Requirement: Safety and Environment

Issue: Tritium Control and Containment

TRL	TRL Function	Generic Definition	Issue-Specific Definition
1	Concept Development	Basic principles are formulated and understood	Principals and data required on the chemistry,solubility, permeation , and transport of tritium and it's compounds
2		Technology concepts and/or applications formulated	Models must be developed to estimate tritium release during normal operation and off-normal events
3		Concepts and models have been benchmarked against data from relevant programs	Concepts and models must be successfully benchmarked against fission program data
4	Proof of Principle	Component and/or bench-scale validation in a laboratory environment	Benchscale tests must be conducted to validate the tritium release and transport predictions
5		Large scale tests have been conducted in a laboratory environment	Large scale tests must be conducted to validate the tritium release and transport predictions
6		Prototype tests have been conducted in a laboratory environment	Full scale tests must be conducted to validate the tritium release and transport predictions
7	Proof of Performance	System prototype demonstration in an operational environment	Tests must be conducted in a fusion operational environment to validate tritium release and transport predictions
8		Actual system completed and qualified through test and demonstration	Tritium release and transport predictions must be demonstrated at the required fusion scale size
9		Actual system proven through successful mission operations	Tritium release and transport must be verified at the required scale size and during fusion mission operations

Requirement: Safety and Environment

Issue: Activation Product Control and Containment

TRL	TRL Function	Generic Definition	Issue-Specific Definition
1	Concept Development	Basic principles are formulated and understood	Principals and data required on the chemistry, solubility, permeation , and transport of activation products
2		Technology concepts and/or applications formulated	Models must be developed to estimate activation product release and transport during off-normal events
3		Concepts and models have been benchmarked against data from relevant programs	Concepts and models must be successfully benchmarked against fission program data
4	Proof of Principle	Component and/or bench-scale validation in a laboratory environment	Benchscale tests must be conducted to validate the activation product release and transport predictions
5		Large scale tests have been conducted in a laboratory environment	Large scale tests must be conducted to validate activation product release and transport predictions
6		Prototype tests have been conducted in a laboratory environment	Full scale tests must be conducted to validate activation product release and transport predictions
7	Proof of Performance	System prototype demonstration in an operational environment	Tests must be conducted to demonstrate activation product release and transport in a fusion environment
8		Actual system completed and qualified through test and demonstration	Activation product release and transport must be examined at the required fusion scale size
9		Actual system proven through successful mission operations	Activation product release and transport must be examined at scale size and during mission fusion operations

Requirement: Safety and Environment

Issue: Management of Radioactive Wastes

TRL	TRL Function	Generic Definition	Issue-Specific Definition
1	Concept Development	Basic principles are formulated and understood	Calculations must establish that all fusion radioactive wastes qualify as Class C
2		Technology concepts and/or applications formulated	Calculations must establish that all fusion radioactive wastes can be handled by similar means as with fission radioactive wastes
3		Concepts and models have been benchmarked against data from relevant programs	Calculations must establish that certain fusion "wastes" can be recycled after sufficient cool down and processing
4	Proof of Principle	Component and/or bench-scale validation in a laboratory environment	Benchscale tests must be conducted to validate calculations noted above
5		Large scale tests have been conducted in a laboratory environment	Large scale tests must be conducted to validate the calculations noted above
6		Prototype tests have been conducted in a laboratory environment	Full scale test must be conducted to validate the calculations noted above
7	Proof of Performance	System prototype demonstration in an operational environment	Prototype tests must be conducted to demonstrate the successful handling and recycling of fusion wastes
8		Actual system completed and qualified through test and demonstration	Successful waste handling and recycle must be demonstrated at required fusion scale size
9		Actual system proven through successful mission operations	Successful waste handling and recycle must be demonstrated at required fusion scale size and during mission operations