

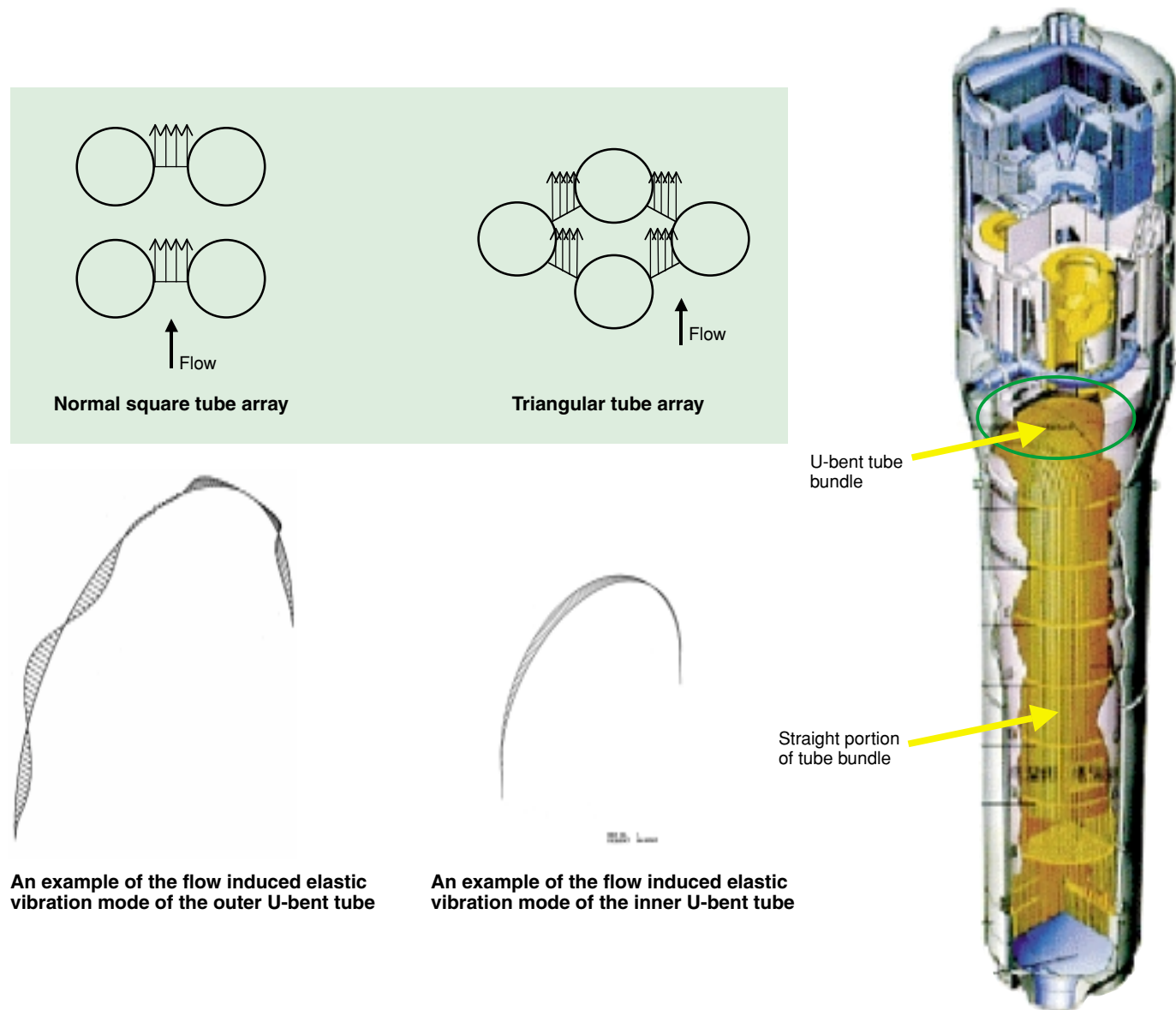
Technical Study on Evaluation Methods of Flow-Induced Vibration

Background and Objectives

As steam generator (SG) tubes are important parts to the safety of nuclear power plants, it is necessary to prevent their damages causing an accident or a trouble resulting in release of the reactor coolant containing radioactive materials out of a reactor system. After the accident of the SG tube rupture due to flow-induced vibration of the Mihama Nuclear Power Station Unit II, preventive measures of the recurrence of a SG tube rupture accident have been adopted. This study aims to prepare standards and criteria through evaluation of the SG tube integrity against the degradation caused by flow induced vibration, etc., since a long life operation of nuclear power plants is expected near the future.

