ABSTRACT

Since reprocessing plants use a large quantity of corrosive nitric acid, adequate corrosion management for their equipments is necessary. Therefore, countermeasures on design for mitigating corrosion such as an adoption of non-corrosive Zirconium materials, a reduction on operating temperature by reduced pressure evaporation system and so on, have been applied for some equipments in severe corrosive conditions at the Rokkasyo reprocessing plant. In addition, In-Service-Inspection (ISI) for some stainless steel evaporators will be performed and their corrosion behaviors will be checked for conformation.

In this paper, a thermosyphon type acid recovery evaporator is taken for instance, and a remote control wall-thickness measurement system which has been developed for ISI is presented. A Summary of Pre-Service Inspection (PSI) and a future ISI plan is also presented.

INTRODUCTION

Japan Nuclear Fuel Limited (JNFL) will operate the first commercial reprocessing plant at Rokkasyo in Japan. That capacity is 800t-Upr/year with using a Purex method.

Since reprocessing plants are operated at low temperature and low pressure, cracks management which needs for nuclear power plants is not necessary. However, corrosion management is very important, because they use very corrosive nitric acid.

JNFL has been developed ISI system for some stainless steel evaporators in order to confirm their corrosion behaviours.

ISI SYSTEM FOR ACID RECOVERY EVAPORATOR

In a reprocessing plant, a large amount of nitric acids is used. The used acid is recovered at an acid recovery evaporator to minimize the amount of waste. The evaporator is thermosiphon type using ultra low carbon stainless steels. It is operated at approx.70 degrees centigrade with using a reduced pressure (approx. 120mmHg) system. The acidity of nitric acid is approx. 9mol/l. In case of reduced pressure evaporators, the highest corrosion portion is heating tubes.
Since the acid recovery evaporator is installed in a closed room called “cell” in the building, it is impossible to access it directly. So, an access tube for ISI was prepared at the construction stage. And its inspection equipment should be remote controlled.

The driving unit of inspection equipment is fixed at the top of evaporator by three arms. The inspection arm can access all of heating tubes remotely. For measuring the wall thickness, both of Eddy Current Testing (ECT) and Ultrasonic Testing (UT) are used. Since the measuring speed by ECT is faster than that by UT, ECT is used as a standard method and UT is used for the ECT data’s confirmation.
A reference type ECT is used and its accuracy is approx. 0.1mm. A UT probe has 8 censors and its accuracy is approx. 0.05mm. The data are recorded at every 10mm distances.

**SUMMARY OF PSI**

PSI data were already taken. The samples of PSI data for the acid recovery evaporator are shown. ECT and UT data show good consistency.

**Future ISI Plan**

ISI will be performed every three years, and 1st ISI will be done very soon. JNFL will operate RRP safely with using these ISI data.
CONCLUSION

Corrosion management is very important for reprocessing plants. ISI is necessary for some stainless steel evaporators in order to confirm their corrosion behaviours. ISI system for them has been developed. PSI data were already taken and 1st ISI will be performed soon. JNFL will operate Rokkasyo reprocessing plant safely using these ISI data.

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