BELT	
Driver:	Male Design Engineer	Driver:	Male Structural Engineer
Vehicle:	Two-door compact	Vehicle:	Two-door compact
Accident:	Driving at 30 mph. Lost control and struck utility pole	Accident:	Driving at 25 mph Lost control and struck utility pole
Injuries:	Broken ribs, broken finger, cuts, bruises	Injuries:	None
Time Off Work:	12 days	Injury Level:	None

Employer Costs:

Medical/Hospital	$ 1,577.00	Medical/Hospital	$ 0
Salary Continuation	$ 2,070.27	Salary Continuation	$ 0
Indirect Estimate	$ 3,647.27	Indirect Estimate	$ 0
Total Direct + Indirect	$ 7,294.54	Total Direct + Indirect	$ 0

TEST CASE III

Employer: The employer is a large electric utility company involved in all stages of the supply of electric power. It maintains a fleet of 874 automobiles and 2,116 pick-up trucks. There are 10,706 employees, and it is estimated that nearly 50 percent of total employees are engaged in business-related activities requiring them to drive or ride with other employee-drivers. In 1980, approximately 36-million miles were covered by employees of the company in business related driving.

Workers' Compensation and Insurance Coverage: Workers' Compensation laws for the State require that cash benefits be provided by the employer to replace employee loss of income due to an occupational injury amounting to two-thirds of wages, and not exceeding $100 per week. (The latter figure is for 1980, the year in which the accident took place). Medical benefits must be paid for necessary treatment resulting from a work-related accident and where there is no permanent impairment, there is no limit to the amount.

The employers in this state are required to carry insurance for Workers' Compensation, but are permitted to be self-insured. The company in this case is self-insured.

Supplementary Payments and Benefits: Workers' Compensation laws in this State require a two-thirds payment of wages during the period of absence from work caused by on-the-job injury. However, the company has an agreement with its employees, both union and nonunion, to pay full wages for this absence, except in cases where the employee is deemed to be responsible for the accident. In these cases the employee receives only the State-guaranteed two-thirds payment of wages.

Employee: The employee was an operations supervisor for the company. His estimated salary level at the time of the accident was $28,100 per annum.

Accident: The operations supervisor was driving his company car, a 1980 Dodge Aspen, on routine business at an estimated speed of 35 mph. He was travelling alone. His car was struck when an on-coming 1977 Plymouth traveling at an estimated 35 mph., crossed over into his inbound lane. The operations supervisor applied his brakes and took evasive action in order to prevent an accident, but he was struck on the driver's side of his vehicle.

Injuries: The operations supervisor suffered four broken ribs, a three-inch laceration on the left side of the head and a broken femur on the left leg. His level of injury is estimated at AIS-2. A safety belt was available in the company car, but the employee did not wear it at the time of the accident.

Categories of Cost to the Company

Medical and Hospital: The employee was taken to a local hospital where he was hospitalized for an indetermined amount of time.

Days of Lost Time: The operations supervisor was off work for seven months as a result of the crash.

Total Costs to the Company

Medical and Hospital	$ 11,933.39
Salary Continuation	$ 16,391.67
Total Direct Costs	$ 28,325.06
Indirect Cost Estimate	$ 28,325.06
Total Direct + Indirect Cost	$ 56,650.12

COMPARATIVE EXAMPLE III

Employer: The employer is a state department of transportation with 4,200 employees and a mixed fleet of 1,700 cars, station wagons, pick-up trucks and vans. For fiscal year 1979-1980, more than 21-million miles were logged on company vehicles by 3,000 workers involved in construction and maintenance of roadways.

Workers' Compensation and Insurance Coverage: The State is self-insured for Workers' Compensation which is administered through the state's industrial commission. The DOT comptroller serves as a liaison between the two. Income benefits for the State prescribe that an employer shall pay 80 percent of spendable earnings up to a maximum amount of $384 for the length of total disability.

Supplementary Payments and Benefits: Hospitalization insurance is paid by the State to a private carrier for employee off-the-job illness/injury.

Sick leave is cumulative for employees. When sick leave is used up, the employee's status is "on leave without pay". Employees can choose between using sick leave, Workers' Compensation, or a combination for applicable on-the-job injury related absence. Because of a generous sick leave policy, it is almost always possible to utilize sick leave, and thus obtain 100% of salary.

For long-term disability there are rehabilitation programs and a lump sum payment after which the worker has no right to further claims.

Employee: The employee was a construction technician who performed technical engineering functions on construction projects. He drove from his residency to construction/survey sites in a state car on a daily basis. His hourly rate at the time of the accident was $7.91.

Accident: The employee was driving a 1974 Ford pick-up truck at approximately 35 miles per hour. The other vehicle, a 1979 Chevrolet straight truck, traveling in the opposite direction crossed the center line and struck the employee's

pick-up on the left side. The entire left side of the State vehicle was reported as heavily damaged. The State employee was traveling alone and wearing his safety belt.

Injuries: Sore ribs on the left side.

Categories of Cost to the State

Medical and Hospital: Doctor's fees amounting to $44.90.

Days of Lost time: 14 hours

Total Costs to the State

Medical and Hospital	$	44.90
Salary Continuation	$	110.74
Total Direct Costs	$	155.64
Indirect Cost Estimate	$	155.64
Total Direct + Indirect Cost	$	311.28

ON-JOB SIDE COLLISION

TEST CASE -- NO SAFETY BELT

Driver: Male
Operations Supervisor

Vehicle: 1980 Dodge Aspen

Accident: Driving at estimated 35 mph.
Struck by 1977 Plymouth at 35 mph. on driver side

Injuries: Four (4) broken ribs, 3 inch laceration on left side of head broken left femur

Injury Level: AIS-2

Time Off Work: Seven months

Employer Costs:

Medical/Hospital	$ 11,933.39
Salary Continuation	$ 16,391.67
Indirect Estimate	$ 28,325.06
Direct + Indirect	$ 56,650.12

COMPARISON CASE -- SAFETY BELT

Driver: Male
Construction Technician

Vehicle: 1974 Ford Pick-Up

Accident: Driving at 35 mph.
Struck by 1979 Chevrolet straight truck at 35 mph. on driver side

Injuries: Sore ribs on left side.

Injury Level: AIS-1

Time Off Work: 14 hours

Employer Costs:

Medical/Hospital	$ 44.90
Salary Continuation	$ 110.74
Indirect Estimate	$ 155.64
	$ 311.28

TEST CASE IV

Employer: The employer is a large property and casualty insurance carrier employing 67,000 people. The company fleet of 891 vehicles includes 430 passenger vans used for commuter van-pooling and 20 company-leased vehicles. Most on-the-job driving is done by 19,500 district sales agents who drive their own cars on company business.

Workers' Compensation and Insurance Coverage: All insurance claims are handled by an outside insurance carrier. The company has a contract with the carrier which includes all types of coverage. The carrier handles all insurance claims. However, the total deductible is so large ($1 million) that the company ends up paying for its claims, and the carrier mainly performs an administrative function.

Supplementary Payments and Benefits: The company pays the same benefits for on-the-job and off-the-job accidents. Employees with less than 5 years of service receive 26 weeks of benefits (wage continuation); those with 5 years service or more receive 52 weeks of benefits. In each case the employee receives full salary for the first four weeks, then declining to 75 percent of salary, and ending at half salary. All medical and hospital benefits are paid by the employer.

Employee: The employee was a 30 year old woman employed as a district agent representing the company in an outside sales capacity. Her annual compensation at the time of the accident is estimated at $18,500.

Accident: The employee was driving her 1979 Ford Mustang at approximately 45-50 mph. As she attempted to exit the highway, she lost control and the Mustang rolled down an embankment. As the car rolled, the young woman was thrown out of the auto. She was thrown 120 feet and landed on her head.

Injuries: Ruptured spleen, fractured pelvis, displaced superior pubic ramis, head injuries, and abrasions. Her level of injury is estimated at the AIS-4 level.

A safety belt was available for the employee's use, but she did not use it.

Categories of Cost to the Company:

Medical and Hospital: Treated in the hospital emergency room and hospitalized for a period of three weeks. The employee is currently totally disabled -- suffers from partial paralysis which is gradually improving.

Days of Lost Time: The district agent has never returned to work. She will probably be permanently disabled and unable to perform her job again. The accident took place in March of 1979, and the company is still paying in this category. There are currently reserves of $40,928 and $75,000 in salary continuation and medical compensation respectively. Figures below encompass payments to date for this employee.

Total Costs to the Company

Medical and Hospital	$	27,669.75
Rehabilitation (physical therapy)	$	877.92
Salary continuation	$	14,849.92
Total Direct Costs	$	43,397.59
Indirect Cost Estimate	$	43,397.59
Total Direct + Indirect Cost	$	86,795.18

COMPARATIVE EXAMPLE IV

Employer: The employer is a satellite company within a large telephone system. The company has operations in five States. In the State studied, the employer has approximately 8,000 employees and a fleet of 2,227 vehicles, including passenger cars, vans and 1/4-ton pick-up trucks. Some "pool vehicles" are used by over 20 people per week on an as-needed basis.

