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INTOR AS AN ENGINEERING TEST DEVICE

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A program for testing in INTOR has been developed. The objective of this test program is to develop engineering information to support DEMO. Design and operational requirements imposed on INTOR and limitations of INTOR's ability to provide engineering data have been addressed for blanket materials, nuclear, electric power generation and reactor component surveillance tests.

Operational constraints imposed on INTOR are summarized. These constraints include the need to operate the reactor at approximately 5 orders of magnitude lower power for approximately two months during nuclear tests to permit use of direct measurement techniques which provide high accuracies. Accuracies greater than 5% limit the value of net breeding tests for blanket designs with breeding ratios near one. Other operational constraints that have been identified include the necessary duration and thermomechanical testing. The test component designs and installation approach are also presented.

A detailed examination of INTOR's ability to provide engineering data to Demo is presented. Included is a comparison of the environments experienced by a blanket in Demo and INTOR. Results of the comparison conclude that "DEMO-LOOK-A-LIKE" module that perform as a DEMO "ACT-A-LIKE" component are required. The "DEMO ACT-A-LIKE" tests simulate critical life limiting conditions anticipated in Demo but in general are able to simulate only one or two parameters of the Demo environments in a given test. Multiple tests provide an overall data base for the components operation in Demo. A second area investigated was INTOR's ability to produce reliability data for Demo. Results indicated that a large number of specimens would not be available to provide statistical information for projecting either the failure rate or life of Demo components and that an extensive parallel test program is required.