

ASSESSING THE IMPACT OF POTENTIAL REGULATORY CHANGES ON DEMONSTRATING COMPLIANCE WITH REACTOR PRESSURE VESSEL INTEGRITY REQUIREMENTS

Dillon Walker

Dr. Kathleen Trauth, Thesis Supervisor

ABSTRACT

This paper provides a review of current regulations concerning reactor pressure vessel toughness requirements and evaluates three potential changes to those regulations. Following a brief overview of the regulatory framework and the mechanical tests used to evaluate reactor pressure vessel integrity, three potential changes to predictive models and/or the overall regulatory structure are described. These include the introduction of an information fusion model, an updated physics model for predicting transition temperature shift, and the implementation of the Master Curve as an alternative method for evaluating static fracture toughness. They are then evaluated on the basis of data availability, data uncertainty, regulatory impact, and model versatility. It is found that the information fusion model may be suitable for benchmarking applications, whereas an updated physics model may replace current predictive formulas and the Master curve may be used by utilities to negate the need for upper shelf energy requirements.