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MEMORANDUM FOR: V. Moore, Assistant Director for Environmental Projects
Division of Site Safety and Environmental Analysis

FROM: R. H. Vollmer, Assistant Director for Site Analysis, DSE

SUBJECT: [illegible]
[illegible]

PLANT NAME: Three Mile Island Nuclear Station Unit 2
LICENSING STAGE: OL
DOCKET NUMBER: 50-320
MILESTONE NUMBER/BRANCH CODE: 36-33
RESPONSIBLE BRANCH: EPB-3
PROJECT MANAGER: J. Norris
REQUESTED COMPLETION DATE: 11/12/76
DESCRIPTION OF RESPONSE: Supplement to FES
REVIEW STATUS: RAB input to FES Supplement Complete

Enclosed is Section 5.4 for the subject plant Final Environmental Statement Supplement. The Draft Supplement Section 6.6 on radiological monitoring will not require revision for the Final Supplement.

This input was prepared by J. Osloond, DSE/RAB.

/S/

Richard H. Vollmer, Assistant Director
for Site Analysis
Division of Site Safety and
Environmental Analysis

Enclosure: as stated

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DATE	11/8/76	11/ 8 /76	11/5/76	11/ /76

Form AEC-318 (Rev. 9-53) AECM 0240 — U.S. GOVERNMENT PRINTING OFFICE: 1974-526-166

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5.X RADIOLOGICAL IMPACTS

5.X.1 Radiological Impact on Man

The models and considerations for environmental pathways leading to estimates of radiation dose commitments to individuals are discussed in detail in draft Regulatory Guide 1.109. Similarly use of these models, and additional assumptions, for population dose estimates are described in Appendix A of this statement.

5.X.1.1 Exposure Pathways

The environmental pathways which were considered in preparing this section are shown in Figure 5.X.1. Estimates were made of radiation doses to man at and beyond the site boundary based on NRC staff estimates of expected effluents as shown in Tables 3.___ and 3.___, site meteorological and hydrological considerations, and exposure pathways at the Three Mile Island Unit 2 nuclear power station.

Inhalation of air and ingestion of food and water containing tritium, C-14 and radiocesium are estimated to account for essentially all of total body radiation dose commitments to individuals and the population within 50 miles of the station.

5.X.1.2 Dose Commitments from Radioactive Releases to the Atmosphere

Radioactive effluents released to the atmosphere from the Three Mile Island Unit 2 facility will result in small radiation doses to the

public. NRC staff estimates of the expected gaseous and particulate releases listed in Table 3.___, and the site meteorological considerations discussed in Section 2.___ of this statement and summarized in Table 5.X.1 were used to estimate radiation doses to individuals and populations. The results of the calculations are discussed below.

Radiation Dose Commitments to Individuals

The predicted dose commitments to "maximum" individuals at the off-site locations where doses are expected to be largest are listed in Table 5.X.2. A maximum individual is assumed to consume well above average quantities of the foods considered (see Table A-2 in Regulatory Guide 1.109). The standard NRC models were used in order to realistically model features of the Three Mile Island Unit 2 plant design and the site environs.

Radiation Doses Commitments to Populations

The estimated annual radiation dose commitment to the population (within 50 miles) for the Three Mile Island Unit 2 Nuclear Power Plant from gaseous and particulated releases were based on the projected site population distribution for the Year 2010. Doses beyond the 50-mile radius were based on the average population densities discussed in Appendix A of this statement. The annual population

dose commitments are presented in Table 5.X.5. Background radiation doses are provided for comparison. The doses from atmospheric releases from the Three Mile Island Unit 2 facility during normal operation represent an extremely small increase in the normal population dose from background radiation sources.

5.X.1.3 Dose Commitments from Radioactive Liquid Releases to the Hydrosphere

Radioactive effluents released to the hydrosphere from the Three Mile Island Unit 2 facility during normal operation will result in small radiation doses to individuals and populations. NRC staff estimates of the expected liquid releases listed in Table 3.__, and the site hydrological considerations discussed in Section 2.__ of this statement and summarized in Table 5.X.3 were used to estimate radiation dose commitments to individuals and populations. The results of the calculations are discussed below.

