# SAFETY ALERT

**Safety Alert No. 386**
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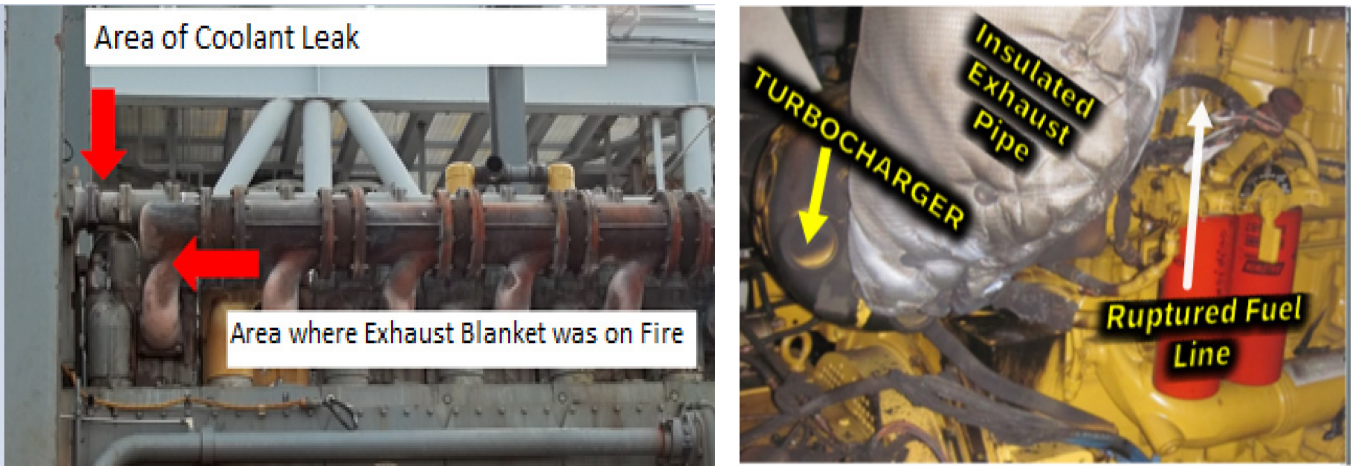
## Turbo and Exhaust Manifold Fires Related to Engines

There have been more than 20 compressor and generator fire incidents caused by high temperature components associated with turbochargers and engine exhaust systems.




*Examples of common fire-causing incidents related to turbochargers and engine exhaust systems.*

Nearly all of the reported incidents included at least one the following common factors:

- Inadequate maintenance resulting in worn or defective mechanical components, which allows materials, such as hydraulic fluid, engine oil, and coolant, to ignite on a hot surface like an engine exhaust manifold/pipe or turbocharger casing.
- Failure of flexible rubberized fuel lines and hydraulic hoses due to 1) fatigue and vibration, 2) improper support, and 3) exposure to high temperature heat sources.
- Loose electrical connections at terminals resulting in excessive heat, which causes cable insulation to melt and ignite.
- Oil feeds directly into the exhaust system and ignites because the turbocharger oil seal fails, which causes excessive high temperatures and increases the risk of igniting nearby components.
- The ratio of hydrocarbons in the air/fuel mixture and the potential for combustion is increased when oil is introduced indirectly in the booster compressor system.

All offshore operators and lessees are advised to review the occurrence of these incidents at their facility and to review prevention, monitoring and contingency controls to ensure the risk from turbocharger and gas/diesel generator fires is adequately controlled.

**Therefore, BSEE recommends that operators and contractors consider the following:**

- Establish procedures to monitor and eliminate the above-mentioned risk factors;
- Ensure all insulation blankets on an exhaust system/pipe are maintained and tight;
- Check that spray shielding is kept in place where used and consider adding shielding around gasketed flanges and other areas if helpful;
- Minimize the use of nonmetallic flexible hoses in systems carrying flammable liquids, particularly in engine areas where failures may ignite the fluids;
- Consult with Original Equipment Manufacturers (OEM) modifications as needed to minimize the risk of fuel spray fires;
- Identify hot spots and examine all heat sources with respect to engine exhausts;
- Check for system vulnerabilities, such as loose or missing pipe clamps and securing devices, that may impact hoses, and piping or tubing;
- Ensure plastic piping is not near hot spots;
- Examine fuel supply pumps, noting shaft sealing for leakages and bearings when fitted, for overheating and indications of wear;
- Properly shield and/or insulate areas where exhaust systems penetrate bulkheads and decks using non-flammable materials;
- Provide sensors, such as cylinder head and discharge air temperature sensors, that automatically shut down a turbo booster when temperatures are exceeded;
- Review fire and gas detection to ensure effective monitoring of enclosed areas for hazardous conditions and provide a timely shut down in response to significant leaks or loss of containment;
- Maintain additional pressure safety devices, such as burst discs, in addition to pressure relief valves (PRV) to safely vent in event of internal combustion. PRVs are not designed for such sudden occurrences.
- Provide adequate instruction, training, assessment of competency and supervision to equipment operators and maintainers.
- Ensure compliance with 30 CFR 250.858 – Gas compressors; and,
- Ensure that proper submittals for plan review are made and documented with BSEE, including re-engineering projects where engines are replaced with different types of engines or engine manufacturers.

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A **Safety Alert** is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding a potential safety issue. It also contains recommendations that could assist avoiding potential incidents on the Outer Continental Shelf.