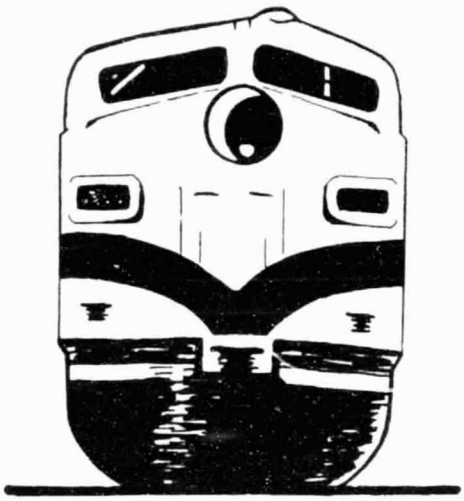
RAILROAD SAFETY PROGRAM



FINAL REPORT
VOLUME I

PREPARED FOR:
NASA HEADQUARTERS
CODE: LGT-1

BY:
ECOSYSTEMS INTERNATIONAL, INC.
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CROFTON, MARYLAND 21114

JANUARY 1985

RAILROAD SAFETY PROGRAM

FINAL REPORT

VOLUME I

CONTRACT # NASW 3789

PREPARED FOR:

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WASHINGTON, D.C.

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ECOSYSTEMS INTERNATIONAL, INC.
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FOREWORD

This Document is the first Volume of the Final Report performed under Contract NASW-3789, entitled Railroad Safety Program.

The objectives of this Contract were:

- To prepare the 1983 National Inspection Plan (NIP), recommended procedures to improve future NIPs, develop a standard format for the NIP, manage the development of the 1984 NIP, and prepare a NIP instruction manual for use in the future;

- To prepare guidelines providing clear instructions on Department of Transportation regulations pertaining the movement of hazardous materials. A test will be devised to apply the guidelines to 10 commodities and a User's Manual prepared.

This Volume contains the first part of the findings pertaining to the National Inspection Plan.

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INTRODUCTION

Since 1981, the Federal Railroad Administration (FRA) has annually prepared a National Inspection Plan (NIP) whose purpose is to summarize Regional efforts to improve railroad transportation safety. A completed NIP consists of the collection of individual safety plans submitted by each of the eight FRA regions; each Regional Plan specifies the overall objectives mandated by the FRA and highlights those priorities required to meet the unique Regional problems.

The purpose of this study was to assist the FRA in the preparation of current and future NIPs; it was arranged, contractually, into the following seven tasks:

I. The preparation of the 1983 NIP, with recommended procedures for improving future NIPs.

II. The development of a outline for the 1984 NIP, including a methodology for the allocation of inspection resources and other specialized Regional activities.

III. The management and development of the 1984 NIP.

IV. The development of an instruction manual to be used in the preparation of future NIPs.

V. The development of guidelines which will provide clear instruction on DOT regulations pertaining to the movement of hazardous material.

VI. The formulation of tests for applying these guidelines to commodities.

VII. The preparation of an FRA Hazardous Materials (HAZMAT) User's Manual.

This volume summarizes the research concluded on Tasks I-IV -- including the problems, conclusions and recommendations associated with these tasks. Volume II summarizes the activities concluded on Tasks V-VII, discusses problems that were encountered and provides recommendations.

A. TASK I - THE PREPARATION OF THE 1983 NATIONALINSPECTION PLAN

A.1 Purpose

The purpose of Task I was to compile the 1983 National Inspection Plan (NIP). The purpose was fulfilled by reviewing the eight Regional Inspection Plans (RIPs), preparing each RIP for publication, and reproducing the 1983 NIP.

A.2 Summary

The 1983 Railroad Safety National Inspection Plan (NIP) was comprised of Regional Safety Plans from each of the eight FRA regions. Each Regional Plan included the overall specified safety priorities set up by the FRA as well as specific priorities where unique safety problems existed in that particular region. For example, passenger transportation is heavy in the Northeast where as hazardous material (Hazmat) transportation is frequent in the Mid-Southwest, therefore, passenger safety was stressed by the Northeast Region and Hazmat Safety was the main concern of the Mid-Western Region.

Each of the eight Regional Safety Plans was subdivided into the following sections:

1. Highlights
2. General Description of the Region
3. Management
4. Project Safety Improvement Activities
5. Region Objectives
6. Submitted State Plans
7. Passenger and Hazmat Route Maps

The Highlights Section provided a summary of the Regions' special safety improvement plans. Under the Management Division, the topics of Personnels, Training, and Equal Employment Opportunity were covered. Accident, complaint, petition and regular inspections as well as the Region's goals and objectives were discussed in the Project Safety Improvement Activities Section. Safety policies concerning track, motive, power and equipment, signals and train control, operating practices, and hazardous materials are mentioned within the Regional objectives.

Despite the low number of railroad fatalities recorded in recent years, the safe transportation of hazardous materials (hazmat) and rail passengers represented the major conerns of the eight FRA Regions in 1983; significant additional concerns related to railroad employee safety, the improvement of rail-highway grade crossings, and the reduction of accidents caused by railroad trespassers. The specific distribution of these and other safety improvement needs, indigenous to each Region, are shown in Figure 1 are summarized as follows.

Region One -- encompassing the eight Northeastern States (Maine, Vermont, New Hampshire, New York, Massachusetts, Rhode Island, Connecticut and New Jersey) -- is characterized by the highest amount of passenger train activity in the U.S., along with the presence of several extremely heavy hazardous material routes. Safety improvement requirements indigenous to this Region, therefore, include increased and timely inspections of passenger routes, updating information on hazmat routes, and preventing the recurrence of hazardous material derailments and other major accidents.

Region Two -- encompassing Pennsylvania, Ohio, Virginia, West Virginia, Maryland and the District of Columbia -- is characterized by a considerably high overall frequency of both hazmat and passenger accidents. Accordingly, the specific safety concern of this Region is to reduce the total number of these accidents by improving long distance and commuter passenger routes, lines handling hazardous material movement, and rail-highway crossings.

Region Three -- comprising the eight Southeastern States (Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina and Florida) -- is characterized by minimal passenger movement and comparatively high industrial traffic between cities. Hazardous material, coal and phosphate rock, constitute a substantial portion of its total industrial rail volume; export/import traffic also contributes

FIGURE 1

SUMMARY OF REGIONAL SAFETY CONCERNS AND

PROJECTED SAFETY IMPROVEMENT ACTIVITIES FOR 1983

REGION		
1	● HEAVY DENSITY PASSENGER ROUTES ● HAZMAT ROUTES ● DERAILMENTS	A FOLLOW-UP OF THE SYSTEM ASSESSMENTS PERFORMED DURING 1982 AS WELL AS SYSTEM ASSESSMENTS OF: THE PROVIDENCE AND WORCESTER COMPANY, THE BOSTON AND MAINE CORPORATION, AND THE DELAWARE AND HUDSON RAILWAY.
2	● REDUCE OVERALL RAIL ACCIDENT FREQUENCY ● IMPROVE SAFETY IN THE TRANSPORTATION OF HAZMAT, PASSENGER TRAIN OPERATIONS & AT RAIL-HIGHWAY CROSSINGS	NO PROPOSED SYSTEM ASSESSMENTS ARE SCHEDULED FOR REGION TWO. SPECIAL ASSESSMENTS ARE PLANNED FOR THE CONRAIL AND THE CHESAPEAKE AND OHIO RAILWAYS.
3	● TRANSPORTATION OF HAZMAT ● TRAFFIC VOLUME IN THE TIDEWATER PORT FACILITIES ● TRANSPORTATION OF COAL AND PHOSPHATE ROCK	SPECIAL ASSESSMENTS WILL BE PERFORMED ON THE FOLLOWING CARRIERS: ATLANTA AND ST. ANDREWS BAY, CHESAPEAKE AND OHIO, ILLINOIS CENTRAL GULF, AND SEABOARD COASTLINE.
4	● TRACK MAINTENANCE ● SIGNAL & TRAIN CONTROL ● OPERATING PRACTICES ● HAZARDOUS MATERIALS	THE FOLLOWING SPECIAL ASSESSMENTS ARE PLANNED: TRACK ASSESSMENT OF THE GRAND TRUNK WESTERN; SIGNAL ASSESSMENT OF THE CHICAGO & WESTERN INDIANA; MP&E ASSESSMENT OF THE DULUTH, WINNIPEG, & PACIFIC; AND OP ASSESSMENT OF THE GRAND TRUNK WESTERN, CONRAIL, NORFOLK & WESTERN, MILWAUKEE RAILROAD, AND SOO.
5	● HAZMAT TRANSPORTATION ● TRACK MAINTENANCE ● SIGNAL & TRAIN CONTROL ● MOTIVE POWER & EQUIPMENT ● OPERATING PRACTICES	SPECIAL ASSESSMENT PROJECTS FOR PT, ATSF, AND THE MISSOURI-KANSAS-TEXAS RAILWAYS AS WELL AS A SYSTEM ASSESSMENT OF THE KANSAS CITY SOUTHERN ARE PLANNED.
6	● PASSENGER & HAZMAT ROUTES ● TRANSPORTATION OF COAL & GRAIN ● INVESTIGATION OF TRAIN ACCIDENTS	SYSTEM ASSESSMENT PROJECTS ARE SCHEDULED FOR THE SP-SSW, THE KCS, AND THE CNW RAILWAYS.
7	● PASSENGER AND HAZMAT ROUTES ● TRACK INSPECTION ● EQUIPMENT INSPECTION	SPECIAL ASSESSMENTS WILL TAKE PLACE ON THE HARBOR BELT LINE AND THE WESTERN PACIFIC RAILROAD.
8	● AMTRAK & HAZMAT ROUTES ● ACCIDENTS CAUSED BY HUMAN FACTORS ● HIGHWAY GRADE CROSSINGS	SPECIAL ASSESSMENTS ARE PLANNED FOR VARIOUS SECTIONS OF THE BURLINGTON NORTHERN AND THE UNION PACIFIC RAILWAYS

materially to this volume. As a result, the major concerns of this Region relate to the safe industrial movement of hazmat, coal and phosphate rock, along with the control of the high volume of traffic that penetrates its tidewater facilities.

Region Four -- constituting the five Central States (Minnesota, Wisconsin, Michigan, Illinois and Indiana) -- is relatively small in area but one of the busiest FRA Regions. It is characterized by a high volume of coal, grain, passenger and hazmat movement; considerable car interchange in the Chicago area; railroad equipment manufacturing and "land-bridge" operations. The major concerns of this Region relate to truck maintenance, signal and train control, operating machines and hazmat safety. More specific improvement needs center on operating practice assessments of track and signals and the inspection of commuterail lines and hazmat transportation containers.

Region Five -- comprising the five states located in the South Mid-west (Texas, Louisiana, Arkansas, Oklahoma and New Mexico) -- includes eighteen percent of the total hazardous material rail line miles in the U.S.; the most track miles considered important to the national defense; some of the most densely populated areas in the U.S.; a high volume of international traffic with Mexico. The specific areas of major concern in this Region are safe hazmat transportation, track maintenance, signal and train control, motive power and equipment operating practices.

Region Six -- includes the five states located in the Central Mid-west (Nebraska, Iowa, Colorado, Kansas and Missouri). Out of 32,436 total railroad miles in this region, only 2,972 miles are mainline passenger routes. Besides passenger route safety considerations, therefore, the transportation of coal and grain, and the inspection of hazmat shipping containers are among the significant safety concerns of this Region.

Region Seven -- consists of the four Southwestern States (California, Arizona, Utah and Nevada). Railroad passenger transportation as well as grain and coal shipments are growing in this Region. Its major safety concern thus relates to the inspection of a constantly increasing number of tracks and equipment.

Region Eight -- constituting the eight states located in the extreme Northwest (Washington, Montana, Oregon, Idaho, Wyoming, North Dakota and South Dakota) -- includes a large number of ports that contribute significantly to its rail traffic volume. In addition, coal and freight trains comprise the majority of the Region's carrier

mainlines in Wyoming and Montana; five of the Region's eight states border Canada, resulting in a heavy amount of railroad traffic movement between the two countries. The major safety concerns of this region relate to the high number of Amtrak and hazmat routes which penetrate its port facilities and the prevention of accidents occurring at its many highway grade crossings caused by specifically human factors.

A.3 Results

This initial review of the FRA Regional Plans for 1983 was followed by the issuance of concrete specifications to the various FRA Regional Directors for rail safety improvements. After each Regional Plan was subsequently revised according to these specifications, the National Inspection Plan (see the attachment) was compiled in accordance to a format which has been designed during the study.

In addition to the 1983 National Inspection Plan (NIP), the following set of recommendations was prepared as a catalyst for improving future plans:

- An adequate safety profile of each region should be developed. This profile should include statistics on the number of accidents; percentages on passenger, hazmat and freight traffic; and information on trespassers, etc.

- A complete review of specific regional problems should be instituted by each Region in order that their cause and potential corrective actions are identified.

- An organized data analysis of pertinent accident and incident date should be undertaken.

- The data analysis strategy should be directed toward obtaining a clear cut, appropriate and realistic plan to improve major safety problem areas.

- A standarized format for preparing safety plans should be utilized by all Regions. This will allow a regional comparison at the national level, resulting in the relocation of safety resources within each Region in order to obtain the greatest return on expenditures.

B. TASK II - STANDARD OUTLINE AND REGIONAL STATISTICAL ANALYSIS REPORT

B.1 Purpose

The purpose of Task II was twoford: to prepare a standard format for the preparation of the 1984 National Inspection Plan (NIP); and to develop a methodology for the allocation of inspection resources in terms of various disciplines and other specialized Regional activities. The underlying goal of Task II was to reduce the risks to passengers, employees and materials transported throughout the United States.

Two documents were developed to augment this goal. The Standard Outline for the 1984 Regional Inspection Plan provides guidelines to be used in the preparation of the 1984 Annual Regional Inspection Plans. The Regional Statistical Analysis Report provides each of the eight FRA Regions with the results of analyzed data and guidelines on incorporating the data from each Region into the 1984 Annual Regional Inspection Plan.

B.2 Summary

B.2.1 Standard Outline for the 1984 NIP

In preparing a standard format for the preparation of the 1984 NIP, FRA's safety standards and goals were reviewed. The major goal of the FRA was found to be the safe transportation of passengers, employees and materials throughout the U.S. In addition, the following specific safety goals were developed by the Office of Safety:

- Reduce the number of train accidents
- Reduce the number of hazardous material releases
- Reduce the number of passenger fatalities
- Reduce the number of railroad employee casualties
- Improve operation of passenger trains

- Improve the safety record at rail-highway grade crossings

In order to incorporate these goals into a standard format for the National Inspection Plan, each Region was required to develop a comprehensive Regional safety analysis plan consistent with FRA goals. Each of these Regional Inspection Plans (RIPs) was expected to include the logical and analytical processes that were used to develop safety and inspection criteria on the National level. A revised format, emphasizing the specific rationale for various safety inspection and improvement activities, was developed for these 1984 RIPs as well. Figure 2 presents an outline of this revised format, while Figure 3 depicts the 1983 format.

In the revised format used to develop the 1984 Regional Inspection Plan (RIP) passenger and hazardous material route maps and a management section have been eliminated; in lieu of these, the "INTRODUCTION" of the 1984 RIP included a brief one paragraph discussion of personnel numbers, training and Equal Employment Opportunity Plans. In addition, the information included under each section of this revised RIP has been modified considerably. Five subsections have been added to the "PROJECTED SAFETY IMPROVEMENT ACTIVITIES" section, see Figure 2. The first of these subsections represents a statistical overview of Regional problem areas; the second covers specific safety goals and objectives; the third discusses the planned system and special assessment for 1984; the fourth covers the anticipated number of accident, complaint, and application investigations for 1984; and the last describes the causes of particular regional problems, together with the logic required for selecting corrective actions deduced from regional trend analyses.

The section entitled "REGIONAL INSPECTION PLANS BY DISCIPLINE" combines Operating Practices and Hazardous Materials into one subheading in the 1984 RIP. Additionally, a standard format for reporting inspection activities has been introduced which will consolidate planned inspection activities and relate them to the goals and objectives of the Region and to the amelioration of unfavorable safety trends, see Figure 4.

The fifth section of the 1984 RIP outline, entitled "METHODOLOGY FOR THE REDUCTION OF ACCIDENTS", allows each Region to discuss its particular methods of collecting and analyzing information regarding accidents, noncompliance, and system and special assessments.

FIGURE 2

1984 REGIONAL INSPECTION PLAN

I. HIGHLIGHTS

II. INTRODUCTION

III. PROJECTED SAFETY IMPROVEMENTS ACTIVITIES

- A. Regional Statistical Overview
- B. Regional Goals and Objectives
- C. System and Special Assessments
- D. Accidents, Complaints and Applications
- E. Major Deficiencies and Remedial Recommendations

IV. REGIONAL INSPECTION PLANS BY DISCIPLINE

- A. Hazardous Material and Operating Practices
- B. Signal and Train Control
- C. Track
- D. Motive Power and Equipment

V. METHODOLOGY FOR REDUCTION OF ACCIDENTS

- A. Methods for Assessment of Accidents
- B. Methods for Assessment of Noncompliance
- C. Evaluation Procedures of System and Special Assessment Projects

VI. STATE PLANS

FIGURE 3

1983 REGIONAL INSPECTION PLAN

I. HIGHLIGHTS

II. GENERAL

III. MANAGEMENT

- A. Personnel
- B. Equal Employment Opportunities
- C. Training

IV. PROJECT SAFETY IMPROVEMENT ACTIVITIES

- A. Accident Investigation
- B. System and Special Assessments

V. REGIONAL OBJECTIVES BY DISCIPLINE

- A. Hazardous Material
- B. Signal and Train Control
- C. Track
- D. Motive Power and Equipment
- E. Operating Practices

VI. STATE PLANS

VII. APPENDIX - MAPS

(Passenger and Hazardous Material Routes)

FIGURE 4

PROJECTED SIGNAL AND TRAIN CONTROL INSPECTION ACTIVITIES

CARRIER NAME	PERCENT OF INSPECTION ACTIVITY
Southern Pacific	15%

- Key hazardous materials moveover 2,310 miles of signaled track involving many interlockings and drawbridges. The defect percentage for S&TC on this carrier was 30%. This carrier moved over 45,180 cars of hazardous materials out of the Houston area alone in 1980. Operates through the heart of downtwon Houston, Dallas, Fort Worth, San Antonio, New Orleans, and several other key cities in the Region. Of 27 HAZMAT releases in the Region during 1980, 7 occurred on this carrier.

- The planned inspection activities will be conducted to determine compliance and prevent defective and dangerous conditions from occurring.

In Section VI of the 1984 RIP, a standard outline for the State Inspection Plans is provided. This outline will provide a clear and concise method for the reporting of planned State inspection activities.

In conclusion, besides summarizing and consolidating information, the 1984 Regional Inspection Plan is expected to emphasize rationale. However, due to the evolutionary nature of the National Inspection Plan, each Regional Inspection Plan will be subject to change over the years as input is obtained from Regional and other pertinent personnel. The Standard Outline for the 1984 Regional Inspection Plan is located in Appendix A.

B.2.2 Methodology for Allocating Safety Resources

The second requirement of Task II was to develop a methodology for the allocation of inspector resources by discipline and other specialized Regional activities. Initially, a review of FRA's safety records, safety programs, and databases was conducted. Safety records for the last five years (1978 through 1982) indicate that the number of railroad accidents on the National level has decreased by 59.3 percent. This impressive safety record may indicate that the railroad safety inspection program has been successful in finding and alleviating unsafe conditions or operations. Moreover, while examining the accident/incident reports and the railroad safety inspection reports within FRA's databases, it was found that it is impossible to merge and correlate the two data sets. Therefore, it can only be assumed that there is a negative correlation between safety inspections and accidents. In other words, as the frequency of inspections increases, the frequency of accidents decreases.

Despite the decreased number of railroad accidents over the last five years, the possibility of a serious accident always remains. By implementing a plan to improve the allocation of inspection resources, a reduction in accidents, injuries and risks to the public should occur. A review of the FRA databases revealed that the best possible method to advance the allocation of safety improvement activities would be to utilize accident ratios for each railroad within a Region. The accident ratio is based on a formula which compares the number of accidents by discipline for each railroad within the entire FRA Region. This simple accident ratio would highlight areas of safety risk to which inspection resources could be devoted.

The Office of Safety at FRA Headquarters, in Washington, D. C. had emphasized that accident ratios are of little value unless they are weighted by the consequences and risks associated with the various accidents. Accordingly, they were weighted as follows:

- Accidents involving passengers received a weight factor of 20,
- Accidents involving the release of hazardous material received a weight factor of 10,
- The speed of the train at the time of the accident was divided by 10 and then weighted to the accident.

By using accident ratio formulas, Regional Directors were able to compare the total number of weighted accidents for a particular railroad division and discipline to the total number of weighted accidents for the entire Region within the same discipline. For example, the accident ratio for track accidents would be based on the following formula:

$$\frac{WTdi}{WTr} = TAR$$

where:

WTDi = total number of weighted track accidents for a particular railroad division

WTr = total number of weighted track accidents for the Region

TAR = track accident ratio for a particular railroad division.

One year totals were of little value in these calculations because of the relative infrequency of railroad accidents. Therefore, the totals were based on three year periods, and seasonal and monthly fluctuations were disregarded. Two main conclusions emerged from these analyses: smaller railroads have a higher accident rate than larger railroads; more accidents occur on yard and other track than on mainline track.

The Office of Safety, accordingly, suggested the following division of accident ratio categories based on size and track:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on all track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track,
- Smaller carrier accidents occurring on all track.

The purpose of the accident ratios is to facilitate the inspection activities among the various railroads within the Region by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad. Other factors, however, influence the allocation of safety inspector activities a well. Defect ratios, compliance adjustment records, overall carrier track conditions, equipment, etc., and the previous interactions between Regional personnel and a particular railroad must all be considered in the allocation of safety inspector activities.

The eight Regional Statistical Analysis Reports, located in Appendix B, contain regional safety trend data for the years 1978 through 1982 and accident ratios for all Regions.

The purpose of the reports is to provide each Region with analyzed accident data to be incorporated into the 1984 Regional Inspection Plan, and to formulate accident ratios in order to influence the allocation of safety inspector activities.

B.3 Results of Task II

The accident data ratios that are outlined in Appendix B compare the total number and causes of weighted accidents for a particular railroad division to the total number and causes of weighted accidents for the entire Region. The accidents are weighted by the following factors.

- Whether passengers were transported,
- Whether a hazardous material tank car was damaged,
- Whether hazardous material was released, and
- The speed of the train.

These weights, developed by the FRA Office of Safety, deal principally with the consequences and not the causes of accidents. The mere transportation of passengers and hazardous material do not cause accidents. Although speed can be a cause of an accident, less than 3 percent of all train accidents in 1982 were attributed to speed. The weights should be based on causes since FRA inspection activities cannot prevent or correct the consequences of any accident.

Another problem with the present weighting scale is that there appears to be no significant difference between weighted and unweighted accident ratios. If this fact is statistically proven, then the present weighting system will be of no apparent value.

The third problem with the weighted accident ratios is the breakdown by size of carrier. It was suggested by FRA officials that accident ratios for the various railroads within a Region be divided by the size of the carrier, since smaller railroads have a higher accident rate than larger railroads. However, a report published by the Office of Safety provides contradictory information. In the report titled, Railroad Safety Statistical Report Train Accidents and Hazardous Material Movements, published in March 1979, the following conclusion is made:

> "...size does not determine safety. Some large railroads tend to have lower accidents rates, but this relationship is statistically weak. Seven of the ten safest railroads are among the top ten in total car-miles. However, since some relatively safe railroads are also small, it cannot be concluded that a railroad must be large in order to achieve a low accident rate. In fact, there are also some large railroads which have high accident rates." (page 2)

In view of the problems indicated above, and taking into account FRA standards and goals, the following are guidelines for modifying the accident data ratios:

1) Test for a significant difference between weighted and unweighted accident ratios

2) Test for a significant difference between large and small carriers, using accident data from safety records accumulated over the last three (3) years.

3) Create a new weighting scale for accidents based on their causes. This weighting scale should be proportional to the average monetary cost of the various types of accidents.

4) Categorize accident data into mainline accidents and yard and other accidents.

5) Test for a correlation between defect ratios and accident ratios for the various railroads.

6) If there is a correlation between the defect ratios and the accident ratios, attempt to combine the two ratios.

7) Assess the possibility of correlating FRA inspection activity to accidents.

C. TASK III - THE DEVELOPMENT AND MANAGEMENT OF THE 1984 NATIONAL INSPECTION PLAN

C.1 Purpose

This Task entailed:

- transmitting the Standard Outline for the 1984 National Inspection Plan and the data compiled under Task II to each of the eight FRA Regions,
- reviewing of the Regional submissions for the 1984 NIP, and
- pacing the Regional submissions in final format for publishing

C.2 Summary

Based on the guidelines outlined in the Standard Outline, each Region submitted their Regional Inspection Plans (RIP) for 1984. The 1984 NIP was comprised of the RIPs submitted by each Region as well as the various state inspection plans submitted by participating states.

The following represented the overall goals which were operative in the formulation of the 1984 National Inspection Plan:

- Improve the safe operation of passenger trains,
- Reduce the number of hazardous material (hazmat) releases,
- Reduce in the number of freight train accidents,
- Reduce the number of railroad employee casualties,
- Reduce the number of accidents occurring at rail-highway grade crossings,
- Decrease the number of trespasser fatalities

The NIP goals were carried through the cooperation of all eight regions by carrying out a multitude of activities in every inspection discipline. Also, several special and system assessments were carried out within the regions and all regions expanded their participation in Operation Lifesaver.

Each Regional Inspection Plan was subdivided into following sections:

1) Highlights
2) Introduction
3) Projected Safety Improvement Activities
4) Regional Inspection Plans
5) Methodology for the Reduction of Accidents
6) State Plan Summaries

The Highlights Section provided a summary of each Region's projected system and special assessments for 1984 as well as its major accomplishments in 1983. Projected Safety Improvement Activities included an overview of Regional Statistical data, 1984 Regional goals and objectives, a detailed description of the planned special and system assessments, and an account of the anticipated number of accident investigations, complaints, and applications in the Region. Regional Inspection Plans included the regular inspection activities planned among the various disciplines, using accident data, inspection information, the inspector's knowledge of the overall conditions of the territory or region, and the average number of inspections that were made in past years. For each Railroad or area involved in these planned inspection activities, the following information was provided:

- the percent of inspection activity spent on each Railroad;
- the rationale for the planned activities; and
- the discipline objectives.

The "Methodology for the Reduction of Accidents" section afforded each Region an opportunity to discuss the particular methods utilized to collect and analyze accident, non-compliance, and system and special assessment data. Each state participating in the plan submitted a summary of their projected inspection activities for 1984. These plans consisted of a general statement, a discussion of planned inspection activities within the state, and comments regarding major problems and remedial actions planned to correct them.

C.3 Results

The Regional Inspection Plans were subsequently evaluated to determine how closely the Standard Outline was utilized by the various Regions and the overall effectiveness of the Standard Outline. This evaluation of the 1984 RIPs resulted in the following conclusions:

- Submitted State Plans were relatively weak in content and did not follow a consistent reporting format.

- Few Regions completed the "Methodology for the Reduction of Accidents" section. Those that were submitted were relatively weak in content.

- Although considerable improvement was apparent in terms of the regional rationale for inspection activities under the 1984 NIP, many Regions were not sufficiently specific and refinement is still needed.

D. TASK IV - GUIDELINES FOR DEVELOPING THE NATIONAL INSPECTION PLAN

D.1 Purpose

The purpose of Task IV under Contract No. NASW-3789 was to develop an instruction manual entitled, Guidelines for Developing the National Inspection Plan. This Manual will establish guidelines for the use of FRA Headquarters and FRA Regional (Field) personnel in meeting the requirements for the preparation of future Inspection Plans.

Guidance for Headquarters personnel in this instruction manual will include:

- Content, scope and format for the issuing of the annual NIP
- FRA Headquarters data to be transmitted to Regional (Field) personnel
- Schedule for NIP preparation

Guidance for Regional (Field) personnel will consist of an addendum to the Manual identifying the content, scope and format of the regional input into the National Inspection Plans.

The task elements of Task IV include:

- specifying Headquarters and Regional functions and responsibilities for the process of developing the NIP;
- establishing NIP work schedules for Headquarters and Regional personnel;
- identifying, defining, and scoping the sections of the NIP:
- identifying appropriate forms and data to be transmitted from FRA Headquarters to Regions;
- developing a standard outline for Regional personnel use in preparing their individual inputs into the NIP;

- producing a final document which thoroughly described the development of the NIP from initiation to completion, incorporating the results of the preceding work elements.

D.2 Summary

In preparing this manual for the future preparation of NIPs a review and analysis of the following were conducted:

- FRA Systems Safety Plans
- FRA Safety Policy
- FRA Headquarters Guidance
- Regional Inspection Plans
- Regional Safety Statistics
- Regional Safety Problems

A considerable amount of information was gathered from the FRA System Safety Plans, Safety Policy, and FRA Headquarters. Past Regional safety statistics were compared with the eight Regional Inspection Plans for 1984 that were submitted to the FRA Office of Safety. Meeting with Headquarters personnel supplied additional information. The strengths and weaknesses of previous plans were discussed at the meetings and FRA Headquarters personnel provided guidance regarding the content of the manual.

The manual for the Development of a National Inspection Plan is comprised of two major sets of guidelines: one for Washington Headquarters Personnel and the other for the use of Regional Personnel.

The guidelines for Washington Headquarters personnel consisted of the following:

- The identification of their functions,

- The time schedules for Regional and National Inspection Plans,
- Instructions for compiling the Regional Statistical Analysis Report.
- Instructions for composing the NIP from Regional Inputs, and
- Instructions for composing the Executive Summary.

The guidelines for Regional personnel consisted of the following:

- A time schedule of Regional activities to be completed
- Functions of Regional Headquarters personnel, and
- Guidelines for developing Regional inputs for the NIP.

Three offices within Washington Headquarters are to be involved in the development of an NIP, namely the Office of Associate Administrator, the Office of Safety Enforcement, and the Office of Safety Analysis. The Office of Associate Administrator serves as the monitor of the entire development of the annual NIP by initiating the various NIP development stages. The Office of Safety Enforcement reviews the Regional plans to check for consistency between Regional Plans and safety trends. The Office of Safety Analysis if responsible for:

- Compiling Regional data,
- Transmitting the Regional Statistical Analysis Report to the Region,
- Preparing a package of information for transmittal to Regions which includes new regulations and policies, and budget information,
- Providing information regarding State participation for the Executive Summary.

Development of the NIP should begin each year in July, with Headquarters compiling data trends to be sent to the Regions. Between August and October, Regional

personnel prepare the Regional inputs for the NIP. Between November and December, Washington Headquarters personnel prepares the NIP for final printing.

The Regional data to be compiled by the Office of Safety consist of:

- Regional Overview Data which contains data that deals with the overall safety picture and safety trends of the Region for a five year period.

- Regional Accident Data which contains data that deals with specific problem areas within the Region based on the last three years of data.

The formula for the accident data ratios is the result of work completed on Task II of the project. For details regarding the accident data ratio formula see the descriptiion under Section B.2 of this report.

The development of each Regional Plan is to be carried out by the joint efforts of the Regional Director, Regional Specialists, Regional Inspectors, and State Inspectors. In addition, plans for the following year's inspection activities are developed on the basis of Regional statistics, special and system assessments and any problems which surfaced during the previous year.

Based on the experience gained in Task I, II, and III, it was suggested that the Standard Outline for the Regional inputs to the National Inspection Plan should stress rationale, be explicit in directions, and follow a format similar to that used for National Inspection Plan. Because the submitted State Plans were often weak in content and did not follow a consistent reporting format, Washington Headquarters suggested that these plans be deleted from the National Inspection Plans as a separate section; the Regional Inspection Plans should instead include the State inspections within their activities.

Figure 2 illustrated the outline of the revised Regional Inspection Plan format, while Figure 5 depicts the format that was used in the 1984 Inspection Plan. The "Methodology for the Reduction of Accidents" section is no longer included in the revised plan. Under the "Projected Safety Improvement Activities" section of the revised plan, "Projected Follow-up Activities on Previous Assessments" was added. This subsection insures that each assessment will receive sufficient follow-up activity to verify the improvement.

FIGURE 5

STANDARD OUTLINE FOR THE REGIONAL INPUTS TO THE NATIONAL INSPECTION PLAN

SECTION

I. HIGHLIGHTS

II. INTRODUCTION

III. PROJECTED SAFETY IMPROVEMENT ACTIVITIES

- A. Regional Statistical Overview
- B. Regional Goals and Objectives
- C. System and Special Assessments
- D. Projected Follow-up Activities on Previous Assessments
- E. Accidents, Complaints and Applications
- F. Major Deficiencies and Remedial Recommendations (Optional)

IV. REGIONAL INSPECTION PLANS BY DISCIPLINE

- A. Hazardous Material and Operating Practices
- B. Signal and Train Control
- C. Track
- D. Motive Power and Equipment

Appendix C contains the Guidelines for the Development of the National Inspection Plan. This report not only contains guidelines for Headquarters personnel but also Regional personnel.

APPENDIX A

STANDARD OUTLINE FOR THE 1984 REGIONAL INSPECTION PLAN

FOREWORD

This report provides the Region with guidelines to be used in preparing the 1984 Annual Regional Inspection Plan. The format of the 1984 Plan has not changed drastically from previous years, however, more emphasis is being placed on safety analysis and logical processes utilized by each Region to arrive at the proposed, detailed inspection and safety improvement activities.

This report should be used in conjunction with the Regional Statistical Analysis Report which provides the Region with results of analyzed data and guidelines on how to incorporate the Region's data into the 1984 Annual Regional Inspection Plan.

STANDARD OUTLINE FOR THE 1984 REGIONAL INSPECTION PLAN

TABLE OF CONTENTS

I. HIGHLIGHTS

Each Region should give a brief description of each of the Region's major projected safety improvement projects. This section should not exceed one page in length. Each "highlight" should be bulleted. The following are some examples of appropriate material for the Highlights Section:

- o System assessments
- o Special assessments
- o Any major change

Since the Highlights Section is a summary of Region issues, it should generally contain an update on old information. Each "highlight" will usually be a restatement of important information, including any new items of interest pertaining to occurrences during the past year.

II. INTRODUCTION

Specific information concerning the Region and the various railroads operating within the Region should be included in the Introduction Section of the Annual Plan. "Specific information" refers to: the number and names of states within the Region, the location of the Region's Headquarters, the railroads operating within the Region, the amount of hazardous material transported within the Region, the number of passenger trains within the Region, etc. The Introduction Section should also be used to give background information on the Region. A summary of the overall plan for assessments and inspections within the Region in the forthcoming year should also be included.

This section should also include a brief discussion on the utilization of Federal and State resources to accomplish regional objectives in the upcoming year. Include a short paragraph on personnel numbers, training, EEO and use of equipment such as railroad cars. Also include how the Region will utilize the O.P. Trainee Specialist for six months during the upcoming year.

III. PROJECTED SAFETY IMPROVEMENT ACTIVITIES

A. Regional Statistical Overview

This Section should consist of a detailed narrative on the actual results of the Region's 1983 Inspections verses the Planned Inspections. The problems that were encountered within the Region, actions which addressed these problems, and the results of these activities should be discussed. Included within this discussion should be a description of the improvements or impairments in the overall safety of individual railroads or railroad divisions. If 1983 safety objectives were not achieved, an analysis should follow.

This Section should also incorporate the data from the Regional Statistical Analysis Report that was sent to your Region. Do not simply restate the data statistics given in the Report, but incorporate these statistics into two formal discussions. One Discussion should relate to the overall Regional Safety Profile, and the other should focus on specific problem areas within the Region and the planned corrective actions. The guidelines found within the Regional Statistical Analysis Report will be instrumental in forming your Region's statistical overview discussions.

