economic but social? Is it not due ultimately to the different mores of our respective citizenry?

It is interesting to note the arrangements which have been made whereby tourists can easily comply with the various compulsory acts using the Green Card system. Similar arrangements are available to American tourists in Europe for there are many American insurers who could make such arrangements for their policyholders, either by direct or indirect participation in such a scheme or through another carrier.

We owe Mr. Astill our thanks for having given us this thorough and very carefully prepared paper. It brings home to us, most of whom are engaged in domestic insurance practice, the fact that insurance is a world-wide mechanism, whose problems and practices transcend national borders.

LIABILITY INSURANCE FOR THE NUCLEAR ENERGY HAZARD

RICHARD H. BUTLER

VOLUME XLVI, PAGE 23

DISCUSSION BY J. P. GIBSON, JR.

Since liability insurance for the nuclear energy hazard is still in the research and development stage, Dick Butler's paper on this subject is a masterpiece in painting the picture as it currently exists.

Mr. Butler was one of the pioneers chosen to blueprint the necessary innovations required to arrive at our present method of handling liability insurance for the nuclear energy hazard. He demonstrates in this paper a thorough grasp of the subject. Only a master of the situation could possibly condense into a short paper the historical background and explanation of progress in this newest of insurance ventures.

The paper only hints at the magnificent job of public relations achieved by the nuclear pools to work out an insurance program that would mesh with the government indemnity, to secure agreement by the insurance industry of uniform reinsurance exclusion clauses and acceptance by the public of concurrent exclusion clauses. The fact that these exclusions accomplished a transfer of liability from one piece of paper to another does not detract from the splendid salesmanship required.

Consider for a moment some of the innovations now in actual practice. The Nuclear Energy Liability Policy continues in effect indefinitely until terminated. The limit of liability expressed in the policy applies to the entire period that the policy is in effect. Loss adjustment expense is included within this limit of liability. The omnibus

definition of assured sweeps into coverage even the *tort-feasor*. With respect to off site property owned by the assured, such property is covered on a third party basis.

At least one innovation will surely be tested in our courts when a suitable occasion arises. This is the clause in the policies that provides for a limitation of liability with respect to multiple policies applicable to the same loss. The insurance industry fervently hopes that this clause will be affirmed by the courts.

Since this type of insurance is still in the research stage, rather precise and yet complicated phraseology was required. In several instances, it was necessary to use the indirect approach. For example, Mr. Butler says in his paper "don't look for this employers' liability coverage in the insuring agreements of the facility policy because it turns up as an exception to an exclusion and as a proviso clause in the 'other insurance' condition." Again the coverage of isotopes is left in the normal liability policies because it falls down between the chairs of other exclusions.

Rate making was a real problem. The buyers of the coverage wanted rates based on probable losses. The insurance industry believed that rates should be made on the basis of possible losses. This difference of opinion was finally resolved by the Industry Credit Rating Plan. While this plan is explained at the end of his paper, Mr. Butler displays consummate diplomacy by giving credit for its creation to the actuaries. To the best of my knowledge, the Industry Credit Rating Plan has not at this date been reduced to an endorsement that could be attached to the outstanding liability insurance policies on the nuclear energy hazard.

For the record, one small comment may be in order. Mr. Butler states "the constitutions of the liability pools were adopted in the Spring of 1956." This is true of the stock pool but not of the mutual pool. The mutual pool has no constitutions, no bylaws, no officers nor in fact, any corporate existence. The mutual pool is purely a reinsurance pool and is one of six administered by the American Mutual Reinsurance Company. In the interest of simplicity and economy, an association of six mutual casualty companies was created known as Mutual Atomic Energy Liability Underwriters. On the mutual side, all liability policies are issued by MAELU and immediately reinsured 100%. Since all six companies are licensed in all of the states and are thus qualified to issue all policies, its operation is simple indeed.

It is my understanding that there is an additional reason for the innovation of the coverage on a third party basis of an assured's off site property. Since no catastrophe reinsurance is available for the companies writing the physical damage coverage on the nuclear energy hazard, such companies were sensitive to the prospect of catastrophe losses. Capacity to insure an individual reactor site appeared to be available, but widespread property damage losses flowing from one nuclear incident might approach catastrophic limits with no catas-

trophe reinsurance. Therefore, the transfer of coverage of such off site property to the liability policies, thus bringing them in for protection under the Government Indemnity Bill, solved this problem for the insurers of the physical damage coverage.

Mr. Butler's paper will serve as an invaluable reference work on the complex, intriguing and highly important subject of liability insurance on the nuclear energy risk.

SOME FURTHER NOTES ON ESTIMATING ULTIMATE INCURRED LOSSES IN AUTO LIABILITY INSURANCE

FRANK HARWAYNE

VOLUME XLVI, PAGE 59

DISCUSSION BY F. J. HOPE

Mr. Harwayne has presented this paper as a supplement to his previous paper "Estimating Ultimate Incurred Losses in Auto Liability Insurance" (Volume XLV, 1958 *Proceedings* of C.A.S.). He here elaborates on the derivation of and the factors underlying a formula incorporated in his preceding paper; namely,

$$\log_{10}y = 2.0674t^{-.80599} \, 10^{-.24841t}$$

In the formula, a value for y expresses losses paid as of any evaluation date t as a percentage of total losses eventually to be incurred on a policy year of automobile insurance exposures.

In this elaboration, Mr. Harwayne examines the various forces that go into the accumulation of losses paid with the passage of time. On the first page, he draws upon Mr. Tapley's earlier paper to suggest two conclusions; namely, that (1) "easier claims are settled first", with which there can hardly be any quarrel, and (2) "that the number of claims paid during a particular time interval is functionally related to the number of claims outstanding at the beginning of that time interval." It would seem that this latter needs some elaboration with respect to relative number of car exposures immediately prior to the period, since that would affect the number of claims outstanding at the beginning of the period.

On Page 60, with respect to the distribution of number of claims paid (as % of total) according to average age of accident, there follows a statement to the effect that the values are "satisfied by a formula for paid increments comprised of 9% of the amount (presumably number) outstanding as of the beginning of each month." There is no elaboration as to how the value of 9% was established, so one must assume that it was derived from the same data as the distribution itself.

The formula for N, the cumulative number of claims paid (as a percent of total) according to time measured from date of accident is rel-