April 27, 1973

Elizabeth S. Bowers, Esq.
Atomic Safety and Licensing
Board Panel
U.S. Atomic Energy Commission
Washington, D.C. 20545

Mr. Lester Kornblith, Jr.
Atomic Safety and Licensing
Board Panel
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dr. William E. Martin
Senior Ecologist
Battelle Memorial Institute
Columbus, Ohio 43201

In the Matter of Iowa Electric Light and Power Company, et. al.,
Duane Arnold Energy Center
Docket No. 50-331

Dear Members of the Board:

In accord with our letter dated April 26, 1973, enclosed for your use in the subject proceeding are copies of the following documents:

1. Errata and addenda, including a revised page 5-25, to the Final Environmental Statement.

2. Testimony of Norman J. Frigerio concerning radiation doses.

3. Testimony of W.J. Mecham concerning inclusion in cost/benefit analysis of dose committment to plant personnel.

OFFICE ▸						Hearing
SURNAME ▸						
DATE ▸						

Form AEC-318 (Rev. 9-53) AECM 0240

We intend to deliver to you by hand, on Monday, April 30, 1973, a revision of Mr. Mann's testimony, supplemental testimony of Thomas Murphy and, if completed, testimony concerning water quality matters.

Sincerely,

/s/

Mark R. Haflich
Counsel for the AEC Regulatory Staff

and

/s/

Robert Newton
Counsel for the AEC Regulatory Staff

Enclosures:
As stated

cc: w/encl.

Douglas V. Rigler, Esq.
Dr. A. Dixon Callihan
Jack R. Newman, Esq.
Chairman, Atomic Safety and Licensing Board Panel
Chairman, Atomic Safety and Licensing Appeal Board
Mr. Frank W. Karas

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

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TESTIMONY OF NORMAN FRIGERIO

SUBJECT: RADIATION DOSES

1. My name is Norman Frigerio. I am a Radiological Assessment Specialist assigned to the Environmental Statement Project at Argonne National Laboratory, Argonne, Illinois. A resume of my professional qualifications and experience has been previously received in evidence in this proceeding.

2. The purpose of my testimony is to respond to questions asked by Dr. Martin at the Duane Arnold pre-hearing conference (Tr. 33-34) concerning the reasons for the differences between the radiation doses calculated by the Applicant and the Staff.

3. As stated in the testimony of Mr. David Flanagan, the Applicant's calculated cumulative population-integrated exposure of 2.9 man-rem/year corresponds to the genetic impact to the population which is the impact traditionally associated with the man-rem concept. The Staff's calculated population-integrated exposure of 15 man-rem/year also includes a component corresponding to the somatic impact to the population and is correspondingly larger than Applicant's calculation.

4. As stated in the testimony of Mr. David Flanagan, another factor resulting in the differences between the dose calculations of the Applicant and of the Staff for gaseous radioactive releases is the different gaseous source terms (i.e., estimates of gaseous radioactive releases) utilized by the Applicant and the Staff. The Staff's estimates for the release of gaseous radioactivity from the plant as a result of normal operation as well as the basis for those estimates are set forth in FES, §3.5.2 and in the affidavit of Bernard Mann, marked "RS-1". The Applicant's estimates and basis are set forth in the testimony of Mr. Flanagan and in the documents incorporated by reference therein.

5. Any differences that would remain between the Applicant's and the Staff's dose calculations after the Applicant's and the Staff's gaseous source terms are adjusted to a common base (i.e., normalized) and the somatic impact component subtracted from the Staff's dose calculation, would be extremely small and would merely reflect the varying degrees of conservatism in parameter definitions and mathematical modeling used by the Applicant and the Staff.

6. As stated in the testimony of Mr. Thomas Broad, the difference between the whole body dose calculations of the Applicant (0.43 man-rem/year) and of the Staff (1.9 man-rem/year) for liquid radioactive releases is almost entirely attributable to Staff's inclusion of a 1.7 man-rem/year component via the dietary-commercial pathway (FES, p. 5-26, Table 5.5). While the Staff believes that some dose will undoubtedly reach the population via this pathway, the uncertainties involved in assigning a realistic value to this component are such that the Staff has no real disagreement with the Applicant's deletion of a component for this pathway. Except for differences attributable to this pathway, the dose estimates of the Applicant and the Staff would be essentially consistent.

7. It should also be noted that cumulative population-integrated exposure via liquid radioactive releases calculated by the Staff to be 12 man-rem/year (FES, pp. 5-25, 5-26, Table 5.5) reflects the inclusion by Staff of a somatic hazard component, in addition to the traditional genetic component calculated by the Applicant.

8. As stated in paragraph 10 of Mr. Flanagan's testimony, the dominant factor contributing to the difference between the Applicant's and the Staff's calculations of the I-131 dose to a child's thyroid from radioiodine received from the air-grass-cow-milk pathway is the difference between the I-131 source terms assumed by the Applicant and the Staff. An additional factor which would account for any difference that would remain after the Applicant's and Staff's I-131 source terms are normalized is the use by the Staff of a thyroid dose conversion factor of 1000 instead of the 700 factor used by the Applicant.

