SKILLED PEOPLE IN THE WATER INDUSTRY – INFORMATION FOR THE FUTURE

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ABSTRACT

The advent of national water qualifications triggered significant changes to the distribution of skilled people who are responsible for the operation of water supply and wastewater networks and treatment plants. Most water industry employers have recognised the need to employ qualified people. The aging population, the lack of popular awareness of career opportunities and changing technologies are just some of the reasons that have been put forward in response to employers who have experienced difficulties with employing the right people.

To-date there has been no attempt to formally collect, analyse and present data that describes the current employment patterns for water and wastewater treatment plants as well as reticulation networks in New Zealand. By combining and filtering a number of existing data bases that are currently used to support training services and to record treatment plant locations and treatment processes, and then linking the data to a GIS platform, there is now the ability to generate wide-ranging enquiries about employment patterns in the New Zealand water industry. Data fields also include employee ages, qualifications, communities served, community sizes and employer locations. Some distinctive patterns have emerged from this analysis to provide insight into future employment needs for the next 20 years. For example, there are alarming implications for the staffing of treatment plants arising from an ageing workforce that has an age profile not expected in the rest of the NZ workforce until 2050. Other outputs related to geographic distribution of skills are graphically presented in the paper.

Further use of this data should allow a concerted industry approach to pre-empting severe skill shortages through the development of location based training, more focused development of formal career programmes and planning locations that would derive maximum benefit from skill sharing by employers.

KEYWORDS

National water qualifications, employment patterns for water and wastewater treatment plants, employment patterns in the New Zealand water industry, skill shortages

Introduction

The Opus Environmental Training Centre is the single largest training provider of water and wastewater technical qualifications at certificate and diploma level in NZ. The Environmental Training Centre in association with the water industry through the joint venture NZ Water and Environment Training Academy (NZWETA) encourage and foster technical skills throughout the water industry.

Over the past 15 years there have been significant changes in the industry. The fundamental changes included:

- Decision by NZWWA to form ITO that would develop and register national water qualifications.

- Uptake of water training by Agriculture ITO as part of their scope and creating Water Industry Training (Water IT).

- Registration of qualifications in water treatment, wastewater treatment and reticulation at operator and supervisor level.

- The advent of workplace assessment to complement classroom based training.

- Formation of NZWETA as Joint venture between NZWWA and Opus to promote and deliver water training.

- Incorporation of training requirements into the Ministry of Health water supply grading criteria.

- The introduction of a risk based approach to water quality management by the Ministry of Health and the importance of operator training to public health risk management plans.

- Incorporation of training requirements by asset owners into maintenance and operations contracts (especially reticulation).

These changes were driven by industry recognition of the small pool of people available, the uneven geographic spread, varying levels of competencies and an apparently aging skilled workforce.

A framework was thereby established, upon which to evaluate skills consistently across the industry. The awareness of the need for consistent approaches to treatment and management became apparent. For the first time the skill requirements and risks around water supply and wastewater networks were acknowledged, leading to the establishment of various reticulation qualifications.

It became evident that there was an increasing demand for operators with formal qualifications and skills. The industry provided an upgrade route to recognise previous local qualifications in the national qualifications framework.

Despite these wide ranging changes to training in the industry, to date there has been no comprehensive formal attempt to collect, analyse and present data that would highlight industry issues and contribute to the development of a strategy to address those issues.

The Environmental Training Centre, aware of these issues through the promotion and delivery of water industry qualifications, has identified a need to more accurately gather and analyse available data. Information has been gathered and analysed, including employee ages, qualification training engaged in, communities served, community sizes, employer locations and complexity of plant technology. The information has been entered into a database with GIS capabilities (plant location, geographic spread etc). Although the data covers the areas of reticulation, wastewater and water treatment, our analysis for this paper has focussed largely on water treatment as this data is the most robust.

1   DATA ANALYSIS AND OUTCOMES

An analysis of the data has led to the drawing of a number of conclusions around the state of the industry and the future challenges the industry is likely to face.

