

The Pipelines Regulations: Considerations and Case Study

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Who is WorkSafe and what is their role

WorkSafe

- Primary workplace health and safety regulator
 - Key Responsibilities
 - **Harm Prevention**
 - **Regulation and Enforcement**
 - **High-Risk Work**
 - **Education and Guidance**
 - Deliver the role by
 - **Engage**
 - **Enforcing**
 - **Permitting**
-

WorkSafe's Regulatory Function – Pipelines Regulations

- Recognition and oversight
- Notification receiver for notifiable operations
- Incident notifications
- Emergency planning oversight

How it happens

- Parliament decides the law – Sets the Rules!
 - Make, amend, and repeal laws (Acts of Parliament)
 - Ministers, typically introduce Bills to Parliament and are responsible for policy decisions within their portfolio
 - Ministers and government departments develop and administer policy
 - Regulators
 - apply,
 - monitor,
 - enforce the law
-

Who feels the greatest impact from the Pipelines Regulations in the geothermal industry? Asset owners? Engineers? Contractors? Project developers?

- Engineer's bear the brunt of the work and frustration in proving compliance
- Asset Owners - Large pipeline specific management system to develop and maintain
- But the cost is born by project developers/Asset Owners
 - Either the cost of electricity increases or the return to the shareholder/owner decreases

Why the regulations were
developed?

Overview

- The Health and Safety in Employment (Pipelines) Regulations 1999 establish the specific health and safety requirements for the design, construction, operation, maintenance, suspension, and abandonment of hazardous pipelines in New Zealand.
- They sit beneath the Health and Safety at Work framework and impose duties on pipeline operators, managers, workers, inspection bodies, and WorkSafe



Why inclusion of geothermal pipelines?

- Pipelines conveying geothermal fluid included in Regulation 2
- Historically, pipelines located entirely within geothermal plant boundary may have been excluded from the pipeline regs and managed under PEPCR Regs
- long-distance geothermal pipelines that cross land boundaries, public infrastructure, or high-consequence locations are exposed to **additional risks**
- These circumstances introduce risks that extend beyond those typically encountered within a process plant boundary and may not be fully addressed by traditional power piping standards alone

Why geothermal pipelines?

- Examples of such hazards include:
 - Excavation damage.
 - Vehicle impacts.
 - Vandalism.
 - Ground movement.
 - Landslides.
 - Earthquakes.
 - Flooding.
 - Severe storms and other climate-related events..
 - dual-standard approach is often considered good engineering practice for geothermal pipelines
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Key Regulatory Themes of the regulations

- Management accountability
 - Regulatory intent: There must always be a clearly accountable person overseeing pipeline safety
 - Risk management requirements
 - Regulatory intent: Prevent major accident events before they occur
 - Compliance with recognised engineering standards
 - Regulatory intent: Ensure pipelines are managed using proven engineering principles rather than operator discretion.
 - Independent certification system
 - Regulatory intent: Independent assurance that pipeline systems remain fit for service
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Also covers.....

- Abandonment Requirements
 - Ensure pipelines remain safe even after their operational life ends.
- Duties to Landowners and Third Parties

From your experience, have those
original objectives largely been
achieved?
?

- Since the 1950s geothermal piping was managed under the Boilers, Lifts and Cranes Act then in 1999 PECPR
 - Decades of service governed by these regulations without major issue
- Pipeline Regulations were issued in 1999 and generally seen as irrelevant by the Asset Owners and the use of these regulations for geothermal was not enforced by Worksafe
- Yes, H&S objectives were achieved but without needing the Pipeline Regulations, so the added regulation is not warranted.

What aspects of the current regulations work particularly well for geothermal operations today from the Regulator's perspective?

