LIMITATIONS OF THE CURRENT NASS SYSTEM AS RELATED TO FHWA ACCIDENT RESEARCH

Julie A. Cirillo, Federal Highway Administration

This paper will include a discussion of the NASS system from the highway user's point of view. It should first be noted that if there is a segment of the highway research community who can use NASS as it now exists, it is the segment represented by the researchers at this conference--the researchers interested in highway hardware.

I will first discuss the problems with the existing NASS system and then move to the areas in which NASS can help the highway researcher. First, the NASS system as it exists cannot give statewide estimates of the accident problem. The sampling scheme being used is designed to produce national estimates, and is not set up to provide estimates within states. Second, and most important, there is currently no way to link the accident data collected with any exposure data. Thus, rates involving million vehicle miles or other highway-related measures cannot be calculated. There is currently a great deal of ongoing activity to help correct this problem, but major problems still exist. Third, it should also be noted that the rates that are of interest to the NHTSA side of the U.S. Department of Transportation are not necessarily the same as the rates that are of interest to FHWA. (Indeed, herein lies part of the problem.) Thus, while the emphasis in the data collected is on accident severity, which is a plus for the researcher interested in highway hardware, this is a negative bias for the researcher who is interested in countermeasures that could prevent accidents. As noted earlier, the NASS system only studies accidents. There are no highway sections where no accidents have occurred.

Fourth, there are problems with the accident reconstruction processes used with barrier crashes and multiple-hit situations. The computer programs that have been developed to reconstruct accidents involving barriers are not very good. So far, the emphasis in computer reconstruction has been on the driver and the vehicle, and it is for this reason that the highway barrier programs are not as adequate as they might be. Fifth, there are some problems with the basic information collected, particularly with some definitions that have been used up until now. As an example, any intersection that included raised channelization would be coded in the current system as a "divided highway" segment, a definition that would mean that these channelized intersections would be grouped with other divided highways if a researcher were interested in pulling out all accidents on divided highways. Thus, it is fair to say that FHWA and NHTSA are not yet completely together on the definitions to be used. There are ongoing efforts to correct these problems.

Let us now turn to what the NASS system can do. First, it can provide national estimates of the accident picture. These are very adequate estimates of type of accidents, total numbers of accidents, accident cost, accident severity, etc.

Second, the NASS system can help carry out what we could refer to as "performance evaluations," particularly evaluations of highway hardware. The system can be structured to collect specific data items to see if a piece of hardware is functioning properly in terms of its severity reducing benefits.

However, even in carrying out these performance evaluations, the NASS user interested in highway hardware must be aware of a basic issue--available sample size. In most highway evaluations, the researcher is interested in analyzing the performance of given pieces of hardware while controlling the numerous other factors such as speed of impact, size of striking vehicle, width of shoulder, presence or absence of curb, etc. Thus, many of these performance evaluations will be done in somewhat of a factorial design. However, as any researcher who has studied factorial designs is aware, an increase in the number of factors can greatly increase the required total sample size. While it may be possible to initiate special studies with the NASS system that can help increase the sample size for various questions, these special studies will cost additional money. Thus, the researcher must use the absolute minimum sample size in all cases, whether the study is using continuously sampled data or is a special study in which special data are collected.

For certain objects beside the roadway, the continuously sampled data can be used to carry out performance evaluations under certain conditions. For example, the items such as trees and guardrails are found along the roadside in enough places and are thus struck enough times that an adequate sample may exist. Using estimates based on one year's NASS data, it is possible for the researcher to estimate the length of data collection time required to fill the cells of the factorial design of interest. While various examples could be cited, suffice it to say that in most cases the researcher must compromise on the number of controlling variables. FHWA has funded two special studies, involving (a) longitudinal barriers and (b) crash cushions. To support the point made above, it is noted that even when compromising on a number of different factors and thus reducing the sample size to a bare minimum, it is estimated that the longitudinal barrier study will require 3 years for adequate data to be collected and the crash cushion study will require 6 years of data. Thus, in most NASS studies, the researcher interested in highway hardware issues must anticipate a study that will require both lots of money and lots of time to complete.

In addition to the problems of defining the cells for a given study and of collecting the data, the researcher must also remember to define the specifics of his data carefully enough so the data collectors can collect them accurately. It should be remembered that the data collectors are not accident investigators, but are indeed data collectors. Precise definitions are required..

In summary, the highway-related researcher who is interested in using the NASS system first must (a) carefully think through the problem of interest to him or her, (b) must decide how to compromise on the number of factors that might possibly be of interest, (c) must define variables as specifically as possible and must provide adequate training for the data collectors and (d) must ensure a method of good quality control for the data while they are being collected.