1.1   DEMOGRAPHIC ANALYSIS

Over the past 10 years 2749 people have entered into the qualification programmes through the Opus Environmental Training Centre, NZWETA and Agriculture ITO. The entrants are/were enrolled in the following courses:

Table 1:   Numbers who have Entered Training for Water Qualifications

Qualification	Numbers engaged in training
National Diploma in Drinking Water DWA (L5)	89
National Diploma in Wastewater Treatment (L5)	124
National Certificate in Water Reticulation (Supervisor) (L4)	140
National Certificate in Wastewater Treatment (L4)	176
National Diploma in Drinking Water Technician (L5)	177
National Certificate in Water Treatment (L4)	291
National Certificate in Water Reticulation (Serviceperson) (L3)	1752

While the above players are the largest, major provider of these qualifications a small number of people may have entered the qualifications framework through alternate routes. These numbers are considered likely to be small and are unlikely to distort the conclusions that have been reached through this research.

1.1.1   MEAN AGE OF EMPLOYEES

The mean age of employees across all sectors in New Zealand was obtained from Statistics NZ data. This was then correlated against the mean age of trainees undertaking the relevant water qualifications.

Figure 1:   Mean Age of Employees Undertaking Water Qualifications

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National Average (2003)	————
Forecasted National Average (2050)	- - - - - - - -
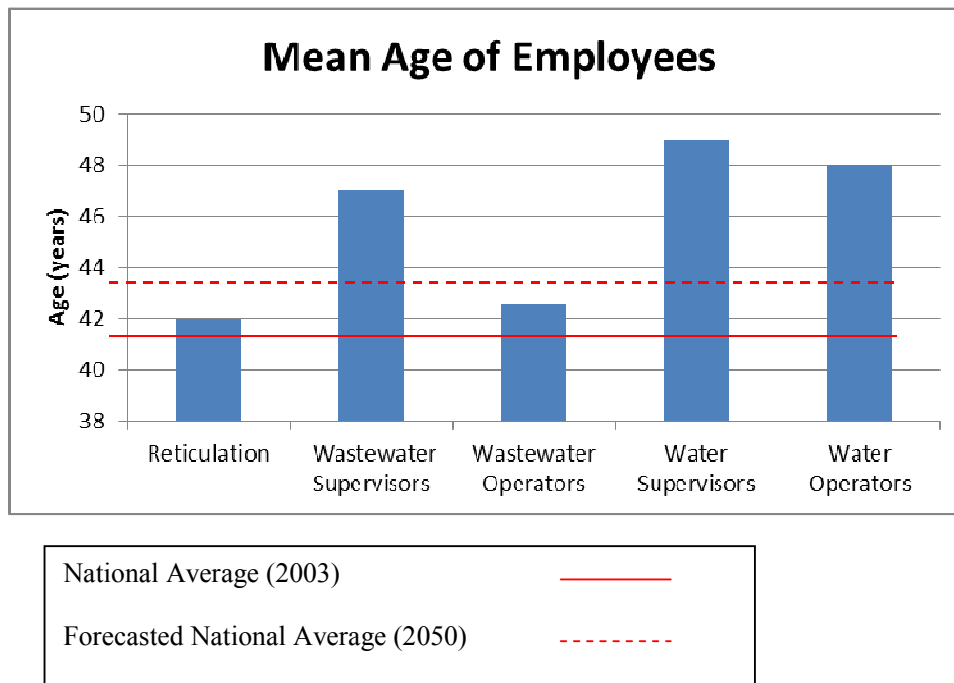
Data obtained from Statistics NZ

The mean age of employees in the water and wastewater industry was higher than the mean age of people in general employment. The degree of this variation depended on the sector of the water industry in which they were employed. For reticulation the mean age of employees is 42. For wastewater supervision a mean industry

age is 47, for wastewater operators 42.5, for water supervisors 49 and for water operators 48. We have identified that that the mean age of employees in the water industry is significantly higher than the national average of employed people. This has the potential to lead to skill shortages in the future if additional and younger entrants are not attracted to the industry.

