

## ABSTRAK

### **ANALISIS RISIKO KEBOCORAN PIPA HRSG DI PT XYZ MENGUNAKAN METODE *RISK BASED INSPECTION* (RBI) SEMI KUANTITATIF**

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Penelitian ini bertujuan menganalisis risiko kebocoran pipa *Heat Recovery Steam Generator* (HRSG) di PT XYZ menggunakan metode *Risk Based Inspection* (RBI) semi kuantitatif berbasis API RP 581 dengan fokus pada pipa ASTM A53 Grade B di area *elbow* yang menunjukkan indikasi penipisan dinding. Analisis *Probability of Failure* (PoF) dilakukan dengan mengombinasikan *generic failure frequency*, *damage factor* akibat mekanisme *thinning*, serta *management system factor*, sedangkan *Consequence of Failure* (CoF) dihitung berdasarkan luas area konsekuensi *non-flammable* dan *non-toxic* untuk beberapa skenario ukuran lubang kebocoran. Hasil perhitungan menunjukkan nilai PoF sebesar  $7,02 \times 10^{-4}$  yang termasuk kategori 3 dan luas area konsekuensi sebesar 62,9 ft<sup>2</sup> yang berada pada kategori konsekuensi rendah (kategori A), sehingga posisi pipa HRSG pada matriks risiko berada pada level 3A (*low risk*). Meskipun demikian, bagian *elbow* tetap diklasifikasikan sebagai area kritis karena dipengaruhi mekanisme *Flow Accelerated Corrosion* (FAC) yang mempercepat *thinning* dan potensi *Sulfide Stress Cracking* (SSC) yang memicu *Stress Corrosion Cracking* (SCC).

Kata kunci: HRSG, *Elbow*, *Risk Based Inspection*, *Flow Accelerated Corrosion*, *Sulfide Stress Cracking*

## **ABSTRACT**

### **RISK ANALYSIS OF HRSG PIPE LEAKAGE AT PT XYZ USING THE SEMI-QUANTITATIVE RISK-BASED INSPECTION (RBI) METHOD**

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*This study aims to analyze the risk of Heat Recovery Steam Generator (HRSG) pipe leakage at PT XYZ using a semi-quantitative Risk Based Inspection (RBI) method based on API RP 581, focusing on ASTM A53 Grade B pipes in elbow areas that show signs of wall thinning. Probability of Failure (PoF) analysis was performed by combining generic failure frequency, damage factor due to thinning mechanism, and management system factor, while Consequence of Failure (CoF) was calculated based on the area of non-flammable and non-toxic consequences for several leak hole size scenarios. The calculation results showed a PoF value of  $7.02 \times 10^{-4}$ , which falls into category 3, and a consequence area of 62.9 ft<sup>2</sup>, which falls into the low consequence category (category A), placing the HRSG pipe position on the risk matrix at level 3A (low risk). However, the elbow section is still classified as a critical area because it is affected by the Flow Accelerated Corrosion (FAC) mechanism, which accelerates thinning, and the potential for Sulfide Stress Cracking (SSC), which triggers Stress Corrosion Cracking (SCC).*

**Keywords:** HRSG, Elbow, Risk-Based Inspection, Flow Accelerated Corrosion, Sulfide Stress Cracking