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U. S. DEPARTMENT OF JUSTICE
Office of Justice Assistance, Research, and Statistics

CATEGORICAL GRANT PROGRESS REPORT

This recordkeeping requirement falls under the authority of P.L. 96-511, Sec. 3507. The information provided will be used by grant monitors to track grant progress. No further monies or other benefits may be paid out under this program unless this report is completed and filed as required by existing laws and regulations (OMB Circulars A-102 and A-110; Omnibus Crime Control and Safe Streets Act of 1968, as amended; Juvenile Justice and Delinquency Prevention Act of 1974, as amended; and the Justice System Improvement Act of 1979, as amended).

1. GRANTEE	2. AGENCY GRANT NUMBER	3. REPORT NO.
Northeastern University 360 Huntington Ave. Boston, MA 02115	86-IJ-CX-0084	5
4. IMPLEMENTING SUBGRANTEE Center for Applied Social Research	**5. REPORTING PERIOD** *(Dates)* FROM: 10/1/87 TO: 12/31/87	
6. SHORT TITLE OF PROJECT Impact of Legislation to Prohibit Happy Hours	**7. GRANT AMOUNT** $97,687	**8. TYPE OF REPORT** ☒ REGULAR ☐ SPECIAL REQUEST ☐ FINAL REPORT
9. NAME AND TITLE OF PROJECT DIRECTOR Michael G. Maxfield Glenn L. Pierce	**10. SIGNATURE OF PROJECT DIRECTOR** Glenn L. Pierce	**11. DATE OF REPORT** 1/15/88

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OJARS FORM 4587/1 (REV. 4-81)

Categorical Grant Progress Report, Vol. V

The fifth phase of our project involved: (I) drafting a final report of our analysis of the impact of legislation to prohibit happy hours; (II) reaquiring Massachusetts motor vehical accident data; and (III) assessing the utility of the Massachusetts data for evaluating happy hour legislation.

I. Drafting the Final Report

A description of the methods and our results are contained in two previous Categorical Grant Progress Reports Vol. III and IV. An outline of the draft report is presented below:

The Impact of Legislation to Prohibit Happy Hours

Chapter 1 Banning Happy Hours to Reduce Drunk Driving

- Introduction
- Background: Why Ban Happy Hours?
- Indiana's Law
- Enforcement and Compliance
- Summary

Chapter 2 Design and Statistical Analysis

- Introduction
- Design
- Controlling Threats to Validity
- ARIMA Modeling
- Summary

Chapter 3 Indiana Accident Data

Introduction
Subset and Format Accidents for Analysis
Define Hourly Intervals
Intervention and Seasonal Variables
Series Plots
Suspected DUI Series

Chapter 4 Analysis Results

Monday through Friday Treatment Series
Monday through Friday Control Series
Tuesday through Thursday
Suspected Alcohol Related Accidents

Chapter 5 Summary and Conclusion

Introduction
Evasion, Enforcement, and Non-Compliance
Other Non-Reduction of "Happy Hour" Drinking
Dilution of Alcohol-Related Accidents
Effects Masked by Other Drunk Driving Policies
Conclusion and Policy Implications

II. Acquiring Massachusetts Motor Vehicle Data

Further efforts to obtain corrected Massachusetts accident data were made during this phase of the project. Project staff met with Massachusetts Registry of Motor Vehicle programming personnel. Existing errors in the data were reviewed with Registry staff and agreements were made to attempt to correct these errors. A set of "corrected" tapes were sent to us in late December.

III. Reanalysis of Massachusetts Data

Reanalysis of Massachusetts data revealed that in a significant number of cases the information on the time of day the accident occurred continues to be incorrectly

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recorded on the Registry's database. At this time it would appear that this information cannot be corrected. In all probability the information on time of day was entered into the Registry's database incorrectly during a conversion from an earlier database system. The earlier information unfortunately is no longer available.

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OJARS FORM 4587/1 (REV. 4-81)

Categorical Grant Final Report

Enclosed is a copy of our draft final report, "Impact of Legislation to Prohibit Happy Hours." The report represents a complete analysis of the impact of Indiana's legislation to prohibit happy hours on alcohol related motor vehicle accidents. After this report is reviewed by NIJ we will incorporate appropriate recommendations into a final draft copy of the report.

In addition to a final draft copy of our analysis we will provide an executive summary of the report to NIJ and we will send a copy of the database used to conduct our analysis to the Criminal Justice Archive at the University of Maryland. The database will be completely documented and SPSS control files used to process the data will also be included.

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OJARS FORM 4587/1 (REV. 4-81)

Categorical Grant Progress Report, Vol. IV

7/1/87 - 9/30/87

The fourth phase of our project has involved: (I) a completion of the analysis of Indiana motor vehicle accident data and (II) a review and evaluation of Massachusetts motor vehicle accident data for the period 1983 through June, 1986.

I. Analysis of Indiana Motor Vehicle Data

Our primary analysis focused on weekly aggregations of accidents, totaled over various time and day combination, described below. Weeks were the most disaggregated unit possible, since happy hours are not defined over weekends. That is, one cannot produce a daily series of happy hour (or non-happy hour) accidents since such festivities were not possible at weekends.

For reasons not entirely anticipated, weeks proved a most suitable unit of analysis. this reflects the fact that much routine activity involving driving, and thus auto accidents, revolves around weekly cycles.

We followed an iterative strategy in defining the treatment series, and conducted analyses on several daytime combinations. The various definitions of happy hour series reported here include the following Monday-Friday and Tuesday-Thursday combination.

Treatment Series

Mon-Fri 4:00 through 6:00 PM
Mon-Fri 6:00 through 8:00 PM
Mon-Fri 4:00 through 8:00 PM
Tues-Thurs 4:00 through 6:00 PM
Tues-Thurs 6:00 through 8:00 PM
Tues-Thurs 4:00 through 8:00 PM

The 4:00-8:00 PM series is the sum of the other two treatment series. This hourly aggregation was examined for two reasons. First was the absence of a consensus in the hospitality industry in designating happy hours. Common times were 4:00-6:00 PM, and 5:00-6:00 or 7:00 PM. We also sought to test for the possibility of spillover effects, in which persons attracted by cheap drinks during the typical 4:00-6:00 PM festivities settled in until later hours.

Control Series

Mon-Fri 8:00 PM through Midnight
Mon-Fri Midnight through 4:00 PM
Tues-Thurs 8:00 PM through Midnight
Tues-Thurs Midnight through 4:00 PM
Saturday and Sunday

It is conceivable that the 8:00 PM through Midnight interval could be an extreme definition of a spillover-treatment series. that is, some portion of happy hour patrons may continue drinking long into the night, much to the delight of the hospitality industry. But interview with managers and bartenders in selected establishments revealed that this was true only occasionally, and for a very small and rotating pool of customers.

In addition to the analysis of all accidents occurring during the various daytime combinations mentioned above, we examined accidents for which there was evidence of alcohol involvement. The Indiana accident data do not include records of citations for driving-under-the influence, but we were able to use two sources of information to identify accidents where alcohol was suspected as a contributing factor: (1) a code for physical state of drivers, and (2) results of breath and blood tests for blood-alcohol content (BAC). We defined alcohol-involved accidents as those that met one of the following criteria:

(1) physical status = "had been drinking"
(2) BAC = .08 or higher.

This evaluation has revealed no evidence that Indiana's 1985 law banning happy hours reduced automobile accidents in the state. After estimating ARIMA models for those days and times corresponding to the periods most likely to be affected by the ban, estimates of the intervention parameter were not significant in any case. Furthermore, intervention components for three control series were negative, and approached statistical significance in one case, suggesting an exogenous reduction in accidents during times and days when the happy hour ban could have had no effect.

These same findings obtained for accidents in each possible treatment period, in Monday through Friday and Tuesday through Thursday aggregations. Analysis of accidents where there was evidence of alcohol involvement were similar. Intervention effects were positive but non-significant for the treatment series, and negative but non-significant for the control series.

Our confidence in these findings is increased by a pattern of results that cannot be readily interpreted in any other way. This is precisely the strength of the non-equivalent dependent variables design. It enhances construct validity by postulated different patterns for different series, and basing these predictions on what is known about the behavior under study and how it could and could not plausibly be affected by an intervention.

II. Evaluation of Massachusetts Motor Vehicle Data

In June, we received Massachusetts motor vehicle data for the time period January 1983 through June 1986. For the most part, the data appeared to be in reasonably consistent form. Unfortunately, for the purposes of analyzing the impact of happy hour legislation in motor vehicle accidents in Massachusetts, a number of key variables appear to be incorrect in a large proportion of cases. Specifically, the time of day in which the accident occurred appears to be wrong at least 50% of the time for the years 1983 and 1984. This means that it is not possible to create appropriate treatment and control group time series for an analysis (See the section above on the Indiana analysis). We are now negotiating with Massachusetts to receive a corrected set of tapes on motor vehicle accidents.

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January 1988

IMPACT OF LEGISLATION TO PROHIBIT HAPPY HOURS

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Table of Contents

1 Banning Happy Hours to Reduce Drunk Driving 1
- Introduction
- Background: Why Ban Happy Hours?
- Indiana's Law
- Enforcement and Compliance
- Summary

2 Design and Statistical Analysis 20
- Introduction
- Design
- Controlling Threats to Validity
- ARIMA Modeling
- Summary

3 Indiana Accident Data 41
- Introduction
- Subset and Format Accidents for Analysis
- Define Hourly Intervals
- Intervention and Seasonal Variables
- Series Plots
- Suspected DUI Series

4 Analysis Results 55
- Monday through Friday Treatment Series
- Monday through Friday Control Series
- Tuesday through Thursday
- Suspected Alcohol Related Accidents

5 Summary and Conclusion 67
- Introduction
- Evasion, Enforcement, and Non-Compliance
- Other Non-Reduction of "Happy Hour" Drinking
- Dilution of Alcohol-Related Accidents
- Effects Masked by Other Drunk Driving Policies
- Conclusion and Policy Implications

References 80

Figures and Tables

Appendix A

Chapter 1

Banning Happy Hours to Reduce Drunk Driving

Introduction

In 1985 Indiana followed the example set by Massachusetts and prohibited "happy hours," the sale of alcoholic beverages at reduced prices during certain hours and days. The happy hour ban sought to curb the especially abusive drinking that can occur when alcoholic beverages are served at significantly reduced prices for a limited time only. Indeed, the Massachusetts ban was prompted by two deaths that had been attributed to high-volume, "beat-the-clock" drinking (Variety, 1984). No such tragedy precipitated Indiana's law, but Hoosier legislators were no less serious in their efforts to reduce drunk driving. By 1987 seventeen other states had adopted policies providing at least some restriction of happy hours.

This report presents results from an evaluation of Indiana's 1985 law, using an interrupted time series design. The specific goal was to determine whether any reduction in automobile accidents could be attributed to the ban, using a research design that capitalizes on the restricted days and times comprising happy hours. Findings indicate the law has

had no such impact, either on all accidents during or after happy hour times or on accidents where alcohol involvement was suspected.

The report is organized as follows. The balance of this chapter describes the rationale behind happy hour prohibition, the specifics of Indiana's law, and information on enforcement and compliance. Chapter 2 describes the overall evaluation design, and statistical analysis. Information on Indiana accident data and how they were used in the analysis is in Chapter 3. Results are presented in Chapter 4, followed by discussion and conclusions in Chapter 5.

Background: Why Ban Happy Hours?

Banning happy hours is one of several policies explored in attempt to address the nation's unhappy problem of drunk driving and its consequences: loss of life, personal injuries, property damage, and resultant public expenditures. This is a relatively recent innovation, launched by regulatory action in Massachusetts at the end of 1984. Then, as now, no hard evidence was available to support such action, but public attention and policy initiatives were peaking, as most states passed various laws aimed at drunk driving (U.S. Department of Transportation (DOT), 1986). It is not uncommon to pursue policy against

drunk driving in the absence of evidence that such policies may be effective (U.S. DOT, 1985). Under increased pressure from organized groups, individuals, and the federal government it is difficult for a state or local official to be too critical of even symbolic actions to curb drinking.

Action in many states was prompted by the 1982 Alcohol Traffic Safety Program (P.L. 97-364) which threatened reductions in federal highway funds unless states took certain specific steps. Raising the legal drinking age to 21, and requiring jail sentences for repeat offenders were among these mandates. In 1983 the Presidential Commission on Drunk Driving recommended numerous actions to be undertaken by private groups, producers and servers of alcoholic beverages, as well as local, state, and national governments. The Commission report called for a multi-dimensional approach, combining information and educational campaigns, direct regulation of the production and sales of alcohol, systemic support of enforcement and adjudication, tougher sentences, and the elimination of diversion and treatment programs as substitutes for criminal penalties (President's Commission, 1983).

The passage of happy hour bills is an example of a regulatory approach to limiting the supply or volume of alcohol. Though not explicitly directed at drunk driving, such regulatory policy seeks to restrict the freedom with

which servers of alcoholic beverages, the "hospitality industry," can fill the glasses of patrons.

However indirect it makes intuitive sense to target a practice that encourages people to drink more for their money. Happy hours pose a potential threat to highway safety for several reasons. First, most happy hours are intended to attract customers during the hours immediately following work. At this time of day many tavern patrons are in a convivial mood, but have probably not eaten for several hours. This means that alcoholic beverages are likely to be more quickly absorbed into the bloodstream, having corresponding effects on blood alcohol levels.

Second, with reduced prices, or two-for-one specials patrons sensitive to price curves are tempted to drink more than they might normally. This tendency may be exacerbated by the general good will and bonhomie typically found among groups of people who get together at a tavern after work. The element of haste is introduced by the limited duration of special prices; value conscious drinkers must either sip quickly or order extra drinks before prices go up.

Third, happy-hour drinking in taverns by definition takes place away from home. For most patrons this means stopping at a local bar on their way from work. Many such persons must then get in their cars and drive home. Writing some

years ago, Carlson reports that: "Origin of the trip which occasioned the illegal drinking-driving is most frequently a bar or tavern or another person's home." (1972: 14) The DOT lists public bars and taverns as among the high alcohol involvement factors with respect to trip origin and place of drinking (1985).

Finally, depending on the time of year, happy hour patrons often drive home at dusk -- an especially dangerous time of day for auto accidents. Visibility is reduced, and not all drivers turn on their headlights at this hour.

The combination of these factors -- having more drinks than usual, drinking on an empty stomach, and then getting in a car and driving home, often at dusk -- would appear to present a major, removable threat to safety. By simply prohibiting happy hours, a discrete low-cost intervention, states can reduce the number of drinking drivers and make the roads safer for everyone. Happy hour bans are politically attractive as well. Compare this action to roadblocks set up "at random" by local law enforcement agencies. Roadblocks may be effective in detecting and apprehending drunk drivers, but if used with any frequency they risk incurring the enmity of perfectly sober citizens who are frequently if not randomly inconvenienced. However dear to the hearts of patrons, the retail alcoholic beverage industry is rarely among a city's political powerhouses.

Indiana's Law

Many of the President's Commission recommendations were pursued by Indiana's counterpart, the Governor's Task Force to Reduce Drunk Driving, established in 1982. Legislation in 1983 set mandatory jail sentences for repeat offenders, automatic one-year suspension of operator's license for refusing a breathalyzer test, and a blood alcohol content of .10 as presumptive evidence of intoxication (I.C. 9-11-3, 9-11-4). Implied consent to a chemical test for intoxication as a condition of driving in the state was added in 1985 (I.C. 9-11-4).

As in other states, citizen interest groups in Indiana coalesced around the drunk driving issue, and expanded their focus to alcohol abuse in general. Mothers Against Drunk Drivers is perhaps the most visible organization, complemented by the spin-off Students Against Drunk Driving. If less nationally notorious, a state group to Boost Alcohol Consciousness Concerning the Health of University Students (BACCHUS) became well known through its inspired acronym if for no other reason.

Against the backdrop of well-organized citizen groups whose actions were cited as exemplary in educational publications

distributed throughout the state, an active state-wide task force, and other efforts, P.L. 86-1985, § 2 was born. Though modified in committee hearings, the bill passed both houses of the Legislature by generous margins in April 1985, and became effective 1 September 1985. As originally passed the law read:

> [IC 7.1-5-10-20] Reduced Prices.
> (a) It is unlawful for a holder of a retailer's permit to do any of the following:
>
> (1) Sell alcoholic beverages during a portion of the day at a price that is reduced from the usual, customary, or established price that the permittee charges during the remainder of that day.
>
> (2) Furnish two (2) or more servings of an alcoholic beverage upon the placing of an order for one (1) serving to one (1) person for that person's personal consumption.
>
> (3) Charge a single price for the required purchase of two (2) or more servings of an alcoholic beverage.
>
> (b) Subsection (a) applies to private clubs but does not apply to private functions that are not open to the public.

The Indiana Alcoholic Beverage Commission (ABC), which shares jurisdiction over the regulation of retail sales in the state with local Alcoholic Beverage Boards (County Boards), was instrumental in proposing legislative action, but played no active lobbying role on its behalf. In fact, the ABC sought only to ban the practices described in subsection (2). That is, it was felt that serving a patron two or more drinks when s/he ordered only one encouraged people to drink more than they might normally. But the ABC

was not particularly interested in banning happy hours per se -- serving drinks at reduced prices (ABC interview 26 November 1986).

The law was not opposed by the Indiana Licensed Beverage Association (ILBA), the Indiana chapter of a national organization that lobbies on behalf of licensed premises. According to the ILBA's Executive Director, many members opposed happy hours:

> Long before the [legislative] session began, some of our locals' members had decided to ban the 'happy hour' concept. Members ... told us that the only reason they were having happy hours was because of the competition.... (ILBA Newsletter, July 1985, p. 4)

This sentiment was echoed by ABC Commissioners, members of Local Boards, and Indiana Excise Police officers, the enforcement arm of the ABC. Happy hours had become analogous to the gas station price wars of days gone by. Smaller establishments felt pressured to lower prices and profits in the face of competition from larger taverns, hotels, and restaurants. Many joined the ILBA in welcoming the legislation. The ILBA, faced with mounting public and official indignation about drunk driving, also felt the popular happy hour bill presented a battle that was not worth fighting. Much the same feeling emerges in nationwide trade publications, where many tavern owners express at worst ambivalence about closing down happy hours (eg, Frydman, 1985; Scoggin, 1985).

Support for Indiana's law was not, however, uniform. Two subsections were added to the original statute in March 1986, effective immediately after passage [PL 79-1986, § 5]:

> (c) Notwithstanding subsection (a)(1), it is lawful for a holder of a retailer's permit to sell alcoholic beverages during a portion of the day at a price that is increased from the usual, customary, or established price that the permittee charges during the remainder of the day as long as the price increase is charged when the permittee provides paid live entertainment not incidental to the services customarily provided.
>
> (d) ... it is lawful for a hotel, in an area of the hotel in which alcoholic beverages are not sold, to make available to its registered guests alcoholic beverages at no additional charge beyond what is to be paid by the registered guests as the room rate.

Subsection (c) was drafted by the ILBA in response to member concerns that, under the original law, they could not raise prices to offset the cost of live entertainment. Cover charges were possible but unpopular. It was felt that these were disliked by many patrons who were nonetheless willing to pay higher prices for drinks while the band played on (ILBA interview, 15 December 1986). State Legislators agreed and adopted the ILBA amendment.

Subsection (d) resulted from an intentional violation of the original law by an exclusive hotel chain whose policy is to provide free drinks to guests during late afternoon and early evening hours. What was described by the Chairman of the ABC as a "friendly prosecution" resulted when the hotel

stuck to its policy. It was friendly because the ABC had no quarrel with free drinks for guests in posh hotels; the Commission simply wanted to prohibit two- and three-for-one specials. The ABC hearing imposed a fine, and the Indianapolis hotel immediately filed an appeal in Marion County Circuit Court. Before final judicial action, subsection (d) was added to PL 79-1986 and the appeal was dropped (ABC interview, 26 November 1986).

Enforcement and Compliance

General Indiana Alcoholic Beverage Law

Most provisions are compiled in Title 7.1 of the Indiana Code (IC), and Title 905 of the Indiana Administrative Code (IAC). Jurisdiction over the regulation of retail sales is bifurcated, with the state ABC and County Boards sharing responsibility for granting retail permits and enforcing state laws. The ABC and County Boards are assisted in various capacities by the State Excise Police.

Three "appointed" and one "designated" member comprise each Local Board. The former are appointed by various county and municipal executives, depending on the size and number of cities within each county. The designated member, an officer in the State Excise Police, is appointed by and represents the ABC. About 10 officers are designated

members, each sitting on multiple Boards throughout Indiana's 92 counties. Boards are bipartisan; no more than two members may be of the same political party. This applies to designated and appointed members alike.

The primary function of Local Boards involves granting and annual review of retail permits. In this capacity most Boards meet once a month. Boards in larger counties, having a larger number of retail establishments, meet twice a month.

Based on observation of meetings in several counties, renewal applications are routine, unless: (1) an applicant has been cited for a violation in the preceding year; or (2) the Board has received complaints about the permit holder, either from local law enforcement officers or private citizens. As part of the renewal process, each licensed premise is visited by the designated Board member, an officer in the Excise Police, sometime during the month before its permit is due for renewal. According to Excise Police officers, these visits are generally routine, and seldom reveal violations that threaten the permit renewal.

Approving new permit applications is somewhat more involved, and governed in part by quotas on the number of permits available to each county based on its population. Since awarding new permits is not directly related to the

enforcement of happy hour bans, this process was not investigated in detail.

Visits to local Board meetings revealed no situations where the possibility of non-renewal was discussed. Non-renewal, or withdrawing a retail permit is the most severe sanction available to either Local Boards or the ABC. If a Local Board recommends that a permit be withdrawn, its decision is first reviewed by the ABC to ensure that proper procedures were followed. ABC members knew of no instances where a permit had been withdrawn for a happy hour violation (ABC interviews 26 November and 11 December 1986). This review power, together with the power to conduct hearings in connection with violations cited by the State Excise Police, constitutes the primary enforcement role of the ABC.

Enforcement of alcoholic beverage laws is, like most law enforcement, primarily reactive. Excise Police respond to complaints or tips about violations by license holders. The Excise Police is divided into six districts across the state, each having an enforcement division. If a complaint is received (from local police or sheriffs, Local Board members, or other license holders), Excise officers investigate the complaint incognito and issue notices of violations if warranted. Serving minors and after-hours operation are the most common violations.

ABC administrative action in response to a notice of violation can result in a fine or permit suspension. Like courts and other administrative tribunals, ABC hearings are frequently avoided through a negotiated settlement prior to formal proceedings. In addition, to administrative sanctions, I.C. 7.1-5-1-8 provides for criminal prosecution of any alcoholic beverage law violation as a class B misdemeanor. In such cases, county prosecuting attorneys initiate criminal proceedings after conferring with ABC Commissioners.

Happy Hour Enforcement

Enforcement of the happy hour ban in Indiana is no different from enforcement of other laws concerning retail sales in that the Excise Police act almost exclusively in a reactive mode. Furthermore, virtually all complaints about suspected happy hour violations are made by other tavern owners. Just as most establishments welcomed the ban to reduce competition in price-cutting, they also appear to resent one of their number seeking a competitive advantage through non-compliance or evasion.

The ABC keeps no centralized records of investigations or hearings by type of violation. It is therefore not possible to obtain any firm data on the number of violations, and action taken in response to investigations. Interviews with

various officials revealed no consensus about the number of violations. Few were able to supply anything other than a general impression. Most, however, felt that compliance was widespread, due primarily to the general support for the ban among license holders. It was also felt that because publicity is an important factor in attracting happy hour devotees, that non-compliance would be readily detected and reported to Excise Police by disgruntled competitors.

According to ABC Commissioners, there have been administrative proceedings against license holders for happy hour violations, but no licenses have been suspended, and no criminal prosecutions have been pursued in local courts. Commissioners could provide no estimates of the number of cases heard.

The prosecuting attorney for the ABC could recall only one "recent" case, and it involved a happy hour violation in addition to several other complaints against the same establishment. It was the prosecutor's impression that there were more cases before the March 1986 amendments, but that no other violations had been brought to his attention (ABC interview, 11 December 1986).

Appointed members of Local Boards in three counties could not recall any violations of the happy hour ban coming to their attention.

The Executive Director of the ILBA is regularly informed of administrative action taken by the ABC. She could not recall happy hour violations that involved any of the approximately 1400 members, but in reviewing records of ABC proceedings, "... had noticed action against some non-member establishments." (ILBA interview, 15 December 1986).

Excise Police officers who served as designated members of Local Boards had limited direct knowledge of the extent of compliance in their jurisdictions. Most of these officers had had no enforcement duties for some time. However, about half felt that there certainly were violations, but that they could not be easily detected unless a complaint was received.