1.1.2   AGE DISTRIBUTION

In order to confirm our assumptions a more detailed analysis of the water treatment industry was undertaken. The analysis was broken down into two categories of operators and supervisors at Level 4 and Level 5 qualifications. 50% of supervisors and 47% of operators who have entered into qualification training are over the age of 51years. This has significant implications for the industry as a whole as approximately half the workforce will exit the industry through retirement or for other reasons within the next 5-15 years. This has the potential to leave a substantial skill and experience gap.

Figure 2:   Age Distribution of Employees Entered into Water Treatment Qualifications
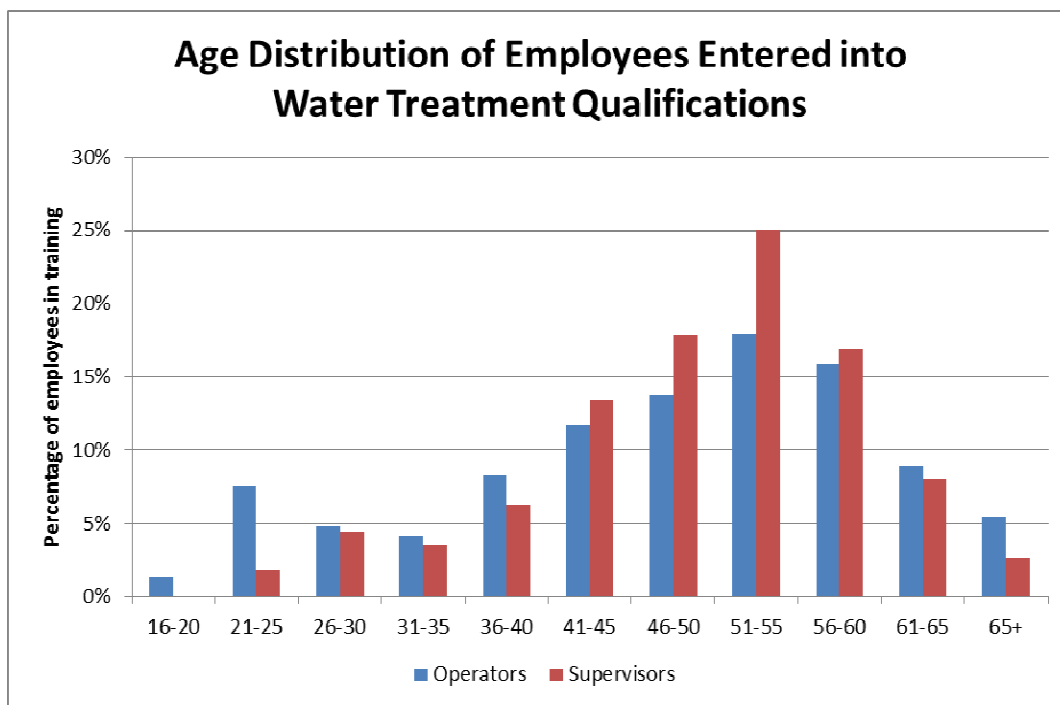

The number of trainees currently entering the industry will not compensate for the losses, based on present industry figures. The data between the years of 2000-2003 in the graph below are distorted due to the introduction of new qualifications within the framework and the consequential grandfathering of previous local qualifications. From 2004 onwards it is considered that the data is representative of the present state of the industry. The average age of people entering training has decreased by 15 years to an average age of 40 in 2010. Although it is positive in the short term to see the average age dropping, it is still a very high age for people to be entering industry training. This should be a concern to the industry as it shows that younger people are not undertaking training. This may be because they do not see the industry as an attractive career option, or employers may not be recognising the career aspirations of employees and their desire to gain or improve their qualifications.

