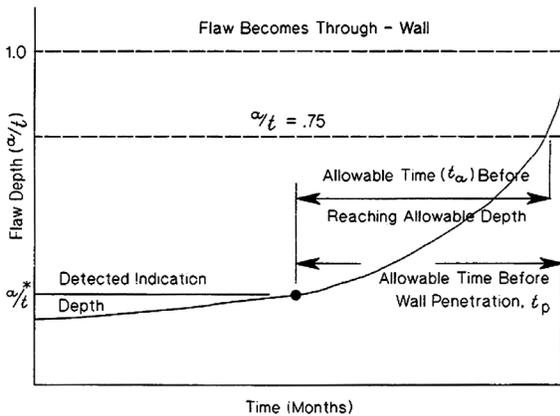


Flaw Evaluation Handbook

Background

In-service inspections are required on a regular basis for any operating nuclear plant to enable detection of flaws or indications that may affect structural integrity. If an indication is found that exceeds the acceptance standards of American Society of Mechanical Engineers (ASME) Section XI, or requires evaluation, as might be the case for reactor vessel head penetrations, a fracture analysis may be performed to demonstrate appropriate margins for continued service without repair.

A Westinghouse-developed *Flaw Evaluation Handbook* provides the results of such an analysis before the inspection is performed, so that the largest allowable flaw indications are calculated and shown graphically in chart format. Separate charts are provided for flaws for each region of the vessel or component to be inspected.



Typical head penetration handbook chart

Description

Handbook charts help determine the acceptability of any flaw indication, with the only information required being the dimensions and location of the indication, which are available directly from the inspection results. This information allows a point to be plotted on the handbook chart and its position allows an immediate determination of the acceptability of the indication. The handbook is constructed in strict accordance with the methods of ASME Section XI, which has been accepted by the U.S. Nuclear Regulatory Commission (NRC), expressly by its endorsement of Section XI through the Code of Federal Regulations, 10 CFR50.55a. For head penetrations, the evaluation handbook is constructed in accordance with the U.S. NRC letter on that subject sent to the Nuclear Energy Institute in April 2003.

Westinghouse has performed evaluations for a number of plants in the past and each has been approved by the U.S. NRC.

A *Flaw Evaluation Handbook* can be produced for:

- Reactor vessels
- Steam generators
- Pressurizers
- Primary coolant system piping
- Control rod drive mechanism head penetrations
- Bottom-mounted instrumentation head penetrations
- Other components, as needed
 - The 10-, 20-, 30-year acceptable flaw limits
 - Within this zone, the surface flaw acceptable by ASME Code analytical criteria in IWB-3600
 - ASME Code allowable since 1983 Winter Addendum
 - ASME Code allowable prior to 1983 Winter Addendum

Benefits

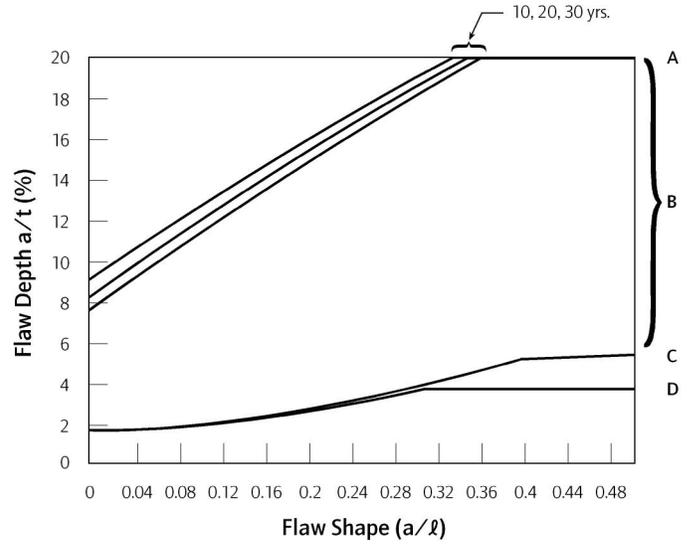
Evaluations are performed up front to minimize potential scheduling delays during an outage. Evaluations are performed using state-of-the-art techniques that eliminate overconservatism that are otherwise required in the urgent evaluation of indications found during in-service inspections. Based on realistic indication probability, cost-benefit evaluations have demonstrated the benefits gained from this product. The handbook also enables easy comparison of the relative flaw tolerance of the various regions of the component of interest, which can also be helpful in license renewal and asset management programs.

Experience

A Westinghouse *Flaw Evaluation Handbook* has been developed for over 35 nuclear units for various components including reactor vessels, reactor internals and reactor coolant piping.

Deliverables

Customers will receive their handbooks within 2 to 4 months of order date. On-site training in the construction of the handbook charts and their use is included.



Typical component handbook chart