For geothermal pipeline operations:

- Notifiable operations under Reg 12 are recognised
- WorkSafe receives and reviews notifications and we provide feedback and guidance
- In a broad sense, it is also good to see the risk recognition for geothermal pipelines
- Operator feedback when they come across challenges pertaining to older/existing pipelines – gap analysis.
- Safe Work Instrument

Other geothermal regulations :

- Geothermal Energy Regulations 1961
 - Outdated (not really fit for purpose)
 - Limited use (much revoked)
- Health and Safety at Work (Major Hazard Facilities) Regulations 2016
 - Safety Case
 - SMS
 - Safety Critical Elements.
 - ER

Regulation overlaps

- Where Pipelines Regs and PECPR start and stop
- PECPR does not exclude geothermal pipelines covered by the pipeline regulations
- This is not limited to the geothermal industry

Pipelines Safe Work Instrument 2023

- Came into force 22 June 2023
- **Purpose** - updates the technical standards that pipeline operators must use to comply with Regulation 8. This SWI specifies which engineering standards are currently recognised by WorkSafe and the Minister
- **Key change** - The original 1999 Regulations referenced engineering standards from the 1980s and 1990s. This SWI replaces those references with current versions of internationally recognised pipeline standards
- **Approved Standards**
 - AS/NZS 2885 Pipeline Series.
 - ASME B31 Series

What aspects of the current regulators work gives the biggest challenges from the operator's perspective?

- Confusion
 - Overlap of regulations
 - Differing viewpoints between certifiers
 - What to do with legacy assets?
 - Enforcement of standards and safety studies that are not fit for purpose
 - Buried ground gas/petroleum piping standards being applied to above ground geothermal piping
 - Added Engineering costs
 - Documentation
 - Engineering studies
 - Reporting
 - None of which makes the pipe any safer
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<https://as2885-info.blog/>

<https://www.tuwharetoageothermal.co.nz/why-geothermal>

Health and Safety in Employment (Pipelines) Regulations 1999

- Specified the use of AS/NZS 2885 (original section 8, now specified per WorkSafe SWI)
- Intended for buried cold hydrocarbon piping
- Includes geothermal but not the focus of the regulation
- Based on experience in Australia. Overwhelming cause of failure is excavation (e.g. Northland avgas pipeline). This is not applicable to above ground piping.
- Consequence of failure can be a different magnitude (ignition)

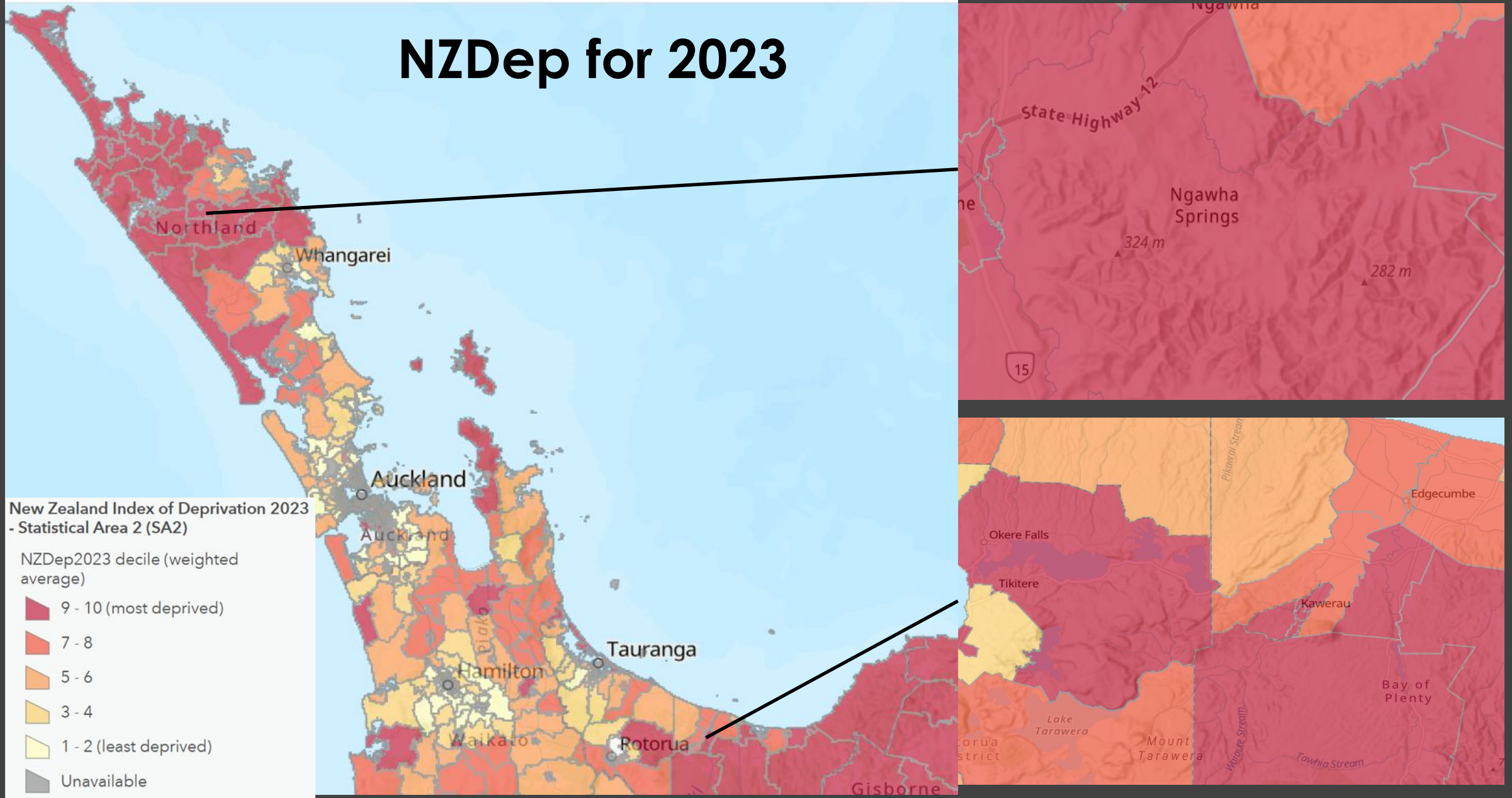
AS 2885:2018 Pipelines – Gas and Liquid Petroleum

