Submission to the Havelock North Water Inquiry – Stage 2

21 JULY 2017

Introduction

The Institution of Professional Engineers New Zealand (IPENZ) is the lead national professional body representing the engineering profession in New Zealand. We have approximately 19,500 members, including engineering students, practising engineers and senior members in positions of responsibility in business. IPENZ is a non-aligned, influential voice on engineering issues affecting the lives of New Zealanders. We offer an expert view on important engineering-related issues that is independent of any commercial interest.

IPENZ is also the Registration Authority for Chartered Professional Engineers under the Chartered Professional Engineers of New Zealand Act 2002 (the CPEng Act). In this role, IPENZ is responsible for the competence assessment and registration processes for Chartered Professional Engineers. We currently register around 3500 engineers from a broad range of engineering disciplines, from structural, mechanical and civil engineering to environmental, chemical and aerospace engineering.

Engineers play an integral role in ensuring the quality of New Zealand's drinking water. IPENZ supports a strong community of water engineers who are committed to quality and the profession's credibility. Our engineers care deeply that we learn from what happened with Havelock North's drinking water and that the events that gave rise to this situation are not repeated. The purpose of this submission is to identify what our engineers who practise in this area see as gaps in the current mechanisms for ensuring quality drinking water, and to identify where the Inquiry has a unique opportunity to strengthen New Zealand's approach to quality drinking water (and public health engineering more broadly).

This submission has drawn on the expertise of Robert Blakemore, a Fellow of IPENZ. Robert has had a wide range of professional positions and national roles in the drinking water industry, including working as Manager, Environmental Training Centre at Trentham for 14 years. His CV is **attached** as **Appendix One**.

General comments

A whole-of-system approach is required to ensure New Zealand's consumers and communities receive quality drinking water. This means complementary legislation (with clear links between the key pieces of legislation[1]), investments in training, a commitment to quality assurance, and coordination between district health boards and drinking water suppliers.

[1] Resource Management Act 1991, the Resource Management (National Environmental Standard for Sources of Human Drinking Water) Regulations 2007, the Health Act 1956, and the Local Government Act 2002.

Our focus is predominantly on the engineering industry's contribution to drinking water quality. The submission is focussed on three key areas particularly relevant to Issue 11 of Stage Two of the Inquiry: competence and certification/licensing; quality assurance; and training in public health engineering.

Competence certification/licensing

Competence and assessment

A key mechanism for ensuring the quality of drinking water supplied to New Zealanders is having the right people doing the right job. In addition, drinking water practitioners – operators, supervisors and managers – need to be competent and supported in their roles. Currently there are no independent benchmarks for the competency of drinking water practitioners in New Zealand, and there are no statutory requirements for any form of licensing, certification, or competency to practise.

We consider that drinking water supply processes would be significantly enhanced if drinking water practitioners are required to demonstrate their competency and measured against minimum competencies set by industry. We understand that Water New Zealand is also strongly advocating for this.

The setting of minimum competencies for drinking water practitioners would create benchmarks and expectations for service delivery, and offer an element of consistency in service delivery throughout New Zealand. Water supply is heavily dependent on operational management capability. Accordingly, these competencies need to look beyond competency in design to address competency in operational performance, including operational risk and management.

Minimum competencies could be assessed and monitored through an independent certification/licensing regime (see below). This could be through a similar mechanism as the competency assessment processes managed by IPENZ for Chartered Professional Engineers, engineering technicians, engineering technologists, and engineering geologists.

Engineers are not required to be registered in order to practise engineering in New Zealand. However, an engineer may voluntarily choose to become registered under the CPEng Act as a mark of quality in relation to that engineer's competence. To become registered as a Chartered Professional Engineer, an engineer must demonstrate that they meet the minimum standards of competence in the particular fields in which they practise, and they must demonstrate continuing competence through regular (at least six-yearly) reassessments of their competence. In addition, Chartered Professional Engineers are professionals bound by a Code of Ethical Conduct that requires them to, amongst other things, take reasonable steps to safeguard the health and safety of people, have regard to effects on environment, report adverse consequences and undertake engineering activities in a careful and competent manner.

IPENZ operates the Register for Chartered Professional Engineers, although there is no requirement for a Chartered Professional Engineer to be a member of IPENZ. In addition, IPENZ has a well-developed framework for assessing the competence of engineering professionals (professional engineers, engineering technologists, engineering technicians and engineering geologists) to internationally benchmarked standards. Our assessment process leads to recognition of engineering professionals in a range of competence-based membership classes and registers, not just Chartered Professional Engineers.