B. Regional Goals and Objectives

The statistics in the above section should indicate problem areas. These problem areas should be discussed and corrective actions should be planned for the upcoming year 1984. For example, if the regional statistics indicate that the number of trespasser fatalities has increased, corrective actions such as presentations on the dangers of working or trespassing on railroad property should be scheduled within the Region during the year.

Based on the Regional Statistical Overview and the statistics within that section, the Region should develop its goals and objectives. A Goal is a statement of intent that is general and timeless and is not concerned with a particular achievement within a specified time period. The regional goals will be the same for all regions and is provided from Washington Headquarters. An Objective is a desired accomplishment that will be achieved within a given timeframe and under

specifiable conditions. Objectives must specify the method of achievement as well as the period of time within which it is to be attained.

C. System and Special Assessments

The Regional Statistical Overview of the Region's problem areas and past experience will indicate the areas where assessments are needed. Special assessments are the efforts of one or more inspectors, or the application of one or more discipline on a specific section of a railroad. In the past, special assessments have been instrumental in achieving compliance to safety standards in problem areas.

The need for special assessments will vary by discipline; therefore, special assessments should be noted in each inspection plan. The number of assessments should be based on past experience, knowledge of new trends which may indicate that additional activity of this type would be beneficial, or other information such as complaints.

Each Region should submit the following information on planned special assessments:

1) The name of the railroad involved and the specific area to be covered by the assessment,

2) The starting and completion dates,

3) The disciplines and the number of inspectors (State and Federal) assigned to the project,

4) The reasons for the assessment, with specific details,

5) Anticipated follow-up activities.

System assessments are the combined efforts of all disciplines to examine an entire railroad system which usually encompasses more than one Region. A system assessment is normally assigned by the Washington Office; however, Regions are encouraged to make recommendations for system assessments.

D. Accidents Complaints and Applications

The planned activities for Accidents, Complaints and Applications are to be reported on the Table located in the Appendix of this report. Incorporate this Table into a brief discussion of the activities planned for the coming year.

Accident investigation activity will be reported based on each Region's past record of investigations including locomotive, train and employee fatality accidents. The number of accidents investigated will be reported on a regional basis. The investigation of these accidents will determine if the accident may have been caused by the carrier's failure to comply with regulations or if consideration should be given for the recommendations of a change or additional regulations in an effort to preclude a reoccurrence. The activity will reflect not only those accidents assigned by the Headquarters Office, but also those assigned by the Regional Director on an informal investigation. All accident investigations should be completed within 60 days. Hazardous materials incident investigations will also be included in this section.

Complaints will be reported on a basis of activities in past years. The number of complaints each Region anticipates receiving shall be shown by discipline. It is the goal of FRA to complete each of these assignments in no more than 60 days.

Applications filed by carriers for modifications, petitions, and waivers shall be reported by each discipline based on the past record of the average number of such assignments investigated. It is the goal of FRA to complete each of these assignments in no more than 45 days.

E. Major Deficiencies and Remedial Recommendations

Railroad investigation and inspection results should be combined with traffic forecasts and safety profiles to identify and describe particular regional problems. The causes of these problems together with the logic for selection of corrective actions as derived from analysis should be described within this section. This type of shared information will assist in making other regions aware of emerging situations and permit the translation of corrective measures before similar accidents occur elsewhere.

IV. REGIONAL INSPECTION PLANS BY DISCIPLINE

In previous RIPs, this Section has been entitled "Regional Objectives by Discipline." As in previous years, this Section will include the planned regular inspection activities among the various disciplines. In this RIP, the disciplines of Hazardous Material and Operating Practices have been grouped together under one discipline.

The purpose of regular inspections is to reduce non-compliances, which will reduce the potential for accidents. The number of regular inspections that will be scheduled should take into account the average number of inspections made during the past several years for each type of inspection activity and projected future requirements. Inspection activities will be planned using accident data, inspection information, and the inspector's knowledge of the overall conditions in his territory. It will be the responsibility of the Region's District Chief to analyze information for his district to assure that inspections are being made in the areas of highest risk and concern. The Region Specialists will also make an evaluation and if necessary, recommend changes in inspection plans. The Specialist will also recommend special assignments to the district field forces for increased enforcement in areas where the greatest potential for continued hazards exist. The District Chiefs and the Specialists must jointly plan these inspection activities.

The Specialist of each discipline in each Region shall carefully monitor the output of the Inspectors of his discipline to insure that a realistic number of units are inspected each month, proportional to the man-hours expended, and that inspections have been conducted at points of greatest need. It will be the responsibility of the Regional Specialist to keep the District Chief aware of the results of this analysis. Special emphasis on inspection procedures and frequency should be designated for 1984.

The planned inspection activities are to be reported by discipline on the sheets located in the Appendix of this Report. These sheets are to be incorporated into the discussion of the inspection activities of each discipline for the upcoming year. Guidelines for the Discussion Sections for the Inspection Disciplines are outlined in the text below.

For each of the four Inspection Disciplines, complete the tables on the various planned Inspection Activities. The Discussion Sections for each of the Inspection Disciplines **should not be a restatement of the information found within the Planned Inspection Activity Tables nor should they be a detailed report on the Assignment.** Each Discussion Section should include the following information:

1) The Areas and Railroads involved in the planned inspection activities,

2) The percent of inspection activity spent on each Railroad,

3) The rationale for the planned activities.

4) The Discipline objectives – expected results of the planned inspection activities,

The most important part of the Inspection Discipline Discussion is the rationale for the planned activities. Inspection activities should be related to the goals and objectives of the Region, as well as the improvement of unfavorable safety trends. Therefore, inspection activities should be justified by a consideration of why each type of inspection is occurring where it is occurring. The standard format for the Regional inspections by discipline, is located in Figure 1. Each inspection discipline discussion should follow this format exactly.

For each discipline, the rationale for inspection activity should be based on the following:

1. The number of accidents of carrier by division.

2. The defect percentages of carrier by division. (This rationale will be used mainly for MP&E and S&TC inspection activities.)

3. The amount of time it took for non-compliance situations be corrected.

4. The overall conditions of the track of carrier by division.

5. The past experiences of inspectors and regional personnel with a particular railroad. (This rationale will be used mainly for OP inspections, however, other disciplines may be applicable.

FIGURE I

PROJECTED SIGNAL AND TRAIN CONTROL INSPECTION ACTIVITIES

CARRIER NAME	PERCENT OF INSPECTION ACTIVITY
#1. Railroad Involved	**#2. % of Inspection Activity**
Southern Pacific	15%

#3. Rationale

- Key hazardous materials movesover 2,310 miles of signaled track involving many interlockings and drawbridges. The defect percentage for S&TC on this carrier was 30%. This carrier moved over 45,180 cars of hazardous materials out of the Houston area alone in 1980. Operates through the heart of downtown Houston, Dallas, Fort Worth, San Antonio, New Orleans, and several other key cities in the region. Of 27 HAZMAT releases in the Region during 1980, 7 occurred on this carrier.

#4. Discipline Objectives

- The planned inspection activities will be conducted to determine compliance and prevent defective and dangerous conditions from occurring.

V. METHODOLOGY FOR REDUCTION OF ACCIDENTS

This Section is divided into three subsections: Methods for Assessments of Accidents; Methods for Assessment of Non-compliance; and Evaluation Procedures of System and Special Assessment Projects. Under each of the subsections provide an explanation of the methods that were utilized to collect and analyze the information regarding Accidents, Non-compliance, and System and Special Assessments.

VI. STATE PLANS

Each Regional Headquarters is to provide guidance to each state which is submitting an inspection plan. Each state plan should be based on the outline below and approximate the brief descriptions which follow.

STATE INSPECTION PLAN OUTLINE

I. GENERAL STATEMENT

II. INSPECTION PLANS*

- A. Track
- B. Signal
- C. Motive Power and Equipment
- D. Hazardous Material and Operating Practices

III. COMMENTS

IV. SUMMARY

* Please note that only some inspection disciplines will apply to the various states. Few states have inspection plans for every discipline.

I. GENERAL STATEMENT

This Section should contain specific information concerning the state and the various railroads operating within the state. The state accomplishments during the past year, problems that were encountered, and the goals and objectives of the state should be included in this Section.

II. INSPECTION PLANS

This Section should discuss the various planned inspection activities within the state for each Discipline. Each Discipline Discussion should include the following information:

1) The areas and railroads involved in planned inspection activities,

2) The percent of inspection activity spent on each Railroad,

3) The rationale for the planned activities.

4) Discipline Objectives -- expected results from the planned inspection activities?,

III. COMMENTS

This Section should include any major problems, and remedial action planned to correct them.

IV. SUMMARY

The Summary Section should clearly and briefly state the number of inspections activities planned within the state for the upcoming year.

Each state plan should average three (3) pages in length and should not exceed five (5) pages.

APPENDIX B

RAILROAD SAFETY PROGRAM

REGIONAL STATISTICAL ANALYSIS REPORT
TASK II

CONTRACT NO. NASW-3789

PREPARED FOR:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION HEADQUARTERS
CODE LGT-1
WASHINGTON, D.C.

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SEPTEMBER 1983

TABLE OF CONTENTS

SUMMARY

The following report is a composite of the 8 Regional Statistical Analysis Reports. Each report contains Regional safety trend data for the years 1978 through 1982 and accident ratios by railroad and division for each Region. The purpose of the reports is to provide each Region with analyzed accident data which is to be incorporated into the 1984 Regional Inspection Plan.

REGION I - BOSTON

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

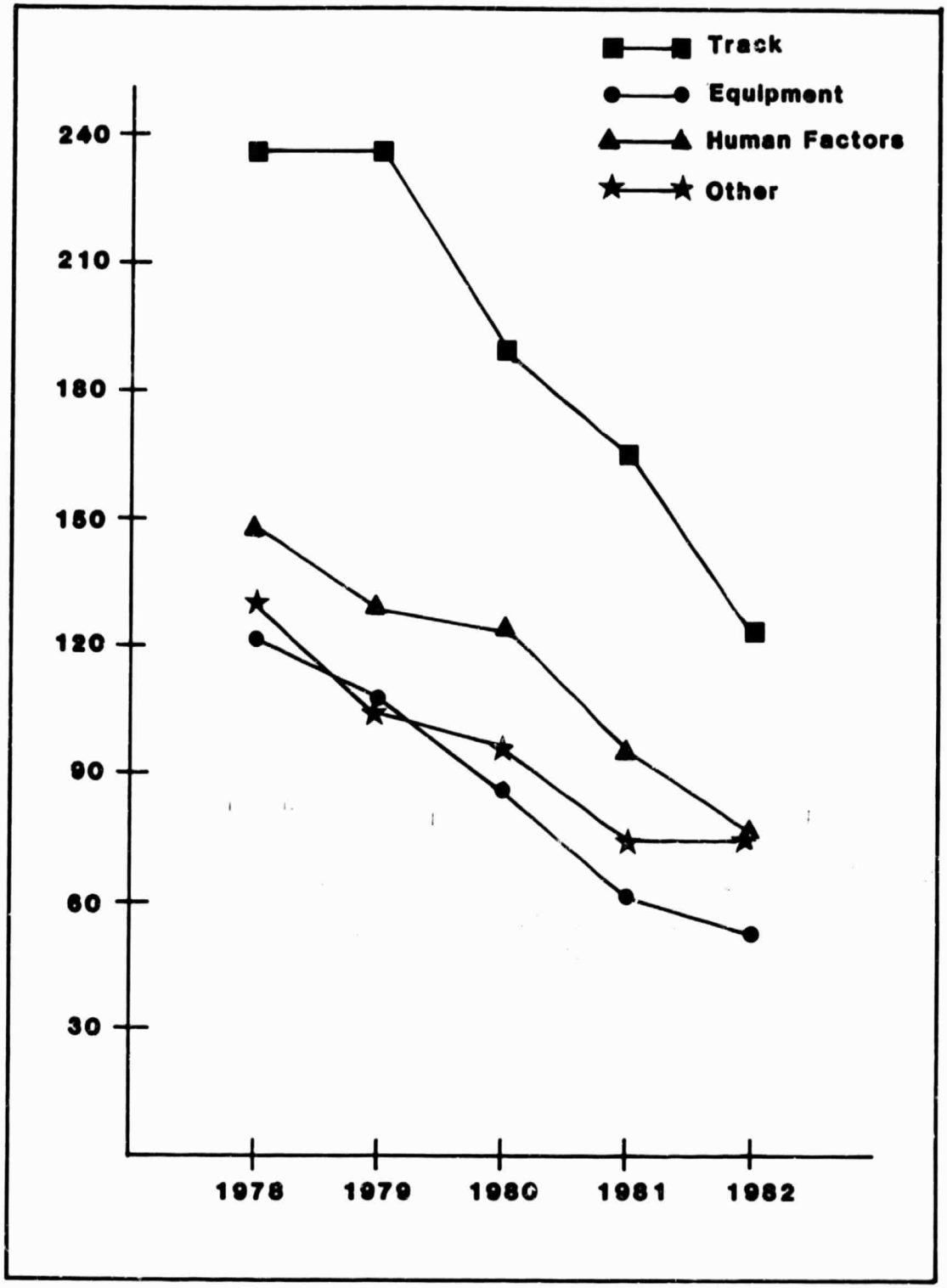
1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region I indicates that there has been a significant decrease in the number of accidents caused by track, equipment, and human factors. The graph also indicates that Region I had a slight increase in accidents due to other miscellaneous causes, however, this increase is not significant.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change data for Region I indicates that the number of accidents in which hazardous material was released decreased by 77.8% from 1981 to 1982. However, on the National level the number of accidents decreased by only 23.4% from 1981 to 1982. A discussion on past safety programs which Region I has utilized to accomplish this safety record, should be incorporated into the Regional Inspection Plan. On the

National level, the number of accidents caused by other factors decreased by 17.3% from 1981 to 1982. However, Region I experienced an increase of 2.7% in the number of accidents caused by other factors from 1981 to 1982. Also, a discussion on what factors may have contributed to this increase and what corrective actions are planned for 1984 needs to be incorporated in the RIP.



REGION 1

Summary of Train Accidents By Cause

For 1978 Thru 1982

National and Regional Safety Trends

Region 1

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	46.7	17.6
ACCIDENTS CAUSED BY TRACK	63.1	22.2	47.7	26.3
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	48.0	19.8
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	56.2	14.5
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	42.3	2.7+
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	40.0	25.0
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	58.8	25.0
NUMBER OF HAZ MAT RELEASES	57.2	23.4	66.7	77.8

+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION I

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
GNWR		0.00	100.00	0.00	71.43
GNWR	SYS	0.00	0.00	0.00	28.57
MSTR		100.00	0.00	0.00	0.00

REGION I

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
CLP	RUT	0.00	0.00	0.00	0.00	63.93
CN	BER	0.00	0.00	0.00	8.49	0.00
CPVM	QUE	0.00	0.00	19.39	0.00	0.00
CNWR		0.00	0.00	0.00	25.55	0.00
GU	SYS	0.00	0.00	0.00	8.52	0.00
LAL		0.00	0.00	51.35	0.00	0.00
LVRC		0.00	0.00	0.00	5.39	0.00
LVRC	EAS	52.05	0.00	10.83	0.00	0.00
LVRC	MAI	0.00	0.00	0.00	10.78	0.00
NYSW	#2	0.00	100.00	0.00	0.00	0.00
NYSW	NOR	0.00	0.00	18.43	0.00	0.00
OMID		0.00	0.00	0.00	11.49	0.00
VTR		0.00	0.00	0.00	0.00	36.07
VTR	BUR	47.95	0.00	0.00	29.79	0.00

REGION I

ACCIDENT RATIOS FOR LARGER CARRIERS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	BOS	9.36	0.61	8.02	5.67	14.89
ATK	EMP	6.79	28.29	10.73	0.03	25.66
ATK	NEW	0.42	6.26	9.81	9.98	0.00
BAR		0.00	3.67	0.00	0.14	0.00
BM	BOS	12.12	2.39	18.26	2.14	11.52
BM	EMP	0.00	0.00	0.00	10.99	0.00
BM	NEW	8.70	1.99	5.79	7.20	0.00
BO	PEN	0.49	0.00	0.17	3.80	0.25
CR	BUF	0.97	5.05	0.49	0.75	27.27
CR	CLE	2.28	0.00	0.00	0.05	0.39
CR	LEH	3.08	0.92	0.27	3.10	0.00
CR	MET	40.21	8.56	15.65	7.51	1.09
CR	MOH	3.54	4.28	10.63	1.17	12.43
CR	NEW	3.00	13.00	4.18	3.28	0.85
CR	NJ	0.00	6.12	5.67	0.00	0.00
DH	#2	0.65	3.02	0.18	1.54	0.00
DH	#4	0.00	2.52	0.00	8.03	0.00
DH	EMP	0.00	0.00	0.00	7.72	0.00
LI		1.88	0.00	0.53	5.79	0.96
MEC	POR	0.61	0.47	1.78	11.71	0.00
MNCW	MET	0.00	0.00	5.80	0.00	0.00

REGION I

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
ATK	BOS	1.75	0.47	1.73	3.90
BM	BOS	9.20	2.01	5.11	6.89
BM	NEW	1.15	5.71	7.67	6.77
CR	BUF	10.60	11.15	9.82	15.87
CR	MET	7.95	4.98	3.27	0.35
CR	MOH	8.84	11.15	11.13	7.41
CR	NEW	5.30	18.16	21.93	20.28
CR	PHI	0.88	2.14	1.96	2.12
DH	#2	0.00	4.88	2.15	2.32
MEC	EAS	2.71	2.54	5.01	1.89
MEC	POR	8.12	2.54	9.02	1.08
PTM	POR	8.44	3.63	8.75	2.70
PW		0.00	6.73	0.00	1.25
SB		17.68	6.78	0.00	5.04
SB	SYS	7.58	1.70	0.00	2.52

REGION 2 - PHILADELPHIA

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

2

This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

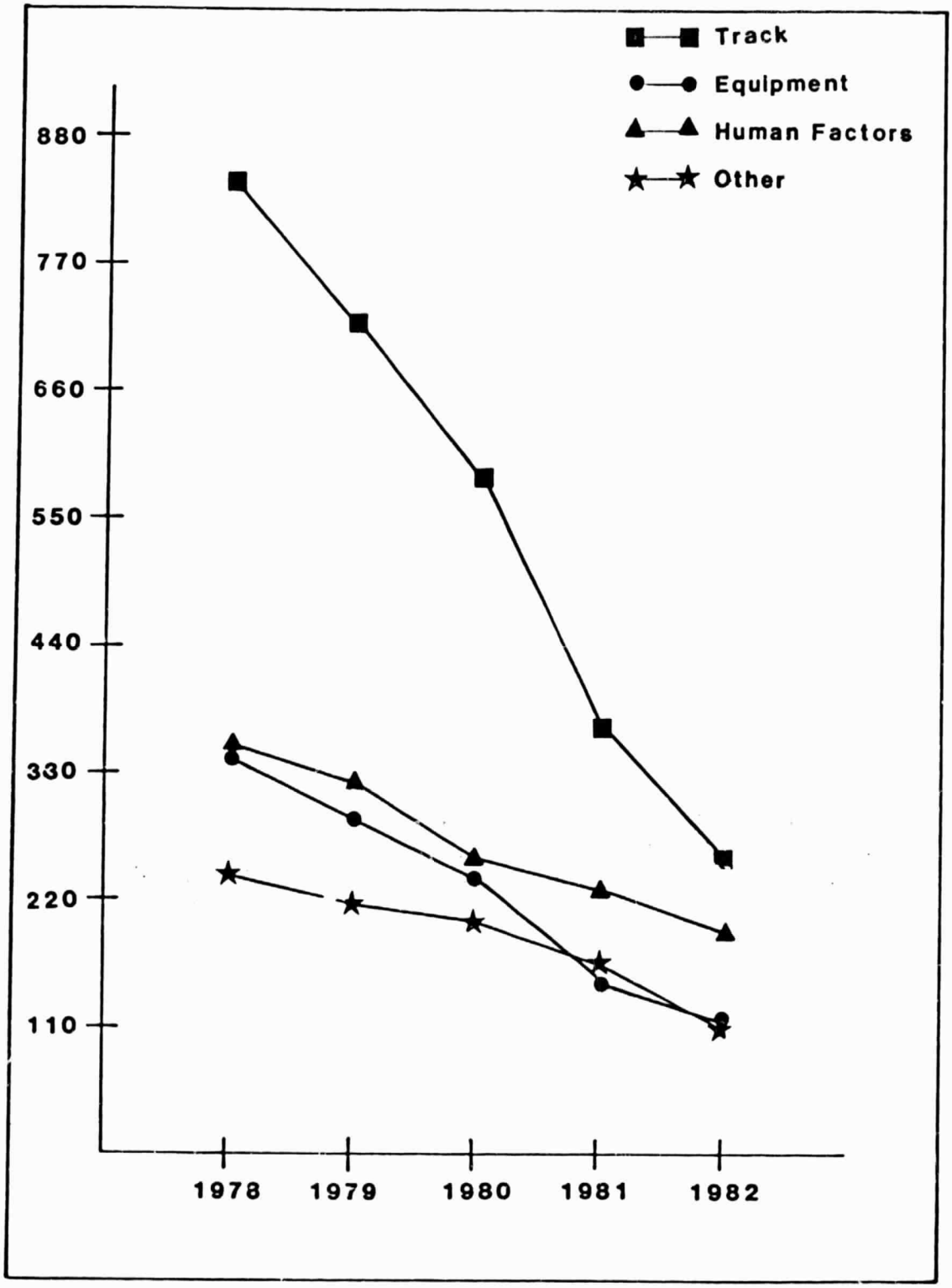
1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 2 indicates that the number of accidents has continued to decrease significantly each year from 1978 to 1982. Track caused accidents within the Region have decreased by more than 60 percent from 1978 to 1982.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change data for Region 2 indicates that on the Regional level that the number of persons killed in train accidents decreased by 42.8% from 1981 to 1982. While on the National level for the same year period, the number of persons killed in train accidents decreased by only 22.2%. Although the number of persons killed in train accidents in Region 2 decreased by more than 20 percent over the National level, the number of persons injured in train accidents decreased by only 0.9 percent which is

almost 15 percent lower than the National level. A discussion on what factors may have influenced the number of persons killed and injured in Region 2 should be incorporated into the Regional Inspection Plan. Also, discuss the reason or reasons for the increase in the number of hazardous material releases in Region 2 from 1981 to 1982.



REGION 2

Summary of Train Accidents by Cause
For 1978 Thru 1982

National and Regional Safety Trends
Region 2

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	60.6	23.7
ACCIDENTS CAUSED BY TRACK	63.1	22.2	69.4	30.8
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	46.9	13.9
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	62.4	20.9
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	47.1	23.4
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	80.9	42.8
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	71.2	0.9
NUMBER OF HAZ MAT RELEASES	57.2	23.4	31.6	30.8+

+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 2

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATC		0.00	0.00	0.00	0.00	8.01
ATK	BAL	3.74	0.64	30.17	20.56	17.00
ATK	MID	0.00	0.00	0.00	0.00	9.16
ATK	PHI	10.79	1.15	1.31	3.28	0.52
ATK	YOU	0.00	0.00	0.00	0.00	5.23
BO	AKR	3.64	3.24	2.02	0.58	0.00
BO	MAR	3.66	2.71	2.58	3.01	2.14
BO	MON	2.43	2.09	1.32	4.05	0.32
BO	PEN	6.96	2.30	3.27	9.52	0.11
BO	WES	0.65	6.68	4.03	0.91	0.43
CO	WES	2.92	4.64	8.40	4.84	0.22
CR	ALL	6.50	4.35	0.64	3.69	0.40
CR	COL	3.48	0.97	0.58	3.78	1.58
CR	HAR	6.14	3.67	6.30	2.01	0.00
CR	PHI	5.53	8.12	11.92	1.49	3.27
CR	PIT	8.00	5.80	1.17	2.56	0.49
CR	SEP	0.00	0.00	0.00	0.00	12.47
CR	YOU	2.29	3.67	0.70	1.03	9.70
DH	#1	0.14	7.16	0.77	0.82	0.33
DTI	NOR	2.47	4.03	0.65	1.97	0.00
NW	NOR	2.65	0.75	0.06	0.15	0.77
NW	POC	2.94	4.04	1.28	3.85	0.67
NW	RAD	0.63	4.51	0.34	0.56	0.39
NW	SCI	2.57	1.32	0.23	0.61	3.56
PLE	PLE	0.76	2.96	0.38	0.75	0.00
RFP		2.11	0.44	0.07	0.00	0.00
SCL	ROC	0.17	0.47	2.49	0.03	12.20
SOU	BAL	0.00	0.00	0.00	4.35	0.00

REGION 2 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
SOU	EAS	0.67	0.00	7.30	6.09	0.38
WATC		0.00	0.00	0.00	2.05	0.00
WM	HAR	0.00	0.00	0.00	2.15	0.00
WM	MAR	1.09	3.53	0.57	0.56	0.28

REGION 2

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ALQS		1.26	1.28	1.11	2.74	0.00
BO	AKR	4.94	6.96	1.35	3.52	0.00
BO	ARK	7.60	0.23	0.00	0.00	0.00
BO	MAR	0.76	9.05	5.38	2.31	0.00
BO	MON	1.52	0.62	1.01	2.92	0.00
BO	PEN	1.90	1.08	5.72	2.62	0.00
BO	WES	3.04	3.40	10.10	1.01	0.00
CO	OHI	1.34	3.75	1.02	2.24	0.00
CO	SOU	0.00	0.00	0.00	2.03	0.00
CO	VIR	5.38	3.91	18.20	1.42	0.00
CO	WES	2.30	2.03	1.70	4.17	0.00
CR	CLE	0.35	2.86	2.80	2.89	0.00
CR	COL	21.12	3.15	2.18	2.70	47.25
CR	HAR	4.75	3.44	1.56	2.14	0.00
CR	PHI	5.46	12.03	14.02	5.50	0.00
CR	PIT	3.17	7.16	2.80	6.80	0.00
CR	SEP	3.87	0.14	0.00	0.00	0.00
CR	TOL	2.11	3.08	1.25	1.30	0.00
CR	YOU	0.35	2.94	1.56	4.28	15.75
DH	#1	0.00	0.00	2.31	0.31	0.00
NW	POC	2.40	1.81	0.61	2.04	0.00
NW	SCI	2.40	0.56	0.61	0.82	0.00
PBR		0.32	0.39	0.84	0.08	28.31
RFP		2.20	4.81	3.37	3.66	0.00
RFP	RAL	0.00	0.00	0.00	2.12	0.00
RT		0.00	0.00	0.17	0.00	8.70
URR	MAI	2.61	0.71	1.15	1.03	0.00
WM	MAR	2.96	0.40	1.75	1.18	0.00

REGION 2

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ABB		0.00	0.00	70.47	8.20	0.00
ABB	SYS	0.00	0.00	0.00	0.00	28.78
ACY		0.00	0.00	2.79	9.09	0.00
LEF		0.00	12.85	0.00	0.00	42.45
MDDE	CAM	0.00	0.00	3.69	0.00	0.00
MGA	MON	2.70	0.00	0.00	0.00	0.00
MGA	PIT	2.70	0.00	0.00	0.00	0.00
MGA	RCE	2.70	34.86	0.00	4.92	0.00
MGA	RIV	35.05	34.86	0.00	27.87	0.00
MGA	TEN	21.57	17.43	0.00	3.28	0.00
MGA	WAY	13.48	0.00	0.00	1.64	0.00
MGA	WES	2.70	0.00	0.00	0.00	0.00
NFD		0.00	0.00	0.00	11.77	0.00
PNER	WIL	0.00	0.00	0.00	0.00	28.78
PS		4.41	0.00	23.05	10.72	0.00
TT		0 00	0.00	0.00	9.12	0.00
TT	OHI	2.50	0.00	0.00	0.00	0.00
WVN	SYS	10.78	0.00	0.00	0.00	0.00
YS		0.00	0.00	0.00	6.19	0.00

REGION 2

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
ACY		0.00	41.99	0.00	0.00
BVRY		0.00	10.60	0.00	0.00
DIS	TOL	40.70	26.45	0.00	6.27
LEF		0.00	0.00	40.98	0.00
MGA	RCP	0.00	0.00	0.00	3.35
MGA	RIV	32.62	0.00	0.00	6.70
MGA	TEN	0.00	0.00	0.00	3.35
MKC		0.00	2.59	0.00	0.00
MKC	LOW	0.00	0.00	13.58	0.00
NSS		0.00	3.36	0.00	0.00
PCY		0.00	7.34	0.00	1.16
PS		26.68	0.00	45.44	10.96
PS	ALL	0.00	0.00	0.00	2.74
TT		0.00	0.00	0.00	20.19
55	OHI	0.00	0.00	0.00	34.16
II	PIT	0.00	0.00	0.00	3.11
TT	TOL	0.00	0.00	0.00	4.66
WVN		0.00	0.00	0.00	3.35
YN		0.00	7.68	0.00	0.00

REGION 3 - ATLANTA

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

3

REGIONAL OVERVIEW

This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

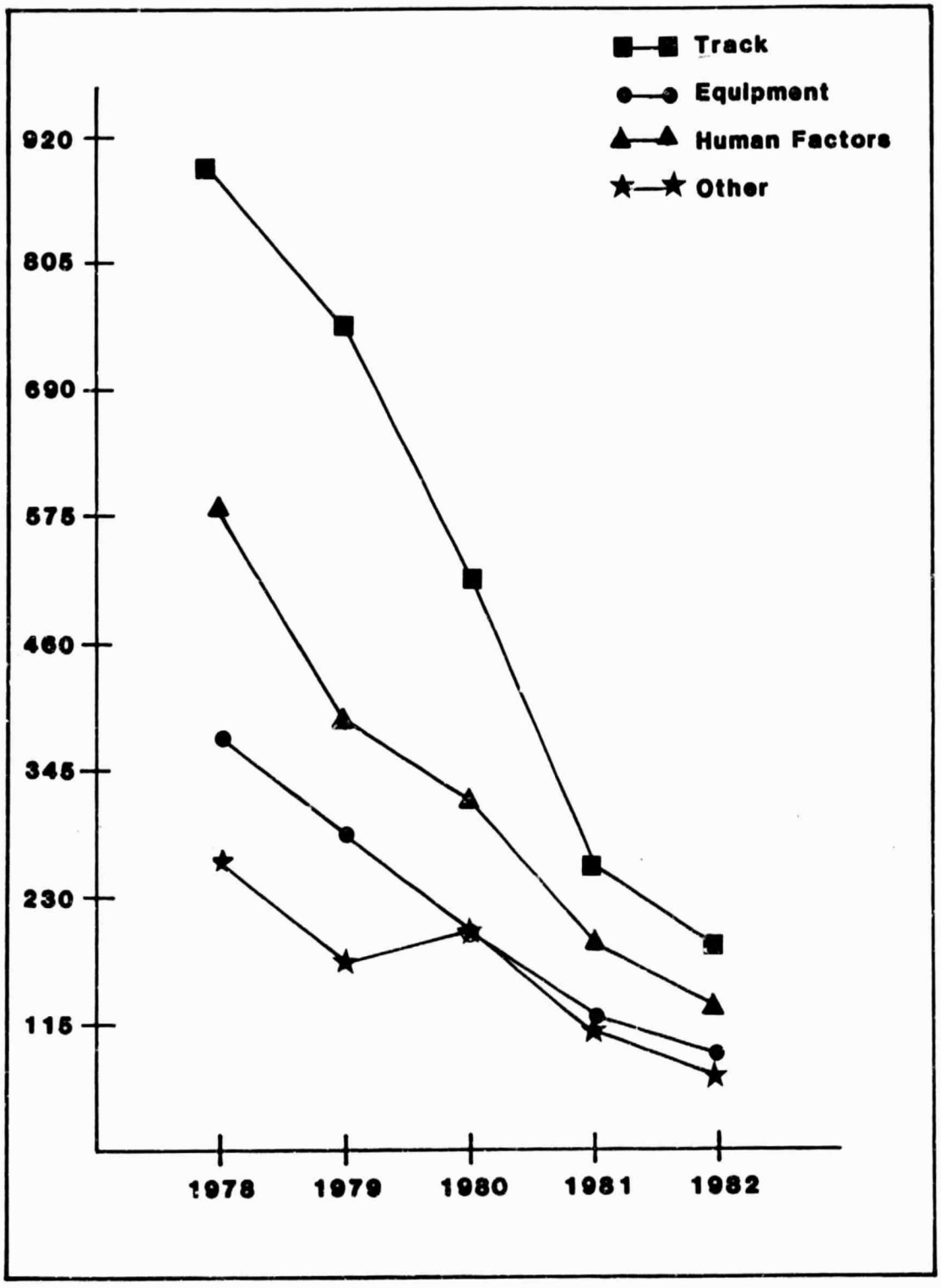
1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 3 shows that there has been a continuing decrease in the number of train accidents by cause with the exception of other miscellaneous cause which had an increase in 1980.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change data for Region 3 indicates that the number of persons killed and injured in train accidents from 1981 to 1982 decreased by 40 percent and 64.3 percent respectively, while on the National level the change was 22.2 percent for persons killed and 16 percent for persons injured. Furthermore, the number of hazardous material releases decreased by 64.7 percent in Region 3 from 1981 to 1982, where the

National level decreased by 23.4 percent. Since the Regional data indicates that the overall safety trends are superior to the National level safety trends, discuss past safety programs which the Region has utilized to accomplish this safety record.



