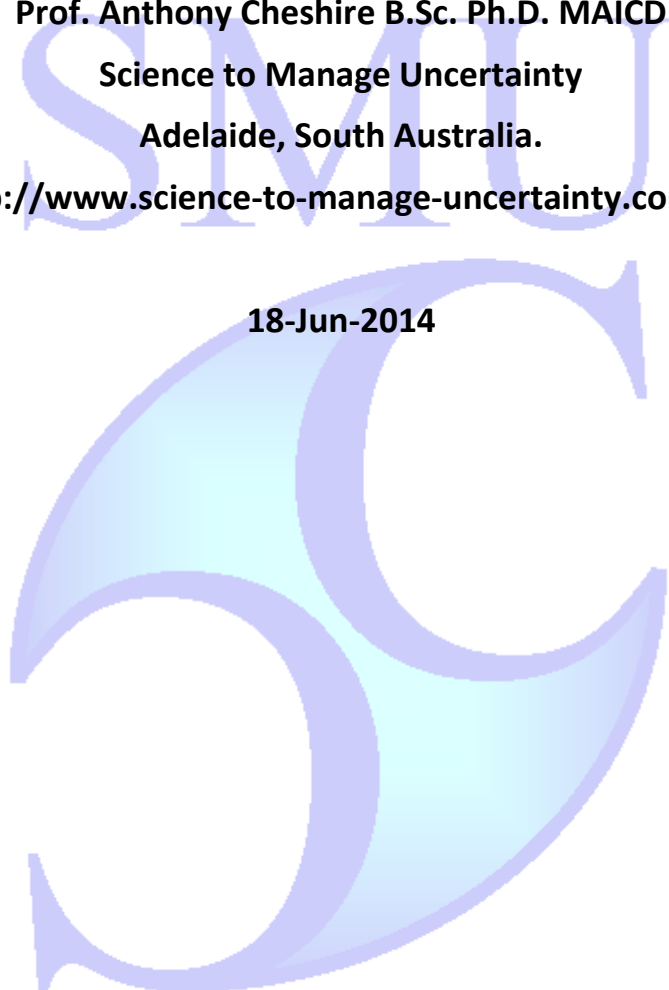


**Review of ecotoxicity testing licence conditions for the Adelaide
Desalination Plant:
June 2014**

**Prepared for
AdelaideAqua Pty Ltd
Report number 14 in the series**

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EXECUTIVE SUMMARY

Purpose

This document represents a report on the extent to which monitoring of ecotoxicology from selected sites in the vicinity of Port Stanvac meets with the EPA Licence conditions for the construction and operation of the Adelaide Desalination Plant (ADP) over the period February 2009 to 12-Dec-2013. The monitoring reports were associated with the construction (including commissioning) of the desalination plant (by AdelaideAqua D&C Consortium – AAD&C) from February 2009 to 12-Dec-2012 and to the operation of the desalination plant (AdelaideAqua Pty Ltd) from 12-Dec-2012 to 12-Dec-2013.

Background

AdelaideAqua Pty Ltd is the operator of the Adelaide Desalination Plant at Port Stanvac South Australia. Operation of the ADP requires the discharge of reject water to the marine environment; this activity was originally conducted under a license issued to AAD&C by the Environment Protection Authority of South Australia (EPA License Number 26902) and subsequently under another license issued to AAPL (EPA License Number 39143). These licenses authorised AAD&C and AAPL to undertake a series of activities of environmental significance under Schedule 1 Part A of the Environment Protection Act 1993 (the Act). The licenses had specific requirements in relation to “Discharges to Marine Waters” that are the subject of this report.

Section 14 (305-626) of the license requires that the licensee must ensure that:

1. An independent review of all marine monitoring is conducted by independent specialist(s) as approved in writing by the EPA prior to the review commencing;
2. All marine monitoring from the period commencing with the issue of the license and ending 12 months after project handover of the 100 GL desalination plant is included in the review; and
3. The full results of the review are provided to the EPA not more than 18 months after project handover of the 100 GL desalination plant.

The EPA has also advised that prior to appointment, the independent reviewer must be able to demonstrate to the EPA that:

1. They will use their own professional judgment;
2. They will take appropriate specialised advice when the issue is outside their expertise;
3. Their opinions will be reached independently;
4. In forming opinions, they will not be unduly influenced by the views or actions of others who may have an interest in the outcome of the review; and
5. They must declare any real or apparent conflict of interest.

With the approval of the EPA, Anthony Cheshire (the author of this report) was selected by AdelaideAqua Pty Ltd (AAPL) to undertake this review.

Approach

This review of ecotoxicity testing encompassed a study of all documentation provided by AdelaideAqua Pty Ltd which comprised a series of 5 monitoring reports each of which was produced by staff at AAD&C, AAPL or by experts contracted by the parties for that purpose.

Each report has been critically reviewed and key issues that pertain to compliance with the licence conditions have been aggregated into a summary that has been presented in this report.

Specific requirements

To consider the work done against the Scheduled Marine Monitoring Requirements detailed in Attachment A to licenses 26902 and 39143. These being:

01-Dec-2010 to 04-Dec-2012: Whole of effluent toxicity - 1 sample assessed within 1 month of first reaching each of 10% production, 20% production & 30% production & a further sample within 3 months of each of “project handover of the 50 GL desalination plant” & “project handover of the 100 GL desalination plant” test on 2 species (to be agreed);

04-Dec-2012 to 31-Dec-2013: Two samples of whole effluent toxicity tested on two species (to be agreed)

The relevant dates are 12-Oct-2011, 15-May-2012, 17-May-2012, 25-Mar-2013 and 19-Aug-2013 respectively.

