Regulatory File Cy.

50-249

Commonwealth Edison Company

ONE FIRST NATIONAL PLAZA ★ CHICAGO, ILLINOIS

Address Reply to:
POST OFFICE BOX 767 ★ CHICAGO, ILLINOIS 60690

December 7, 1970

Dr. Peter A. Morris, Director
Division of Reactor Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dear Dr. Morris:

On October 27, 1970 you forwarded comments by the Department of Health, Education, and Welfare concerning our environmental report for the Dresden Nuclear Power Station Unit 3. You asked for responses to items 1, 2 and 4 of these comments. Enclosed are our responses to those items.

This answer has been delayed due to a pending decision to improve our off-gas clean-up system on Units 2 and 3. Accordingly, we informed you of our decision on December 3.

If you have any further questions, please call me.

Sincerely yours,

Byron Lee, Jr.

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Assistant to the President

3952

HEW CONCLUSION No. 1

Because of the number of units located at this site, the philosophy of the Federal Radiation Council, the recent backfitting of the Monticello plant, and the design of new boiling water reactors, it is our opinion that it is prudent as well as technically and economically feasible to install additional holdup capacity in the gaseous waste discharge systems of Dresden Units 2 and 3 to further reduce offsite doses by a factor of at least 10.

RESPONSE:

The design objectives for effluent control have been based on maintaining radiation doses to the general public which are a small fraction of the permissible dose recommendations of the International Commission for Radiological Protection, the National Council on Radiation Protection and Measurement, and the radiation protection guides of the Federal Radiation Council. The design objectives also result in a dose to the public which is a fraction of the USAEC's Title 10 Code of Federal Regulations Part 20. This limit is 500 millirem/year to an individual continuously occupying the nearest boundary to the power plant. This limit is the same regardless of the number of reactors on the site.

The design objectives have been consistent with the desire to keep the radioactive releases as low as practicable. Stack release rate limits have been calculated on the basis of equaling the limit based upon the stack and off-gas design and atmospheric data for the specific station. Such stack limits have then been presented in USAEC Technical Specifications as upper operating limits only. These should not be thought of as representing anticipated stack release rates and include considerable margin between the upper limit and a

expected annual average dose, which typically have been below 5% of the limit.

It is well known that natural background radiation levels can vary between about 100-300 mrem/year depending on the geographical locations and can vary 10-20 mrem at the same location from year to year. Even in this naturally radioactive environment, we selected a design objective which would result in effects upon the nearest plant neighbor which are less than or equal to the yearly variation (10-20 mrem/year) averaged over the plant life. This objective was selected to be small when compared to other radiation sources which we accept or find unavoidable and which have not proven to be harmful.

Current surveillance requirements provide sufficient operating data to assess, at any point in time, the relationship of the actual releases of radioactivity with respect to permissible limits. Operating experience to date has clearly demonstrated that exposures from operating reactors are truly insignificant. Commonwealth Edison will continue to evaluate the meteorological and radiological data to ensure design objectives are met. In addition, because of advancements in the technology of radwaste systems, since the original planning for Dresden Units 2 & 3, Commonwealth Edison is planning to modify its present system to further reduce the releases from Units 2 & 3. We have been engaged in a technical and economic review of the systems presently available. At the conslusion of this review, we will present to the AEC our plans for modification of these units.

HEW CONCLUSION No. 2

The only presentation of estimated offsite radiation dose is for facility operation without any leaking fuel elements. The operating histories of boiling water reactors (BWR) have shown leaking fuel elements usually exist during normal operation. Therefore, the applicant should estimate, based on discharge data obtained from operating BWR power plants, the potential population dose from the combined operation of the three Dresden units for this condition.

RESPONSE:

Leaking fuel is, in fact, the only significant contributing factor in the consideration of offsite dose from an operating BWR. If one were to assume that the facility normal operation was without leaking fuel elements, the expected offsite radiation dose would not be measurable.

Therefore, the contribution of leaking fuel becomes the major consideration in the evaluation of offsite doses for BWR's. It should be noted, however, that the operating experience to date clearly demonstrates that, even with leaking fuel, the maximum expected exposures from BWR's are only a few per cent of the permissible limits.

The basis used for radwaste system design and shielding design considers a stack release rate of 0.1 Ci/sec of 30 minutes old diffusion mixture of noble gases. This is used as a design basis and does not represent what would be expected to be released. It is prudent to have margin in radwaste and shielding design by using a high fission product release rate than to be underdesigned and limit the unit availability.

