
Environmental Assessment of Radiological Effluents from Data Gathering and Maintenance Operation on Three Mile Island Unit 2

Interim Criteria Approved by the Commission on April 7, 1980

**Three Mile Island Program Office
Office of Nuclear Reactor Regulation**

**U.S. Nuclear Regulatory
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from Data Gathering and Maintenance Operations
at Three Mile Island, Unit 2

Introduction

The staff is currently in the process of preparing a programmatic environmental impact statement (PEIS) for TMI-2 which will address all radiological releases that may occur as a result of the cleanup and recovery operations. These operations will begin after the PEIS is published in final form provided the proposed cleanup programs have been found to be environmentally acceptable. In the interim period it is necessary for the licensee to conduct data gathering and maintenance operations on the damaged reactor. The action of approval of these interim operations does not foreclose any of the options of the PEIS. In addition, regardless of what cleanup choice is made in the PEIS, the approval of these data gathering and maintenance operations enhance the ability of the licensee to maintain the reactor in a safe configuration and to plan effectively for recovery operations. This Environmental Impact Appraisal evaluates the effects on the environment of allowing these data gathering and maintenance operations to be conducted. These data gathering and maintenance operations do not include purging of the containment atmosphere, disposal of EPICOR-II water or the treatment and disposal of high level radioactively contaminated water in the reactor building.

The interim criteria described below provide a mechanism by which the licensee may request to make small radioactive releases as a result of data gathering and maintenance operations. These criteria partly apply to the licensee and partly to the NRC staff. The criteria are as follows:

- The licensee must request approval from the NRC to perform data gathering and maintenance operations. In addition, separate procedures must be developed for each operation and submitted to NRC for approval. These procedures must contain a description of the need for the operation, estimates of radioactivity that may be released, and estimates of onsite and offsite doses that may occur as a result of the operation. The procedures for each operation should be designed to conform to the existing NRC technical specifications as well as the "As Low As Reasonably Achievable" (ALARA) concepts of 10 CFR Parts 20 and 50. The procedures developed by the licensee should not interfere with the applicability of other limitations, conditions, or agreements that the licensee may have regarding the releases of radioactive gaseous or liquid effluents with NRC, or with other federal, state or local authorities.
- These procedures will be reviewed by the NRC to ensure that they meet the existing technical specifications, that the ALARA concepts of 10 CFR Part 20 and 10 CFR Part 50 are met and to ensure that the existing Appendix I to 10 CFR Part 50 design objectives are conformed to, and that they conform to agreements to which the NRC is a party.

Procedures will be reviewed by the NRC with approval authority criteria defined as follows:

- The Deputy Program Director, TMI-2 Cleanup, onsite will have the authority to permit weekly releases which result in offsite doses that are not greater than 5% of the annual Appendix I to 10 CFR Part 50 design objectives normalized to a weekly rate (i.e., 0.05 times the annual design objective divided by 52). These permitted releases will allow the onsite TMI manager the flexibility to continue or authorize decontamination procedures while keeping releases at a small fraction of those evaluated in the FES of 1972 for Units 1 and 2.
- The Director of the Office of Nuclear Reactor Regulation (NRR) will have the authority to permit weekly releases which result in offsite doses that are not greater than 50% of the annual Appendix I to 10 CFR Part 50 design objectives normalized to a weekly rate (i.e., 0.50 times the annual design objective divided by 52).
- Releases which may result in offsite doses in excess of those described above require approval by the Commission.

Environmental Impact Appraisal

The existing radiological environmental technical specifications define limits and conditions for the controlled release of radiological effluents to the environs to ensure that these releases are as low as is reasonably achievable. The existing limits assure that the releases from the plant should result in radiation exposures less than a few percent of natural background exposures. They do not, however, require that the dose design objectives of 10 CFR Part 50, Appendix I be conformed to. The proposed criteria would change this by allowing only procedures which are no greater than 50% of the Appendix I design objectives to be approved by the staff. Furthermore, each procedure would be reviewed from the ALARA standpoint, hence it is likely that the actual doses that occur as a result of the data gathering and maintenance operations are much lower than the Appendix I design objectives.

The existing license technical specifications result in environmental impacts described in the Final Environmental Statement (FES) for Units 1 and 2 dated December, 1972, and in the supplement to the Final Environmental Statement dated December, 1976. The criteria described here will put an additional constraint on the licensee and will assure that 50% of the annual dose design objectives of 10 CFR Part 50, Appendix I are conformed to as actual requirements for approval by the NRC. In addition to these constraints, the licensee will be required to keep radioactive releases as far below these design objectives as reasonably achievable. Consequently, the environmental impact of TMI Unit 2 for these operations will be below that projected in the Final Environmental Impact Statements, and will not result in a significant environmental impact.

In the Final Supplement to the Final Environmental Statement (1976) it was concluded that no significant environmental impacts are anticipated from normal operational releases of radioactive materials, and that the calculated dose to the estimated year 1990 U.S. population is less than 33 person rem/yr. This value is considerably less than that due to natural background which is approximately 28,000,000 person rem/yr. For a 50 mile radius the calculated population dose for normal operation of TMI-2 was 11 person rem/year, whereas the dose due to natural background was estimated to be 310,000 person-rem for the same population.

The predicted dose commitments to the individual who would receive the maximum dose are listed in Table 1 for atmosphere releases and were taken from the FES of 1976. The maximum doses listed in Table 1 are based on an individual consuming well above average quantities of food (see Table A-2 in Regulatory Guide 1.109).