One Excise Police officer who served as a designated Local Board member was able to describe a personal experience with the happy hour law. On his annual visit to a small tavern, he noticed a prominently displayed poster advertising a happy hour. This was shortly after the ban took effect in September 1985, and the officer pointed out to the permit holder that such practices were now illegal. The owner responded that he was unaware of the new law, and promised to discontinue the happy hour immediately. No notice of violation was issued; neither was the incident a problem in

the annual permit renewal hearing (Excise Police Interview, 4 December 1986).

This incident illustrates two points with respect to enforcement of the happy hour ban. First, permit holders were not specifically informed of the new law. Permit holders are required to have on their premises a copy of Indiana Alcoholic Beverage Laws (reprinted from Burns' Indiana Statutes Annotated) but are not required to have a current copy. There are no routine procedures or requirements for keeping licensees up-to-date on changes in alcoholic beverage laws. Second, Excise Police Officers played a major role in educating permit holders about the scope of the happy hour ban. Additional examples of this are described below.

Loopholes and Evasion

If there is uncertainty about the level of compliance and number of violations, the actual scope of the law has also been unclear to permit holders and officials alike. This is because the Indiana statute in its original and amended form does not categorically prohibit selling drinks at reduced prices. Shortly after the law went into effect, the ABC and Excise Police received countless phone calls from permit holders inquiring about specific practices that were and were not prohibited. No guidelines or interpretive

regulations were prepared by the ABC, or Excise Police. Officers investigating possible happy hour violations were advised to check with the ABC before taking action.

Recognizing the potential for evasion, many permit holders have developed creative alternatives to traditional happy hours. Perhaps most common is the "happy day," where a certain drink or brand of beer is sold at reduced price for the entire day. The statute forbids selling drinks "... during a portion of the day at a price that is reduced from the usual, customary, or established price that the permittee charges during the remainder of that day." [IC 7.1-5-10-20 § (a)]. In college towns, Thursday and Friday are popular happy days.

"Now you see it, now you don't" is another adaptation discovered by excise police. This involves selling, for example, Animal Can Beer for $.75 a dose beginning at 5:00 PM. No other bottled or canned beer can be had for less than $1.25. Animal Can is never available before 5:00, and the day's supply is always exhausted by 7:00. This arrangement is legal because Animal Can is not offered at a reduced price during a certain hour of the day. "It's a little Mickey Mouse, but it's legal," responded the Executive Director of the Indiana Restaurant Association when queried about such practices (Indianapolis Star, 28 December 1985).

There are limits to exceptions to the rule. The Chief of ABC's Excise Police reports that bars have attempted to sell 12 ounces of bottled beer at prices lower than those charged for cans of the same brand and size (ABC interview, 26 November 1986). A careful reading of the law would block not even this practice, but the Chief said no.

Furthermore, effective routine surveillance is all but impossible, and such chance encounters as that described above are the only examples of proactive enforcement. From an establishment's point of view, a successful happy hour depends on publicity, and Excise Police report that few taverns are bold enough to advertise happy hours. This means that undercover investigations require at least two visits to a suspected premise before it can be known whether or not they are selling at different prices during different times and days.

Summary

If the Indiana Happy Hour law was controversial, such controversy was not evident in any systematic way among any of the actors most involved in the retail sale of alcoholic beverages. License holders and the principal groups representing their interests before state officials supported the ban, if not necessarily for the same reasons

as its legislative and administrative sponsors. This support is also generally found among the hospitality industry nationwide. Though the Indiana statute does not categorically forbid selling cheap drinks, it did appear to accomplish the primary objective of the ABC, prohibiting two- and more-for-one specials.

No hard information is available on the number of violations or the general level of compliance. The ABC does not keep records that permit an examination of administrative actions by category of violation. Criminal proceedings are initiated by county prosecutors, after consultation with the ABC. Licensed premises are rarely prosecuted in criminal courts for violations of any alcoholic beverage laws, and ABC officials were certain no criminal charges had ever been filed for a happy hour violation.

Loopholes in the happy hour law avail imaginative and contrary tavern managers several avenues for offering beer or drinks at reduced prices. Again, no hard evidence can be found to assess the scope of such evasion, but ABC officials, Excise Police, and industry lobbyists felt that such practices were not widespread.

Chapter 2

Design and Statistical Analysis

Introduction

This chapter begins with a general discussion of the evaluation design. We have used a particular type of interrupted time series model, and begin by describing it, and how our application controls threats to validity often encountered in time series designs. The chapter then presents an overview of the statistical analysis of time series. This discussion is necessarily incomplete, and is intended for readers unfamiliar with this particular class of statistical models. Our goal is to describe the logic of ARIMA modeling, and how that logic is represented in the analysis that follows.

Design

Interrupted time-series designs involve observing trends in some indicator over time, and determining whether an intervention at a known time period produced some change in the pattern of observations. Time series designs have been

applied to several studies of issues in motor vehicle safety (eg, DOT, 1980; Ross et al., 1982; Ross et al., 1970). The logic is both simple and appealing. Cook and Campbell (1979) discuss the principles of interrupted time series, and how such designs can be usefully employed in program evaluation. This section describes the specific design used in the happy hour impact analysis; a later section focuses on statistical techniques.

This project employed a particular class of interrupted time series design described by Cook and Campbell as a non-equivalent dependent variables design (1979: 218-220). The design is particularly appropriate for this study, and offers several advantages in controlling for threats to validity of causal inference. Following the conventions used in Cook and Campbell, it may be represented by the following diagram:

$$\begin{array}{cccccccccc} O_{a1} & O_{a2} & O_{a3} & O_{a4} & & X & & O_{a5} & O_{a6} & O_{a7} & O_{a8} \\ O_{b1} & O_{b2} & O_{b3} & O_{b4} & & X & & O_{b5} & O_{b6} & O_{b7} & O_{b8} \end{array}$$

where O_{ai} and O_{bi} refer to the i_{th} observation of variables a and b, and the X indicates an intervention. Variables a and b are conceptually similar, but not equivalent. Variable a is, a priori, expected to change following the intervention, while variable b should not be affected.

A non-equivalent dependent variable design was used by Ross et al. (1970) to evaluate the impact of the "breathalyzer" in England. These authors first looked for changes in fatalities and serious injuries in all accidents following widespread adoption of the breathalyzer by police in England. Finding no differences they were able to take advantage of the peculiar nationwide drinking laws under which public houses could sell alcoholic beverages only at certain times of the day. When accidents were separated into those occurring during hours pubs are closed, and those taking place on weekend nights, the most popular time for visiting a pub (Maxfield, 1984), the authors found a sharp reduction in accidents occurring during the latter period, but no change in those happening when pubs are closed. Thus the non-equivalent dependent variables are conceptually similar (auto accidents), but only one could be expected to change as a result of the intervention.

This design can be readily applied to the happy hour ban for the same reason it was used in the breathalyzer analysis. Prohibiting happy hours can be expected to reduce auto accidents occurring only at certain times of day. If the happy hour ban is effective, there should be a reduction in accidents and/or injuries during the times and days of the week when such festivities were most common. In most cases this means between the hours of 4:00 and 8:00 PM on Monday through Friday (New York Times, 3 July 1985). While one

would expect a reduction during these times and days, there is no plausible reason to expect a reduction in accidents at other times. These two classes of dependent variables, happy hour accidents and non-happy hour accidents, are conceptually similar, but only one series of observations should change following the intervention.

Controlling Threats to Validity

The general class of interrupted times series designs controls for most threats to internal validity of causal inference discussed by Cook and Campbell (1979: 50-68). History, instrumentation, and construct validity are most problematic with simple interrupted time series designs. However, the potential effects these threats are generally controlled by our application of the non-equivalent dependent variables design.

History

As a problem in interrupted time series, history refers to the influence of some extraneous event on the dependent variable. In the present case history would be a problem if some other policies directed at drunk driving were implemented at some time near 1 September 1985, when Indiana's happy hour ban became effective. History does not pose a threat to the interpretation of this analysis for

three reasons. First, the only other statewide policy taking effect on this date sought to tidy up the one-year administrative license suspension introduced in 1983 legislation. Second, with the exception of statutory changes in penalties, virtually all policies are implemented at the local level; our analysis examines accidents across the state. Third, our application the non-equivalent dependent variable design eliminates most problems with extraneous events. These last two warrant some further comment.

Virtually all law enforcement activity in Indiana, as in most other states, is fragmented. Municipal and county agencies share responsibility with state police for enforcing laws against drunk driving as well. And most specific policies with which police have experimented during the last several years are initiated by local governments. These include road blocks and "get tough" approaches to sentencing offenders. The latter depends on action by the hundreds of judges in Indiana's 92 counties. It is highly implausible that uniform sentencing changes, or consistent use of roadblocks could could emerge throughout the state at any time, not to mention those months immediately following the happy hour ban (cf, Ross and Foley, 1987). Since the data we have used are the product of statewide reporting by law enforcement agencies, it is extremely unlikely that the effects of programs initiated in some jurisdictions at

varying times through the four-year series could bias our analysis.

Most importantly, history can threaten the validity of a non-equivalent dependent variables design only if some event affects one of the two series, but not the other. With respect to automobile accidents, the only plausible example of such local history is adverse weather, which, described below and in Chapter 3, is explicitly incorporated in the analysis reported below.

Instrumentation

Instrumentation refers to inconsistencies in recording observations of the dependent variable. This is probably the most serious threat to validity in time series designs. It is also especially problematic in attempts to assess the effectiveness of policies to reduce drunk driving. Most studies attempt to measure accidents involving alcohol by using various proxy measures such as nighttime fatal accidents and single-vehicle crashes. Heeren et al. (1985) discuss the many problems with these approaches, noting that the best surrogate indicators do not vary closely with actual measures of alcohol-related accidents in the two states where blood alcohol content is recorded most reliably.

There has also been extensive discussion of problems in using state motor vehicle records for any analysis of auto accidents. For example, the All-Industry Research Advisory Council (1984) compared accidents known to insurance companies to accidents recorded by agencies in 37 states, finding wide variation in the overlap between the two sources. Recognizing inter-state variation, one of the goals of the 1982 Highway Safety Act was to encourage standard record-keeping practices for archiving information on traffic accidents.

Problems with measuring alcohol involvement, whether through blood tests or the use of surrogate indicators, and instrumentation threats to the comparability of auto accident records are eliminated in the non-equivalent dependent variables design. The measure of impact used, <u>all</u> auto accidents during the "treatment" series, depends neither on the regular administration of tests, nor on the recorded suspicions of police. Furthermore, it is not plausible to expect statewide inconsistencies in reporting or recording accidents during certain times of day and days of the week, but not others. It is more reasonable to expect that discretion and other sources of variation may exhibit some local differences. But again, our design uses state totals, and assumes that instrumentation, if present, will affect the treatment and control variable series equally.

Construct Validity

An interrupted time series model posits a very simple view of a causal process. ARIMA models are little more than statistical techniques for describing stochastic processes. Threats to construct validity emerge when a time series oversimplifies a complex process. Our design is obviously an incomplete representation of the many random and non-random factors that produce auto accidents. But we feel the construct validity of our analysis is enhanced by our ability to specify a set of expectations about the likely form of impact from the happy hour ban.

In the first place, the non-equivalent dependent variable design specifies a particular pattern of impact: there should be a greater decline (or a lesser increase) in auto accidents during the treatment series than in the control series. Furthermore, since the happy hour ban was a discrete intervention its effects should be immediate, rather than gradual. This is in contrast to the expected impact of, say, publicizing an increase in the number of state police units deployed in hopes of deterring prospective drinking drivers. Policies intended to deter drunken drivers through more strict enforcement may have an immediate impact on apprehension rates, but their deterrent effects will usually be manifest some time after the

enforcement efforts began. Immediate changes in a dependent variable are usually much easier to detect, and it is generally safer to infer that an intervention caused an immediate change as opposed to a gradual and/or delayed change.

ARIMA Modeling

This section presents a very brief conceptual description of ARIMA models, and their application in this research. The most readable and widely cited treatment is McCleary and Hay (1980). McCain and McCleary (1979) present a briefer overview which follows from the design issues described by Cook and Campbell (1979). Most of the following is based on these three publications; notation follows that used by McCleary and Hay. Box and Jenkins (1976) present the most detailed and rigorous discussion of several classes of time series models. A thorough discussion of these procedures is far beyond the scope of this report; interested readers are invited to consult the sources cited above.

In its most basic form, interrupted time-series analysis is concerned with: (1) representing a series of observations over time

$$(Y_1, Y_2, Y_3, \cdots Y_{t-1}, Y_t)$$

and (2) determining whether or not the stochastic behavior of the series changed following some intervention. In our analysis the observations are weekly totals of various day-time combinations of auto accidents; each weekly total represents one observation.

ARIMA modeling refers to the application of a particular class of statistical models to a series of observations. "ARIMA" is an acronym for AutoRegressive Integrated Moving Average, which implies various ways of describing a series of observations. These models are represented as ARIMA·(p·d·q), with an autoregressive component of order p, a moving average component of order q, and a difference or integration component d. Each of these components (p·d·q) refers to a parameter that may be estimated in modeling a series of observations.

An autoregressive series is one where each observation, Y_t, is related to the preceding observation, Y_{t-1}, and a random shock, a_t. That is, succeeding observations are affected, or "predicted" by some portion of the prior observation, plus some random impact. A first-order autoregressive process ARIMA·(1·0·0) is written as:

$$Y_t = \phi_1 Y_{t-1} + a_t$$

where

$$-1 \leq \phi \leq +1$$

A series of monthly observations of employment might be an autoregressive process, where each monthly value is predicted by employment in the prior month, plus a random shock.

Moving average models define a series composed of a current random shock, a_t, and some portion of a preceding shock, a_{t-1}. ARIMA·(0·0·1) represents the first-order moving average process which is written as:

$$Y_t = a_t - \theta_1 a_{t-1}$$

where

$$-1 \leq \theta \leq +1$$

Restricting the ϕ and θ parameters to be $\leq |1|$ means the impact of previous observations and previous random shocks decays over time. Most of the auto accident series we examined were found to be moving average models. The number of auto accidents in a given week is defined by a random shock during that week, plus some portion of the random shock from preceding weeks. Three of the four suspected alcohol-related accident series (described in Chapter 3) were best described by autoregressive models; more on this below.

This way of modeling or defining a series of observations of auto accidents by saying they are dependent on "random shocks" seems nonsensical and illustrates an important principle of ARIMA models: They are essentially empirically derived models of ignorance, which describe a series as a stochastic or random process. Statistical models do not take account of the underlying behavior or social processes that are represented by a time series. ARIMA models are only a mathematical way of representing or describing that behavior. Once the parameters for a suitable ARIMA model have been estimated, that model has been defined and is conditionally accepted. Intervention analysis seeks to determine whether any statistically significant change in the modeled series occurs following some policy change that is thought to influence the behavior.

The (almost) final component of ARIMA models is the order of integration, or differencing. Most social processes, auto accidents included, exhibit some random drift, or more purposive trend over time. Series that drift or trend are said to be non-stationary. Before autoregressive or moving average parameters can be estimated, a series must be transformed to make it stationary. In ARIMA models this is accomplished by differencing, or subtracting the first observation from the second one, the second observation from the third, and so on. A model requiring one differencing, ARIMA·(0·1·0) is:

$$\theta_0 = Y_t - Y_{t-1}.$$

or

$$Y_t = \theta_0 + Y_{t-1}.$$

where θ_0 is the mean or constant level of the series. Since most processes exhibit trend, or drift, or both over time, most series must include (usually) one order of differencing. Combining the moving average and differencing components of a first order process,
ARIMA (0·1·1) produces:

$$Y_t - Y_{t-1} = \theta_0 + a_t - \theta_1 a_{t-1}$$

or

$$Y_t = \theta_0 + Y_{t-1} + a_t - \theta_1 a_{t-1}$$

This states that an observation may be represented by the constant level of the series, plus the preceding observation, plus the current random shock, less a portion of the previous shock. Since differencing usually reduces the mean, or constant level of a series to zero, a (0·1·1) model can be more simply expressed as:

$$Y_t = Y_{t-1} + a_t - \theta_1 a_{t-1}$$

Seasonal ARIMA Models

Many social science time series exhibit seasonal variation. Consumer spending peaks in November and December of each year; agricultural employment reaches highs in summer months. Weekly plots of auto accidents reveal substantial seasonal variation. This can readily be seen in Figure 2.1, which displays a plot of one happy hour series, Monday through Friday, 4:00-6:00 PM. Details on the definition and aggregation of this and other series are in Chapter 3; Figure 2.1 is presented here to illustrate the nature of seasonality in weekly series of auto accidents.

McCleary and Hay (1980) discuss several procedures for dealing with seasonal variation. A series can be deseasonalized with various transformations, or seasonal parameters can be included in an ARIMA model. ARIMA$\cdot(p\cdot d\cdot q)\cdot(P\cdot D\cdot Q)_S$ designates a model with seasonal parameters P, D, and Q of order S. The order of seasonality corresponds to the level of aggregation for a series of observations. Monthly aggregations frequently exhibit a regular pattern every twelve months, while the weekly auto accident series show periodic variation approximately every 52 observations. The approximate nature of this seasonality is important, and will be further discussed after describing the general form of seasonal ARIMA models.

Many of the weekly auto accident series, including that shown in Figure 2.1, were identified as $(0\cdot1\cdot1)\cdot(0\cdot0\cdot1)_{52}$ models which may be written as:

$$Y_t - Y_{t-1} = a_t - \theta_1 a_{t-1} - \theta_{52} a_{t-52} + \theta_1 \theta_{52} a_{t-53}$$

Assuming a zero mean, this states that the differenced series is equal to a current random shock, plus some portion of the preceding random shock, plus some portion of a random shock from the corresponding week in the previous year. The final term is part of a multiplicative seasonal model, and expresses the combined impact of 1st-order and seasonal moving average parameters on the past random shock, a_{t-53} for the differenced series, $Y_t - Y_{t-1}$. Since both θ_1 and θ_{52} are less than ±1, the multiplicative term is usually very small, and was frequently omitted from the models estimated in Chapter 4.

The approximate nature of weekly seasonality in auto accident series is due to the fact that much seasonal variation is a product of inclement weather during winter months, and bad weather rarely occurs at <u>precisely</u> the same time every 52 weeks. For example, weather may have been especially bad during the second week in February 1984, but not during the same period 52 weeks later. This means that the seasonal moving average parameter, θ_{52}, can only approximate the general pattern of periodic random shocks in

the form of snowy weather; it will seldom be the case that winter storms produce spikes in accidents during exactly the same week each year.

This is a further illustration that ARIMA models are simply tools for statistically describing regularities in a series of observations. A simple seasonal model assumes regular variation with a vengeance. It is only possible to account for shifting seasonality by estimating several regular and seasonal parameters, or by explicitly incorporating the source of seasonal variation as an independent variable.

The latter strategy is both more parsimonious and, where appropriate variables are available, more theoretically sound. Snow is a variable that would be expected to produce seasonal spikes of auto accidents during winter weeks. Figure 2.2 includes accidents recorded as occurring on snowy or icy streets during the Monday-Friday, 4:00-6:00 PM time period. Inspection of this figure shows that spikes in all accidents during winter weeks usually correspond with sharp increases in accidents on snowy streets.

Explicitly specifying snow as an independent variable, (described more fully in Chapter 3) recognizes more of the underlying causal process. This is in contrast to treating accidents as a completely stochastic process, and

empirically fitting a model that includes numerous moving average or autoregressive parameters.

Intervention Analysis

The $(p \cdot d \cdot q) \cdot (P \cdot D \cdot Q)$ terms comprise what is referred to as the "noise" component of an ARIMA model. This implicitly recognizes that a series of observations is a random, or noise model. Identifying the noise model is an iterative process, in which the statistical adequacy of alternative ARIMA models is evaluated. Independent variables, including the intervention variable, are added after the best-fitting noise model has been identified. An intervention can be said to have some impact if its parameter estimate is statistically significant.

The mathematical specification of an intervention component depends on its expected impact. The simplest, or zero-order intervention is expressed as:

$$f(I_t) = \delta_0 I_t$$

where I_t is the intervention, effective at time t. Indiana's happy hour law became effective 1 September 1985, the 140th of the 210-week series. Where N_t refers to the noise, or ARIMA$\cdot(p \cdot d \cdot q)$ model:

$$Y_t = N_t + \delta_0 I_t$$

I_t equals zero for Y_1 through Y_{139}, and is set to 1 for Y_{140} through Y_{210}. Including the intervention component with the typical ARIMA $(0\cdot1\cdot1)\cdot(0\cdot0\cdot1)$ model of auto accidents produces:

$$Y_t - Y_{t-1} = a_t - \theta_1 a_{t-1} - \theta_{52} a_{t-52} + \theta_1 \theta_{52} a_{t-53} + \delta_0 I_t$$

This states that observations can be described by the stochastic $(0\cdot1\cdot1)\cdot(0\cdot0\cdot1)$ process, plus the intervention parameter δ_0, beginning at Y_{140}.

The zero-order intervention function δ_0 describes an abrupt, permanent change beginning at time t. The expected impact of Indiana's law is, however, temporary. That is, given the loopholes in the happy hour statute described above, any reduction in accidents will be temporary. The expected form of the intervention is thus an abrupt, temporary impact, or pulse function where $I_t = 1$ at the time of intervention, and I_t = zero before and after the intervention. This is expressed as:

$$Y_t = \tau I_{t-1} + \delta I_t$$

In the happy hour series $I_1 \ldots I_{139}$ and $I_{141} \ldots I_{205}$ = zero, while $I_{140} = 1$. Therefore, at the 140th observation, Y_{140}:

$$Y_{140} = \tau I_{139} + \delta I_{140}$$

$$= \tau(0) + \delta(1) = \delta$$

At the next observation, Y_{141}:

$$Y_{141} = \tau I_{140} + \delta I_{141}$$

$$= \tau(\delta) + \delta(0) = \tau\delta$$

And at observation, Y_{142}:

$$Y_{142} = \tau I_{141} + \delta I_{142}$$

$$= \tau(\tau\delta) + \delta(0) = \tau^2\delta$$

Since τ is less than $\pm$ 1, the value of $\tau^n\delta$ declines as the distance from the moment of intervention, Y_{140}, increases. This accounts for the decaying impact of the intervention.

In practice, however, the zero-order intervention must be statistically significant before the possibility of a temporary impact can be assessed. That is, if δ is not

significantly different from zero, then $\tau^n\delta$ will always equal zero. In the analyses reported in the next section, a zero-order intervention was first estimated. In no cases was this significantly different from zero in the expected direction for a happy hour series, and the question of a decaying impact is therefore moot.

Summary

To summarize, an ARIMA·(p·d·q)·(P·D·Q) model was first identified for each of several series. This involves plotting autocorrelations and partial autocorrelations among the Y_t observations at several lags. Parameters for these preliminary models were then estimated. In practice this was a laborious process, requiring several steps in which alternative models were evaluated. Following procedures described by McCleary and Hay (1980), after tentatively accepting a model, it was re-estimated with higher-order moving average and autoregressive parameters. In no cases did these additional parameters add to the model according to the criteria recommended by McCleary and Hay.

Independent variables, including accidents on snowy or icy streets, a variable representing the incidence of certain holidays during each week (described in Chapter 3), and the happy hour law were added to each ARIMA noise model. Initial analysis of the requisite zero-order intervention

function revealed that in no case was the parameter estimate significant.

Chapter 3

Indiana Accident Data

Introduction

The Indiana State Police archives detailed information about all highway accidents. Data used in this evaluation were extracted from the 1983 through 1986 Accident Statistical Master (ASM) tapes, which include annual compilations of all accidents. Each ASM file includes hundreds of fields, comprising highly specific descriptors of the circumstances involved in each accident. Indiana accident data records have been designed to comply with standards required under the 1982 Highway Safety Act (23 USC 401), and promulgated by the US Department of Transportation's "Uniform Standards to State Highway Safety Programs" (23 CFR 1204.4). A copy of record layout and list of data elements for the 1985 ASM is attached as Appendix A.

There were no significant changes in the types of information recorded, or in criteria for reporting data to the state police during the four years covered by our analysis. All years include only accidents investigated by law enforcement officers. This reduces potential

reliability problems that could emerge if uninvestigated accidents were included. The 1986 data initially received for analysis did include uninvestigated accidents, but these were deleted when the files were subset and reformatted for analysis.

