

## SPECIAL ISSUE ARTICLE

# Evaluation of risk associated with treatment of fat, oil, and grease: Grease interceptor from food processing industry effluent using bowtie analysis

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### Abstract

Fat, oil, and grease (FOG), a deposit in wastewater, develops from any processes in food and processing industries. FOG deposits in wastewater management systems can cause blockages in sewer systems. Grease Interceptor (GI) is one of the control measures to treat and prevent the blockage of FOG deposits in the sewer system. Nevertheless, few studies evaluate the extended hazard of GI application in FOG treatment. This study aims to assess the risk of GI in FOG treatment by using a bowtie technique. The hazard identified is FOG itself, whereas the top event was GI failure. The high contributions of the threats were an unsuitable variation of GI's type and design, no GI cleaning process schedule, and a clogged outflow pipe from GI. GI design according to standard and cleaning FOG deposits in GI by a licensed grease hauler were two suitable preventive barriers. The desludging process is essential to guarantee that the GI operates smoothly and is identified as an excellent recovery barrier. Inter-rater reliability (IRR) analysis to measure the consistency of their ratings on the data provided. The experts had a 75% overall agreement value of IRR risk rating value on assets, while 50% agreement value on people.

### KEYWORDS

bowtie risk analysis, grease interceptor, sanitary sewer, sewage treatment plant, wastewater treatment plant

## 1 | BACKGROUND

Fat, oil, and grease (FOG) are an ever-enlarging environmental concern. Wastewater that contains FOG, produced mainly by food processing industries, may lead to blockage in sewer pipes, thus requiring primary treatment for the FOG separation process. Grease Interceptor (GI), also called Grease Trap (GT), is one of the FOG separation processes. It is used to collect the FOG in the sewer collection system. Another challenge resulting from the present FOG in sewage water treatment plants (STP) may cause further issues in treatment plants since grease takes longer to decompose biologically than other

components of municipal sewage.<sup>1</sup> In Malaysia, 70% of sanitary sewer overflows (SSOs) occur because of blockage of FOG deposits in the sewer pipes of the sewer system.<sup>2</sup> To prevent blockage in the sewer system pipes, most food processing industries take preventive action by using GI in their sewer pipe.

Unfortunately, FOG can be a hazard and develop a blockage in the GI if the GI is not treated and does not undergo appropriate maintenance. Untreated and unmanaged GI can result in a variety of events. There are various reasons, also known as threats, that might lead to and be the cause of a specific event. Those particular events could have several consequences, all of which could pose risks