The largest category of driving employees are those involved in service, repair, and installation operations. Supervisors are assigned passenger cars. Employees may be asked to drive their own vehicles at times -- for which they are compensated by the employer (cancelling any liability on the employer's part). Seventy percent of the driving done by employees is local.

Workers' Compensation and Insurance Coverage: The company is self-insured in the State for Workers' Compensation. The company pays benefits in accordance with the State requirements which are as follows: All medical expenses are paid; the employer pays 80 percent of wages up to a maximum of $384 per week for the time span of total disability; there are no statutory limitations on the amount paid out in wage compensation or medical benefits.

Supplementary Payments and Benefits: For off-job illness/injury, the employer insures personnel with a major health insurance carrier which is actually paid only for its administrative functions. The employer pays all claims ultimately. For off-the-job accidents, the employer pays wages according to length of service. Those with more than five years of service receive full pay for the first seven calendar days. After that time, their pay depends upon how long they are off the job. The most they receive is full pay for a year; usually they receive full pay for only part of the year and half pay for the balance.

Employee: A 42 year old male engineering specialist with an annual salary of $24,000.

Accident: The employee was driving a 1979 Dodge Omni, a company vehicle, at 45 mph. when he hit a pile of loose gravel. The Omni went into a 300 foot skid, rolled down into a ditch and landed in a final upright position. A safety belt was available for this employee's use; he was wearing the device at the time of the accident.

Injuries: None

Categories of Cost to the Company: There were no direct or indirect costs associated with the accident due to employee injury.

ON-JOB ROLLOVER

TEST CASE -- NO SAFETY BELT		COMPARISON CASE -- SAFETY BELT	
Driver:	Female District sales agent	Driver:	Male Engineering Specialist
Vehicle:	Compact car	Vehicle:	Compact car
Accident:	Driving 45-50 mph. Lost control of vehicle Rolled down embankment Driver ejected	Accident:	Driving 45 mph. Hit loose gravel - lost control of vehicle Rolled down embankment
Injuries:	Extensive multiple injuries: ruptured spleen, fractured pelvis, displaced pubic ramis, head injuries	Injuries:	No injury
Injury Level:	Serious	Injury Level:	None
Time Off Work:	Has not returned*	Time Off Work:	None
Employer Costs:		Employer Costs:	
Medical/Hospital	$ 27,669.75	Medical/Hospital	$ 0
Rehabilitation	$ 877.92	Rehabilitation	$ 0
Salary Continuation	$ 14,849.92	Salary Continuation	$ 0
Indirect Estimate	$ 43,397.59	Indirect Estimate	$ 0
Direct + Indirect	$ 86,795.18	Direct + Indirect	$ 0

*Employee has been off the job since March of 1979. It is projected that she will be permanently disabled and unable to perform her job again.

**Figures encompass payments to date. Further costs are anticipated by the employer.

TEST CASE V

Employer: The employer is a city which employs a total of approximately 10,000 people in administration, public works, and fire/police departments. The city's fleet is comprised of 584 trucks (pick-ups and others), 400 passenger cars and station wagons, and 300 police squad cars. Approximately one-half of the city's employees drive each day as part of their routine work. Police Department vehicles comprise approximately 60 percent of the city fleet and account for 70 percent of the total mileage driven. The city fleet drove 14-million miles last year, of which the Police Department drove 8-million miles. There are approximately 2,000 police officers employed by the city.

Workers' Compensation and Insurance: The city is self-insured for Workers' Compensation. City employees have negotiated the benefit of 100 percent of salary for up to a year for industrial injury. After one year off, employees must go back to the regular Workers' Compensation prescribed by the State: up to two-thirds of average weekly earnings.

Supplementary Payments and Benefits: The city pays "Injury Pay" for temporary total or partial disability because of on-the-job injury. Injury Pay is in lieu of Workers' Compensation for up to a year's time and is paid out of funds of the regular salary and wage account of the appropriate department and is reported on the department's payroll as "injury pay".

City employees earn 15 days of sick/disability leave per year. Police department employees have no maximum accumulation limit assigned to this benefit; other employees can accumulate 120 days of sick/disability leave. Police officers can be granted 365 days of sick/disability benefit for any one period of sickness/disability.

The city provides hospitalization insurance for employees for off-job illness/injury. The insurance is administered by an outside carrier, but is self-insured by the employer.

Employee: City police officer

Accident: The police officer was a passenger in the righr front of the squad car, a 1978 Ford LTD. The squad car was traveling north with its red light and siren on at approximately 40 miles per hour when it struck a 1969 Chevrolet station wagon that pulled suddenly into the middle of an intersection. The squad car hit the right rear of the station wagon broadside as the wagon attempted to cross at approximately 35-40 miles per hour.

Injuries: The police officer struck the dash of the squad car as a result of the crash, suffering neck, back and chest injury. Injury level is estimated at AIS-2. The officer did not have his safety belt on at the time of the crash.

Categories of Cost to the City:

Medical and Hospital: The employee was taken to the hospital emergency room. Details of hospitalization are not known.

Days of Lost Time: The police officer lost seven weeks from his work.

Total Costs to the City

Medical and Hospital	$ 745.00
Workers' Compensation	$ 1,631.00
Total Direct Costs	$ 2,376.00
Indirect Cost Estimate	$ 2,376.00
Total Direct + Indirect Cost	$ 4,752.00

COMPARATIVE EXAMPLE V

Employer: The employer is the same employer as in the preceeding Test Case V.

Employee: A city police officer

Accident: The police officer was a passenger in the right front of a 1980 Plymouth Fury squad car which was pursuing a 1973 Ford LTD station wagon. As the station wagon attempted a wide left-hand turn, the cruiser's front hit the left rear of the wagon in a legal intervention maneuver. Both vehicles had been traveling between 60 and 70 mph. directly prior to the crash.

Injuries: The police officer sustained no injury as a result of the crash. A Safety belt was available in the squad car and he was using it at the time of the crash.

Categories of Cost to the Company: None

ON-JOB FRONTAL CRASH

TEST CASE -- NO SAFETY BELT

Driver: Male
Police Officer

Vehicle: 1978 Ford LTD

Accident: Driving at 40 mph
Struck 1969 Chevrolet station wagon crossing intersection at 35-40 mph

Injuries: Neck, back and chest injury from striking dash

Injury Level: AIS-2

Time Off Work: 12 days

Employer Costs:

Medical/Hospital	$ 745.00
Salary Continuation	$ 1,631.00
Indirect Estimate	$ 3,647.27
Total Direct + Indirect	$ 4,752.00

COMPARISON CASE -- SAFETY BELT

Driver: Male
Police Officer

Vehicle: 1980 Plymouth Fury

Accident: Driving 60-70 mph
Struck a 1973 Ford LTD station wagon making wide left turn at 60-70 mph.

Injuries: None

Injury Level: None

Time Off Work: None

Employer Costs:

Medical/Hospital	$ 0
Salary Continuation	$ 0
Indirect Estimate	$ 0
Total Direct + Indirect	$ 0

TEST CASE VI

Employer: The employer is a gas utility company which sells and distributes natural gas to residential and commerical customers in 225 communities in four states. The firm employs approximately 2,230 people. In 1980 the firm had a total of 1,180 vehicles on the road -- mostly customer service vans -- manned by one person each. About 400 meter readers, construction workers, etc., are on car allowance whereby they utilize their own vehicles for on-the-job purposes. In 1981 a total of 9,801,000 miles were driven by company employees.

Workers' Compensation and Insurance: The company is self-insured for Workers' Compensation and pays benefits in accordance with State laws. In the four States where the company has operations, Workers' Compensation laws require maximum weekly payments for total disability of two-thirds of a worker's weekly wages.

Supplementary Payments and Benefits: Employees receive ten days per year sick leave which can be accumulated from one year to the next according to company regulations. Accumulated sick leave can be integrated with Workers' Compensation benefits where applicable to achieve 100 percent coverage of wage for a work-related injury or illness.

Employees are provided with a comprehensive medical plan which covers a wide range of medical and hospital expenses. The company pays the premium for medical insurance coverage; medical claims are paid by an outside carrier.

Employees may enroll in the group life insurance plan offered by the employer. However, the employee shares the burden of premium payment with the employer. The plan is carrier-insured.

Employee: The employee was a meter reader at the time of the accident. His hourly rate was $7.39 per hour.

Accident: The meter reader on routine business was driving the company 1977 Hornet west across an intersection at an estimated speed of 55 miles per hour. A 1972 Matador, going south, ran a stop sign at an estimated speed of 35 miles per hour and collided into the left front of the employee's vehicle.