These data are organized in a hierarchical file that includes six separate records for each accident. The environment record acts as a "parent" for all other record types, and includes basic information on each accident. Any number of driver and vehicle records can be "owned" by the single parent environment record. That is to say there is only one environment record per accident, but each accident may involve more than one vehicle and driver. Additional record types (not used in our analysis) include pedestrians, injured persons, and trailers. Table 3.1 shows the number of records of each type for the years 1983 through 1986.

The numbers of environment records in Table 3.1 show a general upward trend in the number of accidents in Indiana. This is consistent with trends in other states through recent years (US Department of Transportation, annual) and reflects exogenous increases in the number of licensed drivers, vehicles in service, and overall driver-miles. It is also likely that some of this increase is related to declining gasoline prices over this period.

Subset and Format Accidents for Analysis

Since the original data files include records for each accident, the first task involved subsetting and aggregating accidents to a suitable level of analysis. Our primary analysis focused on weekly aggregations of accidents, totaled over various time and day combinations, described below. Weeks were the most disaggregated unit possible, since happy hours are not defined over weekends. That is, one cannot produce a daily series of happy hour (or non-happy hour) accidents since such festivities were not possible at weekends.

For reasons not entirely anticipated, weeks proved a most suitable unit of analysis. This reflects the fact that much routine activity involving driving, and thus auto accidents, revolves around weekly cycles. Patterns of travel are different on weekends than during the week. Auto use also varies by time of day. Furthermore, we discovered that holidays produce changes in the frequency and circumstances of auto accidents just as they introduce variety into daily routines. Given the tradition of Monday and Friday breaks from workaday habits holidays can be unambiguously associated with weekly patterns of auto accidents. Finally, there proved to be a sufficient number of weekly totals when accidents were aggregated over the various day-time

combinations used in our analysis. Having too few observations in each time period can produce sharp increases in the variance of a series that makes ARIMA parameter estimation difficult.

Weekly aggregations into several combinations of days and times reduced some 650,000 accidents involving about 1.25 million vehicles over a period of four years to 210 weekly observations.[1] The first and last weeks were deleted because they included fewer than 7 days each. Analyses were therefore conducted on 208 weekly observations. Weeks were defined as commencing on Monday and ending on Friday. Though inconsistent with the Julian calendar, this definition of weeks corresponds more closely to patterns of routine activity and the cognitive definition of a week. Most people view Saturday and Sunday as a unit, rather than the last and first days of consecutive weeks. This also permits a cleaner delineation of weekly happy hour and non-happy hour aggregations. Incomplete weeks at the end of years 1983, 1984, and 1985 were padded by carrying them over into the next year to produce continuous seven-day units.

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1 The original data filled four 2400-foot tapes at 6250 BPI; after aggregating and subsetting, the primary analysis file occupies all of 6% of a 360 Kb floppy disk. Such is the stuff of interrupted time series analysis.

Define Hourly Intervals

It is not possible to be absolutely precise in defining hourly groupings for the treatment series, those times when the happy hour ban should reduce auto accidents. On the one hand, since happy hours were typically celebrated between the hours of 4:00 PM and 7:00 PM it could be expected that auto accidents during that time would decline if the ban was effective. On the other hand, there is reason to postulate some spillover effect whereby recreational drinking during happy hours continues into later periods. In this case accidents might be reduced during those times near the conclusion of happy hours, or even in the hours immediately following. Furthermore, systematic, if non-random, sampling of various establishments revealed that many taverns specialized in midweek happy hours; Monday and Friday patrons paid full price.

Accordingly we followed an iterative strategy in defining the treatment series, and conducted analyses on several day-time combinations. The various definitions of happy hour series reported here include the following Monday-Friday and Tuesday-Thursday combinations.

Treatment Series

Mon-Fri 4:00 through 6:00 PM
Mon-Fri 6:00 through 8:00 PM
Mon-Fri 4:00 through 8:00 PM
Tues-Thurs 4:00 through 6:00 PM
Tues-Thurs 6:00 through 8:00 PM
Tues-Thurs 4:00 through 8:00 PM

The 4:00-8:00 PM series is the sum of the the other two treatment series. This hourly aggregation was examined for two reasons. First was the absence of a consensus in the hospitality industry in designating happy hours. Common times were 4:00-6:00 PM, and 5:00-6:00 or 7:00 PM. We also sought to test for the possibility of spillover effects, in which persons attracted by cheap drinks during the typical 4:00-6:00 festivities settled in until later hours.

Control Series

Mon-Fri 8:00 PM through midnight
Mon-Fri midnight through 4:00 PM
Tues-Thurs 8:00 PM through midnight
Tues-Thurs midnight through 4:00 PM
Saturday and Sunday

It is conceivable that the 8:00 PM through midnight interval could be an extreme definition of a spillover-treatment series. That is, some portion of happy hour patrons may continue drinking long into the night, much to the delight of the hospitality industry. But interviews with managers and bartenders in selected establishments revealed that this

was true only occasionally, and for a very small and rotating pool of customers. It is certainly possible that we overlooked some number of establishments in Indiana that cater to a larger number of regular patrons whose custom routinely carries over from happy hours to later hours. But it is unreasonable to expect that: (1) there are very many such places serving very many people; and (2) that this very small group of hypothetical patrons would later comprise a substantial portion of drivers on the streets. On the other hand, arrests for driving under the influence are more common during the late night hours, and it is conceivable that some number of weekday accidents could result from happy hour spillovers.

Spillover effects for the midnight through 4:00 PM series are extremely unlikely. Because happy hours were primarily devices to increase patronage at normally slow times for the hospitality industry weekend happy hours were virtually unknown.

Intervention and Seasonal Variables

Indiana's happy hour ban took effect 1 September 1985, week 140 of the 208-week series. The intervention component for our impact analysis was therefore set to 0 for weeks 1 through 139, and 1 for weeks 140 through 208.

Preliminary analysis and examination of series plots revealed evidence of considerable seasonal variation. As described in Chapter 2, ARIMA modeling includes mechanical procedures for deseasonalizing a series, but we explicitly incorporated an independent variable to account for the most profound seasonal impact, poor road conditions during the winter months. This control was produced by extracting accidents where road conditions were coded as "snow," "ice," or "slush" and aggregating them into day-time categories that correspond with the treatment and control series. These "snow" accidents were then included in final ARIMA models.

Though seasonal parameters were estimated for all series, in most cases the snow variable had a much stronger effect. This is because the impact of snow in producing spikes in accidents is of course seasonal, but it is not seasonal in a uniform fashion. That is, the seasonal parameters in ARIMA assume a consistent impact over the same time period each year. While snow increases accidents in winter, it seldom does so in precisely the same week each year.

Holidays are a somewhat different source of seasonal variation, and weeks including holidays affected happy hour and control series differently. This is because holidays modify working patterns -- many fewer people drive to work during the morning and afternoon commuting hours. This

produces an exogenous decline in happy hour accidents during most holidays. In contrast, it is commonly believed that many holidays, particularly those coupled with weekends through the federal policy of shifting historic birthdays and other anniversaries to convenient Mondays and occasional Fridays, increase weekend driving and produce more auto accidents during non-working hours. The seasonal impact of holidays is once again not uniform. Those explicitly linked to weekends are usually celebrated on different days each year, and thus makes it difficult to approximate their impact by estimating seasonal ARIMA parameters.

Weeks including holidays were identified by consulting past calendars. The actual holiday variable was defined as a pulse function, and coded 1 for weeks including holidays, and 0 for normal weeks. The following holidays were identified:

Holiday	Key on Figures 3.1 through 3.15
New Year's day	Y
Presidents' day	P
Easter	E
Memorial day	M
Fourth of July	J
Labor day	L
Columbus day	C
Thanksgiving	T
Christmas	X

Series Plots

Figures 3.1 through 3.11 show plots of the weekly series for each day-time combination. In addition to the number of accidents each week, these figures show codes for holidays, as listed above, and the number of snow accidents. The happy hour intervention begins at week 140 of each series, about two-thirds through 1985. This and the corresponding weeks including 1st September in other years are indicated by an "H" on the horizontal axis.

Several features of these plots are noteworthy. First, no impact of the happy hour ban is readily visible in any of the three treatment series (labeled 1601-1800, 1801-2000, 1601-2000) for either the Monday-Friday or Tuesday-Thursday weekly groupings. There is a noticeable decline in the early weeks of 1986 for these figures, but this cannot be associated with the happy hour statute since a four-month delayed impact is highly implausible.

The decline in early 1986 is primarily due to a mild winter. This can be seen by comparing the pattern of snow accidents to all accidents, and examining the trend in the former over the four-year series. Most spikes in total accidents during winter months correspond with spikes in snow accidents. This illustrates another consistent pattern in these figures. A general decline in snow accidents is also

evident in comparing the early weeks of 1984, 1985, and 1986.

The impact of holidays varies by series and individual holiday. This is discussed in more detail in Chapter 4, but an examination of standard scores (not shown) computed for holidays in the Monday-Friday 1601-2000 series shows a slight tendency as follows:

Below Average Accidents	Above Average Accidents
Presidents' day	Columbus day
Easter	Thanksgiving
Memorial day	Christmas
Fourth of July	
Labor day	
New year's day	

There are several possible interpretations of these patterns, but one seems most plausible. With the exception of Columbus day, certainly the holiday least widely observed in Indiana, weeks including the extra-day-off designated federal holidays are below average. New year's day and Easter are also below average. The latter occurs on Sunday and is therefore less likely to reduce weekday accidents, while the former perhaps is more often spent in quiet reflection of the preceding year (or night), or in front of television screens than behind the wheel. Thanksgiving and Christmas are holidays that traditionally prompt many Americans to take to the highways.

Suspected DUI Series

In addition to the analysis of all accidents occurring during the various day-time combinations mentioned above, we examined accidents for which there was evidence of alcohol involvement. The Indiana accident data do not include records of citations for driving-under-the influence, but we were able to use two sources of information to identify accidents where alcohol was suspected as a contributing factor: (1) a code for physical state of drivers, and (2) results of breath and blood tests for blood-alcohol content (BAC). We defined alcohol-involved accidents as those that met one of the following criteria:

(1) physical status = "had been drinking"
or
(2) BAC = .08 or higher.

In practice, the few accidents that met the first but not the second criterion were those where a test was administered, but results were less than .08. Codes for physical status are clearly subjective, dependent on the discretion and judgment of officers investigating the accident. But together, these criteria provide a conservative estimate of the number of alcohol-involved accidents.

Because there were (fortunately) relatively few such accidents, they were aggregated into bi-weekly totals. This

produces about 70 pre-intervention periods, and 35 post-intervention observations. Furthermore, there were not enough observations to produce each of the day-time groups described above. The suspected alcohol-related series were coded into the following groups:

Monday through Friday, 4:00 - 8:00 PM	Figure 3.12
Monday through Friday, 8:00 PM - midnight	Figure 3.13
Monday through Friday, midnight - 4:00 PM	Figure 3.14
Saturday and Sunday	Figure 3.15

Accidents on snowy or icy streets were also extracted for the alcohol-related series corresponding with each of the above categories. Holidays were not coded, as their impact is ambiguous when collapsed into a two-week unit of observation. However, visual inspection showed an apparent decline in alcohol-related accidents during early two-week periods for each calendar year. Suspecting this might be evidence of either heightened enforcement or deterrence from public service messages about drunk driving, we included a "new year" dummy variable for the first observation in each year. These series are shown in Figures 3.12 through 3.15.

Again, these figures disclose no readily apparent evidence of an impact by the happy hour ban. The series differ from those including all accidents in a couple of ways. First, none of the suspect alcohol-related series show the upward trend evident in the plots of all accidents. In fact the weekend and Monday through Friday 8:00 PM through midnight

series actually decline over the four-year period. These are times and days when driving under the influence is generally believed to be more common. The decline in alcohol related accidents during such peak periods is no doubt due to the impact of heightened enforcement by jurisdictions throughout the state, combined with some general deterrent effect of various policies designed to reduce drunk driving. More on this in Chapter 4.

There also appears to be considerably less seasonality in the alcohol-related accidents. The absence of spikes during winter months, and the smaller number of accidents on snowy streets suggest that inclement weather has less effect on accidents where alcohol use is involved.

Chapter 4

Analysis Results

Monday through Friday Treatment Series

Table 4.1 shows the results of these analyses for the three Monday through Friday treatment series. The t-ratio listed for each parameter estimate expresses the ratio of the estimate to its standard error; a ratio of 2 or greater is the criterion for statistical significance. The Ljung Box Q statistic, LBQ, tests for autocorrelation among the residuals of each model (Box and Jenkins, 1976). If a model is adequate, residuals should be white noise, indicated by a non-significant p value for each LBQ statistic. Of the models shown in table 4.1, only that for 4:00-6:00PM approaches significance, with $.20 \leq p \leq .10$.

Each series was found to be a moving average process. The happy hour ban had no significant effect in any series. Beyond these similarities there are several interesting differences in the series shown in Table 4.1. In most cases the pattern of results is intuitively satisfying, and enhances our confidence in these results.

The first-order moving average parameter, θ_1, and the random snow variable had the greatest impact on weekly accidents for each hourly aggregation. In each case the seasonal component, θ_{52}, improved the model fit somewhat, and was negative, reflecting a general trend of less severe winters over the four-year period. The significance of snowy weather is underscored by the fact that seasonal parameter estimates were much higher in initial models (not shown here) in which the snow variable was omitted, but were otherwise less satisfactory. This is because snow accounts for much seasonal variation in most series, and the necessarily approximate estimate of weather effects by seasonal ARIMA terms obscures this. Including a variable that, a priori, accounts for much seasonality is more theoretically satisfying, and produces better fitting models.

Holidays have a significant effect on accidents only for the 4:00-6:00 PM series. As expected, weeks with holidays have slightly fewer accidents, but this is only true for the evening commuting hours. The 6:00-8:00 period is a time when most working hoosiers have already returned home, or wherever, at the end of the day, and the 4:00-8:00 PM series includes this later interval, diluting the decline evident during commuting times. This is sensible, since holidays modify working patterns for many people, and reduce obligatory driving during evening rush hours. As a result,

federal holidays produce a decline of about 16 accidents per week in this two-hour period during normal working days. The policy implications of this will not be discussed.

The happy hour intervention component does not approach significance for any of the aggregations shown in Table 4.1, and the estimate in each case is positive. By itself, this is not conclusive evidence that banning happy hours had no impact on auto accidents. Figures 3.1 through 3.3, corresponding to the models in Table 4.1, displayed a general increase in accidents over four years. Though this trend is removed by differencing, it is possible that any decline in the treatment series due to the happy hour ban might be offset by an exogenous increase in all accidents. The happy hour ban could therefore be effective if there were a <u>greater</u> increase in accidents during non-happy hour times. That is, a finding of no impact for the treatment series, and a significant positive estimate for the intervention component during the control series would be evidence that the happy hour ban produced a relative decline in auto accidents. This is an example of how history might undermine results from a simple interrupted time series model, and can be controlled through the non-equivalent dependent variables design.

Monday through Friday Control Series

However plausible, this prospect is not supported by analysis of the control series, shown in Table 4.2, which presents final models for the three non-happy hour day/time aggregations. The intervention parameter estimate is negative for each control series, and approaches statistical significance for Saturday and Sunday accidents. The most likely explanation for this lies in considering the time periods of each control series, together with what is known about the highest risk times for driving under the influence of alcohol.

Past research has consistently shown that drunk driving is most common during late night hours, especially on weekends (U.S. DOT, 1985; Heeren et al. 1985; Governor's Task Force, 1984). This is true whatever measure is used -- blood-alcohol tests, or various surrogate measures such as late-night single-vehicle fatalities. Each of the control series includes some portion of these high-risk time periods. Concern with the problem of drunk driving increased during much of the four-year period examined here, and, as discussed above, new state laws and many local policies were implemented as well. The negative parameter estimates for the happy hour intervention probably reflect an exogenous decline in alcohol-related accidents during the control series as a result of policies other than the happy hour ban

that concentrated on enforcement during periods when driving under the influence is more common. In particular, several jurisdictions initiated roadblocks, most often set up on weekend nights.

This can be seen more clearly by comparing the relative magnitude of the parameter estimate for happy hour in each of the three control series. The estimate is highest for Saturday and Sunday, that time period including early Saturday morning, late Saturday night, and early Sunday morning. This represents three-fourths of the late-night, weekend hours when driving under the influence is known to be most common. The smallest estimate is for midnight through 4:00 PM on weekdays. Although this period includes risky late-night, early morning hours all occur during the work week when drunken driving is less common. More importantly, the relatively small number of accidents during these times is offset by the much larger number occurring during morning rush hours. In between these two estimates is the 8:00 PM to midnight weekday series; this is not contaminated by a high volume of accidents during rush hours, but neither does it include high-risk weekends.

Analysis of the suspected alcohol-involvement series, discussed below, provides further evidence supporting this interpretation.

In most other respects, models for the control series are similar to those in Table 4.1. Accidents increase when streets are snowy, and θ_1 is large and positive. Weekday accidents between 8:00 PM and midnight exhibited no seasonal variation that could not be accounted for by snow. This suggests that the unmodeled seasonal regularities in driving do not affect accidents during this period; they are well representing by a first-order random shock and inclement weather. Again reflecting on patterns of routine behavior helps us interpret this. "Discretionary" driving is probably greatest during this time period. That is, decisions to take to the streets between 8:00 PM and midnight are most affected by factors such as weather, and least subject to other seasonal regularities; when it snows, many people heed the advice of television weather-readers and don't drive. In contrast, the midnight to 4:00 PM weekday series includes the obligatory drive to work for most people. Both snow and other seasonal regularities affect the commuter's daily routine.

Holidays significantly affect only the weekend series, producing a decline in accidents. This appears counterintuitive in the face of the "holiday traffic toll" relentlessly predicted by public officials and monitored by news media everywhere. However, the evidence does not support this popular view. There are significantly <u>fewer</u> accidents during holiday weekends in Indiana. Non-holiday

weekends from 1983 through 1986 averaged 824 accidents, compared to 741 for holiday weekends.

Tuesday through Thursday

The story is largely similar for Tuesday through Thursday, shown in Table 4.3, which includes models for treatment and control series. Each is a first-order moving average process, and includes a seasonal moving average component. The θ_{52} term is larger for each treatment series, indicating that Tuesday through Thursday accidents are more affected by unmodeled seasonal factors than are corresponding accidents on Monday through Friday. This is especially true for the 4:00 to 6:00 PM period, and is largely due to the non-significant impact of holidays. Since most holidays reduce the work week, together with commuting and accidents, by omitting Monday or Friday it is not surprising that holiday reductions are absent in the Tuesday through Thursday series. Accidents again increase on snowy days, and again the happy hour intervention has no effect on any of the three treatment series.

The two control series for Tuesday through Thursday accidents[1] are also similar. Each model includes a negative coefficient estimate for the intervention, but neither is

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1The Saturday and Sunday series is identical, and omitted from Table 4.3.

statistically significant. Unlike the Monday through Friday models, Table 4.3 shows a small but significant seasonal moving average parameter for the 8:00 PM to midnight series.

Suspected Alcohol Related Accidents

It is clear that Indiana's happy hour ban had no effect in reducing all automobile accidents during the treatment period. However, as discussed in Chapter 3, it is possible that the intervention could have a more selective impact in reducing accidents involving suspected alcohol abuse. This effect is possible because the happy hour treatment periods, 4:00 PM through 6:00 or 8:00 PM, includes larger numbers of auto accidents than any other two- or four-hour interval. If the law reduced alcohol-related accidents, its impact may be concealed or offset by the much larger number of "normal" accidents that routinely take place during rush hours.

Results from the analysis of accidents where alcohol was suspected are shown in Table 4.4. This table includes only one treatment series, Monday through Friday 4:00 to 8:00 PM because of the relatively small number of alcohol-related accidents during this time period. Also note that these are biweekly intervals, including a total of 103 observations.

The principal difference between series shown in Table 4.4 and weekly series of all accidents is that only the

treatment series, Monday through Friday, 4:00 to 8:00 PM is best represented by a moving average model. The three control series are autoregressive, with a negative estimate for the ϕ_1 parameter. Bearing in mind the caveat that ARIMA models describe stochastic processes, the negative autoregressive patterns for control series lend themselves to a substantive interpretation. As noted above, various policies to curb drunk driving have been initiated over these four years. The negative coefficient describes a general downward trend in suspected alcohol-related accidents. Furthermore, an autoregressive series is one in which each observation is "dependent" on some portion of the prior observation. It makes more intuitive sense to view drunk driving accidents as an autoregressive process rather than one described by a random shock. Substantively, the autoregressive trend -- the relationship between current and past accidents -- is downward, and probably due to heightened enforcement and deterrence. This cannot be conclusively proven, but is a highly plausible interpretation of the general form of the models shown in Table 4.4, and reflection on the overall pattern of results for all models.

Then why is the treatment series again a moving average process? The primary reason is that there are few alcohol-related accidents during this Monday through Friday time period, and fewer drunk driving enforcement actions target

the weekday evening commuting hours. There are twice as many suspected DUI accidents in the 8:00 to midnight period as in the treatment series. In contrast, for the series including all accidents there are twice as many in the treatment period as in the 8:00 to midnight interval.

This reinforces our interpretation of the negative intervention parameter estimates in the models shown in Table 4.2. Policies other than the happy hour ban reduced accidents in the control series because drunk driving, and alcohol-related accidents are more common during this time. Table 4.4 supports this by showing that alcohol-related accidents decline in the high-risk periods, but not on weekdays during late afternoon and early evening hours.

In all likelihood this pattern is due to a combination of more concentrated enforcement during higher risk days and hours, increased deterrence during these times, and selective targeting by law enforcement personnel. Selective targeting means that police are less inclined to strict enforcement in lower risk hours, so neither enforcement nor deterrence has much of an impact.

It is also possible that police are less inclined to administer tests, or record their suspicions of alcohol use during the treatment series, and that this discretion conceals the possibility that drunk driving has been reduced

during the happy hour times. This is extremely unlikely given the overall pattern of results in Tables 4.1 through 4.4, and the logic of the non-equivalent dependent variable design. If selective targeting caused police to overlook possible drunk driving during the treatment series, and the happy hour ban did reduce accidents, then this would produce either a negative parameter estimate for the intervention in the treatment series, or a smaller positive estimate for the treatment series when compared to control series. But Tables 4.1, 4.2, and 4.3 showed precisely the opposite: negative (though not significant) estimates for the control series, and positive (again not significant) estimates for the treatment series.

A few additional comments about other aspects of the models in Table 4.4. None of the models included a seasonal component, but this is in part due to the increasingly ambiguous concept of seasonality in auto accidents aggregated to biweekly intervals. The requisite level of aggregation no doubt obscures some seasonal regularity in suspected alcohol-related accidents. The new year variable approaches significance only for the weekend series, where the first two weeks of each new year average about 27 fewer accidents where alcohol use is expected.

Snowy weather affected these series somewhat differently. Its impact was modest at best during the treatment period

and the midnight to 4:00 PM series; snowy weather had no significant impact on accidents during the two peak drunk driving periods. A substantive explanation again presents itself. Each of the two series where snow increased accidents includes commuting hours, times when most people are obliged to drive to work whatever the prevailing weather. Driving at other times, late night and weekends, is more discretionary; drunk or sober, people heed warnings to stay off the streets when it snows. It is also possible that alcohol and snow impede driver control about equally during the high-risk drunk driving hours, thereby obscuring an exogenous increase in accidents due to bad weather.

Chapter 5

Summary and Conclusion

Introduction

This evaluation has revealed no evidence that Indiana's 1985 law banning happy hours reduced automobile accidents in the state. After estimating ARIMA models for those days and times corresponding to the periods most likely to be affected by the ban, estimates of the intervention parameter were not significant in any case. Furthermore, intervention components for three control series were negative, and approached statistical significance in one case, suggesting an exogenous reduction in accidents during times and days when the happy hour ban could have had no effect.

These same findings obtained for accidents in each possible treatment period, in Monday through Friday and Tuesday through Thursday aggregations. Analysis of accidents where there was evidence of alcohol involvement were similar. Intervention effects were positive but non-significant for the treatment series, and negative but non-significant for the control series.

Our confidence in these findings is increased by a pattern of results that cannot be readily interpreted in any other way. This is precisely the strength of the non-equivalent dependent variables design. It enhances construct validity by postulated different patterns for different series, and basing these predictions on what is known about the behavior under study and how it could and could not plausibly be affected by an intervention.

This chapter discusses possible explanations for these findings in more detail. Likely reasons include:

1. Evasion and/or non-compliance.
2. Other reasons for non-reduction of happy hour drinking.
3. Dilution of alcohol-related accidents by other accidents.
4. Effects masked by other policies to reduce drunk driving.

The chapter concludes with some general observations and recommendations regarding the regulation of happy hours.