Figure 3:   *Number and Average Age of People Enrolled for a Water Treatment Qualification*
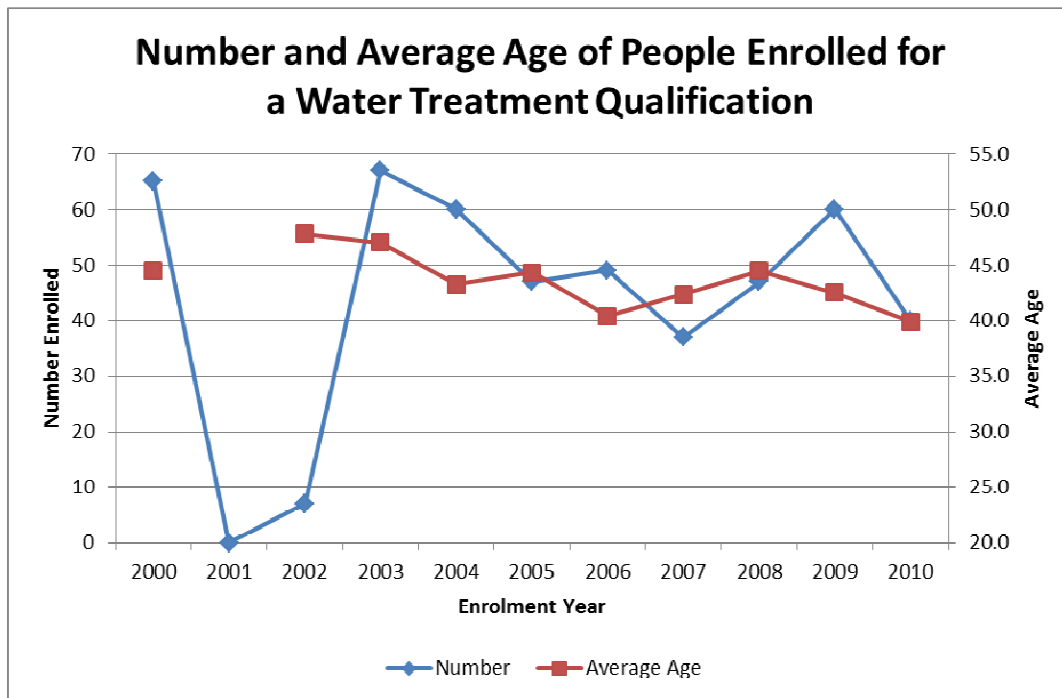
We have used trainee demographic information and their workplaces (many work a circuit of plants), GIS coordinates to provide a snapshot of age by treatment plant. The following map provides the average age of plant operators and supervisors by treatment plant servicing a population of greater than 500 people. The information could be useful for succession planning, skills and experience evaluation within each plant, and even assessing the risk of continuity due to a lack of skilled operations staff.