Radiation Dose Commitments to Individuals

The estimated dose commitments to individuals at selected off-site locations where exposures are expected to be largest are listed in Table 5.X.4. The standard NRC models given in Regulatory Guide 1.109 were used for these analyses.

Radiation Doses Commitments to Populations

The estimated population radiation dose commitments to 50 miles for the Three Mile Island Unit 2 facility from liquid releases, based on the use of water and biota from the Susquehanna River, are shown in Table 5.X.5. Dose commitments beyond 50 miles were based on the assumptions discussed in Appendix A.

Background radiation doses are provided for comparison. The dose commitments from liquid releases from the Three Mile Island Unit 2 facility represent small increases in the population dose from background radiation sources.

5.X.1.4 Direct Radiation

Radiation from the facility Radiation fields are produced in nuclear plant environs as a result of radiactivity contained within the reactor and its associated components.

Doses from sources within the plant are primarily due to nitrogen-16, a radionuclide produced in the reactor core. Because of variations in equipment lay-out, exposure rates are strongly dependent upon

overall plant design. Since the primary coolant of pressurized water reactors is contained in a heavily shielded area of the plant, dose rates in the vicinity of PWR's are generally undetectable (less than 5 mrem/yr).

Low level radiactivity storage containers outside the plant are estimated to contribute less than 0.01 mrem/year at the site boundary.

Occupational Radiation Exposure

Based on a review of the applicant's safety analysis report, the staff has determined that the applicant is committed to design features and operating practices that will assure that individual occupational radiation doses (occupational dose is defined in 10 CFR Part 20) and that individual and total plant population doses will be as low as is reasonably achievable.(1) For the purpose of portraying the radiological impact of the plant operation on all on-site personnel, it is necessary to estimate a man-rem occupational radiation dose. For a plant designed and proposed to be operated in a manner consistent with the 10 CFR Part 20, there will be many variables which influence exposure and make it difficult to determine a quantitative total occupational radiation dose for a specific plant. Therefore, past exposure experience from operating nuclear power stations(2) has been used to provide a widely applicable estimate to

(1) 10 CFR Part 20, Standards for Protection Against Radiation

(2) NUREG 75/032, Occupational Radiation Exposure to Light Water Cooled Reactors 1969-1974 (June 1975)

be used for all light water reactor power plants of the type and size for the Three Mile Island Unit 2 plant. This experience indicates a value of 500 man-rem per year per reactor unit.

On this basis, the projected occupational radiation exposure impact of the Three Mile Island unit 2 station is estimated to be 500 man rem per year.

Transportation of Radioactive Material

The transportation of cold fuel to a reactor, of irradiated fuel from the reactor to a fuel reprocessing plant, and of solid radioactive wastes from the reactor to burial grounds is within the scope of the NRC report entitled, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants." The environmental effects of such transportation are summarized in Table 5.X.6.

5.X.1.5 Comparison of Dose Assessment Models

The applicant's site and environmental data provided in the Environmental Report[a] and in Evaluation to Demonstrate Compliance with 10 CFR 50 Appendix I was used extensively in the dose calculations.

[a]Three Mile Island Nuclear Station Unit 2 Environmental Report, Operating License Stage, Metropolitan Edison Co., Docket Number 50-320.

5.X.1.6 Evaluation of Radiological Impact

The radiological impact of operating the proposed Three Mile Island Unit 2 nuclear power station is presented in terms of individual dose commitments in Table 5.X.5. The annual individual dose commitments resulting from routine operation of the plant are a small fraction of the dose limits specified in 10 CFR Part 20. The population dose commitments are small fractions of the dose from natural environmental radioactivity. As a result, the staff concluded that there will be no measurable radiological impact on man from routine operation of this plant.

5.X.1.7 Comparison of Calculated Doses with NRC Design Objectives

Tables 5.X.7 and 5.X.8 show a comparison of calculated doses from routine releases of liquid and gaseous effluents from the Three Mile Island Unit 2 plant with the design objectives of Appendix I to 10 CFR 50 and with the proposed staff design objectives of RM-50-2.