Evasion, Enforcement, and Non-Compliance

In describing Indiana's statute, Chapter 1 suggested several ways in which the spirit of the happy hour ban could be evaded. There is also some evidence that enforcement has been casual at best.

No one questions the law's loopholes. Interviews with ABC officials, representatives of County Alcoholic Beverage Boards, Excise Police, and lobbyists for the hospitality industry produced stories and anecdotes about creative alternates to happy hours. This view was supported by visits to several establishments which revealed a few examples of day-long reduced-price specials on beer or drinks, the "happy day" evasion. Other examples have been described in general circulation newspapers in Indiana, and nationwide trade publications.

Some instances of creative interpretation of the law are founded in the March 1986 revisions: bars near colleges and universities begin serving a particular brand of beer at astonishingly low prices immediately before live entertainment is scheduled to commence, and raise them to reflect market prices as the band begins to play. In practice this would have no impact on happy hour accidents as defined and measured here, since these price adjustments occur very late, eclipsing the midnight hours and thus comprising "raised prices" to offset entertainment costs.

Neither is there any evidence of concerted attempts to enforce the law. Citing lack of personnel and the time consuming efforts necessary to detect violations, ABC and Excise Police are unable to monitor let alone enforce compliance (ABC interview, 26 November 1986). The chair of

the Indiana General Assembly committee that held hearings on the happy hour bill also recognizes that: "... compliance depend[s] on the ingenuity of the bar owners." (Indianapolis Star, 22 December 1985).

It is not possible to assess the level of evasion and non-compliance with any precision. Circumstantial evidence points in two directions. On the one hand, ABC officials and state legislators claim their objective was to halt two-for-one specials; there is no evidence that this uncharacteristically specific prohibition is being evaded. This together with their admission that other provisions of the bill are being successfully avoided suggests something more than sporadic evasion.

On the other hand, the incentive structure of the hospitality industry supported calling an end to competitive price wars, and most tips on suspected violations have come from bar owners. Nationwide reports of relief among innkeepers in states where happy hours are restricted in some way suggests that most establishments would be unwilling to seek out creative ways of reducing their profits (Orange County Register, 13 January 1987; New York Times, 23 June 1985; Frydman, 1985).

Other Non-Reduction of "Happy Hour" Drinking

Even if compliance among bars and taverns was widespread, it is possible that on-premise consumption was not substantially reduced. That is, much of the rationale for prohibiting reduced-price specials is founded in the assumption that patrons are sensitive to prices. If this is not the case, then relative increases in the cost of drinks may have done little to reduce consumption.

It is not possible to directly assess this, and previous research on drinkers' responses to price changes is mixed. Most evidence is indirect, and is based on package sales of alcoholic beverages. Younger people appear to be especially sensitive to changes in beer prices. Saffer and Grossman (1985) linked increases in state excise taxes to a reduction in motor vehicle fatalities among people under age 25. But Ornstein and Levy (1983) report mixed results in estimating the relationship between price increases and consumption, finding that demand for distilled spirits is more sensitive to price increases than is demand for beer. This raises the question of substitution effects, which Levy and Sheflin (1983) argue cannot be easily estimated.

There is less evidence on the price elasticity of on-premise sales (Maynard, 1983). Drinking in bars is probably less affected by price increases because of the much higher cost

of beverages in bars, compared to package prices. Another possibility is locational substitution, where value conscious former happy hour customers would substitute drinking at home for the more costly consumption in taverns. However, this adaptation, if widespread, should reduce auto accidents during the treatment period as the drinking-driving sequence of events is reversed.

It is most likely that the majority of after-work drinkers, in defiance of microeconomic theory, continued their occasional after-work visits to the local. The traditional charms of familiar and congenial surroundings no doubt offset marginal increases in price among some number of regular patrons. Adaptive behavior by the industry may also play a role. Complementary hors-deoeuvres have replaced special prices in many establishments as loss-leaders to attract customers (Richmond Times-Dispatch, 1 April 1985; Nation's Restaurant News, 24 March 1986). This practice does not directly encourage consumption as did reduced prices, but it nonetheless enables budget-conscious drinkers to spend money on products other than food, and provides incentives to do their drinking in bars.

Dilution of Alcohol-Related Accidents

The implicit target of happy hour legislation is alcohol-related accidents during or immediately following the times

when happy hours were typically celebrated. Chapter 4 showed that the number of accidents where alcohol was suspected as a contributing factor during these periods was small, compared to suspected DUI accidents at other times. However, the two-hour time period, 4:00-6:00 PM Monday through Friday, accounts for a larger number of all accidents than any other two-hour aggregation. It is therefore possible that some small reduction in alcohol-related accidents could be attributed to the happy hour law, but its effects are offset by the much larger number of normal accidents.

Results presented in Chapter 4 provided strong evidence that this was not the case. Even when suspected alcohol-related series are examined separately, no decline was found in the treatment series, but there appeared to be a reduction during other times. It remains possible that a very small number of happy hour accidents was prevented, but the presence of such an impact cannot be detected through this design, or any other design known to the authors.

Effects Masked by Other Drunk Driving Policies

Chapter 1 described the range of strategies to combat drunk driving begun in the early 1980s throughout the country. Indiana increased penalties and pursued widespread publicity campaigns to warn drunk drivers, and broaden public support

for its get-tough approach. The analysis presented in Chapter 4 supplies indirect evidence that such policies reduced the number of alcohol-related auto accidents. Nationwide trends reflect similar experiences in other states, as alcohol related fatalities declined from 1982 through 1985 (DOT, 1987; Fell, 1985).

Despite these trends, there are two reasons why it is unlikely that other policies obscured an impact of the happy hour ban. The first reason follows from the non-equivalent dependent variable design. Our indirect evidence concerning the effectiveness of other laws found an exogenous decline in all accidents and alcohol-related accidents during non-happy hour periods, but no decline during treatment series. It is highly improbable that tougher enforcement and deterrence would reduce alcohol-related accidents during times when drunk driving is more common, but not reduce such accidents at other times.

Secondly, the downward trend in nationwide drunk driving deaths, and alcohol-related accidents in Indiana was reversed in 1986, after the happy hour ban took effect. Figures 5.1 through 5.4 show this trend in Indiana. In addition to plotting the number of suspected alcohol-related accidents for four day-time combinations, these figures also show annual and sliding means. The annual mean expresses the average number of accidents in each of the four years,

while the sliding mean, or "moving average," recomputes the mean number of accidents as each bi-weekly period is added to the total series.

Figure 5.1 shows the treatment series, Monday through Friday 4:00-8:00 PM. This figure differs from the three control series in its stability over the four-year period; neither the moving average nor annual means vary much from 1983 through 1986. In contrast, each of the other three series shows successive declines from 1983 through 1985, and an increase in 1986. The moving average declines each year, and levels out during 1986. If deterrence and stricter enforcement account for the 1983-1985 decline in the control series, it is all but inconceivable that: (1) this pattern would not be found during the treatment series, and (2) that exogenous reductions in drunk driving accidents mask effectiveness of the happy hour ban.

Reasons for the Indiana and national changes are unclear, but waning public attention to the drunk driving issue probably plays a role (New York Times, 29 October 1987). Recent research in New Mexico and Indiana indicates that another reason may be lax enforcement of tougher laws, and failure to comply with mandated jail sentences. Though their research focuses on sentencing practices through 1985, Ross and Foley (1987) document reluctance by prosecutors and judges to impose stiff jail sentences on drunk drivers.

Furthermore, jail records indicate that repeat offenders frequently do not serve the mandatory 48-hour sentence when it is imposed by judges (see also Indianapolis Star, 22 December 1985).

This suggests that the combination of uneven enforcement and diversion of public interest in the issue has produced a reversal in previous declines in alcohol-related accidents. The specific deterrent effects of unenforced penalties are ameliorated among the relatively small number of repeat offenders; general deterrence loses momentum as public attention drifts away.

Conclusion and Policy Implications

"No impact" findings are frequently instructive, especially when coupled with an indication that some actions can reduce drunk driving and its consequences. Happy hour legislation in Indiana and elsewhere is best viewed as an example of symbolic action against a policy problem in the face of public pressure to do something. A Boston police officer, asked about the impact of the first statewide action against happy hour in Massachusetts, described it as "[A] farce, emotional grandstanding by politicians ..." (Richmond Times-Dispatch, 1 April 85). It is understandably tempting for legislators to get on the anti-drunk driving bandwagon, and hard to imagine effective opposition to curbing a practice

that encourages heavy drinking in bars. Happy hour supporters would have to either align themselves with a group that lacked a respectable constituency, or argue that restricting the free market in drink prices is unwarranted regulatory interference.

That the action was primarily symbolic is underscored by the absence of appropriations for enforcement. Few political actors could resist endorsing a policy that: (1) capitalized on public concern, (2) responded to pressure from an organization led by mothers, (3) took on an unpopular industry, (4) banned a practice that enabled drinkers to get more for their money, and (5) cost nothing. In this respect, happy hour laws resemble countless legislative enactments ranging from trivial resolutions to honor a winning basketball coach, to macabre mandates that medical supplies used to treat AIDS patients be disposed of properly.

In a more general and directly relevant vein, this is an example of the gap between the high principles of legislative enactments and the pragmatic details of implementation. Ross and Foley's research illustrates this with respect to policies aimed more squarely at drunk driving. Prosecutors, judges, and jailors hesitate to impose the stiff penalties required by law, justified in part by their perception of discrepancies between the

popular view of killer drunks, and the chagrined middle class community resident standing before them (1987:·320). Staunch belief in judicial independence also plays a role, as phrased by a trial court judge in expressing his view of New Mexico's required license suspension: "The law was a response to MADD and other pressure groups. The legislature got stampeded. The courts have to resist these pressures." (Ross and Foley, 1987: 321).

Our research indirectly supports the view that effective drunk driving requires systemic action, and can rely neither on political panaceas like happy hour laws, nor assumptions that policies will implement themselves. If license suspensions and jail sentences are to dissuade offenders from repeating their transgressions, then certainty of punishment should be assured. If publicity and public support enhance general deterrence, it must be recognized that the issue attention cycle is fickle and easily displaced. When public priorities shift from alcohol, the most widely abused drug, to other concerns, media themes and public attention obligingly follow. If campaigns against cocaine and its derivatives can reverse the attitudes of a generation, more concerted action is needed before sustained change can be effected in the more traditional habits of alcohol use.

We therefore cannot recommend that states be encouraged to restrict happy hours, but neither is there any reason to rescind policies adopted in Indiana and other states. In the first place, the direct targets of such restrictions all but welcomed the ban. It would be odd, at best, to justify a reversal by citing either the skepticism of researchers or the need for deregulation to increase competition among bar owners. More importantly, per capita alcohol consumption has declined in recent years among all but those too young to legally drink in the first place (Williams et al., 1986). There is no justification for symbolic action to endorse its increase by repealing happy hour prohibition.

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FIGURES

Figure 2.1

Monday–Friday, 1601–1800

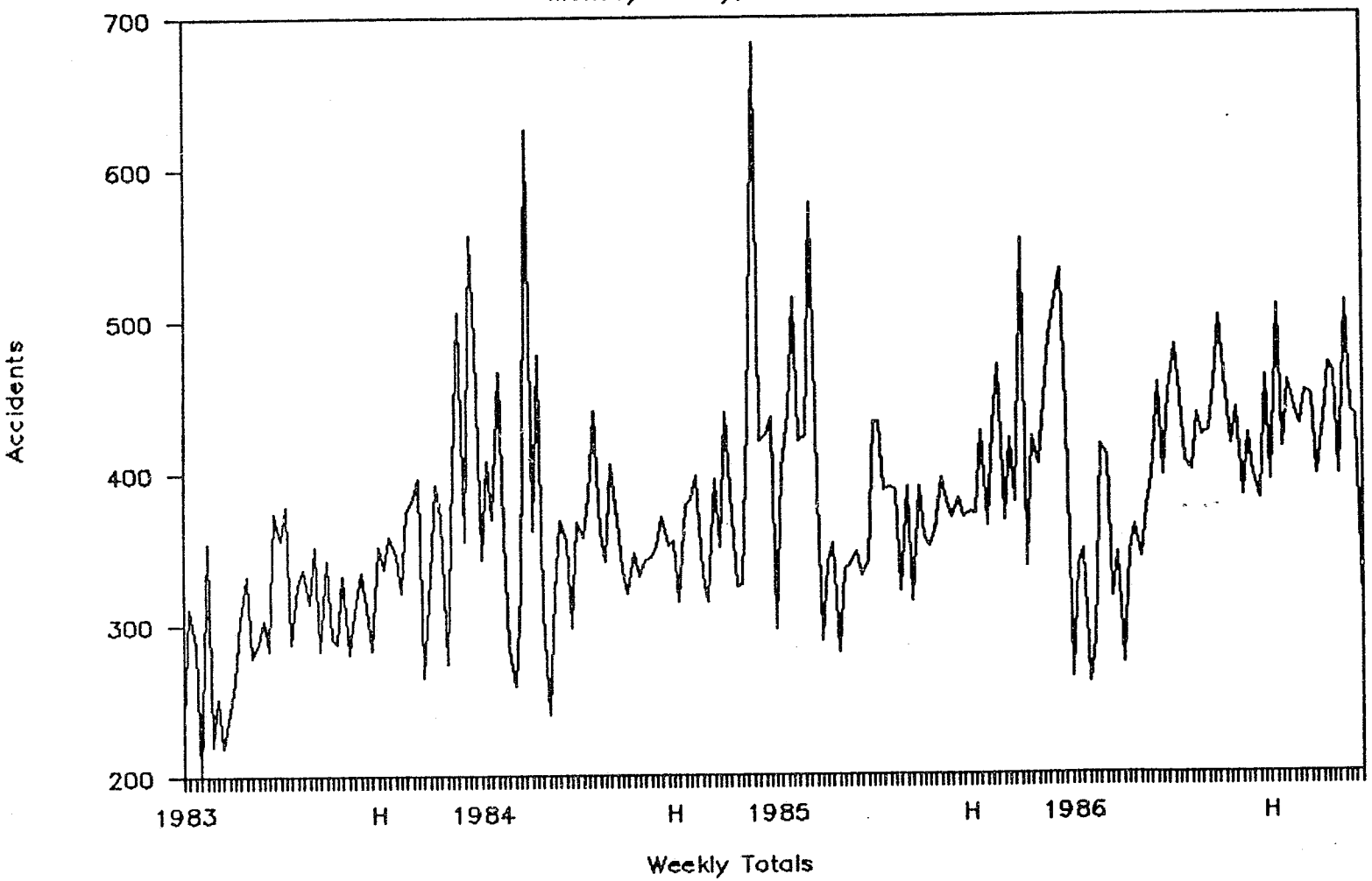


Figure 2.2

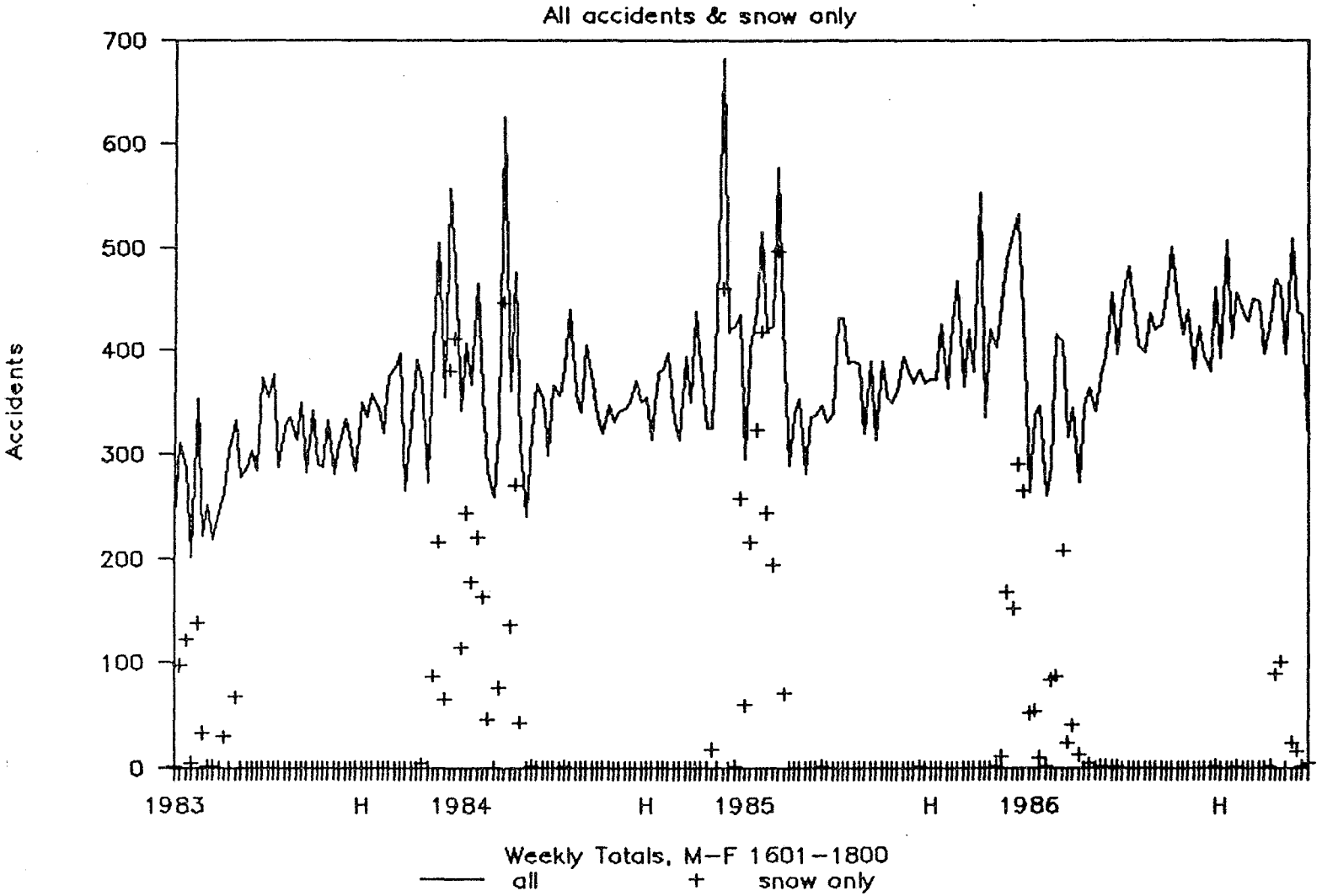

All accidents & snow only
Accidents
700
600
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals, M–F 1601–1800
all
snow only

Figure 3.1

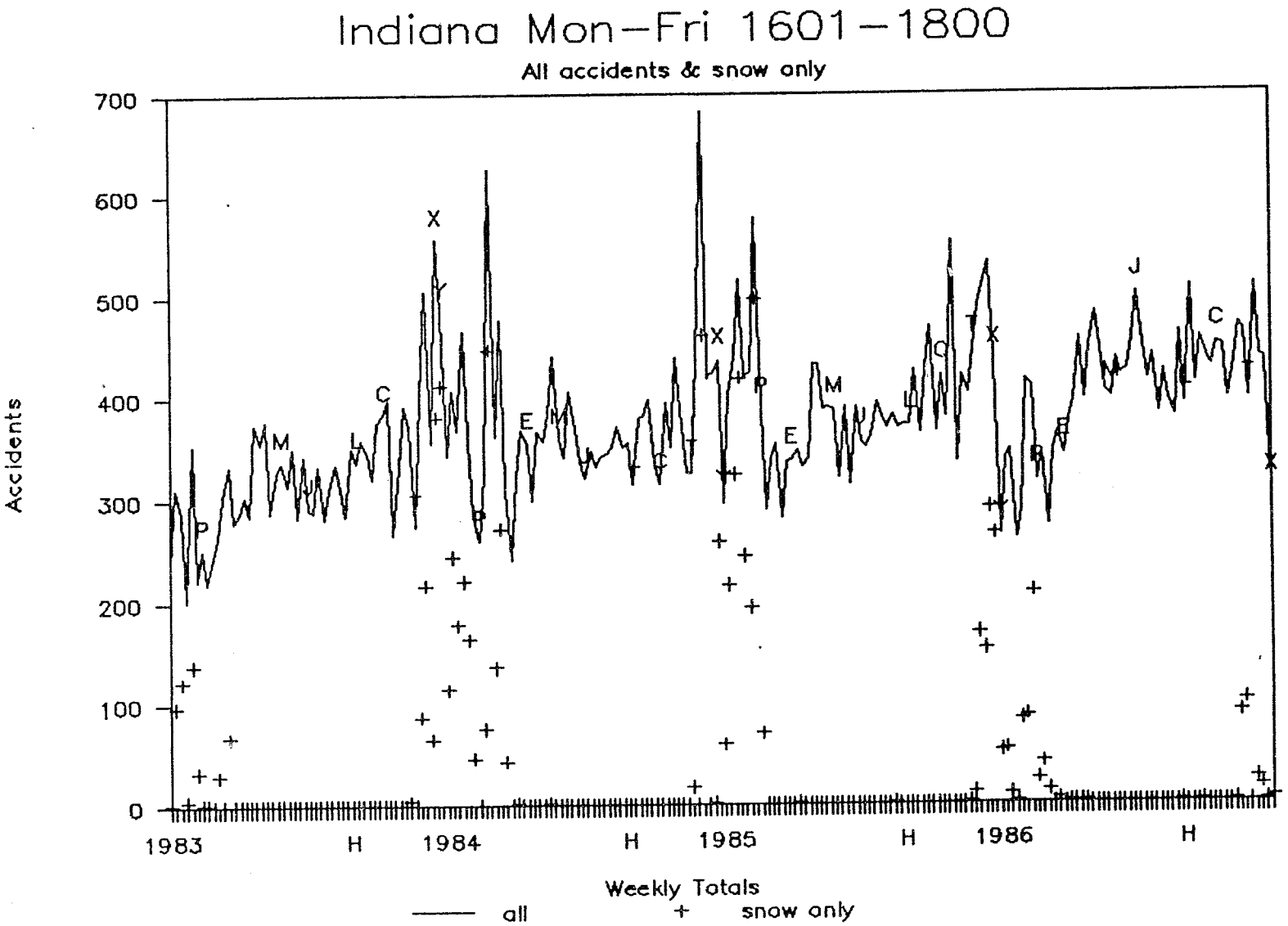

Indiana Mon–Fri 1601–1800
All accidents & snow only
Accidents
700
600
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.2

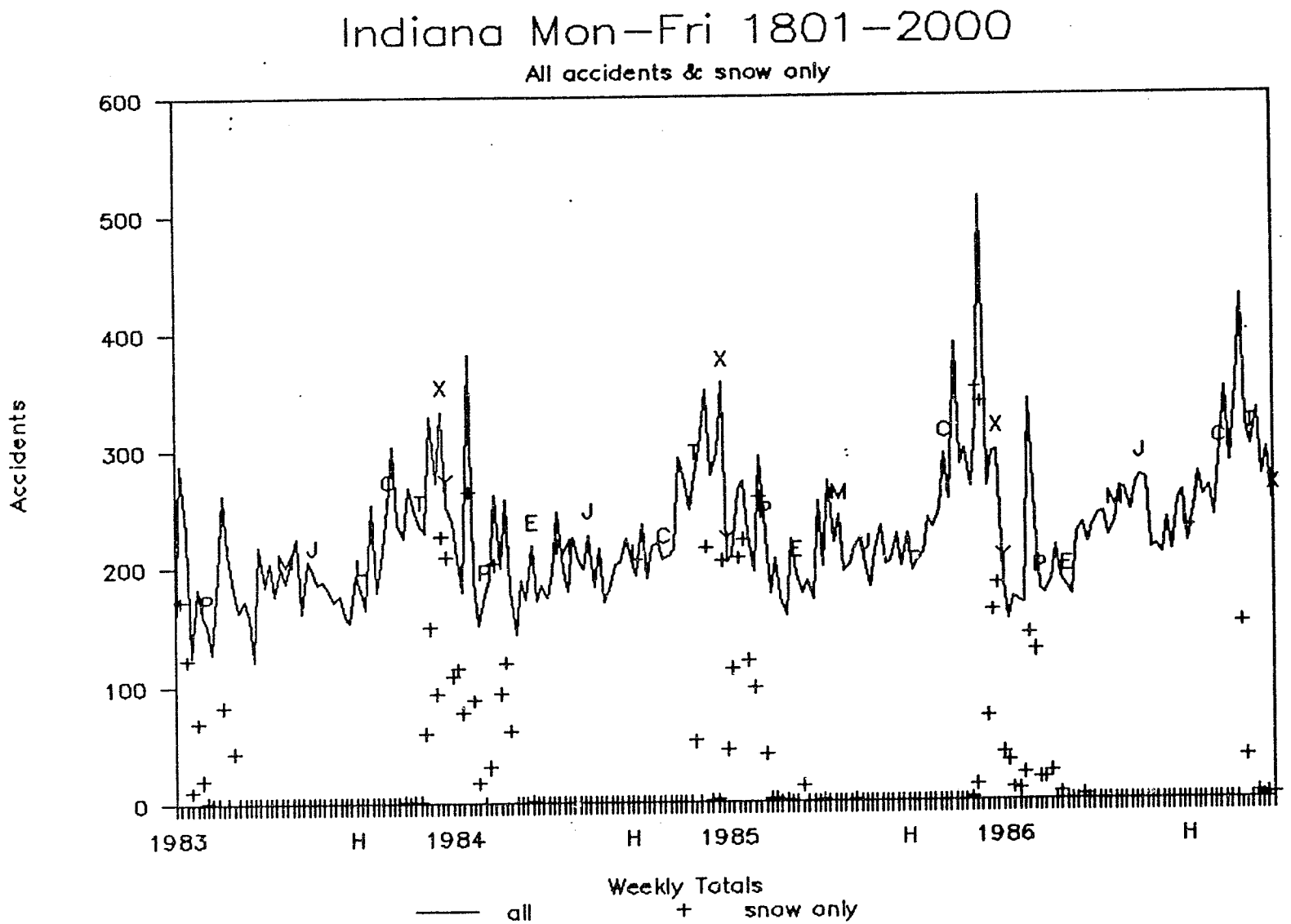

Indiana Mon–Fri 1801–2000
All accidents & snow only
Accidents
600
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.3