Injuries: The employee suffered fractured ribs and a fractured leg. Injury level is estimated at AIS-3. The meter reader was not wearing his safety belt at the time of the crash.

Categories of Cost to the Company:

Medical and Hospital: The employee was hospitalized for a total of 13 days.

Days of Lost Time: The meter reader was off work for approximately six months.

Total Costs to the Company:

Medical and Hospital:	$ 8,364.65
Partial Permanent Disability	$ 8,672.40
Workers' Compensation	$ 4,809.24
Total Direct Costs	$ 21,846.29
Indirect Cost Estimate	$ 21,846.29
Total Direct + Indirect Cost	$ 43,692.58

COMPARATIVE EXAMPLE VI

Employer: A State department of transportation with 4,200 employees and a mixed fleet of 1,700 cars, station wagons, pick-up trucks and vans. For fiscal year 1979-1980, more than 21-million miles were logged on company vehicles by 3,000 workers involved in construction and maintenance of roadways.

Workers' Compensation and Insurance Coverage: The State is self-insured for Workers' Compensation which is administered through the State's industrial commission. The DOT comptroller serves as a liaison between the two. Income benefits for the State prescribe that an employer shall pay 80 percent of spendable earnings up to a maximum amount of $384 per week for the length of total disability.

Supplementary Payments and Benefits: Hospitalization insurance is paid by the State to a private carrier for employee off-the-job illness/injury.

Sick leave is cumulative for employees. When sick leave is used up, the employee's status is "on leave without pay". Employees can choose between using sick leave, Workers' Compensation, or a combination for applicable on-the-job injury related absence. Because of a generous sick leave policy, it is almost always possible to utilize sick leave, and thus obtain 100 percent of salary.

For long-term disability there are rehabilitation programs and a lump sum payment after which the worker has no right to further claims.

Employee: An assistant survey party chief at the time of the crash. He drove to construction sites to assist with technical engineering/survey work. His hourly rate was $7.79.

Accident: The employee was driving on-the-job in a State owned 1976 Plymouth sedan at approximately 55 mph when a 1978 Ford pick-up came through an intersection at an estimated 35 miles per hour and hit the Plymouth on the driver's side.

Injuries: The employee suffered minor whiplash with pain in the lower back and neck as a result of the crash. He was wearing his safety belt when the crash occurred. Injury level is estimated at AIS-1.

Categories of Cost to the State

Medical and Hospital: The employee was seen by a medical doctor.

Days of Lost Time: The employee lost no days of time as a result of the crash.

Total Costs to the State:

Medical and Hospital	$ 25.85
Workers' Compensation	$ 0
Total Direct Costs	$ 25.85
Indirect Cost Estimate	$ 25.85
Total Direct + Indirect Cost	$ 51.70

ON-JOB FRONTAL CRASH

TEST CASE -- NO SAFETY BELT

Driver: Male
Meter Reader

Vehicle: 1977 Hornet

Accident: Driving at 55 mph. Hit in left front by 1972 Matador at 35 mph.

Injuries: Fractured ribs and fractured leg.

Injury Level: Severe

Time Off Work: Six Months

Employer Costs:

Medical/Hospital	$ 8,364.65
Partial permanent disability	$ 8,672.40
Salary Continuation	$ 4,809.24
Indirect Estimate	$ 21,846.29
Direct + Indirect	$ 43,692.58

COMPARISON CASE -- SAFETY BELT

Driver: Male
Assistant Survey Party Chief

Vehicle: 1976 Plymouth Sedan

Accident: Driving at 55 mph. Hit in left front by 1978 Ford Pick-up at 35 mph.

Injuries: Minor whiplash

Injury Level: Minor

Time Off Work: None

Employer Costs:

Medical/Hospital	$ 25.85
Partial permanent disability	0
Salary Continuation	$ 0
Indirect Estimate	$ 25.85
Direct + Indirect	$ 51.70

CHAPTER 3 -- SAFETY BELT PROGRAMS AND POLICIES THAT WORK

The Case for Safety Belts

The vast majority of people in this country are familiar with safety belts. They have been standard equipment in every new car sold in the U.S. for more than a decade. Most people understand why their cars are equipped with safety belts. And it only takes a matter of seconds to properly fasten a standard safety belt. Yet in 1979 only 10.9 percent of American drivers regularly wore their safety belts. Why?

There are many reasons. Primary among them is the pervading attitude that "it just won't happen to me". But the evidence is that every one of us can expect to be in a motor vehicle accident once every ten years. For one out of 20, it will be a serious crash. For one out of 60 born today, it will be fatal.

A lot of people believe that safety belts need only be worn on long trips or at high speed, but studies tell us that 80 per cent of deaths and serious injuries occur in cars traveling 40 mph or less, and 74 percent of deaths and injuries happen less than 25 miles from home.

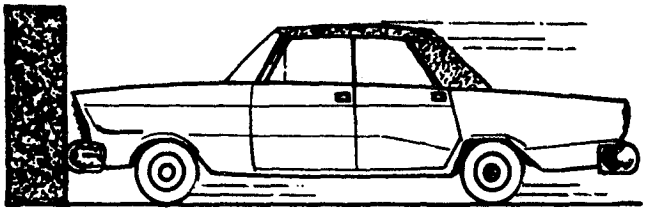
Nor do people understand the dynamics of a motor vehicle crash. Few realize that a car impacting a fixed barrier at 30 mph stops in about 1/10th of a second (see Figure 1), but an unrestrained occupant continues moving forward at 30 mph until he slams into some part of the vehicle's interior -- an impact that is usually fatal. It is not possible to brace yourself against such an impact with your arms or legs. The force of impact at just 10 mph is equivalent to catching a 200-pound bag of cement thrown from a first-story window.

Among other leading myths concerning safety belts is the misbelief that you are better off being thrown from a car during an accident, or that safety belts may cause entrapment in case of fire or submersion. The fact is that chances of fatal injury are nearly 25 times greater if you are thrown out of a vehicle than if you were restrained by a safety belt. Fire and submersion occur in only

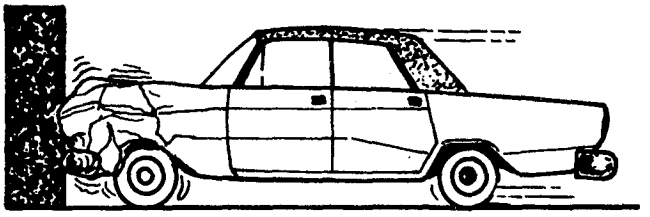
FIGURE 1:

What Happens in a Collision

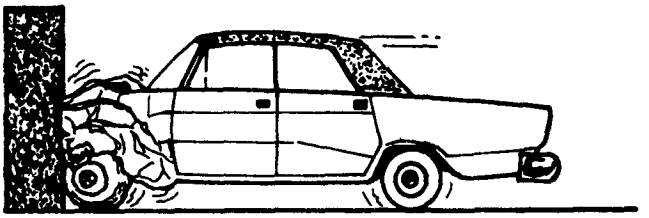
1st, The Car Collision



When a car hits a solid barrier, it doesn't stop all at once. The bumper stops immediately, but the rest of the car continues to move forward.

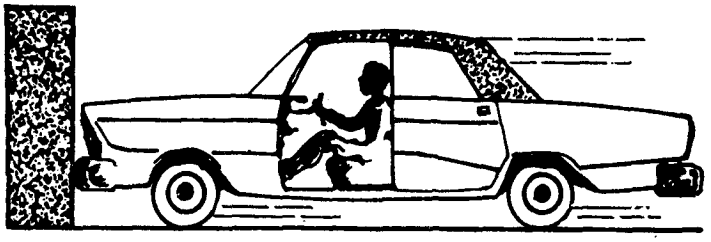


The car slows down as the crushing of the front end absorbs some of the force of the collision.



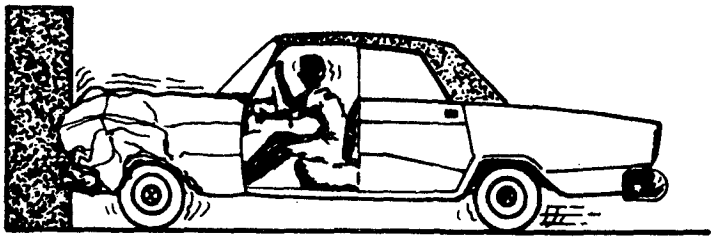
At 30 mph, the car takes about 1/10 of a second to come to a complete stop. The front end is crushed, but the passenger compartment usually remains undamaged.