*Figure 4:   Average Age of Trainees Linked to a Treatment Plant in the Waikato Region*
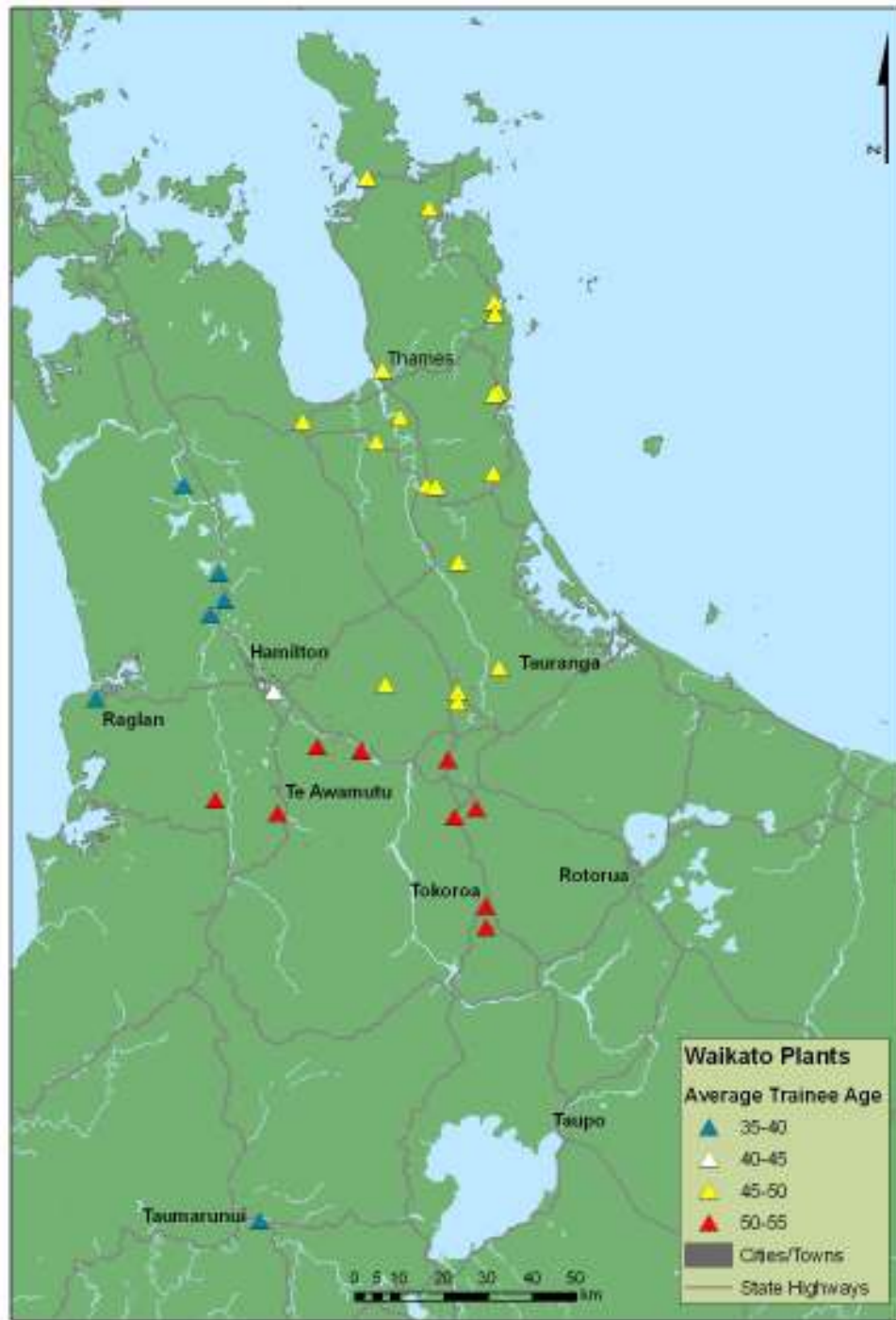
1.2   SKILL ANALYSIS

For the purpose of skill analysis it is more useful to break down skills by geographic area. For this purpose Regional Council boundaries were applied and skills correlated for that particular region. In addition the information was also broken down by qualification engaged in (Level 4 for Operators and Level 5 for Supervisors).

1.2.1 LEVEL 4 OPERATORS

The age distribution by region is largely consistent with the national trend showing an aging workforce. Certain areas appear to have a better age and skill distribution than others. Waikato, Manawatu Wanganui, Otago and Southland Regions have a well distributed age demographic in training. The data suggests that other regions such as West Coast, Nelson, Taranaki, Bay of Plenty and Auckland are likely to encounter serious skill issues within the next 5-15 years.