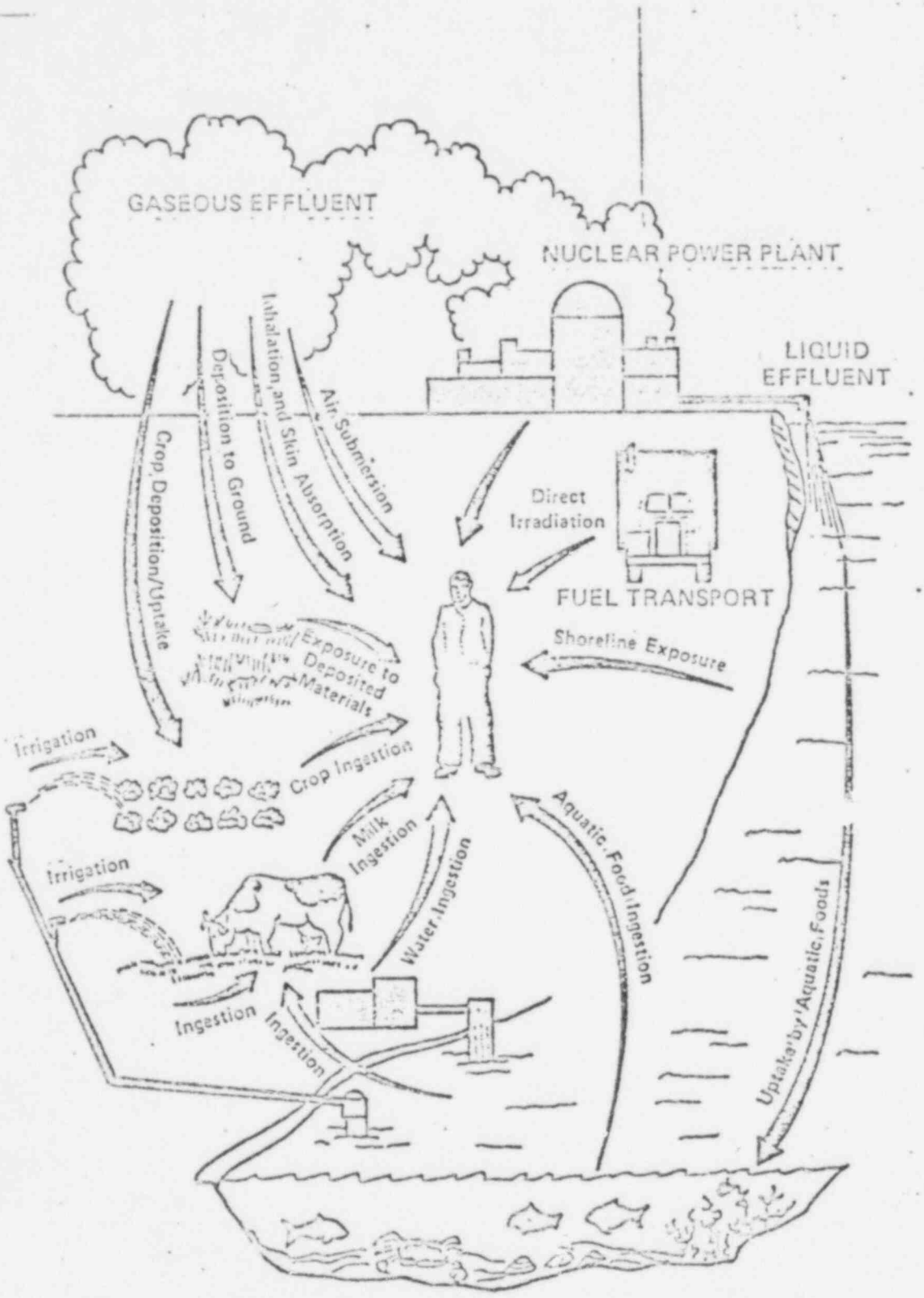

FIGURE 5.X.1 EXPOSURE PATHWAYS TO MAN

5.X.1 SUMMARY OF ATMOSPHERIC DISPERSION FACTORS AND DEPOSITION VALUES FOR SELECTED LOCATIONS NEAR THE THREE MILE ISLAND UNIT 2 NUCLEAR POWER STATION*

LOCATION	SOURCE	X/Q (sec/m^3)	RELATIVE DEPOSITION (m^{-2})
Nearest Site Land Boundary (0.37 mi WNW)	A	1.4 E-06	2.2. E-08
	B	6.7 E-06	1.4 E-07
	C	4.5 E-05	1.1 E-07
Nearest Residence and garden (0.37 mi WNW)	A	1.4 E-06	2.2 E-08
	B	6.7 E-06	1.4 E-07
	C	4.5 E-05	1.1 E-07

*The doses presented in the following tables are corrected for radioactive decay and cloud depletion from deposition, where appropriate, in accordance with Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light Water Reactors," March 1976.