2nd, The Human Collision



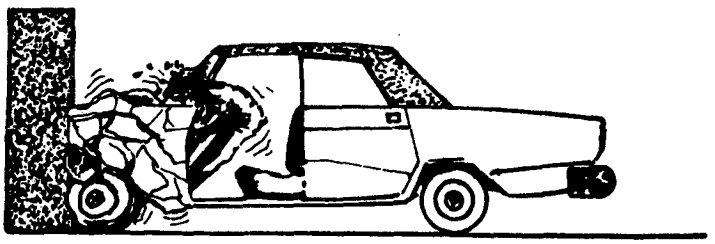
0.000 seconds - car hits barrier

On impact, the car begins to crush and to slow down. The person inside the car has nothing to slow him down, so he continues to move forward inside the car at 30 mph.



0.100 seconds - car stops

Within 1/10 of a second, the car has come to a complete stop, but the person is still moving forward at 30 mph.



0.120 seconds - person hits car interior

One-fiftieth of a second after the car has stopped, the person slams into the dashboard and windshield. This is the human collision. The car takes 1/10 of a second to stop; the human takes only 1/100 of a second.

a tiny fraction of all motor vehicle accidents, and occupants are far more likely to remain conscious and able to free themselves if they are belted in.

Some people also believe that, since they can move around freely when their safety belts are fastened, they must not be worth much in a crash. They do not understand that modern safety belts are designed with a latching device that locks the belt in place in case of severe braking or sudden impact (see Figure 2 below).

One of the main reasons people do not wear safety belts is that they simply never got in the habit. Most people driving today never learned to use safety belts as children or young adults. Learning and adopting new attitudes and behavior is not easy. But as we have seen in such major health campaigns as anti-smoking, it is possible. Employers can obviously play an important part in the effort to get people to buckle up and, as shown in the preceding case histories, it is worth it. As the trend to employer downsizing of fleet vehicles continues, having employees buckle up will become even more life and cost-saving.

Components of a Successful Safety Belt Program and Policy

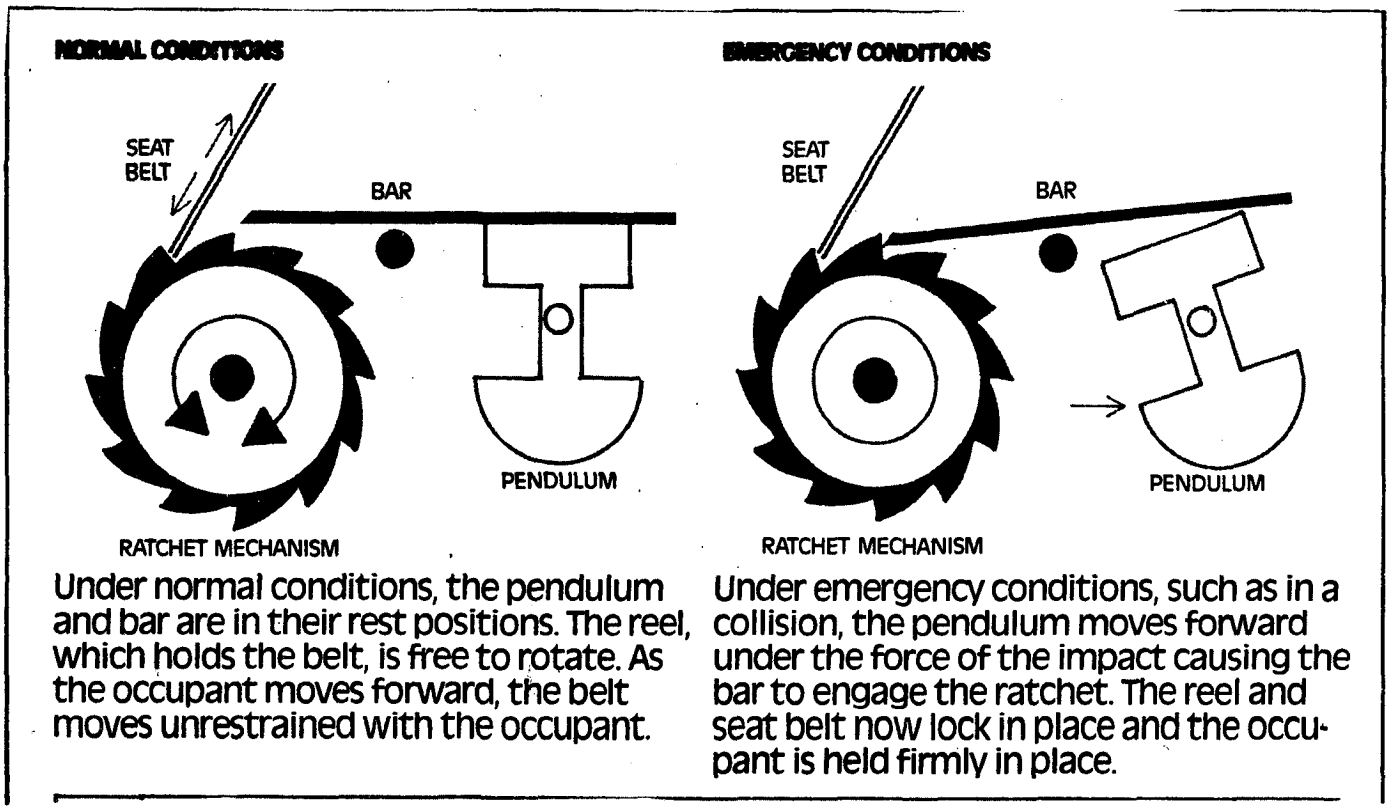
They key component of a successful safety belt program and policy is the employer's commitment to employee safety. In every instance studied where an employer has a successful safety belt program, the program is one part of a company-wide safety effort. The company vehicle is regarded as one of many pieces of equipment for which standards of safe usage are applied and enforced. When a worker drives or rides on-the-job, the vehicle is his workplace and the use of the safety belt is required for safe operation.

The following components were generally found to be common among successful safety belt programs and policies:

- Management commitment to the program and policies as well as a high level of employee safety consciousness.

FIGURE 2

THE SAFETY BELT: HOW IT WORKS



- Very specific and highly publicized goals and objectives for the employee safety belt program which often are based upon the past safety record of the company.
- Responsibility for employee safety rests with line management.
- Positive incentives for good safety records are given to line management.
- The company mandates a well-publicized safety belt use policy for all employees.
- Disciplinary procedures are well defined and publicized for non-compliance with the policy.
- There is an on-going personalized safety education and training effort for all employees, including driver training/defensive driving instruction.
- There are positive incentives for employees to use their safety belts.
- Employee participation in safety training is promoted.
- The company conducts systematic accident recordkeeping -- including the recording of safety belt use or non-use.
- Accident cases on-the-job are subject to a company review procedure.
- Companies have attempted some form of general safety belt use audit -- dependent upon the company's physical setup and other factors -- to obtain a general measure of employee compliance with the safety belt use policy.
- Company vehicles are routinely checked to insure that safety belts are in good working order.
- Special efforts are directed toward the encouragement of off-job safety belt use -- including outreach to family members.

Exemplary Safety Belt Programs and Policies: Employer Experience

Five employers are featured in this section whose safety belt programs/ policies have met with varying levels of success. Some of the employers have used innovative approaches to encouraging employees to buckle up -- such as contests and special campaigns. Others have relied mainly upon a strongly enforced policy along with routine training and education. All of the employers have tried to impact upon employee safety belt use off-the-job as well as at work. One in particular designed and implemented a contest/campaign aimed specifically at off-the-job safety belt use.

Company #1: A State department of transportation with 4,200 employees and a mixed fleet of 1,700 cars, station wagons, pick-up trucks, and vans. For fiscal year 1979-1980, more than 21-million miles were logged on company vehicles by 3,000 workers involved in construction and maintenance of roadways.

Safety Belt Programs/Policies: The state has mandated the use of seatbelts for all on-the-job driving. Enforcement entails a progressive disciplinary system:

- First offense - verbal reprimand
- Second offense - written reprimand
- Third offense - suspension of 1-3 days
- Fourth offense - dismissal

Supervisors are responsible for compliance, although the employee is considered ultimately responsible. Awards are given to supervisors whose employees have the best accident rates and the least number of bodily injury cases. Random spot audits have been conducted throughout the year in the form of "destination checks" which were really aimed at checking for safety belt use. The destination checks along with an audit done at the yearly State safety conference revealed that approximately 50 percent of State employees were wearing safety belts on-the-job.

Six district committees comprised of six to 11 members and the central office safety committee are responsible for reviewing accident and injury reports and safety inspection procedures in each area. The committees meet monthly to review the accident and injury reports of their district, to look for repetitive accidents and attempt to classify an accident as preventable or not. They also determine if any measures can be taken to prevent similar accidents from occurring again.

The committees try to inspect all DOT garages and construction sites in their district at least once, if not twice a year. They inspect for compliance with federal safety regulations and general safe housekeeping procedures, including the condition of safety belts in State vehicles.