Figure 5:   Level 4 Employees in Training by Age Band and Regional Council Boundary
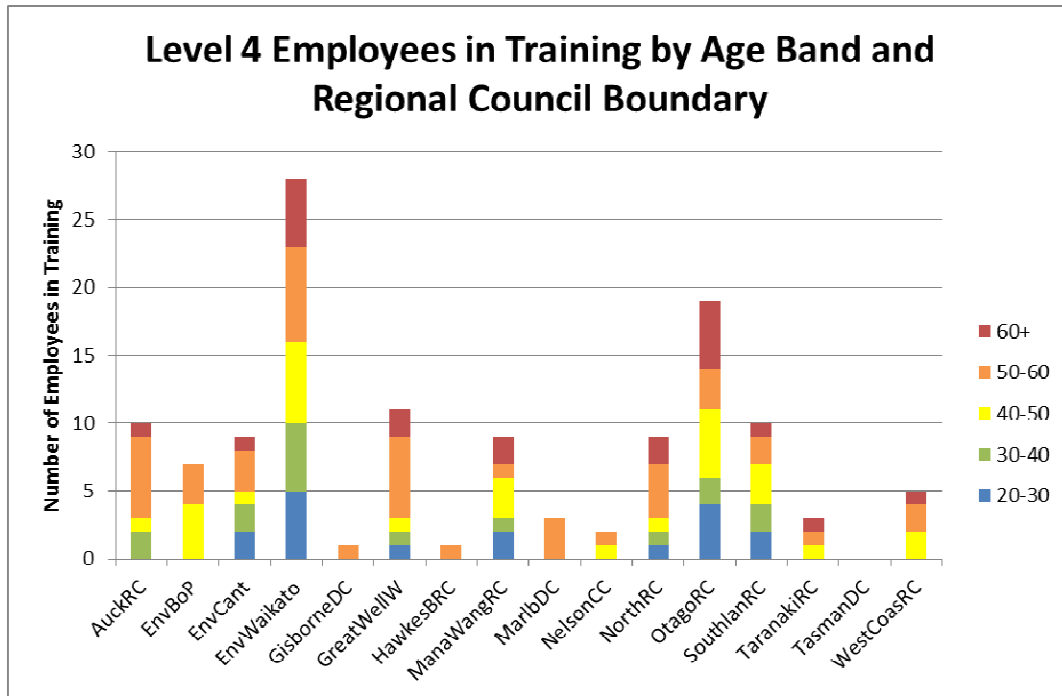

1.2.2 LEVEL 5 SUPERVISORS

The age distribution by region is once again largely consistent with the national trend showing an aging workforce. The result of this analysis is of major concern because, other than Auckland and West Coast, for each region the vast majority of people involved in qualification training are over the age of 40.

The data for Level 4 and Level 5 qualification training may be affected to some extent by the training policies of major employers. For example there are almost three times as many L5 people in training in the Auckland region than L4.

Figure 6:   Level 5 Employees in Training by Age Band and Regional Council Boundary
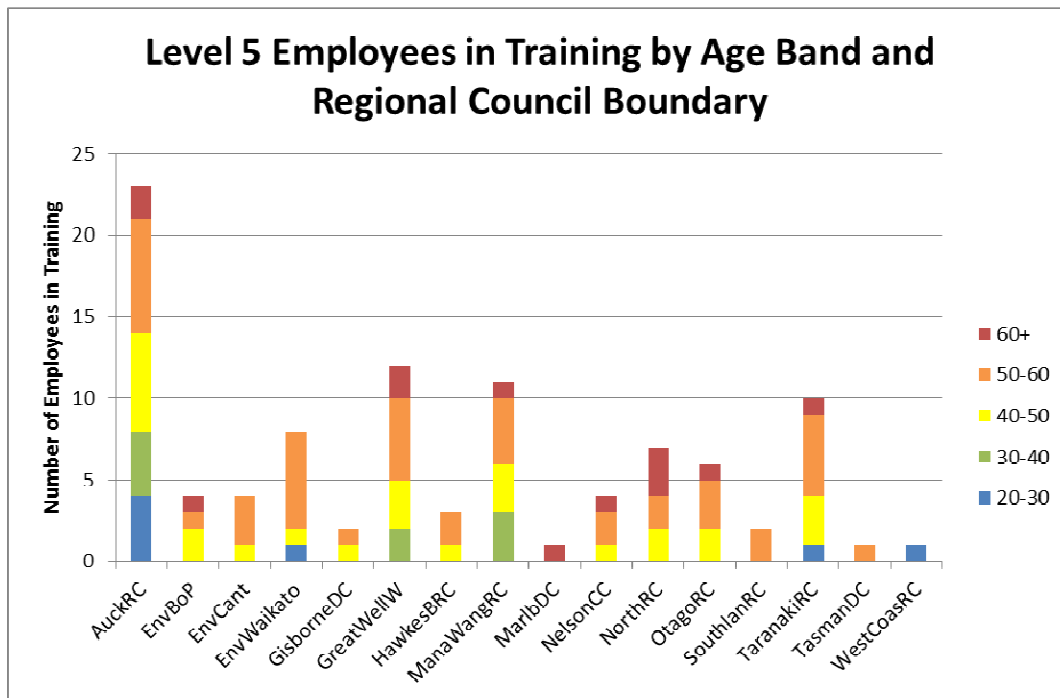

