

From: Grace Ockwell
To: [REDACTED]
Cc: [Laura McElhone](#); [Gerard McCombie](#)
Subject: Request for information - UV light disinfection at water treatment plants
Date: Wednesday, 11 March 2015 01:00:52 p.m.

Dear Nigel,

Thank you for your email of 4 February 2015 addressed to Pam Jordan requesting confirmation that ultraviolet light disinfection at the water treatment plants had been reduced as a budgetary measure. You also requested any background information regarding this reduction.

Your request has been considered under the provisions of the Local Government Official Information and Meetings Act 1987 and the following response is provided.

We confirm that the original regime of continuous UV treatment of water at the Mt Grand and Southern Water Treatment Plants ceased on 1 July 2013. UV treatment at Mt Grand was switched off completely, while UV treatment at the Southern treatment plant only occurs when chemical cleaning (CIP) of the filters is carried out. This occurs for about one week in every 4 to 5 weeks. It was found that running of the UV units during the CIP periods was necessary to ensure that a 3 log credit is maintained because occasionally the filter log credit was not being achieved when the membranes cells were brought back on line post CIP.

Based on catchment risk the DCC requires a minimum 3 log credit at our treatment plants to maintain our grading and comply with the drinking water standards. The plants as designed achieve a 7 log credit, however without the UV running a 4 log credit is achieved. Annually the UV reactors cost approximately \$100k to operate, so without the reactors running, \$100k is saved operationally. Prior to the decision being made to switch off the UV plants, a drinking water assessor was consulted who confirmed that the UV stage in the process was not necessary to meet drinking water standards and to maintain our current grading.

I am attaching copies of the following documents:

1. Minute extract from Executive Leadership Team (3 October 2012) approving reducing UV disinfection at water treatment plants.
2. Report to EMT2 October 2012 "Operation Cost Savings & Public Health Risk – UV Disinfection at Mt Grand and Southern Water Treatment Plants"

Yours sincerely,

Grace Ockwell
Governance Support Officer
Dunedin City Council

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7 OPERATION COST SAVINGS AND PUBLIC HEALTH RISK - UV DISINFECTION AT MT GRAND AND SOUTHERN WATER TREATMENT PLANTS

Acting Water and Waste Services Manager (Laura McElhone) joined the meeting.

The Dunedin City Council has committed to meeting the Drinking Water Standards and maintaining the A gradings at the Southern and Mount Grand Water Treatment plants. There is an opportunity to realise operational cost savings whilst still meeting these requirements by turning off the UV treatment process. The risks and opportunities surrounding such a change were discussed. Consideration to be given to how this decision is communicated.

It was moved (General Manager Operations/General Manager City Strategy and Development):

"That EMT approve Option B (shut down the UV at Mount Grand and Southern WTP whilst maintaining in operable condition) to be included as the preferred option to be considered in the 2013/14 budget process."

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Motion carried

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TO: Executive Management Team

FROM: Water Production Manager

MEETING DATE: 2 October 2012

SUBJECT: **OPERATION COST SAVINGS & PUBLIC HEALTH RISK – UV
DISINFECTION AT MT GRAND AND SOUTHERN WATER
TREATMENT PLANTS**

SUMMARY

The Dunedin City Council has committed to meeting the Drinking Water Standards and maintaining the A gradings at the Southern and Mount Grand Water Treatment plants. There is an opportunity to realise operational cost savings whilst still meeting these requirements by turning off the UV treatment process. This report discusses the risks and opportunities surrounding such a change.

IMPLICATIONS FOR:

- | | |
|--|---|
| (i) Policy: | No |
| (ii) Approved Annual Budget: | Yes if decision is taken to shut down the Mt Grand and Southern UV reactors |
| (iii) LTP/Funding Policy: | Yes if decision is taken to shut down the Mt Grand and Southern UV reactors |
| (iv) Activity Management Plans: | Yes if decision is taken to shut down the Mt Grand and Southern UV reactors |
| (v) Community Boards: | No |
| (vi) Sustainability: | Yes - a decision to shut down the UV reactors would reduce the Council's energy consumption and improve financial sustainability. |

RECOMMENDATIONS

That EMT approve Option B (shut down the UV at Mount Grand and Southern WTP whilst maintaining in operable condition) to be included as the preferred option to be considered in the 13/14 budget process.

INTRODUCTION

The Dunedin City Council has set targets for rates increases in its Long Term Plan which is driving the search for sustainable operational cost savings. In addition, the proposed Central Government reform of local authorities is giving a clear message of the delivery of “good” services that are “most cost effective for households and businesses.”

