



CS ENERGY PROCEDURE FOR
LEGIONELLA TESTING IN POWER STATION WATERS
CWP-CH-3003
KKS: CA0G, CB0G and CC0G

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DOCUMENT HISTORY

Date	Key Changes	Author	Approver

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1 PURPOSE

The inhalation of Legionella bacteria in high counts can cause serious illness and the possibility of death and requires frequent monitoring.

2 SCOPE

This procedure details the method used for the collection of water samples for legionella examination

3 RESPONSIBILITIES AND ACCOUNTABILITIES

3.1 Management

Management are responsible for ensuring that:

- All staff and contractors following the procedures and observe the safety precautions

3.2 Employees

Employees are responsible for ensuring that:

- They follow the procedure and observe the safety precautions

3.3 Contractors / Consultants

Contractors / Consultants are responsible for ensuring that:

- They follow the procedure and observe the safety precautions

4 LIMITATIONS

4. Limitations	
	Detection limit for examination are as follows:
	• Plate Counts: >2000 to <10000000 CFU/mL
	• Legionella pneumophilia serogroup 1-14: <10 CFU/mL
	• Legionella species not pneumophilia: <10 CFU/mL

5 SAMPLING REQUIRMENTS

5.1 Container

Samples are collected in sterile, disposable, plastic sample jars. These containers are currently prepared and obtained from:

Biotech Laboratories
Level 2 Administration Building
Greenslopes Private Hospital
Newdegate Street
Greenslopes QLD 4012
Phone: 07 3847 9488
Fax: 07 3847 9890

Each sample container used shall be labelled with the following:

- Sample Description
- CS Energy Callide B Power Station
- Date and Time of Sampling
- The tests required to be carried out

5.2 Minimum Sample Volume Requirements

Plate Count: 10mL
Legionella: 120 mL

5.3 Collection and Preservation

When chlorinated waters are sampled then sufficient pre-sterilised sodium thiosulfate (100 mg.L⁻¹) solution shall be present in the sample container. This neutralises the residual chlorine in the sample.

Sterilised containers must not be opened prior to sample collection.

Any containers found to have loose lids or in any other way being suspected of contamination must be discarded.

Samples must be collected so that some air space is left in the container.

To reduce the risk of contamination, where appropriate gloves should be worn.

6.0 SAFETY PRECAUTIONS

Where there is a possibility of inhalation of cooling tower spray, then personal protective equipment in the form of a mist-approved respirator must be used by the sample collector.

Under such conditions where a mist-approved respirator must be worn it is preferable that the sampler does not have a beard as this significantly reduces the effectiveness of the respirator.

Respirator cartridges should be discarded after each usage.

7. APARATUS

- Sample Container
- Gloves
- Watch

8. REAGENTS

Not Applicable

9.0 PROCEDURE

9.1 Sampling Procedure

9.1.1 When sampling from a sample point allow the water to run freely for a minimum of 1 minute prior to filling the sample container.

Remove the sample container cap only when the sample is ready to be taken. Keep the cap turned downwards to prevent contamination.

- **do not** set down the cap (hand-hold cap)
- **do not** touch the inside surfaces of the container, container lip or cap
- **do not** flush the container or lid prior to sampling

9.1.2 For samples of exposed bulk water, hold the sample container from its base and plunge it approximately 50mm below the surface. Turn the container so that the neck points slightly upwards. Create an artificial current by pushing the container horizontally forwards and away from the hand.

In circumstances where the bulk water to be sampled has been chlorinated (i.e. sodium thiosulfate is required), hold the sample container from its base so that the neck points slightly upwards. Obtain a surface sample by pushing the container horizontally forwards and away from the hand.

9.1.3 Sample containers shall be filled so that some air space still remains. The cap should be replaced firmly and the sample container inverted and tested for leaks.

9.1.4 The sample container should be dried and a label attached. The labelling ink should not be water-soluble.



9.1.5 After collection samples should be stored in the refrigerator until they are ready to be dispatched.

9.2 Sample Dispatch Procedure

9.2.1 Samples should be dispatched to the testing laboratory as rapidly as possible.

Biotech Laboratories
Level 2 Administration Building
Greenslopes Private Hospital
Newdegate Street
Greenslopes QLD 4012

9.2.2 The sample should be received by the testing laboratory at a **maximum** of 24 hours after sampling and preferably less.

9.2.3 Samples should be placed in an insulated container (eg. "Esky") with sufficient ice bricks to keep the samples cool. It is important that the sample is **NOT** frozen.

9.2.4 Containers shall be marked "Urgent " to ensure delivery within 24 hours.

10.0 CALCULATION

Not Applicable

11. PRECISION

Not Applicable

12.0 ACCURACY

Not Applicable

13.0 REPORTING

All samples when collected shall be entered into WINLIMS. When received results should also be recorded into WINLIMS.