REGION 3

Summary of Train Accidents By Cause

For 1978 Thru 1982

National and Regional Safety Trends
Region 3

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	76.8	15.2
ACCIDENTS CAUSED BY TRACK	63.1	22.2	79.2	28.9
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	57.6	13.4
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	64.4	30.1
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	55.9	15.9
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	89.1	40.0
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	83.6	64.3
NUMBER OF HAZ MAT RELEASES	57.2	23.4	80.6	64.7

\+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

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- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

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REGION 3

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AGS	CRE	1.26	0.95	0.33	2.27	12.67
ATC		5.35	0.00	0.00	0.00	0.00
ATK	BAL	3.50	0.00	0.00	0.00	13.75
ATK	SOU	0.00	3.71	0.00	0.00	8.68
BN	MEM	1.23	2.06	0.78	0.05	0.43
CAGY		0.23	3.90	2.22	3.69	0.00
CCO		2.90	4.73	2.42	2.64	0.74
CCO	CLI	0.00	4.73	0.00	2.72	0.00
GA	MAI	4.84	0.39	4.64	3.72	0.45
ICG	ALA	4.44	2.84	2.94	3.16	0.00
ICG	DEL	0.97	1.55	0.00	3.16	1.31
ICG	KEN	1.64	1.81	4.70	5.06	0.00
ICG	MID	0.12	0.26	8.06	0.65	0.00
ICG	MIS	2.13	1.55	3.97	9.52	0.81
ICG	ST	0.00	0.00	0.00	7.43	0.00
LN	ATL	1.24	3.10	5.44	2.45	0.56
LN	BIR	2.31	0.96	0.68	0.95	0.93
LN	COR	3.38	7.64	8.57	6.36	0.37
LN	EVA	0.39	0.72	3.40	0.34	0.28
LN	LOU	0.90	3.82	0.68	0.73	1.03
LN	MOB	4.67	5.25	0.54	3.65	0.75
LN	NAS	0.68	3.10	1.90	2.88	0.37
SBD	NAS	0.08	0.00	0.00	3.41	0.26
SCL	ATL	7.25	4.07	3.86	0.65	3.88
SCL	FLO	0.53	0.45	0.90	0.33	12.35
SCL	JAC	3.57	0.23	4.89	6.79	1.41
SCL	RAL	8.74	4.52	0.77	0.94	1.68
SCL	ROC	3.41	0.00	6.56	2.93	1.68

REGION 3 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
SCL	SAV	9.59	1.36	1.80	1.46	12.00
SCL	SOU	0.00	0.00	0.00	8.95	0.00
SCL	TAM	0.91	13.79	1.29	0.53	7.59
SCL	WAY	4.21	3.84	0.64	0.33	0.00
SLSF	SOU	1.00	1.70	0.24	2.75	1.33
SOU	ALA	1.05	1.70	2.67	0.15	1.99
SOU	PIE	2.33	0.43	1.70	0.00	1.66
SOU	TEN	0.80	1.49	5.57	0.61	1.99
WA	AWP	0.00	0.00	4.93	0.00	0.00

REGION 3

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AGS	CRE	0.39	0.65	2.06	0.33	0.00
AWP	ATL	0.00	2.29	0.00	0.00	0.00
BN	MEM	2.78	2.08	1.27	1.89	0.00
CCO		13.41	1.06	4.37	3.67	12.15
CGA	GEO	0.00	0.25	0.34	0.38	5.68
CO	WES	1.24	7.82	24.08	10.10	0.00
GA	MAI	3.14	1.74	0.00	2.17	0.00
ICG	ALA	1.57	3.19	5.97	5.23	0.00
ICG	DEL	3.66	2.61	1.99	6.34	0.00
ICG	KEN	4.18	0.58	1.19	3.00	0.00
ICG	MIS	0.52	0.72	0.80	2.00	0.00
ICG	ST	0.00	0.00	0.00	2.23	0.00
LN	ATL	3.39	2.41	1.47	2.57	0.00
LN	BIR	0.00	0.27	0.74	0.31	18.42
LN	CIN	0.97	0.27	2.21	1.03	0.00
LN	COR	0.00	1.74	0.37	2.37	0.00
LN	EVA	2.90	1.07	0.74	0.82	0.00
LN	MOB	1.45	2.28	1.47	1.03	0.00
LN	NAS	2.[illegible]	1.07	4.42	0.62	0.00
LN	TIL	0.97	2.15	1.47	2.16	0.00
SBD	RAL	2.03	0.88	0.00	0.34	0.00
SCL	ATL	5.50	4.32	0.70	2.05	0.00
SCL	FLO	2.29	2.67	1.74	0.19	0.00
SCL	HAM	0.46	2.03	2.09	0.39	0.00
SCL	TAM	1.37	6.09	4.53	1.85	0.00
SCL	WAY	2.29	2.29	11.16	2.14	0.00
SCL	WY	0.46	0.51	2.44	0.00	0.00
SLSF	MEM	3.44	2.15	3.28	1.28	0.00

REGION 3 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
SOU	ALA	6.90	4.06	0.98	1.93	10.94
SOU	COA	2.59	3.17	0.66	2.39	0.00
SOU	EAS	3.02	0.60	0.33	0.37	5.47
SOU	GEO	2.16	3.76	0.33	1.65	0.00
SOU	PIE	0.43	2.39	0.66	2.61	0.00
SOU	TEN	4.31	3.58	0.00	3.49	27.36

REGION 3

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AN		0.00	0.00	0.00	11.17	0.00
AN NEW		0.00	0.00	0.00	11.17	0.00
AN YAR		22.40	0.00	0.00	0.00	0.00
CARR		0.00	4.82	0.00	0.00	0.00
CCR		12.72	0.00	0.00	0.00	0.00
ECBR		0.00	54.33	0.00	0.00	0.00
ECBR	SYS	0.00	16.30	0.00	0.00	0.00
GANO	COA	0.00	0.00	0.00	4.17	0.00
GM	GAI	0.00	0.00	0.00	6.61	0.00
HB		0.00	0.00	0.00	16.18	0.00
NTR		0.00	0.00	0.00	11.00	0.00
PI	KEN	0.00	0.00	0.00	23.51	0.00
SAN	COA	0.00	10.87	0.00	0.00	0.00
TASD	MOB	0.00	13.68	100.00	0.00	0.00
TWRY		64.88	0.00	0.00	16.18	0.00

REGION 3

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AN		0.00	49.11	0.00	10.62	0.00
AN	SYS	0.00	0.00	64.91	0.00	0.00
ARC	SYS	0.00	15.69	0.00	0.00	0.00
CARR		0.00	0.00	0.00	2.28	0.00
CCR		13.56	0.00	0.00	2.01	0.00
FCIN		0.00	0.00	0.00	5.13	0.00
HB		0.00	0.00	0.00	10.25	0.00
HPTD	SYS	0.00	0.00	0.00	0.00	100.00
MSV	MSV	0.00	0.00	0.00	7.15	0.00
PI	KEN	0.00	11.48	0.00	40.95	0.00
SAN		51.87	0.00	0.00	0.00	0.00
TTIS		0.00	0.00	35.09	0.00	0.00
TWRY		34.58	23.71	0.00	20.50	0.00

REGION 4 - CHICAGO

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

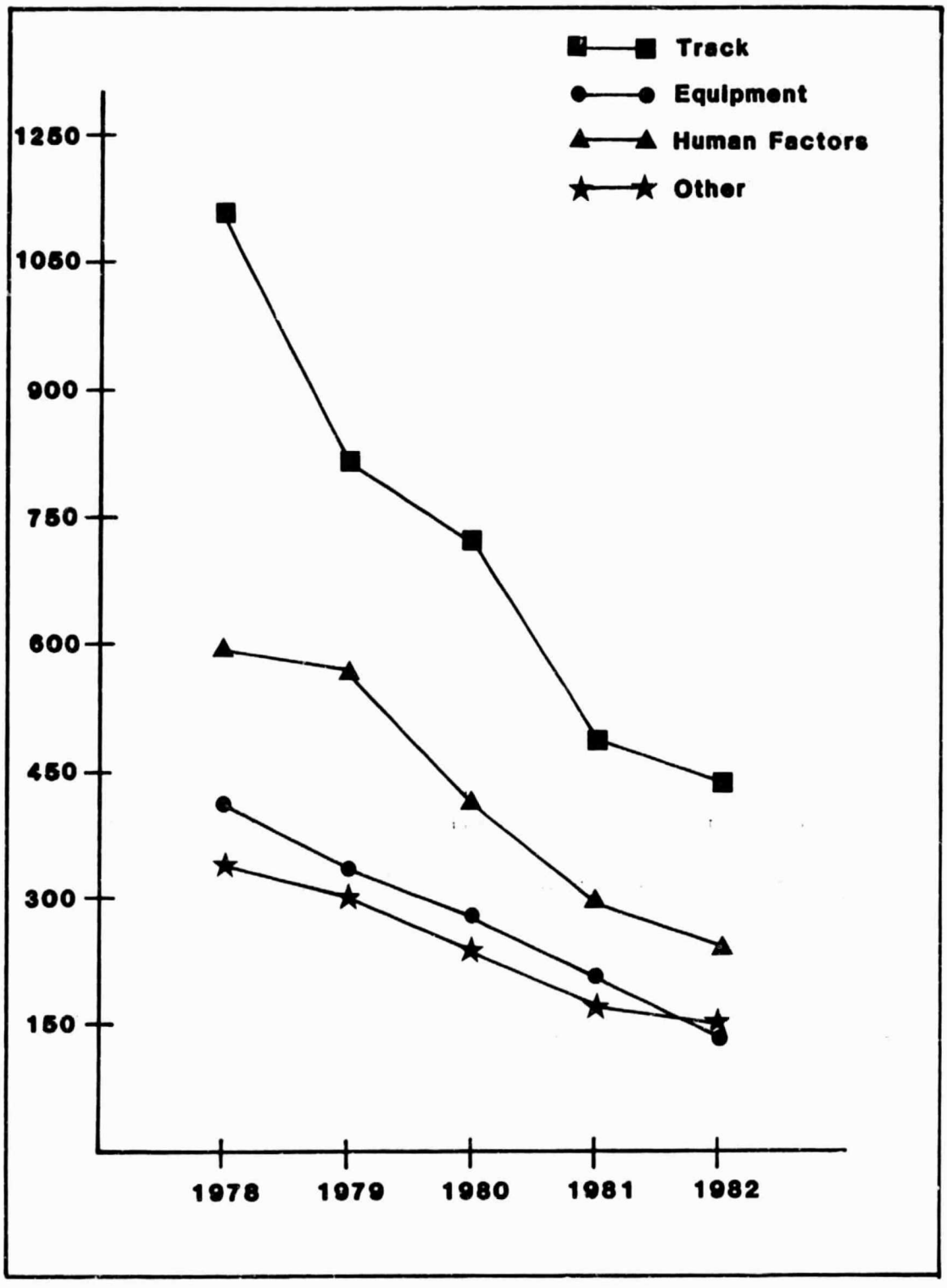
This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 4 indicates that there has been a significant decrease in the number of accidents from 1978 to 1982. The greatest have occurred in the areas of track and human factors.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change chart for Region 4 reveals that the number of persons killed and injured in train accidents significantly decreased above that National level from 1981 to 1982. Discuss the past safety programs which the Region has utilized to accomplish this safety record in the "Regional Statistical Overview" Section of the 1984 Regional Inspection Plan.



REGION 4

Summary of Train Accidents By Cause

For 1978 Thru 1982

National and Regional Safety Trends
Region 4

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	59.8	15.2
ACCIDENTS CAUSED BY TRACK	63.1	22.2	60.5	10.7
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	57.6	13.4
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	64.4	30.1
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	55.9	19.0
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	70.6	58.3
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	91.9	28.2
NUMBER OF HAZ MAT RELEASES	57.2	23.4	52.4	28.6

\+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 4

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	MID	0.57	3.43	12.09	0.00	14.56
ATK	ST	0.00	10.30	0.00	0.00	0.00
ATSF	CHI	0.00	3.98	0.00	0.00	0.00
ATSF	ILL	0.42	0.00	0.04	0.05	3.73
BN	CHI	11.37	8.52	21.96	1.46	2.95
BN	GAL	0.34	0.13	7.68	1.03	0.00
BN	MIN	1.49	4.77	6.69	1.05	0.10
BO	WES	3.01	0.70	3.69	3.98	0.09
CNW	ILL	2.47	1.12	2.32	3.16	0.03
CNW	TWI	5.24	2.46	1.70	5.96	0.12
CNW	WIS	3.78	3.13	0.83	2.77	0.15
CO	MIC	4.03	0.71	4.47	4.43	0.09
CO	WES	3.08	0.28	0.08	1.74	0.00
CR	CHI	0.78	1.43	3.30	1.38	2.61
CR	MIC	1.26	1.04	0.36	3.73	7.53
CR	MID	0.00	0.00	0.00	3.61	0.00
CR	SOU	5.30	2.08	1.16	1.52	1.56
CSS	WES	0.00	0.00	3.21	0.00	1.17
GTW	CHI	2.38	15.78	0.13	1.14	0.38
ICG	ILL	3.36	0.00	0.40	12.29	0.05
ICG	IOW	0.24	0.12	0.13	2.05	0.00
ICG	MID	0.34	0.00	0.00	14.01	0.00
ICG	ST	0.60	0.24	0.09	1.33	5.02
MILW	IL	0.99	0.00	0.00	0.37	11.47
MILW	ILL	1.26	0.27	4.48	0.56	4.31
MILW	MIN	1.26	0.27	0.20	2.30	0.18
MILW	NOR	3.64	0.67	1.29	1.15	0.35
MILW	PAS	0.00	0.00	0.40	0.00	11.23

REGION 4 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
MILW	PSG	0.00	0.00	0.00	0.00	7.82
MILW	SOU	2.97	3.76	0.00	0.81	0.30
MILW	WIS	3.51	5.38	2.49	1.37	0.21
MP	ILL	2.73	1.73	1.42	1.95	0.06
NW	DEC	1.78	0.13	2.15	1.67	0.02
SOO	CEN	3.29	0.59	0.66	4.33	0.26
SOO	EAS	9.62	9.94	1.24	4.19	0.31

REGION 4

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AWN	ENO	0.00	21.01	0.00	0.00	12.82
CWI		5.35	0.00	0.00	1.96	0.00
CWI	CHI	0.00	26.15	6.44	9.80	0.00
DNE		0.00	0.00	0.00	0.00	6.38
DTS	TOL	55.09	16.38	0.00	0.00	0.00
ELS		13.20	0.00	21.17	11.28	26.33
LSI		0.00	0.00	4.05	1.23	0.00
LSTT	SYS	0.00	0.00	0.00	3.92	0.00
LSTT	WIS	8.03	0.00	0.00	9.80	0.00
MIGN	NOR	1.67	0.00	28.08	0.00	0.00
MIGN	SOU	1.67	0.00	12.03	1.22	0.00
MNS		0.00	36.36	8.92	1.36	0.00
MTFR		0.00	0.00	0.00	10.58	0.00
PACY		0.00	0.00	0.00	16.67	0.00
TSBY		0.00	0.00	0.00	0.00	23.08
TSBY	ANN	0.00	0.00	0.00	0.00	15.39
WSRY		5.35	0.00	0.00	3.92	0.00
WSRY	EAS	2.68	0.00	0.00	1.96	0.00
WSRY	FIF	0.00	0.00	0.00	3.92	0.00
WSRY	FIR	5.35	0.00	0.00	1.96	16.01
WSRY	THI	0.00	0.00	19.32	0.00	0.00

REGION 4

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ALS	ALT	1.36	3.17	12.99	2.25	0.00
ATK	MID	2.74	0.11	1.75	0.02	0.00
BN	CHI	2.32	2.08	3.63	1.59	0.00
BN	MIN	3.29	2.14	2.46	1.30	0.00
BN	WIS	2.71	0.82	3.63	1.28	0.00
BO	NEW	0.00	0.06	0.14	0.04	31.19
BOCT	CHI	0.00	0.93	1.20	0.34	21.90
BRC		4.59	7.34	5.72	5.22	0.00
CNW	CHI	4.76	5.78	3.19	4.53	0.00
CNW	ILL	2.38	1.54	1.14	1.95	0.00
CNW	TWI	4.76	3.37	4.10	8.89	0.00
CNW	WIS	4.25	2.17	2.28	4.10	0.00
CO	MIC	3.23	1.65	1.23	0.56	0.00
CR	CHI	1.78	2.80	2.65	1.25	0.00
EJE	G&S	3.12	1.05	6.01	1.90	0.00
GTW	CHI	4.38	2.95	1.21	0.84	0.00
GTW	DET	0.52	3.47	0.52	0.64	0.00
ICO	CHI	0.00	0.36	0.24	2.44	0.00
ICG	ST	0.91	6.89	0.12	1.29	0.00
IHB	EAS	3.09	0.66	0.26	1.78	0.00
ITC	SOU	0.59	0.67	0.39	2.37	0.00
MILW	ILL	1.63	2.31	4.66	2.58	0.00
MILW	MIN	1.63	2.55	3.29	1.88	0.00
MILW	NOR	2.86	3.12	4.38	5.20	0.00
MILW	SOU	0.82	2.26	1.51	2.15	0.00
MILW	WIS	3.27	1.85	2.46	3.21	0.00
NW	ST	0.29	0.11	0.00	0.15	14.05
SOO	CEN	1.94	5.34	1.40	2.03	0.00

REGION 4 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
SOO	EAS	5.53	2.33	2.61	1.60	0.00
SOO	WES	0.15	0.30	0.30	0.11	10.95
SSW	COT	2.83	0.27	0.42	1.39	0.00

REGION 4

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
CHIT	CHI	2.69	0.00	0.00	0.64
CIW	CHI	0.00	0.00	0.00	10.68
CN	ASS	0.00	12.26	0.00	0.00
CWI		8.22	24.61	0.00	3.90
CWI	CHI	0.00	30.77	0.00	3.90
ELS		10.14	0.00	0.00	1.60
LSI		0.00	7.74	0.00	6.13
LSTT	CEN	0.00	0.00	0.00	3.90
LSTT	TWI	0.00	0.00	0.00	3.90
LSTT	WIS	24.67	14.61	0.00	5.85
MIGN	CAD	0.00	0.00	0.00	6.08
MNS		0.00	0.00	0.00	4.05
MTFR		44.38	0.00	0.00	10.35
PACY		0.00	0.00	0.00	9.76
WSRY	EAS	0.00	0.00	0.00	3.90
WSRY	4TH	8.22	0.00	0.00	1.95
WVRC	WVR	0.00	0.00	0.00	9.32

REGION 5 - FORT WORTH

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

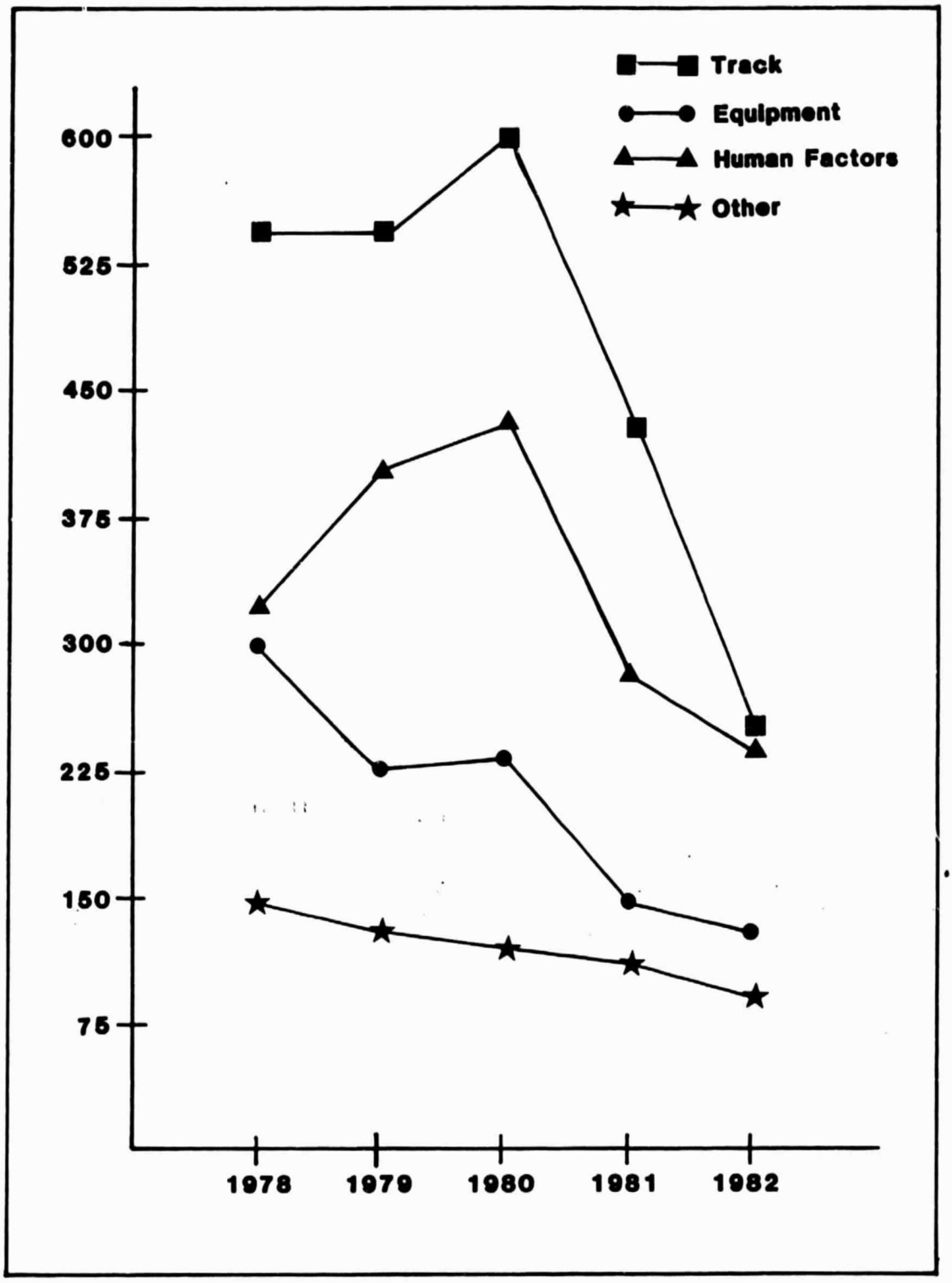
This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 5 indicates that the number of accidents in Region 5 which occurred during 1982 was lower than the number of accidents which occurred during 1978. However, the Region experienced an increase in the number of accidents caused by track, equipment, and human factors during 1980. Since 1980, the safety record for Region 5 has significantly improved. In the "Regional Statistical Overview" Section of the 1984 Regional Inspection Plan (RIP), discuss the Regional deficiencies or weaknesses that existed in Region 5 and what corrective action were taken by the Region to accomplish its present safety record.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change data for Region 5 indicates that the number of persons injured in train accidents decreased by 47 percent from 1981 to 1982; while on the National level, the decrease was by 16 percent. Discuss the past safety programs which the Region has utilized to accomplish this safety record in the 1984 RIP. Since the percent changes from 1981 to 1982 for the number of train accidents caused by equipment and the number of persons killed in train accidents are lower than the National level, determine where the Regional weaknesses exist and discuss what corrective actions are planned for 1984.



REGION 5

Summary of Train Accidents By Cause

For 1978 Thru 1982

National and Regional Safety Trends
Region 5

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	42.7	22.6
ACCIDENTS CAUSED BY TRACK	63.1	22.2	48.3	34.3
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	25.3	14.5
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	55.4	12.5
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	35.1	11.9
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	46.7	11.1
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	51.2	47.0
NUMBER OF HAZ MAT RELEASES	57.2	23.4	63.9	18.8

\+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 5

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	MID	0.00	0.00	8.24	0.00	14.23
ATK	ST	0.00	0.00	0.00	0.00	3.56
ATK	WES	0.00	6.53	0.00	0.00	0.00
ATSF	COL	0.20	6.28	0.19	0.18	0.00
ATSF	NOR	1.61	1.89	0.67	3.66	0.69
ATSF	PLA	5.11	1.82	3.92	4.31	1.51
ATSF	SOU	2.57	6.13	1.72	2.62	1.71
BN	TUL	0.36	2.03	1.47	3.06	1.10
ICG	MIS	1.55	0.00	1.61	2.74	8.50
ICG	SOU	0.68	0.00	7.34	0.82	0.00
KCS	FIF	0.88	4.06	8.96	4.48	0.00
KCS	FOU	2.45	2.58	5.58	1.23	0.00
KCS	SEC	1.18	0.55	6.05	0.69	0.00
KCS	THI	2.74	3.13	1.40	2.74	0.00
LA	TEX	0.79	1.49	8.34	0.19	0.00
MKT	SOU	0.99	3.03	0.20	2.35	1.41
MP	ARK	1.60	0.56	0.12	5.44	0.77
MP	CEN	0.55	4.23	0.00	1.18	0.34
MP	DEQ	0.15	3.01	0.24	0.48	0.43
MP	KIN	1.60	0.94	0.47	2.03	0.34
MP	LOU	0.45	0.19	0.47	2.80	0.16
MP	MID	0.00	0.00	0.00	5.16	0.00
MP	NEW	2.35	1.03	0.00	0.44	0.17
MP	PAL	2.90	0.19	0.83	2.17	0.98
MP	RED	4.95	2.07	4.51	2.84	0.43
MP	RIO	1.50	2.45	0.59	2.99	1.20
SP	HOU	5.08	6.07	3.42	9.00	3.60
SP	LAF	1.75	1.85	1.67	4.01	29.25

REGION 5 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
SP	SAN	22.65	10.69	11.83	5.61	4.44
SP	TUC	4.56	0.59	3.75	0.26	0.72
SSW	COT	10.18	4.41	4.38	2.41	10.09

REGION 5

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ARW		0.00	0.00	0.00	40.11	0.00
BRR	BEL	0.00	0.00	60.50	0.00	0.00
DQE	D&E	0.00	28.39	0.00	2.91	0.00
DQE	DQE	0.00	0.00	39.50	0.00	0.00
EACH	ARK	0.00	17.55	0.00	0.00	0.00
FP	SYS	0.00	0.00	0.00	4.26	0.00
GHH	DEQ	0.00	0.00	0.00	4.46	0.00
LNW		0.00	0.00	0.00	0.00	100.00
LNW	SYS	86.20	0.00	0.00	0.00	0.00
LRWN		0.00	0.00	0.00	4.46	0.00
NCTR	FOR	0.00	0.00	0.00	10.15	0.00
NCTR	SYS	0.00	39.61	0.00	0.00	0.00
NLG	HOD	0.00	0.00	0.00	5.27	0.00
NLG	SYS	0.00	0.00	0.00	5.27	0.00
RSS		0.00	0.00	0.00	4.49	0.00
SRN	SYS	5.25	0.00	0.00	0.00	0.00
TOE	TOE	0.00	14.45	0.00	0.00	0.00

REGION 5

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
BN	TUL	0.49	1.53	2.92	0.61	0.00
FWD	FOR	1.15	0.75	2.10	0.88	0.00
HBT	HOU	5.57	8.02	4.08	2.29	18.13
ICG	MIS	0.46	1.20	2.11	3.70	0.00
KCS	SEV	1.40	2.31	1.71	1.43	15.22
LA	BAT	1.26	1.85	1.53	1.76	13.64
LA	TEX	2.10	1.20	0.77	0.25	0.00
MKT	SOU	2.76	3.17	0.00	2.15	0.00
MP	DEQ	2.62	1.30	0.44	0.37	0.00
MP	KIN	2.62	1.80	10.91	1.10	0.00
MP	LIT	3.82	0.80	3.93	0.66	0.00
MP	NEW	3.58	0.56	0.00	2.19	0.00
MP	RIO	5.97	0.68	1.75	0.64	0.00
OKT		0.89	0.46	1.62	2.20	0.00
PTRA		4.42	2.46	2.31	0.60	0.00
PTRA	HOU	0.00	6.63	0.00	1.63	0.00
SPA	HOU	23.11	16.38	12.85	0.41	21.79
SP	LAF	3.68	7.30	7.96	17.70	0.00
SP	RIO	0.00	0.00	0.00	4.16	0.00
SP	SAN	4.52	4.43	2.76	4.23	0.00
SP	TUC	6.36	4.04	3.67	1.73	0.00
SSW	COT	4.70	7.11	12.43	5.93	0.00

REGION 5

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
ARW		0.00	0.00	0.00	5.74
BXN		0.00	3.69	0.00	0.00
DQE	D&E	0.00	0.00	0.00	3.74
DQE	DQE	0.00	0.00	0.00	3.74
EACH		0.00	9.45	0.00	4.63
FSVB		0.00	11.71	0.00	0.00
GHH		0.00	11.71	0.00	5.74
GHH	GAL	0.00	0.00	11.71	0.00
GHH	HOU	0.00	0.00	0.00	11.47
GHH	SOU	0.00	0.00	0.00	5.74
GWF	SYS	0.00	6.04	0.00	2.96
LRWN		0.00	0.00	76.12	0.00
LRWN	SYS	0.00	0.00	0.00	5.74
NCTR	SYS	0.00	10.66	0.00	0.00
NCTR	TEX	0.00	0.00	0.00	5.22
NOPB		0.00	0.00	7.02	0.00
TCT		0.00	0.00	0.00	9.35
TN		100.00	0.00	0.00	7.96
TOE	TOE	0.00	23.33	16.86	7.62
WRRC	STO	0.00	11.71	0.00	0.00

REGION 6 - KANSAS CITY

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

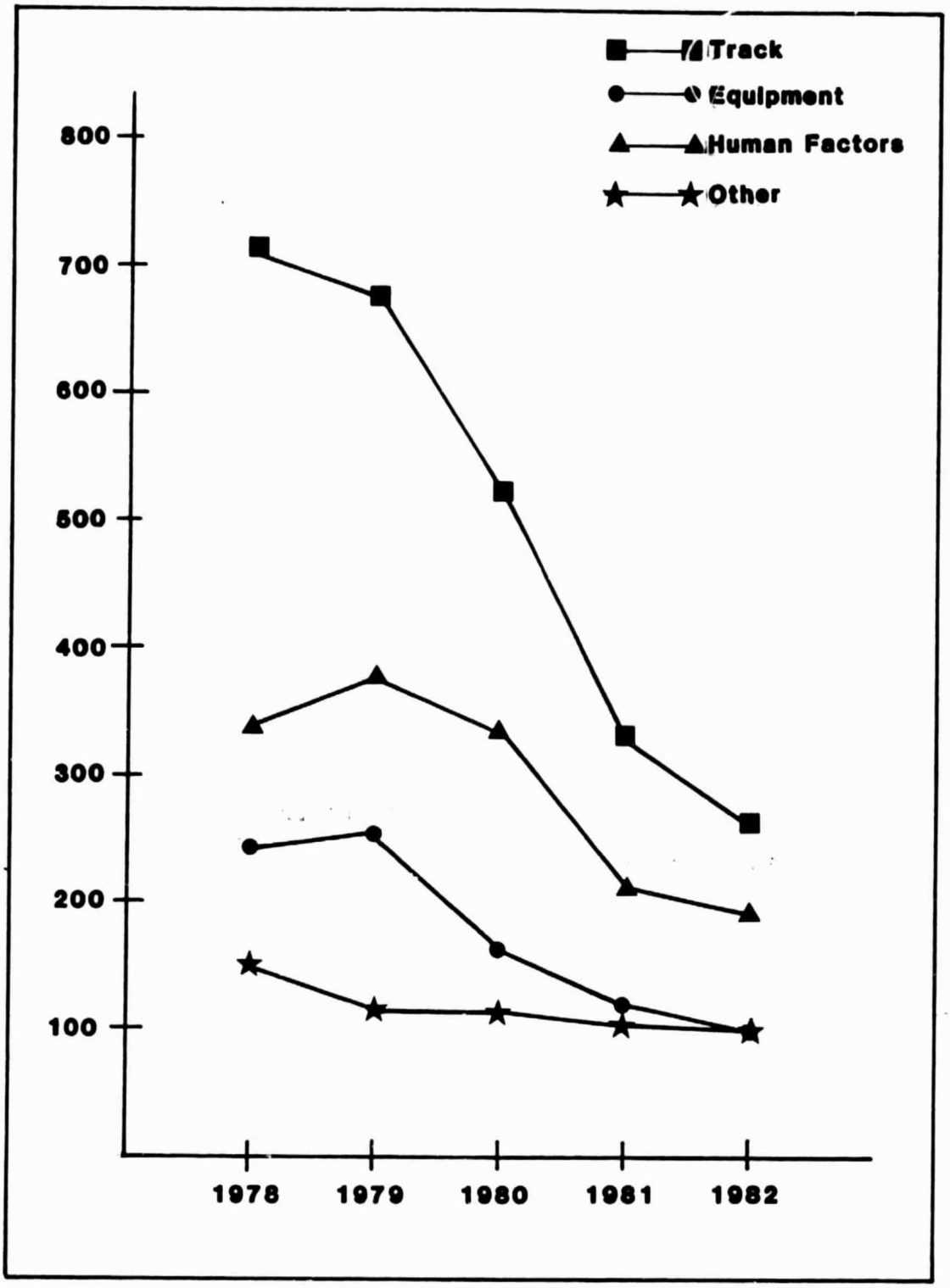
1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 6 indicates that the number of accidents which occurred during 1982 was lower than the number of accidents which occurred during 1978. However, the Region experienced an increase in the number of accidents caused by human factors and equipment during 1979. Since 1980, the safety record for Region 6 has improved. In the "Regional Statistical Overview" Section of the 1984 Regional Inspection Plan (RIP), discuss the Regional deficiencies that existed in Region 6 and what corrective actions were taken by the Region to accomplish its present safety record.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change chart for Region 6 indicates that the number of persons killed in train accidents and the number of hazardous material releases has significantly

increased from 1981 to 1982. Furthermore, there has been no significant decrease in these areas from 1978 to 1982. Determine where Regional deficiencies exist and discuss what corrective actions are planned for 1984 in the "Regional Statistical Overview" of the RIP.