Existing Health Legislation effectively defines what levels of service is in Community Water Supplies through the Ministry of Health’s Drinking Water Standards Grading system.

BACKGROUND

The Dunedin City Council has level of service targets to maintain “A” grade treated water from its major metropolitan water supplies and maintain compliance with the drinking water standards. Simply speaking, the grading is achieved when the water treatment plant meets the targets relative to the risk assessment relating to the catchment area from which it is supplied.

The Drinking Water Standards also require that a water supply authority prepares and implements a public health risk management plan to demonstrate that it is taking all practicable steps to meet the drinking water standards. Water suppliers are required to adopt a multi-barrier approach, which separately considers how to prevent contamination of raw water, remove particles from water, kill germs and prevent recontamination after treatment.

The current barriers for managing public health risk from the Mount Grand and Southern Water supplies are shown in the tables below.

Barriers to :	Mount Grand system	Southern System
Prevent contamination of raw water	<ul style="list-style-type: none"> • Destocked catchments • Programs to prevent feral animals • Control on vehicle access to catchments • Upgrading catchment boundary fences • Fencing of raw water reservoir <p>Catchment risk requires 3 Log credit removal of protozoa</p>	<ul style="list-style-type: none"> • Deep Creek / Stream catchments destocked. • Silverstream catchment 99% destocked. • As per Mount Grand system for Deep Creek / Deep Stream catchments. • Silverstream catchment 99% destocked, with programs to prevent feral animals. <p>Taieri River catchment is not protected.</p> <p>Catchment risk requires 3 Log credit removal of protozoa</p>
Remove particles from water	<ul style="list-style-type: none"> • Encouraging catchment regeneration with tussock to prevent rapid runoff • Intake pond provides natural settlement • Coarse screening of vegetable matter at intake • Raw water reservoir provides back up if raw water quality is poor • Two step coagulation and dissolved air flotation remove particles and colour • Dual media filtration removes heavier particles • Can divert non compliant water back to raw water reservoir <p>Treatment process provides 4 Log credit removal of protozoa</p>	<ul style="list-style-type: none"> • Encouraging catchment regeneration with tussock in Deep Creek and Deep Stream catchments • Highly turbid raw water not conveyed to storage reservoirs • Natural settlement occurs in raw water ponds and reservoirs • Particles filtered by infiltration gallery at Taieri borefield • Pre-screening occurs at treatment plant • Coagulation and flocculation removes particulates and colour • Microfiltration membranes remove particles and germs <2µm <p>Treatment process provides 4 Log credit removal of protozoa</p>
Kill germs	<ul style="list-style-type: none"> • Chlorination kills bacteria, viruses and giardia • UV treatment inactivates cryptosporidium and kills bacteria 	<ul style="list-style-type: none"> • Membrane filters remove bacteria and protozoa • Chlorination kills bacteria, viruses and giardia

		<ul style="list-style-type: none"> • UV treatment inactivates cryptosporidium and kills bacteria.
	UV treatment provides 3 Log credit removal of giardia	UV treatment provides 3 Log credit removal of giardia
Prevent recontamination after treatment	<ul style="list-style-type: none"> • Storage reservoir is sealed • Residual chlorination in reticulation • Water supply system is totally enclosed after reservoir • Backflow prevention programme • Reservoir cleaning programme • Risks actively managed during repairs • And others. 	<ul style="list-style-type: none"> • Storage reservoir is sealed • Residual chlorination in reticulation • Water supply system is totally enclosed after reservoir • Backflow prevention programme • Reservoir cleaning programme • Risks actively managed during repairs And others.

The grading of a water treatment system is a log system of compliance which measures the treatment processes ability to remove protozoa, the most infectious and difficult to remove or kill being cryptosporidium. The Log credit system provides a measure of organisms removed or inactivated as shown below:

Log 3 = 99.9% removal

Log 4 = 99.99% removal

Log 5 = 99.999% removal and so on.

The catchment risk assessments for both the Mt Grand and Southern Water Treatment Plants require Log 3 compliance in order to receive an A grading. An A grade is defined as being "completely satisfactory, low level of risk".

Each element of the treatment system that is designed to kill pathogens earns a particular number of log credits. Both the Mount Grand and Southern Treatment plant processes earn a total value of 7 log credits, of which the UV system earns 3 credits. Consequently, if the UV system were not part of the process, the 4 remaining credits from the other elements would be sufficient to maintain the overall A grading.

