

3.6.2 Material Limitations

Applicability

This specification applies to experiments installed in the reactor and its experimental facilities.

Objective

The objective is to prevent damage to the reactor or excessive release of radioactivity by limiting material quantity and radioactive material inventory of the experiment.

Specifications

- (a) Explosive materials in quantities greater than 5 pounds shall not be allowed within the reactor building. Irradiation of explosive materials shall be restricted as follows:
- (1) Explosive materials in quantities greater than 25 milligrams shall not be irradiated in the reactor pool. Explosive materials in quantities less than 25 milligrams may be irradiated provided the pressure produced upon detonation of the explosive has been calculated and/or experimentally demonstrated to be less than the design pressure of the container.
 - (2) Explosive materials in quantities greater than 25 milligrams shall be restricted from the reactor pool, the upper research level, demineralizer room, cooling equipment room and the interior of the pool containment structure.
 - (3) Explosive materials in quantities greater than 5 pounds shall not be irradiated in experimental facilities.
 - (4) Cumulative exposures for explosive materials in quantities greater than 25 milligrams shall not exceed 10^{12} n/cm² for neutrons or 25 roentgen for gamma exposures.

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- (b) Each fueled experiment shall be controlled such that the total inventory of iodine isotopes 131 through 135 in the experiment is no greater than 1.5 curies.

Bases

- (a) This specification is intended to prevent damage to the reactor or reactor safety systems resulting from failure of an experiment involving explosive materials.
- (1) This specification is intended to prevent damage to the reactor core and safety related reactor components located within the reactor pool in the event of failure of an experiment involving the irradiation of explosive materials. Limited quantities of less than 25 milligrams and proper containment of such experiment provide the required safety for in-pool irradiation.
- (2) This specification is intended to prevent damage to vital equipment by restricting the quantity and location of explosive materials within the reactor building. Explosives in quantities exceeding 25 milligrams are restricted from areas containing the reactor bridge, reactor console, pool water coolant and purification systems and reactor safety related equipment.
- (3) The failure of an experiment involving the irradiation of up to 5 lbs of explosive material in an experimental facility located external to the reactor pool structure will not result in damage to the reactor or the reactor pool containment structure.
- (4) This specification is intended to prevent any increase in the sensitivity of explosive materials due to radiation damage during exposures.
- (b) The 1.5 curie limitation on iodine 131 through 135 assures that in the event of failure of a fueled experiment leading to total release of the iodine, the exposure dose at the exclusion area boundary will be less than that allowed by 10 CFR Part 20 for an unrestricted area.

3.6.3 Failure and Malfunctions

Applicability

This specification applies to experiments installed in the reactor and its experimental facilities.

Objective

The objective is to prevent damage to the reactor or excessive release of radioactive materials in the event of an experiment failure.

Specifications

- (a) Experiment materials, except fuel materials, which could off-gas, sublime, volatilize, or produce aerosols under (1) normal operating conditions of the experiment or reactor, (2) credible accident conditions in the reactor, or (3) possible accident conditions in the experiment shall be limited in activity such that if 100% of the gaseous activity or radioactive aerosols produced escaped to the reactor room or the atmosphere, the airborne concentration of radioactivity averaged over a year would not exceed the limit of Appendix B of 10 CFR Part 20.
- (b) In calculations pursuant to (a) above, the following assumptions shall be used:
 - (1) If the effluent from an experimental facility exhausts through a holdup tank which closes automatically on high radiation level, at least 10% of the gaseous activity or aerosols produced will escape.
 - (2) If the effluent from an experimental facility exhausts through a filter installation designed for greater than 99% efficiency for 0.3-micron particles, at least 10% of these vapors can escape.

- (3) For materials whose boiling point is above 130°F and where vapors formed by boiling this material can escape only through an undistributed column of water above the core, at least 10% of these vapors can escape.
- (c) If a capsule fails and releases material which could damage the reactor fuel or structure by corrosion or other means, removal and physical inspection shall be performed to determine the consequences and need for corrective action. The results of the inspection and any corrective action taken shall be reviewed by the Director or his designated alternate and determined to be satisfactory before operation of the reactor is resumed.

Bases

- (a) This specification is intended to reduce the likelihood that airborne activities in excess of the limits of Appendix B of 10 CFR Part 20 will be released to the atmosphere outside the facility boundary of the NSC.
- (b) These assumptions are used to evaluate the potential airborne radioactivity release due to an experiment failure.
- (c) Operation of the reactor with reactor fuel or structure damage is prohibited to avoid release of fission products. Potential damage to reactor fuel or structure must be brought to the attention of the Director (NSC) or his designated alternate for review to assure safe operation of the reactor.