REGION 6

Summary of Train Accidents By Cause
For 1978 Thru 1982

National and Regional Safety Trends
Region 6

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	54.7	16.2
ACCIDENTS CAUSED BY TRACK	63.1	22.2	62.4	19.3
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	44.0	10.8
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	59.8	21.8
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	34.0	11.0
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	42.8	33.3
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	3.0	53.8+
NUMBER OF HAZ MAT RELEASES	57.2	23.4	0.0	50.0+

+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 6

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	MID	4.27	0.00	3.42	0.00	0.00
ATK	NEB	0.00	0.00	0.00	0.00	6.11
ATK	ST	0.00	0.00	0.00	0.00	8.73
ATK	WES	0.00	0.00	10.27	0.00	21.83
ATSF	COL	1.03	1.29	12.49	0.07	9.62
ATSF	EAS	1.73	1.29	3.97	1.99	0.10
ATSF	KAN	0.00	2.72	0.00	0.00	0.00
BN	ALL	1.27	12.33	3.55	0.90	0.84
BN	COL	10.21	2.40	4.39	3.80	1.29
BN	GAL	1.63	0.83	13.78	0.00	0.00
BN	NEB	2.53	4.05	1.61	7.92	10.09
BN	OTT	6.49	1.16	0.59	1.09	0.00
BN	SPR	6.01	7.94	0.34	1.62	0.91
CNW	CEN	4.55	4.95	2.08	12.37	0.80
CNW	IOW	6.96	3.20	3.42	3.88	2.85
CNW	TWI	0.19	0.58	0.00	2.59	0.00
CS	COL	0.64	3.60	1.74	0.86	0.00
DRGW	COL	0.24	3.30	0.19	0.14	0.00
ICG	ST	0.10	0.00	3.18	0.04	0.00
KCS	FIR	0.00	0.32	0.97	2.16	0.00
KCS	SEC	1.21	5.68	0.32	1.76	0.12
MILW	ILL	5.35	5.94	2.50	6.39	0.27
MILW	MIN	0.00	1.05	0.18	2.93	0.00
MILW	SOU	4.68	2.62	3.30	5.50	1.09
MP	ARK	2.62	0.97	9.94	0.33	5.03
MP	CEN	0.41	0.64	0.33	2.33	0.00
MP	NOR	4.56	3.78	1.31	4.76	7.55
MP	ST	2.15	0.64	0.25	0.08	0.00

REGION 6 (CONT'D)

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
NW	MOB	0.05	1.15	1.18	3.13	0.00
SLSF	EAS	4.65	1.02	0.00	0.58	0.00
TRRA	MER	0.12	2.26	0.19	0.10	0.00
UP	KAN	2.52	1.85	0.15	1.05	0.67
UP	NEB	4.09	6.41	2.47	1.52	1.28
UP	WYO	0.18	0.29	0.22	0.00	18.11

REGION 6

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
DMU	SYS	0.00	0.00	0.00	3.72	0.00
DRI	CHI	0.00	0.00	0.00	3.72	0.00
DRI	DRI	11.23	0.00	33.33	3.72	0.00
DRI	FIR	0.00	0.00	33.33	0.00	0.00
DRI	IL-	0.00	0.00	0.00	3.72	0.00
DRI	ILL	0.00	0.00	0.00	3.72	0.00
DRI	SOU	0.00	0.00	0.00	3.72	0.00
DRI	IST	16.84	3.68	0.00	7.43	0.00
GWR		0.00	0.00	0.00	0.00	12.39
GWR	SOU	0.00	0.00	0.00	0.00	37.16
GWR	SYS	0.00	0.00	0.00	0.00	24.77
IRRC	CEN	0.00	0.00	0.00	0.00	25.68
KCT		33.68	90.06	33.33	39.02	0.00
KCT	KAN	0.00	0.00	0.00	11.15	0.00
KCT	KC	0.00	0.00	0.00	3.72	0.00
KCT	NOR	0.00	0.00	0.00	3.72	0.00
KYLE	SYS	38.26	6.26	0.00	12.67	0.00

REGION 6

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
DMU		33.33	15.15	50.00	5.32
DRI	CHI	0.00	0.00	0.00	5.32
DRI	DRI	33.33	7.58	0.00	0.00
DRI	FIR	33.33	0.00	50.00	0.00
DRI	ILL	0.00	0.00	0.00	2.66
DRI	SOU	0.00	0.00	0.00	5.32
DRI	SYS	0.00	0.00	0.00	2.66
DRI	IST	0.00	7.58	0.00	5.32
IRRC	WES	0.00	0.00	0.00	2.87
KCT		0.00	7.58	0.00	3.99
KCT	CEN	0.00	0.00	0.00	5.32
KCT	ILL	0.00	0.00	0.00	2.66
KCT	KAN	0.00	0.00	0.00	15.97
KCT	MIL	0.00	0.00	0.00	7.98
KCT	OTT	0.00	0.00	0.00	2.66
KCT	ROC	0.00	0.00	0.00	2.66
KCT	SOU	0.00	0.00	0.00	5.32
KCT	SPR	0.00	0.00	0.00	5.32
SJT		0.00	60.61	0.00	0.00
SJT	CEN	0.00	0.00	0.00	18.63

REGION 6

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATSF	COL	6.34	1.26	3.76	0.35	15.57
ATSF	KAN	2.24	2.37	0.00	0.42	0.00
ATSF	MID	1.12	1.70	0.00	2.08	0.00
BN	ALL	0.95	3.13	0.00	0.66	0.00
BN	COL	3.34	4.04	6.58	3.14	9.95
BN	NEB	3.82	5.70	5.57	3.28	9.95
BN	SPR	3.82	4.24	6.08	1.73	0.00
CNW	CEN	6.71	12.60	12.91	20.32	17.50
CNW	ILL	2.52	2.13	2.23	2.73	0.00
CNW	IOW	9.23	8.96	15.14	14.02	0.00
CNW	WES	0.00	0.53	0.00	0.62	35.01
CS	COL	1.73	0.73	2.45	1.82	12.02
MILW	IL-	8.07	0.21	0.00	0.56	0.00
MILW	ILL	2.02	4.69	3.21	2.81	0.00
MILW	SOU	6.05	3.63	2.14	3.74	0.00
MKT	NOR	0.77	2.35	3.26	2.28	0.00
MP	KAN	4.64	4.76	2.95	2.97	0.00
MP	NOR	0.93	1.28	0.00	2.54	0.00
MP	ST	0.00	1.08	10.83	0.34	0.00
NW	ST	0.95	2.41	0.00	0.35	0.00
RI	DES	3.12	0.00	0.00	2.03	0.00
RI	MO	3.12	0.33	0.00	2.03	0.00
SLSF	NOR	0.00	2.81	1.57	0.82	0.00
SSW	KAN	9.72	0.00	0.83	2.16	0.00
SSW	ROC	0.78	6.08	0.83	1.59	0.00
TRRA		2.17	0.92	1.15	0.00	0.00
UP	KAN	3.29	2.52	2.18	0.50	0.00
UP	NEB	4.11	2.56	2.62	0.99	0.00

REGION 7 - SAN FRANCISCO

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

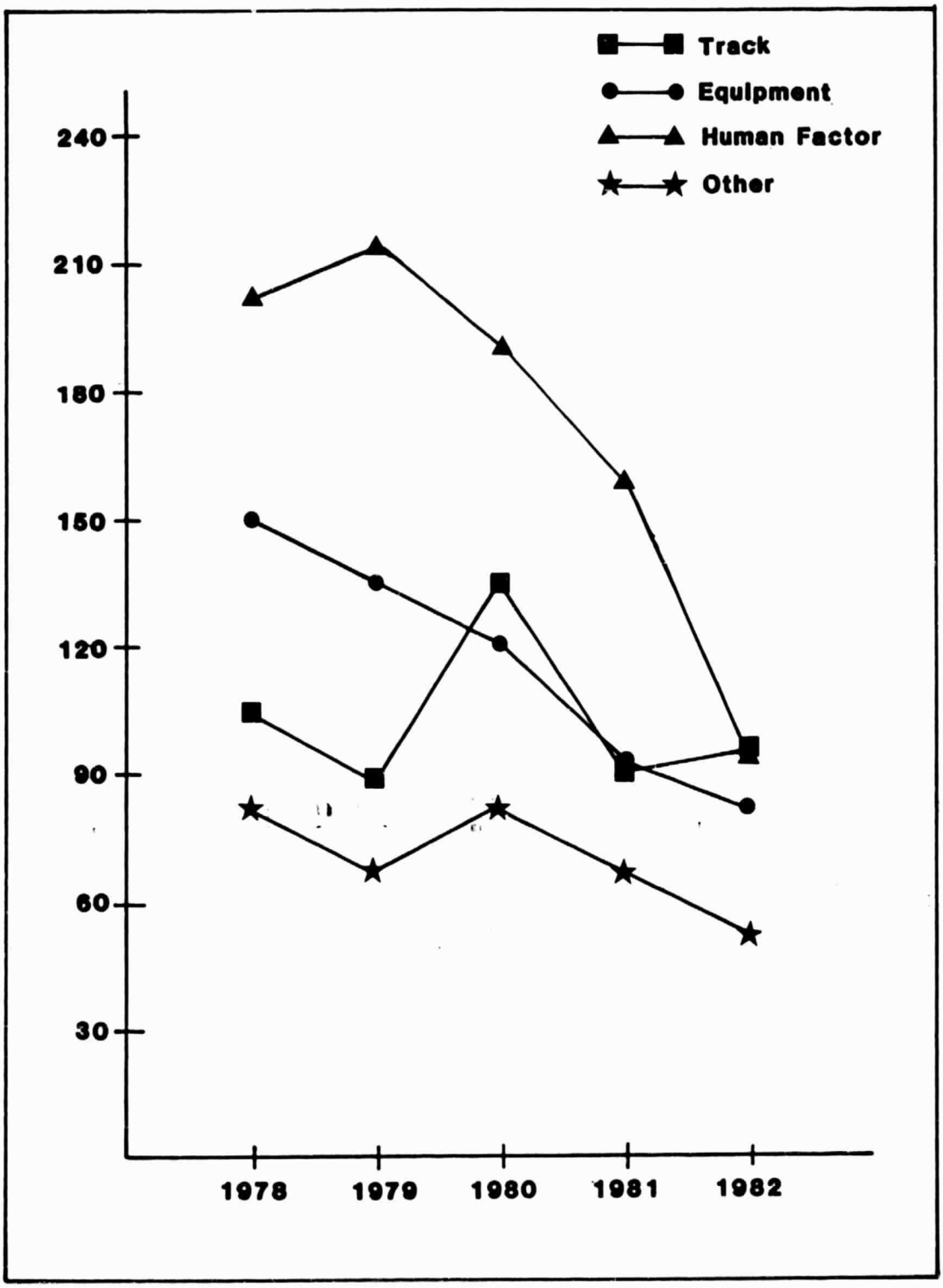
This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 7 indicates that the number of train accidents caused by equipment has steadily decreased from 1978 to 1982. The number of accidents due to human factors has significantly decreased from 1978 to 1982 despite a slight increase in 1979. Also, the number of accidents due to other miscellaneous causes have significantly decrease despite an increase in 1980. On the other hand, track caused accidents show no significant decrease from 1978 to 1982. Furthermore, the number of track caused accidents have increased from 1981 to 1982. In the "Regional Statistical Overview" Section of the 1984 Regional Inspection Plan (RIP), discuss the Regional deficiencies that exist in Region 7 and what corrective actions are planned for the upcoming year.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change chart for Region 7 indicates that the decrease in the number of track caused accidents from 1978 to 1982 is inferior to the National level. Furthermore, track caused accidents increased by 4 percent from 1981 through 1982. Also, the number of persons killed in train accidents increased by 14.3 percent from 1978 to 1982 and increased by 64.3 percent from 1981 to 1982. The number of persons injured in train accidents has increased by 30.4 percent from 1981 to 1982. Determine where Regional deficiencies exist and discuss what corrective actions are planned for the upcoming year in the 1984 RIP. The Region, however, has experienced a significant decrease in the number of hazardous material releases and in the number of accidents caused by human factors. These decreases are also significantly greater than the National level. In the 1984 RIP, discuss what safety programs Region 7 has utilized in the past to accomplish these safety records.



REGION 7
Summary of Train Accidents By Cause
For 1978 Thru 1982

National and Regional Safety Trends
Region 7

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	40.4	26.3
ACCIDENTS CAUSED BY TRACK	63.1	22.2	10.4	4.0+
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	54.2	41.0
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	44.4	10.6
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	37.8	21.5
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	14.3+	64.3+
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	32.5	30.4+
NUMBER OF HAZ MAT RELEASES	57.2	23.4	50.0	50.0

+ DENOTES AN INCREA

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 7

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	WES	0.00	3.05	0.00	0.13	97.19
ATSF	ALB	1.12	2.13	2.32	0.59	0.00
ATSF	LA	2.80	0.88	0.46	0.00	0.00
ATSF	LOS	3.36	3.09	1.86	1.18	0.00
ATSF	VAL	3.36	2.13	3.02	1.33	0.00
SP	LOS	34.71	34.78	25.94	42.51	2.81
SP	SAC	32.27	17.71	25.13	9.53	0.00
SP	SAN	0.00	1.54	0.00	2.32	0.00
SP	TUC	7.82	5.26	2.43	5.54	0.00
SP	WES	7.81	10.14	17.43	13.27	0.00
UP	CAL	2.47	7.62	3.58	4.07	0.00
UP	UTA	1.85	4.70	6.14	5.20	0.00
UP	WES	0.00	0.00	0.00	6.51	0.00
WP	WES	0.72	4.42	3.56	1.41	0.00

REGION 7

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATK	UTA	0.00	0.00	0.00	0.00	7.17
ATK	WES	0.00	0.00	32.95	0.00	25.98
ATSF	ALB	5.92	5.27	0.60	1.20	0.00
ATSF	LOS	2.37	15.50	12.50	1.64	7.71
ATSF	VAL	0.91	0.44	0.00	0.10	7.63
SP	LOS	23.05	24.88	2.71	7.73	11.05
SP	ORE	2.65	1.53	2.67	15.46	0.36
SP	SAC	13.78	9.44	15.99	1.09	1.63
SP	TUC	15.47	17.09	6.57	4.91	1.04
SP	WES	7.21	5.49	16.09	55.64	20.83
UP	UTA	10.64	4.19	2.34	0.69	9.26
WP	EAS	8.42	4.11	3.41	0.87	0.00
WP	WES	2.95	5.32	2.44	2.23	0.60

REGION 7

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
AMC	AMA	0.00	0.00	0.00	0.00	100.00
CBC		0.00	0.00	0.00	20.41	0.00
MCR		15.41	0.00	7.24	0.00	0.00
NN		30.52	0.00	0.00	66.89	0.00
SPAE		0.00	0.00	74.42	0.00	0.00
SDAE	EAS	0.00	0.00	7.44	0.00	0.00
SERA		8.38	0.00	0.00	0.00	0.00
SMV		10.94	0.00	0.00	0.00	0.00
STE	YAR	0.00	100.00	0.00	0.00	0.00
TRC		23.17	0.00	0.00	12.70	0.00
TRC	TRC	11.59	0.00	10.89	0.00	0.00

REGION 7

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
HBL	WIL	0.00	100.00	0.00	0.00	0.00
LAJ		0.00	0.00	100.00	0.00	0.00
LAJ	LA	0.00	0.00	0.00	100.00	0.00

REGION 8 - PORTLAND

REGIONAL STATISTICAL ANALYSIS REPORT

INTRODUCTION

This report provides the Region with results of analyzed accident data and guidelines on how to incorporate this data into the Regional Inspection Plan (RIP). It will not only provide information for the completion of the "Regional Statistical Overview" of the RIP, but should also be instrumental in assisting with the formulation of Regional objectives, locating areas where system and special assessments are necessary, and indicating major deficiencies. The report contains two sections:

- The Regional Overview contains data which deals with the overall safety picture and safety trends of the Region for the years 1978 through 1982. It will not only provide each Region with a general overview of their past and present safety trends, but will also allow each Region to compare their Regional safety trends to the National safety trends.

- The Regional Accident Data contains data which deals with specific problem areas within the Region.

REGIONAL OVERVIEW

This section contains a graph and a chart which depicts the overall safety trend of the Region for the years 1978 through 1982. The graph indicates the number of accidents by cause and year for the Region. The causes of the train accidents are classified into four categories:

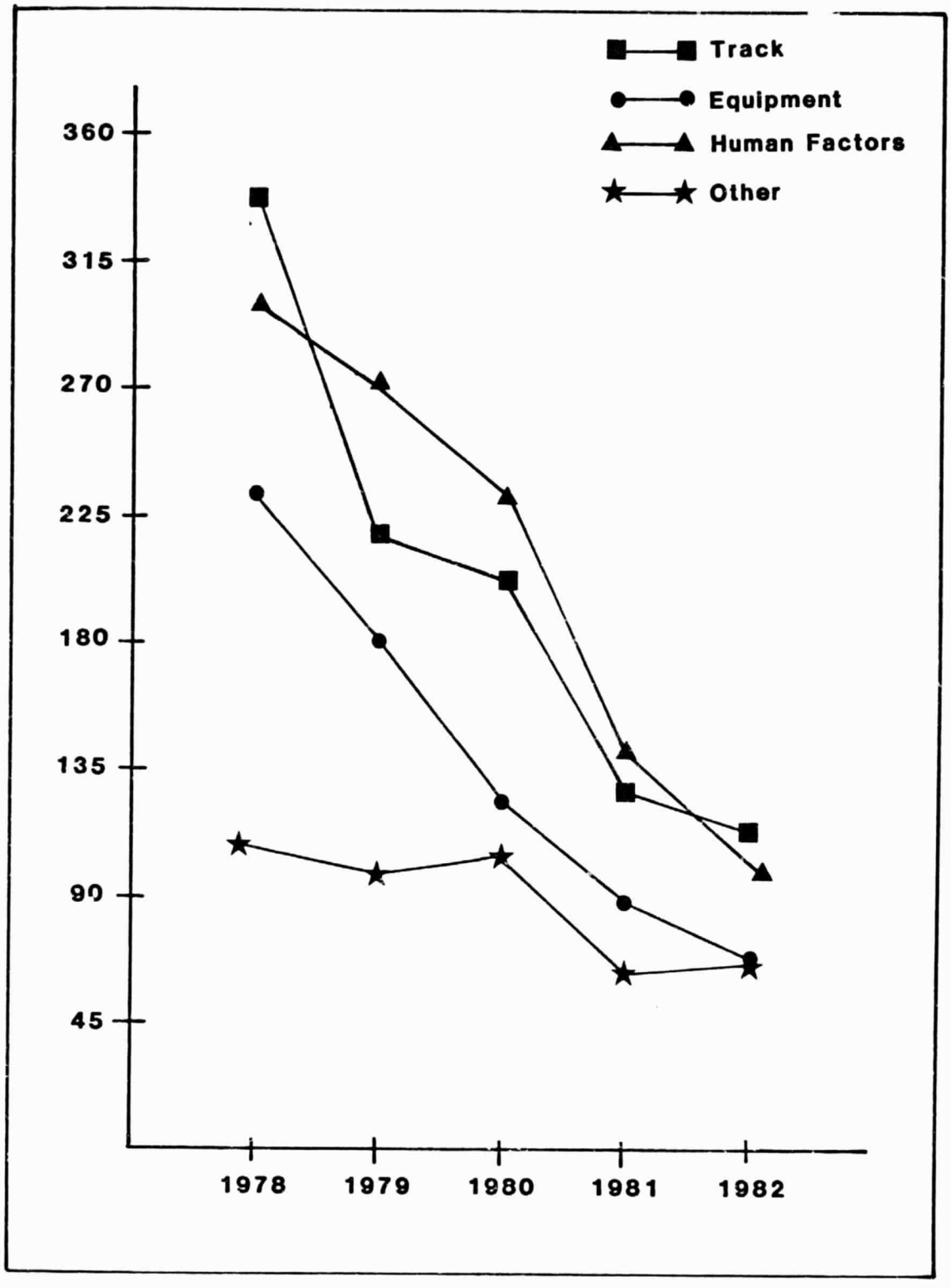
1. Track Accidents
2. Equipment Accidents
3. Human Factor Accidents
4. Other Accidents

The graph for Region 8 indicates that the number of accidents caused by track, human factors and equipment have continually decreased from 1978 to 1982. Accidents caused by other miscellaneous factors has decreased significantly from 1978 to 1982 despite slight increases in 1980 and 1982.

The chart in this section contains the percent changes on the National and Regional Levels for train accidents by cause, the number of persons killed in train accidents, the number of persons injured in train accidents, and the number of hazardous material releases due to train accidents. The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within a given year. For example, the total number of train accidents that occurred in all of the eight FRA Regions during 1978 were compared with the total number of accidents that occurred during 1982 in all of the Regions. The percent changes on the Regional level, however, are simply based on the total number of reportable train accidents that occurred in one particular Region during a given year. The "National and Regional Safety Trends" chart allows each Region to note how the overall safety trends of their Region compare to the National safety trends.

The percent change chart for Region 8 indicates an increase in the number of accidents caused by other factors from 1981 to 1982, but this increase is not significant. Although the number of persons killed in train accidents increased by 33.3 percent from 1981 to 1982, the percent change from 1978 to 1982 was a decrease of 72.7 percent; hence, a 33.3 percent increase is not significant.

The number of hazardous material releases did not change from 1981 to 1982, however, from 1978 to 1982 the number decreased by 72.7. In the 1984 Regional Inspection Plan, discuss the safety program that the Region has utilized in the past to accomplish this safety record.



REGION 8

Summary of Train Accidents By Cause

For 1978 Thru 1982

National and Regional Safety Trends
Region 8

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	64.5	17.5
ACCIDENTS CAUSED BY TRACK	63.1	22.2	65.9	11.5
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	67.0	29.8
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	70.6	21.8
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	40.4	3.1+
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	72.7	33.3+
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	59.2	27.9
NUMBER OF HAZ MAT RELEASES	57.2	23.4	72.7	0.0

+ DENOTES AN INCREASE

REGIONAL ACCIDENT DATA

The Accident Ratio data in this section will provide a methodology to allocate inspectors, system and special assessments, and other specialized Regional activities. It is assumed that by implementing a plan to advance the allocation of safety improvement activities, a reduction in accidents, injuries, and risks to the public will occur. The number of railroad accidents on the National level has decreased by 20.6% from 1981 to 1982. Although the number of railroad accidents has been decreasing, safety efforts cannot be relaxed since the possibility of a serious accident always remains. The nature of the relationship between safety improvement activities and accidents is assumed to be a negative correlation. In other words, as the number of safety improvement activities increase, the number of accidents decrease. Therefore, by advancing the allocation of safety improvement activities, the number of accidents can be reduced.

The accident ratios for each railroad within a Region is based on a formula which takes into account the number of accidents by discipline for the railroad, the speed of the train, and whether hazardous materials were present or involved in the accident.

The number of accidents are based on a three year average. Since accidents are such a rare occurrence, a one year average is of little value. The seasonally and monthly fluctuations have been disregarded. The accident ratios for railroads within a Region are divided into six categories:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Larger carrier accidents occurring on mainline, yard, and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track, and
- Smaller carrier accidents occurring on mainline, yard, and other track.

The accident ratios in the following Tables are railroads and divisions which have an accident ratio which is greater than two percent. The railroads and divisions which have been disregarded have a very low accident rate. This does not indicate that the railroads which have been disregarded do not require inspection activity, but that based on accident ratios of past years, these railroads have had a low accident rate. It is possible

that the railroads which have been disregarded may require inspection activity due to a recent increase in accidents and/or non-compliance situations, or due to the Regional inspector's knowledge of the railroad.

By using the accident ratios provided in the following Tables, a preliminary allocation of inspection activities may be made to the various railroads within the Region. It should be noted that inspection activities can not be allocated using only past accident records. The allocation of inspection activities should also be based on defect ratios, the amount of time it took for non-compliance situations to be corrected, the overall conditions of the carrier's track, equipment, etc., and the past experiences of inspectors and regional personnel with a particular railroad. The accident ratios assist in the allocation of inspection activities by providing a base percentage of total inspection time for a given discipline that would be allocated to a particular division of a railroad.

REGION 8

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ARR		7.56	1.26	0.00	2.21	100.00
BN	ALL	1.36	7.83	7.58	5.65	0.00
BN	DAK	2.71	4.47	5.68	1.93	0.00
BN	MIN	1.36	1.22	0.95	2.68	0.00
BN	MON	0.00	1.83	0.00	2.83	0.00
BN	PAC	20.34	8.74	18.00	14.43	0.00
BN	POR	6.78	12.81	10.42	7.74	0.00
BN	ROC	4.07	4.27	4.26	2.68	0.00
BN	SOP	2.71	8.13	6.63	11.60	0.00
BN	WES	0.00	0.00	0.00	5.95	0.00
BN	YEL	8.13	6.51	4.26	5.50	0.00
CNW	WES	0.00	0.36	3.33	1.57	0.00
MILW	WAS	2.87	0.00	0.00	0.63	0.00
SOO	WES	0.00	4.09	2.93	3.22	0.00
SP	ORE	22.20	5.69	9.70	15.63	0.00
UP	IDA	4.67	11.56	12.24	2.31	0.00
UP	ORE	7.01	6.48	8.16	2.05	0.00
UP	WYO	2.34	9.46	1.63	2.05	0.00

REGION 8

ACCIDENT RATIOS FOR LARGE CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ARR		0.29	0.00	2.45	0.80	12.22
ARR	FAI	0.00	0.00	0.00	2.68	0.00
ARR	MAT	0.00	0.00	0.00	0.00	9.78
ARR	NEW	0.24	0.00	0.00	0.00	6.72
ATK	WES	6.38	11.35	0.00	0.00	10.65
BN	ALL	7.25	3.36	4.48	6.05	1.58
BN	DAK	6.46	3.57	8.43	5.89	2.57
BN	MIN	0.08	1.05	2.11	2.48	0.20
BN	MON	10.16	3.05	6.85	13.99	12.63
BN	ORE	0.00	0.00	0.00	6.91	0.00
BN	PAC	4.65	6.62	10.80	5.78	2.17
BN	POR	5.91	1.05	8.83	1.51	1.58
BN	ROC	3.94	1.89	5.27	9.24	0.99
BN	SPO	6.97	23.76	11.86	4.97	0.00
BN	WES	0.00	0.00	0.00	12.96	0.00
BN	YEL	4.14	1.47	2.63	1.30	3.75
CNW	WES	0.55	1.11	0.93	7.51	0.00
MILW	MIN	1.66	0.89	0.00	3.42	1.67
SI		0.15	3.69	0.00	0.20	0.00
SOO	WES	1.10	1.95	2.04	4.01	0.00
SP	ORE	10.59	2.30	6.11	2.06	30.96
UP	IDA	14.25	5.61	4.08	1.40	1.02
UP	ORE	3.87	15.12	9.53	1.86	0.85
UP	WYO	9.87	7.43	7.72	0.74	0.68

REGION 8

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
BAP		0.00	0.00	0.00	6.85
LPN	GAR	0.00	0.00	0.00	12.17
LPN	ORE	0.00	0.00	0.00	12.17
LS	PAC	0.00	0.00	0.00	12.50
OCE		0.00	0.00	0.00	24.34
PRTD		0.00	26.87	0.00	0.00
TMBL		100.00	73.13	0.00	0.00
TMBL	BEL	0.00	0.00	0.00	7.99
TMBL	PAC	0.00	0.00	0.00	7.99
TMBL	TMB	0.00	0.00	0.00	7.99
TMBL	YAR	0.00	0.00	0.00	7.99

REGION 8

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
CLC	MAI	31.50	0.00	0.00	0.00
COP		0.00	0.00	0.00	13.68
OCE		25.42	70.81	0.00	59.28
POVA		0.00	29.19	0.00	0.00
SNCT	MAI	43.08	0.00	0.00	23.18
SNCT	SEA	0.00	0.00	0.00	3.86

APPENDIX C

FEDERAL RAILROAD ADMINISTRATION

GUIDELINES FOR THE DEVELOPMENT OF THE NATIONAL INSPECTION PLAN

FOREWORD

The purpose of this Manual is to outline the procedures for the preparation of the Annual Federal Railroad Administration National Inspection Plan (NIP). The Manual provides guidelines for FRA Headquarters and FRA Regional (Field) personnel.

Guidance for Headquarters personnel includes the following:

- Content, scope and format of the Annual NIP
- FRA Headquarters data to be transmitted to Regions
- Schedule for NIP preparation

Guidance for Regional personnel consists of the following:

- content,
- scope, and
- format of Regional input into the National Inspection Plan.

TABLE OF CONTENTS

I. BACKGROUND

The Federal Railroad Safety Authorization Act of 1980 established the basis for the annual National Inspection Plan. Provisions required the development of a methodology to determine the frequency and schedule of safety inspections. Priority was to be provided to track and equipment associated with passenger trains and the movement of hazardous material. FRA was directed to consider the safety records of the Carriers and focus on all items relevant to safety.

Accordingly, the FRA established broadbased goals designed to improve the railroad industry safety record related to the following:

- Operation of passenger trains
- Transportation of hazardous materials
- Number of freight train accidents
- Casualty rate among employees
- Rail-highway grade crossing accidents
- Trespasser fatality rate

The National Inspection Plan (NIP) is a vital element in the implementation of FRA's annual goals and objectives by field personnel located throughout the country. The plan provides an update on activity performed during the past year, analyzes current conditions and describes work to be accomplished in the coming year. This report provides a standard set of procedures for preparation of the NIP.

II. FUNCTIONS OF WASHINGTON HEADQUARTERS PERSONNEL

A. OFFICE OF ASSOCIATE ADMINISTRATOR

THE OFFICE OF THE ASSOCIATE ADMINISTRATOR IS RESPONSIBLE FOR THE FOLLOWING DUTIES REGARDING DEVELOPMENT OF THE ANNUAL NATIONAL INSPECTION PLAN:

1) JULY 1 INITIATE THE PREPARATION OF REGIONAL DATA PACKAGES WHICH INCLUDE: ACCIDENT DATA, GOALS AND OBJECTIVES, AND NEW REGULATIONS AND POLICIES

2) AUGUST 1 INITIATE THE REGIONAL PREPARATIONS OF THE NATIONAL INSPECTION PLAN

3) OCTOBER 15 INITIATE THE REVIEW, EDIT, AND PREPARATION OF THE NIP FOR PRINTING AS WELL AS THE COMPOSITION OF THE EXECUTIVE SUMMARY

B. OFFICE OF SAFETY ANALYSIS

THE OFFICE OF SAFETY ANALYSIS IS RESPONSIBLE FOR THE FOLLOWING DUTIES REGARDING THE DEVELOPMENT OF THE ANNUAL NATIONAL INSPECTION PLAN:

1) COMPILES DATA FROM THE FRA DATA BANK THAT DEAL WITH THE OVERALL SAFETY PICTURE AND SAFETY TRENDS OF EACH REGION;

2) PREPARES THE REGIONAL STATISTICAL ANALYSIS REPORT TO BE TRANSMITTED TO EACH REGION -- SPECIFIC GUIDELINES ON THE DEVELOPMENT OF THE REGIONAL STATISTICAL ANALYSIS REPORT ARE OUTLINED IN SECTION IV, PP 10 THROUGH 19;

3) PREPARES A PACKAGE OF INFORMATION FOR TRANSMITTAL TO REGIONS WHICH INCLUDES NEW REGULATIONS AND POLICIES, AND BUDGET INFORMATION

4) PROVIDES A SUMMARY OF NATIONAL TRAIN ACCIDENT STATISTICS, AS WELL AS, A DISCUSSION ON THE NATIONAL SAFETY PROFILE WHICH WILL BE INCORPORATED INTO THE EXECUTIVE SUMMARY OF THE NIP. SPECIFIC GUIDELINES ON THE DEVELOPMENT OF THE EXECUTIVE SUMMARY ARE OUTLINED IN SECTION VI, PP 22-23;

5) PROVIDES INFORMATION REGARDING STATE PARTICIPATION FOR THE EXECUTIVE SUMMARY -- SPECIFIC GUIDELINES ON THE DEVELOPMENT OF THE EXECUTIVE SUMMARY ARE OUTLINED IN SECTION VI, PP 22-23.

C. OFFICE OF SAFETY ENFORCEMENT

THE OFFICE OF SAFETY ENFORCEMENT IS RESPONSIBLE FOR THE FOLLOWING DUTIES REGARDING THE DEVELOPMENT OF THE ANNUAL NATIONAL INSPECTION PLAN:

1) ADVISES REGIONS ON SAFETY TRENDS THAT NEED TO BE ADDRESSED IN THE NATIONAL INSPECTION PLAN;

2) ASSEMBLES HIGHLIGHTS OF THE PREVIOUS YEAR'S SAFETY ACCOMPLISHMENTS THROUGHOUT THE U.S. AND SUBMITS TO THE OFFICE OF THE ASSOCIATE ADMINISTRATOR FOR INCORPORATION INTO THE EXECUTIVE SUMMARY OF THE NIP -- SPECIFIC GUIDELINES ARE OUTLINED IN SECTION VI, PP 22-23;

3) REVIEWS THE NUMBER OF SAFETY INSPECTIONS SYSTEM AND SPECIAL ASSESSMENTS, ACCIDENTS, COMPLAINTS, PETITIONS AND WAIVER INVESTIGATIONS, TO BE CARRIED OUT WITHIN THE REGIONS DURING THE UPCOMING YEAR FOR INCORPORATION INTO THE EXECUTIVE SUMMARY.

III. TIME SCHEDULE FOR THE NIP

DATE	ACTIVITY
1 JULY	ASSOCIATE ADMINISTRATOR INITIATES DEVELOPMENT OF NIP
1 JULY - 31 JULY	PREPARATION OF REGIONAL STATISTICAL ANALYSIS REPORTS, GOALS AND OBJECTIVES, NEW REGULATIONS AND POLICIES, AND BUDGET INFORMATION BY WASHINGTON HEADQUARTERS FOR TRANSMITTAL TO REGIONS
1 AUGUST	LETTER OF TRANSMITTAL FROM THE OFFICE OF ASSOCIATE ADMINISTRATOR IS SENT TO THE REGIONS ALONG WITH THE REGIONAL STATISTICAL ANALYSIS REPORTS, INSTRUCTION FOR REGIONAL PLANS, GOALS AND OBJECTIVES, NEW REGULATIONS AND POLICIES, AND BUDGET INFORMATION
AUGUST - OCTOBER	REGIONAL PERSONNEL PREPARE THE REGIONAL INPUTS FOR THE NIP
15 OCTOBER	REGIONAL PLANS ARE RECEIVED IN WASHINGTON FROM REGIONS
15 OCTOBER - 21 NOVEMBER	WASHINGTON REVIEWS AND EDITS NIP AND NOTIFIES REGIONS OF ANY NEEDED REVISIONS
7 DECEMBER	REWRITES ARE RECEIVED IN WASHINGTON FROM REGIONS
7 DECEMBER - 1 JANUARY	WASHINGTON REVIEWS, AND EDITS NIP FOR PRINTING AND COMPOSES THE EXECUTIVE SUMMARY
1 JANUARY	WASHINGTON SENDS NIP TO PRESS

IV. REGIONAL DATA -- REGIONAL STATISTICAL ANALYSIS REPORTS

The Office of Safety Analysis is to commence preparations for developing the Regional Statistical Analysis Report on July 1. The Regional Statistical Analysis Reports are to be transmitted to each Regional Director on August 1.

The Regional Statistical Analysis Report provides each Region with results of analyzed accident data and suggestions on how to incorporate this data into the Regional input of the NIP. It has the following parts:

- The Regional Overview Data contains data which deals with the overall safety picture and safety trends of the Region for the last five years of available data within the FRA data banks.

- The Regional Accident Data contains data which deals with specific problem areas within the Region based on the latest 3 years of available data.

- Supplementary Data - upcoming year's goals and objectives, new regulations of policies, and budget information.

A. Regional Overview Data

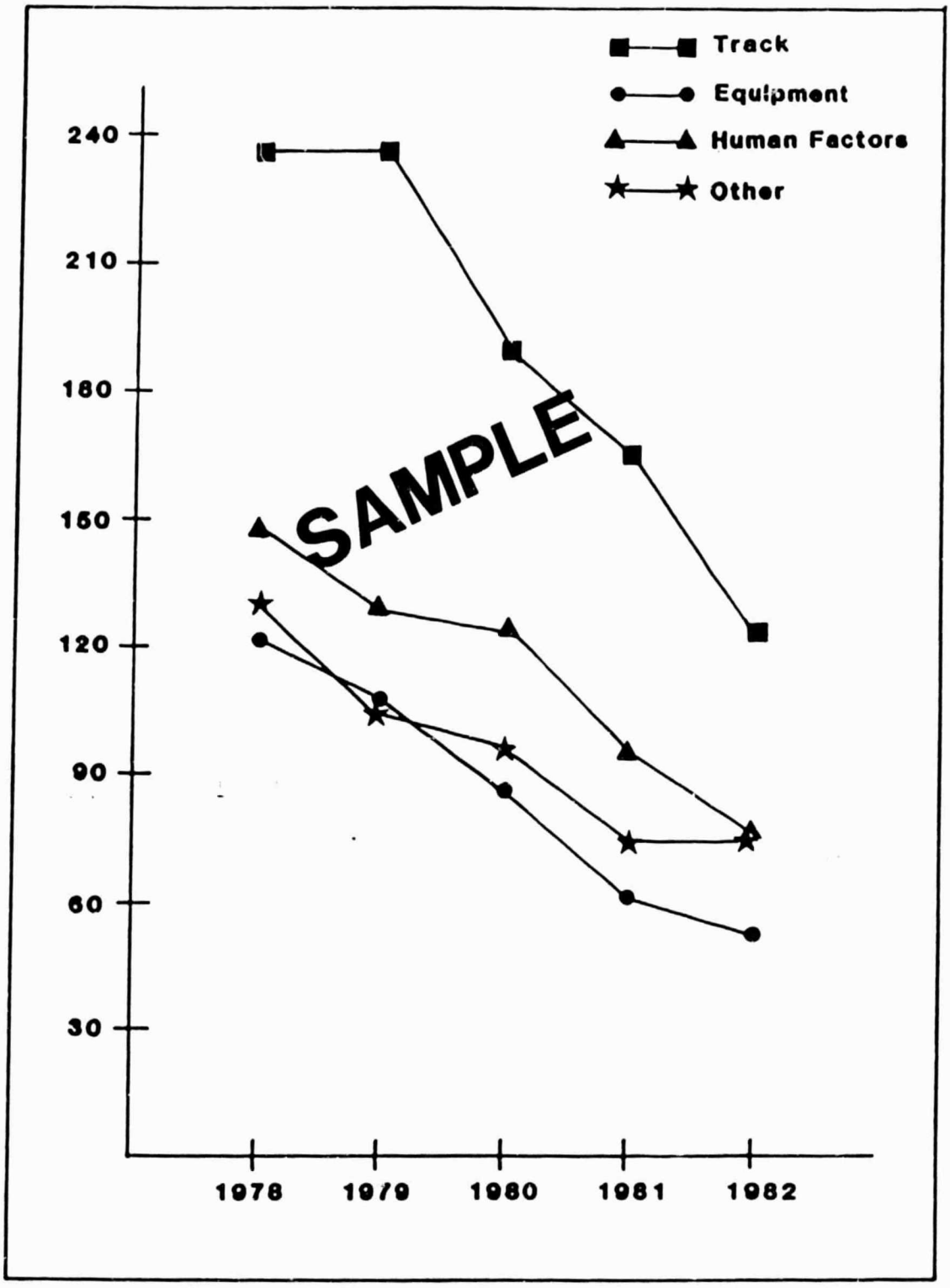
This section contains a graph (Figure 1) and a chart (Table 1) which depict the overall safety trends of the Region for a five year period.

The percent changes on the National level are based on the total number of reportable train accidents that occurred in all of the eight FRA Regions within the last 12 months of available data. The percent changes on the Regional level are based on the total number of reportable train accidents that occurred in the particular Region during the last 12 months of available data.