**"Nearest" refers to that type of location where the highest radiation dose is expected to occur from all appropriate pathways.

Source A is Reactor Building Vent
Source B is Reactor Building Vent Purge
Source C is Turbine Building Vent

TABLE 5.X.2 ANNUAL DOSE COMMITMENTS TO A MAXIMUM INDIVIDUAL DUE TO GASEOUS AND PARTICULATE EFFLUENTS

LOCATION	PATHWAY	DOSE (mrem/yr) TOTAL BODY	GI-TRACT	BONE	LIVER	THYROID	LUNG	SKIN
Nearest*	Plume	0.30	0.30	0.30	0.30	0.30	0.32	0.93
Residence	Ground Deposit	0.02	0.02	0.02	0.02	0.02	0.02	0.02
and Garden	Inhalation (Child)	0.04	0.04	**	0.04	0.06	0.04	0.04
(0.37 mi WNW)	Vegetation (Child)	1.4	1.4	5.9	1.4	1.5	1.4	1.4

*"Nearest" refers to that type of location where the highest radiation dose is expected to occur from all appropriate pathways.

**Less than 0.01 mrem/yr.

TABLE 5.X.3 SUMMARY OF HYDROLOGIC TRANSPORT AND DISPERSION FOR LIQUID RELEASES FROM THE THREE MILE ISLAND UNIT 2 NUCLEAR POWER STATION*

LOCATION	TRANSIT TIME (Hours)	DILUTION FACTOR
Nearest Drinking Water Intake (16 mi. downstream Columbia, Pa)	3.	20.
Nearest Sport Fishing Location (∿.1 mi. downstream)**	<1.	2.
Nearest Shoreline (.1 mi. downstream)	<1.	1.
Nearest Irrigated** Crops (3.5 mi. downstream)	<1.	20.

*See Regulatory Guide 1.112, "Analytical Models for Estimating Radioisotopes Concentrations in Different Water Bodies," (1976).

**Assumed for purposes of an upper limit estimate-detailed information not available.

TABLE 5.X.4 ANNUAL INDIVIDUAL DOSE COMMITMENTS DUE TO LIQUID EFFLUENTS

LOCATION	PATHWAY	DOSE (mrem/yr) TOTAL BODY	BONE	LIVER	THYROID	LUNG	GI TRACT
Nearest River Water Use (16 mi. downstream)	Drinking Water	0.04	**	0.04	0.08	0.04	0.04
Nearest Fish Production (.1 mi. downstream)	Fish (Outfall Area)	1.6	1.2	2.1	0.19	0.24	0.23
Nearest Shoreline (.1 mi. downstream)	Sediments	**	**	**	**	**	**
Nearest Use* of Irrigated Food Crops (3.5 mi. downstream)	Irrigation Water-Food Crops (Adult)	0.05	**	0.05	0.05	0.04	0.05

*Assumed for purposes of an upper limit estimate-detailed information on usage and productivity not available.

**Less than 0.01 mrem/yr

TABLE 5.X.5 ANNUAL POPULATION DOSE COMMITMENTS IN THE YEAR 2010

Category	Population Dose Commitment (man-rem) 50 miles	U.S. Population
Natural Radiation Background[a]	310,000.[b]	28,000,000.[c]
Three Mile Island Unit 2 Nuclear Power Plant Operation		
Plant Work Force	**	500.
General Public (Total)	11.	33.
Noble Gases Submersion	2.	2.
Inhalation	1.	1.
Ground Deposition	*	*
Terrestrial Foods (including irrigated crops)	5.	18.
Drinking Water	3.	5.
Aquatic Foods	*	*
Recreation	*	*
Transportation of nuclear fuel and radioactive wastes	**	7.