Committees are also responsible for promoting employee safety programs each month. Each district field worker is required to have one hour of safety training per month. The committee reviews the safety information distributed by the safety and training section and distributes the information to garage foremen for presentation to the field workers. Some of the monthly presentations have included: On and Off-the-Job Safety, Hydro-planing and Skidding, Hand Tools, Disabling Injuries and Motor Vehicle Accidents, Winter Driving, Backing and Parking, and Housekeeping. Safety belt use is discussed where appropriate.

Safety belts are considered as a piece of on-the-job protective equipment. All State vehicles feature a safety belt reminder sticker on the dash. Every facility has a "Buckle Up" sign. The safetybelt program features showing the film "Room to Live" for all employees as well as demonstrations of a machine developed by the DOT called the "Seatbelt Convincer". The "Convincer" is a sled device which allows a person to experience the force of occupant impact at a low rate of speed. The occupant is belted to the seat of the sled and restrained by the safety belt when the "impact" occurs.

The total cost for the dash and bumper stickers, film, and construction of the "convincer" was an estimated $7,000 in 1978.

Once per year the safety committees gather for the annual safety committee training session. Inspection training, accident prevention and other safety-related topics such as employee safety belt use are discussed at the meeting and plans made for the year.

Company #2: The company is one of a number of companies comprising a large telephone system. The company has operations in five states. In the state studied, the employer has approximately 8,000 employees and 2,227 vehicles, including passenger cars, vans and 1/4-ton pick-up trucks. Some vehicles, "pool vehicles" are used by over 20 people per week on an as-needed basis.

The largest category of driving employees are those involved in service, repair and installation operations. Supervisors are assigned passenger cars. Employees may be asked to drive their own vehicles at times -- for which they are compensated by the employer (cancelling any liability on the employer's part). Seventy percent of the driving by employees is local.

Safety Belt Programs/Policies: All employees are mandated to wear lap or lap-and-shoulder belts (as equipped) while driving or riding on company business. The company policy states:

1. Lap belts must be used by all employees on company business (including own vehicles).
2. First time not complying, the employee gets a reminder and warning of the possibility of disciplinary measures.
3. Second time not complying, the recommended disciplinary action is a two-day suspension of company drivers license.
4. Third occurence of non-compliance may result in demotion or dismissal of the employee.

All accident cases are separately reviewed for preventability and safety belt use. An accident investigating committee is comprised of the employee, his supervisor, his supervisor's superior and one safety staff member. The committee analyzes the accident dynamics, determines if or how the accident might have been prevented, and, if appropriate, prescribes disciplinary action.

All drivers must be "certified" to drive on the job. They are trained in the Smith System of defensive driving. As part of driver training, employees are advised of the company safety belt policy and are shown the film on safety belt effectiveness, "Room to Live".

The company is extremely accident prevention and safety conscious. At the end of 1980 their accident record regarding motor vehicles was 5.21 accidents per million miles of driving. Spot checks conducted by the company safety staff have revealed a 98 to 99 percent employee safety belt compliance figure.

Safety belts are regarded as part of overall employee safety. Line management is responsible for safety of employees under each manager's supervision. The company Accident Prevention Plan encompasses all safety measures -- of which the wearing of safety belts is but one.

A Safety Knowledge Review has appendices relevant to each job description -- e.g., the safe way to remove staples, the safe way to use hooks and belts, etc. An on-going safety observation program is in effect in which supervisors must observe each employee on a specified operation to make sure it is done according to the safety standards relevant to the job. The frequency of the observations (1, 2, or 3 times per month) depend upon the employee exposure to danger. Each supervisor must ride with every driver under his supervision twice per year and submit a checklist for safety on the driver. Safety belt use is on the checklist. Supervisors are ranked on the safety of their particular operations as part of their personnel review.

Company fleet vehicles are inspected twice per year, including a safety belt check-up.

Company #3: Once owned by an individual, this company with 3,500 employees world-wide is now part of a large corporation. The division under study manufactures electronic components and sells them to major appliance, computer, and telecommunications industries. It employs 1100 persons and maintains a company fleet of 143 cars.

Most driving is local (30 to 40 miles) trips by sales/service engineers and managers, but many engineers may travel up to 1,500 miles on round-trips to corporate headquarters. In 1980, 2.2 million miles were logged on company business. The company has never had a fatality, serious injury or lost time auto accident on-the-job. No sales people have been in an on-the-job auto accident without a safety belt.

Safety Belt Programs/Policies: The company is vitally concerned with both on and off-the-job accidents of all types. All employees must attend a monthly safety meeting which features various safety topics and issues. The programs are not "canned" but are actually done by employees.

Safety is a condition of employment. An employee can be discharged quickly for a deficiency in this area. Plant managers are expected to set a positive safety example.

All driving personnel -- mainly sales engineers -- receive rigorous auto safety training (48 to 52 hours), including:

- National Safety Council program taught by a former State Trooper
- Skid-school which dramatically demonstrates the need for safety belts in maintaining control of the auto. This course must be passed by all sales people.
- AIM driving program
- Special 2½-hour presentation/talk with a State Trooper on "police relations".

Sales people are tested in all areas of safety training. They are further subjected to quarterly audits, which include driving for one hour under controlled conditions.

Off-the-job safety is also a major company concern. In 1980, surprised by a study showing that in the four-county area surrounding the plant only 11 percent of the population used safety belts, the company decided to launch a major safety belt campaign with an announced goal of 90 percent usage. The campaign centered around a contest whereby all employees would win a prize if, during a six-month's period 90 percent of the employees used their safety belts off-the-job for two out of the six months. Unnanounced audits would determine the percent of usage. As an added incentive, employees were offered a $15 reimbursement if they installed safety belts in their cars. Those without safety belts were counted as non-wearers. A catalogue of 71 prizes was sent to each employee's home before the start of the contest to add pressure from the homefront. At the contest kick-off audit around Easter, a six-foot white rabbit met each car at the gate and gave a carnation or an orchid to each safety belt wearer and a safety brochure to everyone. Safety belt wearers were visible all day at the plant and the media gave heavy coverage to the event.

Results for the first day were 64 percent usage, with 70 percent recorded by the end of the month.

During the second month, the safety issue was plugged on bulletin boards and peer pressure began to come into play. The employees wanted to win and exerted pressure on non-safety belt wearers. At the end of the second month, the 90 percent goal had been reached. The company distributed Hershey's kisses throughout the plant and the film, "Room to Live" was shown to all employees. Letters were sent home announcing that the contest was half-won.

During the third month, safety belt wearers received a car air freshner during the spot audits. At the end of the month, the second and winning 90 percent had been reached. Although the contest was over and the employees were selecting their prizes from the catalogue, the company continued to give small awards to safety belt users during the spot audits which are still being conducted.

The campaign and companion contest cost the company $20,000. But the benefits during the six months of the contest and the remaining months of that year more than compensated.

Prior to the campaign an employee who was not wearing a safety belt was involved in a head-on collision with a telephone pole. She suffered injuries to the head, face and pelvic areas. She was hospitalized for 64 days and was unemployed for a year. The company paid $3,500 in direct benefits and absorbed at least another $3,500 in indirect costs.

During and after the campaign six employees were involved in serious accidents ranging from a broken tie rod to roll-overs. All employees were wearing safety belts. One employee's car was totaled and the State Trooper at the accident credited his safety belt with saving his life. Only one work day was lost from all six accidents.

Time lost due to motor vehicle crashes on-the-job were reduced after the campaign by 47 percent. The combined savings of job time from both on and off the job crashes reached 74 percent. This translates to 337 days gained or 2,696 working hours.

It is estimated that the safety belt program is costing the company approximately $10,000 per year -- audits and token gifts -- as it is presently conducted apart from the catalogue-gift campaign.

Company #4: The company is a large multi-faceted organization primarily engaged in the manufacture and sale of chemical products. Of its 105,000 U.S. employees, 2,600 marketing employees make-up the predominant group of driving personnel. They are engaged in intra- as well as inter-state travel.

In 1980, the company logged 53 million business miles and 3.2 million personal use miles on a fleet of 2,603 company vehicles -- late model passenger sedans. The company's accident rate per million miles for 1980 was 3.61 total and 1.16 preventable (by company definition). Only one work-day was lost due to a motor vehicle accident in 1980.

The company is divided into seven distinct divisions which are somewhat like separate companies. Accident rates are tabulated for each division and its subdivisions for preventable and non-preventable accidents.

Safety Belt Programs/Policies: The employer puts a strong emphasis on the prevention of accidents and goes by the philosophy that most are preventable. Safety is considered to be part of overall efficiency, and safety belt use is viewed as part of the total safety focus. Before safety belts were available to the public, the employer purchased and had them installed in company vehicles and offered them to employees for their private vehicles.

Safety belt use is compulsory for all employees driving on the job. Enforcement is line management's responsibility like all other safety rules -- e.g., hard hat use, equipment operation standards, etc. Any incident of failure to use the safety belt is recorded in an employee's personnel file as part of overall performance and may affect promotions.

