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COMMENTS ON "Environmental and Genetic Factors in the Oral Dental  
and Medical Characteristics of Utah School Children"

1. If persons had continued to live in the areas of Utah indicated in the study, they would have received in general, two to four roentgens of total exposure from all fallout since tests began in Nevada in 1951. During the period of major atmospheric testing in Nevada (1951-1958) the guidelines of the International Commission on Radiological Protection and the National Committee on Radiation Protection for normal nuclear operations was 1-1/2 roentgens per year to individuals. Later this was reduced to 1/2 roentgen per year but in doing so the Commission and Committee carefully pointed out that such reduction was not based on evidence of biological damage, but rather constituted a more conservative approach to establishing radiation guides.
2. It is correct that most of the total exposure in the stated areas in Utah occurred within a few months during 1953. This does not alter the conclusion implied in the first comment that persons exposed to two to four roentgens (delivered within a few months) would not constitute a profitable group to study for radiation effects. What these data do clearly show, however, is the need to look at a specific population group. For examples:
  - a. Children conceived after this period of time did not receive the radiation exposure.
  - b. It will be necessary to check quite accurately the location of the subject in the specific 1953 time period. This is further complicated by the fact that the fallout patterns were quite sharp, i.e., potential radiation exposures from the center line of the patterns outward decreased greatly over just a few miles and even within the pattern there were variances. If the subject was not present in the specific areas at the pertinent time, he should not be considered in the study. Contrariwise, those who were present at the time of the fallout and moved to other areas afterwards must be located and examined. It would not be justifiable to assure that these two factors cancel each other. These facts, of course, raise difficulties in the performance of the studies, but are essential if there are any hopes of reaching sound conclusions.
3. The number of subjects involved is so exceedingly small, for these types of studies, that results can be statistically suspect even before obtaining them. Statistical manipulation of data has validity up to a point but no such operations are proper substitutes for inadequate input data. Wide variations may be expected in the effects sought, among groups of 2000 children in the country. Although there has been an attempt to find a comparable control group, the proposal does not give adequate assurance that this has been accomplished,

and even if so, the small number of cases involved would militate against unequivocal data.

It is also noted that some of the possible effects are to be determined by subjective criteria. If this be necessary, the requirement for an adequately designed study is all the more imperative.

4. Some additional uncertainties concerning the validity of the background data and information used by the proposal are: \_\_\_\_\_

- a. The proposal submits as its first argument, in its Introduction, that the relatively high concentration of fallout debris in the air constitutes evidence of high external radiation exposures. It has been repeatedly shown that for the cases of fallout in question the whole body exposure resulted after the material was deposited on the ground. Further, relationships between concentrations of radioactive debris in the air and that deposited on the ground have not been established. *mc 4/4*
- b. The proposal states " . . . 3 curies would be retained in the body." This is a generalized statement which may lead to false assumptions. The fallout debris from Nevada tests has been found to be in general very insoluble, at least in the nearby areas, thus the lung would be the critical organ. The estimated lung dose from inhalation of these relatively high concentrations of fallout debris is not great compared with the exposure from natural occurring materials in the air. In the case of iodine, much larger potential doses result from ingestion rather than from inhalation.
- c. On page 2 of the proposal it is stated: "It has been estimated by one group that the 700 children residing in Washington County who were less than two years of age during the peak exposure period received, in 1953 alone, between 120 and 440 rads to their thyroid from I-131 in milk." This estimate was made by one individual whose methods of calculation received a critical appraisal by an Ad Hoc Committee of experts. Another estimate, reported on the same page of reference 10 (but not quoted in the proposal) was 68 rads with an uncertainty factor of 4. This estimate was based on comparisons with relative concentrations of beta activity in the air. The method used in the second estimate is quite unreliable, as is the method used in the first estimate.
- d. On page 4 of the proposal there is mentioned that one of the tissues of interest is the bone in relation to strontium. The levels of strontium-90 in the foodstuffs in the Nevada-Utah environs are among the lowest in the country.
- e. It is noted on page 5 that "Experimental studies in animals have shown that a variety of maternal traumas can affect the development of fetal teeth." With such variables as these, and many others, how does one delineate the problem?