At the time that the Mount Grand Treatment plant was upgraded, the UV disinfection step was included because there was some concern that coal and sand filters were not considered as an absolute barrier to protozoa, and chlorine disinfection is ineffective at killing protozoa. Also, at the time of the initial upgrade, there was no ability to run non-compliant water to waste. However, since that time a further upgrade has been undertaken which provides the ability to run water to waste and continue supply from stored treated water. Furthermore, the catchments supplying Mount Grand are fully protected and destocked, meaning that there is minimal risk of protozoa in the raw water now and into the future. The pending capital works arising out of the security of supply strategy will also provide full back-up to the Mount Grand system in the unlikely event that there was a prolonged problem with raw water quality or prolonged failure of the treatment system.

The Southern Treatment system uses membrane filtration which is considered to be an absolute barrier to protozoa. However, at the time the installation was seen as relatively cheap insurance to offset the perceived future risk of protozoa contamination from the unprotected Taieri River catchment which is unprotected catchment and increasingly subject to dairy conversion. However, the catchment risk assessment is repeated every 5 years which would give adequate early warning of increasing risk. Furthermore, the Regional Council are implementing stringent new standards to maintain and improve water quality in Otago's rivers and streams. This also provides a level of future mitigation against this risk.

The operating environment at the time that these investment decisions were made was substantially different from the current environment. At the time, there was concern that future changes to the Drinking Water Standards would be increasingly stringent. However, there has been significant concern across New Zealand on the ability of communities to afford to meet the current standards. The Associate Minister for Health and recently wrote to the President of Local Government New Zealand (attachment 1) to confirm that the requirements of legislation are for water suppliers to take all practicable steps to meet the drinking water standards, which allows for costs to be taken into consideration. It is permissible for suppliers not to meet the standards provided that they have an approved public health risk management plan which demonstrates that they are taking all practicable steps to comply.

This is a significant change from the Dunedin City Council's previous operating philosophy which was that compliance with the standards was mandatory; that the requirement was for all practicable steps to be taken to protect public health; and that the drinking water standards provided a minimum acceptable level. The confirmation from the Associate Health Minister makes further changes to the Drinking Water standards increasing the required levels of treatment seem highly unlikely in the foreseeable future.

The total operational costs of the Mount Grand and Southern UV systems are approximately \$110k per annum, mainly from replacement of lamps which, despite their cost, are considered a consumable item. The energy costs are not included in this figure as there is no plant level metering to allow the energy consumption of the UV plant to be separately assessed,

The replacement cost of the UV system is approximately \$2.5m. However, there are no capital works programmed within the next 10 years.

DISCUSSION

There is an opportunity to realise over \$100k of operational savings by ceasing the UV treatment at the Mount Grand and Southern Water Treatment plants. The Medical Officer for Health and Drinking Water Assessor have confirmed that switching off the UV treatment process would not adversely affect the plants' current A gradings. They indicated that they have no concerns about the Council taking such a decision provided that the public health risk management plans are updated to reflect the change and approved by the Drinking Water Assessor prior to implementation. This is something that could be done internally with no additional cost.

A consideration in the decision to cease UV treatment is what role the UV plant plays in the event of failure of other elements of the treatment process. Over the past two years, the performance of both treatment plants has ranged from Log 3 to Log 7 compliance. Typically, where the filtration system fails, the UV system is also ineffective as high water clarity is a prerequisite of effective UV treatment. For the Mount Grand plant there have not been any instances where there would have been non-compliance with the drinking water standards if the UV plant had not been part of the treatment process. For the Southern Water Treatment plant there have been two periods of 15 minutes where the treatment process would have been non-compliant if the UV treatment process had not been present. However, in both instances the cause of the non-compliance is believed to have been air in the sampling line to the turbidimeter rather than an actual failure of the filtration system. These two periods are not therefore considered to represent a real increase in public health risk during that time.

The Dunedin City Council has recently made a decision not to create a CCO for water. However, as part of this, a review of operations and maintenance is to be undertaken. An element of this review is to compare the efficiency on an in-house model for operations and maintenance delivery with a partially or fully outsourced model. Any outsourced model for operations and maintenance is likely to be based around the requirement to meet levels of service targets, rather than specifying how such a target should be achieved. The premise would be that an outsourced operator would meet the level of service as efficiently as possible. Given that the UV system is not required to meet the Drinking Water Standards or maintain the plants' A grading, it seems likely that an operations and maintenance contractor would not run the plant unless specifically required to do so through the provisions of the contract.

There are a number of options for changes to the operation of the UV system, ranging from 'do nothing' to total removal and onselling of the equipment.