National Safety Council's defensive driving course has been required for driving employees since 1965. Skid school courses are provided for driving personnel as well as special instruction to trouble-shoot problems as they are manifested.

Each division of the company has its own safety program(s) of which safety belt use is a part. Company-wide safety goals are set in January of each

year at a goal-setting meeting attended by corporate divisional safety staff. For 1980, the goal for preventable accidents was 1.05 per 1mm. Each division has its own goal for preventable accidents. The managers share safety program information and are each striving to achieve the best divisional safety record in the company. When an accident occurs everyone knows about it.

Accident reports from division regions across the U.S. are sent to the division's Safety Coordinator -- one of 25 in the entire company. He reviews the cases and brings them up before the Classifications Committee to be considered as a preventable or non-preventable accident. A visual diagram is prepared which includes the dynamics of the accident. A description is read including time, date, conditions, damages involved. The designation of cause is made and the reason for the decision, and the results are disseminated in a weekly staff report. Year-to-date vs. previous year accident rates are included on the report along with the current year preventable accident rate goal.

Flash bulletins apprise employees of exemplary employee auto accidents which include: what occurred, what resulted, significant cause and prevention. This is done so that employees might learn from the experiences of other employees.

A Safety Meeting is held each month in which the Safety Coordinator must give the Vice President a monthly update on preventable and non-preventable accidents vis-a-vis the divisional goal.

A publication on safety written especially for company managers keeps them abreast of company-wide safety issues, findings, innovative programs and campaigns.

The coordinator and the Auto Safety Committee on the divisional level review, modify and utilize existing safety program components and create their own when necessary. One division, for example, decided to base their auto safety effort, including safety belt use, on a film presentation followed by a discussion and slide show. The division is made up of 8 separate groups and the film and

slide show were shown to employees at national and district meetings.

Special awards are given in a ceremony to drivers who have had five (5) years or more of accident-free driving (given in 5 year increments). The award is considered very important and of special significance on the personnel record. Prizes are awarded to the safe drivers which ascend in value with the increment of safe driving achieved.

Company #5: The employer is a gas utility company which sells and distributes natural gas to residential and commercial accounts in four states. The firm employs approximately 2,230 people. In 1980 the company had a total of 1180 vehicles on the road -- mostly company service vans manned by one employee each. About 400 meter readers, construction workers, etc. are on car allowance whereby they utilize their own vehicles for on-the-job purposes.

Safety Belt Programs/Policies: Employees must wear their safety belts according to written company policy. Company accident investigation form asks if the belt was worn. However, there is no prescribed disciplinary procedure for not wearing the device.

The company has a comprehensive on and off-job employee safety program of which motor vehicle safety and safety belt use is an integral part. Off-the-job committees meet with their assigned group and put on one program per month. The programs are planned six months at a time and subjects are solicited from the employees. Each supervisor must conduct an on-the-job safety meeting every month of at least 15 or 20 minutes. All employees under his/her supervision must attend the meeting.

No employee is allowed to drive a company vehicle without an 8 hour course in the Smith System. Smith stresses safety belt use. Every 5 years an employee must be retrained. Safety belt use policy is written in company vehicle manual of operation in a safety/driving section.

Safe driving awards are given out to drivers of company vehicles who have a long-time record of safe driving -- 20 years or more. Crews also win dinners for one year of driving without a preventable accident.

Crews are published in the employee paper when they reach four years of "perfect" driving or 250,000 manhours without a disabling injury. There is also an award for 100,000 hours without a disabling injury.

Vehicles are given a preventative maintenance check once per month. Safety belts are checked. Stickers which remind employees of safety belt policy are

placed on all car glove boxes.

All motor vehicle accidents are subjected to a post-accident investigation and follow-up. The accident is judged preventable or non-preventable according to set criteria. Safety belt use is checked.

In 1980 the company mounted an extensive safety belt campaign to serve the following purposes:

- To educate employees about the company rule and the advantages of using safety belts
- To reward and reinforce the positive attitudes of those who always wear safety belts
- To encourage, reward and educate those who use their belts occasionally but need more motivation to use them at all times
- To encourage and educate those who do not wear safety belts routinely
- To influence those who flagrantly resist compliance with the rule

The company hoped to achieve its goals through publicity in company publications, posters, literature and other handouts. Part of the campaign plan was a series of prize drawings during 1980 in March, June, September and December with an additional Grand Prize in December 1980. There were three drawings in each of those months for savings bonds. The education/advertising campaign and contest were given a highly publicized management "kick-off".

Any hourly and non-exempt employee who was a driver or a passenger in a company vehicle or a privately owned vehicle used on company business (on a paid basis -- mileage or monthly) was eligible. "Participation" involved wearing the safety belt while operating the motor vehicle.

Every management person was issued a packet of safety belt certificates. When a management person observed an employee wearing his safety belt while driving a vehicle, that manager sent a certificate to the Safety Department in the name of that employee. The certificate indicated that the employee was wearing a safety belt. The Safety Department then sent that employee a packet of literature and put the certification in a barrel used for drawings.

When a management person observed an hourly employee not wearing a safety belt, another certificate was issued with a copy to the Safety Department. The certificate was logged in a register alphabetically. If an employee's name was drawn for a bond and there was an offsetting noncompliance, that employee was ineligible for that drawing and both certificates were cancelled.

As of July 1, 1980, a noncompliance certificate was to serve as a first reprimand and placed in the employee's file in addition to offsetting any drawings for that quarter. A second noncompliance certificate would generate a letter of official reprimand.

An employee could win one bond in each quarter. Management people were eligible for a separate drawing for savings bonds in each quarter. Each type of certificate issued were required to have a management person's signature upon it, and both positive and negative certificates were used in this drawing. Safety staff were not eligible for drawings. The campaign cost the company a total of an estimated $3,000 which included banners, bonds, etc. Employee wages (supervisors, management employees) were not included in this estimate.

Management asserts that safety belt use is high among employees. The campaign resulted in 85 percent compliance according to certificates issued. In 1980 there were four cases of personal injury on-the-job due to motor vehicle crashes (nearly 10,000,000 miles were driven on-the-job in 1981). The accident rate was 7.59 per million miles.

Recordkeeping

Accidents, especially motor vehicle accidents, are a cost item to employers. Unlike other cost, there is no return on it. It is simply a waste. To evaluate and reduce this waste an employer must have complete and accessible data. Records should be kept on every motor vehicle accident -- i.e., time, place, speed, vehicle, etc. They should show whether or not the driver and/or passengers were wearing safety belts, and what the accident cost the company in time lost from work, medical bills, and other direct costs. To the extent possible, indirect costs should also be recorded.

Since employers must keep at least minimum records required by State Workers' Compensation laws for on-the-job crashes, the additional cost of maintaining complete records of accidents should be minor. At any rate, the added cost will be more than justified when comparing cost and savings of a safety belt program.

APPENDIX F: FINAL EMPLOYER MANUAL

THE PROFIT IN SAFETY BELTS: A VIEW FOR EMPLOYERS

INTRODUCTION

Businessmen today are always looking for ways to improve productivity and profits. It would be a rare manager who would ignore a major health problem of high cost and potentially disasterous impact to his personnel, particularly if there were a simple, reliable, cost-effective solution to the problem right at hand.

The growing cost of motor vehicle crashes is such a problem to American business, and the solution -- found in virtually every motor vehicle on the road today -- is the safety belt.

To employers, motor vehicle crashes represent the number-one cause of both lost work time and on-the-job fatalities. Each employee fatality is estimated to cost the employer $120,000 in direct payments for medical care, property damage and fringe benefits. Not included in that figure are the many indirect costs associated with the temporary or permanent loss of a valued employee. These costs are paid whether the crash occurred on or off-the-job, and can run several times the amount of direct costs.

In addition to the staggering economic cost to society -- estimated by the National Highway Traffic Safety Administration at $50-billion annually -- there is the incalculable human tragedy caused by 50,000 highway fatalities a year. Four-million more are injured -- many of them in a way that prevents their ever fully functioning again. Motor vehicle crashes are the leading cause of death for Americans under age 44. They also account for the majority of new cases of paraplegia (from damage to the spinal cord) and are the primary cause of epilepsy (from head injury).

The human economic losses are particularly tragic because they are unnecessary. Fully half the 35,000 people who die each year in passenger cars, light trucks and vans could have been saved if only they had been

wearing their safety belts. The severity of injuries would have been reduced by a corresponding 50 percent. Using safety belts can mean the difference between life or death, minor bruises or crippling injuries, and continued productivity or economic loss.

Influencing attitudes and behavior is not easy. But it can be done. The significant savings in severe injuries, lives, and their resulting costs, have encouraged a growing number of employers to establish safety belt programs within their companies.