B. Regional Accident Data

The accident ratio is based on a formula which computes the number of accidents by discipline for each railroad within the entire FRA Region. The accident ratios are weighted by the safety priorities of FRA:

Figure 1



REGION 1

Summary of Train Accidents By Cause

For 1978 Thru 1982

Table 1

National and Regional Safety Trends

Region 1

	PERCENT CHANGE			
	NATIONAL LEVEL		REGIONAL LEVEL	
	1978-82	1981-82	1978-82	1981-82
TOTAL REPORTABLE TRAIN ACCIDENTS	59.3	20.6	46.7	17.6
ACCIDENTS CAUSED BY TRACK	63.4	22.2	47.7	26.3
ACCIDENTS CAUSED BY HUMAN FACTORS	54.9	19.6	48.0	19.8
ACCIDENTS CAUSED BY EQUIPMENT	63.3	21.7	56.2	14.5
ACCIDENTS CAUSED BY OTHER FACTORS	49.5	17.3	42.3	2.7+
PERSONS KILLED IN TRAIN ACCIDENTS	64.7	22.2	40.0	25.0
PERSONS INJURIED IN TRAIN ACCIDENTS	75.3	16.0	58.8	25.0
NUMBER OF HAZ MAT RELEASES	57.2	23.4	66.7	77.8

+ DENOTES AN INCREASE

- Accidents involving passengers received a weight factor of 20

- Accidents involving the release of hazardous material received a weight factor of 10

- The speed of the train at the time of the accident was divided by 10 and then weighted to the accident.

Accident ratios for the railroads within a Region are divided into the following categories based on size and track:

- Larger carrier accidents occurring on mainline track,
- Larger carrier accidents occurring on yard and other track,
- Smaller carrier accidents occurring on mainline track,
- Smaller carrier accidents occurring on yard and other track.

The program which generates the accident ratios is in the FRA data base filed as Matrix SAS Query. An example of Regional Accident Ratios is located in Tables 2-5.

C. Regional Statistical Analysis Report

The Regional Statistical Analysis Report contains the following graphs and charts:

1) Summary of Train Accidents by Cause (graph)

2) National and Regional Safety Trends (chart)

3) Accident Ratios for Small Carrier Accidents Occurring on Mainline Track (chart)

4) Accident Ratios for Small Carrier Accidents Occurring on Yard and Other Track (chart)

REGION 2

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ABB		0.00	0.00	70.47	8.20	0.00
ABB	SYS	0.00	0.00	0.00	0.00	28.78
ACY		0.00	0.00	2.79	9.09	0.00
LEF		0.00	12.85	0.00	0.00	42.45
MDDE	CAM	0.00	0.00	3.69	0.00	0.00
MGA	MON	2.70	0.00	0.00	0.00	0.00
MGA	PIT	2.70	0.00	0.00	0.00	0.00
MGA	RCE	2.70	[illegible]	0.00	4.92	0.00
MGA	RIV	35.05	[illegible]	0.00	27.87	0.00
MGA	TEN	21.[illegible]	17.43	0.00	3.28	0.00
MGA	WAY	13.48	0.00	0.00	1.64	0.00
MGA	WES	2.70	0.00	0.00	0.00	0.00
NFD		0.00	0.00	0.00	11.77	0.00
PNER	WIL	0.00	0.00	0.00	0.00	28.78
PS		4.41	0.00	23.05	10.72	0.00
TT		0 00	0.00	0.00	9.12	0.00
TT	OHI	2.50	0.00	0.00	0.00	0.00
WVN	SYS	10.78	0.00	0.00	0.00	0.00
YS		0.00	0.00	0.00	6.19	0.00

REGION 2

ACCIDENT RATIOS FOR SMALL CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK
ACY		0.00	41.99	0.00	0.00
BVRY		0.00	10.60	0.00	0.00
DIS	TOL	40.70	26.45	0.00	6.27
LEF		0.00	0.00	40.98	0.00
MGA	RCP	0.00	0.00	0.00	3.35
MGA	RIV	32.62	0.00	0.00	6.70
MGA	TEN	0.00	[illegible]	0.00	3.35
MKC		0.00	[illegible]59	0.00	0.00
MKC	LOW	0.00	0.00	13.58	0.00
NSS		0.00	3.36	0.00	0.00
PCY		0.00	7.34	0.00	1.16
PS		26.68	0.00	45.44	10.96
PS	ALL	0.00	0.00	0.00	2.74
TT		0.00	0.00	0.00	20.19
55	OHI	0.00	0.00	0.00	34.16
II	PIT	0.00	0.00	0.00	3.11
TT	TOL	0.00	0.00	0.00	4.66
WVN		0.00	0.00	0.00	3.35
YN		0.00	7.68	0.00	0.00

REGION 2

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON MAINLINE TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ATC		0.00	0.00	0.00	0.00	8.01
ATK	BAL	3.74	0.64	30.17	20.56	17.00
ATK	MID	0.00	0.00	0.00	0.00	9.16
ATK	PHI	10.79	1.15	1.31	3.28	0.52
ATK	YOU	0.00	0.00	0.00	0.00	5.23
BO	AKR	3.64	3.24	2.02	0.58	0.00
BO	MAR	3.66	2.71	2.58	3.01	2.14
BO	MON	2.43	2.09	1.32	4.05	0.32
BO	PEN	6.96	[illegible]	3.27	9.52	0.11
BO	WES	0.65	[illegible]	4.03	0.91	0.43
CO	WES	2.92	[illegible].64	8.40	4.84	0.22
CR	ALL	6.50	4.35	0.64	3.69	0.40
CR	COL	3.48	0.97	0.58	3.78	1.58
CR	HAR	6.14	3.67	6.30	2.01	0.00
CR	PHI	5.53	8.12	11.92	1.49	3.27
CR	PIT	8.00	5.80	1.17	2.56	0.49
CR	SEP	0.00	0.00	0.00	0.00	12.47
CR	YOU	2.29	3.67	0.70	1.03	9.70
DH	#1	0.14	7.16	0.77	0.82	0.33
DTI	NOR	2.47	4.03	0.65	1.97	0.00
NW	NOR	2.65	0.75	0.06	0.15	0.77
NW	POC	2.94	4.04	1.28	3.85	0.67
NW	RAD	0.63	4.51	0.34	0 56	0.39
NW	SCI	2.57	1.32	0.23	0.61	3.56
PLE	PLE	0.76	2.96	0.38	0.75	0.00
RFP		2.11	0.44	0.07	0.00	0.00
SCL	ROC	0.17	0.47	2.49	0.03	12.20
SOU	BAL	0.00	0.00	0.00	4.35	0.00

REGION 2

ACCIDENT RATIOS FOR LARGER CARRIER ACCIDENTS
OCCURRING ON YARD AND OTHER TRACK

RAILROAD	DIVISION	EQUIPMENT	HUMAN FACTORS	MISCELLANEOUS	TRACK	RAILROAD HWY.CROSSING
ALQS		1.26	1.28	1.11	2.74	0.00
BO	AKR	4.94	6.96	1.35	3.52	0.00
BO	ARK	7.60	0.23	0.00	0.00	0.00
BO	MAR	0.76	9.05	5.38	2.31	0.00
BO	MON	1.52	0.62	1.01	2.92	0.00
BO	PEN	1.90	1.08	5.72	2.62	0.00
BO	WES	3.04	3.40	10.10	1.01	0.00
CO	OHI	1.34	3.75	1.02	2.24	0.00
CO	SOU	0.00	0.00	0.00	2.03	0.00
CO	VIR	5.38	3.[illegible]	18.20	1.42	0.00
CO	WES	2.30	[illegible]	1.70	4.17	0.00
CR	CLE	0.35	2.86	2.80	2.89	0.00
CR	COL	21.12	3.15	2.18	2.70	47.25
CR	HAR	4.75	3.44	1.56	2.14	0.00
CR	PHI	5.46	12.03	14.02	5.50	0.00
CR	PIT	3.17	7.16	2.80	6.80	0.00
CR	SEP	3.87	0.14	0.00	0.00	0.00
CR	TOL	2.11	3.08	1.25	1.30	0.00
CR	YOU	0.35	2.94	1.56	4.28	15.75
DH	#1	0.00	0.00	2.31	0.31	0.00
NW	POC	2.40	1.81	0.61	2.04	0.00
NW	SCI	2.40	0.56	0.61	0.82	0.00
PBR		0.32	0.39	0.84	0.08	28.31
RFP		2.20	4.81	3.37	3.66	0.00
RFP	RAL	0.00	0.00	0.00	2.12	0.00
RI		0.00	0.00	0.17	0.00	8.70
URR	MAI	2.61	0.71	1.15	1.03	0.00
WM	MAR	2.96	0.40	1.75	1.18	0.00

5) Accident Ratios for Large Carrier Accidents Occurring on Mainline Track (chart)

6) Accident Ratios for Large Carrier Accidents Occurring on Yard and Other Track (chart)

These charts **should not** be computer generated printouts, but should be typed on standard 8 1/2 x 11 pages. With regard to accident ratios, all ratios below 2% should be deleted.

Along with the charts and graphs transmitted to each Region should be a narrative description of each chart and graph which will assist each Region in composing the NIP. This narrative should point out the strengths and weaknesses of the Region based on the accident data. Also, the supplementary data (New Regulations and Policies, Goals and Objectives, and Budget Information) Package should be submitted to the Regions.

ACCIDENT RATIO FORMULA (TRACK)

$$\frac{WTd_i}{WTr} = \text{TAR (Track Accident Ratio)}$$

where:

WTd_i = Sum of weighted track accidents for a particular railroad division;

WTr = Sum of weighted track accidents for the Region;

TAR = Track accident ratio for a particular railroad division.

NOTE: Totals are based on three year periods and seasonal and monthly fluctuations are thereby averaged. Accident ratios for track, equipment, human factors and miscellaneous causes are also computed.

V. COMPOSING THE NIP FROM REGIONAL INPUTS

The composing of the National Inspection Plan from Regional inputs will begin 15 October.

Each Regional NIP should be reviewed by Washington Headquarter Personnel in the following sequence:

1) Read through the entire document checking to make certain all appropriate sections have been included,

2) Review Methodology

3) Check for compliance with Goals and Objectives

All eight Regional NIPs should be typed according to the following specifications:

Margins:	Top - 1 1/2 inches	Bottom - 1 inch
	Left - 1 inch	Right - 1 inch
Justification:	Right and Left margins	
Line Spacing:	1 1/2 spaces	
Character Spacing:	12 pitch	
Indent Paragraphs:	5 spaces	

All Section titles should be centered, underlined, and in upper case.

Main sections should always begin on a new page.

One final edit should be made before the document is submitted for printing to check for typing errors.

VI. EXECUTIVE SUMMARY GUIDELINES FOR NIP

The compiling of the Executive Summary begins after all Regional NIPs have been edited and reviewed. The Executive Summary will be a list of major inspection activities that have been or will be taking place within each of the eight FRA Regions.

The Executive Summary should be divided into the following subsections.

I. INTRODUCTION

- The Goals and Objectives, New Regulations and Policies, Plans, and Programs
- Highlights of the previous year's safety accomplishments throughout the U.S. including follow-up activities of Special and System assessments.
- Summary of National Train Accident Statistics

II. PROJECTED SAFETY IMPROVEMENT ACTIVITIES

- A discussion on the National Safety Profile, e.g., have the number of train accidents increased or decreased
- The number of System and Special Assessments planned and follow-up activities planned within all Regions
- The projected number of Accidents, Complaints, Petitions, and Waiver investigations to be carried out within the Regions during the upcoming year

III. REGIONAL INSPECTION PLANS

- The planned number of inspections throughout all eight Regions
- The participating States including the number of inspectors

ADDENDUM

REGIONAL GUIDELINES

STANDARD OUTLINE FOR THE
NATIONAL INSPECTION PLAN

FOREWORD

This report provides the Region with guidelines to be used in preparing the Annual Inspection Plan. These guidelines emphasize the utilization of safety analysis and logical processes by each Region to arrive at the proposed, detailed inspection and safety improvement activities.

This report should be used in conjunction with information sent from Washington including the Regional Statistical Analysis Report which provides the Region with results of analyzed data and guidelines on how to incorporate the Region's data into the annual National Inspection Plan.

REGIONAL GUIDELINE

TABLE OF CONTENTS

I. TIME SCHEDULE FOR THE NATIONAL INSPECTION PLAN

DATE	ACTIVITY
7 AUGUST	REGIONS WILL RECEIVE THE REGIONAL STATISTICAL ANALYSIS REPORT AND OTHER INSTRUCTIONS FROM WASHINGTON HEADQUARTERS
AUGUST - SEPTEMBER	REGIONAL PERSONNEL COMPOSE THE REGIONAL INPUTS FOR THE NIP
15 OCTOBER	**REGIONAL INPUTS FOR THE NIP ARE TO BE RECEIVED IN WASHINGTON**
21 NOVEMBER	UNSATISFACTORY REGIONAL NIP's ARE SENT BACK TO REGIONS FROM WASHINGTON
7 DECEMBER	REVISED REGIONAL INPUTS MUST BE RECEIVED IN WASHINGTON

II. RESPONSIBILITIES AND DUTIES OF REGIONAL PERSONNEL

A. REGIONAL DIRECTOR

THE REGIONAL DIRECTOR IS RESPONSIBLE FOR THE FOLLOWING DUTIES REGARDING THE DEVELOPMENT OF THE ANNUAL NATIONAL INSPECTION PLAN

1) MEET WITH EACH PARTICIPATING STATE AND DISCUSS THE PLANNED STATE INSPECTION ACTIVITIES AS WELL AS THE STATE PARTICIPATION IN SYSTEM AND SPECIAL ASSESSMENTS

2) NOTIFY EACH REGIONAL SPECIALIST TO BEGIN PREPARING HIS/HER DISCIPLINE'S INPUT TO THE NIP PLAN. REVIEW AND DISCUSS MATERIAL RECEIVED FROM WASHINGTON WITH REGIONAL SPECIALISTS

3) COORDINATE AND MONITOR THE WORK OF ALL REGIONAL PERSONNEL INVOLVED WITH THE NIP TO PROMOTE AND ACHIEVE A UNIFORM UNDERSTANDING AND PERFORMANCE OF ALL INSTRUCTIONS PERTAINING TO THEIR DUTIES INVOLVED WITH THE DEVELOPMENT OF THE REGIONAL INPUT FOR THE NIP

4) MAINTAIN SCHEDULE

B. REGIONAL SPECIALISTS

EACH REGIONAL SPECIALIST IS RESPONSIBLE FOR THE FOLLOWING DUTIES REGARDING THE DEVELOPMENT OF THE ANNUAL NATIONAL INSPECTION PLAN.

1) PLAN, COORDINATE, AND RATIONALIZE HIS/HER DISCIPLINE'S REGULAR ROUTINE INSPECTIONS

2) PLAN, COORDINATE, AND RATIONALIZE HIS/HER DISCIPLINE'S PARTICIPATION IN SPECIAL AND/OR SYSTEM ASSESSMENT AND FOLLOW-UP ACTIVITIES

C. CLERICAL

IT IS THE RESPONSIBILITY OF THE CLERICAL STAFF OF THE REGION TO ASSURE THAT THE TYPIST OF THE REGIONAL INPUT INTO THE NIP MANUSCRIPT ADHERES TO THE FOLLOWING SPECIFICATIONS:

MARGINS:	TOP -- 1 1/2 INCHES	BOTTOM -- 1 INCH
	LEFT -- 1 INCH	RIGHT -- 1 INCH

JUSTIFICATION: RIGHT AND LEFT MARGINS (IF POSSIBLE)

LINE SPACING: 1 1/2 SPACES

CHARACTER SPACING: 12 PITCH

INDENT PARAGRAPHS: 5 SPACES

ALL SECTION TITLES SHOULD BE CENTERED, UNDERLINED, AND IN UPPERCASE.

MAIN SECTIONS SHOULD BEGIN ON A NEW PAGE.

III. GUIDELINES FOR DEVELOPING REGIONAL INPUTS TO THE NIP

The following outline provides guidance for the development of the NIP. All Sections of the ducument are outlined as to their content, scope, and format.

STANDARD OUTLINE FOR THE REGIONAL INPUTS TO THE NATIONAL INSPECTION PLAN

TABLE OF CONTENTS

I. HIGHLIGHTS

Each Region should give a brief description of the Region's major projected safety improvement projects. Each "highlight" should be bulleted. The following are some examples of appropriate material for the Highlights Section:

- System assessments (including number)
- Special assessments (including number)
- Assessment Follow-up (including number)
- Any major change

Since the Highlights Section is a summary of Regional issues, it should be a review of the principal issues discussed within the Plan. Each "highlight" will be a restatement of important information, including any items of interest pertaining to occurrences during the past year. Additionally, this section must show the number of miles of track to be inspected, number of signal inspections, number of equipment inspections, hazardous material inspections and operating practice inspections.

II. INTRODUCTION

Specific information concerning the Region and the various railroads operating within the Region should be included in the Introduction Section of the Plan. "Specific information" refers to: the number and names of states within the Region, the location of the Region's Headquarters, the railroads operating within the Region, the amount of hazardous material transported within the Region, the number of passenger trains within the Region, etc. The Introduction Section should also be used to give background information on the Region. A summary of the overall plan for assessments, follow-up on assessments and inspections within the Region including State participation in the forthcoming year should also be included. This section should also include a brief discussion on the utilization of Federal and State resources to accomplish regional objectives in the upcoming year.

III. PROJECTED SAFETY IMPROVEMENT ACTIVITIES

A. Regional Statistical Overview

This section should include of a detailed narrative on the actual results of the Region's Inspections of the past year versus the Planned Inspections for that year. The problems that were encountered within the Region, actions which addressed these problems, and the results of these activities should be discussed. Included within this discussion should be a description of the improvement or degradation in the overall safety of individual railroads or railroad divisions. If the past year's safety objectives were not achieved, an analysis should follow.

This section should also incorporate the data from the Regional Statistical Analysis Report that was sent to your Region. Do not simply restate the data statistics given in the Report, but incorporate these statistics into two formal discussions. One discussion should relate to the overall Regional Safety Profile, and the other should focus on specific problem areas within the Region and the planned corrective actions. The guidelines found within the Regional Statistical Analysis Report will be instrumental in forming your Region's statistical overview discussions.

B. Regional Goals and Objectives

The statistics in the above section should indicate problem areas. These problem areas should be discussed and corrective actions should be planned for the upcoming year. For example, if the regional statistics indicate that the number of equipment failures have increased, corrective actions such as assessments or concentrated inspections should be scheduled within the Region during the year.

Based on the Regional Statistical Overview and the statistics within that section, the Region should develop its goals and objectives. A Goal is a statement of intent that is general and timeless and is not concerned with a particular achievement within a specified time period. The regional goals will be the same for all regions as provided by Washington. An Objective is a desired accomplishment that will be achieved within a given timeframe and under specifiable conditions. Objectives must specify the method of achievement as well as the period of time within which it is to be attained.

C. System and Special Assessments

The Regional Statistical Overview of the Region's problem areas and past experience will indicate the areas where assessments are needed. Special assessments are the efforts of one or more inspectors, or the application of one or more discipline on a specific section of a railroad. In the past, special assessments have been instrumental in achieving compliance to safety standards in problem areas.

The need for special assessments may vary by discipline; therefore, special assessments should be noted in each inspection plan. The number of assessments should be based on past experience, knowledge of new trends which may indicate that additional activity of this type would be beneficial, or other information such as complaints.

Each Region should submit the following information on planned special assessments:

1) The name of the railroad involved and the specific area to be covered by the assessment,

2) The starting and completion dates,

3) The disciplines and the number of inspectors (State and Federal) assigned to the project,

4) The reasons for the assessment, with specific details,

5) Anticipated follow-up activities, required to begin 60 days after issuance of first report.

System assessments are the combined efforts of all disciplines to examine an entire railroad system which usually encompasses more than one Region. A system assessment is normally assigned by the Washington Office; however, Regions are encouraged to make recommendations for system assessments.

D. Projected Follow-up on Activities Previous Assessments

To insure that the assessment process achieves maximum results, each assessment must receive sufficient follow-up activity to verify that improvement has occurred. Once an assessment has been identified in the NIP, a discussion must follow leading to the close out of the assessment. Often times an assessment may be mentioned in several NIPs until all recommendations have been fully implemented.

The follow-up section should identify the assessment and any outstanding recommendations, issues or other effort required to complete activity on the assessment. Items that may be covered, depending on status of the assessment include:

- A review of current statistical information related to the assessed area
- A review of specific accident causal factors related to the recommendations
- Information on current inspections
- Information on meetings with carrier personnel
- Exactly what recommendations or findings have not been resolved, what is yet required and the plan to finalize
- Discussion of specific activities such as further assessment, inspection, meetings or enforcement action

This section should contain information on each open assessment until adequate results are achieved to verify that the assessment was successful. It is imperative that each Region discuss each assessment that was open, planned or ongoing in the previous year's plan if the assessment was not closed out and discussed in a previous plan.

E. Accidents, Complaints, and Applications

The planned activities for Accidents, Complaints, and Applications are to be reported on the Table located in the Appendix of the report. Incorporate this Table into a brief discussion of the activities planned for the coming year.

Accident investigation activity will be reported based on each Region's past record of investigations including locomotive, train and employee fatality accidents. The number of accidents investigated will be reported on a Regional basis. The investigation of these accidents will determine if the accident may have been caused by the carrier's failure to comply with regulations or if consideration should be given for the recommendations of a change or additional regulations in an effort to preclude a reoccurrence. The activity will reflect not only those accidents assigned by the Headquarters Office, but also those assigned by the Regional Director on an informal investigation. All accident investigations should be completed within 60 days. Hazardous materials incident investigations will also be included in this section.

Complaints will be reported on a basis of activities in past years. The number of complaints each Region anticipates receiving shall be shown by discipline. It is the goal of FRA to complete each of these assignments in no more than 60 days.

Applications filed by carriers for modifications, petitions, and waivers shall be reported by each discipline based on the past record of the average number of such assignments investigated. It is the goal of FRA to complete each of these assignments in no more than 45 days.

F. Major Deficiencies and Remedial Recommendations (Optional)

Railroad investigation and inspection results should be combined with knowledge of traffic levels and safety profiles to identify and describe particular regional problems. The causes of these problems together with the logic for selection of corrective actions as derived from analysis should be described within this section. This type of shared information will assist in making other regions aware of emerging situations and permit the translation of corrective measures before similar accidents occur elsewhere.

IV. REGIONAL INSPECTION PLANS BY DISCIPLINE

This Section will include the planned regular inspection activities by both the Region and participating States among the various disciplines. The disciplines of Hazardous Material and Operating Practices have been grouped together under one discipline.

The purpose of regular inspections is to reduce non-compliances, which will reduce the potential for accidents. The number of regular inspections that will be scheduled should take into account the average number of inspections made during the past several years for each type of inspection activity and projected future requirements. Inspection activities will be planned using accident data, inspection information, and the inspector's knowledge of the overall conditions in his territory. It will be the responsibility of the Region's District Chief to analyze information for his district to assure that inspections are being made in the areas of highest risk and concern. The Region Specialists will also make an evaluation and if necessary, recommend changes in inspection plans. The Specialist will also recommend special assignments to the district field forces for increased enforcement in areas where the greatest potential for continued hazards exist. The District Chiefs and the Specialists must jointly plan these inspection activities.

The Specialist of each discipline in each Region shall carefully monitor the output of the Inspectors of his discipline to insure that a realistic number of units are inspected each month, proportional to the man-hours expended, and that inspections have been conducted at points of greatest need. It will be the responsibility of the Regional Specialist to keep the District Chief aware of the results of this analysis. Special emphasis on inspection procedures and frequency should be designated.

The planned inspection activities are to be reported by discipline on the sheets located in the Appendix of this Report. These sheets are to be incorporated into the discussion of the inspection activities of each discipline for the upcoming year. Guidelines for the Discussion Sections for the Inspection Disciplines are outlined in the text below.

For each of the four Inspection Disciplines, complete the tables on the various planned Inspection Activities. The Discussion Sections for each of the Inspection

Disciplines **should not be a restatement of the information found within the Planned Inspection Activity Tables nor should they be a detailed report on the Assignment.** Each Discussion Section should include the following information:

1) The Areas and Railroads involved in the planned inspection activities,

2) The percent of inspection activity spent on each Railroad,

3) The rationale for the planned activities.

The most important part of the Inspection Discipline Discussion is the rationale for the planned activities. Inspection activities should be related to the goals and objectives of the Region, as well as the improvement of unfavorable safety trends. Therefore, inspection activities should be justified by a consideration of why each type of inspection is occurring where it is occurring. The standard format for the Regional inspections by discipline, is located in Figure 1. Each inspection discipline discussion should follow this format exactly.

For each discipline, the rationale for inspection activity should be based on the following:

1. The number of accidents of carrier -- by division.

2. The defect percentages of carrier -- by division. (This rationale will be used mainly for MP&E and S&TC inspection activities.)

3. The amount of time it took for non-compliance situations to be corrected.

4. The overall carrier's situation -- by division.

5. The past experiences of inspectors and regional personnel with a particular railroad. (This rationale will be used mainly for OP inspections, however, other disciplines may be applicable.

FIGURE 1

IV. REGIONAL INSPECTION PLANS

CARRIER	PERCENT OF ACTIVITY			
	OP&H	S&TC	TRACK	MP&E
Atchison, Topeka and Santa Fe	13	17	12.7	1

This carrier has the third highest percentage of human factor-caused accidents in the Region. Hazardous materials movements are in excess of 1,400 cars per month over each of the main line routes. The ATSF has 2,000 signaled miles that carry Hazmat in excess of 2,700 cars annually. There are 800 signaled miles that are in a 79-90 mph passenger train operation. The carrier had the third highest number of reportable materials in 1982. The ATSF had 12 percent of the Region equipment-caused accidents in 1982.

CARRIER	PERCENT OF ACTIVITY			
	OP&H	S&TC	TRACK	MP&E
Burlington Northern	10	10	7	13

This carrier has the fourth highest percentage level of reportable human-factor cause accidents in the Region. The BN, including the former FWD, had an unusually high S&TC defect percentage in FY 83 of 49 percent. The BN Tulsa Division has the highest accident ratio for carrier accidents occurring on mainline track and yards of any other BN Division in the Region. The BN had 13 percent of the Region's equipment-caused accidents.

CARRIER	PERCENT OF ACTIVITY			
	OP&H	S&TC	TRACK	MP&E
Kansas City Southern	10	8	6.3	12

The carrier has the fourth highest percentage level of reportable human factor-caused accidents in the Region. The S&TC defect rate was 19 percent on this carrier in FY 83. There is a high track accident ratio for carrier accidents occurring on the main track on the thir and fifth subdivisions and on yard and other tracks on the seventh division. This carrier has a high defect ration in locomotives and cars and had 14 percent of the Region's equipment-caused accidents.

APPENDIX

SIGNAL AND TRAIN CONTROL INSPECTION ACTIVITIES FOR 1984

INSPECTION ACTIVITY		PLANNED	ACTUAL INSPECTIONS			
			1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
ROUTINE	ABS					
	INTERLOCKING					
	TCS					
	TRAIN CONTROL					
	CAB SIGNAL					
	TRAIN STOP					
TECHNICAL MEETING						
GRADE CROSSING						
FALSE PROCEEDS						
RECORDS						

OPERATING PRACTICES AND HAZARDOUS MATERIAL INSPECTION ACTIVITIES

FOR 1984

INSPECTION ACTIVITY			PLANNED	ACTUAL INSPECTIONS			
				1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
OPERATING PRACTICE INSPECTIONS	ROUTINE	YARD LIMITS					
		TRAINING PROGRAM					
		OPERATING TESTING					
		ACCIDENT REPORTING					
		RADIO STANDARDS					
		REAR END MARKERS					
		HOURS OF SERVICE					
	OBSERVATIONS	HAZMAT OPERATIONS					
		TRAIN OPERATIONS					
		BLUE SIGNAL					
		FLAG PROTECTION					
	PRESENTATIONS						
	OTHER						
HAZARDOUS MATERIAL INSPECTIONS	ROUTINE	OPERATIONS INSPECTIONS					
		CAR INSPECTIONS					
		SHIPPER INSPECTIONS					
		CONSIGNEE INSPECTIONS					
	OTHER						
	PRESENTATIONS						

TRACK INSPECTION ACTIVITIES FOR 1983

INSPECTION ACTIVITY		PLANNED	ACTUAL INSPECTIONS			
			1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
REGULAR	MAIN LINE (MILES)					
	YARD (MILES)					
FEDERAL ASSISTANCE PROJECTS						
TECHNICAL MEETINGS						
GOVERNMENT OWNED TRACK						
OTHER						
RECORDS						

MOTIVE POWER AND EQUIPMENT INSPECTION ACTIVITIES

FOR 1984

INSPECTION ACTIVITY		PLANNED	ACTUAL INSPECTIONS			
			1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
REGULAR INSPECTION	SHOPS (MP&E)					
	LOCOMOTIVES					
	CARS					
TEST OBSERVATIONS	TRAIN BRAKE					
	SINGLE CAR					
	BLUE FLAG					
	NOISE LEVEL					
PRESENTATION						
OTHER						

STATE AND FEDERAL PERSONNEL BY DISCIPLINE FOR 1984

DISCIPLINE	PLANNED		ACTUAL PERSONNEL							
			1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
	FED.	STATE	FED.	STATE	FED.	STATE	FED.	STATE	FED.	STATE
TRACK INSPECTOR										
TRACK SPECIALIST										
IGNAL INSPECTOR										
SIGNAL SPECIALIST										
MP&E INSPECTOR										
MP&E SPECIALIST										
OP INSPECTOR										
OP SPECIALIST										
HAZMAT INSPECTOR										
TRAINEE										
DISTRICT SUPERVISOR										
SUPERVISORY SPECIALIST										
CLERICAL										
REGIONAL DIRECTOR										

APPENDIX D

AN INVESTIGATION OF RAILROAD EMPLOYEE CASUALTIES

FOR:

FEDERAL RAILWAY ADMINISTRATION

BY:

ECOSYSTEMS INTERNATIONAL, INC.
2411 CROFTON LANE - SUITE 16B
CROFTON, MARYLAND 21114

SEPTEMBER 1983

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I. INTRODUCTION

The Federal Railroad Administration (FRA) is responsible for the administration of U.S. railroad safety regulations. FRA has responded by eliciting the assistance and expertise of other governmental agencies and industrial researchers for the overall purpose of reducing safety risks to railroad employees, passengers and inadvertent victims of railroad accidents. The following analysis of railroad employee casualties represents a contribution to this FRA mandate.

In 1981, the FRA established the specific goal of reducing the following major types of rail-related accidents by 20% in five years.

- o hazardous material releases,
- o serious passenger train accidents,
- o railroad employee injuries,
- o rail-highway crossing accidents, and
- o trespasser fatalities.

Since the largest percentage of these rail-related accidents are those sustained by employees on the job (100 fatalities and 55,000 injuries each year), the following study was completed to facilitate the goal of significantly reducing these particular casualties. The specific objectives of this effort were to uncover problem areas by investigating the relationship between the occurrence and the severity of various injuries; and, then, to assess where and how FRA Inspector activities should be allocated to reduce these casualties, with maximum cost effectiveness.

II. BACKGROUND

In response to its regulatory responsibilities under the Federal Railroad Safety Act of 1970 and the Accident Report Act, the FRA has divided accident/incident data into three categories:

1) Death, injury or occupational illness
2) Rail equipment accidents/incidents
3) Rail-highway crossing collisions

Data from the first category--death, injury or occupational illness--were analyzed for three successive years (1980, 1981 and 1982), in order to circumvent possible statistical variances within a single year.

In the course of this analysis, the following methodological steps were taken: 1) a selection of a casualty unit of measurement; 2) a selection of a casualty severity weighting scale; 3) a comparison of dollars lost from casualties among the eight FRA regions; 4) a frequency/severity analysis of the main injury categories; 5) the isolation of casualty causes and job categories by railroad region. The expectation in adopting this approach was to exploit FRA's data base to the fullest by sampling "real world" facts from interchanges with personnel from selected FRA regions--which would augment the establishment of clearer guidelines for the activities of FRA Inspectors.

The following subsections, by way of further background, represent an overview of three ancillary components of this analysis: the railroad casualty data reporting operative within the FRA; the published literature on railroad casualty data; the data analysis tool to be used.

A. Railroad Casualty Data Reporting

Casualty data are reported to FRA on a monthly basis by each railroad operating within the U.S. Each casualty report (Form FRA-F-6180-55 or 55a) provides the following information relative to the operation of a particular railroad:

1. The number of locomotive train-miles
2. The number of passenger train-miles
3. The number of motor car train-miles
4. The number of yard switching train-miles
5. The number of casualties
6. The type of person affected, and/or his/her occupation
7. The type of illness/injury
8. The cause and type of incident
9. The number of days lost from work
10. The number of days of restricted activity
11. The age of each person injured
12. The number of casualties resulting in no work days lost

In compiling this information, railroad operators are permitted to provide estimates of train-miles, days away from work, or days of restricted duty consequent to injuries, if factual information is not available.

These railroad casualty data reports are keypunched for FRA by outside firms, which enter and edit the data on microcomputers and then transcribe the data onto data bases. The editing process consists of single entry edits, cross field edits, a check for duplicate records, a manual sampling check, and a data check against the original handwritten report. The percentage of data that is checked is dependent on the size of the field entered and the experience of the data entry technician. FRA subsequently groups the casualty data into the following six categories:

1. Employees on duty
2. Employees off duty
3. passengers
4. Non-trespassers
5. Trespassers
6. Contractors (when keyed into the data base, this group is keyed as non-trespassers)

B. Railroad Casualty Literature

Prior to this analysis of railroad employee casualty data, Ecosystems conducted a state-of-the-art literature review of U.S. rail safety research, safety methodologies and the corresponding procedures used for data analysis. A total of 39 works (articles, studies and documents) supplied by FRA were examined. The majority of these were prepared by FRA; others were submitted by FRA contractors. The literature included a broad range of technical research, from memoranda of a few pages to reports of up to 200 pages. A diversity of subject matter was covered as well, including accident data analysis, track maintenance research, hazmat releases and rerouting analyses. These literature reviews are detailed in a separate study entitled, "Rail Safety Research: A Review of the State-of-the-Art", dated November 1983.

Each literature review addressed two critical questions:

1. How germane and useful is its subject matter to the analysis of cause-effect relationships of casualty data?

2. How germane and useful is its methodology to the analysis of casualty data?

Each work was then classified into one of the following three categories, depending upon its applicability to the analysis of casualty data:

1. Low priority
2. Ancillary
3. High priority

The "low priority" classification suggests that both its subject and/or its methodology are not relevant to this analysis of railroad employee casualty data.

The "ancillary" classification suggests that either its subject or its methodology contributes indirectly to the analysis of employee casualty data.

The "high priority" classification suggests that its methodology and subject are very germane or highly useful to employee casualty data analysis. These works were subsequently separated out for further study and for use as reference material.

Among the 39 works which were reviewed, 20 were classified as low priority, 11 as ancillary, and 8 as high priority.

Three salient results of this literature review are germane to this analysis:

1. DOT has quantified, extensively, the monetary equivalent of injuries and loss of life from rail-related accidents.

2. Analogies can usefully be drawn between the occurrences of road traffic casualties and railroad casualties.

3. Few quantitative analytical investigations of railroad casualties, such as are attempted in this study, have been performed; previous exploitation of FRA's data base was found to be minimal.

C. Data Analysis Tool

The Statistical Analysis System (SAS), FRA's host computer system located at the National Institutes of Health, was utilized as the data base for this analysis of railroad casualty data. SAS provided the following data analysis tools:

-- data storage and retrieval
-- data modification and programming
-- statistical routines

SAS was accessed through the following two programs:

a) A main program, providing access to the host system, the SAS program, and data files.

b) A subroutine program, accessed through the main routine, and used for all data analysis.

III. METHODOLOGY

A. A Statistical Examination of FRA Casualty Data

This study represents an analytical attempt to draw inferences from "real world" data, and thereby arrive at valid results which would lead to reasonable decisions with respect to FRA Inspector allocations and activities. The quality of these research results, therefore, depends upon how well they elucidate the relationship among casualty variables and suggest ameliorative measures to reduce railroad employee casualties.