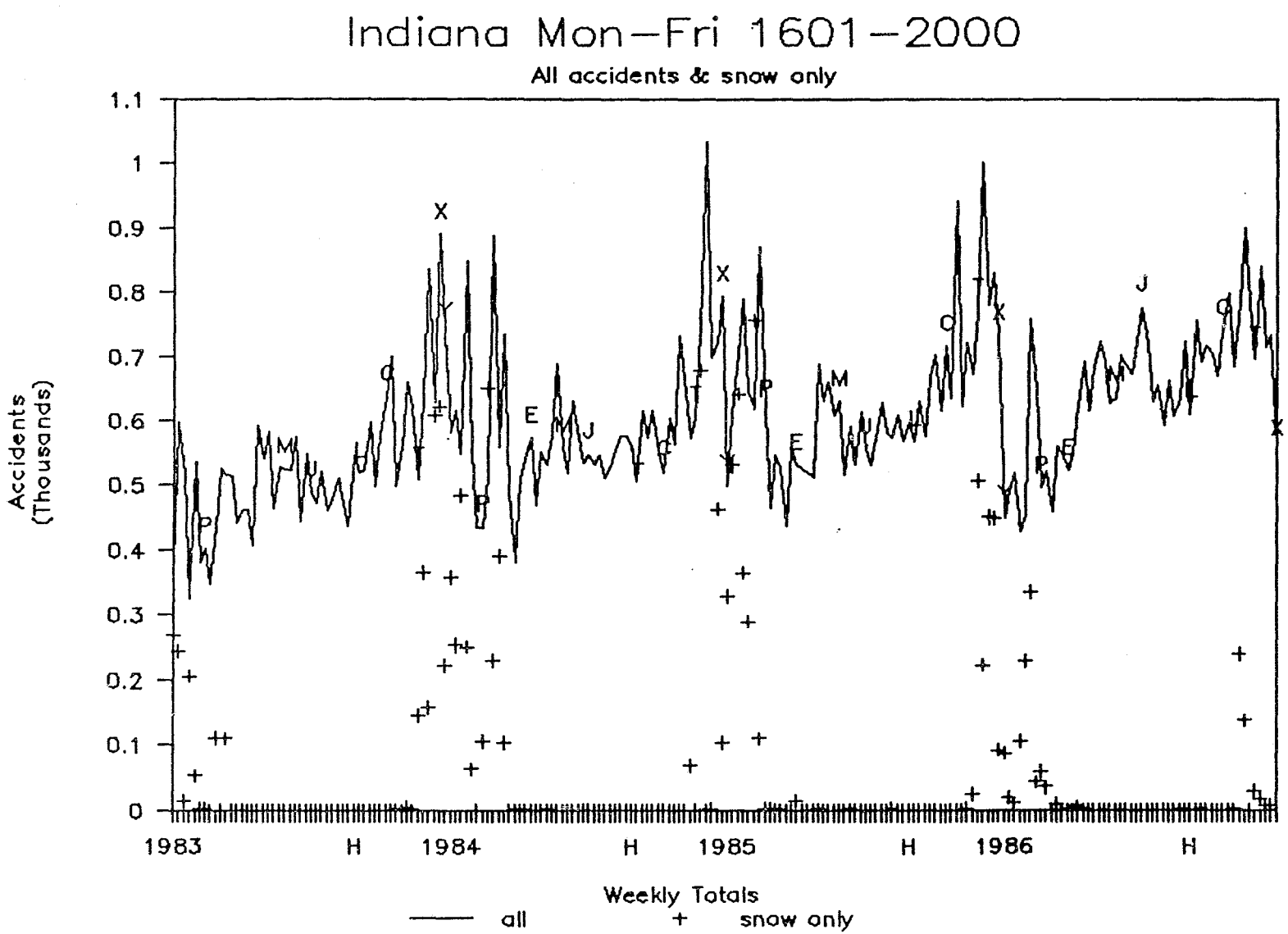

Indiana Mon–Fri 1601–2000
All accidents & snow only
Accidents (Thousands)
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.4

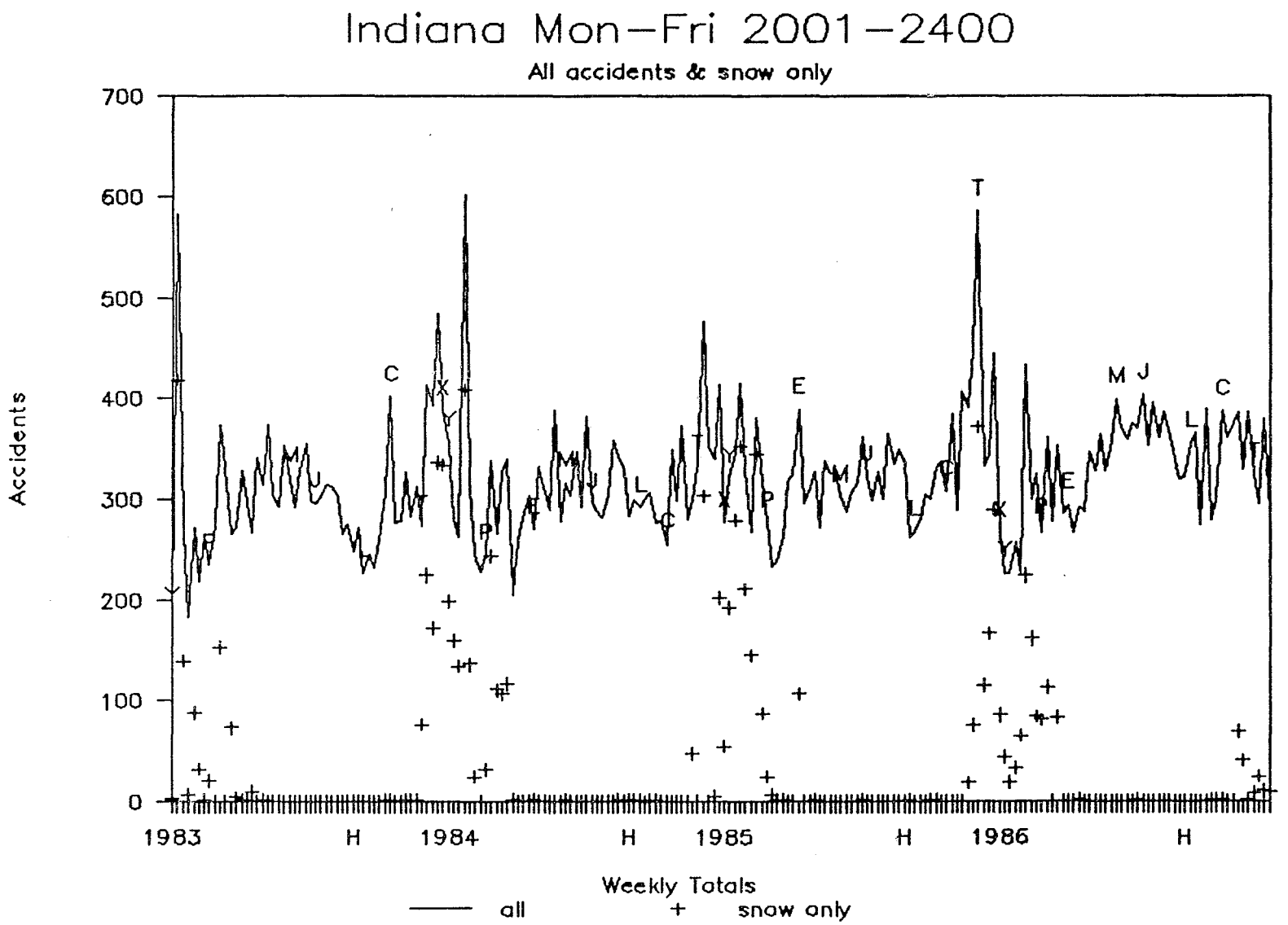

Indiana Mon–Fri 2001–2400
All accidents & snow only
Accidents
700
600
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.5

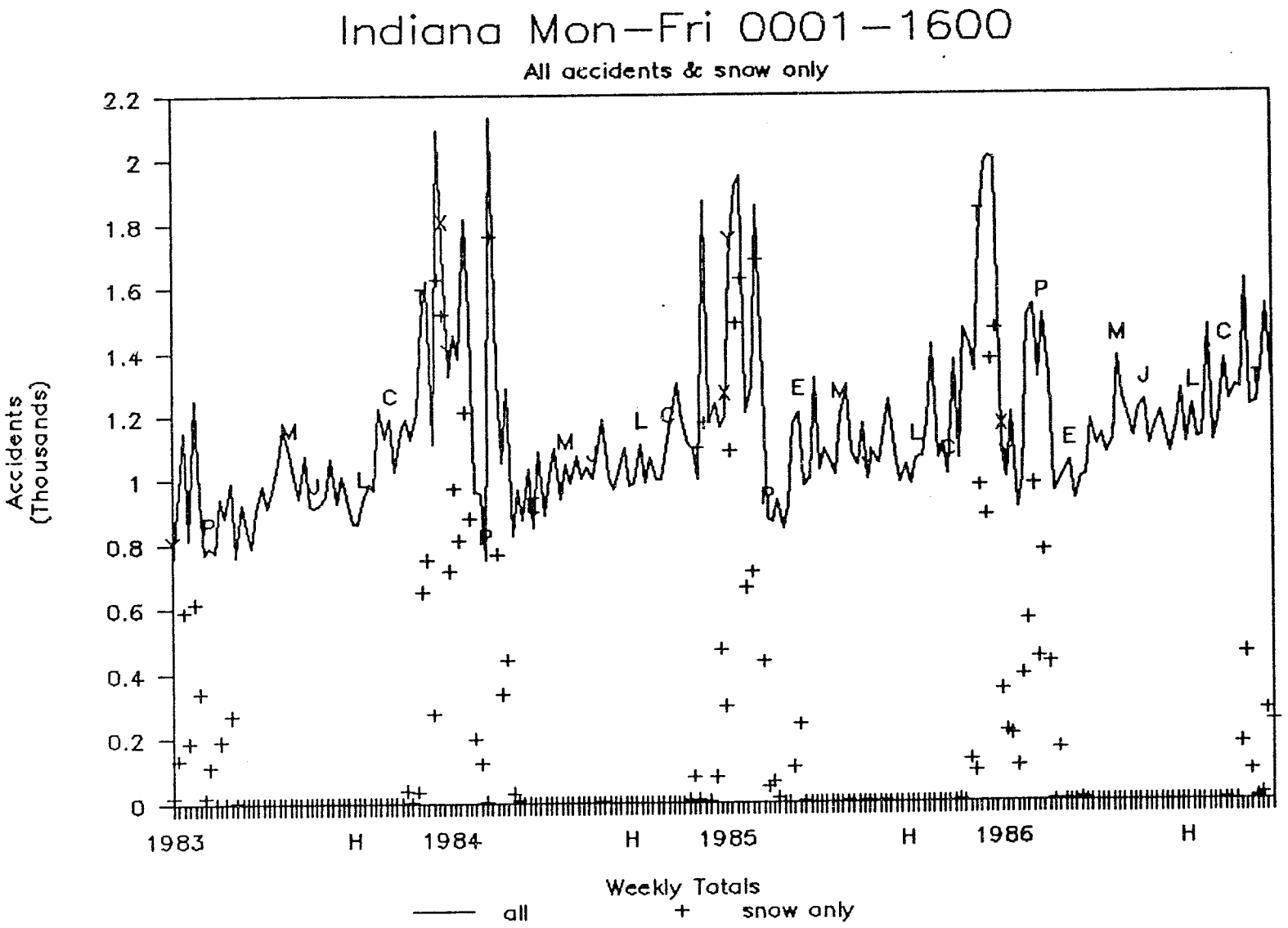

Indiana Mon–Fri 0001–1600
All accidents & snow only
Accidents (Thousands)
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.6

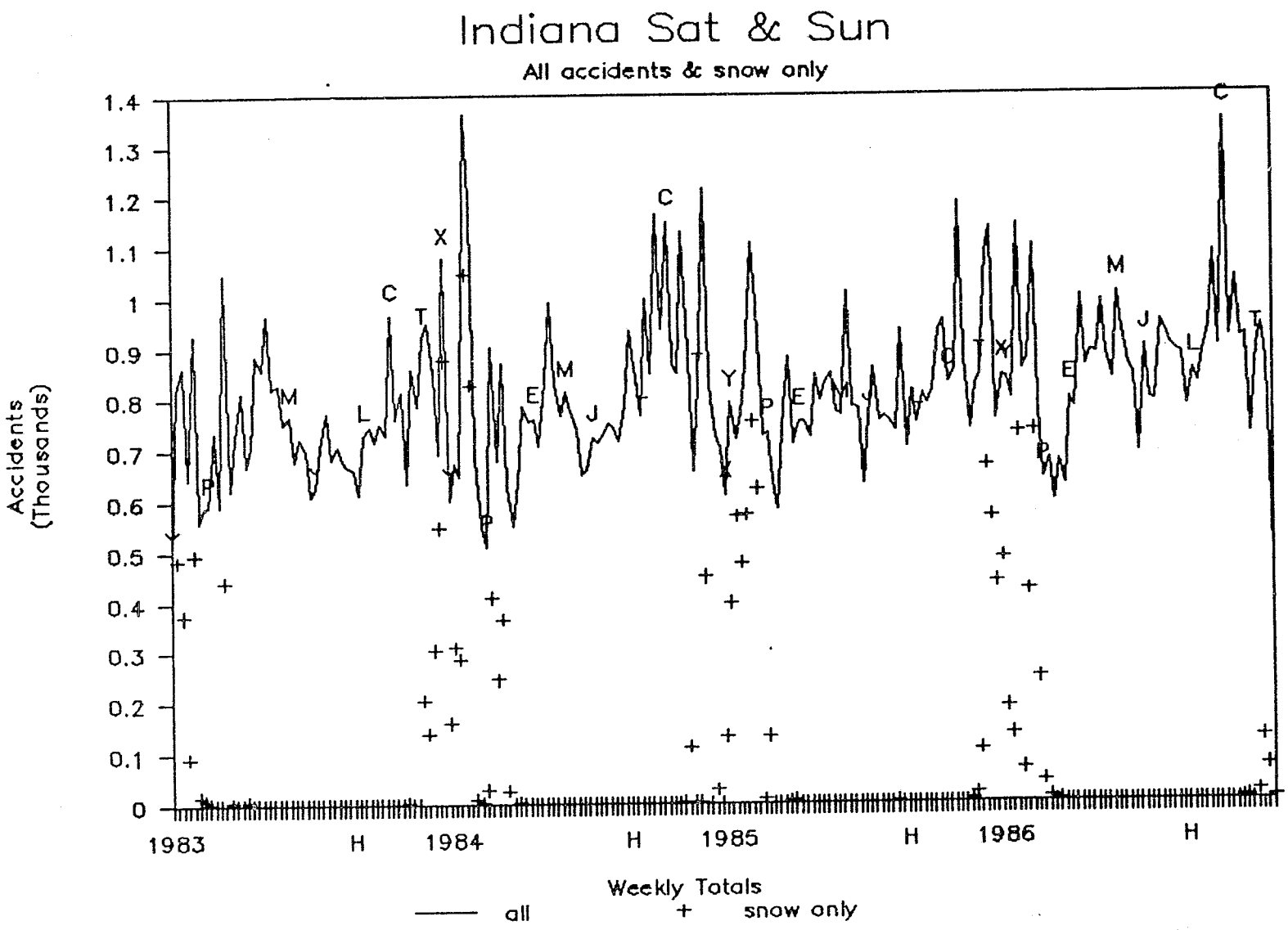

Indiana Sat & Sun
All accidents & snow only
Accidents (Thousands)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.7

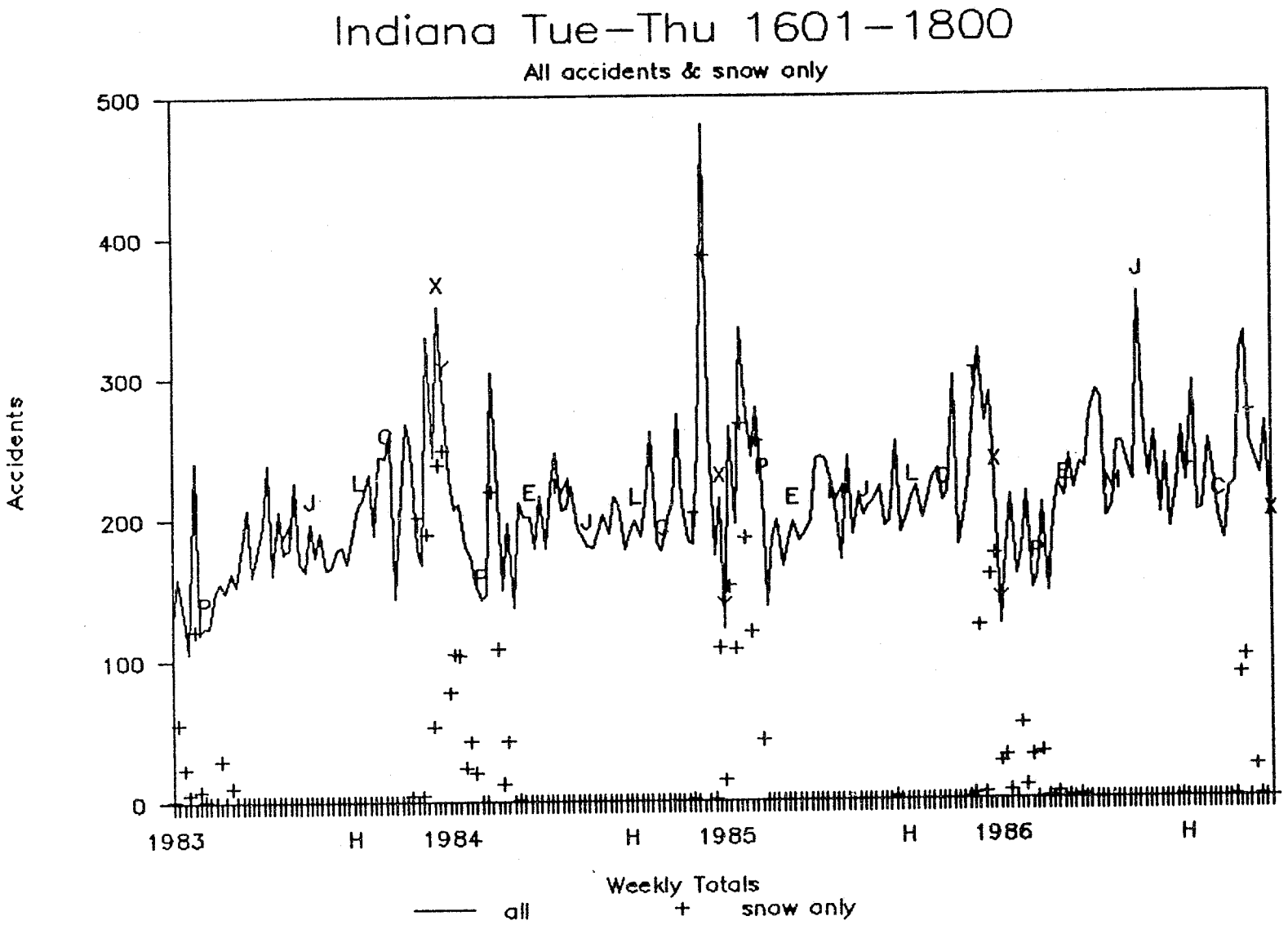

Indiana Tue–Thu 1601–1800
All accidents & snow only
Accidents
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.8

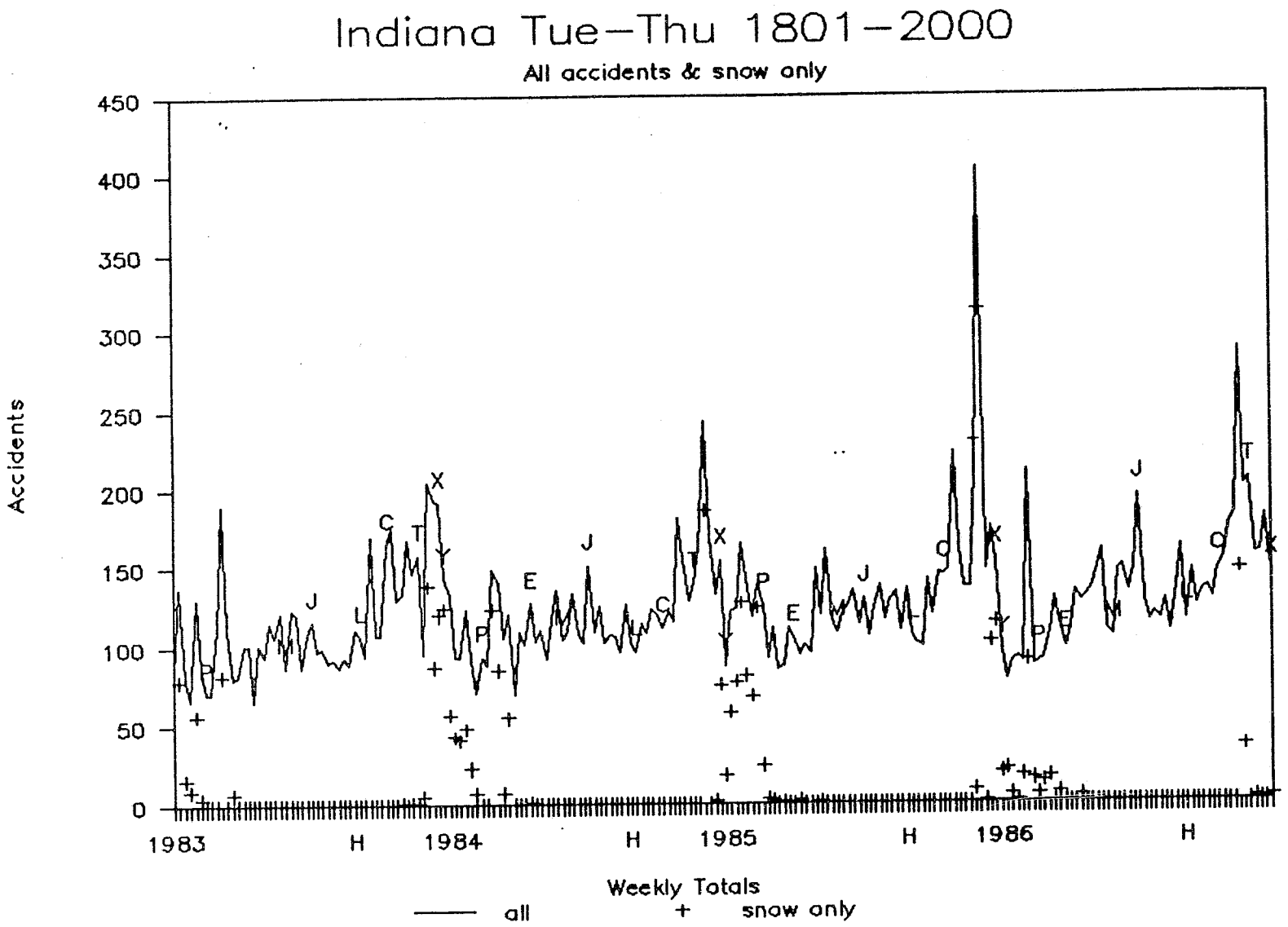

Indiana Tue–Thu 1801–2000
All accidents & snow only
Accidents
450
400
350
300
250
200
150
100
50
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.9

