Very Small Amount of $^{13}$N and $^{14}$C Produced in Nitrogen Gas

Following a DT pulse activities of $^{13}$N and $^{14}$C are only $0.9$ and $1.3 \times 10^{-6}$ Ci from N gas activation.

From Displacement Damage

Increase in Electrical Resistivity ($\Omega$) of Cu is $10^{-15}$ lower than the D-T shots.

Shots are more than three orders of magnitude more than the D-D shots.

Peaks of Cu, Nb, and Ni are produced in the TF coils and the 20 cm shield at the top of the TF coil.

Radionuclide Activities and Decay Heat Values during the 3 hours between pulses are low.

Activity and decay heat of radionuclides during the 3 hours between pulses are tolerable.

Radiation Induced Resistivity in Cu Coils is small.

Calculations also performed for DD pulses with 1 MW of fusion power.

Four pulses per day with pulse width of 20 seconds and 3 hours between pulses are performed.

FIRE Design is in pre-conceptual phase with different design options and operation scenarios.

FIRE Development is in pre-conceptual phase with different design options and operation scenarios.

All Components Qualify as Class C Low Level Waste.

All calculations are performed for 150 MW DT shots.

In FIRE design with wedged coils and added compression ring, the TF inner leg insulation does not have to be reweldable.

In the event of a failure, it is possible to maintain the system during short periods of time.

A target success of 70% and 50% in space between 200 and 700 V.

Total Dose of 100 Rads is allowed for hands-on maintenance.

Total Heating in the DT and DD shots is 5 TJ.

Total fusion energy of 5 TJ DT and 0.5 TJ DD is produced.

Very Small Amount of $^{13}$N and $^{14}$C Produced in Nitrogen Gas

Insulators with radiation tolerance up to $\sim 1.5 \times 10^{10}$ Rads under FIRE load conditions should be used.

End-of-life He production values imply that VV will be reweldable.

End-of-life He production in the VV is less than 1 appm.

The PFC include Be-coated Cu FW and divertor plates made of tungsten rods mounted on water-cooled Cu heat sink.

Polyimides are more radiation resistant than polyethylene, which is used in current machines.

FIRE Design is in pre-conceptual phase with different design options and operation scenarios.

Calculations also performed for DD pulses with 1 MW of fusion power.

Conclusions

All calculations are performed for 150 MW DT shots.