The Selection of a Unit of Measurement

In line with the scientific, analytical objective of this report, a reliable, quantitative unit of measuring the casualty data was required. Our inquiries showed that the unit expressed as "number of hours worked" has been well established in the analysis of road casualties and "on the job" injuries; in addition, FRA and the Association of American Railroads (AAR) have adapted this unit.

Foreign railroad authorities, however, have frequently adapted a "train-miles travelled" unit.

It was decided that the usefulness of both units of measurement--employee man-hours and railroad miles--could be discerned by determining the statistical correlation between these units and the casualty output. Only a high correlation between one or both of these input variables and the casualty output would lead to reasonable conclusions from subsequent analysis.

Linear regressions were, therefore, performed between the number of railroad employee man-hours and the number of railroad miles (the independent variables), and the number of casualties (the dependent variable), for all of the railroads monitored by the FRA.

Figure 1, accordingly, shows the relationship between casualties and the first unit of measurement: employee man-hours. The parameter estimates obtained from this regression analysis were:

R^2	=	0.73
Intercept	=	18.37
Slope	=	2.92×10^{-5}
Number of observations	=	1308

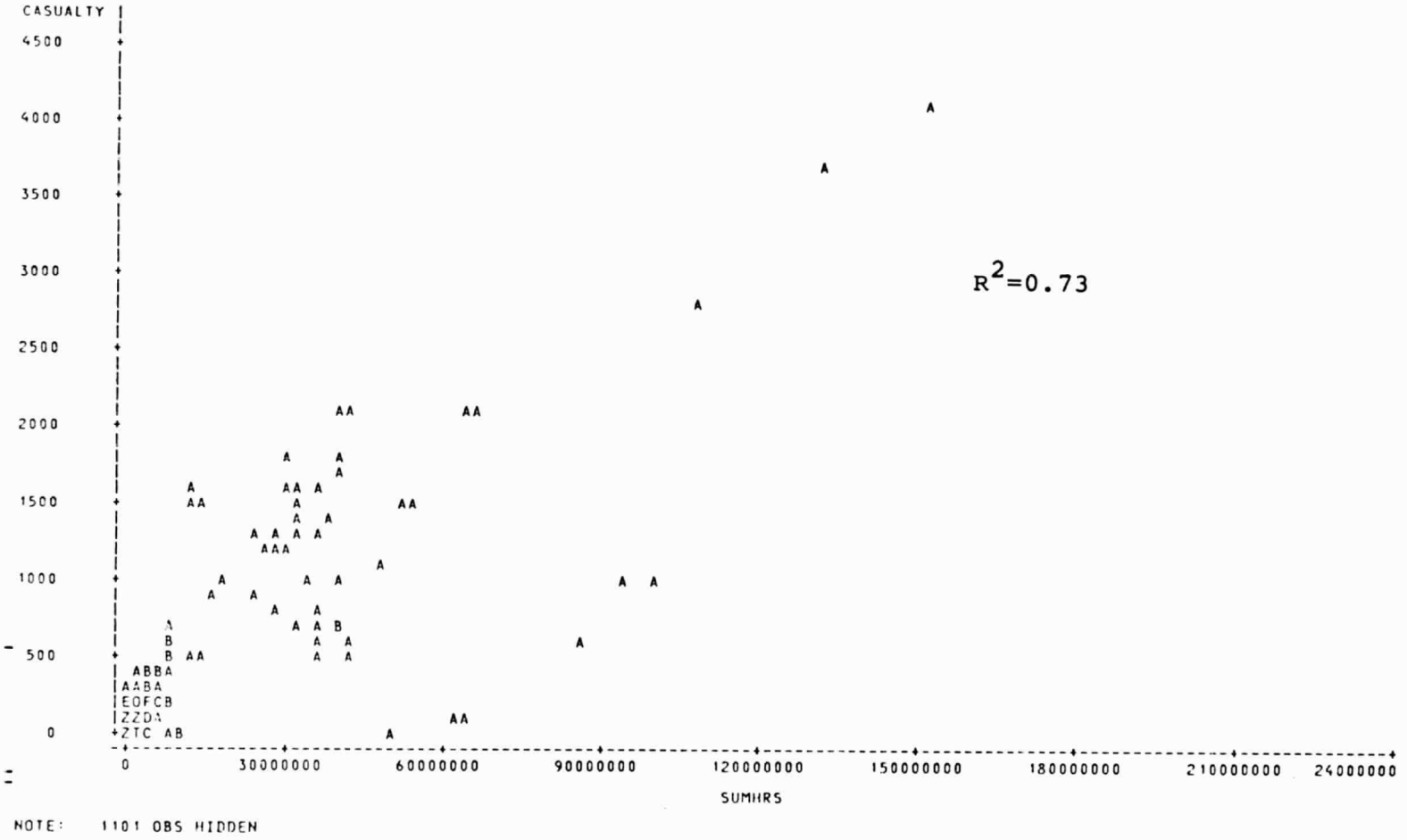
While the figure indicates that the probability of casualties increases as a function of increasing employee man-hours, the correlation is imperfect, as shown by the computed value of the "goodness of fit" coefficient R^2. A perfect correlation would cause the points of the figure to fall on a straight line, and R^2 to be unity ($R^2=1$).

Figure 2 shows the analogous relationship between casualties and the second unit of measurement: railroad miles travelled. The parameters obtained were:

R^2	=	0.61
Intercept	=	21.56
Slope	=	3.18 x 10-5
Number of observations	=	1308

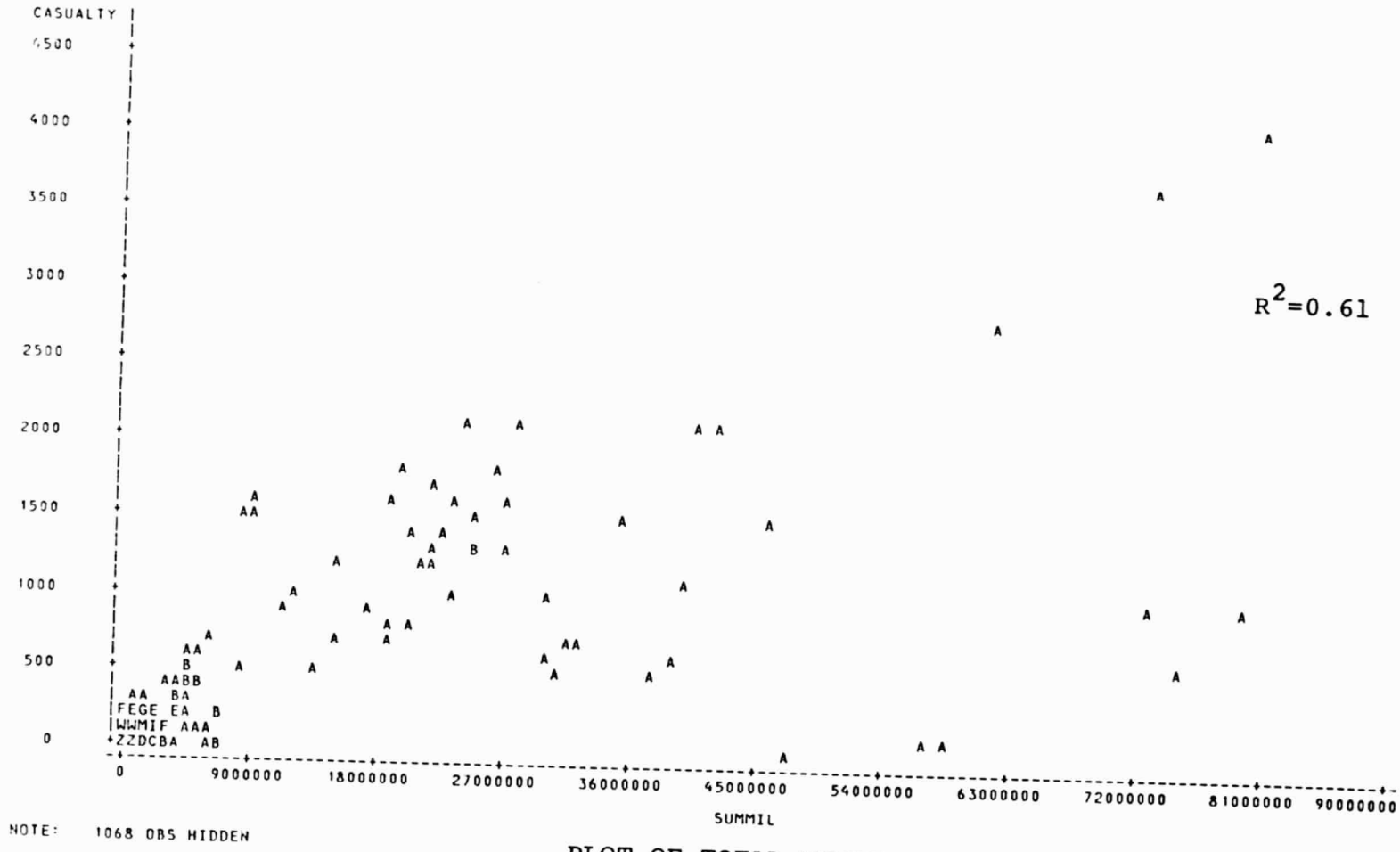
This figure indicates that the longer the distance travelled, the higher the probability of casualties. However, the "goodness of fit" is less perfect than the relationship between casualties and employee man-hours.

In each of these sets of relationships, an imperfect correlation appears. To obtain a conceivably better "goodness of fit", both independent variables--employee man-hours and railroad miles--were combined. The R^2 value for a double regression of the variables was 0.78 for 1308 observations. The slight coefficient improvement value over that obtained by employee hours alone, however, does not justify the added complexity of using both variables.



PLOT OF TOTAL NUMBER OF
CASUALTIES BY MAN HOURS FOR U.S. RAILROADS

FIGURE 1



PLOT OF TOTAL NUMBER
OF CASUALTIES BY U.S. RAILROAD MILES

FIGURE 2

It was therefore decided that the single variable yielding the highest correlation, namely employee man-hours, was the preferable unit of measurement for this study. Although this unit of measurement was found to be imperfect--the man-hour time of exposure to risk does not complete "explain" the occurence of casualties--the residual factors influencing casualty events seem to be statistically small when it is adopted.

The Application of the Employee Man-Hour Unit of Measurement to the FRA Regions

Once the employee man-hour unit of measurement was chosen a complementary consideration presented itself, i.e., whether an improved goodness of fit would be achievable by segregating the analysis of FRA regions.

Such a segregation of statistical populations is frequently needed because aggregate populations often exhibit a "spurious" lack of correlation, caused by the "mixing" of statistical populations.

Correlations were therefore performed between employee man-hours and incidences of casualties for the eight FRA regions. These correlations are shown in the Appendix.

Two salient results of these correlations emerged:

- The goodness of fit of six FRA regions is better than that exhibited by the U.S. as a whole.

- The exceptions are Regions 4 and 6, which contain two distinct populations that appear to be "well-behaved" by themselves but, when mixed, demonstrate a lowering of their correlation coefficients.

It was, therefore, decided that the unit, employee man-hours worked, could be used as an independent variable for all but Regions 4 and 6. The two populations of these latter two regions would have to be disaggregated prior to any future analysis.

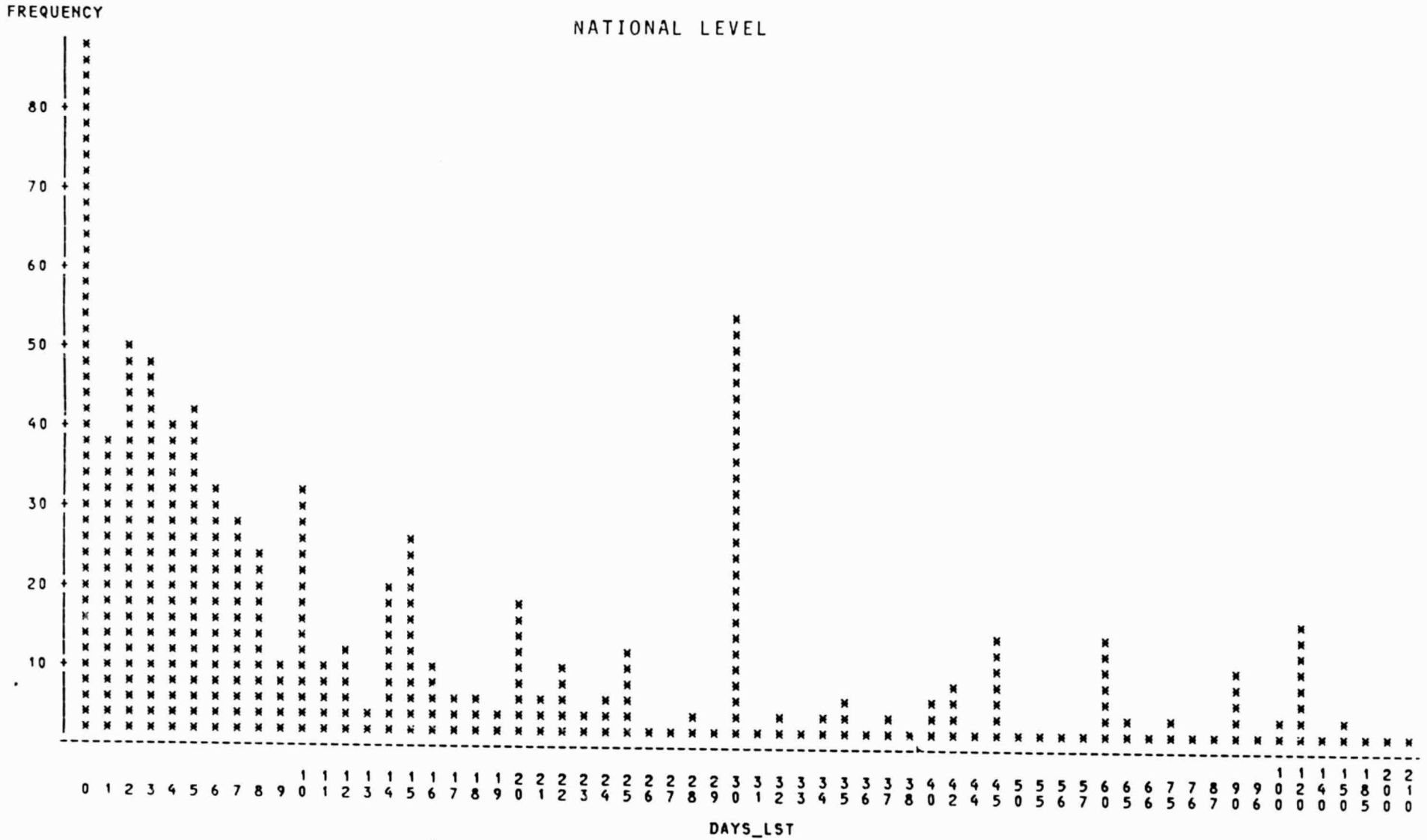
The Statistical Distribution of the Casualty Data Adapted

An important factor in the analysis of any statistical data is which type of distribution of the data is to be adapted.

In the case of most industrial, on the job injuries and road traffic casualties, the distribution of casualties versus the independent variable chosen (passenger miles or hours worked) follows approximately a Poisson relationship, in which the least severe casualties are the most frequent, and the most severe are the rarest. To verify whether the Poisson relationship is applicable to railroad employee casualty data, number of days lost from work was used as a rough severity index of employee illness. The results of this analysis for two selected injury codes are shown in Figures 3 and 4.

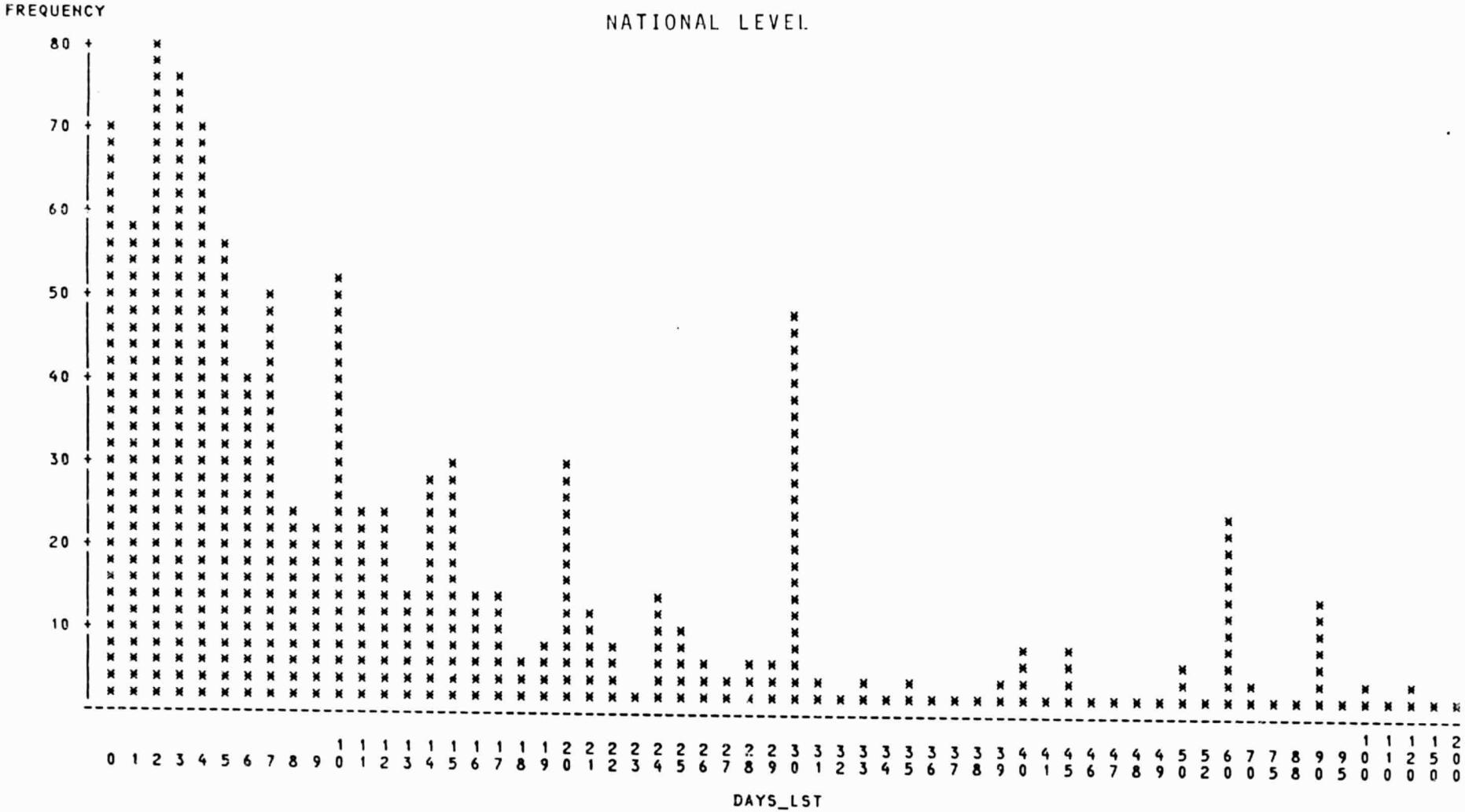
The distribution of days lost from work appears to be multimodel in these figures, with peaks recurring at five day intervals. While these distributions suggest a general Poisson--type trend, the exact reasons for the recurrence of peaks at five day intervals is not known. A reasonable hypothesis is that these recurrences are attributable to physicians' standards in prescribing "time-off" from work, combined with the patient's average recovery period. Because of the inexact nature of the aggregate data on this subject, however, it was decided that a more precise investigation of the relationship betwen "time-off" and severity of illness would need to be explored in association with the individual railroads themselves, in a separate study.

If such an investigation into time lost from work were to uncover ways and means to ameliorate the periodic casualty recurrences, significant savings might accrue to railroad organizations, since days lost are tantamount to loss of money. Moreover, should these recurrences be "cleaned out" or at least satisfactorily explained, and should the residual "clean" distribution indeed follow Poisson's law, an interesting theoretical possibility would emerge. This would arise from the fact that Poisson distributions are characterized by a single parameter (the mean, which also equals the variance), which might allow the characterization of a given railroad by a single, simple "severity indiex". The combination of these indices could then serve as general



FREQUENCY BAR CHART OF DAYS LOST FROM WORK:
ILLNESS CODE 206

FIGURE 3



FREQUENCY BAR CHART OF DAYS LOST FROM WORK:
ILLNESS CODE 203

FIGURE 4

comparative indicators as to which railroad ought to be the object of particular attention by FRA Inspectors.

B. The Selection and Applications of a Severity Weighting Scale

Not only was a unit of measurement required to measure the available FRA casualty data, a uniform "yardstick" was needed to normalize the degree of severity among different types of rail-related, employee casualties. This latter requirement was based on the intuitive realization that bruised fingers, for example, are not of comparable severity as a fractured leg or, even more strikingly, a death related accident.

To facilitate the process of creating such a severity yardstick or weighting scale, we reviewed fifteen DOT reports, and initiated personal correspondences with the following agencies: the Association of American Railroads, DOT's Transportation System Center, the Corps of Engineers, the Highway Research Board, the Bureau of Labor Statistics, and selected insurance agencies. On the basis of this research we were able to conclude that severity weighting scales in current use are based upon either subjective or objective criteria.

The subjective criteria used to create a severity weighting scale are derived from societal and/or specific social group perceptions relating to the significance of a particular injury. Thus, from this subjective perspective, an astronaut dysfunction in space would appear more significant and thus be weighted higher than an injury from a conventional automobile accident.

Objective criteria for creating a severity weighting scale, by contrast, would be derived from precise monetary costs sustained by a particular industry: for example, the number of days lost from work times a worker's pay, or the amount of insurance compensation which is mandated by specific injuries.

Prior to the actual choice of either a subjective or an objective severity weighting scale, the relative availability of FRA casualty data was assessed. Two principal data limitations were discovered: 1) Among FRA

Railroad Injury and Illness Summary Reports, the frequency of multiple injuries, permanent disabilities, simple and compound fructures and other data useful in constructing an exact weighting scale were unavailable; 2) The FRA data base lacked actual costs (such as medical bills and insurance premiums) incurred by individual railroads as a results of diverse casualties.

However, the FRA was able to provide an average "social cost" of injuries that lead to days lost and death; these social cost estimates represent a reasonable assessment of the actual monetary damages associated with employee casualties.

After considering the relative appropriateness of using an objective or a subjective severity weighting scale in view of these FRA data base characteristics, an objective weighting scale was selected for two principal reasons: 1) it provided an indication of monetary loss (accessible in FRA's social costs data), which could then be correlated to the occurence and types of casualties (a step not taken by FRA); 2) it could later be converted, if needed, to a subjective scale, given the availability of the appropriate conversion factors.

The objective weighting scale specifically selected for this anlaysis was derived from 1975 societal costs as enumerated in: A Framework for Federal Inspection Resource Allocation by George Skaliotis (The Transportation Systems Center, July 1980). Figures from this study were then escalated to 1982 dollars, based on the historical rate of inflation as defined by the Bureau of the Census. Accordingly, the cost of death was calculated to be $449,068 per employee and $339,372 for non-employees; the cost of a day lost to be $195 per employee and $165 for non-employees. In addition, restricted duty per day was estimated at 80% of a whole day's cost, and each "zero day lost" was assigned 25% of a whole day's cost (attributable to medical and other "on-the-job" expenses). These "dollars lost" values are based on costs incurred by society; they, therefore, correspond to the average "social cost" of an injury as provided in FRA's data base, and not the dollars paid by railroads for insurance and other expenses.

Average "dollars lost" per railroad employee hour worked, as derived from this objective weighting scale, declined by 14% between 1980 and 1982, see Figure 5; total "dollars lost" declined even more precipitously--by 30% during this same period, see Table 1. While these percentages presuppose some statistical variances deducible from external causes (such as the effects of the economic recession upon the railroad's mode of operation and worker behavior), they strongly suggest that the FRA has made important strides in realizing its goal of an overall 20% safety improvement for the 1981 to 1985 time period.

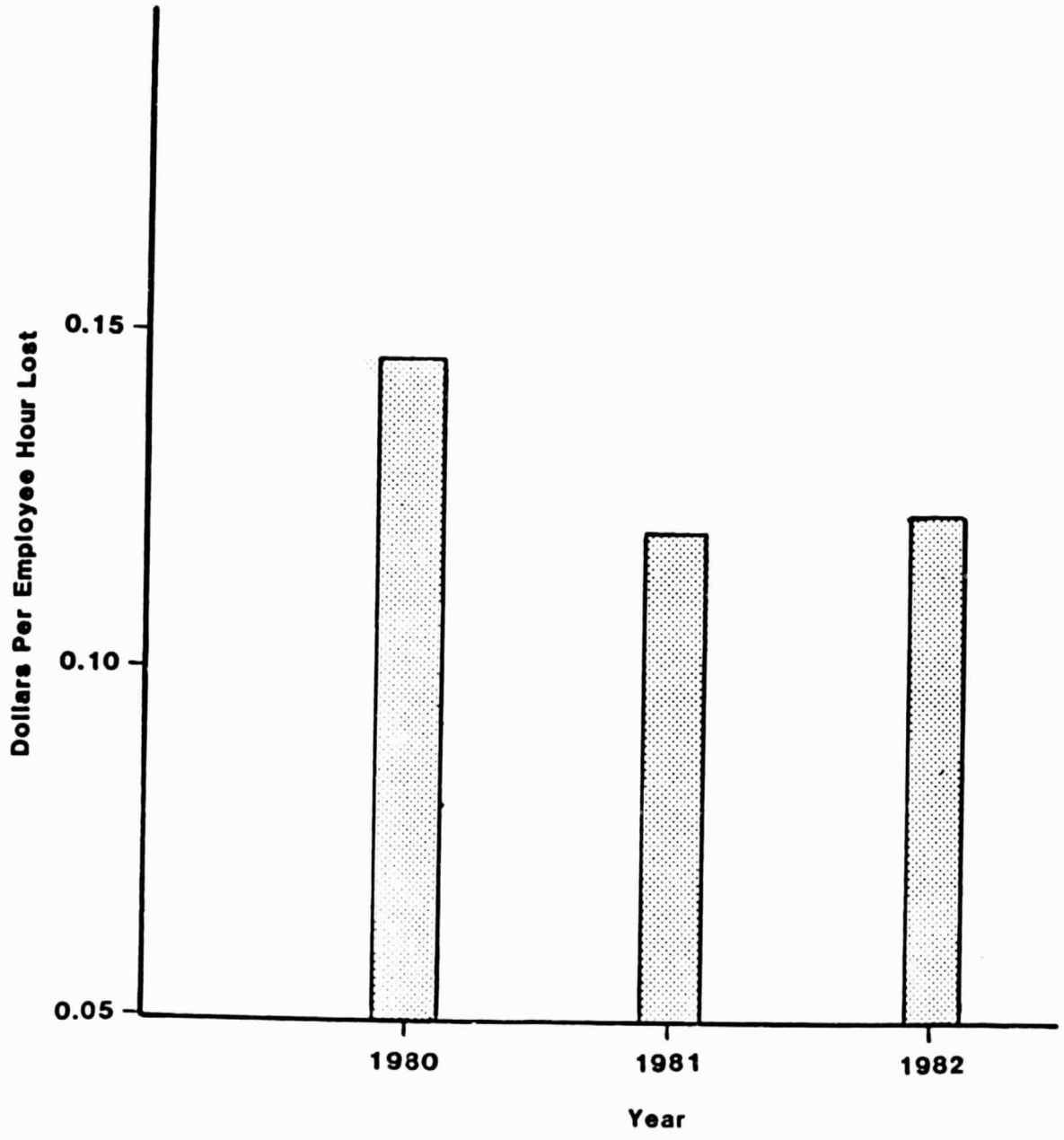
The Relationship Between Dollars Lost and Railroad Regions

Our objective severity weighting scale--dollars lost as a result of employee injury--was accordingly applied to each FRA region for the years 1980, 1981 and 1982. Region 2 showed the greatest total dollars lost for this period: 22% of the total; Region 8 showed the least at 5% of the total, see Figure 6 and Table 1. In terms of the dollars lost per employee hour, Region 1 showed the highest amount while Region 6 represented the lowest, see Table 2.

The Relationship Between Dollars Lost and Various Injury Categories

In terms of the frequency of injuries throughout the U.S., 80% of all 85 injury categories fall within 15 categories, as shown in Table 3 and Figure 7. With respect to the financial severity of there injuries, Figure 8 and Table 4 indicate that 80% of the total dollars lost from these employee injuries are due to 13 injury codes (which also rank highest in terms of number of injuries). At both the national and regional levels these 13 injury codes ranked highest, in terms of total dollars lost, for 1980, 1981 and 1982, see Figure 9 and 10.

Since this information, however, does not provide a lead as to the type of employee involved in or the causes of these injuries, the next steps in our analysis were to ascertain the relationships between job categories and dollars lost and injury causes and dollars lost.



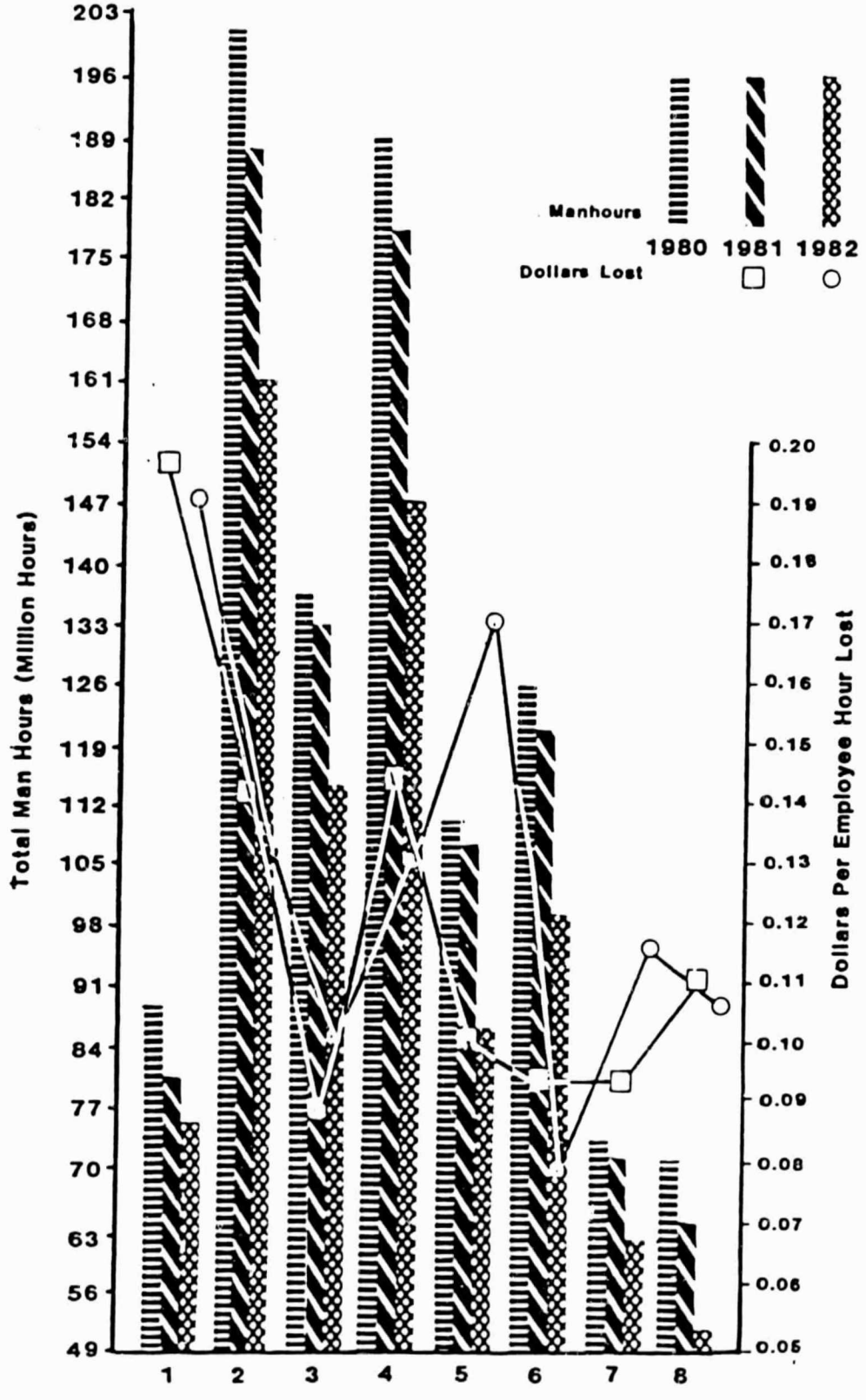
Dollars Per Employee Hour Lost For Railroad Industry For Years 1980 Thru 1982

FIGURE 5

TABLE 1

TOTAL DOLLARS LOST BY RAILROAD REGION

REGION	DOLLARS LOST		
	1980	1981	1982
1	17,011,391	16,235,558	14,570,903
2	33,224,863	26,708,964	21,393,773
3	16,[illegible]39,072	11,625,020	11,583,789
4	19,255,291	25,621,750	30,092,062
5	18,700,731	10,800,858	14,098,288
6	13,683,610	11,184,569	7,820693
7	11,064,701	6,832,854	6,947,161
8	8,663,417	7,344,996	5,653,192
RAILROAD INDUSTRY TOTALS	**148,841,240**	**116,331,275**	**101,313,196**



Total Manhours &
Dollars Per Employee Hour Lost
From Injuries - By Region

FIGURE 6

TABLE 2

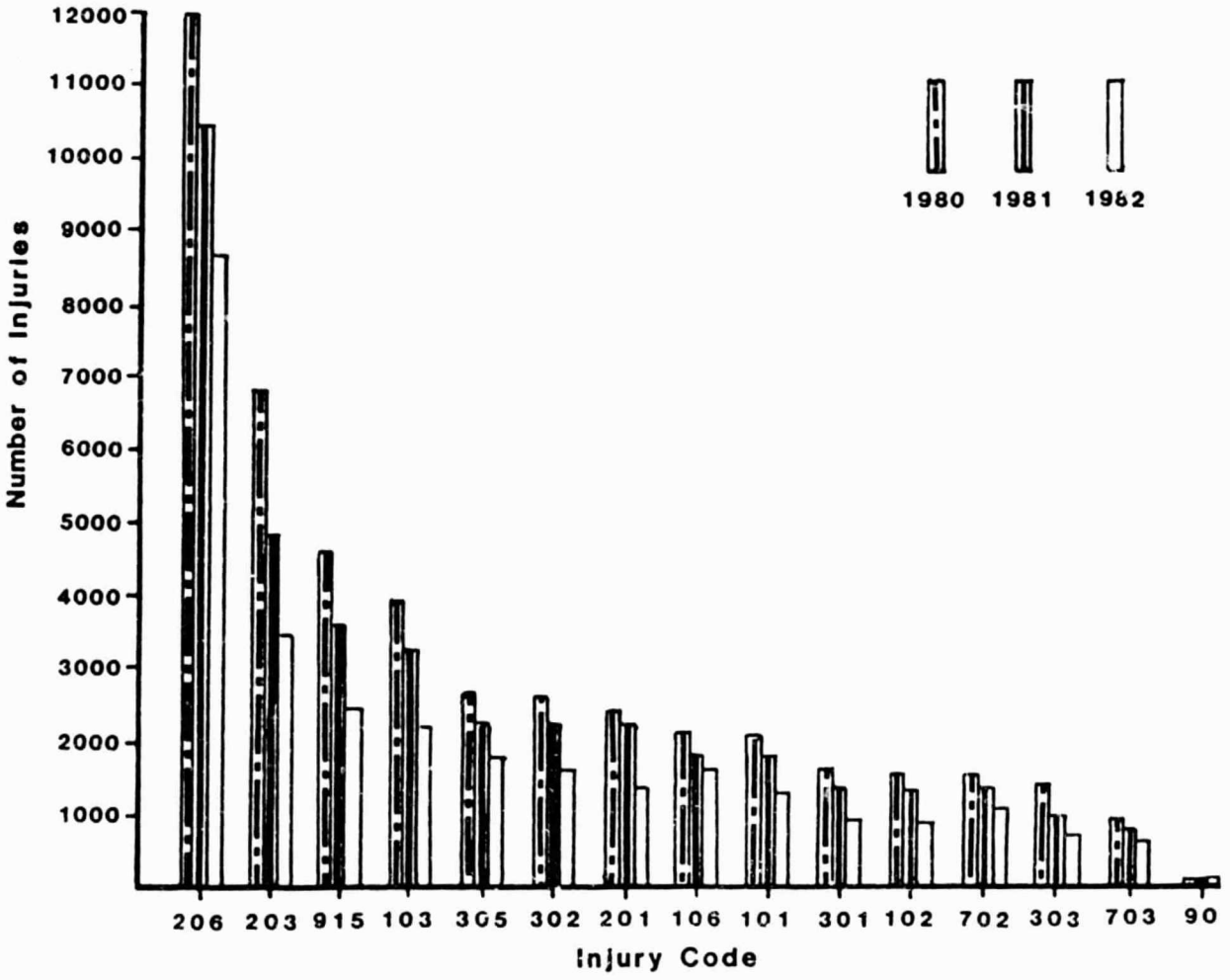
TOTAL DOLLARS LOST PER EMPLOYEE HOUR BY REGION

