

## 786 – Lessons Learned Through Commissioning, Livening, and Operating Switchgear

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Abstract: During commissioning, verifying the functionality of protective relays and wiring prior to livening is standard practice in the oil and gas industry. For protective relays, verification is complex due to their increased capabilities and the sophisticated control schemes that use them. This paper presents lessons learned from an industrial project of approximately 12,000 protective relays covering a 110, 35, 10, 6, and 0.38 kV power generation, transmission, and distribution system.

The paper discusses power-system-related events from commissioning to after handover. Some events involve a single relay; others include complex schemes involving multiple electronic devices, communication protocols, and their impact on overall power system performance. Each event includes a detailed analysis using the protective relays waveform capture, sequential event report, logic diagrams, instruction manuals, and functional design specifications to determine the root cause and corrective action.