Limit Values (TLVs) and Immediately Dangerous to Life and Health (IDLH) levels, are far less reliable indicators of potential risks from ambient exposures by the general public. These values are not based on such an extensive critical literature review as the preferred sources, and are not derived for the exposure situation under study in the risk assessment. To reflect this uncertainty, a screening method using a conservative margin of safety is incorporated into the derivation of acute reference criteria, for example a factor of 1,000 when using the IDLH. It is not appropriate to assume, as Mr. Brown did, that acute reference values derived from the preferred sources should produce the same values as those derived using the screening technique of applying safety factors to TLVs or IDLH values.

During Mr. Brown's presentation (p.21 of overheads), flame height was estimated using ARCHIE, a computer program. He also stated that ARCHIE "should be recognized as an authoritative reference" (p. 58 of transcript).

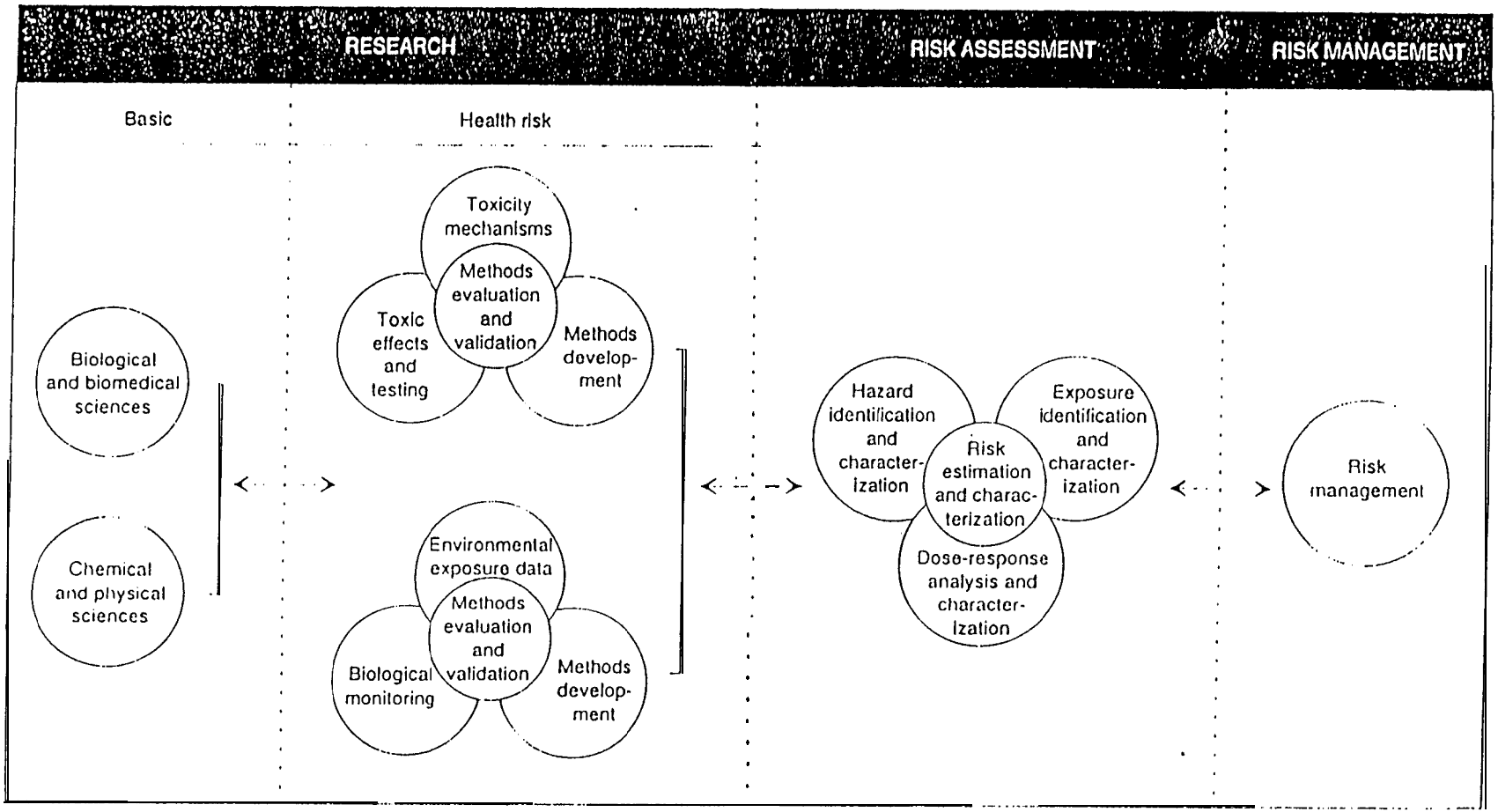
Response: We have been unable to replicate the results presented as ARCHIE outputs in the presentation. Further, the ARCHIE model cannot be considered the authoritative model for accident analysis since many federal agencies, including EPA, have published alternative methods and programs. For example, the World Bank Hazard Analysis (WHAZAN) model, like ARCHIE, is capable of estimating the consequences of accidental releases of flammable gases and liquids. In addition, ARCHIE does not meet the general scientific criterion for "authoritative" such as peer review or validation. It should also be recognized that ARCHIE is a screening level model that is designed to provide approximate answers for general emergency planning purposes. One of the major problems with ARCHIE is its inability to handle complex chemical mixtures. This is especially true when the mixture is found as a two phase minimum boiling azeotrope which is the situation represented by the pool fire risk assessment. Since ARCHIE depends strongly on boiling points and since boiling points of azeotropes must be empirically derived, the net outcome is a large degree of uncertainty from using ARCHIE.