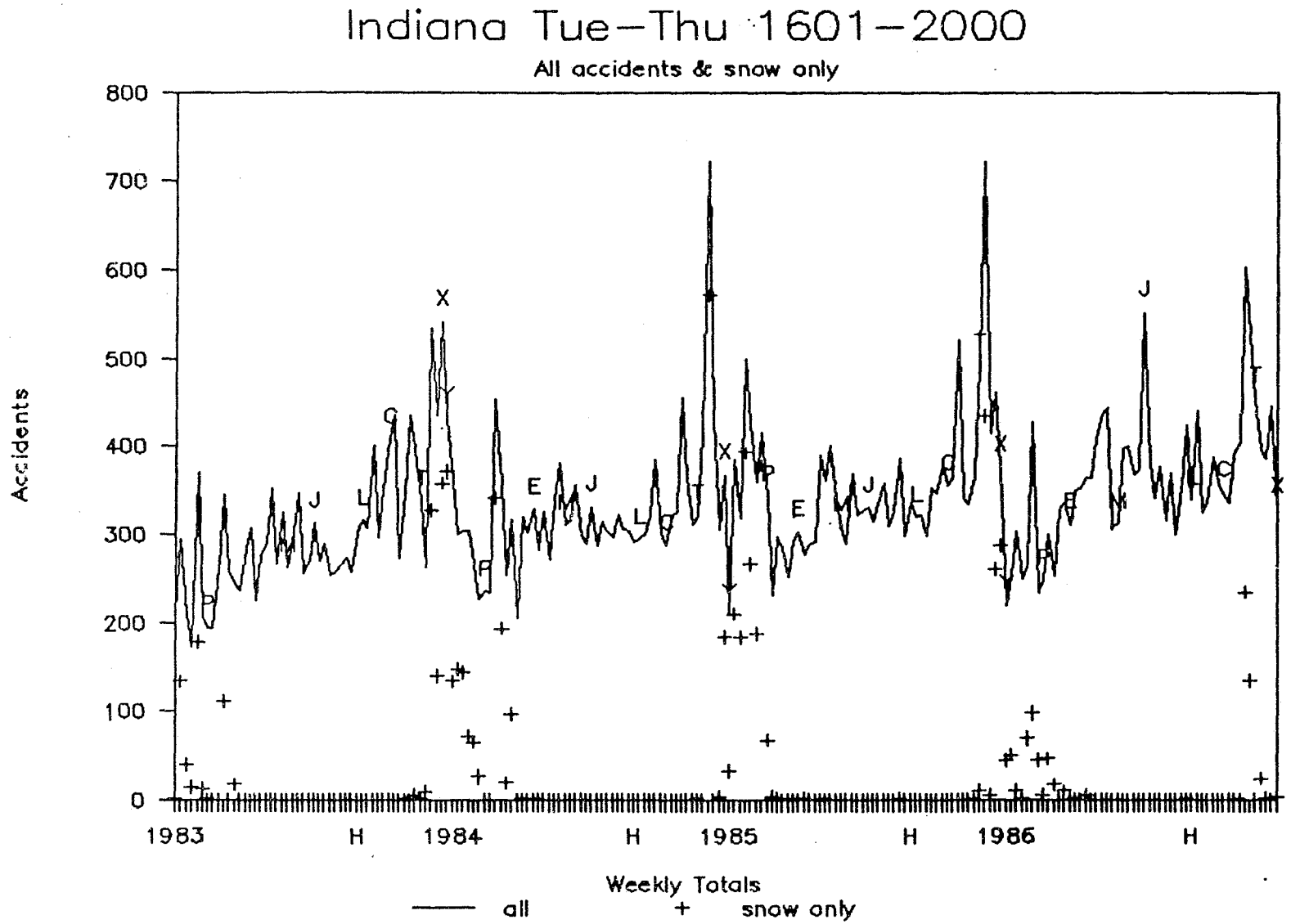

Indiana Tue–Thu 1601–2000
All accidents & snow only
Accidents
800
700
600
500
400
300
200
100
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.10

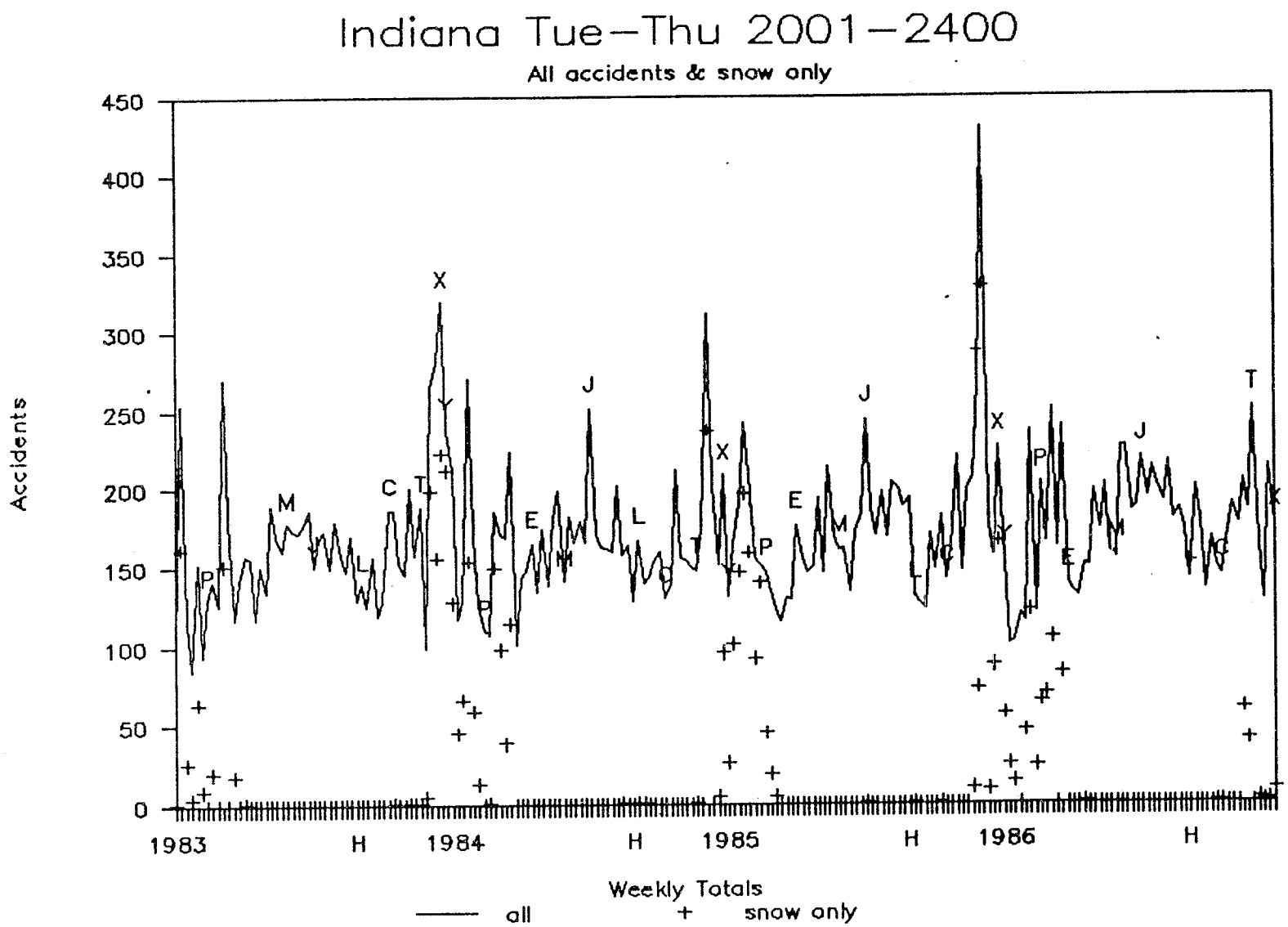

Indiana Tue–Thu 2001–2400
All accidents & snow only
Accidents
450
400
350
300
250
200
150
100
50
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.11

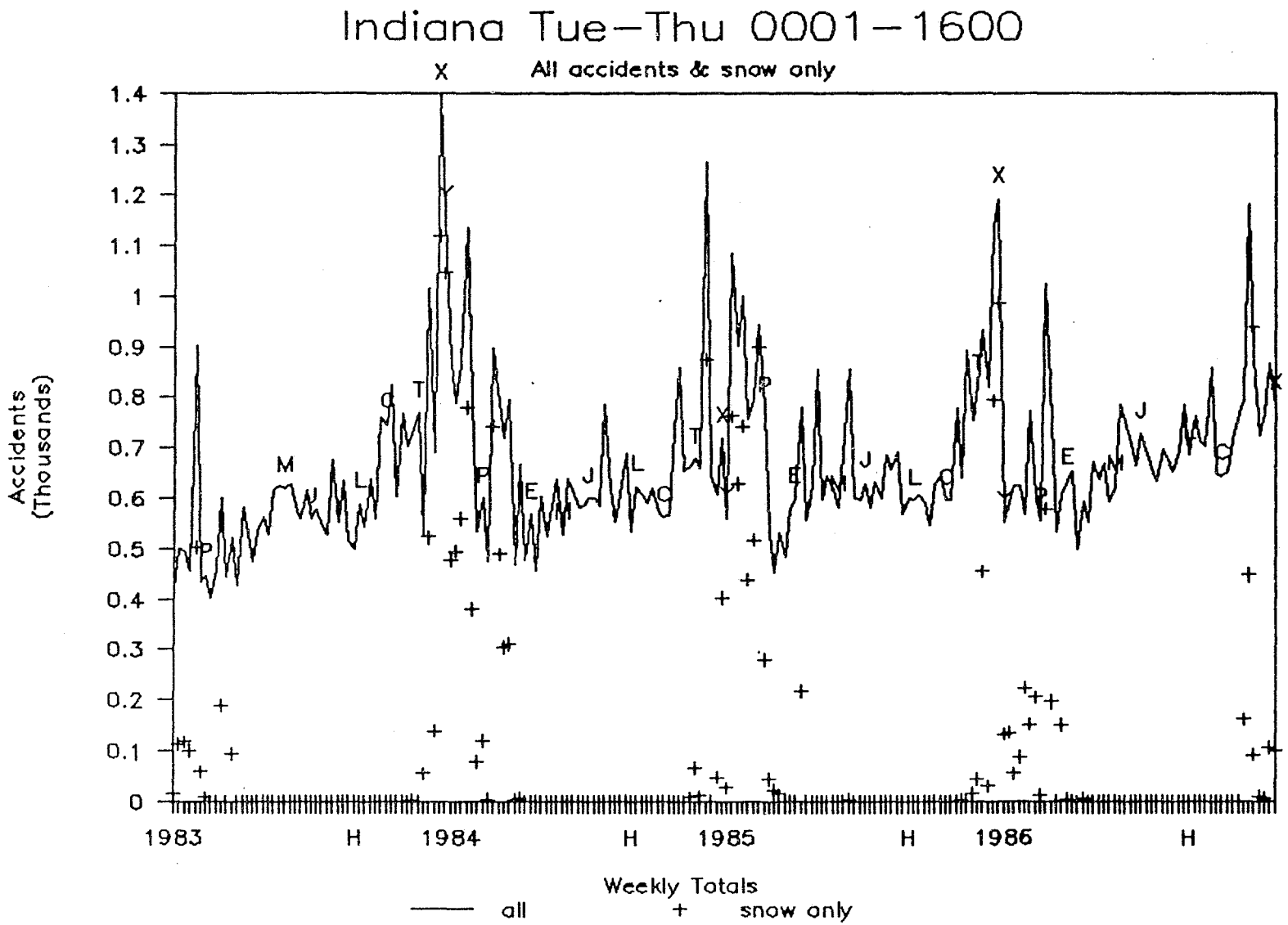

Indiana Tue–Thu 0001–1600
All accidents & snow only
Accidents (Thousands)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1983
H
1984
H
1985
H
1986
H
Weekly Totals
all
snow only

Figure 3.12

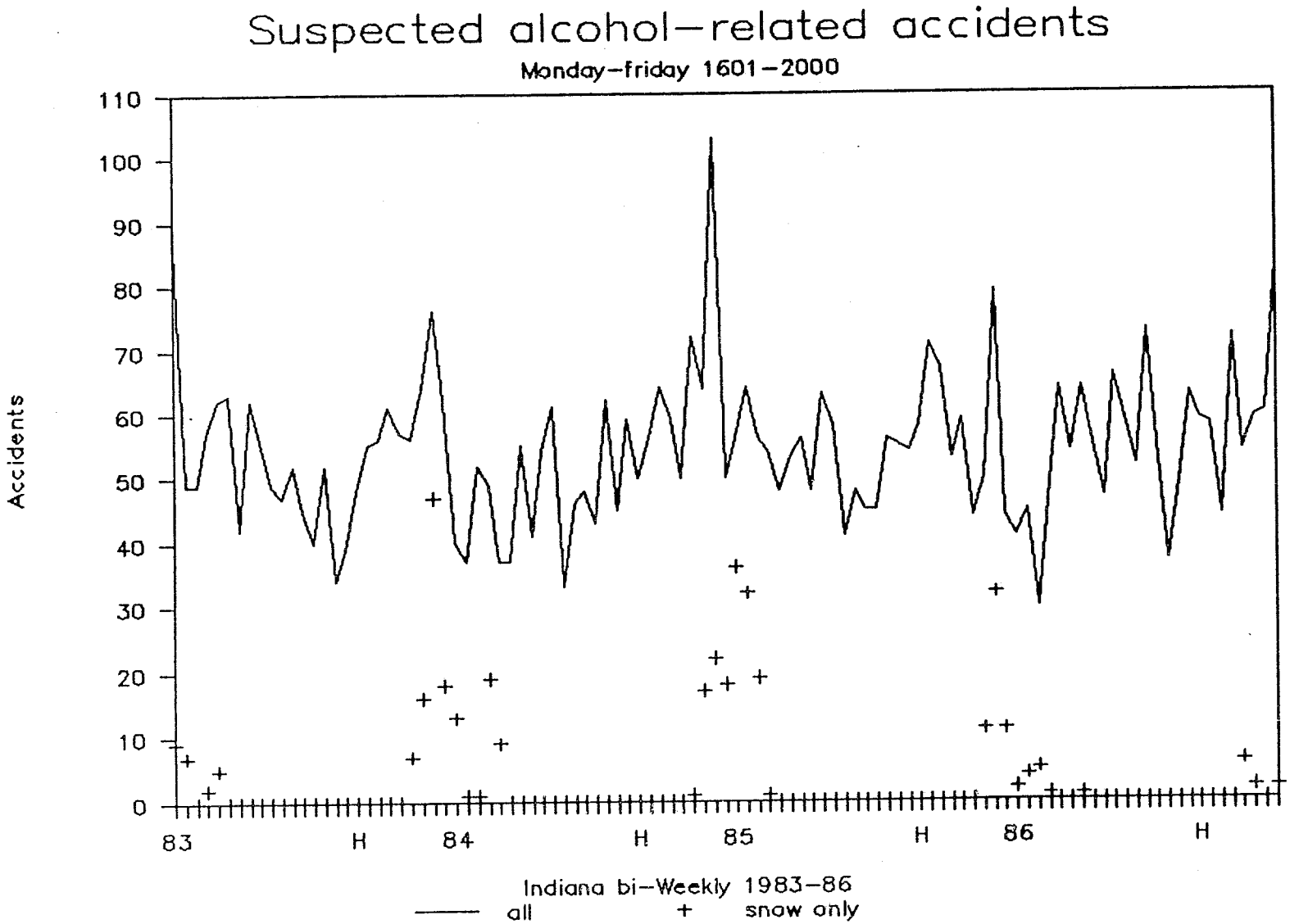

Suspected alcohol-related accidents
Monday-friday 1601-2000
Accidents
110
100
90
80
70
60
50
40
30
20
10
0
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
all
snow only

Figure 3.13

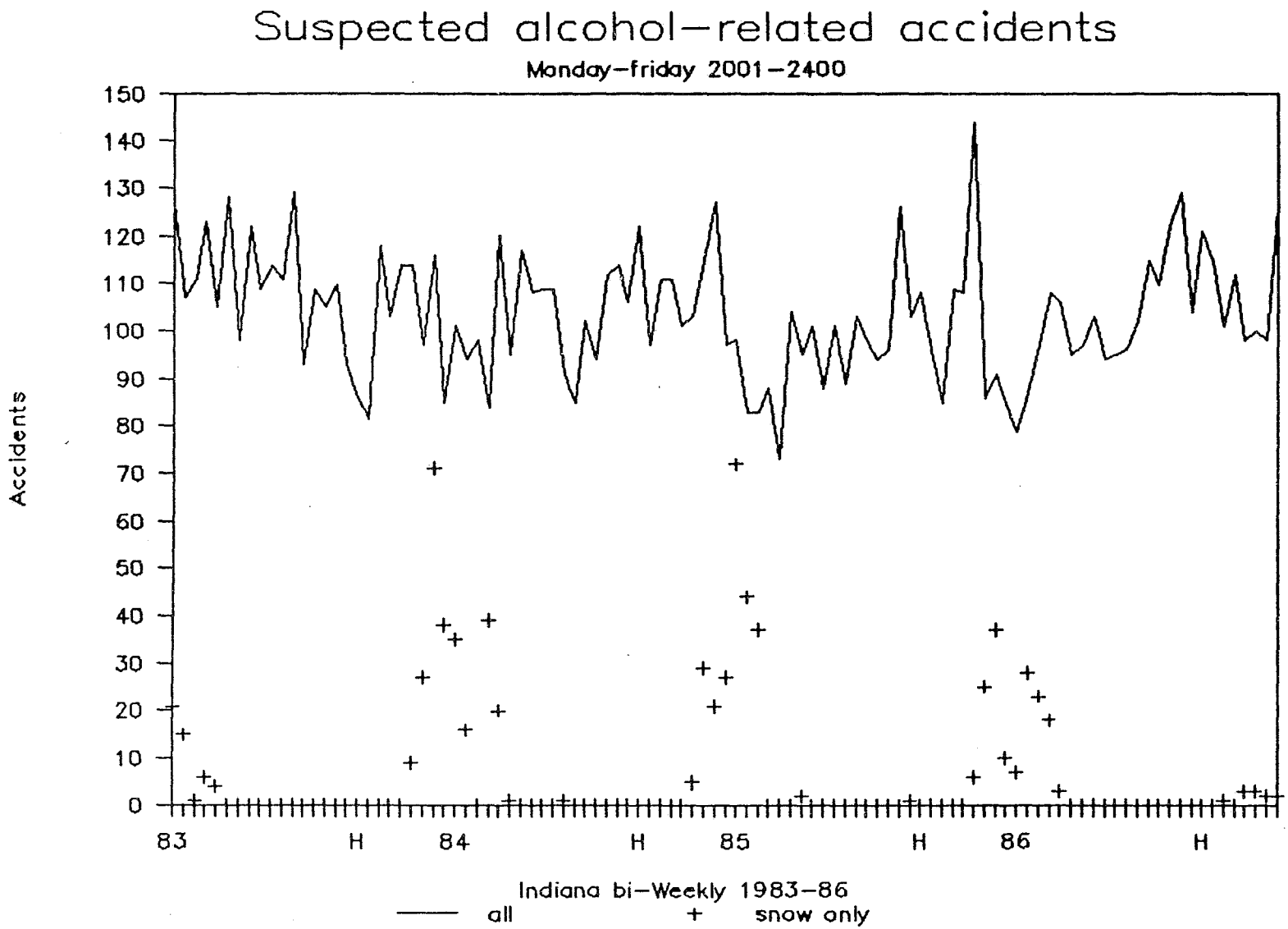

Suspected alcohol-related accidents
Monday-friday 2001-2400
Accidents
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
all
snow only

Figure 3.14


Suspected alcohol-related accidents
Monday-friday 0001-1600
Accidents
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
all
snow

Figure 3.15


Suspected alcohol-related accidents
Saturday and Sunday
Accidents
350
300
250
200
150
100
50
0
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
all
snow only

Figure 5.1


Suspected alcohol-related accidents
Monday-friday 1601-2000
Accidents
110
100
90
80
70
60
50
40
30
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
+ Annual mean

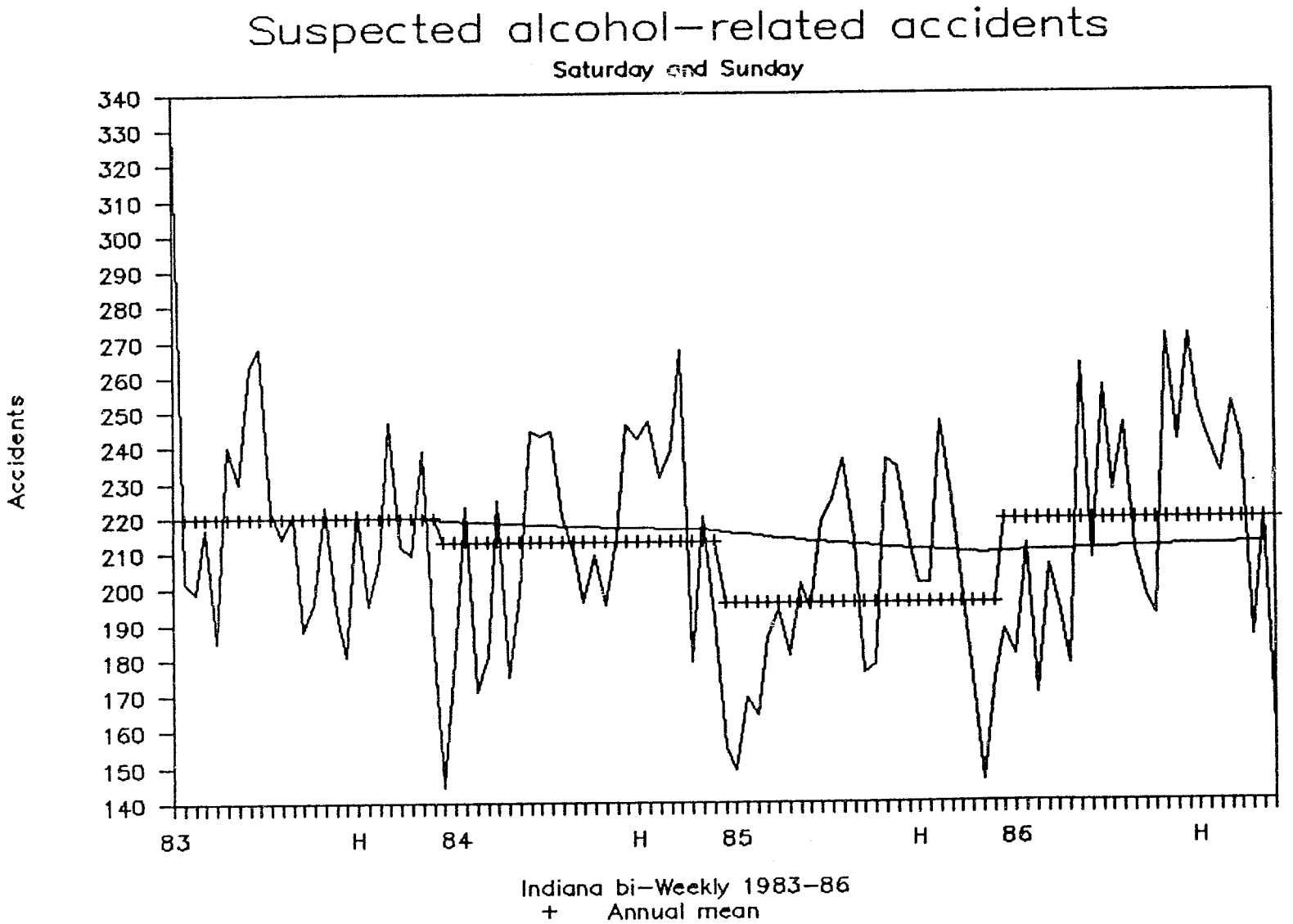
Figure 5.2


Suspected alcohol-related accidents
Monday-friday 2001-2400
Accidents
150
140
130
120
110
100
90
80
70
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
+ Annual mean

Figure 5.3


Suspected alcohol-related accidents
Monday-friday 0001-1600
Accidents
160
150
140
130
120
110
100
90
80
70
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
+ Annual mean

Figure 5.4


Suspected alcohol-related accidents
Saturday and Sunday
Accidents
340
330
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
83
H
84
H
85
H
86
H
Indiana bi-Weekly 1983-86
+ Annual mean

TABLES

Table 3.1

Indiana 1983-86 Accident Record Totals

Number of records by type

	1983	1984	1985	1986[1]
Environment	147974	161631	170794	173408
Vehicle	262621	287248	304702	395448
Driver	241778	265559	281813	367167
Pedestrian	1848	2215	2260	2294
Injury	22165	22807	23425	27243
Trailer	6766	8291	8187	8726

1. The 1986 files initially included accidents that were not investigated by law enforcement officers. Since these uninvestigated accidents were not included in files for the earlier years, they were deleted from the 1986 environment record. The environment record is the "parent" of all other records in the hierarchical design of Indiana accident records. This means that subsequent matching of vehicle and driver record information automatically excluded uninvestigated accidents.