*Less than 1 man-rem/yr

**Included in the U.S. population, since some exposure is received by persons residing outside 50 mile radius.

(a)"Natural Radiation Exposure in the United States," U.S. Environmental Protection Agency, ORP-SID 72-1 (June 1972).

(b)Using the average Pennsylvania state background dose (97. mrem/yr) in (a), and year 2010 projected population of 3,200,000.

(c)Using the average US background dose (102 mrem/yr) in (a), and year 2010 projected U.S. population of 280,000,000 from "Population Estimates and Projections," Series II, U.S. Dept. of Commerce, Bureau of the Census, Series P-25, No. 541 (Feb. 1975).

TABLE 5.X.6 ENVIRONMENTAL IMPACT OF TRANSPORTATION OF FUEL AND WASTE TO AND FROM ONE LIGHT-WATER-COOLED NUCLEAR POWER REACTOR[a]

Normal conditions of transport

Heat (per irradiated fuel cask in transit)	250,000 Btu/hr
Weight (governed by Federal or State restrictions)	73,000 lbs. per truck; 100 tons per cask per rail car
Traffic density	
Rail	< 1 per day
	< 3 per month

Exposed population	Estimated number of persons	Range of doses to exposed individuals (millirems per reactor yr)	Cumulative dose to exposed population (man-rems per reactor yr)[c]
Transportation Worker	200	0.01 to 300	4
General Public			
Onlookers	1,100	0.003 to 1.3	
Along Route	600,000	0.0001 to 0.06	3

Accidents in transport

Radiological effects	Small[d]
Common (nonradiological) causes	1 fatal injury in 100 reactor years; 1 nonfatal injury in 10 reactor years; $475 property damage per reactor year

[a] Data supporting this table are given in the Commission's Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants, WASH-1238, December 1972, and Supp. I, NUREG 75/038, April 1975.

[b] The Federal Radiation Council has recommended that the radiation doses from all sources of radiation other than natural background and medical exposures should be limited to 5,000 millirems/year for individuals as a result of occupational exposure and should be limited to 500 millirems/year for individuals in the general population. The dose to individuals due to average natural background radiation is about 102 millirems/year.

[c] Man-rem is an expression for the summation of whole-body doses to individuals in a group. Thus, if each member of a population group of 1,000 people were to receive a dose of 0.001 rem (1 millirem), or if 2 people were to receive a dose of 0.5 rem (500 millirems) each, the total man-rem in each case would be 1 man-rem.

[d] Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single reactor or a multi-reactor site.

TABLE 5.X.7 COMPARISON OF CALCULATED DOSES TO A MAXIMUM INDIVIDUAL FROM THREE MILE ISLAND UNIT 2 OPERATION WITH GUIDES FOR DESIGN OBJECTIVES PROPOSED BY THE STAFF[a]

CRITERION	RM-50-2 DESIGN OBJECTIVE	CALCULATED DOSE
Liquid Effluents		
Dose to total body or any organ from all pathways	5 mrem/yr	2.3 mrem/yr
Noble Gas Effluents (at site boundary)		
Gamma dose in air	10 mrad/yr	0.5 mrad/yr
Beta dose in air	20 mrad/yr	1.5 mrad/yr
Dose to total body of an individual	5 mrem/yr	0.3 mrem/yr
Dose to skin of an individual	15 mrem/yr	1.0 mrem/yr
Radioiodine and Particulates[b]		
Dose to any organ from all pathways (Child)	15 mrem/yr	5.9 mrem/yr

[a]Guides on Design Objectives proposed by the NRC staff on February 20, 1974; considers doses to individuals from all units on site. From "Concluding Statement of Position of the Regulatory Staff," Docket No. RM-50-2, Feb. 20, 1974, pp. 25-30, U.S. Atomic Energy Commission, Washington, D. C.

[b]Carbon-14 and tritium have been added to this category.