- Part 0 1.2.3 specifically excludes steam and water piping.
- The focus is to reduce capital costs by using higher strength steels and higher allowable design stresses
- To compensate for the reduced conservatism, other factors were introduced to increase conservatism in populated areas based on credible threats
 - There is a risk that the additional application of AS/NZS 2885 will add further conservatism near high-risk areas to an already conservative B31.1 design
- Risk assessment methods (SMS) largely irrelevant for geothermal

Case Study –
where the Pipelines Regulations
have a significant influence on a
geothermal project?

- Ngawha Generation Limited & Ngati Tuwharetoa Geothermal Assets
- Both are community owned
- The impact is on the asset owner which in turn impacts the community they represent and that in turn impacts the taxpayer

NZDep for 2023



Top Energy

- Ngawha Generation Limited wholly owned by Top Energy
 - Owned by their customers
 - Profit they make is returned back into the customers and local community
 - Annual profit returns \$/customer
 - Top Energy spends around \$500k per annum on their sponsorships
 - Young Enterprise Scheme, Healthy Homes Tai Tokerau, WaterSafe, Northern Rescue, Top Energy Rescue, the Far North Science and Technology Fair
 - Everyday people bear superfluous costs not wealthy investors or shareholders (In contrast to AS 2885 being developed explicitly for this purpose.)
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Ngati Tuwharetoa Geothermal Assets

- Wholly owned by the settlement trust - Tuwharetoa mai Kawerau ki te Tai.
- NTGA operations maintain and operate the renewable energy assets supplying energy to industry for direct heat use
- NTGA supports the Trust and its beneficial owners as a priority, creating opportunity and prosperity by:
- Support the local community by:
 - School and Koeke grants
 - Education, tertiary and sports grants
 - Improved health care opportunities and investment in the local medical centre
 - Food pack distribution
 - Housing
 - Investment in Tuwharetoa Iwi Marae.
 - Apprenticeship programs and job opportunities

Upfront costs for pipeline regulations compliance

- Engineering time – writing, reviewing, and collating documentation
- Safety Management Study
- Pressure Integrity Management Plan
- Other studies (e.g. gaps analysis)
- Pipelines equipment inspector
- Other consultants
- All the above in addition to PECPR compliance
- The additional works added up to about \$200,000

Approximate total compliance cost for a client

- Initial pipeline \$200,000 assessment
- Estimated cost per annum for certifying additional piping (over the next 5 years) is \$120,000
- The total above is \$880,000 for full compliance of the clients piping
- Ongoing reviews and recertification costs have been ignored

