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Operator Electrocuted Trying to Charge a Battery

On a drilling rig offshore in the Gulf of Mexico, an operator for a cementing contractor was trouble shooting an electronic instrument failure. He suspected a discharged battery in a battery box was the problem. He plugged a wheeled battery charger (*like those in all service stations*) into a three-prong extension cord carrying household 115V current, and was killed by electrocution.

A BSEE Panel investigated the incident and determined that the extension cord was shorted in its female end with the ground wire burned off. This allowed a hot wire from the extension cord to connect with the ground wire of the battery charger. The ground wire of the battery charger then energized the metal case and when the operator knelt on a wet deck and touched the battery charger case, current passed through his hand to his knee, stopping his heart.

The root causes of this fatality lie with: (1) faulty repair and maintenance; (2) little or no training in dealing with the dangers of electricity; (3) failure to adhere to best practices for wiring and electricity distribution as identified in identified in the NEC NFPA 70, OSHA requirements 29 CFR 1926, and API recommended practice 14F, etc.; (4) poor communication between the field and the repair and maintenance departments.

The investigation identified the following major specific issues:

- Neither the extension cord nor the electrical circuit had a ground fault circuit interrupter (GFCI), a type of circuit breaker.

- The short was probably caused by moisture seeping into the plug and plug receptacle. NEMA-4 standard water-tight plug and plug end were not used, yet the connection was in a location subjected to heavy fluid exposure and weathering.

- Wiring and maintenance on the cement skid was sub-standard;

- The use of an extension cord to supply power over extended distance and time is against best practice of API RP 14F, UL, OSHA, etc., (*see full report for details)*;

- The extension cord was not of industrial quality, was many years old with dangerously frayed armor, and with other obvious damage, yet was allowed to remain in service;

- Printed warnings on the battery charger and user guide repeatedly warned against using an un-grounded circuit for power and also warned against using an extension cord except under the most carefully controlled circumstances. These warnings were not followed;

- No supervision, training, JSA, addressed the dangers of connecting or using a common commercial battery charger.

The BSEE recommends the Operators review the incident report and familiarize their employees and contractors with the circumstances of electrocution by household current. The BSEE also recommends the following:

- Do not use extension cords for power transmittal unless absolutely necessary. For power transmittal over distance and time, properly hard wire the connections and insure NEMA standards are met for water and dust-proofing;

- Insure any extension cords meet UL, OSHA, API, etc., industrial standards for grade and that all three wires are intact. Limit the length of extension cords in use, and regularly inspect and replace any extension cord used to transmit power per best practice. Use only extension cords equipped with an integral ground fault circuit interrupter (GFCI);

- Use proper protective equipment, read user's manuals, conduct JSA meetings even for relatively common tasks;

The full Panel report can be reviewed at the following link:

http://www.bsee.gov/Inspection-and-Enforcement/Accidents-and-Incidents/Panel-Investigation-Reports/Panel-Investigation-Reports/

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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 an accident or a near miss. It also contains recommendations that should help prevent the recurrence of such an incident on the Outer Continental Shelf.