The Role of Risk Assessment in Permitting

The HWFB has overemphasized the relevance and importance of the risk assessment in this permit process. Risk assessment is a tool, not an answer. Risk assessment provides order of magnitude estimates, not a single answer which can be interpreted as the only truth. Risk assessment is separate from, but intimately related to, both basic science research and risk management_ This interconnection was highlighted in the U.S. Office of Technology Assessment's (OTA 1993) recent report, Researching Health Risks. As shown in Figure 2 from this report, risk assessment exists in an open environment in which there is exchange back and

FIGURE 2

LINKING RESEARCH ON HEALTH RISKS TO DECISIONMAKING



SOURCE: Office of Technology Assessment, 1993.

forth between the basic research sciences and risk management decision making. Its role in the decision making process was highlighted by OTA, as follows:

> Whatever is expected of risk assessment in any given set of circumstances, it is only one of the elements in the formulating of regulatory actions. Legislative mandates, social values, technical feasibility, economic factors, and the achievements or shortcomings of the research that feeds into risk assessment may assume a more prominent role than expert projections of risk.
>
> The limits of science manifest themselves at a variety of levels. Uncertainty in measurements and observations constrains science at the most fundamental level, and the scientific underpinnings of risk assessment are more subject to that limitation than are experimental sciences.

As recognized by OTA, and risk assessment scientists throughout the US., risk assessment does not exist in a static environment in which there is only one answer to a problem, such as might occur in the design of a particular type of processing facility. The principles applied in risk assessment are not the same as those applied in engineering design. As a tool to evaluate potential health risks, risk assessment combines information from many different scientific disciplines to predict potential impacts, and significantly differs in its application from those involved in the primary sciences and engineering. Just as medicine relies on science in combination with a great deal of personal judgement, so does risk assessment rely on data from the scientific literature supplemented with judgement. There can be legitimate disagreements among experts in many areas of risk assessment, just as there are scientific controversies in biology, chemistry, or physics. What is important is individual experience in making risk assessment judgements, the willingness to work toward a health-protective consensus, and the proper use of a risk assessment in the regulatory decisionmaking process.

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