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MONITOR SMARTER NOT HARDER

How Engineering Driven Monitoring is Changing TSF Safety

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1 WHAT IS THE PROBLEM

Tailings Storage Facilities (TSFs) are among the highest-risk structures in mining — where failure can result in catastrophic environmental, financial, community and reputational loss. Yet, many monitoring systems are built reactively, layer by layer, over time.

What starts as a simple setup becomes a tangled web of sensors, cables, data loggers, and communication links — often with minimal documentation and no clear design logic.

This "organic evolution" leads to:

- Excessive complexity and interdependency between system components
- Frequent outages due to power or communications faults
- Alarm fatigue from false positives
- Delayed repairs due to poor documentation and knowledge held by only a few key people
- Lost productivity and reduced trust in the data during critical decision-making moments

The result? Misinformed decision making.

A monitoring system that seems operational — but can you trust it.

2 THE SPECTRUM APPROACH

Monitoring systems shouldn't evolve — they should be engineered. This framework brings systems thinking to dam instrumentation, replacing messy, ad-hoc setups with structured, resilient design.

Key shifts:

✓ Plan, don't patch: Design for uptime, redundancy, and lifecycle.
✓ Simplify: Standardise hardware and cut complexity.
✓ Make it visible: Clear documentation, live registers, audit trails.
✓ Link to risk: Align sensors and triggers with actual failure modes.
✓ Stay online: Cyber-secure, remotely accessible, and disaster-ready.

It's not just better monitoring — it's infrastructure you can trust.

3 REAL RESULTS

SMC has applied the "Spectrum Approach" to a portfolio of large, mature Australian TSF's leading to:

📉 **67% less downtime**

From 93 to 30 hours per month — fewer outages, more reliable data, growing trust in the major infrastructure.

📉 **30% fewer alarms**

Reduced false positives and unnecessary TARP escalations.

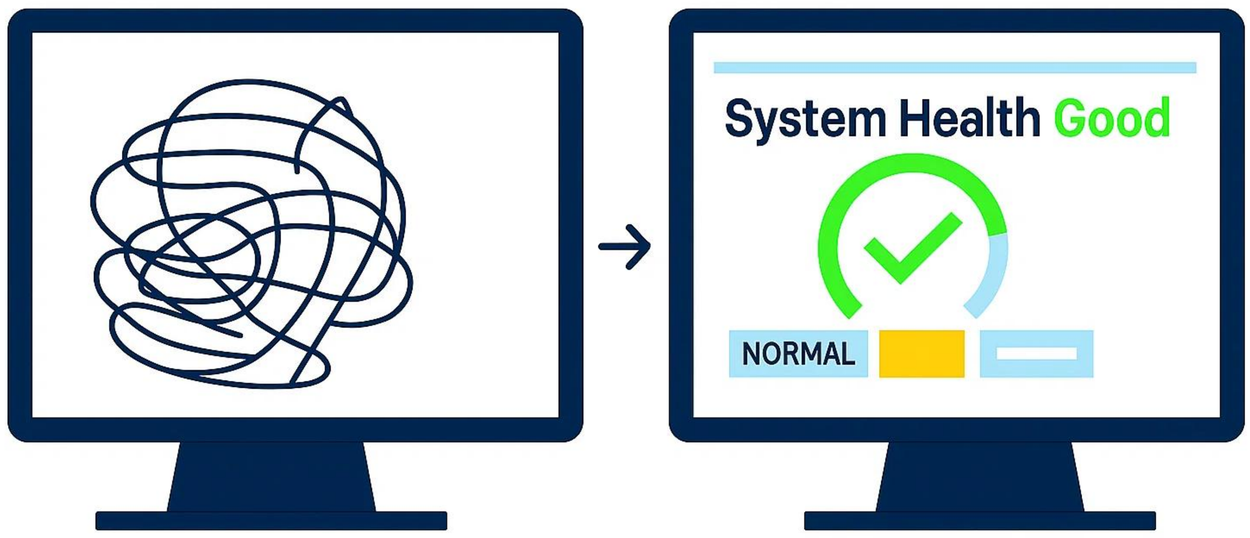
💡 **750+ hours recovered**

Freed up resources and boosted efficiency.

✅ **More confidence, less chaos**

Improved visibility, faster response, stronger safety culture.

Structured monitoring delivers real, measurable impact.



4 FOUR PILLARS OF A RELIABLE SYSTEM

1. Reliability
✓ Target ≥98% uptime
✓ Redundancy (N+1)
✓ Environmentally hardened

2. Safety
✓ Early warning triggers
✓ FMEA-informed thresholds
✓ Linked to TARP

3. Efficiency
✓ Standardised hardware
✓ Less complexity, lower cost
✓ Preventative maintenance

4. Transparency
✓ Live registers & metadata
✓ Traceable documentation
✓ Clear system governance

5 WHY IT MATTERS

This isn't just compliance — it's about trust, safety, and control.
Structured monitoring means:

- Reduced risk of undetected dam instability through consistent, accurate data
- Lower potential for loss of life enabled by earlier, clearer warnings
- Minimised downtime and emergency costs through proactive system design
- Greater stakeholder confidence through clear, traceable monitoring data

Better systems = safer dams and smarter decisions.

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