The effect of District and Regional Council policy can determine the level of qualifications engaged in by each region. This is clearly demonstrated in the reticulation sector, where Regional and District Councils have made the holding of qualifications a prerequisite for maintenance and operations contracts. The industry has responded by increasing the number of people in training to meet the Council's contract requirements. This can be considered a positive factor as those regions have a greater skill base to draw upon.

1.3   PLANT COMPLEXITY, TECHNOLOGY AND SERVICE NUMBERS

Complexity, in this analysis, is determined by the number of processes utilised in a treatment plant. Complex plants are considered to have more than 3 processes operating. The data that has been analysed is limited to plants servicing greater than 500 people.

The graph demonstrates the number of complex plants by region. This information has been correlated against qualifications engaged in (L4 and L5) by linking operators and supervisors to a plant or plants. Many operators/supervisors in the country are responsible for the operation of more than one plant. The effect of losing an operator or supervisor impacts not only the operation of a single plant, but the operation of multiple plants. This has the potential of increasing the risk of plant failure and risk to public health.

Figure 7:   Number of Plants by Complexity (No of Processes) and Regional Council Boundary
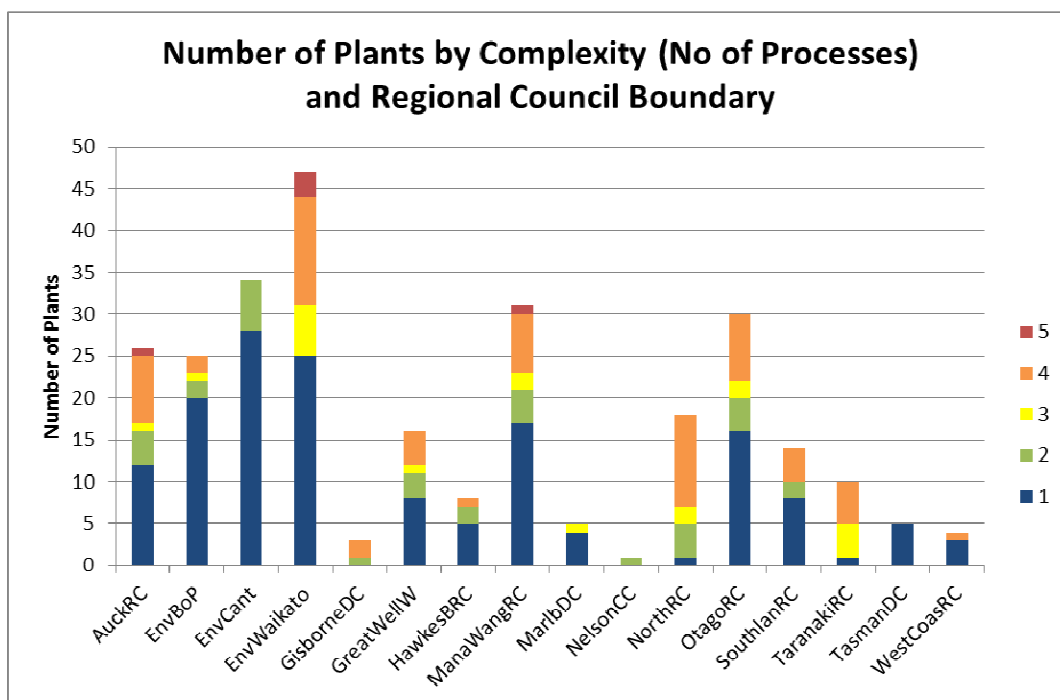
2   OBSERVATIONS

The data collection and analysis has led us to make a number of observations about the state of the industry.