The cost to society

If \$880,000 is spent on:	Savings to taxpayer
Primary Health Care	\$11,400,000
Early Education	\$5,300,000 to \$14,100,000
Housing	\$2,600,000 to \$3,500,000

These values are not accurate but do give an indication of where this money would be better spent

<https://www.nzinitiative.org.nz/reports-and-media/reports/the-heart-of-healthcare-renewing-new-zealands-primary-care-system/>

<https://4es.nz/blog/the-power-of-early-investment/>

https://evidence2impact.psu.edu/wp-content/uploads/2023/05/s_wifis32c01.pdf

<https://www.qlcht.org.nz/resources/social-return-on-investment/>

<https://www.tetoimahana.org.nz/social-housing-delivers-threefold-return-on-investment/>

When challenges arise, at what point during a project do regulatory issues most commonly emerge?

- Procurement (e.g. PSL1 vs PSL2 pipe)
- Detailed Engineering
- Certification

Detailed Engineering Challenges

- Detracts from actual safety and engineering
 - There is a limited pool of skilled people (i.e. engineering and operators)
 - Ignores hazards specific to geothermal
 - Unnecessary effort for compliance removes focus true safety outcomes
 - Difficult to apply AS/NZS 2885
 - Mixing design/fabrication/ inspection requirements from PE-ACOP, ASME and AS/NZS 2885 is bad practice but difficult to separate entirely.
 - This can lead to actual design errors.
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Certification Challenges

- Limited availability of Pipeline Certifiers with geothermal experience.
- PECPR inspectors with decades of experience cannot certify pipelines without added Worksafe endorsement
- Pipelines fall under Worksafe High Hazards Unit but geothermal piping is not high hazard – PECPR and Pipelines different departments within Worksafe

What advice would you give organisations to avoid surprises?

Assuming that compliance with the Pipeline Regulations & AS/NZS2885 is required then:

- Early resolution of the asset owner's interpretation and compliance method
- Early engagement of the certifying inspector

Successful Projects...?

Observations :

- Recent Geothermal Projects – different challenges
 - TOPP2
 - Te Huka 3
 - Ngatamariki (OEC5)
 - Steam / Brine & Pentane Hammer events
 - Benefit of MHF regulation – Design Notice
 - Older equipment challenges
 - WorkSafe's visibility during construction process for new geothermal pipelines
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What next?

If you could recommend improvements to the Pipelines Regulators that would make the biggest positive difference for the geothermal sector, what would it be?

- Worksafe could reconcile the Pipeline Regulations with PECPR
 - Edit the Safe Work Instrument to endorse the PE-ACOP for geothermal pipelines and remove the preference for AS/NZS 2885 where it is not appropriate
 - This solves the regulatory overlap with the stroke of a pen
 - But for this to happen it will require consensus and direction from within the geothermal industry

Safety Management Systems

- Often required by different sets of regulation
- It is not unique to electricity generators
- A single robust SMS covering the relevant specifics thereby avoiding duplication
- A candidate for an ACoP....?

[bridge the gap between AS/NZS 2885 and NZS 7901 together with ASME B 31.1 for high-pressure geothermal pipeline external interference management.]

Inspection Bodies / Certifiers

- What are the specific issues?
 - The lack of certifiers?
 - Lack of knowledgeable geothermal certifiers?
 - Limited option of recognized inspection body

How can industry and regulators
work together more effectively to
improve future
regulatory settings?

ACOP's?

- Geothermal - Approved Code of Practice?
- New amendment bill – 01 April 2027
- Led and drafted by **industry** and submitted to WorkSafe
- Industry being –
 - geothermal pipeline operators,
 - specialist engineers,
 - relevant utility/authorities or
 - land management stakeholders

The changes...

The amendments passed by Parliament make changes to:

- the Health and Safety at Work Act 2015
 - the WorkSafe New Zealand Act, and
 - the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016.
-
- focus the health and safety system on critical risk

Encourages...

more industry involvement in developing approved codes of practice (ACOPs)

where a business follows an ACOP (made after 1 April 2027)
it will be considered to have complied with HSWA.

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Ngā mihi nui

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Mahi Haumaru Aotearoa