TABLE 5.X.8 COMPARISON OF CALCULATED DOSES TO A MAXIMUM INDIVIDUAL FROM THREE MILE ISLAND UNIT 2 OPERATION WITH APPENDIX I DESIGN OBJECTIVES[a]

CRITERION	APPENDIX I DESIGN OBJECTIVE	CALCULATED DOSES
Liquid Effluents		
Dose to total body from all pathways (Adult)	3 mrem/yr	1.7 mrem/yr
Dose to any organ from all pathways (Adult-Liver)	10 mrem/yr	2.3 mrem/yr
Noble Gas Effluents (at site boundary)		
Gamma dose in air	10 mrad/yr	0.5 mrad/yr
Beta dose in air	20 mrad/yr	1.5 mrad/yr
Dose to total body of an individual	5 mrem/yr	0.3 mrem/yr
Dose to skin of an individual	15 mrem/yr	1.0 mrem/yr
Radioiodines and Particulates[b]		
Dose to any organ from all pathways Child-bone)	15 mrem/yr	5.9 mrem/yr

[a]Appendix I Design Objectives from Sections II.A, II.B, II.C of Appendix I, 10 CFR Part 50; considers doses to maximum individual per reactor unit. From Federal Register V. 40, p. 19442, May 5, 1975.

[b]Carbon-14 and tritium have been added to this category.

5.Y.1 Radiological Impact on Biota Other Than Man

The models and considerations for environmental pathways leading to estimates of radiation doses to biota are discussed in detail in Volume 2, "Analytical Models and Calculations" of WASH-1258.[a]

5.Y.1.1 Exposure Pathways

The environmental pathways which were considered in preparing this section are shown in Figure 5.Y.1. Dose estimates were made for biota at the nearest land and water boundaries of the site, and in the aquatic environment at the point where plant's liquid effluents mix with the Susquehanna River. The estimates were based on estimates of expected effluents as shown in Tables 3.__ and 3.__, site meteorological and hydrological considerations, and the exposure pathways anticipated at the Three Mile Island Unit 2 nuclear power station.

5.Y.1.2 Doses to Biota from Radioactive Releases to the Biosphere

Depending on the pathway (as discussed in Regulatory Guide 1.109), terrestrial and aquatic biota will receive doses approximately the same or somewhat higher than man receives. Dose estimates for some typical biota at the Three Mile Island site are shown in Table 5.Y.1 Doses to a greater number of similar biota in the off-site environs will generally be much lower.

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[a] FES, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Practicable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, WASH-1258 July 1973.

5.Y.1.3 Doses to Biota from Direct Radiation

Although many of the terrestrial species may be continuously exposed, and thereby receive higher doses than man, aquatic species and some terrestrial species may receive somewhat lower doses depending on shielding by water or soil (e.g., burrows). As a result of these uncertainties, it was assumed that the direct radiation doses to biota at the site boundary will be about the same as for man. As shown on Table 5.X.7, direct radiation doses will generally be less than 5 mrad/yr.

5.Y.1.4 Evaluation of the Radiological Impact on Biota[a,b]

Although guidelines have not been established for desirable limits for radiation exposure to species other than man, it is generally agreed that the limits established for humans are also conservative for other species. Experience has shown that it is the maintenance of population stability that is crucial to the survival of a species, and species in most ecosystems suffer rather high mortality rates from natural causes. While the existence of extremely radiosensitive biota is possible and while increased radiosensitivity in organisms may result from environmental interactions with other stresses (e.g., heat, biocides, etc), no biota have yet been discovered that show a sensitivity (in terms of increased disease or death) to radiation exposures as low as those expected in the area surrounding

[a] S. T. Auerbach, "Ecological Considerations in Siting Nuclear Power Plants. The Long Term Biota Effects Problems," Nucl. Safety 12: 25 (1971).

[b] "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," BEIS-NRC, 1972 ("BEIR" Report)

the Three Mile Island nuclear power station. The "BEIR" Report concluded that the evidence to date indicates that no other living organisms are very much more radiosensitive than man. Therefore, no measurable radiological impact on populations of biota is expected from the radiation and radioactivity released to the biosphere as a result of the routine operation of the Three Mile Island Unit 2 nuclear power station.