Certification/licensing of drinking water practitioners

We believe that the certification/licensing of drinking water practitioners could be effectively achieved through leveraging off the current well-developed and recognised competence assessment system that IPENZ operates. This would create a single coherent assessment framework for drinking water practitioners, and would involve relatively minor system development (and cost). The current assessment system ensures practitioners hold appropriate qualifications, and are assessed as competent by their peers against industry standards.

In 2014, Government proposed that Chartered Professional Engineers to be required to certify the structural integrity of commercial, multi-storey residential buildings and complex buildings. We are currently lobbying Government to broaden this proposal and introduce an occupational licensing scheme for all safety-critical engineering work, and this includes water engineering. We are working to enhance our current competency assessment process so that we can smoothly transition to any occupational licensing scheme introduced in the future. For example, we are aligning the assessment of engineers working in various engineering practice fields with specific Bodies of Knowledge and Skills (BOKS), which are being developed by the relevant technical societies and set out the minimum standards of technical competence expected of an engineer working in that practice field. Currently BOKS are under development in relation to structural and geotechnical engineering.

If IPENZ were to operate a new certification/licensing regime for drinking water practitioners, we would work with Water NZ and the wider industry to define categories of work for which certification/licensing is required, and to develop BOKS that will underpin any competence assessment for drinking water practitioners. This would mean looking particularly at the competencies needed in respect of operational risk and management, and to achieve best practice multi-barrier approaches to source protection, provision of adequately treated water, distribution management, monitoring and response.

Quality assurance

As well as ensuring that the right people are doing the right job, and that they remain competent, we consider that greater focus should be given to on-going quality assurance and the role competent engineers can play in this, most specifically in the development and implementation of water safety plans.

Under section 69Z of the Health Act 1956, drinking water suppliers are required to prepare and implement a water safety plan. The section sets out certain requirements for what the plan must cover, including identifying mechanisms for preventing, reducing, and eliminating public health risks arising in that drinking water supply. The plan must be approved by a drinking-water assessor.

A plan remains in force for no longer than five years,[2] after which drinking water suppliers are required to review the plan and submit the existing, or a revised or new plan, to a drinking-water assessor for approval. The effect of this is that a plan may be reviewed only every five years.

We believe that plans need to be living documents with strong risk-mitigation strategies (comprehensive guidelines for assessing risk would be helpful here) and be used to inform operational action and understanding on an on-going basis. There needs to be a clear connection between the plan and operations, such that drinking water practitioners know, rely on, and use the plans to actively inform their day-to-day actions. Furthermore, the plans need to feed into the drinking water supplier's planning processes and be used to inform investment decisions. There needs to be a clear connection between what a drinking water supplier says it will do in the plan and what it commits to from a resourcing perspective.

Under section 69ZL of the Health Act 1956, drinking water assessors are tasked with assessing the performance of drinking water suppliers to determine whether they are implementing their plans, and with verifying the adequacy of and certify the implementation of those plans. This recognises that, for drinking water supply, the operation and maintenance of the supply is as important as the initial design and construction. However, to do this effectively, drinking water assessors need to have reliable information about all aspects of the plan's implementation and its operationalisation, which often requires specialist technical and operational knowledge and skills that drinking water assessors may not have.

[2] See section 69ZB of the Health Act 1956.

We consider that there is opportunity to strengthen the processes around the development and implementation of the plans in a way that supports the current framework in the Health Act. In particular, competent water engineers could offer a strong support role to drinking water assessors, suppliers and regulators in the approval of water safety plans and the certification of their implementation, specifically around the plan's technical and operational adequacy.

One way this could be achieved is through the introduction of an auditing process. A Chartered Professional Engineer with specialisation in drinking water could audit specific elements of the plan's implementation, with the results of the audit being used to inform the drinking water assessor's overall certification. For example, the auditor could certify that the plan correctly identifies the risks to the supply, and that improvements to address those risks are appropriate. This would support the drinking water assessor and provide a specialist level of technical verification of the plans.

Audits could be carried out on a regular basis, integrated with the supplier's planning processes, to ensure that any opportunities for improvement identified in the audit/plan certification are aligned with and fed into the supplier's subsequent planning process (for example, three-yearly). We believe that regular and independent audit would ensure that drinking water suppliers commit to the implementation of their plan and dedicate adequate focus and resources to drinking water quality, including in local authority long term and annual plans.