Thus, as it currently exists, the NASS system may be of limited use to the highway accident researcher. To make this system of greater use to FHWA and other highway researchers, however, will require major changes. The biggest requirement is that good exposure data must be collected and must be merged with the accident data now being collected. There is a need to periodically review the system to be sure that data items that are not being used are culled out in order to decrease the number of unused items and increase the quality of those that are collected. Finally, as a suggested major change in the system, I would suggest that the NASS system as it now exists be scrapped, or rather modified, as a system that, instead of monitoring accidents, monitors highway segments. By sampling from all the segments across the nation and monitoring certain of these segments, accident data could be collected from accidents that occur on these segments and exposure data could be collected at the same time. This would change the nature of the NASS system in that those teams that are currently at one location pulling accidents from one set of files would become "traveling salesmen" who would travel in a larger geographic area to continually monitor numerous segments of highway. It is obvious that the problems with changing the system to this new format would be very formidable. However, drastic changes like this should be carefully considered in order to make this system as useful as it possibly can be for the researcher interested in the highway side of the accident problem.

SUMMARY OF PART 3

Forrest M. Council, Highway Safety Research Center, University of North Carolina

As might be expected, the above six papers generated a great deal of discussion among the participants at this workshop. While many points were raised in these discussions, two issues of interest arose.

First, in terms of terminology, it became apparent to those in the workshop that two types of in-the-field accident research were being discussed. For lack of better names, these two types of research might be termed "statistical research," which is aimed at evaluating how well a given piece of hardware reduces injuries to occupants of striking vehicles, and "clinical studies," which are aimed at determining the failure modes of a given piece of hardware once it is put in the real world. These clinical studies are used to validate the results of the crash testing. While many of the requirements for these two studies are similar, the data and study design needs are not always the same.

While there is a great need for clinical studies, there is perhaps an even greater need for the well-controlled field statistical studies that provide information concerning how well a design actually works--its benefits in terms of severity or frequency reduction. Indeed, if the tough question being asked by Congress, consumer groups, state legislators, the U.S. General Accounting Office and other fiscal analysts is one of "how many lives can it save" (i.e., how well does it work), then the second type of research, the statistical study, is the most important in that it alone can provide severity reduction factors to the cost/benefit analyses so desperately needed.

This lack of good statistical studies generated the second major point of the discussions. There was a strong feeling that one major roadblock to the improvement of accident research is the system under which the evaluations must now be conducted. The current requirements for "evaluation" of all improvements by every state in every project results in inadequate funding for a given evaluation, pitifully poor research designs and thus results of little or no value. As noted in the discussions, there are alternatives to this existing system. For example, rather than require the "evaluation" of every improvement project conducted in a given state, a system could be devised that would require the state (perhaps as an option) to conduct one well-designed evaluation in which control or comparison groups are required. This single well-designed evaluation could be done in place of the numerous before/after studies that are now conducted. In this manner, at least one piece of new information would arise from each state each year. Thus, in summary, while discussion indicated that inertia and other pressures continued to make changes in the existing system difficult, such changes are needed and are worth working for.

Part 4: Session 3, Group Consensus on Key Programs and Recommendations

As stated in the Introduction to this Circular, pre-workshop and workshop written opinions of key data problems were used to select four key issues for more detailed subgroup discussion and recommendations. These findings were then presented to the workshop attendees at large. The four topics selected were

1. Use or Revision of Existing Data Banks to Obtain a More Efficient or Improved Analysis of Accidents with Roadside Features;
2. Clinical Engineering Analysis of Performance of Roadside Features in Real-World Collisions;
3. Utilization of Simulation to Predict Probability of Injury; and
4. Linkage Between Physical Testing and Likelihood of Injury.

The time allotted in the workshop for this process was quite limited. Thus in some cases the identification of an area of the workshop as a top-priority issue in obtaining needed impact severity data is in itself the contribution of this workshop.

ISSUE: USE OR REVISION OF EXISTING DATA BANKS TO OBTAIN A MORE EFFICIENT OR IMPROVED ANALYSIS OF ACCIDENTS WITH ROADSIDE FEATURES

Julie A. Cirillo, Federal Highway Administration, Moderator

Other group members: Roy Anderson, Lindsay I. Griffin, III, Russell A. Smith, Harry W. Taylor, Edward J. Tye, Charles V. Zegeer

Methods of improving evaluations of safety appurtenances was the basic topic of our subgroup. Much discussion centered on the design of the evaluation. Use of NASS for this type of special study was also discussed. In general it was agreed that:

1. Well-designed in-service evaluations of accident countermeasures is one of the biggest gaps in the safety field.
2. Requirements to evaluate every safety improvement are a big deterrent to good evaluations.
3. Some policy change may be necessary to allow states to undertake a limited number of well-designed evaluations.
4. Use of a NASS special study to do evaluations may be feasible.
5. Proper selection of sections for installation of countermeasures is critical for accurate evaluations.
6. Standard evaluations are important for transfer of information.