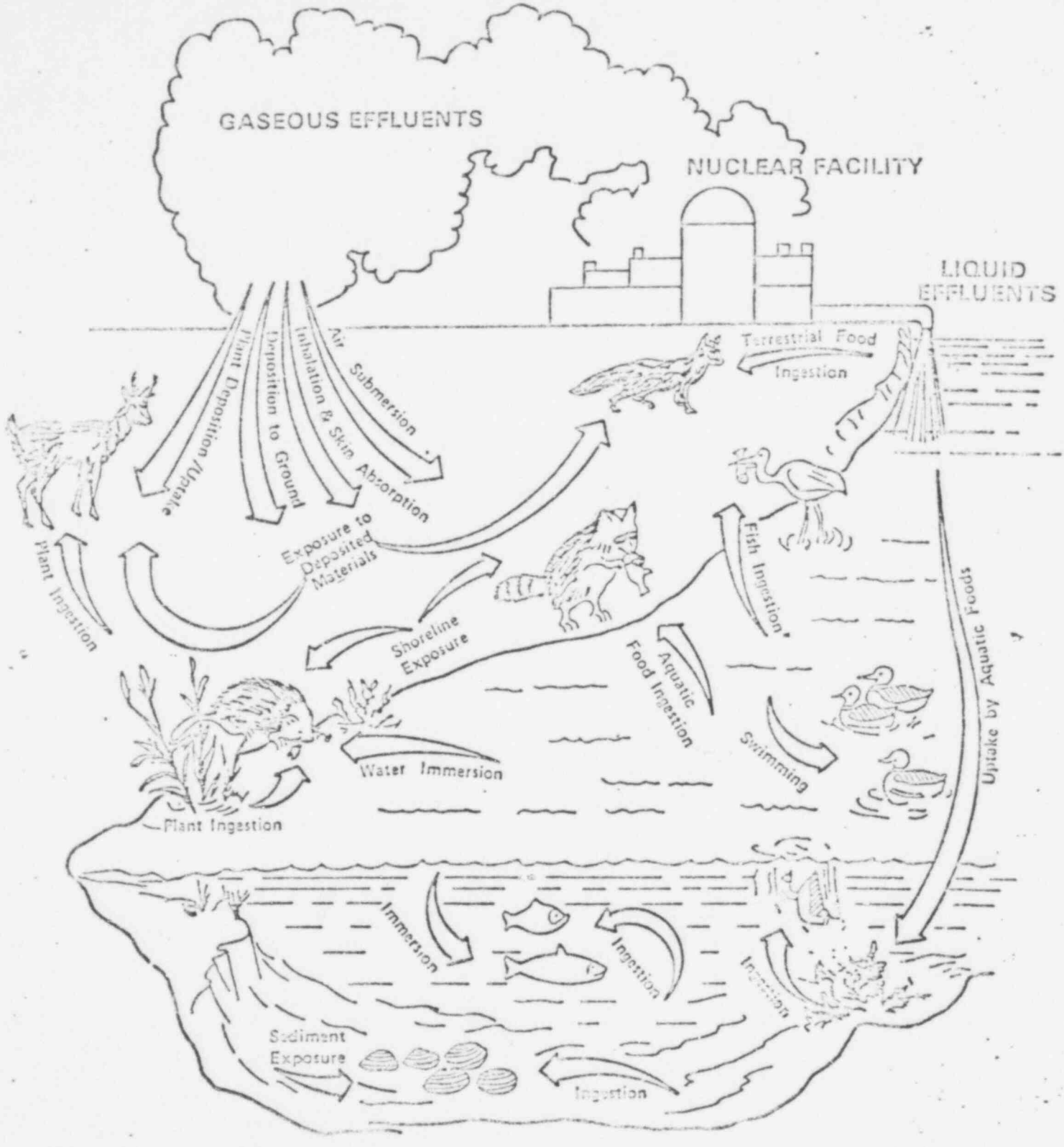

FIGURE 5.Y.1 EXPOSURE PATHWAYS TO BIOTA OTHER THAN MAN

TABLE 5.Y.1 DOSE ESTIMATES FOR TYPICAL BIOTA AT THE THREE MILE ISLAND UNIT 2 SITE

BIOTA	LOCATION	PATHWAY	DOSE (mrad/yr)
Deer	Nearest Site Land Boundary (0.4 mi. WNW)	Atmosphere	0.6
Fox	"	"	1.0
Terrestrial Flora	"	"	0.2
Raccoon	"	Atmosphere Hydrosphere	2
Muskrat	"	"	10
Heron	"	"	20
Duck	Plant Outfall	"	10
Fish	"	Hydrosphere	10
Invertebrates	"	"	8
Algae	"	"	7

Note: Atmospheric doses include estimates of plume dose, ground deposition dose, inhalation dose, and ingestion doses where appropriate. Hydrospheric doses include estimates of immersion dose, dose from consumption, and sediment dose where appropriate.