Option A: Do Nothing

Advantages

- Provides an extremely high level of treatment and minimises public health risk
- No risk of adverse publicity
- Provides high level of future proofing against future changes to raw water quality.

Disadvantages

Lost opportunity to realise a saving of over \$100k and better utilise that funding elsewhere.

Option B: Switch off UV plant at both plants, but maintain in operable condition

Advantages

- Realise savings in excess of \$100k pa. with effectively no change in level of service.
- Ability to re-activate the equipment at relatively short notice should the need arise.

Disadvantages

- Some ongoing operational and maintenance costs to keep plant in operable condition (not yet quantified)
- Potential for negative public perception of declining drinking water quality.

Option C: Mothball UV plant

Advantages

- Realise savings in excess of \$100k p.a. with effectively no change in level of service.
- Plant could be brought back on line in future if required

Disadvantages

- Likely to be reasonably significant costs (not yet quantified) to bring plant back into commission after an extended period out of use.
- Potential for negative public perception of declining drinking water quality.

Option D: Remove and on-sell UV plant

Advantages

- Realise operational savings in excess of \$100k p.a. with effectively no change in level of service.
- Realise one off revenue from sale of equipment - not currently quantified.

Disadvantages

- Plant not available for future use.
- Potential for negative public perception of declining drinking water quality.

Turning off the UV systems at both the Mount Grand and Southern Water Treatment plants is in line with the Council's expectations for Water operations and maintenance to be more commercially focussed.

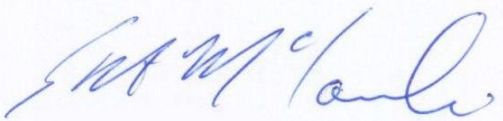
At this stage, it is not clear whether there would be a buyer for the UV equipment, what the purchase price might be, or what the operating costs might be to keep the plant in operable condition but not in regular use. It is therefore recommended that Option B be adopted initially and factored into the 13/14 budgets. This does not preclude future consideration of options C and D when more information is available.

CONCLUSION

The Mount Grand and Southern Water treatment plants are required to comply with the Drinking Water Standards and maintain their A gradings. These conditions can still be met without operating the UV treatment process at either plant. An annual cost saving in excess of \$100k could be realised by turning off the UV equipment at both plants. The increase in public health risk associated with such a decision is negligible. However, there is a risk that public or political perception may be of a reduction in drinking water quality.

Any decision to cease UV treatment would need to be reflected in updated public health risk management plans and signed off by the Drinking Water Assessor.

Prepared by:



Gerard McCombie
WATER PRODUCTION MANAGER

Approved for submission by:



Laura McElhone
**ACTING WATER & WASTE SERVICES
MANAGER**

Approved by: Tony Avery
GENERAL MANAGER OPERATIONS

Date report prepared: 25 September 2012

Attachments

Attachment 1: Letter from the Associate Minister for Health clarifying the requirements for water suppliers to meet the drinking water standards.



Office of Hon Jo Goodhew

MP for Rangitikei

Minister for the Community and Voluntary Sector

Minister for Senior Citizens

Minister of Women's Affairs

Associate Minister of Health

21 AUG 2012

Mayor Lawrence Yule
President
Local Government New Zealand
PO Box 1214
Wellington

22 AUG 2012
LOCAL GOVERNMENT NZ

Dear Lawrence

Thank you for meeting with me on 2 August 2012, to discuss local government concerns about compliance with the drinking water provisions of the Health Act 1956.

As I noted in the meeting, I think we need to communicate the requirements more clearly to water suppliers. I am very grateful for your offer to assist with this.

The Government understands the importance of safe drinking water, but is aware of concerns among Councils that the costs of complying with the legislation may be significant.

Water suppliers need only take "all practicable steps" to comply with the drinking water standards. Practicability includes affordability. In addition, if a water supplier is implementing its public health risk management plan (water safety plan), it will comply with the Act and does not need to also comply with the standards.

The Ministry of Health is developing more detailed guidance to assist water suppliers to assess affordability, and will be consulting with local government on the draft guidance later this year.

Other work underway to support drinking water suppliers includes development of a plain language guide to the drinking water provisions of the Health Act 1956, the preparation of a Rural Agricultural Drinking-water Standard, and the ongoing provision of advice and information from drinking-water assessors and other public health staff at local district health board public health units.

Thank you again for your understanding of the importance of safe – but affordable – drinking water, and for your support in clarifying the regulatory and legislative requirements for your members.

Yours sincerely

Hon Jo Goodhew
Associate Minister of Health