Experience with plants like Big Rock Point, Dresden 1 and Humboldt Bay shows that release rates are much less than the design rate o 0.1 Ci/sec. In fact, average stack release rates during 1967-1969 for the three plants were 0.007, 0.014 and 0.024 Ci/sec, respectively.

If one assumed for discussion purposes, that 0.1 Ci/sec did leave the stack, which would be indicative of operation with failed fuel, the public exposure from operation of Dresden Units 2 and 3 would be very low. The following tabulation illustrates the expected exposure:

Annual Average Stack Release Rate (Ci/sec)	Neareast Site Boundary Dose (mrem/yr)	People Dose (mrem/yr)
Dresden Unit 2 or 3		
0.05-0.1	25-50	5-10
Dresden Units 2 and 3		
0.1-0.2	28-56	~5.5-11

Though it is expected that stack releases will be less than the 0.1 Ci/sec, the estimated offsite public exposures at that level would be of the order of a few per cent of the AEC's permissible dose. This is truly an insignificant addition to the already radioactive environment (see Response to Conclusion No. 1).

Calculations of stack release rates are performed on each nuclear power plant. The analytical technique was presented in Appendix A of the Dresden 2 and 3 FSAR. Certain aspects of the calculations involved assumptions and/or extrapolation of existing data. Even so, the calculations are considered conservative and experimental verification of the results has been completed.

1. Verification of GE Analytical Model

Two different sets of data were used in this verification effort. One was from the Brookhaven National Laboratory and the second was accumulated at the Dresden site while Unit 1 was operating. In the use of Brookhaven, the research reactor emits Argon 41 in small but easily measurable quantities. Meteorological and off-gas data taken from this site were used to predict the detector doses[1] and compare to the measured data. The following table summarizes the results:

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(1) "A Comparison of Calculated and Measured Long Term Gamma Dose From a Stack Effluent of Radioactive Gases," M.J. May and I.F. Stuart, General Electric Co., May, 1967. Presented at Health Physics Mid-Year Symposium January 1968, Augusta, Georgia.

AVERAGE ANNUAL GAMMA DOSE (MRAD/YR) FOR
BGRR 1963 - PREDICTED AND OBSERVED

Station	Sector	Distance(meters)	Detector Dose (m Rad/Yr) Measured(a)	Calculated(c)
E-2	NW	1100	21(b)	20
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E-9	NE	2750	45	34
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E-11	S	420	140	122
E-12	NNE	460	158	156

Note: (a) Based on a 10 month average
(b) Based on a 9 month average
(c) Based on an 85% operation factor giving a release rate of 0.127 Ci/sec.

As can be seen, the comparison is very good as the calculated and measured values are quite similar.

In the case of the Dresden site, data were used for a period where off-gas release was just measurable in the environment. The values used in these determinations were obtained from paired 10-mr gamma dosimeters in each of the environmental stations at Dresden. All chambers were read weekly with results averaged on a monthly basis. The calculated iso-dose contours relating doses in the environment to Dresden Unit 1 stack emission were compared to the field data. A seven-month period when the release rate averaged about 51,500 μCi/sec (September 1964 to March 1965) was selected as the test period. Since the high environmental background resulting from atmospheric bomb testing was known to be decreasing during the period of interest, comparable seven-month periods the year before and the year following the period of interest were averaged to minimize seasonal meteorological variables. The background obtained was substracted from the gross reading during the period of test. Results were compared to predicted values obtained from iso-dose curves obtained for a release

rate of 51,500 μCi/sec. Statistical analysis has shown that the ion chambers lowest level of detection at the 05% confidence level was approximately 0.4 to 0.5 mr/wk above background. Results of these comparisons are shown in Figure 1-1. In this case, the measurements are quite near the sensitivity of the instruments so that more uncertainity exists in the data compared with Brookhaven data. However, agreement between predicted and observed data is still quite good with predicted maximum dose being greater than observed except for one instance.

On the basis of the above experimental data supporting the analytical methods, it is concluded that the proposed off-gas limits are reasonably realistic values.