Table 4.1

Happy Hour Treatment Series
Monday through Friday

	4:00-8:00 PM	4:00-6:00 PM	6:00-8:00 PM
	(011)(001)	(011)(001)	(011)(001)
θ_1	0.55	0.69	0.59
t ratio	14.74	16.54	10.38
θ_{ss}	-0.27	-0.25	-0.15
t ratio	-6.14	-5.92	-2.74
Snow	0.56	0.59	0.61
t ratio	14.57	15.87	13.41
Holiday	-19.50	-19.56	-0.65
t ratio	-1.60	-2.52	-0.11
HH law	1.61	11.80	1.55
t ratio	0.04	0.43	0.06
LBQ	22.00	27.00	20.00
p	0.30	0.15	0.50

Table 4.2

Control Series
Monday through Friday

	8:00 PM-Midnight	Midnight-4:00 PM	Sat. & Sun.
	(011)	(011)(001)	(011)(001)
θ_1	0.58	0.76	0.62
t ratio	10.07	22.02	13.12
θ_{s2}	ns	-0.24	-0.28
t ratio	ns	-6.63	-6.56
Snow	0.65	0.66	0.58
t ratio	15.42	26.62	12.63
Holiday	7.25	-13.84	-78.50
t ratio	1.05	-0.71	-4.20
HH lav	-41.20	-32.15	-115.00
t ratio	-1.16	-0.60	-1.55
LBQ	20.00	16.00	22.00
p	0.50	0.70	0.30

Table 4.3

Tuesday through Thursday

	4:00-8:00 PM	4:00-6:00 PM	6:00-8:00 PM
	(011)(001)	(011)(001)	(011)(001)
θ_1	0.68	0.78	0.63
t ratio	16.30	19.74	11.64
θ_{ss}	-0.29	-0.76	-0.37
t ratio	-7.15	-28.75	-5.78
Snow	0.63	0.63	0.70
t ratio	15.17	18.35	15.72
Holiday	-6.67	-7.05	1.03
t ratio	-0.73	-1.12	0.23
HH lav	1.22	5.95	-0.40
t ratio	0.04	0.40	-0.02
LBQ	29.00	29.00	27.00
p	0.10	0.10	0.20

	8:00 PM-Midnight	Midnight-4:00 PM
	(011)(001)	(011)(001)
θ_1	0.67	0.70
t ratio	12.67	14.27
θ_{ss}	-0.21	-0.26
t ratio	-3.05	-4.00
Snow	0.72	0.65
t ratio	16.26	22.10
Holiday	6.25	-2.40
t ratio	1.18	-0.16
HH lav	-24.97	-29.90
t ratio	-1.16	-1.54
LBQ	22.00	28.00
p	0.40	0.10

Table 4.4

Suspected Alcohol-Related Accidents

Monday through Friday

	4:00-8:00 PM	8:00 PM to Midnight
	(011)	(110)
θ_1	0.89	-0.58
t ratio	18.91	-6.73
Snow	0.52	-0.06
t ratio	3.82	-0.58
New year	-7.80	-7.03
t ratio	-1.24	-1.08
HH law	3.48	-7.83
t ratio	0.71	-0.66
LBQ	20.00	28.00
p	0.50	0.10

	Midnight to 3:00 PM	Saturday and Sunday
	(110)	(110)
θ_1	-0.53	-0.42
t ratio	-6.38	-5.26
Snow	0.27	0.08
t ratio	3.05	0.53
New year	6.05	-26.90
t ratio	0.83	-1.91
HH law	-13.84	-25.38
t ratio	-1.02	-0.93
LBQ	24.00	26.00
p	0.30	0.20

APPENDIX

Indiana Motor Vehicle Accidents

Record Layout

1985 Accident Statistical Master

ACCIDENT INFORMATION SYSTEM
ACCIDENT MASTER FILE DESCRIPTION

The Accident Master file is resident on magnetic tape. The record size is 130 characters, the blocking factor is 63, making the blocksize 8190 characters.

Each master file contains year-to-date activity for up to one complete year. There will be multiple records for an accident, and records have been formatted according to type of information. That is, the following record types, (or hierarchy levels) will be contained on the master file:

1. Environment
2. Vehicle
3. Driver
4. Pedestrian
5. Injured
6. Trailer
7. Arrest

Each record will contain a 14-byte unique key consisting of accident number, record type, and sequence number. For any one accident, the accident number on all the records will be the same and no two accidents will ever have the same accident number.

Each accident will have one and only one Environment Record (Type '1') describing the circumstances, location, and surrounding conditions of the accident. There will be from 1-50 Vehicle Records (Type '2'), one for every motor vehicle involved. There will be from 0-50 Driver Records (Type '3'), one for each driver involved. There will be from 0-50 Pedestrian Records (Type '4'), one for each pedestrian who was injured in the accident. There will be from 0-99 Injured Records (Type '5'), one for each person, other than a driver or pedestrian, who was injured as a result of the accident. There will be from 0-9 Trailer Records (Type '6'), one for each trailer involved. There will be from 0-19 Arrest Records (Type '7') one for each driver or pedestrian involved in the accident who was arrested.

The following pages describe the fields on each record type and their possible values.

ACCIDENT INFORMATION SYSTEM
ACCIDENT MASTER RECORD DESCRIPTIONS

1. ENVIRONMENT RECORD - Describes circumstances, location, and surrounding conditions of the accident. Each accident begins with one and only one Environment Record.

Positions	Description
1-2 ACC YR 3-4 ACC MTH 5-6 ACC DAY (1-6)	DATE OF ACCIDENT The date on which the accident occurred in YYMMDD format.
COUNTY (7-8)	COUNTY OF ACCIDENT The one of 92 counties of the state in which the accident occurred. County numbers range from 01-92.
ACCNUM (9-11)	SEQUENCE OF ACCIDENT NUMBER A number assigned to make each accident number unique. Must be within range 001-999.
RECTYPE 12	RECORD TYPE A portion of the key to the Master file designating the type of information contained in that record on file. 1 = Environment Record 2 = Vehicle Record 3 = Driver Record 4 = Pedestrian Record 5 = Injured Record 6 = Trailer Record 7 = Arrest Record
13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Record Type. Will always be an '01' for Environment Records.
15-16	Not used at this time. Will be blanks.
15-DOW 17	DAY OF WEEK The specific day of the week the accident occurred on. 1 = Sunday 2 = Monday 3 = Tuesday 4 = Wednesday 5 = Thursday 6 = Friday 7 = Saturday

Positions	Description
18-21 16-19 ACCTIME	TIME OF ACCIDENT The time of day in military format at which the accident occurred. 0001-0059 = 1201 AM - 1259 AM 0100-1159 = 0100 AM - 1159 AM 1200-1259 = 1200 PM - 1259 PM 1300-2359 = 0100 PM - 1159 PM 2400 = 1200 AM
22-23 20-21 NUMVEH	NUMBER OF VEHICLES The total count of motor vehicles involved in the accident. Must be from 01-50. (1-11, 27)
24-25 NUMINJ 22-23	NUMBER OF INJURIES The total count of the number of persons incurring non-fatal injuries as a result of the accident. This will include all drivers, pedestrians, vehicle occupants, and others. Must be from 00-99. (0-13, 15, 24, 31, 43)
26-27 24-25 NUMDEAD	NUMBER OF DEAD The total count of persons incurring fatal injuries as a result of the accident. This will include all drivers, pedestrians, vehicle occupants, and others. Must be from 00-99. (0-4, 6)
28 26 SEVERITY	SEVERITY Indicates the most serious injury incurred in the accident. 1 = Fatal 2 = Personal Injury 3 = Property Damage
29-30 27-28 NUMPED	NUMBER OF PEDESTRIANS The total count of pedestrians incurring either fatal or non-fatal injuries as a result of the accident. Must be from 00-50. (0-3, 7, 13)
31 29 NUMTRAIL	NUMBER OF TRAILERS The total count of trailers involved in the accident. Must be from 0-9. (0-5)
32-33	DISTRICT NUMBER The number assigned to the Indiana State Police District in which the accident occurred.
34-35	TOWNSHIP The number assigned to the township of the accident site if the accident was a rural accident. If the accident was an urban accident, this field will be blank. 01-21 = Number of Township blank = Not applicable (urban)

	Positions	Description
CITY	36-39	CITY OF ACCIDENT The number assigned to the city of the accident site if the accident was an urban accident. If the accident was a rural accident, this field will be blank. 1036-9684 = city code blank = not applicable (rural)
POP 30 POP	40	POPULATION The population size, according to ranges, of the city in which any urban accident occurred. 1 = Under 1,000 2 = 1,000-2,499 3 = 2,500-4,999 4 = 5,000-9,999 5 = 10,000-24,999 6 = 25,000-49,999 7 = 50,000-99,999 8 = 100,000-249,999 9 = 250,000 and Over blank= Not Applicable (rural)
URBIND 31 URBIND	41	URBAN INDICATOR Indicates whether the location of the accident occurred inside (urban) or outside (rural) of a legal corporation. Y = Yes (Inside Corporate Limits - Urban) N = No (Outside Corporate Limits - Rural)
PROPTYP 32 PROPTYPE	42	TYPE OF PROPERTY Indicates the type of land the accident occurred on. P = private D = DNR (state) O = All other
	43	Not used at this time. Will be blanks.
FUNCLE	44-49	ROAD NUMBER CODE The unique number associated with the road on which the accident occurred. Will be from 000000-999998.
REFID	50-55	REFERENCE ROAD NUMBER CODE The unique number associated with the intersecting road, milepost, or interchange closest to the scene of the accident. Will be from 000000-999998.

	Positions	Description
RDCLAS	56-57	ROAD CLASS The category of road the accident occurred on. 1IS = Interstate 2US = U.S. Route 3SR = State Road 4ET = Eastbound Toll Road 5WT = Westbound Toll Road 6CR = County Road 7CS = City Street
HYWNUM	58-60	HIGHWAY NUMBER The number of the highway on which the accident occurred for Interstates, U.S. Routes, State Roads and the Toll Road. County roads and city streets will be left blank. 001-999 = Actual number of highway blank = Not applicable (city street or county road)
	61-63	MILEPOST NUMBER The number of the post indicating the distance in miles from or to a given point for any accident occurring on the Toll Road. For all other roads this field will be blank. 000-157 = milepost of toll road blank = not applicable
DIR FROM REF	64	DIRECTION FROM REFERENCE The compass direction the scene of the accident was from the reference road. 0 = North 1 = East 2 = Northeast 3 = Southeast 4 = South 5 = West 6 = Southwest 7 = Northwest blank = Unknown or No Direction
DIST FROM REF	65-69 *	DISTANCE FROM REFERENCE The actual distance in feet the scene of the accident was from the reference road. 00000-50000 = Distance in feet U = Unknown
REF MOD	70	REFERENCE MODIFIER Identifies multiple intersections occuring between the same two or more roads. 0-9 = modifier code blank = not applicable

	Positions	Description
REFCNTY	71-72	COUNTY OF REFERENCE The one of 92 counties of the state which contains the reference intersection. May be blank if same as COUNTY OF ACCIDENT.
REFCITY	73-76	CITY OF REFERENCE The number assigned to the city which contains the reference intersection. May be blank if same as CITY OF ACCIDENT. 1036-9684 = city code blank = same as CITY OF ACCIDENT
FLOW	77	TRAFFIC FLOW DIRECTION The directional lane of a divided highway on which the accident occurred. N = north S = south E = east W = west blank = not applicable
INTSREF	78-83	ROAD NUMBER INTERSECTING REFERENCE The number of the road which connects the road of accident to the reference intersection if the road of accident does not intersect with the road specified for the reference road. 000000-999998 = road code blank = not applicable
STDAM	84	STATE DAMAGE Indicates whether any damage to State property was incurred in the accident. Y = Yes (State property damage occurred) N = No (State property not damaged)
DAMESTA 36 DAMAGE	85	DAMAGE ESTIMATE FOR NON-VEHICULAR PROPERTY The estimate of damage in dollars, categorized into ranges, for all property other than the motor vehicles involved in the accident. 1 = Under $200 2 = $200-$1000 3 = $1001-$2500 4 = $2501-$5000 5 = $5001-$10,000 6 = $10,001-$25,000 7 = $25,001-$50,000 8 = $50,001-$100,000 9 = over $100,000 blank = not applicable or unknown

	Positions	Description
NVLP 7	86-88	RESPONSE TIME
37-39	RESPTIME	The elapsed time in minutes from the time the investigating agency was notified of a need for investigation to the time the investigating officer arrived at the scene of the accident.
		000-999 = elapsed time in minutes
		blank = not applicable or unknown
		(0 - 981)
INVAGN	89	INVESTIGATING AGENCY
40	INVEST	Indicates if the accident was investigated and if so, the department that the investigating officer works for.
		0 = not investigated
		1 = State Police investigated
		2 = Sheriff investigated
		3 = City police investigated
PCONTRC	90-91	PRIMARY CONTRIBUTING CIRCUMSTANCE
41-42	CIRCUM	The one factor which was determined to be the most contributory major cause of the accident.

01 = Alcoholic Beverage
02 = Illegal Drugs
03 = Prescription Drugs
04 = Driver Apparently Asleep
05 = Driver Inattention
06 = Driver Illness
07 = Unsafe Speed*
08 = Failure to Yield Right of Way
09 = Disregarded Signal/ Regulatory Sign
10 = Left of Center
11 = Improper Passing
12 = Improper Turning
13 = Improper Lane Usage
14 = Following Too Closely
15 = Unsafe Backing
16 = Wrong Way on One Way
17 = Pedestrian(s) Actions*
18 = Passenger Distraction
19 = Violation Driver License Restrictions
20 = Engine Failure or Defective
21 = Accelerator Failure or Defective
22 = Brake Failure or Defective
U = Unknown
23 = Tire Failure or Defective
24 = Headlight Defective or Not On
25 = Other Lights Defective*
26 = Steering Failure
27 = Window/Windshield Defective
28 = Oversize/Overweight Load
29 = Insecure/Leaky Load
30 = Tow Hitch Failure
31 = Animal(s) Present on Roadway
32 = Glare
33 = Surface Material Loose
34 = Material on Surface (Include Weather)
35 = Holes/Ruts in Surface
36 = Shoulder Defective
37 = Road Under Construction*
38 = Obstruction Not Marked
39 = Lane Marking Obscured
40 = View Obstructed By A Vehicle
41 = View Obstructed By *
42 = Other *

	Positions	Description
	92-93	COLLISION DIAGRAM Code representing one of the pictorial diagrams or verbal representation indicating the directional analysis and angle of impact of the first event between vehicles involved in the accident. 01 = Rear End, neither turning 02 = Head On, neither turning 03 = Same Direction Sideswipe 04 = Opposite Direction Sideswipe 05 = Off Road Collision 06 = Right Angle 07 = Left and Right Turns 08 = Left Turn 09 = Left Turn 10 = Left Turn 11 = Left Turn 12 = Left Turn 13 = Left Turn 14 = Right Turn 15 = Right Turn 16 = Right Turn 17 = Right Turn 18 = Right Turn U = Unknown
TYPACC	94	TYPE OF ACCIDENT The category of accident as determined by the first harmful event of the accident 1 = hit and run 2 = collision 3 = overturned 4 = non-collision U = unknown
LOCF-E	95	LOCATION OF FIRST DAMAGE OR INJURY The locality where first damage occurred (i.e., physical damage to vehicle or property, or injury to occupant or pedestrian.) 1 = intersection 2 = driveway access 3 = interchange area 4 = off roadway 5 = shoulder 6 = median 7 = roadway U = unknown
LOCALE	96	LOCALITY The primary usage of the land in the vicinity of the accident location. 1 = school/playground 2 = residential 3 = commercial/industrial 4 = rural 5 = public park 6 = urban interstate U = unknown

Positions	Description
97	CONSTRUCTION Indicates whether road construction, maintenance, or utility work was going on at the time of the accident within the right-of-way space at the location of the accident. 1 = Yes (construction present) 2 = No (no construction present) U = Unknown
98	LIGHT CONDITION The amount of light present at the time of the accident. 1 = Daylight 2 = Dawn/Dusk 3 = Dark (Street Lights On) 4 = Dark (Street Lights Off) 5 = Dark (No Street Lights) U = Unknown
99	WEATHER The general atmospheric conditions at the time of the accident. 1 = Clear 2 = Cloudy 3 = Rain 4 = Snow 5 = Sleet/Hail/Freezing Rain 6 = Fog/Smoke/Smog U = Unknown
100	ROAD SURFACE TYPE The general composition of surface of primary road of accident. 1 = Concrete 2 = Blacktop 3 = Brick 4 = Dirt/gravel 5 = Other U = Unknown
101	ROAD CHARACTER The horizontal and vertical character of the primary road of accident. 1 = Straight/Level 2 = Straight/Grade 3 = Straight/Hillcrest 4 = Curve/Level 5 = Curve/Grade 6 = Curve/Hillcrest U = Unknown

Positions	Description
102	ROAD SURFACE CONDITION Indicates the weather conditions present on the surface of the primary road of accident. 1 = Dry 2 = Wet 3 = Muddy 4 = Slush 5 = Snow/Ice U = Unknown
103	MATERIAL ON ROAD SURFACE Indicates foreign matter, if any, present on the surface of the primary road of accident. 6 = Sand/Gravel 7 = Organic Material 8 = Chemical/Solvents 9 = Grain 0 = Trash/Debris blank = Not applicable
104-107	MICROFILM INDEX (#1) The roll number and frame number indicating where the accident report document images are resident on the microfilm. Stored in packed decimal format. 0000000 = no index present 0010001-9999999 = microfilm location
108-111	MICROFILM INDEX (#2) Same as MICROFILM INDEX #1.
112-115	MICROFILM INDEX (#3) Same as MICROFILM INDEX #1.
116-119	MICROFILM INDEX (#4) Same as MICROFILM INDEX #1.
120-123	MICROFILM INDEX (#5) Same as MICROFILM INDEX #1.
124	POLICE REPORT INDEX (#1) A number indicating which positional microfilm index represents where the investigator's police report is located on the microfilm. 1 = Microfilm Index #1 is a police report 2 = Microfilm Index #2 is a police report 3 = Microfilm Index #3 is a police report 4 = Microfilm Index #4 is a police report 5 = Microfilm Index #5 is a police report blank = no police report present

Positions	Description
125	POLICE REPORT INDEX (#2) Same as POLICE REPORT INDEX #1.
126-129	Not used at this time. Will be blanks.
130	STATUS Status of accident on file. Will be blank.

Vehicle Record

2. VEHICLE RECORD - Describes the vehicle, circumstances of the accident unique to each vehicle, and owner's name. Each accident will have from one to fifty Vehicle Records, one for each vehicle involved in the accident.

Positions	Description
1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '2' for Vehicle Records.
13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Vehicle Records. Also referred to as VEHICLE NUMBER. Will be from 01-50 for Vehicle Records.
15-16	Not used at this time. Will be blanks.
17-31	LAST NAME OF VEHICLE OWNER The last name of the owner of the vehicle involved. Will be alphabetic with no embedded blanks, or blank if unknown.
32-41	FIRST NAME OF VEHICLE OWNER The first name of the owner of the vehicle involved. Will be alphabetic with no embedded blanks, or blank if unknown.
42	MIDDLE INITIAL OF VEHICLE OWNER The middle initial of the owner of the vehicle involved. Will be alphabetic, or blank if none or unknown.
43-44	VEHICLE YEAR The last two digits of the model year as designated by the manufacturer for the vehicle involved. 00-99 = Actual year U = unknown
45-48	MAKE OF VEHICLE The abbreviated name of the manufacturer of the vehicle involved. Will only be edited for passenger cars. If edited, will be either alphabetic characters or blanks (if unknown)
49-51	MODEL OF VEHICLE The abbreviated name designation of the vehicle given by the manufacturer of the vehicle involved. Will only be edited for passenger cars. If edited, will be either alphabetic characters or blanks (if unknown).

Positions	Description
52-53	VEHICLE TYPE The category of description for the motor vehicle involved. 01 = Passenger car/station wagon 02 = Pickup 03 = Van 04 = Truck 05 = Semi Tractor (Only) 06 = Semi Tractor/Trailer 07 = Combination Vehicle 08 = Recreational Vehicle 09 = Bus 10 = School Bus U = Unknown 11 = Police Car 12 = Fire Truck 13 = Ambulance 14 = Motorcycle 15 = Moped 16 = Snowmobile 17 = Motorized Bicycle, Motor Scooter, Minibike 18 = Farm Equipment 19 = Special Vehicle 20 = Other
54-55	VEHICLE USE The classification of use or service the vehicle was fulfilling at the time of the accident. 01 = Personal (Farm, Company) 02 = Commercial (Buses, Taxis, Common and Contract Carriers) 03 = Rental, not leased 04 = School 05 = Police, Fire, Ambulance U = Unknown 06 = On emergency run 07 = Military 08 = Highway Department 09 = Other Government (Postal, Welfare, etc.) 10 = Public Utilities (Gas, Electric, etc.) 11 = Other
56-57	SPEED LIMIT The legal limit of speed for the road on which the vehicle was traveling at the time of the accident. 05-55 = speed limit U = unknown
58-65	FUEL TAX NUMBER The number assigned by the Department of Revenue to any vehicle having three or more axles or a fifth wheel. 00000000-99999999 = fuel tax number blank = unknown or not applicable

Positions	Description

66-67 DIRECTION OF TRAVEL

The actual compass direction the vehicle was travelling prior to the accident.

N = north	S = south
NE = northeast	SW = southwest
E = east	W = west
U = unknown	NW = northwest
blank = not applicable	

68-69 NUMBER OF OCCUPANTS

Indicates how many people occupied the vehicle involved.

00 - 99 = number of people
U = unknown

70 FIRE

Indicates whether the vehicle did or did not catch fire as a result of the accident.

Y = yes, fire involved
N = no, fire not involved
U = unknown

71 NUMBER OF AXLES

The count of axles on the vehicle involved.

2-9 = number of axles
U = unknown

72 FOUR-WHEEL DRIVE

Indicates whether the vehicle had drive power in both front and rear axles.

Y = yes, vehicle is a four-wheel drive
N = no, vehicle is not a four-wheel drive
U = unknown

73 TOWED

Indicates whether the vehicle was removed from the accident scene under its own power or was towed.

Y = yes, vehicle was towed
N = no, vehicle was not towed

74-75 INITIAL IMPACT

The section of the vehicle at which first contact was made with another vehicle or object.

01 = left front	07 = left rear
02 = center front	08 = left side
03 = right front	09 = center/roof/windows
04 = right side	10 = undercarriage
05 = right rear	11 = trailer
06 = center rear	12 = none

Accident Master File Description
Vehicle Record (Cont'd)

Positions	Description
76	DAMAGE ESTIMATE FOR VEHICLE The estimate of damage in dollars, categorized into ranges for the vehicle involved. 01 = Under $200 02 = $200-$1,000 03 = $1,001-$2,500 04 = $2,501-$5,000 05 = $5,001-$10,000 06 = $10,001-$25,000 07 = $25,001-$50,000 08 = $50,001-$100,000 09 = over $100,000 U = unknown
77-78	VEHICULAR CONTRIBUTING CIRCUMSTANCE (#1) One of the factors for the vehicle involved which was judged to have contributed to the cause and/or severity of the accident. 01-42 = same as PRIMARY CONTRIBUTING CIRCUMSTANCE of Environment Record U = unknown blank = not applicable
79-80	VEHICULAR CONTRIBUTING CIRCUMSTANCE (#2) Same as VEHICULAR CONTRIBUTING CIRCUMSTANCE #1.
81-82	PRE-ACCIDENT VEHICLE ACTION Indicates what the vehicle was doing immediately prior to accident involvement. 01 = Going Straight Ahead 02 = Turning on Red 03 = Making Right Turn 04 = Making Left Turn 05 = Making U Turn 06 = Exiting to Ramp 07 = Merging 08 = Changing Lanes 09 = Driving Left of Center 10 = Crossed Median 11 = Overtaking 12 = Passing 13 = Backing 14 = Starting in Traffic 15 = Slowing or Stopping 16 = Stopped in Traffic 17 = Start From Parked Pos. 18 = Entering Parked Pos. 19 = Parked 20 = Avoiding Obj. in Road 21 = Driverless Moving 22 = Other U = Unknown

	Positions	Description
COLL-INV1	83-84	COLLISION-INVOLVED (#1) The object which was collided with during the accident for the vehicle involved.