9. It should be noted that the Staff utilized the methodology of ICRP Report No. 2 and 10 CFR Part 20 in calculating the I-131 dose to a child's thyroid from radioiodine received from the air-grass-cow-milk pathway.

TESTIMONY OF WILLIAM J. MECHAM

RE: INCLUSION OF DOSE COMMITMENT TO

PLANT PERSONNEL IN STAFF COST-BENEFIT ANALYSIS

1. My name is William J. Mecham. I am a Chemical Engineer, assigned to the Environmental Statement Project at Argonne National Laboratory, Argonne, Illinois. A resume of my educational and professional qualifications has been previously received in evidence in this proceeding.

2. The purpose of my testimony is to respond to the question asked by Mr. Kornblith at the Duane Arnold pre-hearing conference (Tr. 38) as to how the Staff's cost-benefit analysis would be affected if an estimated dose commitment to plant personnel at DAEC were to be included as a cost in the Staff's cost-benefit balancing.

3. I was responsible for performing the Staff's cost-benefit analysis for DAEC and for preparing the cost-benefit summary appearing in FES, § 11.

4. Relying on the testimony of Mr. Thomas Murphy concerning the estimated dose commitment to plant personnel at DAEC, I have concluded that inclusion of the estimated 200 man-rem annual on-site esposure as a cost in the Staff's cost-benefit balancing (FES, § 11) would not significantly affect the overall cost-benefit balance.

ERRATA AND ADDENDA, APRIL 1973

to the

FINAL ENVIRONMENTAL STATEMENT

related to the operation of

Duane Arnold Energy Center

USAEC Directorate of Licensing

March 1973

1. In the interest of clarifying the intent of the Staff in recommending the conditions appearing on pages iv and v, (viz.; that the conditions be included only in the proposed facility operating license) the following changes should be made in paragraph 7 of page iv:

   line 6 - after the word "are" add -": (1)"
   line 7 - after the word "and" add - ": (2)"
   line 8 - after the word "facility" add - "which operating license is".

2. Page 3-7, lines 6-7, replace "are also discharged in this manner." with "are discharged via the sanitary system discharge canal."

3. Page 5-15, subparagraph (e), line 16, change "0.2 mg/l" to "0.1 mg/l".

4. Page 12-7, change first line to read "that within 12 months after startup the Applicant will submit to the Staff a report analyzing its chlorination program."

5. Page 5-25, replace with revised Page 5-25 (attached hereto).

halogens and particulates (e.g., I-131), and of noble gases (e.g., Kr-85). These are given because they represent the limiting cases of human hazard (e.g., carcinogenesis).

The maximum airborne doses are found in the north sector at, or near, the boundary. This sector is also habitable so that the maximum value, 1.4 mrem/year, represents a potential dose commitment. Direct doses in all sectors are completely dominated by the noble gas component. Hunters, anglers, and other occasional occupants of the area will receive doses at this rate or less, with an annual dose markedly less than 1.4 mrem. The annual population-integrated dose commitment over a 50-mile radius will be 15 man-rem (the natural population-integrated dose commitment for the same radius is about 74,000 man-rem), which includes an insignificant (i.e., negligible) increment due to indirect doses.

The nearest identifiable dairy herd is pastured about 1.6 miles to the west-northwest of the site. Annual doses to a child's thyroid via the air-cow-milk iodine pathway will be less than 6.5 mrem. The nearest land suitable for pasture lies about 0.7 miles north of the site. Pasture uses of such land represents a potential dose to a child's thyroid less than 20 mrem/year. Monitoring, administrative measures and/or design changes will be required to insure that the actual dose does not exceed 5 mrem/year.

If in the future a cow is located closer to the DAEC than at present (1.6 miles from the site), the Applicant will be required to evaluate the thyroid radiation doses likely to result from consumption of milk produced at the new location, and to take whatever steps are necessary to assure that these doses will be compatible with the then-existing limits for human exposure.

Direct and indirect doses to man via waterborne radionuclides are given in Table 5.5. These include doses to permanent residents of the area, to temporary residents, anglers, boaters, swimmers, etc., and to consumers of foods produced in the area. The maximum, cumulative, annual dose received by any member of the population via normal liquid releases from the DAEC would be less than 0.38 mrem. The annual population-integrated dose commitment over a 50-mile radius would be less than 12 man-rem.

Direct dose rates from radioactive fuel and/or radionuclides produced at and/or stored at the DAEC will be less than one mrem/year at the closest approach to the DAEC. This dose drops off very rapidly with distance, however, so that the total annual population dose from this source will be less than one man-rem. This source is independent of plant releases.

In summary, the Staff concludes that the radiological characteristics of the DAEC and its environs are such as to limit human doses and dose rates to a very small fraction of the natural background (about 135 mrem/year).[31]

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