General requirements

In addition the EPA require that the Independent Reviewer is to undertake a technical review of all marine monitoring results from the commencement date of the License 26902 (D&C) until 12 December 2013 (12 months after plant handover) in order to assess the environmental impact of the desalination plant. This matter will be addressed in a subsequent report.

Conclusion

The monitoring program is consistent with the specific requirements of the License as detailed in Attachment A of the Licence conditions. Furthermore, the key result provided through these results is that the dilution factor within the mixing zone (50:1) should provide the necessary level of protection for all organisms assessed during this series of tests. It was concluded that all of the results for the mussel and sea urchin and the survival results for the polychaete were within the 50:1 dilution ratio. On this basis it can be concluded that, given the concentration of the saline discharge and the effectiveness of the ADP diffuser, operation of the desalination plant to meet the required performance criteria (i.e. achieving a 50:1 dilution within the mixing zone) is sufficient to mitigate the ecotoxicological risks from discharging a saline concentrate to the environment.

LICENCE CONDITION: ECOTOXICITY TESTING

In the following the specific requirements pertaining to the licence condition (ecotoxicity testing) are summarised along with information about the documents that have been reviewed.

Documents reviewed for this licence condition:

Document Name	Reference
Toxicity report 10%_October11.pdf	Anonymous, (2011). Toxicity Assessment of an Outfall Sample from the Adelaide Desalination Plant: Test Report October 2011. ecotox Services Australasia.
2012_Toxic report 20 % and 30%.pdf	Anonymous, (2012). Toxicity Assessment of Two Outfall Samples from the Adelaide Desalination Plant: Test Report May 2012. ecotox Services Australasia.
PR0997_AdelaideAqua_Report_March2013.pdf	Anonymous, (2013). Toxicity Assessment of an Outfall Sample from the Adelaide Desalination Plant: Test Report March 2013. ecotox Services Australasia.
PR0997_AdelaideAqua_Report_August2013.pdf	Anonymous, (2013). Toxicity Assessment of an Outfall Sample from the Adelaide Desalination Plant: Test Report August 2012. ecotox Services Australasia.
13-078-oAA01_L_V3-0_Adelaide_desal_plant_toxicity_evaluation.pdf	Hobbs, D., (2013). Interpretation of Adelaide desalination plant ecotoxicity reports. Hydrobiology.

Specific requirement (see Attachment A – Marine Monitoring Schedule):

01-Dec-2010 to 04-Dec-2012: Whole of effluent toxicity - 1 sample assessed within 1 month of first reaching each of 10% production, 20% production & 30% production & a further sample within 3 months of each of “project handover of the 50 GL desalination plant” & “project handover of the 100 GL desalination plant” test on 2 species (to be agreed);

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Overall summary in relation to ecotoxicity testing

This component of the project uses selected marine organisms to determine the toxicity of the discharge from a whole of effluent sample collected from the desalination plant.

Chronic tests with appropriate sensitivity and ecological relevance to the study area have been incorporated into the suite of proposed bioassays. Individual methods for each species have been provided by the laboratory prior to commencement of assessment.

Ecotoxicity tests needed to be performed within 1 month of the plant reaching 10% of the total production (30MLD), 20% (60MLD) and 30% (90MLD) and within 3 months of 'Project handover of SP1 (50GL plant)"; this occurred on 25/03/12 and the plant production was 165MLD. Similarly within 3 months of "Project handover of SP2 (100GL plant)"; this occurred on 19/08/2013 and the plant production was 90MLD.

Outfall water samples were collected for testing consistent with the timing for sampling detailed above. For each sample ecotoxicity tests were undertaken on two of three species including the mussel (*Mytilus galloprovincialis*), the polychaete (*Diopatra asciculata*) and the sea urchin (*Heliocidaris tuberculata*). For the mussel and urchin the tests were 48 h (mussel) and 72 h (urchin) larval survival tests. For the polychaete the test was a 14 day growth and survival test. The mussel was used in all five tests; the polychaete was used for the first three tests and the sea urchin for the last two.

Appendix A KEY DATES IN PLANT CONSTRUCTION AND OPERATION

The following provides a list of key dates in the construction and operation of the plant. This material provides background to the review and in particular places the analysis and interpretation of each of the monitoring reports into context with the activities that were occurring on-site in the period leading up to the monitoring event.

Date	Activity
01-Feb-2009	Construction activities commenced
16-Nov-2009	Maritime platform arrived on site
08-Jul-2010	Maritime platform completed operations
01-Jun-2011	First discharge and first intake of seawater
14-Oct-2011	First Water – plant production was (30 MLD)
21-Mar-2012	SP1 – Full production from first half the plant (150 MLD)
31-May-2012	SP2 – Full production from second half of the plant (150 MLD)
24-Oct-2012	Performance test – plant running at full production for 7 days (150 MLD)
07-Nov-2012	Performance test – plant running at full production for 7 days (150 MLD)
21-Nov-2012	Reliability test – continuous running at various production rates
12-Dec-2012	Plant handover from commissioning