

CONCEPTUAL DESIGN AND OPTIMIZATION FOR JET WATER DETRITIATION SYSTEM CRYO-DISTILLATION FACILITY

X. Lefebvre,^{a*} A. Hollingsworth,^a A. Parracho,^a P. Dalglish,^a B. Butler,^a R. Smith^a and JET EFDA Contributors^b

^a JET-EFDA, Culham Science Centre, Abingdon, Oxon OX14 3DB, UK

* Xavier.Lefebvre@ccfe.ac.uk

The aim of the Exhaust Detritiation System (EDS) of the JET Active Gas Handling System (AGHS) is to convert all Q-based species (Q₂, Q-hydrocarbons) into Q₂O (Q being indifferently H, D or T) which is then trapped on molecular sieve beds (MSB). Regenerating the saturated MSBs leads to the production of tritiated water which is stored in Briggs drums. An alternative disposal solution to offsite shipping, is to process the tritiated water onsite via the implementation of a Water Detritiation System (WDS) based, in part, on the combination of an electrolyser and a cryodistillation (CD) facility. The CD system will separate a Q₂ mixture into a detritiated hydrogen stream for safe release and a tritiated stream for further processing on existing AGHS subsystems. A sensitivity study of the Souers' model using the simulation program ProSimPlus (edited by ProSim S.A.) has then been undertaken in order to perform an optimised dimensioning of the cryodistillation system in terms of available cooling technologies, cost of investment, cost of operations, process performance and safety.