WORKSHOP "A" SUMMARY

"RISK ASSESSMENT"

A lively discussion followed the paper by B. L. Cohen on "A Super Analog Computer for Evaluating the Safety of Buried Radioactive Waste". The major points on the issue seemed to be:

1) The behavior average risk as representative of the behavior of waste packages,

2) The use of average acquifers and formations to characterize a repository,

3) Heterogeneity and unknown state of host rock in nearby zones,

4) The effect of intrusive and expulsive events on the average groundwater migration case.

The first three points all deal with variations from the average proposed in the paper. Cohen suggested that parameters for many aquifers (perhaps as high as 10,000) be measured so that either the average or least favorable case could be used. At least some of these should contain the residual effects of all proposed deviations. Also the analog preposed is already conservative since a repository would be in a better-than-average location and chosen for the absence of a flowing aquifer (at least for the near-term). Another perspective was the possible use of Cohen's model as the average or expected performance, along with results of extremely conservative or pessimistic models as the upper limit or worst case. This view related back to the paper by Koplik and Bartlett which showed the grouping of modeling results into two similar classes of highly conservative and expected average results.

The last point dealt with the effects of extraordinary descriptive events of low or uncertain probability (intrusive and expulsive events). The proposed model includes the secondary effects of these events on groundwater transport since at least a few of the large number of aquifers to be measured would have been affected by drilling, volcanos, earthquakes, and similar events. The model does not treat the primary effects via other transport pathways since groundwater transport was the subject of the analysis. Cohen suggested that the primary effects be treated separately with appropriate models for direct releases.

The discussion next turned to the time scale for risk analysis and consequence calculations. There was general agreement that results for the first few hundred years were useful to show thermal effects and the decay of most fission products, and the gradual transition to dominance by actinides and a few long-lived fission products. The suggestions for long-term cutoff times tended to cluster into two groups: around 10,000 years and several million years. The proponents of 10,000 years suggested that such times were long enough to see the effects of plutonium on the risk at such times. Furthermore, even though the calculated dose commitments may increase at later times, the increase is not large and is eventually determined by the uranium feed material rather than reactor-generated products. The million-year supporters suggested that 10,000 years was too short to see the impact of groundwater transport and long-term geologic changes, as well as lacking completeness for the long-lived nuclides. Part of the difficulty arises form the lack of complete agreement over which nuclides other than ^{239}Pu actually dominte long-term hazards. Candidates include ^{237}Np, ^{129}I, ^{99}Tc, ^{14}C, and actinide daughters (primarily ^{226}Ra). It was pointed out that over the very long term, the use of uranium in reactors reduces the amount of radioactive material eventually available to the biosphere. Thus the analysis might conclude at the time when the results show a net benefit for potential radiation exposure.

A discussion of input data for models led to consideration of validation and field verification of the combined use of models and data. A few field verifications were mentioned and the need for more was suggested. Chemical transport in groundwater and radionuclide transport from ore deposits were possible candidates for model application and verification. The need for site-specific field data was stated.

The public acceptance problem was considered first from the standpoint of how to present the results to three groups of people: 1) other scientists for peer review and comment, 2) the general public who take the risks and pay the bills, and 3) regulators and politicians as eventual decision-makers. The usual data tables are of limited utility except for peer review so additional perspectives and presentation methods are needed. The form of the results needs to be both honest and understandable.

The largest concern was over the fact that the credibility of the entire community is at a rather low ebb. This was generally recognized but there were several perceptions of the status:

1) Acceptance will not be regained and the game is lost.

2) Acceptance will be gained only when the blackout occurs and nuclear is the least noxious solution.

3) The general public may be uncommitted, but it will be difficult to overcome the influcence of the antinuclear portion of the news media. Hopefully the impartial members of the media can be helpful if presented with factual and understandable information.

4) A collection of many individual efforts through public discussion might be fruitful over the long term, although a quick success should not be expected.