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Process Safety Fundamentals for an Electricity Generation Company

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ABSTRACT

This presentation describes the development and implementation of Process Safety Fundamentals at Mercury NZ Ltd. The programme is a frontline-focused initiative designed to strengthen operational control of major hazard risks across hydro and geothermal electricity generation.

Process Safety Fundamentals are well-recognised and mature concepts within the oil and gas and chemical sectors. This initiative does not introduce new or untested principles; rather, it adapts established process safety fundamentals to the electricity generator's context.

The programme translates established process safety principles into a concise, practical set of five fundamentals directly applicable to high-risk activities: Safe Isolation, Tightness / Leak Testing, Double Isolation, Return-to-Service Checks, and Safety-Critical Barriers.

Rather than introducing new rules or procedures, the programme was deliberately positioned as an awareness and reinforcement initiative, focused on strengthening existing behaviours and decision-making at the frontline. Frontline feedback played a critical role in shaping and refining the fundamentals to ensure relevance and practicality within Mercury's operating context. A values-based approach was adopted, emphasising curiosity, care, committment, and connection over enforcement.

A key innovation of the programme was its story-led engagement model. Real frontline workers were positioned as "heroes", sharing personal experiences and practical insights through short video content and supporting visual materials. Inclusive, "we"-based messaging reinforced shared accountability for process safety, while consistent iconography and modular resources enabled integration into toolbox talks, site meetings, and ongoing operational discussions.

The Process Safety Fundamentals programme forms part of Mercury's broader Safety Intelligence campaign, which focuses on improving how people recognise, understand, and manage risk in everyday work. By emphasising frontline decision-making, learning, and shared ownership, the programme supports the development of safety citizenship.

https://safetyintelligence.mercury.co.nz/

KEY WORDS

Process Safety, frontline engagement, major hazard prevention, hydro, geothermal electricity generation, Process Safety Fundamentals, safety-critical barriers, Safety Intelligence

BIOGRAPHY

Kent Mahon is a Specialist Process Safety Engineer at Mercury, where he plays a key role in strengthening process safety management systems and advancing their application within the context of dam safety. His work focuses on integrating robust engineering principles with practical risk-management strategies to support the safe, reliable operation of Mercury's critical assets. Before joining Mercury, Kent spent 26 years at what was the Marsden Point Oil Refinery in New Zealand. For 11 of those years, he served as Process Safety Manager, leading the development and implementation of safety frameworks, major hazard management programs, and operational risk processes.

Leigh McLellan is Mercury's Site Engineering Lead for its Geothermal Power Plants, with an operational focus on safe, reliable asset performance. She previously held the role of Engineering Manager – Technical Safety, leading Mercury's Process Safety and Dam Safety functions. Leigh has a background in process engineering and has held design, operational, and R&D roles across the geothermal power and oil & gas industries in New Zealand and Australia. Her current role bridges the gap between technical safety frameworks and day-to-day operations, ensuring process safety principles are practically embedded in geothermal plant engineering and asset management.

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