Table 1

Annual Dose Commitments to a Maximum
Exposed Individual Due to Gaseous and
Particulate Effluents

<u>Location</u>	<u>Pathway</u>	<u>Dose (mrem/yr)</u>	
		<u>Total Body</u>	<u>Thyroid</u>
Nearest residence* and garden 0.37 mi. WNW	Plume	0.30	0.30
	Ground Deposit	0.02	0.02
	Inhalation (Child)	0.04	0.04
	Vegetation (Child)	1.4	1.4

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

The predicted dose commitments to the individual who would receive the largest dose are listed in Table 2 for liquid releases and were taken from the FES of 1976.

Table 2
Annual Individual Dose Commitments
Due to Liquid Effluents

<u>Location</u>	<u>Pathway</u>	<u>Dose (mrem/yr)</u>	
		<u>Total Body</u>	<u>Thyroid</u>
Nearest residence* use (16 mi. down- stream)	Drinking water	0.04	0.04
Nearest Fish Use (.1 mi. downstream)	Fish	1.6	2.1
Nearest Shoreline (.01 mi. downstream)	Sediments	<.01	<0.01
Nearest Use of irrigated drops	Crops	0.05	0.07

Since the interim activities will be required to conform to the existing technical specification, with the additional modified dose design objective constraints of Appendix I to 10 CFR 50, it is concluded that the environmental impacts associated with this action are within the bounds of the FES of 1972 and 1976. Therefore, no significant environmental impacts will be attributable to this action.

The criteria proposed here will also indirectly limit the activity that could be released. Table 3 lists the maximum activity that could be released for several nuclides based on historical meteorological data.

Table 3

Maximum Expected Activity that
Could be Released Under the
Proposed Criteria

Nuclide	Activity (Ci/week)	
	Maximum Allowed by TMI Support Staff	Maximum Allowed by NRR Director
Kr-85	51.	510.
Cs-137	4.6×10^{-6}	4.6×10^{-6}
H-3	7.5	75.

These criteria would allow TMI support staff to permit entry into the containment once or twice per week and venting of the krypton activity that gets into the airlock upon each entry (about 20 to 25 curies of Kr-85 will get into the airlock when entry to the reactor building is made). More frequent entries prior to purging the reactor building could only be approved by the director of NRR.

The Effluent and Waste Disposal Semiannual Report for TMI-2, for the third and fourth quarter of 1979 lists the amounts of radioactive materials which are being released. An average of 240 curies of Kr-85 were released over each quarter during this period. This criteria would allow the TMI support staff to increase this by about 660. curies and would allow the director of NRR to increase it by 6600 curies. The above report described the CS-137 activity that was released during the third quarter of 1979 to be .029 curies and during the fourth quarter of 1979 to be 0.009 curies. This criteria would allow the TMI support staff to increase this by about 6×10^{-6} curies and would allow the director of NRR to increase it by 6×10^{-5} curies. The above report describes the H-3 activity that was released for the third and fourth quarters fo 1979 to be 9.9 curies and 20 curies, respectively. This criteria would allow the TMI support staff to increase this by about 97. curies and would allow the director of NRR to increase it by 970 curies. While some of these increases are significantly larger than what is now being released, the environmental effects of these releases should be judged on the basis of the doses that could occur. These doses will be kept below the dose design objectives of Appendix I to 10 CFR Part 50

and will also be maintained to a level which is as low as reasonably achievable.

Conclusion

The environmental impact associated with this action will not exceed those already described in the FES of 1972 and 1976 for TMI. Therefore no significant environmental impact will result.

APPENDIX A
IMPLEMENTATION OF INTERIM CRITERIA

On April 7, 1980, the Commission approved the interim criteria outlined in SECY-80-175 that is to be used by the staff when deciding whether radioactive releases resulting from the TMI-2 cleanup operation are acceptable. The following discussion describes the technical approach that will be followed in implementing these interim criteria.

The only noble gas of significance remaining within the TMI-2 facility is Kr-85. Appendix I to 10 CFR Part 50 states annual design objectives for noble gases as follows:

10 mrad air dose from the gamma radiation component and
20 mrad air dose from the beta radiation component, provided that
no member of the general public receives greater than 5 mrem total body
dose or 15 mrem skin dose

For Kr-85, the 20 mrad beta air dose and the 15 mrem skin dose are about equally limiting. Based on the annual average meteorological dispersion factor $6.7 \times 10^{-6} \text{ sec/m}^3$ and a shielding factor of 0.7, a constant Kr-85 release rate of 1440 Ci/week will yield a 15 mrem annual skin dose at the most limiting site boundary location.

Using the approved interim criteria, noble gas releases up to 5% of the above (Appendix I) weekly rate can be approved by the onsite deputy director (i.e.,

72 Ci/week). Noble gas releases above 72 Ci/week but less than 50% of the Appendix I weekly rate (i.e., 720 Ci/week) can be approved by the Director, Office of Nuclear Reactor Regulation. Release rates above 720 Ci/week require Commission approval.

Appendix I to 10 CFR 50 expresses the dose design objectives in terms of limiting the release of radioactive materials to the environment. Therefore, it is necessary to calculate the allowable releases in curies on a priori basis. This procedure is consistent with the most recent generic technical specifications which limit the release of radioactive materials based on historical meteorological data and land use. Of course, periodic updating is required. In addition, the weekly curie releases can be distributed freely during the week. For example, the entire limit can be reached in less than one day provided that no releases occur during the remaining part of the week.





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