2. Public Health Service Study at Dresden

The Public Health Service Study[2] performed at the Dresden site resulted in many vertifications of the fact that the operation of Dresden Unit 1 has had negligible radiological impact on the environmen Dr. Lieberman in his paper on monitoring and surveillance presented in Minneapolis on October 10, 1969 stated: "The critical pathway for possible exposure of the population from this reactor was determined to be via the atmosphere through the discharge of noble gases. Based on survey instrument and dosimeter measurements around the site, the average exposure at the sampling locations during the study was estimated to be less than 5 millirem per year. A more precise estimate

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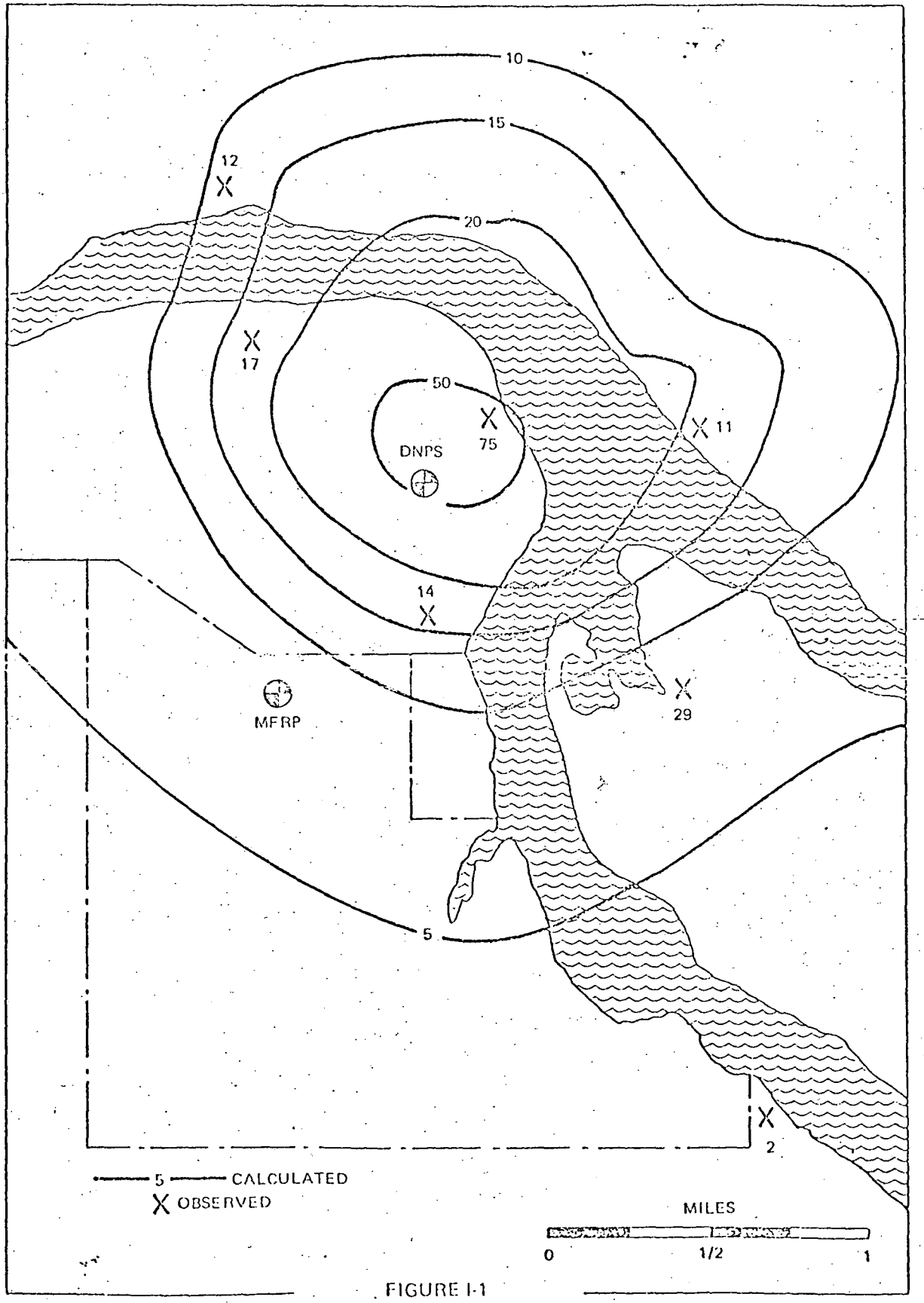

FIGURE I-1

DOSE (MREM) PATTERN
AROUND DRESDEN UNIT 1
STACK (51,500 μCi/SEC
9/64-3/65)

was difficult because gaseous releases from Dresden have resulted in environmental radiation levels which were only marginally above background". As stated in this quotation, the dose to an individual is estimated to be less than 5 mrem/year. Population exposure from this same situation at 10 miles away (assuming people present) would be about 100 times less than this 5 mrem/year. These are truly insignificant exposures.