- Employers and asset managers would benefit from considering the implications of an ageing work force and the consequences of loss of experience and knowledge. An ageing work force can be managed in a number of ways:
    - Replacement of workforce with technology – which in itself creates specific skill and training issues.
    - Proactive encouragement of young workers and people engaged in other occupations to consider the water industry as a strong career opportunity with support, through training for their growth and development.
    - Provision of well-planned career paths for people already in the water industry to advance into other areas.
    - Skill sharing between neighbouring utilities, making the workforce more mobile.
    - Capturing the experience and institutional knowledge of the present workforce through formal storage mechanisms (databases, asset management, maintenance schedules etc).
    - Improved succession planning within the industry to promote the effective transfer of institutional knowledge.

- Proactive engagement of the industry with training providers will enable the parties to better identify training needs and the delivery of training.

- The assessment of existing competencies against treatment plant sophistication and the size of distribution networks will allow employers and the training provider to identify areas of likely skill gaps and how best to address those skill gaps.

- Frequent review of the relevance of qualifications is necessary to account for changes in technology and the delivery of training that meets the demands of the future.

- Greater investment in research will assist in better understanding the changing demographics and needs of the industry. By upgrading and improving data about skills, demographics, geographic location and plant complexity, future needs can be better addressed.

- Regional differences are significant and a better understanding of the reasons for these would be useful.

- Gaining a better knowledge of the skills and experience that the industry has nationally, will allow better planning for future emergencies should this need to be drawn on.

3 CONCLUSIONS

The observations that have been reached in this exercise are to a certain extent limited by the nature and availability of the data. These deficiencies need to be recognised and acknowledged. The data presented is only a snapshot in time. Wide industry support is needed if this work is to be further progressed particularly if there is to be similar analysis of the wastewater treatment and reticulation industry.

There have been significant growing pains for the industry over the last 10 years to adapt to a new training regime. There is now however an acceptance of the need for qualifications and the value of training. Past experience has provided a strong base upon which to address the potential issues facing the water industry. NZWETA was established to address skill needs and provides a strong platform upon which to take these matters forward.

We would encourage the industry as a whole to engage in discussion on these issues.

GLOSSARY

GIS	Geographical Information System is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographically referenced data.
Environmental Training Centre	The Environmental Training Centre (ETC) is a business group within Opus International Consultants and has a long association with training in New Zealand offering recognised training and qualifications for more than 50 years. ETC is a registered private training establishment (PTE) with the New Zealand Qualifications Authority (NZQA).
ITO	Industry Training Organisation. Industry training is linked to the needs of workers, workplaces and industry and evolved from the previous vocational training and apprenticeship system in 1992. Industry training organisations (ITOs) are set up on behalf of their industries but recognised by government.
NZWETA	New Zealand Water and Environmental Training Academy NZWETA, is a joint venture between Water New Zealand and Opus International Consultants. It provides education and training for all sectors of the broader water and wastes industry.
NZWWA	New Zealand Water & Wastes Association Now known as Water New Zealand.

Water Grading Criteria	Ministry of Health grades each water supply with populations over 500 in order to compare water supplies and identify those which may not be delivering quality water. Smaller supplies may be graded in the future. The current Grading specification was released by the Ministry of Health in 2003, replacing the previous one of 1993

ACKNOWLEDGEMENTS

REFERENCES

Register of Community Drinking-water Supplies in New Zealand, 2007 Edition. Compiled by ESR Water Group for Ministry of Health

Statistics NZ web site www.stats.govt.nz