This booklet outlines what it costs employers when their employees are involved in motor vehicle collisions. Both the direct and indirect costs are discussed, together with case studies drawn from industry that show how safety belts can reduce those costs. Examples of successful safety belt programs are included to highlight measures which have been proven effective in the past. We hope your company will be encouraged to join this trend toward improved employee safety.

THE CASE FOR SAFETY BELTS

Safety belts are found in every new car sold in the U.S. since 1965. Most people understand how to use safety belts, and it only takes seconds to fasten one properly. Yet in 1979 only 10.9 percent of American drivers regularly wore their safety belts. Why?

There are many reasons. Primary among them is the prevailing attitude that "it just won't happen to me". But the fact is that every one of us can expect to be in a motor vehicle crash once every ten years. For one out of 20, it will be a serious crash. For one out of 60 born today, it will be fatal.

Some people wear safety belts on long trips at freeway speeds but ignore them on short trips around their home. However, studies show that three out of four crashes happen within 25 miles of home, and 80 percent of serious injuries and death occur in cars traveling 40 miles per hour (mph) or less.

Few people realize that even at low speeds the force of impact on a driver and passengers is brutal. In a car crash at 30 mph, for example, the car stops in 1/10 of a second, but unbelted occupants continue to travel forward at 30 mph until they slam into some part of the car's interior. It takes them only 1/100 of a second to stop -- with the same force as if you had jumped head-first off a three story building. It is impossible to brace yourself against that kind of impact.

A leading myth concerning safety belts is the misbelief that you are better off being thrown from a car during a crash, or that safety belts may trap you in case of fire or submersion. The fact is that chances of fatal injury are nearly 25 times greater if you are thrown out of a vehicle that if you were protected by a safety belt. Fire or submersion occurs in less than 1/2 of one percent of motor vehicle accidents, and occupants are far more likely to remain conscious and able to free themselves if they are belted in.

Some people also believe that, since they can move around freely when their safety belts are fastened, belts must not be worth much in a crash. But modern safety belts are designed with a latching device that locks the belt in place in case of severe braking or sudden impact, while permitting freedom of movement and comfort during normal wear. Modern belts work, but only when they need to work.

Finally, many people simply never got in the habit of wearing safety belts. Most people driving today never learned to use safety belts as children or young adults. Learning and adopting new attitudes and behavior is not easy. But as we have seen in such major health campaigns as high blood pressure control, it is possible. Employers can obviously play an important part in the effort to get people to buckle up and, as shown in the following case histories, it is worth it. As the trend to downsizing of fleet vehicles continues, having employees buckle up will become even more life and cost-saving.

THE HIDDEN COST OF CRASHES

Most employers are aware of the direct costs of motor vehicle crashes. Wages paid to absent employees, property damage, medical expenses, physical and vocational rehabilitation costs, or survivor benefits are either paid directly by the company or borne in the ever-increasing cost of insurance coverage. But these costs may just be the "tip of the iceberg" when compared with the hidden cost of business disruptions caused by both on-the-job and off-the-job highway accidents.

The loss of productivity caused by a missing employee and the many measures necessary to temporarily or permanently replace his services have been estimated to range from 1 to 10 times that of direct cost. These hidden costs may not always require a direct cash outlay, but they are, nonetheless, true economic burdens to the company -- burdens that result from off-the-job crashes as well as work-related accidents.

The following examples of indirect cost offer a more complete picture of the full cost of motor vehicle accidents:

- Supervisor's time may be usurped in rescheduling and making special arrangements to cover the sudden, unexpected absence of an injured employee. Other work may suffer as a result, and productivity may fall.
- Rescheduling existing staff may cause them to neglect their own tasks or perform them less efficiently.
- Overtime pay may be expended to cover the work of a missing employee.
- Temporary replacements may be necessary which entail additional administrative work, increased salary costs, and a period during which the new worker operates at less than full productivity.
- Unique or special employees because of their accumulated knowledge, skill, or personal contacts, are very difficult to replace. Even a temporary loss of such employees can impose catastrophic costs on the employer.

- Re-entry and retraining may be required for an employee returning to the job after an accident. If work is resumed on a part-time basis, productivity will be reduced; and if job requirements have changed during the employee's absence, the employer will incur additional expense for retraining, and the re-adjustment period will lengthen.

- Hiring a permanent replacement, necessary when an employee is permanently disabled or dies as a result of a motor vehicle crash, can cost more than hiring a temporary replacement if more extensive recruitment, employee search procedures, and additional training requirements come into play. The permanent loss of an exceptional or unique employee may result in unrecoverable costs.

- Administrative costs result from the necessary documentation of injuries, medical treatments, and absence for compliance with State Workers' Compensation laws and other State and federal regulations. Other accident investigation, review, and record-keeping processes may also be activated by an employee accident. The employer pays for all paper-work, processing, review and analysis associated with the incident.

THE BOTTOM LINE: LIVES, INJURIES AND MONEY SAVED

Study after study show safety belts cut motor vehicle fatalities by 60 to 70 percent and reduce the number of serious injuries by a minimum of 50 percent. In almost every crash, the use of safety belts reduces the severity of injury by some degree. Since there is a direct relationship between the severity of injury and the resulting cost, safety belts mean a significant savings to employers.

The following case studies show the effectiveness of safety belts in reducing injuries and lost work time and the marked difference in costs to employers when safety belts are used. Each case illustrates two parallel, or as closely similar crashes as possible, in which one employee was wearing a safety belt and the other was not.

Although salary, benefit, insurance and administrative costs differ from one company to another, costs quoted here are typical of most industries, and can be used as a guide to determine the types of savings available through the use of safety belts. However, the most conservative one-to-one ratio of indirect to direct cost is used because indirect costs are hard to quantify. Actual indirect costs can run much higher. And though safety belts are known to have an accident prevention value (belted drivers retain better control of their vehicles in emergency situations), the exact extent of that value is not known. For that reason property damage costs or other savings from accident prevention is not included, even though there may be significant savings in this category as well.

TEST CASE I: OFF-JOB ROLLOVER

NOTE: Both examples involve the same employee of the same company driving the same vehicle in similar crashes six months apart. In the first crash he was not wearing his safety belt, but in the second he was wearing it.

SAFETY BELT OFF

Driver:	Male Press Operator
Vehicle:	1978 Datsun Pick-Up
Accident:	Driving 45 mph. Lost control of vehicle Rolled over guardrail
Injuries:	Fractured vertebrae, multiple cuts/bruises, severe neck strain
Time Off Work:	29 days

Employer Costs:

Medical/Hospital	$ 1,300**
Salary Continuation	$ 2,320
Indirect Estimate	$ 3,620
Direct + Indirect	$ 5,940

SAFETY BELT ON

Driver:	Male Press Operator
Vehicle:	1978 Datsun Pick-Up
Accident:	Driving 45 mph. Lost control of vehicle Rolled down embankment
Injuries:	Bruised and shaken*
Time Off Work:	1 day

Employer Costs:

Medical/Hospital	$ 0
Salary Continuation	$ 80
Indirect Estimate	$ 80
Direct + Indirect	$ 160

*State Police remarked that the safety belt saved driver's life.

**Medical/Hospital expenses were paid by the outside insurance carrier; therefore, this expense is only included in the total employer cost figure in that it is used in calculation of the indirect estimate.

TEST CASE II: OFF-JOB FRONTAL CRASH

SAFETY BELT OFF

Driver:	Male Design Engineer
Vehicle:	Two-door compact
Accident:	Driving at 30 mph. Lost control and struck utility pole
Injuries:	Broken ribs, broken finger, cuts, bruises
Time Off Work:	12 days

Employer Costs:

Medical/Hospital:	$ 1,577.00
Salary Continuation:	$ 2,070.27
Indirect Estimate	$ 3,647.27
Direct + Indirect:	$ 7,294.54

SAFETY BELT ON

Driver:	Male Structural Engineer
Vehicle:	Two-door compact
Accident:	Driving 25 mph. Lost control and struck utility pole
Injuries:	None
Time Off Work:	None

Employer Costs:

Medical/Hospital	$ 0
Salary Continuation	$ 0
Indirect Estimate	$ 0
Direct + Indirect	$ 0

TEST CASE III: ON-JOB ROLLOVER

SAFETY BELT OFF		SAFETY BELT ON	
Driver:	Female District Sales Agent	Driver:	Male Engineering Specialist
Vehicle:	Compact Car	Vehicle:	Compact Car
Accident:	Driving 45-50 mph. Lost control of vehicle. Rolled down embankment. Driver ejected.	Accident:	Driving 45 mph. Hit loose gravel. Lost control of vehicle. Rolled down embankment.
Injuries:	Extensive multiple injuries ruptured spleen, fractured pelvis, displaced pubic ramis, head injuries	Injuries:	None
Time Off Work:	Has not returned*	Time Off Work:	None

Employer Costs:**

		Employer Costs:	
Medical/Hospital	$ 27,669.75	Medical/Hospital	$ 0
Rehabilitation	$ 877.92	Rehabilitation	$ 0
Salary Continuation	$ 14,849.92	Salary Continuation	$ 0
Indirect Estimate	$ 43,397.59	Indirect Estimate	$ 0
Direct + Indirect	$ 86,795.18	Direct + Indirect	$ 0

*Employee has been off the job since March of 1979. It is projected that she will be permanently disabled and unable to perform her job again.