HEW CONCLUSION No. 4

The environmental statement does not, but should, contain a commitment by the applicant to use the plant's radioactive waste treatment system to the extent of its capacity and to maintain radioactive waste effluents at as low a level as practicable.

RESPONSE:

Commonwealth Edison has in the past and will continue in the future to use the radioactive waste treatment facilities to the full extent of their capacity to maintain effluent levels as low as practicable.

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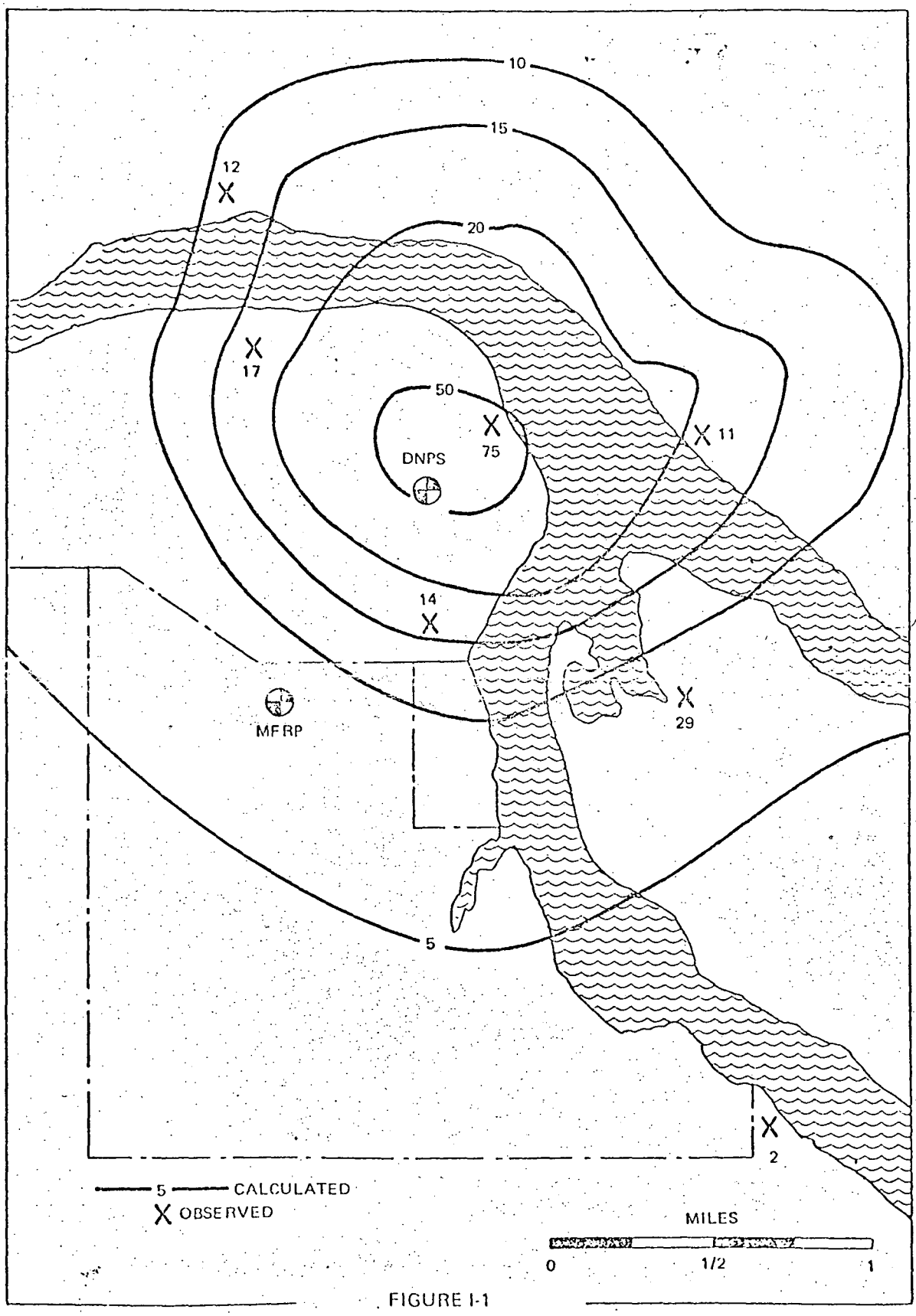

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