REGION	DOLLARS LOST PER EMPLOYEE HOUR	
	1984	1982
1	0.19	0.19
2	0.14	0.13
3	0.08	0.10
4	0.14	0.13
5	0.10	0.17
6	0.09	0.08
7	0.09	0.11
8	0.11	0.11

TABLE 3

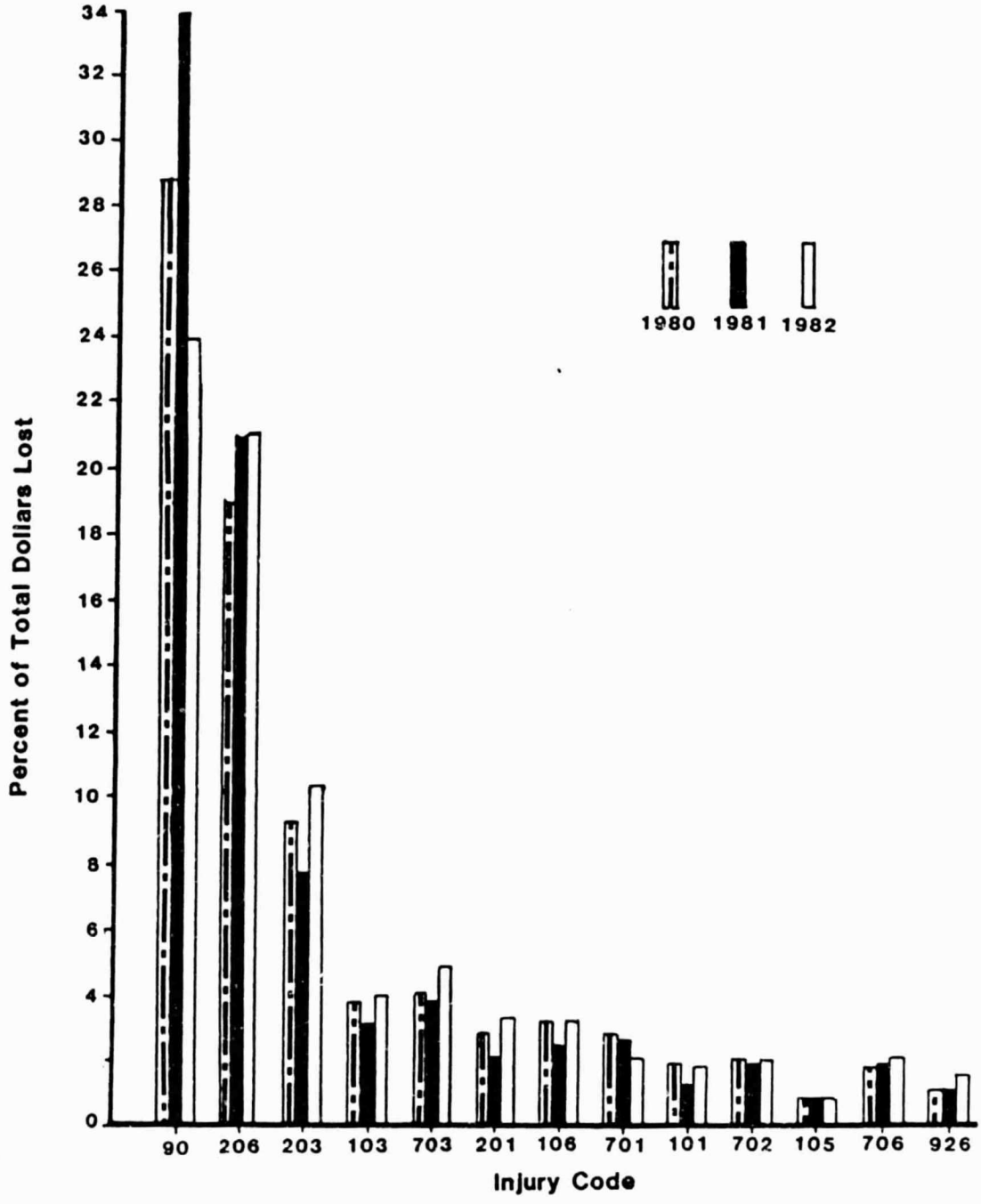
THE FIFTEEN MAJOR INJURIES BASED ON FREQUENCY

INJURY	CODE	NUMBER OF INJURIES 1980	1981	1982
SPRAINED TORSO	206	11,974	10,566	8,791
SPRAINED LEG	203	5,875	4,825	3,512
FOREIGN OBJECT IN EYE	915	4,604	3,685	2,469
BRUISED LEG	103	3,916	3,202	2,258
LACERATION OF HEAD	305	2,644	2,272	1,707
LACERATION OF FINGER	302	2,586	2,220	1,527
SPRAINED ARM	201	2,310	2,172	1,235
BRUISED TORSO	106	2,248	1,721	1,643
BRUISED ARM	101	2,067	1,770	1,226
LACERATION OF ARM	301	1,633	1,391	908
BRUISED FINGER	102	1,512	1,276	861
FACTURED FINGER	702	1,506	1,329	1,041
LACERATION OF LEG	303	1,367	942	673
FRACTURED LEG	703	944	812	623
DEATH	90	97	65	78



Number of Injuries for Various Injury Codes for the National Railroad Industry for 1980 Thru 1982

FIGURE 7



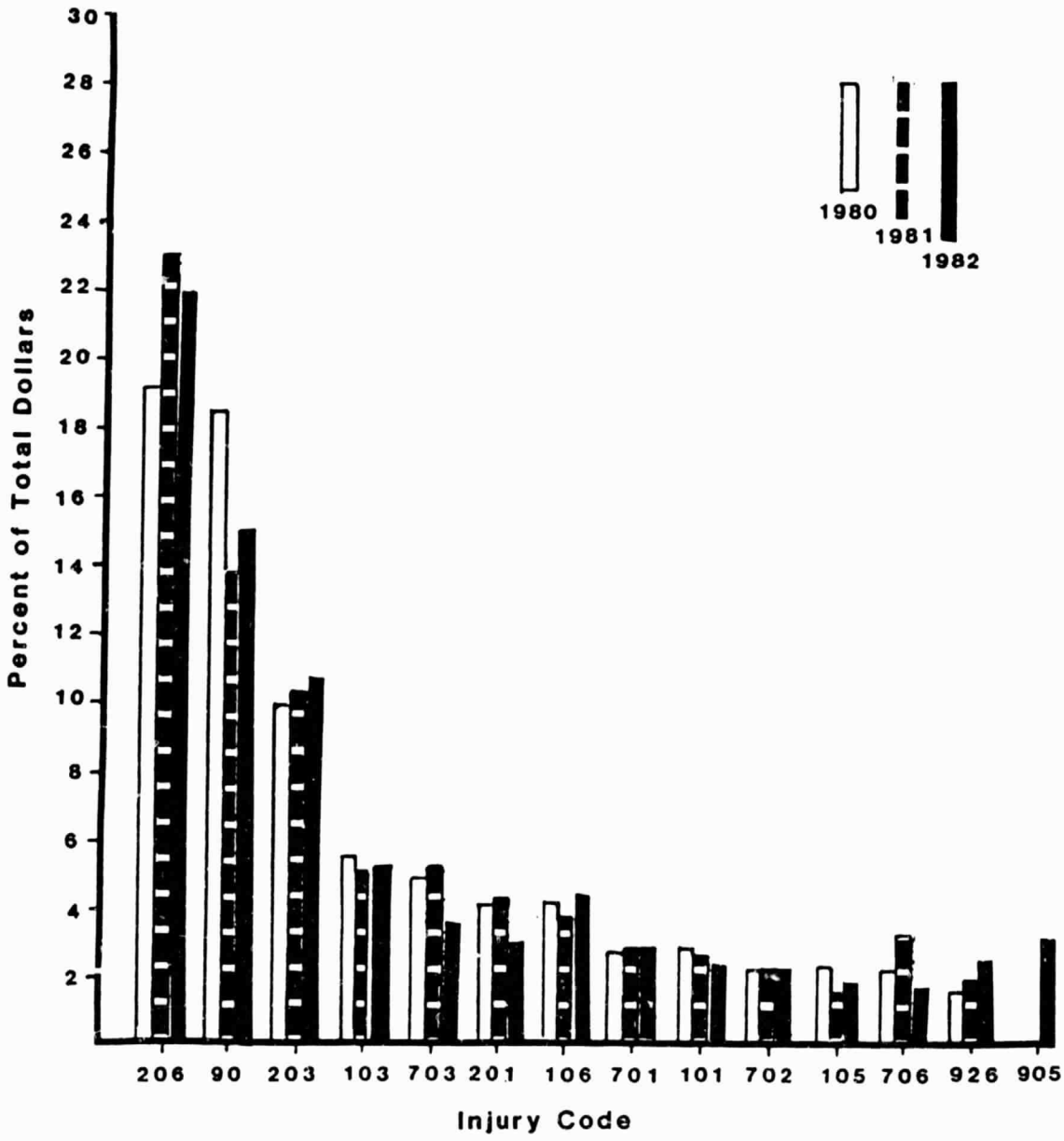
National Percentage of Total Dollars Lost
For Various Injury Codes
For Years 1980 Thru 1982

FIGURE 8

TABLE 4

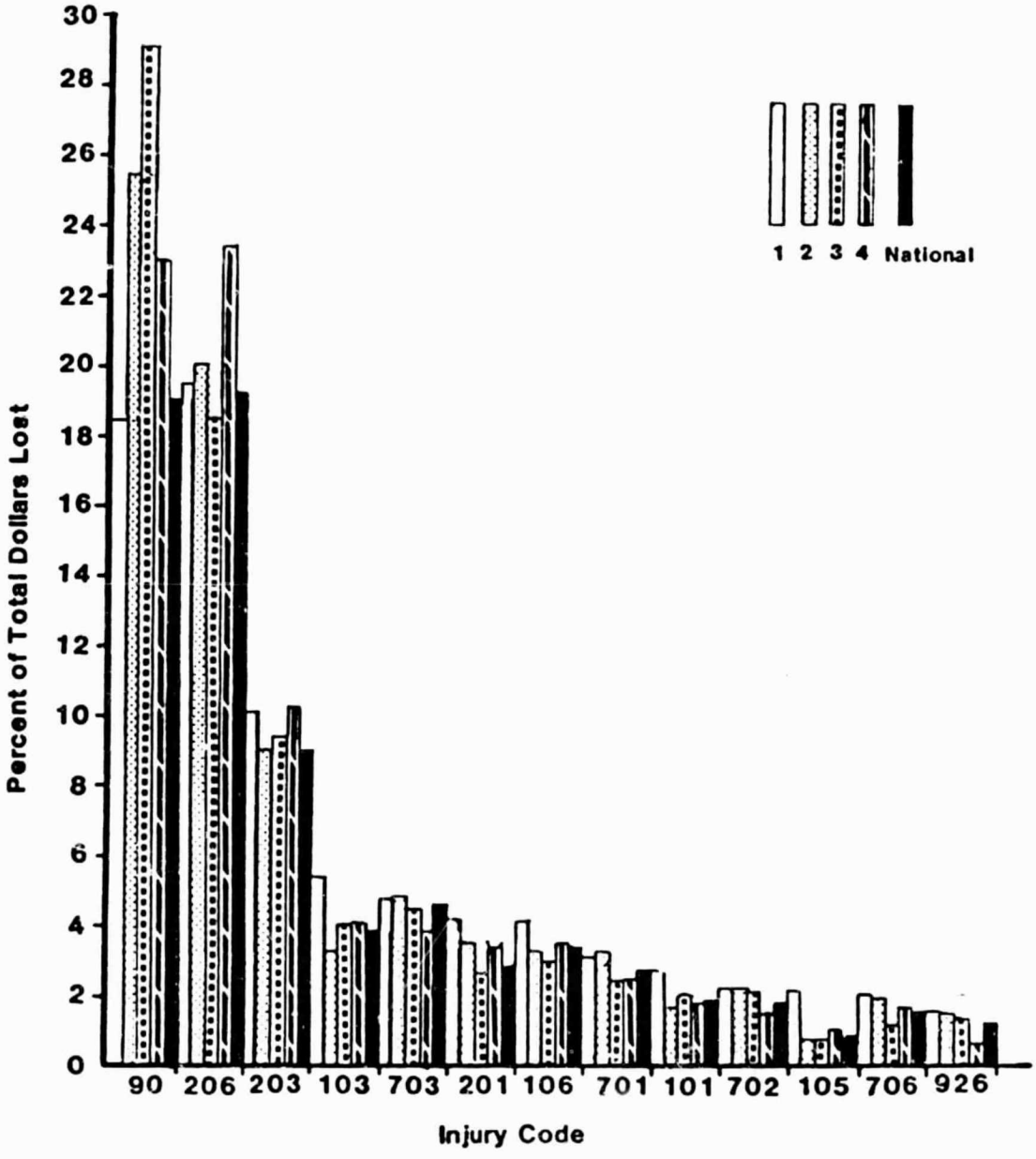
THE THIRTEEN MAJOR INJURIES BASED ON PERCENTAGE OF TOTAL DOLLARS LOST

		PERCENTAGE OF TOTAL DOLLARS LOST		
INJURY	CODE	1980	1981	1982
DEATH	90	28	34	24
SPRAINED TORSO	206	19	21	21
SPRAINED LEG	203	9	9	8
BRUISED LEG	103	4	3	4
FRACTURED LEG	703	4	4	5
SPRAINED ARM	201	3	2	3
BRUISED TORSO	106	3.5	3	3.5
FRACTURED ARM	701	3.5	3	2.5
BRUISED ARM	101	2	1	2
FRACTURED FINGER	702	2	2	2
BRUISED HEAD	105	1	1	1
FRACTURED TORSO	706	2	2	2
HERNIA	9261	1	1	1.75



Percentage of Total Dollars Lost - Region 1

FIGURE 9



Percentage of Total Dollars Lost - For 1980

FIGURE 10

The Relationship Between Dollars Lost and Job Categories

The 122 job codes described in the FRA Guide for Preparing Accident/Incident Reports (pp. 111-116) were aggregated into six categories:

1) Executives, officials, and staff assistants (FRA job codes 1 and 2)

2) Professional, clerical, and general (FRA job codes 3-26)

3) Maintenance of way and structures (FRA job codes 27-49)

4) Maintenance of equipment and stores (FRA job codes 50-74)

5) Transportation (other than train, engine, and yard) (FRA job codes 75-104)

6) Transportation (train, engine, and yard) (FRA 105-122)

Table 5 shows the "total dollars lost" as a result of injuries incurred within each job category in 1982 (similar results were observed for 1980 and 1981). Figures 11 and 12, comparing job categories for 1980 and 1982, provides an initial assessment of the job categories that are most subject to casualties. Category 6 (Transportation: train, engine and yard) contributed more than 30% of the "total dollars lost", while categories 3, 4 and 6 together contributed 85%.

The next question pertains to the principal causes of railroad casualties, i.e., those causes which would require the most attention in terms of safety precautions and personnel training measures.

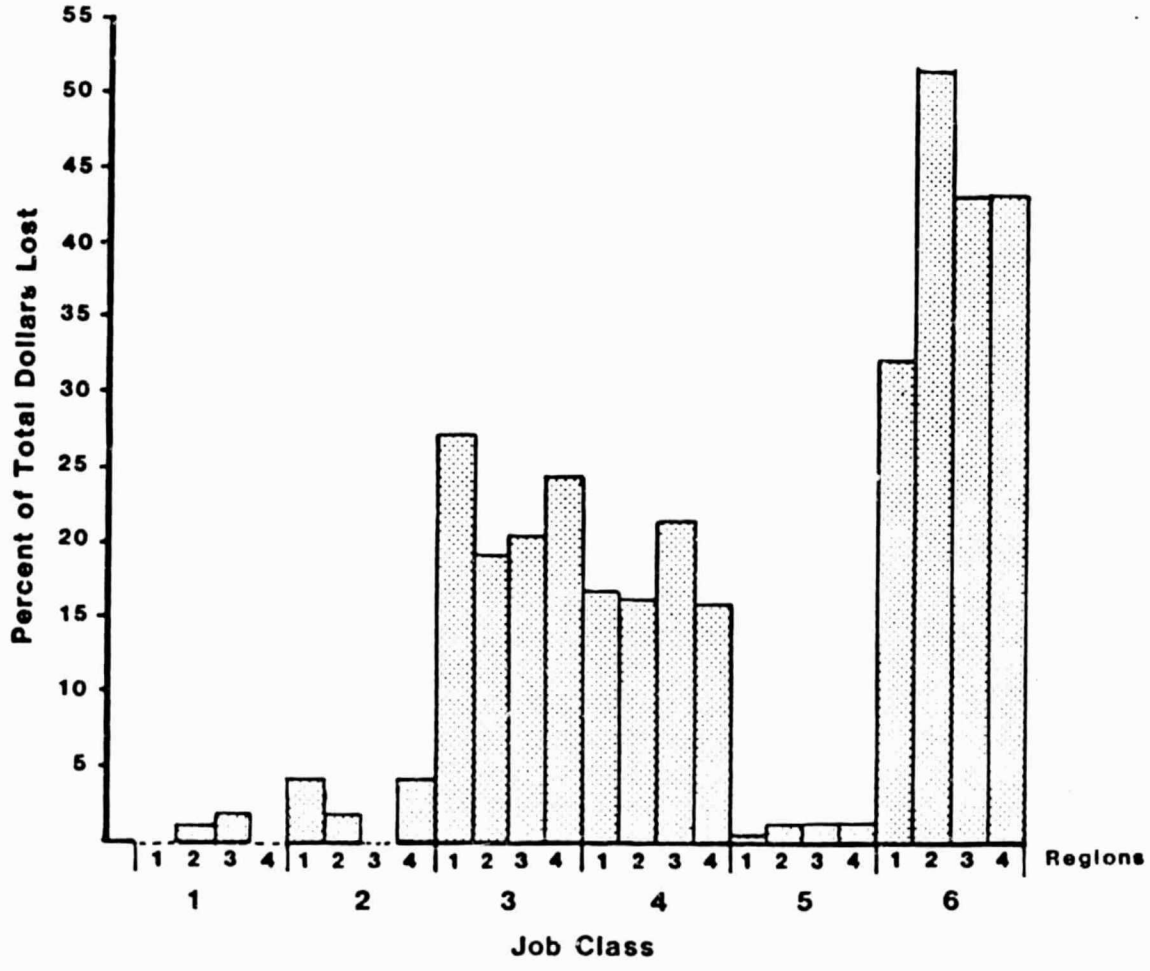
The Relationship Between Dollars Lost and Cause Categories

The 354 FRA cause codes described in the FRA Guide for Preparing Accident/Incident Reports (pp. 119-138) were grouped into 21 categories. These are listed in Table 6 together with the corresponding FRA cause codes.

TABLE 5

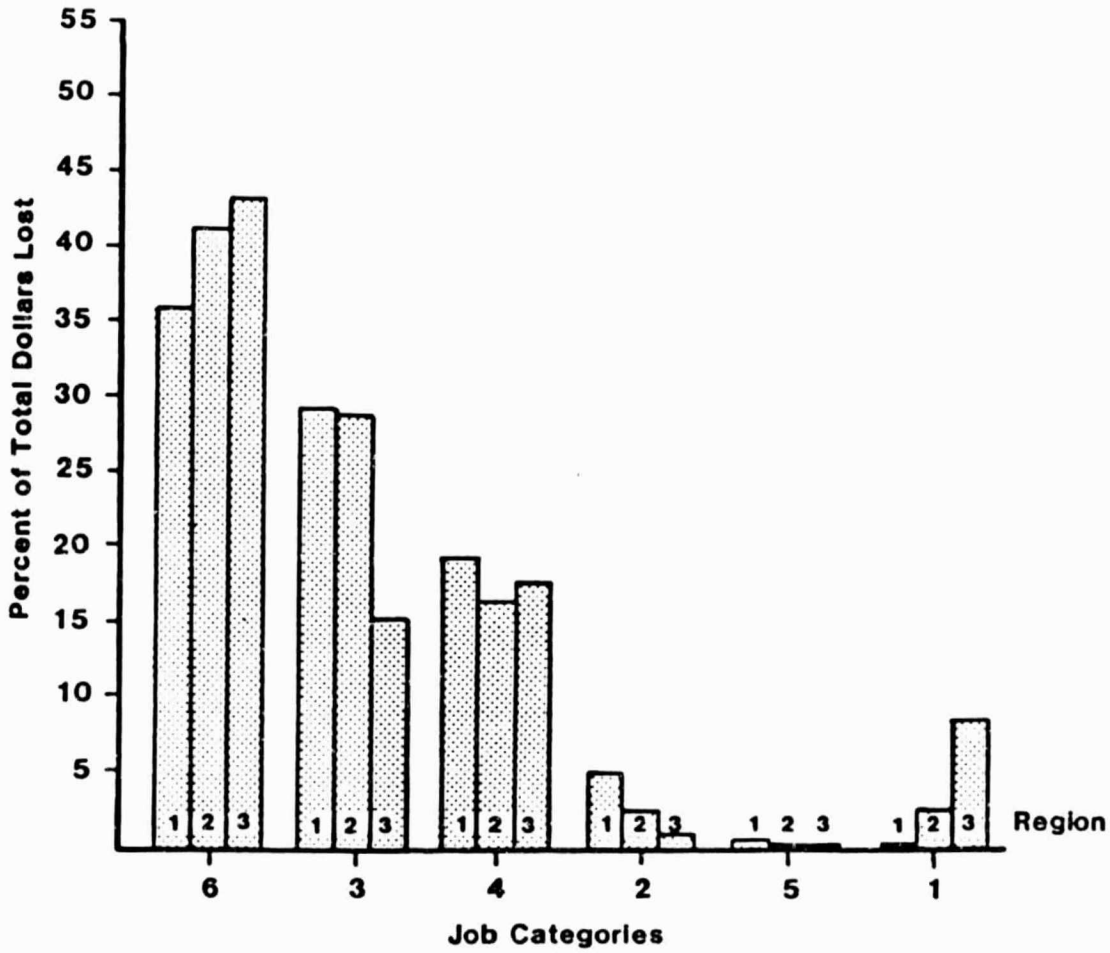
REGIONAL PERCENTAGE OF TOTAL DOLLARS LOST BY JOB CATEGORIES FOR ALL INJURIES - 1982

	JOB CATEGORIES					
REGION	1	2	3	4	5	6
1	0	4.895	29.294	19.191	0.734	35.979
2	2.314	2.099	28.67	15.652	0	42.528
3	8.101	0.957	15.19	17.559	5.112	43.212
4	0	3.323	25.987	15.348	0	45.468
5	3.607	5.094	26.105	8.542	0	46.514
6	0	0.799	43.896	12.016	0	33.406
7	0	10.304	30.864	18.048	0	31.332
8	0	10.085	30.1596	13.136	0	36.387



Percentage of Total Dollars Lost
By Job Categories For All Injuries
Year 1980

FIGURE 11



Regional Percentage of Total Dollars Lost For All Injuries By Job Categories - 1982

FIGURE 12

TABLE 6

DESCRIPTION OF CAUSE CATEGORIES

CAUSE CATEGORY	DESCRIPTION	FRA CAUSE CODES
A	COUPLING AND UNCOUPLING LOCOMOTIVES OR CARS	001T-009T
B	COUPLING AND UNCOUPLING AIR HOSE	051-059T
C	WHILE OPERATING OR ON LOCOMOTIVE	101-119T
D	OPERATING RAIL MOTOR CARS	151-159T
E	OPERATING HAND BRAKES	200-209T
F	OPERATING SWITCHES OR DERAILS	301-309T
G	PERSON ON LOCOMOTIVE COMING IN CONTACT WITH FIXED OBJECT	401-409T
H	GETTING ON OR OFF CARS OR LOCOMOTIVES	501-519T
I	RAIL EQUIPMENT AND RAIL-HWY ACCIDENTS/INCIDENT	601C-610
J	STRUCK BY OR RAN INTO LOCOMOTIVE	701-709T
K	SERVICING OR MAINTAINING EQUIPMENT	800T-825T
L	MAINTENANCE OF WAY AND STRUCTURE	852-899T
M1	FREIGHT, BAGGAGE, EXPRESS OR MAIL	901-904T
M2	WINDOWS, DOOR, ETC. ON ON-TRAIN EQUIPMENT	907-919T
M3	PASSENGER CAR DOORS	920-927T
M4	STUMBLING, SLIPPING, FALLING, CAUGHT	930-939T
M5	FLYING OR FALLING OBJECTS, BURNS, ETC.	940-949T
M6	OPERATION OF ON-TRACK WORK EQUIPMENT	950T-959T
OT	OTHER OCCURRENCES	970-989T
ASI	UNPROVOKED ASSAULTS	96A-96G
ASII	ASSAULTS DUE TO PROTECTION RAILROAD PROPERTY	96J-96N

The percentage of "dollars lost" associated with these various injury cause categories was calculated for each of the 8 FRA Regions during the years 1980, 1981 and 1982. Table 7 shows that 50% of the "total dollars lost" under injury code 206 (sprained torso) are attributable to the following cause categories: Maintenance of Way and Structures; Servicing or Maintaining Equipment, Operating Switches; Derails. For the other major injury codes, principal causes vary. In general, cause codes which create maximum casualties under one injury code do not have a comparable effect on other injury codes.

C. The Development and Applications of a Severity Index

A severity index was subsequently constructed to compare the accumulated data on employee casualty dollars lost among the eight FRA regions. This index, computed by dividing severity dollars (total dollars lost) by total employee hours, was applied to all FRA regions from 1980 thorugh 1982.

In order to elucidate the meaning of this severity index, a casualty index was constructed to estimate employee hours per injury, i.e., the length of "exposure to risk" needed to generate one injury, see Table 8. An index of significance was then estimated by dividing the total number of employee hours of the railroad by the casualty index (employee hours per injury). A high index of significance number will suggest a high severity index (a number 10 and above may be used for any conclusions).

Job Category and Occurrence Code Analysis

As was previously indicated, Region 1 demonstrated the highest dollars lost per employee hour worked among the eight FRA regions; interms of our severity index the severity dollars lost per man-hour worked for each railroad within the region are shown in Tables 9 and 10. Table 11, delineating the top 80% of high severity job categories in the Region, shows the presence of major severity associated with job categories 6, 7, 4 and 3. The transportation job category (#7) for Conrail (CR) in New Jersey shows the highest severity index (12.24) in the region.

TABLE 7

PERCENTAGE OF DOLLARS LOST FOR INJURY CODE 206

CAUSE CATEGORY	REGION 1	2	3	4	5	6	7	8
L	28.741	34.163	24.33	25.64	43.75	42.45	24.45	32.80
K	21.93	15.35	29.96	14.18	9.03	16.74	16.55	13.34
M4	11.85	10.17	4.0	10.87	1.47	5.98	4.72	6.48
F	9.67	11.11	12.14	15.54	14.17	8.38	11.09	10.55
OT	8.07	5.64	8.68	6.89	5.02	3.70	15.14	8.60
M2	4.68	0.77	0.99	1.51	1.22	1.19	0.66	2.97
E	3.27	4.32	3.61	1.34	5.56	2.69	4.72	2.22
I	2.67	2.92	0.81	2.69	1.87	4.45	6.24	1.20
H	2.57	3.05	4.87	6.99	4.37	6.85	5.42	6.10
A	2.12	6.42	5.94	6.32	4.51	4.11	5.13	5.10
C	1.14	2.51	2.12	1.84	4.48	2.25	2.43	2.42
D	0.899	0.55	0.57	0.68	0.78	0.65	0.68	1.63
M1	0.532	0.49	0.91	0.67	2.15	0.66	1.15	3.64
AS1	0.437	0.09		0.31			0.09	0.005
B	0.342	0.05	0.60	1.33	0.36	0.51		0.73
M6	0.27	1.60	0.44	2.25	0.47	0.38	0.53	1.57
M5		0.61		0.33			0.37	
M3		0.15						
J		0.05	0.002	0.06	0.78		0.61	0.041

TABLE 8

CASUALTY INDEX ESTIMATION FOR 1982

REGION	INJURIES	EMPLOYEE HOURS	EMPLOYEE HOURS/INJURY
1	4,930	75,639,333	15,342.66
2	7.158	160,606,601	22,437.35
3	5.325	113,580,724	21,329.71
4	6,320	146,756,785	23,221.01
5	4,351	87,573,569	20,127.22
6	3,456	98,856,736	28,604.38
7	2,396	62,326,701	24,012.81
8	2,172	52,580,234	24,208.21
NATIONAL	36,108	797,920,684	22,098.16

TABLE 9

SEVERITY DOLLARS LOST PER MANHOUR
WORKED BY RAILROAD - REGION 1

STATE 09

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
PW	3.21	0.21	0.02
CR	0.13	0.10	0.11
ATK	0.12	0.14	0.07
CV	0.08	--	0.18

STATE 23

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
PTM	0.16	0.20	0.20
CP	0.16	0.12	0.09
MEC	0.11	0.11	0.09
BML	0.07	--	0.17
BAR	0.04	0.05	0.08
CN	0.02	0.001	--
AVL	0.007	2.10	0.01
BM	--	0.02	0.13

STATE 25

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
ST	0.46	--	--
PW	0.24	0.36	3.89
CR	0.18	0.29	0.19
BM	0.09	0.40	0.07
ATK	0.08	0.06	0.03
FOR	0.03	--	0.09
GU	0.01	0.006	--
CV	0.004	0.30	12.73

STATE 33

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
GMRC	0.13	--	0.14
MEC	0.06	0.28	0.11
BM	0.06	0.04	0.04
BMS	0.01	--	--
ST	-	--	0.56

TABLE 9 (Continued)

SEVERITY DOLLARS LOST PER MANHOUR
WORKED BY RAILROAD - REGION 1

STATE 34

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
BEDT	0.73	--	--
ATK	0.49	0.10	0.11
CR	0.23	0.23	0.29
EJR	0.19	1.21	0.17
RV	0.09	0.17	--
NYSW	--	0.49	0.008
RFP	--	0.01	--

STATE 36

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
LBJ	0.50	--	--
NYD	0.32	0.13	0.05
SIRC	0.24	--	--
CR	0.24	0.21	0.18
LI	0.20	0.26	0.29
CO	0.11	--	0.06
NW	0.11	0.02	0.05
GNWR	0.10	0.17	0.15
BM	0.10	0.04	0.03
SB	0.09	0.06	0.03
DM	0.09	0.09	0.11
ATK	0.07	0.10	0.15
BO	0.04	0.06	0.06
BN	0.04	--	--
BEDT	0.02	0.01	--
OMID	0.02	--	--
FJG	--	0.68	0.63
MSTR	--	0.08	--
CACV	--	0.06	--
CNYR	--	0.05	--
NYLE	--	0.02	0.003
ST	--	--	0.96
NYSW	--	--	0.11
CNYR	--	--	0.02

TABLE 9 (Continued)

SEVERITY DOLLARS LOST PER MANHOUR
WORKED BY RAILROAD - REGION 1

STATE 44

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
CR	0.23	0.06	0.10
ATK	0.08	0.06	0.02
DW	0.06	0.16	0.07
MOV	0.03	0.09	--

STATE 50

RAILROAD	SEVERITY INDEX ($/HR) 1980	1981	1982
MEC	1.29	0.19	0.48
VTR	0.16	0.08	0.10
CPUM	0.05	0.06	0.10
LVRR	0.04	0.09	--
GMRC	0.02	0.01	--
CV	0.01	0.03	0.01
ATK	--	0.19	0.20
ST	--	0.18	0.02
BM	--	0.10	--

TABLE 10

SEVERITY DOLLARS LOST PER MANHOUR WORKED
BY RAILROAD AND STATE - REGION 1

RAILROAD	STATE	SEVERITY INDEX ($/HR)			INDEX OF SIGNIFICANCE		
		1980	1981	1982	1980	1981	1982
PW	09	3.21	0.21	0.02	9.47	9.31	8.21
MEC	50	1.29	0.19	0.48	1.05	1.58	1.19
BEDT	34	0.73	--	--	1.40	--	--
LBR	36	0.50	--	--	0.69	--	--
ATK	34	0.49	0.10	0.11	140.83	112.85	87.01
ST	25	0.46	--	--	1.29	--	--
NYD	36	0.32	0.13	0.05	11.36	10.85	19.20
PW	25	0.24	0.36	3.89	9.47	9.31	8.21
CR	36	0.24	0.21	0.18	1612.09	1469.58	1265.96
SIRC	36	0.24	--	--	4.40	--	--
CR	44	0.24	0.06	0.10	14.50	20.78	13.97
CR	34	0.23	0.23	0.29	827.33	763.285	664.233
LI	36	0.21	0.26	0.29	851.94	835.04	778.81
EJR	34	0.19	1.21	0.17	1.19	0.58	1.08
CR	25	0.18	0.29	0.19	189.51	168.86	142.40
PTM	23	0.17	0.20	0.19	42.13	37.47	30.93
VTR	50	0.16	0.08	0.10	9.84	8.39	8.78
CP	23	0.16	0.126	0.09	27.40	26.80	24.21
GMRC	33	0.13	--	0.14	0.32	--	0.55
CR	09	0.13	0.10	0.11	265.05	249.91	236.89
ATK	09	0.12	0.14	0.07	109.43	86.930	86.17
MEC	23	0.11	0.11	0.09	166.87	163.50	150.24
CO	36	0.11	--	0.06	2.72	--	2.91
NW	36	0.11	0.02	0.05	26.14	22.59	18.05
GNWR	36	0.10	0.17	0.15	7.97	7.67	7.98
BM	36	0.10	0.04	0.03	27.68	32.09	27.37
SB	36	0.09	0.06	0.03	43.93	44.74	30.57
DM	36	0.09	0.09	0.11	214.42	197.51	177.32
BM	25	0.09	0.40	0.07	335.75	296.913	279.55
RV	34	0.09	0.17	--	1.39	1.25	--

TABLE 10 (Continued)

SEVERITY DOLLARS LOST PER MANHOUR WORKED
BY RAILROAD AND STATE - REGION 1

RAILROAD	STATE	SEVERITY INDEX ($/HR)			INDEX OF SIGNIFICANCE		
		1980	1981	1982	1980	1981	1982
ATK	44	0.08	0.06	0.02	33.05	39.59	38.13
ATK	25	0.08	0.06	0.03	95.72	104.22	107.08
CV	09	0.08	--	0.18	7.30	--	6.79
BML	23	0.07	--	0.17	2.29	--	1.24
BM	33	0.07	0.04	0.04	43.68	38.7	42.65
MEC	33	0.07	0.28	0.11	2.38	2.13	2.83
ATK	36	0.07	0.10	0.15	389.02	310.34	355.49
PW	44	0.06	0.16	0.07	9.47	9.31	8.21
CPVM	50	0.05	0.06	0.10	24.82	22.01	19.46
LVRR	50	0.04	0.09	--	5.21	4.22	--
BN	36	0.04	--	--	2.47	--	--
BAR	23	0.04	0.05	0.08	83.17	80.10	71.96
FOR	25	0.03	--	0.09	1.39	--	1.17
MOV	44	0.03	0.09	--	0.73	0.64	--
CN	23	0.02	0.001	--	6.82	3.69	--
BEDT	36	0.02	0.01	--	3.16	0.75	--
OMID	36	0.02	--	--	1.22	--	--
GMRC	50	0.02	0.01	0.001	4.78	4.09	2.78
GU	25	0.01	--	--	0.522	--	--
BMS	33	0.01	--	0.001	3.19	--	3.12
CV	50	0.01	0.03	0.01	44.00	37.71	36.59
AVL	23	--	2.10	0.01	--	1.89	0.38
BM	23	--	0.02	0.13	--	3.85	5.50
CV	25	--	0.30	12.73	--	2.35	2.29
NYSW	34	--	0.49	0.008	--	1.45	1.53
FJG	36	--	0.68	0.63	--	0.31	0.34
MSTR	36	--	0.08	--	--	1.38	--
NYLE	36	--	0.02	--	--	1.03	--
CNYR	36	--	0.05	--	--	0.06	--

TABLE 10 (Continued)

SEVERITY DOLLARS LOST PER MANHOUR WORKED
BY RAILROAD AND STATE - REGION 1

RAILROAD	STATE	SEVERITY INDEX ($/HR)			INDEX OF SIGNIFICANCE		
		1980	1981	1982	1980	1981	1982
CACV	36	--	0.06	--	--	0.05	--
BO	36	--	0.06	0.06	--	36.87	30.78
ATK	50	--	0.19	0.20	--	2.29	1.83
BM	50	--	0.10	0.02	--	3.71	5.04
ST	50	--	0.18	--	--	0.54	--
ST	33	--	--	0.46	--	--	0.56
ST	36	--	--	0.96	--	--	0.36

TABLE 11

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST)
BY JOB CATEGORIES FOR REGION I

		JOB CATEGORIES						
RR	STATE	1	2	3	4	5	6	7
CR	NJ			3.92	2.74			12.24
CR	NY		1.53	6.49	5.66		10.29	
LI	NY		1.77	9.20	8.23			4.70
ATK	NY			3.78				
PW	MA							3.27
CV	MA			3.08				
CR	CT							1.30
CR	MA			1.25				1.05

The isolation of the major causes of the injuries associated with these and other job categories may facilitate the identification of broad and specific areas of safety concern. Therefore, severity analyses, relative to the occurrence codes and job codes associated with Regions 1 through 5, are given in Tables 12 through 16.

