



Safety Alert No. 495

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## **BSEE Alerts Offshore Workers to Potential Risks of Turbine Generator Exhaust Silencer Failure**

The Bureau of Safety and Environmental Enforcement (BSEE) received notification of an incident highlighting the potential dangers of turbine generator exhaust silencer failures in offshore industrial environments. The incident occurred after a turbine generator shut down, scattering pieces of perforated steel from inside the turbine silencer onto the deck. The lack of proper maintenance and safety precautions could potentially have led to severe injuries or fatalities had personnel been present at the time the debris fell.

### **Incident Overview:**

During offshore energy production operations, personnel reported an unusual sound and noticed the exhaust expansion joint pulsing on turbine generator No. 3 (TGen3). Operators initiated troubleshooting procedures, and mechanics recommended shutting down TGen3 using standard protocols. Emergency stop procedures were avoided over concerns that rapid unloading could cause catastrophic turbine engine failure or a power blackout.

After TGen3 was shut down, a walkdown revealed pieces of perforated steel from inside the silencer (Figure 1) scattered on the deck (Figure 2), some weighing as much as 44 pounds. The steel had failed around the supporting struts and was ejected from the silencer exhaust tip approximately 110 feet above the deck (Figure 3).



Figure 1: Looking up at the silencer.



Figure 2: Perforated steel section.

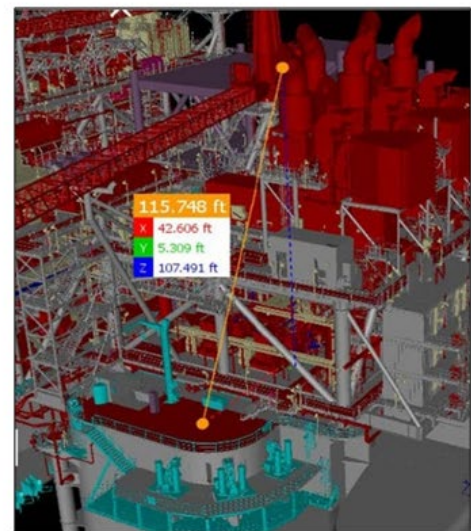


Figure 3: Fall distance.

The silencer was supported by eight struts, welded on both sides without backing support. Visual inspections showed no weld failures. No alarms or performance issues were noted in the control room, and no personnel were in the area at the time.

The offshore facility is powered by three LM2500 turbine generators (TGen3), typically requiring two to operate simultaneously. Unlike TGen1 and TGen2, which have Waste Heat Recovery Units and limited silencer use, TGen3 operates in a simple cycle, routing all exhaust through the silencer.

The TGen3 silencer, which has been in continuous service for 18 years, features an 82-inch inlet and outlet and is designed to reduce exhaust noise to 85 decibels at three feet. The incident occurred after the silencer had undergone 1,872 thermal cycles, with temperatures ranging from ambient to 1,000 degrees Fahrenheit. Maintenance records showed that silencers were not considered serviceable components, and inspections had been limited to the exhaust plenum discharge flange.

**Where appropriate, BSEE recommends that operators and their contractors consider the following:**

- Define and implement comprehensive inspection and maintenance strategies for turbine engine exhaust components, including silencers, for new and existing equipment.
- Ensure regular inspections go beyond the exhaust plenum discharge flange to include the entire silencer assembly.
- Incorporate robust design specifications and quality assurance measures, including manufacturer documentation for new silencers.
- Establish and maintain strict dropped object prevention measures, especially in areas where personnel, hazardous materials, or equipment are at risk. These measures are critical to protect workers and prevent injuries or damage.

By taking these precautions, operators can enhance safety and prevent similar incidents in the future.

– BSEE –

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.

**Category: Rotating Equipment**