Fire risk assessment dengan QRA event tree analysis di Gas Metering station CNOOC ses Ltd Cilegon

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Abstrak

ABSTRAK
Gas Metering Station CNOOC SES Ltd di Cilegon adalah fasilitas untuk serah terima gas dari pihak CNOOC SES Ltd kepada PLTGU Cilegon dengan jumlah penyerahan gas sekitar 80 juta kaki kubik per hari yang berlokasi di Kecamatan Pulo Ampel Kabupaten Serang Propinsi Banten. Bahaya yang timbul dari kegiatan operasi Gas Metering Station ini adalah bahaya kebakaran akibat kebocoran gas dari fasilitas yang ada antara Iain : slug receiver, closed drain dmm, pig receiver, filter coalescer & metering skid serta pipa penyalur serta kemungkinan terjadinya Iedakan. Penelitian yang dilakukan merupakan penelitian analitis deskritif dengan melakukan analisa dan perhitungan terhadap faktor-fakior yang menyebabkan terjadinya bahaya kebakaran dan ledakan serta level keparahan (severity) yang mungkin terjadi. Metode yang dipergunakan adalah melakukan sectioning di Gas Metering Station, penghitungan frekuensi kebocoran berdasarkan data yang ada di dalam E&P Forum, menilai scenario kebakaran yang mungkin terjadi dengan metode ETA-Event Tree Analysis, menilai severity yang mungkin timbul dengan menggunakan acuan Health & Safey Executive Standard serta menentukan hazardous area dengan menggunakan tabel dari Canada Gas institute. Gas Metering dapat dibagi menjadi 5 section yakni : slug receiven closed drain drum, pig receiver; filter coalescer & metering skid dan pipa penyalur dengan scenario berdasarkan safety protection philosophy sebagai berikut : Kemungkinan Percikan - Alarm Sukses - Emergency Shutdown - Blowdown System - Fire Protection Sukses - Trend Teijadinya Kebakaran. Frekuensi kebakaran per tahun untuk masing-masing section adalah sebagai berikut : slug receiver (5.2x10?), closed drain drum (3.8 x10"), pig receiver (2.2 x 10"), rilter coalescer & metering skid (5 x10"?) dan pipa penyalur (7.5x10??). Event outcome sebagai hasil Event Tree Analysis beserta nilainya adalah sebagai berikut : Gas Bocor -> Percikan Langsung -> BDS Sukses -> Jet Fire (0.00E+OO), Gas Bocor -> Percikan Langsung -> BDS Gagal -> Jet Fire (3.07E-02), Gas Bocor -> Percikan Langsung ~> FPS Sukses -> Eksplosion (0.00E+0O), Gas Bocor -> Percikan Langsung -> FPS Gagal -> Eksplosion
(1 .62E-03), Gas Bocor -> Percikan Menyusul -> BDS Sukses -> Flash Fire (0.00E+00), Gas Bocor -> Percikan Menyusul -> BDS Gagal -> Flash Fire (1 .62E~03), Gas Bocor -> Deteksi Gagal -> ESD Sukses -> BDS Sukses ->

FPS Sukses (8.08E-05), Gas Bocor -> Deteksi Gagal -> ESD Gagal -> BDS Gagal (4.25E-06). Pada keadaan teriadi kebakaran maka severity mempunyai level significant dengan kecepatan gas terbakar 0.57 lgq/detik selama 125 detik, dan tangki bahan bakar solar PLTGU Cilegon dalam keadaan aman. Dengan program perawatan peralatan fire protection system di Gas Metering Station dan pelatihan tanggap darurat untuk personil di Iapangan, diharapkan severity level dapat ditekan menjadi minor bahkan tidak terjadi.

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ABSTRACT

The risk of Gas Metering Station operation is the gas leakage of the following equipment such as: slug receiver, closed drain drum, pig receiver, filter coalescer & metering skid which potentially result a tire and followed by a explosion. The research- design is analytical descriptive by performing analysis and calculation of the related factors produces a tire and explosion and its level of severity. The sequences of research are as follow: Gas Metering Station sectioning, calculate frequency refering the E&P Forum database, assessment of the Ere scenario by using ETA-Event Tree Analysis, assessment of the Severity by using Health & Safety Executive Standard and determine the hazardous area by using Canada Gas Institute table. Gas Metering Station consists of 5 sections i.e. slug receiver, closed drain drum, pig receiver, filter coalescer 8. metering skid and pipeline. Refer to the safety protection philosophy of Gas Metering Station, the sequences of a fire as follow: Initial Ignition - Alarm Success - Emergency Shutdown success - Blowdown System Success - Fire Protection System Success and Escalation of fire occurrence. The fire frequencies per year for each seclioning are as follow: slug receiver (5.2x10"), closed drain drum (3.8 x10??), pig receiver (2.2 x 10??), filter coalescer & metering skid (5 x1 O"?) and pipeline (7.5x10?°).The event outcome of event tree analysis including the values are as follow:

Gas Leaking ~> Immediate Ignition -> BDS Success -> Jet Fire (0.00E+00),

Gas Leaking -> Immediate Ignition -> BDS Fail -> .let Fire (3.07E-02),

Gas Leaking -> Immediate Ignition -> FPS Success -> Explosion (0.00E+O0),

Gas Leaking -> Immediate Ignition -> FPS Fail -> Explosion (1.62E~03),

Gas Leaking -> Lagging Ignition -> BDS Success -> Flash Fire (0.00E+0O),

Gas Leaking -> Lagging ignition -> BDS Fail -> Flash Fire (1 .62E-03), Gas Leaking -> Detector Fail -> ESD Success -> BDS Success -> FPS

Success (8.08E-05),

Gas Leaking -> Detector Fail -> ESD Fail -> BDS Fail (4.25E-06)

ln case of ire occurs, the severity will be signiticant level with gas leak flow rate is 0.57 kgs/second during 125 seconds and the PLTGU Cilegon fuel storage tank is in safe condition.

By implementing the tire protection system maintenance program and regular

personnel training for emergency response, the severity level of Gas Metering Station will be minor and expected to be zero.<hr>