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Proposal of the Confinement Strategy for EU DEMO

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Following the European roadmap to the realisation of fusion energy, a demonstration fusion power plant (DEMO) is currently in pre-conceptual design phase till 2020. In this context an external stakeholder group formulated a nuclear licensed manufacturing and construction (M/C) as the top level requirement for a DEMO, translating essentially to the confinement of radioactive and hazardous materials as the most fundamental safety function in normal, abnormal and accidental situations. In a first step energy sources and radioactive source have been assessed for a conceptual DEMO configuration. Based on the European Plant Description Document (PDD) the main systems have been classified as active or passive systems with respect to their confinement functionality. By means of a bottom-up approach at system level, the major DEMO systems are analysed regarding a potential confinement function. On the basis of those DEMO systems identified as having a confinement function a confinement strategy for EU DEMO has been proposed with respect to confinement barriers and confinement systems. In addition, confinement for the maintenance has been issued as well. The assignment of confinement barriers to the identified sources under abnormal and accidental conditions has been performed, and the DEMO main safety systems have been proposed as well. Confinement related open issues such as discharge of the huge magnet energy in an accidental case, confinement concerning plant states, investigation on further passive / active methods for the confinement, confinement during the procedure of removing and replacing in-vessel components, etc. need to be resolved in parallel with DEMO development.

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