Appendix A

NEPA Population Dose Assessment

Population dose commitments are calculated for all individuals living within 50 miles of the facility employing the same models used for individual doses (see Regulatory Guide 1.109 in preparation). In addition, population doses associated with the export of food crops produced with the 50-mile region and the atmospheric and hydrospheric transport of the more mobile effluent speci[illegible]ch as noble gases, tritium, and carbon-14 have been considered.

5.A.1 Noble Gas Effluents

For locations within 50 miles of the reactor facility, exposures to these effluents are calculated using the atmospheric dispersion models in Regulatory Guide 1.111 and the dose models described in Section 5.1 and Regulatory Guide 1.109. Beyond 50 miles, and until the effluent reaches the northeastern corner of the United States, it is assumed that all the noble gases are dispersed uniformly in the lowest 1,000 meters of the atmosphere. Decay in transit was also considered. Beyond this point, noble gases having a half-life greater than one year (e.g., Kr-85) were assumed to completely mix in the troposphere of the world with no removal mechanisms operating. Transfer

of tropospheric air between the northern and southern hemispheres, although inhibited by wind patterns in the equatorial region, is considered to yield a hemisphere average tropospheric residence time of about two years with respect to hemispheric mixing. Since this time constant is quite short with respect to the expected mid-point of plant life (15 yrs), mixing in both hemispheres can be assumed for evaluations over the life of the nuclear facility. This additional population dose commitment to the U. S. population was also evaluated.

5.A.2 Iodines and Particulates Released to the Atmosphere

Effluent nuclides in this category deposit onto the ground as the effluent moves downwind, which continuously reduces the concentration remaining in the plume. Within 50 miles of the facility, the deposition model in Regulatory Guide 1.111 was used in conjunction with the dose models in Regulatory Guide 1.109. Site specific data concerning production, transport and consumption of foods within 50 miles of the reactor were used. Beyond 50 miles, the deposition model was extended until no effluent remained in the plume. Excess food not consumed within the 50-mile distance was accounted for, and additional food production and consumption representative of the eastern half of the country was assumed. Doses obtained in this manner were then assumed to be received by the number of individuals living within the direction

sector and distance described above. The population density in this sector is taken to be representative of the Eastern United States, which is about 160 people per square mile.

5.A.3 Carbon-14 and Tritium Released to the Atmosphere

Carbon-14 and tritium were assumed to disperse without deposition in the same manner as krypton-85 over land. However, they do interact with the oceans. This causes the carbon-14 to be removed with an atmospheric residence time of 4 to 6 years with the oceans being the major sink. From this, the equilibrium ratio of the carbon-14 to natural carbon in the atmosphere was determined. This same ratio was then assumed to exist in man so that the dose received by the entire population of the U.S. could be estimated. Tritium was assumed to mix uniformly in the world's hydrosphere, which was assumed to include all the water in the atmosphere and in the upper 70 meters of the oceans. With this model, the equilibrium ratio of tritium to hydrogen in the environment can be calculated. The same ratio was assumed to exist in man, and was used to calculate the population dose, in the same manner as with carbon-14.

5.A.4 Liquid Effluents

Concentrations of effluents in the receiving water within 50 miles of the facility were calculated in the same manner as described

above for the Appendix I calculations. No depletion of the nuclides present in the receiving water by deposition on the bottom of the Susquehanna River was assumed. It was also assumed that aquatic biota concentrate radioactivity in the same manner as was assumed for the Appendix I evaluation. However, food consumption values appropriate for the average individual, rather than the maximum, were used. It was assumed that all the sport and commercial fish and shell fish caught within the 50 mile area were eaten by the U.S. population.

Beyond 50 miles, it was assumed that all the liquid effluent nuclides except tritium have deposited on the sediments so they make no further contribution to population exposures. The tritium was assumed to mix uniformly in the world's hydrosphere and to result in an exposure to the U.S. population in the same manner as discussed for tritium in gaseous effluents.