**Figures encompass payments up to March, 1981. Further costs are anticipated by the employer.

TEST CASE IV: ON-JOB FRONTAL CRASH

SAFETY BELT OFF

Driver:	Male Meter Reader
Vehicle:	Mid-Sized Car
Accident:	Driving at 55 mph. Hit in left front by full-sized car at 35 mph.
Injuries:	Fractured ribs and fractured leg.
Time Off Work:	Six months

Employer Costs:

Medical/Hospital	$ 8,364.65
Partial permanent disability	$ 8,672.40
Salary Continuation	$ 4,809.24
Indirect Estimate	$ 21,846.29
Direct + Indirect	$ 43,692.58

SAFETY BELT ON

Driver:	Male Assistant Survey Chief
Vehicle:	Mid-sized car
Accident:	Driving at 55 mph. Hit in left front by full-sized pick-up at 35 mph.
Injuries:	Minor whiplash
Time Off Work:	None

Employer Costs:

Medical/Hospital	$ 25.85
Partial permanent disability	$ 0
Salary Continuation	$ 0
Indirect Estimate	$ 25.85
Direct + Indirect	$ 51.70

HERE IS WHAT YOU CAN DO

Clearly, motor vehicle crashes cost employers money -- often a great deal more money than they are aware of. And, as these cases so vividly demonstrate, it only takes one serious crash for costs to mount to major proportions. As a result, more and more companies are taking measures to reduce and prevent these losses. One of the best ways of reducing losses due to motor vehicle collisions is a comprehensive and well coordinated program of employee safety belt use.

A simple "paper policy" recommending safety belts, or a few scattered posters, or a one-shot promotion is unlikely to achieve improved or lasting safety belt use among employees. Successful programs are built on a strong long-term commitment by management to overall employee safety, in which the motor vehicle is regarded as one of many pieces of equipment to which safety standards are applied and enforced.

The following factors are common among successful safety belt programs:

- Systematic investigation and review of all motor vehicle crashes to determine use or nonuse of safety belts.
- Comprehensive record-keeping of all direct and indirect costs of motor vehicle crashes in order to evaluate and reduce losses.
- Specific and highly publicized goals and objectives for employee safety belt use based on a survey of current usage (where you are; where you want to go).
- An ongoing, personalized safety education and training program for all employees that includes safety belt use.
- Incentives and recognition for line management and workers for good safety records.
- A well publicized, mandatory safety belt policy for all employees on company business with well defined disciplinary procedures for noncompliance.

- Regular spot checks or some form of safety belt use audit to determine employee compliance.

- Routine check of vehicles to insure that safety belts are in good working order.

- Special efforts to encourage off-the-job safety belt use. Family occupant protection programs, particularly child protection, are an effective means of introducing workplace programs. They often enhance the image of the company to both employees and the general public in addition to saving money for the company in reduced payments for family injuries.

SAFETY BELT PROGRAMS THAT WORK

Is a comprehensive employee safety belt program worth the effort? Judge for yourself.

In every successful program studied by NHTSA, companies were rewarded for their efforts with reduced accident/bodily injury rates. That translates into a significant financial savings, improved productivity and management/worker relations, and, in many cases, an enhanced public image.

While there are a large number of employers who could serve as examples, the five noted here provide a good cross-section of effective safety belt programs. Some have used innovative approaches, such as contests and special promotions. Others relied mainly on a strongly enforced policy along with routine training and education. There is no single strategy or technique that is right for everyone. In every case, however, employers maintained a long-term effort to improve safety belt use off-the-job as well as at work.

- A large telephone company with operations in five states achieved an employee safety belt compliance rate of 98 percent in 1980. The company has a mandatory safety belt use policy, and employees can be dismissed for three infractions of this rule. Responsibility for enforcement is given to line management, and supervisors are ranked on the safety of their particular operations as part of their personnel review. Regular training and retraining, education, inspection and review of employee safety belt use are part of their overall commitment to employee safety.

- A state department of transportation was able to reach an employee safety belt use rate of 50 percent in one year through strict enforcement, on-going training, education, promotion, award, inspection and review programs. The safety belt program featured demonstrations of a machine developed by the department of transportation called the "Seatbelt Convincer". The "Convincer" is a sled device which allows a person to experience the force of occupant

impact at a low rate of speed. The occupant is belted to the seat of the sled and restrained by the safety belt when the "impact" occurs.

- Employees of an electronics components manufacturer were more than a little startled to be greeted by a six-foot white rabbit one Monday morning. The rabbit, who gave out a carnation or an orchid to each driver wearing a safety belt, drew a lot of attention from the local media as the kick-off for a wide ranging safety belt campaign. Every employee stood to win a prize from a gift catalogue if the company reached its goal of 90 percent safety belt use within six months. Gift catalogues were sent to each employee's home in an attempt to involve the whole family in the effort. The combined family involvement, on-the-job peer pressure, and educational programs were highly effective -- within 90 days the company had surpassed its goal. Eventually the rate of 93 percent safety belt use was achieved.

The contest cost the company $20,000. But time lost due to motor-vehicle accidents on and off-the-job was reduced by 74 percent. This meant a savings of 337 work days, or more than $26,000 in disability payments alone by the company. The savings of indirect costs were even greater. Continuing efforts to maintain that usage level are estimated to cost $10,000 per year.

- In 53 million miles of driving a fleet of 2,600 company vehicles, a large chemical manufacturer reported only one work-day lost due to on-the-job motor vehicle crashes in 1980. The company attributes this outstanding record to its philosophy that safety is a part of overall efficiency, and that most accidents are preventable. Emphasis on safety belt use by employees began before belts were required equipment in all cars -- the employer purchased them and had them installed in all company vehicles. Today the program incorporates every support measure outlined previously and serves as a model for all industry programs.

• Mandatory safety belt use, driver training and retraining, regular promotion of safety belt use, and recognition for employees with outstanding safety records have long been part of a large gas utility company's comprehensive safety program. Yet to improve on their already good safety record, the company undertook an extensive safety belt campaign in 1980 that included regular prize drawings for employees observed wearing their safety belts on-the-job. Employees observed not wearing their safety belts became ineligible for the drawing. These incentives, plus a stepped up promotion of safety belt use, allowed the company to achieve a usage level of 85 percent -- where it remains today. The special campaign is estimated by the company as costing $3,000 which includes savings bonds as prizes; however, supervisors' wages are not included.

CONCLUSION

A trained and productive work force is an employer's number one asset. It should be protected. As the leading cause of on-the-job fatalities and of lost work time, motor vehicle accidents deserve the immediate attention of every employer.

The most effective means of reducing losses due to motor vehicle accidents is a comprehensive safety belt program backed by long-term management commitment, careful planning and coordination. When combined with other on-going employee safety programs, results can be achieved. And the benefits from such a program are guaranteed to more than offset the effort or cost.

If your company is interested in joining this growing business movement to improved employee safety, there is help. The National Highway Traffic Safety Administration (NHTSA, provide information here) ...

So why wait? Begin today to protect your most precious investment -- your employees -- by writing to:

Office of Occupant Protection
National Highway Traffic Safety Administration
400 7th Street, S.W.
Washington, D. C. 20590

APPENDIX G: ON-JOB FALL FROM VEHICLE

NOTE: The comparison case (Safety Belt On) is theoretical, based upon the operational dynamics of a normal occupant restraint system.

SAFETY BELT OFF		SAFETY BELT ON	
Passenger:	Male Line Foreman	Passenger:	Male Line Foreman
Vehicle:	Truck	Vehicle:	Truck
Accident:	As truck backed around corner, passenger door opened and employee fell out.	Accident:	As truck backed around corner, passenger door opened and employee remained in vehicle.
Injuries:	Fractured skull	Injuries:	None
Time Off Work:	20 days	Time Off Work:	None

Employer Costs:

		Employer Costs:	
Medical/Hospital	$ 800.00*	Medical/Hospital	$ 0
Salary Continuation	$ 1,079.00**	Salary Continuation	$ 0
Supplemental Salary	$ 539.00	Supplemental Salary	$ 0
Indirect Estimate	$ 2,418.00	Indirect Estimate	$ 0
Direct + Indirect	$ 2,957.00	Direct + Indirect	$ 0

*Medical/hospital costs were paid by an insurance policy with an outside carrier.

**Salary continuation was paid by an insurance policy with an outside carrier.