In Region 1 (Table 12) , eight occurrence codes contribute 70% or more to the level of severity; 25% of this severity is attributable to the K occurrence code (Servicing and Maintaining Equipment) and the L occurrence code (Maintenance of Way and Structure). When this analysis was extended to Region 2 (Table 13), more than 50% of severity was contributed by nine occurrence codes. For Regions 3, 4 and 5 (Tables 14, 15 and 16) significantly different occurrence codes contribute the highest percentage of severity.

In general, although job categories 3, 4, and 6 represent 85% of the total dollars for this industry as a whole the occurrence codes corresponding to the job categories among these regions vary considerably. Our conclusion, therefore, is that a severity analysis of each region must be performed separately; a comparative analysis of severity among the regions will not yield significant, general conclusions, because of the large variance among injury causes from region to region.

TABLE 12

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST) BY JOB CATEGORIES AND OCCURRENCE CODES FOR REGION 1

			OCCURRENCE CODES							
RR	STATE	JOB CAT	K	L	T	I	H	I	P	N
LI	NY	D	6.62							
CR	NY	D	4.68							
CR	NJ	D	2.34							
CR	NY	C		5.70						
LI	NY	C			4.54					
LI	NY	C		4.25						
CR	NJ	C		3.47						
CV	MA	C				3.08				
CR	MA	C		1.00						
CR	NJ	G					3.86	3.3[illegible]	1.79	
PW	MA	G						3.08		
CR	NY	G					1.45		2.87	1.09
LI	NY	G							1.86	1.16

TABLE 13

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST) BY JOB CATEGORIES AND OCCURRENCE CODES FOR REGION 2

			OCCURRENCE CODES								
RR	STATE	JOB CAT	J	P	I	H	T	K	S	L	Q
CR	OH	G	6.31	3.22	2.74						.1
BLE	PA	G			2.51						
BO	PA	G					2.22				
CO	VA	G							2.14		
CR	PA	G		1.99			1.01				
NW	VA	G							2.43		
CR	PA	D									4.33
CR	OH	D									3.50
NW	WV	D									2.10
NW	VA	D									1.06
CR	OH	C									4.16
CR	PA	C							2.15		3.47
NW	VA	C	2.12						2.10		
ATK	MD	C	2.10								
ATK	DE	C									2.10
NW	OH	C									1.06
NW	VA	A								2.10	

TABLE 14

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST) BY JOB CATEGORIES AND OCCURRENCE CODES FOR REGION 3

			OCCURRENCE CODES						
RR	STATE	JOB CAT	I	H	K	T	A	R	L
LN	AL	G	8.1						
SOU	SC	G		3.98					
CCO	SC	G	3.8						
SOU	TN	D			5.24				
LN	KY	D			1.93				
SCL	GA	D			1.69				
CO	KY	D			1.63				
ICG	KY	D			1.46				
SOU	GA	D			1.45				
SCL	NC	E				3.89			
LN	GA	A					3.88		
CGA	GA	A				3.88			
BN	AL	C						3.88	
LN	KY	C							1.31
ICG	MS	C							1.31
SCL	GA	C							1.01

TABLE 15

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST) BY JOB CATEGORIES AND OCCURRENCE CODES FOR REGION 4

			OCCURRENCE CODES									
RR	STATE	JOB CAT	J	L	F	K	S	I	G	A	P	H
CR	IN	C	4.66									
CNW	MI	C		2.33								
CNW	IL	C	2.33									
BN	IL	C			2.33							
ICG	IL	C		2.05								
CR	IN	C		1.65								
NW	IL	D				2.62						
ATK	IN	D					2.33					
ICG	IL	D				1.70						
CR	IN	D				1.55						
CR	MI	D				1.12						
CR	IL	G						2.53				
NW	IL	G						2.46				
MP	IL	G						2.36				
BN	IL	G							2.33			
TRRA	IL	G								2.33		
NW	MI	G	2.33									
CR	IN	G									1.44	
GTW	MI	G										1.04
CNW	IL	F	2.33									

TABLE 16

COMPARISON OF PERCENT TOTAL SEVERITY (DOLLARS LOST) BY JOB CATEGORIES AND OCCURRENCE CODES FOR REGION 5

RR	STATE	JOB CAT	OCCURRENCE CODES T	I	J	C	F	H	K	L	P
MP	TX	G	7.02								
MP	AR	G		6.42							
HBT	TX	G	3.19								
ICG	LA	G	3.19								
BN	OK	G			3.19						
MP	TX	G				1.53	1.21	1.07			
MP	AR	C							3.29		
SP	LA	C	3.24								
SP	TX	C								3.19	
ATSF	OK	C									3.19
MP	TX	C								3.06	
MP	AR	C								1.90	
SP	TX	B	3.19								
GWF	TX	B								1.10	
SP	TX	A	3.19								
ATSF	OK	D	3.19								

IV. CONCLUSIONS AND RECOMMENDATIONS

Four germane conclusions emerge relative to the dollars lost from, along with the causes and relative severity of railroad employee casualties.

- Job categories 3 (Maintenance of way and structure), 4 (Maintenance of equipment and stores), and 6 (Transportation: train, engine and yard) represent 85 percent of the total dollars lost from casualties, for individual regions and for the national railroad industry as a whole.

- More than 25 percent of the total lost dollars are attributable to injuries incurred in job category 6 alone.

- Thirteen injury codes are responsible for approximately 80 percent of the total dollars last on both the national and regional levels. However, the occurrence of these thirteen injuries varies from region to region.

- The relative severity of the dollars lost from injuries, in terms of the enumerated job and cause categories, varies from region to region.

The following recommendations are made to FRA Inspectors, on the basis of this first level analysis of railroad personnel casualties:

- A data verification study of the reported casualties, and the associated job and cause categories, should be conducted. The validated data may then be examined to determine whether casualty data should be gathered in the same fashion or by using different reporting procedures.

- A detailed severity analysis of employee casualties associated with each railroad within a region should be conducted.

- A regional data analysis and severity index should be used to develop a casualty protection plan that will provide resource allocations for reducing railroad casualties.

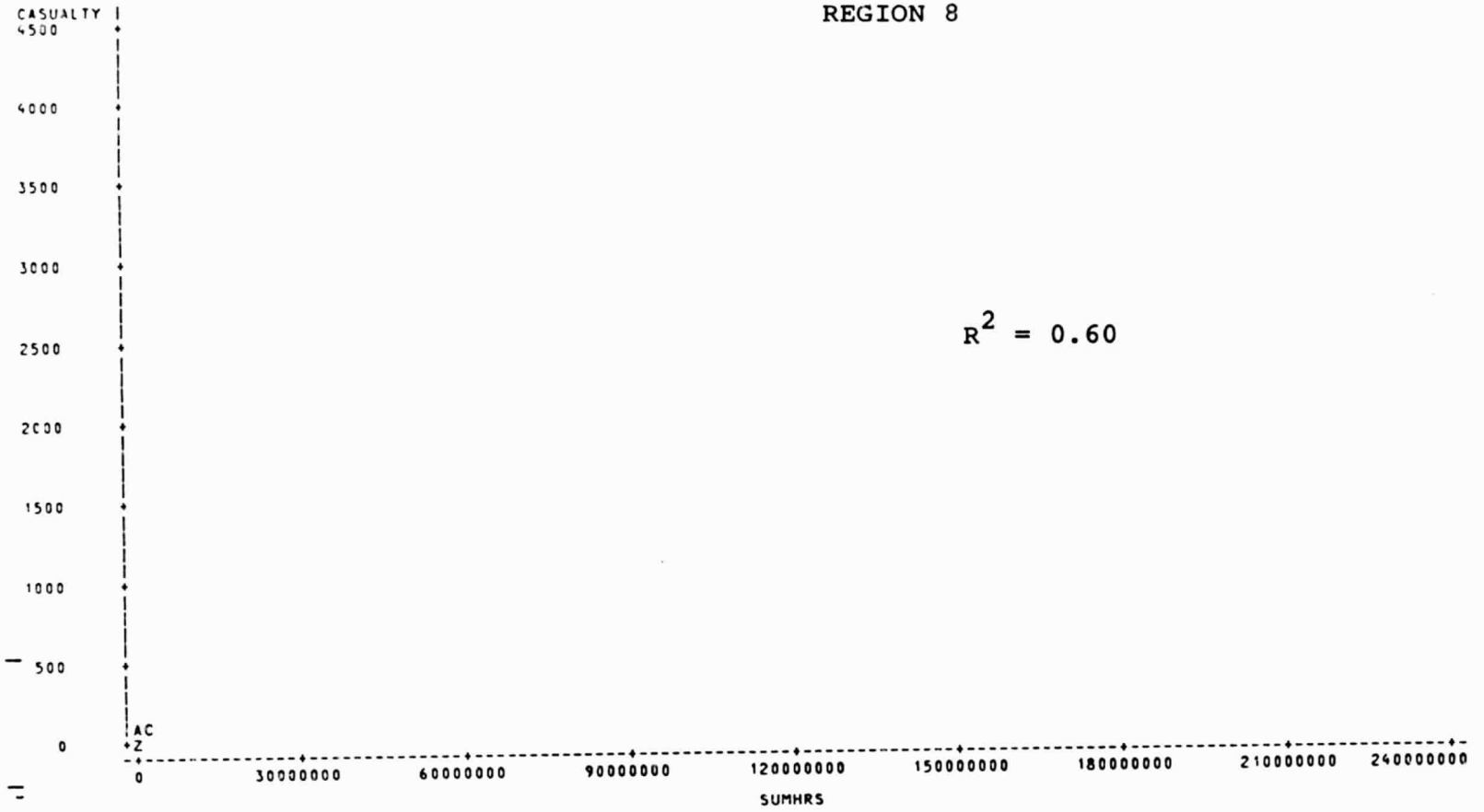
- Individual railroads should be provided with a training and/or safety plan for dealing with those casualty cause and job categories that require special attention from FRA Inspectors.

APPENDIX

CORRELATION PLOTS FOR EIGHT FRA REGIONS

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 8

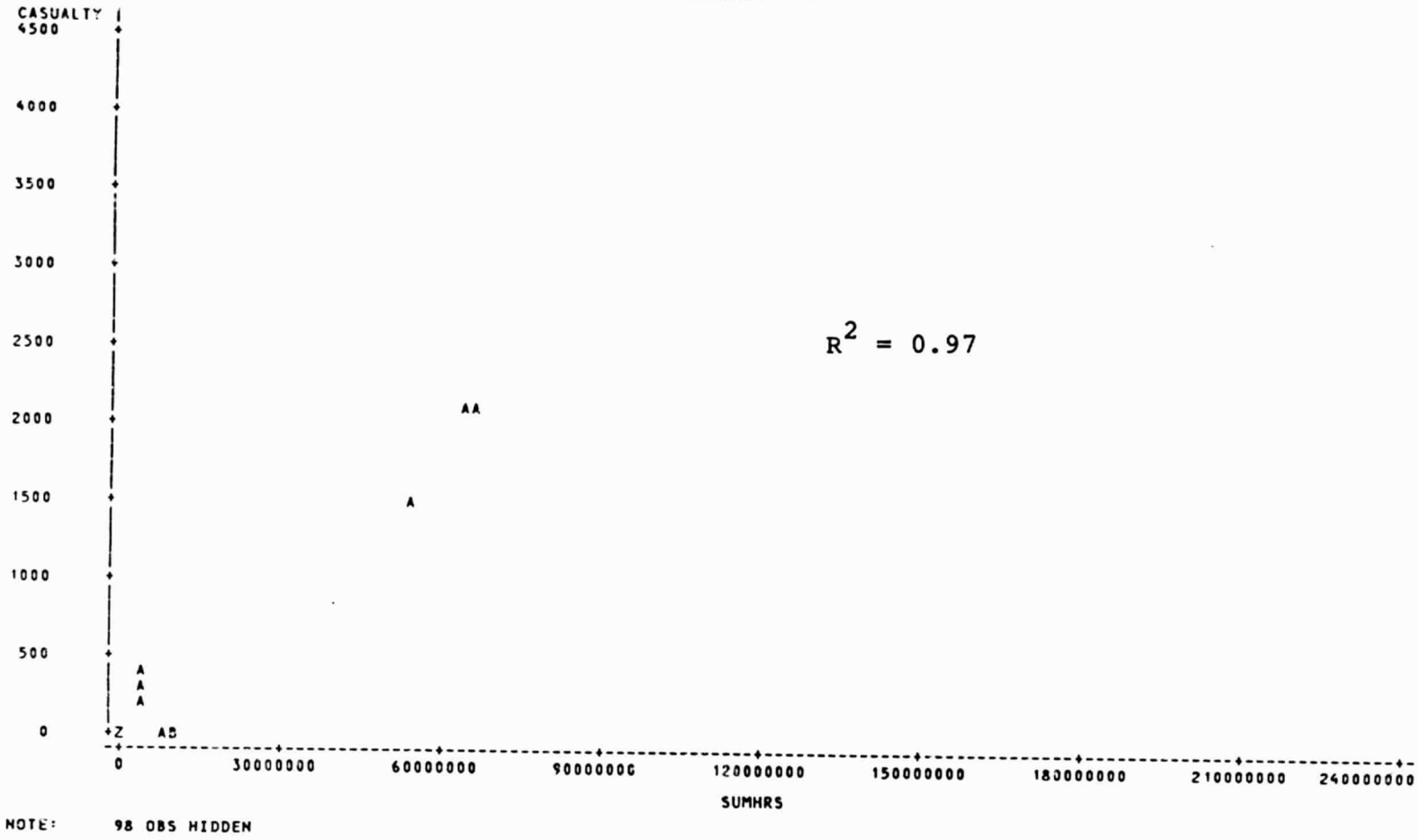


$R^2 = 0.60$

NOTE: 59 OBS HIDDEN

THE PLOT TO THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 7

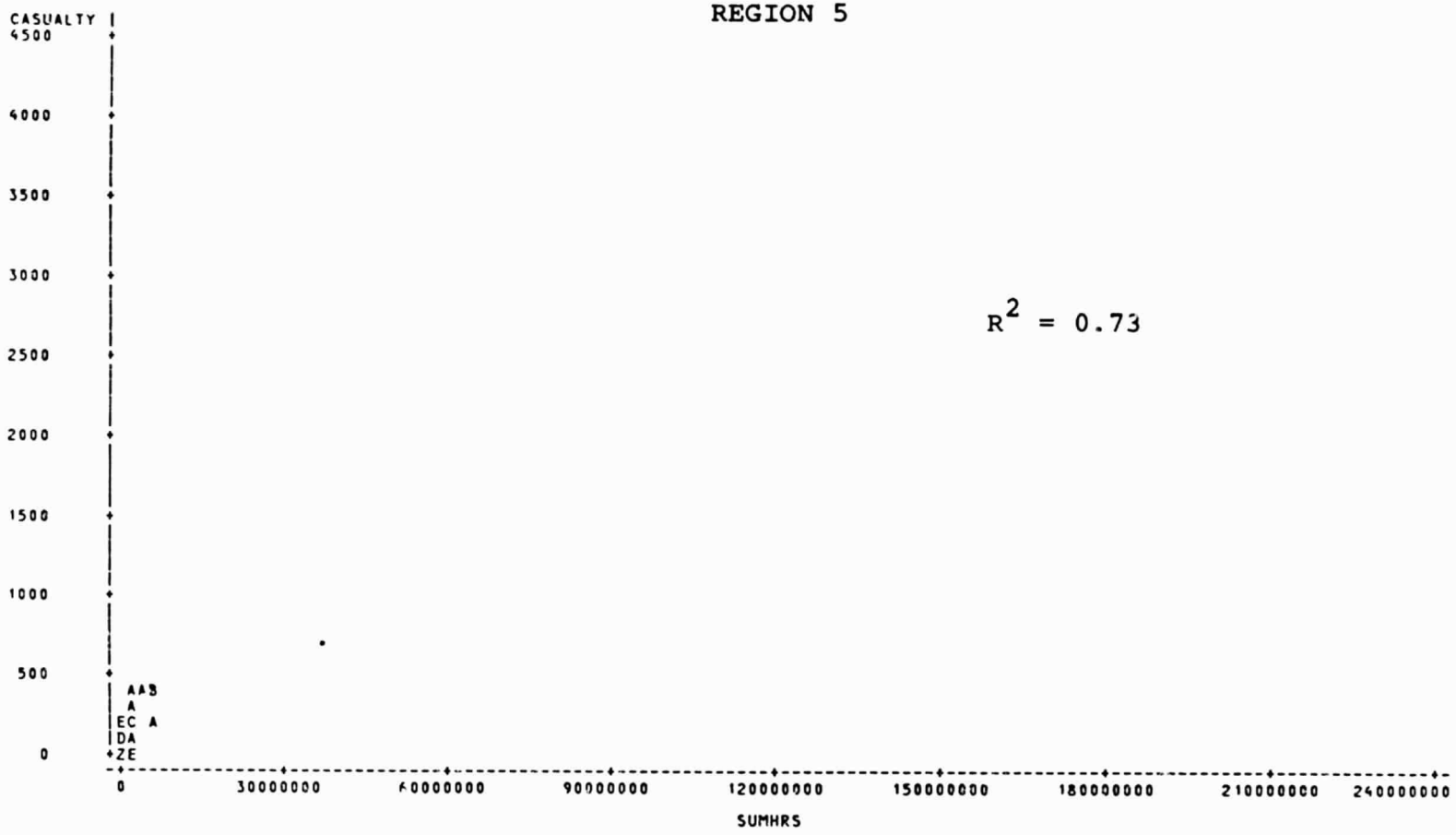


$R^2 = 0.97$

NOTE: 98 OBS HIDDEN

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 5

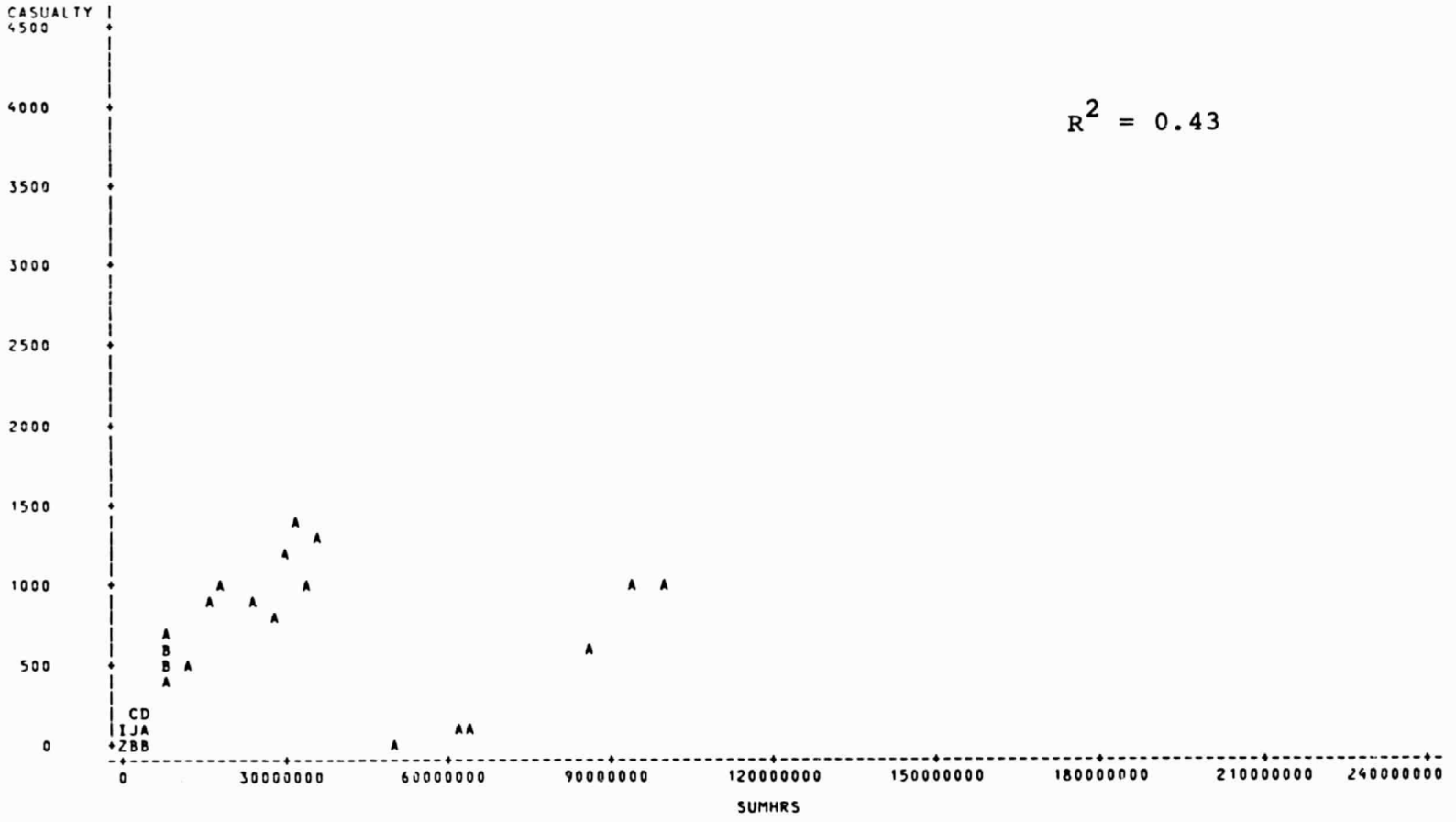


$R^2 = 0.73$

NOTE: 113 OBS HIDDEN

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 4

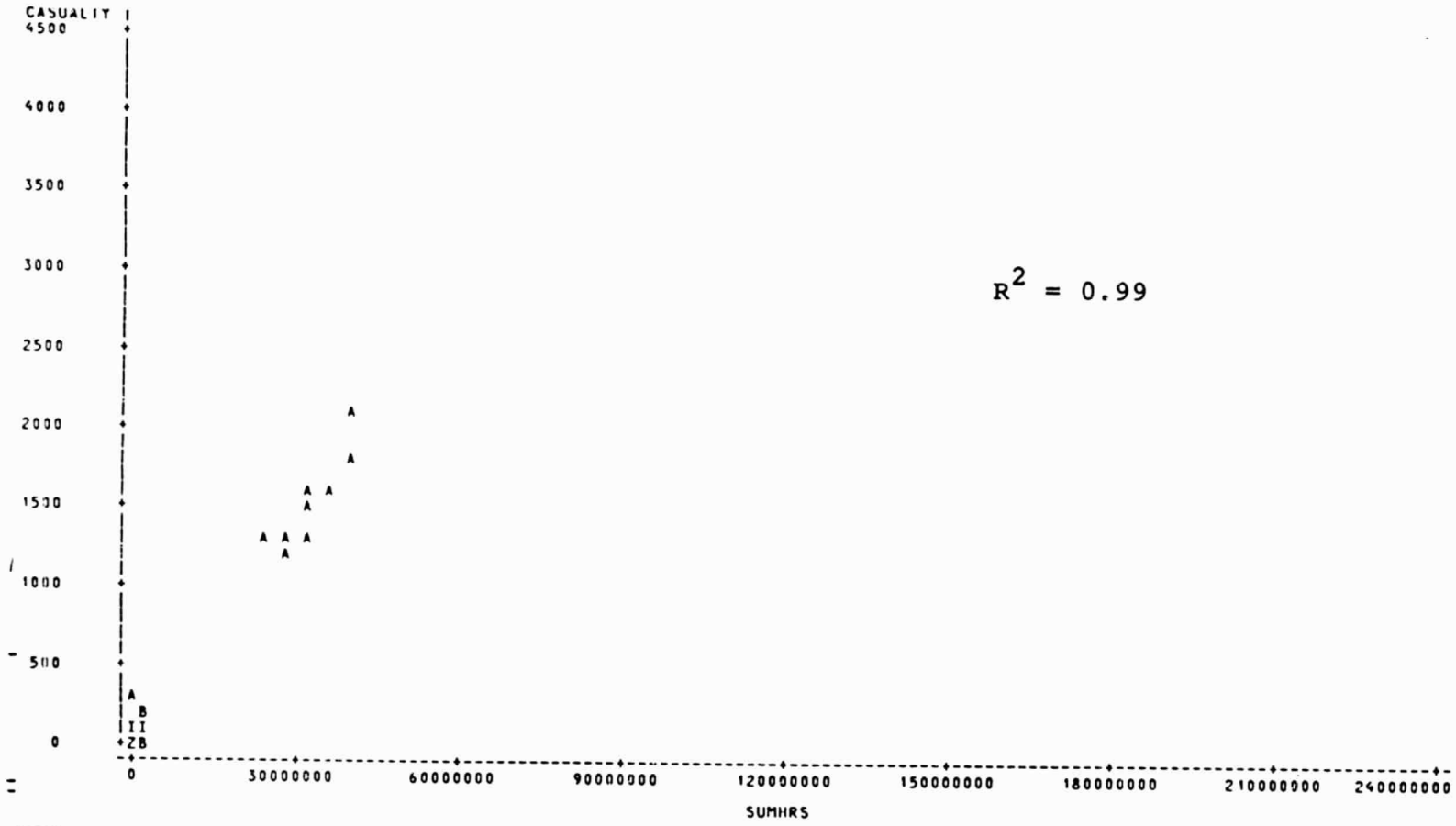


$R^2 = 0.43$

NOTE: 146 OBS HIDDEN

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 3

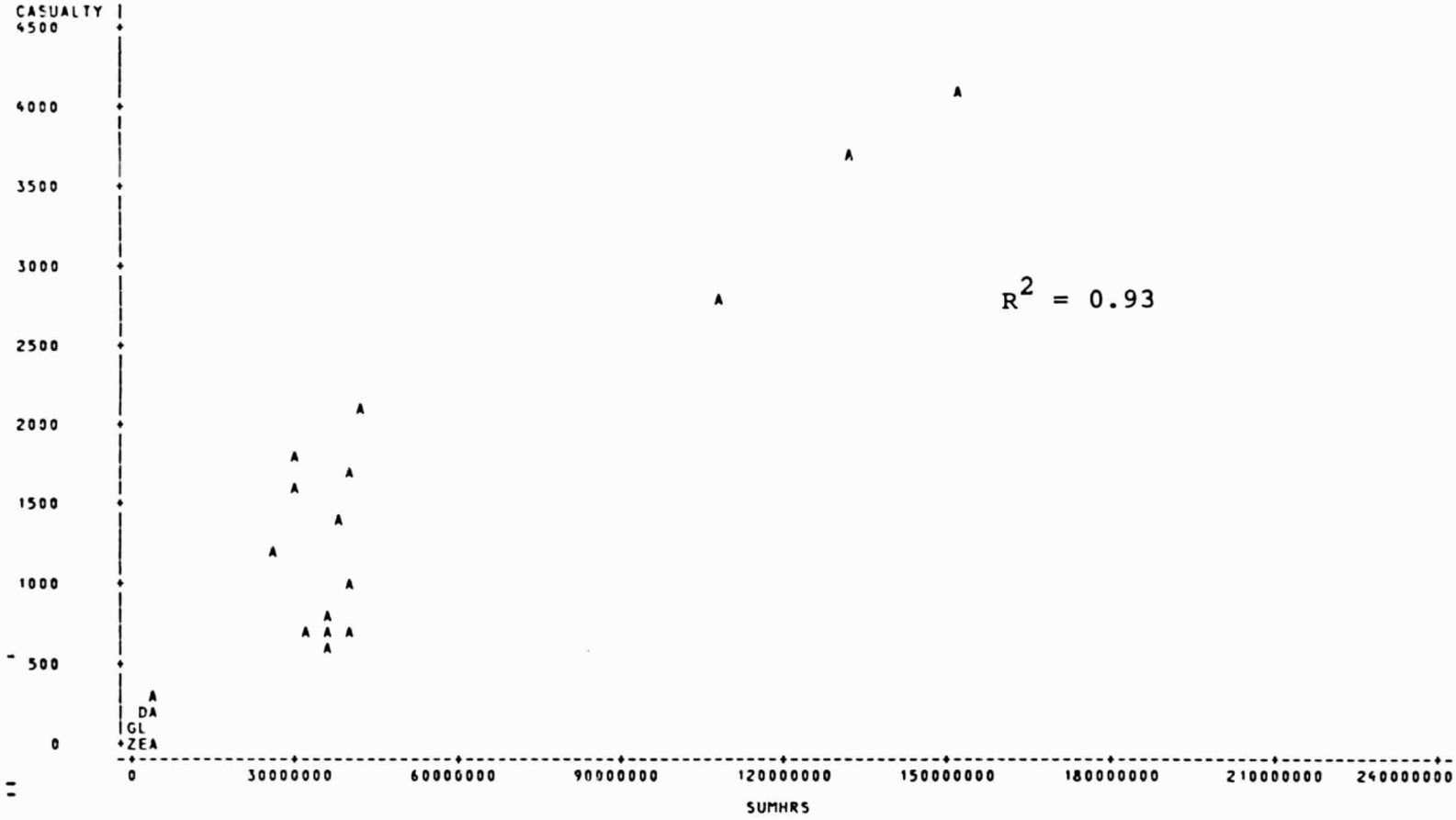


$R^2 = 0.99$

NOTE: 162 OBS HIDDEN

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

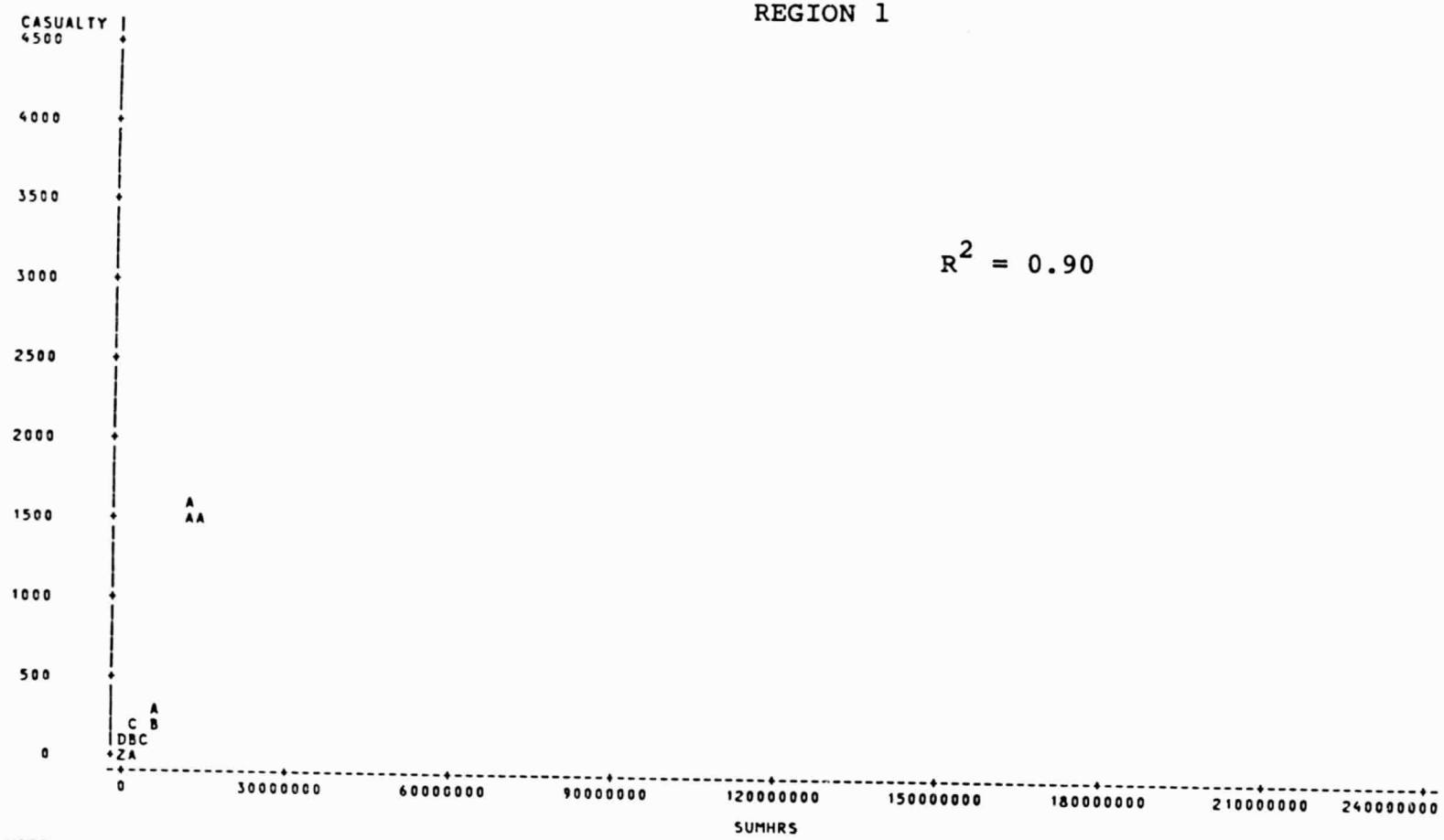
REGION 2



NOTE: 143 OBS HIDDEN

THE PLOT OF THE TOTAL NUMBER OF CASUALTIES
BY THE TOTAL NUMBER OF MAN HOURS
FOR 1980, 1981, and 1982

REGION 1



$R^2 = 0.90$

NOTE: 123 OBS HIDDEN