We consider that Chartered Professional Engineers competent to practise drinking water supply engineering are best placed to carry out these audits, as they have the necessary technical and operational expertise. We recommend that consideration is given to making audit by a Chartered Professional Engineer a legislative requirement in the Health Act 1956 in a way that supports and complements the role of the drinking water assessor in discharging their responsibilities under Section 69ZL. This would be consistent with many other areas of safety critical work in which legislation requires certification by Chartered Professional Engineers (see examples in **Appendix Two**). In these examples, engineers have a certification role in large dam safety, amusement devices safety, and heavy motor vehicle safety. The policy objective in these legislative requirements is generally public safety, but not exclusively. There is a strong argument that the public health is significantly more at risk from drinking water than from dams, amusement devices and heavy motor vehicles.

A key consideration in any proposal to introduce a requirement for Chartered Professional Engineer input into the plan certification process is ensuring there are sufficient practitioners with the appropriate competencies available to meet demand. This starts with ensuring that avenues are available to promote drinking water as an attractive career choice, making training and competence assessment requirements accessible, and supporting drinking water practitioners to develop their knowledge and skills. IPENZ has a variety of levers to assist in this advocacy work, but it will require buy-in from the sector generally.

Training in public health engineering

The events of Havelock North throw the spotlight on public health engineering more broadly. Such an event could easily happen in other areas of water engineering or public health, such as waste-water services. Adequately operating and maintaining wastewater services is also a workplace health and safety matter and a public health issue.

We believe that the events leading to the Inquiry offer a unique opportunity to reflect on the adequacy of our overall approach to public health engineering in the broader sense. Our engineers working in this industry consider that engineering graduates coming through tertiary institutions today lack sufficient background and core knowledge in public health engineering (specifically core knowledge in operational performance) to effectively prepare them for the challenges of working in this area. For example, engineering students need to learn not only how to design a water treatment plant clarifier, but also what determines whether a water treatment plan clarifier is performing adequately. Our engineers would like to see tertiary institutions more effectively give future practitioners skills in operational performance and management, as well as design.

IPENZ can begin to have conversations with tertiary providers about this. However, there is opportunity for the Inquiry to recommend greater attention and investment in training in this important engineering discipline, most specifically, ensuring that our tertiary institutions are setting future practitioners up with key skills in operational management.

Conclusion

A whole-of-system approach is required to ensure New Zealand's consumers and communities receive quality drinking water. We need to ensure that drinking water practitioners are adequately trained and competent, and that specific engineering expertise is sought at key stages in drinking water delivery – specifically quality assurance.

We have only touched on three very general areas where, from an engineering point of view, improvements to the system could be made through this Inquiry: competence and certification/training; mandated quality assurance, specifically in relation to water safety plans; and training in public health engineering.

Beyond this, to make real and lasting improvements, we highlight the need for an across-the-board response to improve drinking water quality (and public health engineering more broadly) in New Zealand. This needs complementary legislation, investments in training, a commitment to quality assurance, and coordination between district health boards and drinking water suppliers. We also need council buy-in and commitment to developing, implementing, and resourcing robust water safety plans that are responsive to changing levels of risk.

IPENZ appreciates the opportunity to make this submission and is able to provide further clarification if required. For more information, contact:

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Appendix 1

Curriculum Vitae – Robert Blakemore

Academic qualifications

CPEng (Environmental, Civil)

1999 Workplace Assessor

1979 ME (Civil), University of Canterbury

1978 BE Civil (Hons), University of Canterbury

Professional positions held

2016 – Present Chief Advisor, Service Planning, Wellington Water Ltd

2013 – 2015 Market Sector Manager (Water Asset Management and Training), Opus International Consultants

2005 – 2012 Manager, Water Asset Services, Opus International Consultants

1998 – 2012 Manager, Environmental Training Centre, Opus International Consultants

1997 – 1998 Asset and Quality Manager, Wellington Regional Council Utilities Division

1996 – 1997 Headworks Engineer, Wellington Regional Council, Bulk Water Department

1995 – 1996 Plant Manager, Yorkshire Water PLC, Leeds, Yorkshire, England

1990 – 1995 Headworks Engineer, Wellington Regional Council, Bulk Water Department

1988 – 1990 Development Engineer, Wellington Regional Council, Wellington City Water

1978 – 1983 Graduate Engineer and Engineer, Wellington Regional Council, Technical Services Department

Present research/professional speciality

- Specialist in water resource planning, water supply and treatment, asset management and industry training.
- Long term investment plans for water supply, wastewater and stormwater services to the Metropolitan area of Wellington.
- Development of asset management approaches and supporting documentation/ guidelines to improve the long term provision of water supply, wastewater and stormwater services that includes asset and non-asset solutions.
- Advice to Agriculture Industry Training Organisation on content of qualifications under their Scope including unit standards as well as the detailed content.

Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc.)

2006	Fellow of IPENZ
2011 - 2017	Member of MOH Sanitary Works Technical Advisory Committee
1999 – 2013	Participation on NZ Water and Wastes Association Board from 1999 – 2003 as Board Member, Vice President, President and Immediate Past President (re-elected to NZWWA Board in 2005 for 2006 – 2007 term and 2011 – 2013).
2012	Tertiary Education Commission Performance Based Research Fund Committee Participation
2008	2007 Recipient of IPENZ Technical Angus Award (Utilities)
2005	Member of Ministry of Health Expert Committee for 2000 and 2005 Drinking Water Standards revision.
2005-2009	Participation on NZWETA Committee since inception of joint venture.
	Past Chair of Water Supply Managers Group
	Contributed to design of previous PWC benchmarking programme (Water NZ)
1998-current	Member of Water NZ Annual Conference Technical Committee and organiser of workshops in resource consent conditions consistency and 2014 Renewals Bow-wave Fact or Fiction?
	Past member of IPENZ Technical Standing Committee to review educational providers of National Diploma in Engineering qualifications for recognition under the Dublin Accord
2013-2015	Opus representative on NAMS Partners group

Appendix 2

Current Licensing of Chartered Professional Engineers

Legislation	Requirement	Licensed Role	Regulator
Amusement Devices Regulations 1978	CPEng with a qualification in mechanical engineering	Examination of amusement devices and issuing of engineer's certificate	WorkSafe NZ, local authorities
Building Act 2004	Recognised engineer: CPEng, prescribed qualifications; and prescribed competencies, no financial interest in dam.	Verification of dam specifications, audit of dam safety assurance programmes	MBIE
	CPEng	Building work for which building consent is not required under Schedule 1 of the Building Act	
Building (Designation of Building Work Licensing Classes) Order 2010	CPEng	Automatically licensed in building work licensing class	MBIE
Climate Change (Unique Emissions Factors) Regulations 2009	CPEng and at least five years' experience after achieving CPEng or 100 working days' verification experience, obtained within the three years immediately before the date of application to become verifier	Verifier of unique emissions factors. This can also be performed by Chartered Accountants	Environmental Protection Authority
Electricity Act 1992	Registration as electrical engineer – requires: Bachelor of Engineering (Electrical) qualification and passed Electricians' Regulations written examination; and completed the Electricians' practical three stage assessment or passed the practical examination (if available); and completed approved safety training within the prescribed time frame. OR Holds a National Diploma in Engineering (Electro technology) Level 6, or New Zealand Certificate in Engineering (Electrical); and passed the Electricians' Regulations written examination; and passed the Electricians' practical examination (if available) or three stage assessments; and completed approved safety training within the prescribed time frame; and completed three years' practical experience which is satisfactory to the Board.	Undertaking prescribed electrical work	MBIE

Legislation	Requirement	Licensed Role	Regulator
Fire Service Act 1975	Engineer with qualifications suitable for the purposes of the Act	Issuing a valuation certificate	Department of Internal Affairs
Health and Safety in Employment Regulations 1995	CPEng with a qualification in mechanical engineering	Restoration of self-propelled mobile mechanical plant. This can also be done by manufacturer's principal agent	WorkSafe NZ
Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999	CPEng with a qualification in mechanical engineering	Investigation of circumstances of accident event. This can also be performed by inspection body	WorkSafe NZ
Heavy Motor Vehicle Regulations 1974	CPEng	Issuing of certificates following inspection of bridges and provision of advice regarding fixing weight or speed limits	Road controlling authorities
Land Transport Rule: Heavy Vehicles 2004	Road transport certifying engineer: CPEng (mechanical)	Setting of masses and forces on heavy vehicles This can also be performed by manufacturer or vehicle inspector Inspection of heavy vehicles and connections	NZ Transport Agency, Ministry of Transport
Pressure Equipment, Cranes and Passenger Ropeways Regulations 1999	CPEng and certificate stating they are suitably qualified to carry out specified activity in relation to specified equipment	Design verifier	WorkSafe NZ
Securities Act 1978	A qualification entitling the holder to practise the profession of engineering in New Zealand – suggests membership of IPENZ	Exemption from the Act	MBIE