Study on Evaluation Methods of the Flow Induced Elastic Vibration of Triangular Tube array

Steam generators of Japanese PWR plants mainly use normal square array tubes. For a flow-induced elastic vibration evaluation of the U-bent tubes of triangular tube arrays (power up is possible without enlarging a steam generator) to be adopted near the future, a draft of guideline for the SG design to prevent a SG tube rupture due to the flow induced elastic vibration through study and analysis of existing test results has been developed.

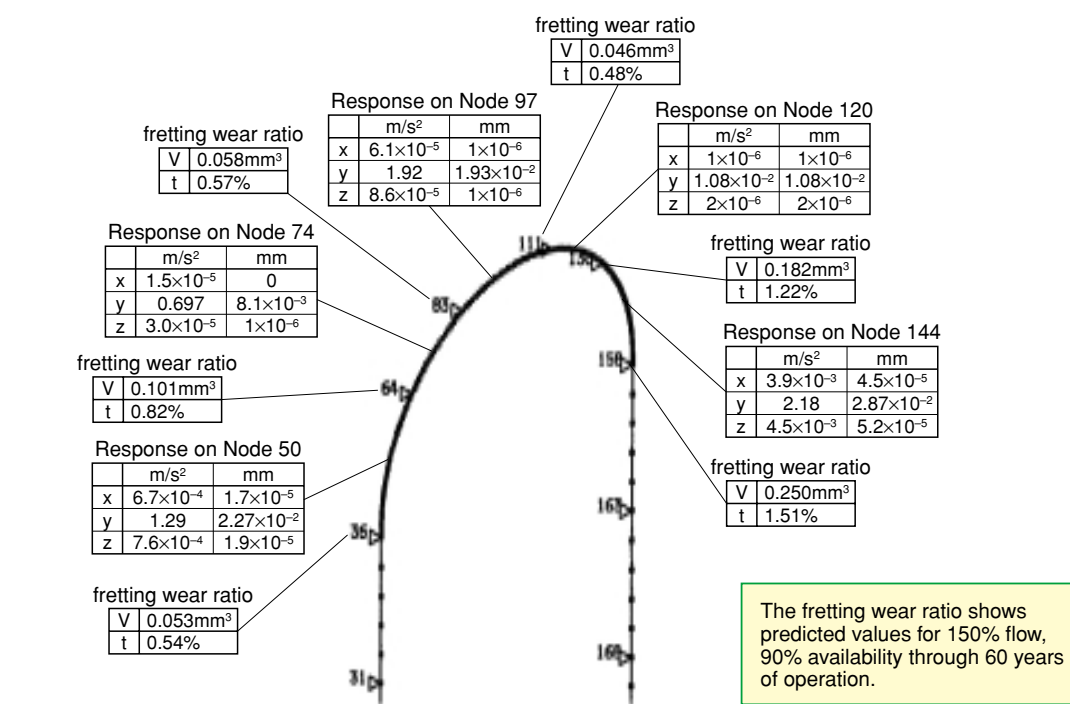


Time Period of the Project

Item	Fiscal Year	2000	2001	2002	2003
(1) Research and Planning					
(2) Study of Flow Induced Vibration Evaluation Methods					

Study of Evaluation Methods of the Flow Induced Random Vibration of Normal Square Tube Array

For random vibration of SG tubes, evaluation methods for the fretting wear ratio of SG tubes were developed based on the study of the existing test results. Moreover, the random vibration evaluation results for a long period operation using the developed methods, have shown the adequacy of integrity of SG tubes. In addition, the evaluation methods were arranged as a draft guideline for the SG design in addition to summarizing the application issues.



The fretting wear ratio shows predicted values for 150% flow, 90% availability through 60 years of operation.

The fretting wear ratio, response acceleration, and displacement due to random vibration