01 = Other Motor Vehicle
02 = Pedestrian
03 = Bicyclist
04 = RR Train
05 = Animal Drawn Vehicle
06 = Animal
08 = Light Support/ Utility Pole
09 = Guide Rail/Median Barrier
10 = Impact Attenuator
11 = Sign Post
12 = Tree
13 = Building/Wall
14 = Curbing
15 = Fence
16 = Bridge Support
17 = Culvert/Head Wall/ Drainage Structure
18 = Snow Embankment
19 = Earth Embankment/Rock Cut/Ditch
20 = Fire Hydrant
21 = Traffic Signal
22 = Mailbox
23 = Other Non-Fixed Object
24 = Other Fixed Object
71 = Deer - one involved
72 = Deer - two involved
73 = Deer - three involved
74 = Deer - four involved
75 = Deer - five involved
76 = Deer - six involved
77 = Deer - seven involved
78 = Deer - eight involved
79 = Deer - nine or more involved
U = Unknown
blank = not applicable

COLL-INV2	85-86	COLLISION-INVOLVED (#2) Same as COLLISION INVOLVED #1.
COLL-INV3	87-88	COLLISION-INVOLVED (#3) Same as COLLISION INVOLVED #1.
TRAF-CNTL	89-90	TRAFFIC CONTROL (#1) The most prominent automated or manual device to regulate traffic for the vehicle involved.

01 = Officer/Crossing Guard/Flagman
02 = RR Crossing Gate/Flagman
03 = RR Crossing Flashing Signal
04 = RR Crossing Sign/Pavement Markings
05 = Traffic Control Signal
06 = Flashing Signal
07 = Stop Sign
08 = Yield Sign
09 = Lane Control
10 = No Passing Zone
11 = Other Regulatory Sign/Markings
12 = None
U = Unknown

TRAF CONT2

91-92 TRAFFIC CONTROL (#2)
Same as TRAFFIC CONTROL #1.

TR. OPR

93 TRAFFIC CONTROL OPERATIONAL
Indicates whether the automated traffic control equipment at the accident scene was working for the vehicle at the time of accident.

1 = yes, automated control working
2 = no, automated control not working
3 = none present
U = unknown

94-130 Not used at this time. Will be blanks.

3. DRIVER RECORD - Describes the driver, name, license, injury, and alcohol/drug test information for each driver. Each accident will have from zero to fifty Driver Records, one for each driver involved in the accident.

Positions	Description
1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '3' for Driver Records.
13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master File which specifies a unique record within multiples of Driver Records. Also referred to as VEHICLE NUMBER. Will be from 01-50 for Driver Records.
15-16	Not used at this time. Will be blanks.
17-31	LAST NAME OF DRIVER The last name of the driver involved. Will be: 1) alphabetic with no embedded blanks, 2) the literal 'HIT AND RUN' if driver was a hit and run, or 3) blank if unknown.
32-41	FIRST NAME OF DRIVER The first name of the driver involved. Will be alphabetic with no embedded blanks or blank if unknown.
42	MIDDLE INITIAL OF DRIVER The middle initial of the driver involved. Will be alphabetic with no embedded blanks or blank if none or unknown.
43-44	NATURE OF INJURY The classification of driver's injury by categories.

01 = Severed	07 = Severe Bleeding (Arterial)
02 = Internal	08 = Fracture/Dislocation
03 = Minor Burn	09 = Contusion/Bruise
04 = Severe Burn	10 = Complaint of Pain
05 = Abrasion	11 = None Visible
06 = Minor Bleeding	

U = injured, but injury unknown
blank = not injured

Positions	Description
LOCINJD 45-46	LOCATION OF INJURY The part of the driver's body which sustained the most severe, apparent personal injury. 01 = Chest 02 = Neck 03 = Eye 04 = Face 05 = Head 06 = Back 07 = Shoulder/Upper Arm 08 = Elbow/Lower Arm/Hand 09 = Abdomen/Pelvis 10 = Hip/Upper Leg 11 = Knee/Lower Leg/Foot 12 = Entire Body U = injured, but location unknown blank = not injured
INJSTD 47	INJURY STATUS The physical state of awareness of each injured driver. 1 = Conscious 2 = Semi-conscious 3 = Incoherent 4 = Unconscious 5 = Shock 6 = Dead U = injured, but status unknown blank = not injured
48-51	EMERGENCY MEDICAL SERVICES NUMBER The numeric identity of the EMS vehicle which transported the injured driver from the accident scene. 0000-9999 = EMS number U = unknown blank = driver not injured, or not transported by EMS vehicle
52-53	AGE OF DRIVER The computed age of the driver involved. 03-98 = actual age 99 = 99 year of age or older U = unknown
54	SEX OF DRIVER The sex of the driver involved. M = male F = female U = unknown
55	TEST GIVEN (#1) Identifies the chemical agent (drug or alcohol) tested for in the driver. 1 = none 2 = alcohol 3 = drug 4 = refused

	Positions	Description
	56	TEST TYPE (#1) Identifies the medium of test given for drugs or alcohol for the test given. 1 = blood 2 = urine 3 = breath 4 = other blank = not applicable
	57-59	TEST RESULTS (#1) The concentration of tested substance found present in the alcohol or drug test given. 000-999 = actual content (decimal point is implied in front of value) C = contaminated sample U = unknown blank = not applicable
	60	TEST GIVEN (#2) Same as TEST GIVEN #1.
	61	TEST TYPE (#2) Same as TEST TYPE #1.
	62-64	TEST RESULTS (#2) Same as TEST RESULTS #1.
	65	SAFETY EQUIPMENT (#1) The type of safety equipment used by the driver. 1 = no restraint 2 = lap belt 3 = harness 4 = child restraint 5 = helmet 6 = air bag 7 = other U = unknown blank = not applicable
	66	SAFETY EQUIPMENT (#2) The type of safety equipment used by the driver. 2 = lap belt 3 = harness 4 = child restraint 5 = helmet 6 = air bag 7 = other blank = not applicable

Positions	Description
67	SAFETY EQUIPMENT (#3) Same as SAFETY EQUIPMENT #2.
68	EJECTION/TRAPPED Identifies whether the driver remained in, was trapped in or under, or was thrown from the vehicle of occupancy. 1 = not ejected 2 = partially ejected 3 = ejected 4 = trapped in 5 = pinned under U = unknown
69	POSITION IN VEHICLE Locates where the driver was located in the vehicle. Will always be a '1' for drivers.
70	PHYSICAL STATUS OF DRIVER The apparent general physical status of the driver immediately prior to their involvement in the accident. 1 = normal 2 = had been drinking 3 = physical handicaps 4 = ill 5 = fatigued 6 = asleep 7 = medication/drugs U = unknown
71	ARRESTED Indicates whether the driver involved was arrested. Y = yes, arrest was made N = no, arrest was not made U = unknown
72-77	DATE OF BIRTH OF DRIVER The month, day, and year the driver involved was born on. Will be in MMDDYY format or 'U', if unknown.
78-87	DRIVER LICENSE NUMBER The letter and number as indicated on the driver's license of the driver involved, if that license is an Indiana license. The first position will be A-Z or blank and positions 2-10 will be 000000000-999999999. The entire field will be blank for an out-of-state license, no license, or unknown.

Accident Master File Description
Driver Record (Cont'd)

Positions	Description
88-89	DRIVER LICENSE STATE The state the driver's license was issued from from the driver involved.

AL = Alabama
AK = Alaska
AZ = Arizona
AR = Arkansas
CA = California
CO = Colorado
CT = Connecticut
DE = Delaware
DC = District of Columbia
FL = Florida
GA = Georgia
HI = Hawaii
ID = Idaho
IL = Illinois
IN = Indiana
IA = Iowa
KS = Kansas
KY = Kentucky
LA = Lousiana
ME = Maine
MD = Maryland
MA = Massachusetts
MI = Michigan
MN = Minnesota
MS = Mississippi
MO = Missouri
MT = Montana
NB = Nebraska
NV = Nevada
NH = New Hampshire
NJ = New Jersey
NM = New Mexico
NY = New York
NC = North Carolina
ND = North Dakota
OH = Ohio
OK = Oklahoma
OR = Oregon
PA = Pennsylvania
RI = Rhode Island
SC = South Carolina
SD = South Dakota
TN = Tennessee
TX = Texas
UT = Utah
VT = Vermont
VA = Virginia
WA = Washington
WV = West Virginia
WI = Wisconsin
WY = Wyoming
FO = all foreign countries
blank = no license or unknown

90-91 DRIVER LICENSE TYPE
The kind of license the driver had.

DE = Indiana Driver Education Learner Permit
LP = Indiana Learner's Permit
OP = Indiana Operator's License
CH = Indiana Chauffer's License
PP = Indiana Public Passenger Chauffer's License
LM = Indiana Motorcycle Learner's Permit
OM = Indiana Operator's License with Motorcycle Endorsement
CM = Indiana Chauffeur's License with Motorcycle Edorsement
PM = Indiana Public Passenger Chauffeur's License with Motorcycle Endorsement
NL = No license
blank = out-of-state or unknown

Accident Master File Description
Driver Record (Cont'd)

Positions	Description
92	RESTRICTION (#1) The limitations or conditions of normal driving privileges other than total suspension from driving for the driver involved. A = Glasses or Contact Lenses B = Outside Rearview Mirror C = Daylight Driving Only D = Automatic Transmission G = Special Controls I = Employment Only K = Motorcycle Only M = To and From Employment Only blank = no restriction, out-of-state, no license, or unknown N = Employer's Vehicle Only U = Power Steering V = P.P. Chauffer's Rest. to Taxi Only X = Authorized State Owned Vehicles Only Y = Special Restrictions 1 - Probation DWI 2 - Probation HTO
93	RESTRICTION (#2) Same as RESTRICTION #1.
94-130	Not used at this time. Will be blanks.

4. PEDESTRIAN RECORD - Describes the pedestrian, name, injury, and alcohol/drug test information for each pedestrian. Each accident will have from zero to fifty Pedestrian Records, one for each injured pedestrian involved in the accident.

Positions	Description
1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '4' for Pedestrian Records.
13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Pedestrian Records. Will be from 01-50 for Pedestrian Records.
15-16	Not used at this time. Will be blanks.
17-31	LAST NAME OF PEDESTRIAN The last name of the pedestrian involved. Will be alphabetic with no embedded blanks, or blank if unknown.
32-41	FIRST NAME OF PEDESTRIAN The first name of the pedestrian involved. Will be alphabetic with no embedded blanks, or blank if unknown.
42	MIDDLE INITIAL OF PEDESTRIAN The middle initial of the pedestrian involved. Will be alphabetic, or blank if none or unknown.
43-44	NATURE OF INJURY The classification of pedestrian's injury by categories. 01 = Severed 02 = Internal 03 = Minor Burn 04 = Severe Burn 05 = Abrasion 06 = Minor Bleeding 07 = Severe Bleeding (Arterial) 08 = Fracture/Dislocation 09 = Contusion/Bruise 10 = Complaint of Pain 11 = None Visible U = Unknown
45-46	LOCATION OF INJURY The part of the pedestrian's body which sustained the most severe, apparent personal injury. 01 = Chest 02 = Neck 03 = Eye 04 = Face 05 = Head 06 = Back 07 = Shoulder/Upper Arm 08 = Elbow/Lower Arm/Hand 09 = Abdomen/Pelvis 10 = Hip/Upper Leg 11 = Knee/Lower Leg/Foot 12 = Entire Body U = Unknown

Accident Master File Description
Pedestrian Record (Cont'd)

Positions	Description
47	INJURY STATUS The physical state of awareness of each injured pedestrian. 1 = Conscious 2 = Semi-conscious 3 = Incoherent 4 = Unconscious 5 = Shock 6 = Dead U = Unknown
48-51	EMERGENCY MEDICAL SERVICES NUMBER The numeric identity of the EMS vehicle which transported the pedestrian from the accident scene. 0000-9999 = EMS number U = unknown blank = not transported by EMS vehicle
52-53	AGE OF PEDESTRIAN The declared age of the pedestrian involved. 01-98 = actual age 99 = 99 years of age or older U = unknown
54	SEX OF PEDESTRIAN The sex of the pedestrian involved. M = male F = female U = unknown
55	TEST GIVEN (#1) Identifies the chemical agent (drug or alcohol) tested for in the pedestrian. 1 = none 2 = alcohol 3 = drug 4 = refused
56	TEST TYPE (#1) Identifies medium of test given for drugs or alcohol for the test given. 1 = blood 2 = urine 3 = breath 4 = other blank = not applicable

Positions	Description
57-59	TEST RESULTS (#1) The concentration of tested substance found present in the alcohol or drug test given. 000-999 = actual content (decimal point is implied in front of value) C = contaminated sample U = unknown blank = not applicable
60	TEST GIVEN (#2) Same as TEST GIVEN #1.
61	TEST TYPE (#2) Same as TEST TYPE #1.
62-64	TEST RESULTS (#2) Same as TEST RESULTS #1.
65-69	Not used at this time. Will be blanks
70	PHYSICAL STATUS OF PEDESTRIAN The apparent general physical status of the pedestrian immediately prior to their involvement in the accident. 1 = normal 2 = had been drinking 3 = physical handicaps 4 = ill 5 = fatigued 6 = asleep 7 = medication/drugs U = unknown
71	ARRESTED Indicates whether the pedestrian involved was arrested. Y = yes, arrest was made N = no, arrest was not made U = unknown

Positions	Description
72-73	PEDESTRIAN ACTION Indicates what the pedestrian was doing immediately before or at the time of the accident. 01 = Not in roadway 02 = Standing in roadway 03 = Playing in roadway 04 = Pushing or working on vehicle 05 = Other working in roadway 06 = Walking in roadway with traffic 07 = Walking in roadway against traffic 08 = Getting on or off vehicle 09 = Getting on or off school bus 10 = Crossing or entering not at intersection 11 = Crossing or entering at intersection 12 = Other U = Unknown
74	TRAFFIC CONTROL FOR PEDESTRIAN Indicates whether any sign, signal, or marking designating control for pedestrian actions in the roadway was present at the scene of the accident. Y = yes, control present N = no, control not present U = unknown
75-130	Not used at this time. Will be blanks.

5. INJURED RECORD - Describes the injured person (other than a driver or pedestrian who was injured), name, injury, and alcohol/drug test information for each injured. Each accident will have from zero to ninety-nine Injured Records, one for each injured person, other than drivers or pedestrians, involved in the accident.

Positions	Description
1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '5' for Injured Records.
13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Injured Records. WilI be from 01-99 for Injured Records.
15-16	Not used at this time. Will be blanks.
17-31	LAST NAME OF INJURED The last name of the injured person involved. Will be alphabetic with no embedded blanks, or blank if unknown.
32-41	FIRST NAME OF INJURED The first name of the injured person involved. Will be alphabetic with no embedded blanks, or blank if unknown.
42	MIDDLE INITIAL OF INJURED The middle initial of the injured involved. Will be alphabetic, or blank if none or unknown.
43-44	NATURE OF INJURY The classification of injured person's injury by categories. 01 = Severed 02 = Internal 03 = Minor Burn 04 = Severe Burn 05 = Abrasion 06 = Minor Bleeding 07 = Severe Bleeding (Arterial) 08 = Fracture/Dislocation 09 = Contusion/Bruise 10 = Complaint of Pain 11 = None Visible U = Unknown
45-46	LOCATION OF INJURY The part of the injured person's body which sustained the most severe, apparent person injury. 01 = Chest 02 = Neck 03 = Eye 04 = Face 05 = Head 06 = Back 07 = Shoulder/Upper Arm 08 = Elbow/Lower Arm/Hand 09 = Abdomen/Pelvis 10 = Hip/Upper Leg 11 = Knee/Lower Leg/Foot 12 = Entire Body U = Unknown

Positions	Description
47	INJURY STATUS The physical state of awareness of the injured person. 1 = conscious 2 = semi-conscious 3 = incoherent 4 = unconscious 5 = shock 6 = dead U = unknown
48-51	EMERGENCY MEDICAL SERVICES NUMBER The numeric identity of the EMS vehicle which transported the injured person from the accident scene. 0000-9999 = EMS number U = unknown blank = not transported by EMS vehicle
52-53	AGE OF INJURED The declared age of the injured person involved. 01-98 = actual age 99 = 99 years of age or older U = unknown
54	SEX OF INJURED The sex of the injured person involved. M = male F = female U = unknown
55	TEST GIVEN (#1) Identifies the chemical agent (drug or alcohol) tested for in the injured person. 1 = none 2 = alcohol 3 = drug 4 = refused
56	TEST TYPE (#1) Identifies medium of test given for drugs or alcohol for the test given. 1 = blood 2 = urine 3 = breath 4 = other blank = not applicable

	Positions	Description
TSTRES1I	57-59	TEST RESULTS (#1) The concentration of test substance found present in the alcohol or drug test given. 000-999 = actual content (decimal point is implied in front of value) C = contaminated sample U = unknown blank = not applicable
ALCTST2I	60	TEST GIVEN (#2) Same as TEST GIVEN #1.
TSTTYP2I	61	TEST TYPE (#2) Same as TEST TYPE #1.
TSTRES2I	62-64	TEST RESULTS (#2) Same as TEST RESULTS #1.
SAFEQP1I	65	SAFETY EQUIPMENT (#1) The type of safety equipment used by the injured person. 1 = no restraint 2 = lap belt 3 = harness 4 = child restraint 5 = helmet 6 = air bag 7 = other U = unknown blank = not applicable
SAFEQP2I	66	SAFETY EQUIPMENT (#2) The type of safety equipment used by the injured person. 2 = lap belt 3 = harness 4 = child restraint 5 = helmet 6 = air bag 7 = other blank = not applicable
SAFEQP3I	67	SAFETY EQUIPMENT (#3) Same as SAFETY EQUIPMENT #2.

	Positions	Description
EJTRFI	68	EJECTION/TRAPPED Identifies whether the injured person remained in, was trapped in or under, or was thrown from the vehicle of occupancy. 1 = not ejected 2 = partially ejected 3 = ejected 4 = trapped in 5 = pinned under U = unknown
SEATPOSI	69	POSITION IN OR ON VEHICLE Locates where the injured occupant of a motor vehicle was riding in or on the vehicle. 2 = passenger, middle front 3 = passenger, right front 4 = passenger, right back 5 = passenger, middle back 6 = passenger, left back or passenger on motorcycle 7 = passenger in truck bed 8 = riding or hanging on outside U = unknown blank = not applicable, injured not in vehicle
	70-71	Not used at this time. Will be blanks.
VEHOCCPI	72-73	VEHICLE NUMBER OCCUPIED OR PERSON CLASSIFICATION Identifies which vehicle the injured person was associated with. Also categorizes other injured persons involved in the accident as either bicyclists or other. 01-50 = vehicle number occupied B = bicyclist O = other injured U = unknown
	74-130	Not used at this time. Will be blanks.

6. TRAILER RECORD - Provides the name and vehicle associated with for each trailer involved in the accident. Each accident will have from zero to nine Trailer Records, one for each trailer involved in the accident.

	Positions	Description
CASENUM	1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
RECTYP	12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '6' for Trailer Records.
TRLNUM	13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Trailer Records. Will be from 01-09 for Trailer Records.
	17-31	LAST NAME OF TRAILER OWNER The last name of the trailer owner involved. Will be alphabetic with no embedded blanks, or blank if unknown.
	32-41	FIRST NAME OF TRAILER OWNER The first name of the trailer owner involved. Will be alphabetic with no embedded blanks, or blank if unknown.
	42	MIDDLE INITIAL OF TRAILER OWNER The middle initial of the trailer owner involved. Will be alphabetic, or blank if none or unknown.
VE[illegible]T	43-44	VEHICLE NUMBER Identifies which vehicle the trailer was associated with. 01-50 = number of vehicle U = unknown
	45-130	Not used at this time. Will be blanks.

7. ARREST RECORD - Provides the Indiana Code Numbers of each driver or pedestrian arrested. Each accident will have from zero to nineteen Arrest Records, one for each driver or pedestrian arrested in the accident.

	Positions	Description
CASENUM	1-11	ACCIDENT NUMBER Same as ACCIDENT NUMBER of Environment Record.
RECTYP	12	RECORD TYPE Same as RECORD TYPE of Environment Record. Will be a '7' for Arrest Records.
ARTNUM	13-14	RECORD SEQUENCE NUMBER A portion of the key to the Master file which specifies a unique record within multiples of Arrest Records. Will be from 01-19 for Arrest Records.
	15-16	Not used at this time. Will be blanks.
PERTYP	17	RECORD TYPE OF ARRESTED PERSON Indicates whether the person arrested was a driver or a pedestrian. Corresponds to the RECORD TYPE in the driver or pedestrian record. 3 = driver 4 = pedestrian
PERNUM	18-19	RECORD SEQUENCE NUMBER OF ARRESTED PERSON Specifies which unique driver or pedestrian was arrested. Corresponds to the RECORD SEQUENCE NUMBER in the driver or pedestrian record. Will be from 01-50.
ICNUM1	20-39	INDIANA CODE NUMBER (#1) The code number of the violation for which an arrest was made. 14-1-3-11 - 9-9-3-1 = IC Number U = unknown
ICNUM2	40-59	INDIANA CODE NUMBER (#2) The code number of the violation for which an arrest was made. 14-1-3-11 - 9-9-3-1 = IC Number U = unknown blank = not applicable
	60-130	Not used at this time. Will be blanks.

1983

PROGRAM ID. - AISTP PROGRAM NAME ______ DATE 4/17/80 PAGE 1 OF 2

DATA SET NAME DDNAME=AISMSTR, DSN=ISPAISVS.ACCIDENT.MASTER.KSDS RECSIZE = 130 max BLKSIZE = ______ BLKFACTOR ______

IN ______ OUT ______ I/O ______ CARD ______ TAPE ______ LABEL ______ DISK ✓ ORGANIZATION VSAM ACCESS ______

RECORD NAME VSAM Layout - Accident Master RECORD KEY Positions 1-14 Acc #, Rec Type, Seq.

CDP RECORD LAYOUT

"1"

KEY																																												
ACCIDENT # (YY MM DD CO)	SEQ	RN NO	b	DAY	TIME	# VEH	# INJ	# DEAD	SEVERITY	# INJURED	[illegible]	DISTRICT	T/P	CITY	[illegible]	[illegible]	[illegible]	b	ROAD NUMBER	REFERENCE ROAD NUMBER	RD CIS	HWY #	MILE POST	[illegible]	DISTANCE	DIR FROM	REF CO	REF CITY	[illegible]	ROAD INTERSECT RD	[illegible]	[illegible]	RESP TIME	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	RD SURF

01 05 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

			MICROFILM INDEXES									FILLER
SOURCE	[illegible]	CONDITION	#1 (P)	#2 (P)	#3 (P)	#4 (P)	#5 (P)	POLICE	REPORT	b	STATUS	F I L L ER

01 05 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

"2"

KEY			NAME OF VEHICLE OWNER																		CONTRIB CIRC			COLLISION INVOLVED			TRAFFIC CONTROL				FILLER
ACCIDENT # (YYMMDDCO)	REC TYPE	VEH NO	b	LAST	FIRST	MI	YEAR	MAKE	MODEL	TYPE	USE	SPD LMT	FUEL TAX NUMBER	VEH DMG	# OCCUP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	#1	#2	[illegible]	#1	#2	#3	#1	#2	[illegible]	b	

01 05 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 — 130

"3"

KEY			NAME OF DRIVER										CHEMICAL TESTS #1		#2		SAFETY EQUIP						DATE OF BIRTH								FILLER
ACCIDENT # (YYMMDDCO)	REC TYPE	VEH NO	b	LAST	FIRST	MI	[illegible]	[illegible]	[illegible]	[illegible]	EMS #	AGE	SEX	TYPE	RESULTS	TYPE	RESULTS	#1	#2	#3	[illegible]	[illegible]	MM	DD	YY	DRIVER ID NUMBER	LIC ST	LIC TYPE	LIC REST	b	

01 05 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 — 130

CDP1L2 DEC. 73