ISSUE: WHAT METHODS CAN BE USED TO ACQUIRE OR DEVELOP IN-SERVICE COLLISION PERFORMANCE DATA OF ROADSIDE APPURTENANCES?

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After considerable discussion of the type of collision data that should be of primary concern to this undertaking, a conclusion was reached that purely statistical performance and analysis data were not what was wanted. Rather, data of a clinical nature such as of vehicle impacts, appurtenance performance, highway environment and specific collision performance information associated with each type of safety device would be relevant. Depending on the appurtenance system being considered, the desired pertinent data may possibly lie somewhere between clinical and statistical in nature. This would include descriptive information such as size and weight of impacting vehicles, number of collisions, angle of impact, resultant damage and personal injury and system performance.

The group next discussed who should do it by considering the pros and cons of four distinct resource bases: insurance companies, transportation agencies (state, county, municipal, police), public entity and private sector and NASS system (PSU's). After much deliberation, it was felt that the transportation agencies were the most qualified and better-suited groups to perform the data acquisitioning for collision performance of safety devices on our transportation network. Only new systems should be included in this endeavor because of the urgency for the required greater performance of smaller and lighter-weight automobiles. Further discussion emphasized the many complexities associated with evaluating existing installations in this program. When detailed clinical data would be required, the PSU's or private accident investigators could be employed.

The planned program for the collection of collision performance data should be capable of short-term as well as long-term continuance activity. The developed program must be implemented with conditions of the real world in mind, i.e., considering actual field conditions. There should be a trial period for experimental design. Failures and successes of systems under evaluation should be recorded.

Because of personal decisions, subjectivity and appurtenance performances, two types of studies must be contemplated: system performance having recorded accident reports and system performance without accident reports.

Optimum use of photographic recording and on-site visual reports should be considered to supplement written accident report data by police, eyewitnesses, etc. In some cases, remote sensing, TV camera systems, etc., could be most worthwhile for the purpose. For on-site visual reporting, there must be involved personnel who have the best experience background with the technology associated with the contemplated system in order to determine actual collision performance. Employment of maintenance organization personnel could be rather effective and productive for performing this task. With experience and training, subjectivity in evaluations could be greatly reduced. Proper use might also be made of some degree of accident reconstruction, noting the attitude of the vehicle on contact with the appurtenance as well as information detailing the dynamics of the vehicle and kinematics of vehicle occupants.

ISSUE: THE LINK BETWEEN CONTROLLED VEHICLE CRASH TESTS AND LIKELIHOOD AND EXTENT OF OCCUPANT INJURY IN A SIMILAR REAL-WORLD COLLISION

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The following statements summarize the group's consensus:

1. Over the past 20 years or more, a great number of controlled crash tests have been conducted involving a fairly broad range of vehicles and a wide variety of highway safety appurtenances. Test variables have included impact velocity, impact angle, point of impact on the vehicle and/or the appurtenance, terrain conditions, etc. Data acquisition systems of varying capability have been employed to document the dynamic and the kinematic responses of the crash vehicle and the appurtenance. In most of the tests, the crash vehicle has contained one or more dummy occupants. In all of these crash tests, the pretest and posttest conditions were thoroughly documented by still photography. In most of the tests, the entire crash event, including dummy movements, were documented on high-speed film. Also, the responses of accelerometers mounted in the occupant compartment of the vehicle, and sometimes in the dummies themselves, were often recorded throughout the crash event.

2. In summary, crash test researchers know what will happen to the vehicle (acceleration, momentum change, velocity, trajectory, damage, etc.) during collision with a wide variety of highway safety appurtenances or can acquire such data through further crash testing when required.

3. Computer simulation programs are a valuable supplemental source for data on crash vehicle dynamics and kinematics during interactions with various highway appurtenances and/or terrain conditions provided they have been validated with the data from a sufficient number of crash tests, particularly tests that "bracket" the area of concern.

4. Crash test researchers have developed and/or used various "ballpark" criteria to estimate the likelihood of serious injury or fatality (a life-threatening situation) occurring in a specific vehicle/appurtenance crash test. These criteria have been based on the dynamic and kinematic data acquired from a controlled crash test, i.e., vehicle damage (body crush, occupant compartment integrity, etc.); vehicle kinematics (rollover, rebound, etc.); vehicle and/or dummy acceleration responses; degree of occupant restraint (unrestrained, lap belt, shoulder harness, etc.); dummy damage and movement; etc. These criteria have generally been developed from research performed by other than the normal highway research community and financed by NASA, NHTSA, etc. At best, these criteria have produced conservative estimates or predictions on the likelihood of serious injury or fatality occurring in a specific vehicle/appurtenance crash test. These criteria have not been capable of producing occupancy injury/fatality