Cooling water results shall be reviewed with respect to the chemical dosing regime at the time.

14. DEFINITIONS

Term	Definition

15. REFERENCES

Reference No	Reference Title	Author
ASNZS 3666.3	Standards	Standards Australia International Ltd.

16. ATTACHMENT / APPENDIX

16.1 Nominal Sample Points/ Frequency

System Sampled	Frequency
B1 Cooling Water, After Condenser	w
B2 Cooling Water, After Condenser	w
C3 Cooling Water, After Condenser	w
C4 Cooling Water , After Condenser	w
SCC Cooling Tower	w
Raw Water	m
Ash Dam B	m
Callide B Ashing Water	m
Drains Reclaim Dam Reclaim	m
Coal Plant Sprinkler System	m
Admin Building Sprinkler System	m
Annex Supply, B Test Valve	m
Callide B Site Fire Fighting System	m
Callide A Fire Fighting System	m

16.2 Legionella Control Strategy

Chlorine Plant Strategy

Test result	Required control strategy
Plant performance to be checked daily by chemical plant operators to confirm that the plant has injected the required times in the past 24 hours to each tower	
Plant dosed according to schedule	(1) Maintain program.
Loss of chlorination from any sort of chlorine plant malfunction.	Action Level 1 -loss of one chlorination cycle to a tower. Plant to be repaired within 24 hours. People on site to be informed of Action level 1 status. Need to consider chlorination effectiveness prior to the loss of chlorination in determining response activity.
	Action Level 2 -Chlorination not restored within 24 hours. People on site advised to wear P2 masks in vicinity* of the effected tower[s] until double chlorination completed. Once chlorine plant restored, double chlorination for next 24 hours followed immediately by sampling for Legionella testing. (2)

Chlorine Dosing Control Strategy

Test result (mg/L post chlorination)	Required control strategy
0.7-1.0	(1) Maintain tri-weekly monitoring. Maintain chlorination regime.
Detected as <0.5	Action Level 1 - Chlorine residual less than 0.5ppm. Site advised by Station Chemist of Action level 1 status. Plant adjustments made and each successive cycle tested until 0.5ppm achieved.
	Action Level 2 -0.5ppm chlorine residual not achieved for 3 successive injections. Site advised by Station Chemist to wear P2 masks in the vicinity of the effected tower/towers until double chlorination completed. Double chlorination for next 24 hours after residual achieved. (3) Undertake microbial test within a day of double chlorination.

Heterotrophic Organism Control Strategy

	Test result (cfu/mL)	Required control strategy
1.	<100 000	(Maintain monthly monitoring Maintain water treatment program
2.	>100 000 <500 000	Investigate problem Review chlorine plant, unit plant and all other test data from the date of the previous sampling to the date of the sampling of the high result. If all other data is according to the management plan, then the high result is interpreted as a rogue sample, a precautionary double duration chlorination injection will be undertaken. Action Level 1 -If all the plant and test data is not all according to the management plan. Double chlorination for 24 hours and subsequently sampled for Total Plate Count and Legionella testing. Note -if there is a non-conformance in the plant/test data, then corrective action would have already been taken, along with another sample for Legionella testing. See items 1/. and 2/. above. Therefore this Total Plate Count result would no longer be relevant. Therefore consider this result only if corrective action had not been already been taken.
		Action level 2 -Subsequent Total Plate Count test also 100000 to 500000 cfu/ml. Site advised by Station Chemist to wear P2 masks in vicinity* of effected tower[s] until Total Plate Count results show less than 100000 cfu/ml. Double chlorination for 48 hours and subsequent sampling for Total Plate Count and Legionella.
3.	>500 000	Investigate problem Review water treatment program Take necessary remedial action including immediate on-line disinfection in accordance with Appendix B and undertake control strategy 5.
4.		Retest water within 3 to 7 days of plant operation (a) If test result is <100000 cfu/mL repeat control strategy (1) (b) If test result is >100000 cfu/mL but <500 000 cfu/mL repeat control strategy (4) (c) If test result is >500000 cfu/mL investigate problem and review water treatment program, carry out immediate on-line decontamination in accordance with Paragraph C2 of Appendix C and repeat control strategy (5)



Legionella Control Strategy

1	Test result (cfu/mL)	Required control strategy
	Not detected (<10)	Maintain Weekly monitoring. Maintain water treatment program.
2.	Detected as <1000	<p><u>Legionella Results 100 to 1000cfu/ml.[After chlorination]</u></p> <p>Review chlorine plant, unit plant and all other test data from the date of the previous sampling to the date of the sampling of the high result. If all other data is according to the management plan, then the high result is interpreted as a rogue sample, a precautionary double duration chlorination injection is carried out and a sample for Legionella testing is taken subsequently.</p> <p>Action Level 1- If all the plant and test data is not all according to the management plan. Double chlorination for 24 hours and subsequently sampled for Legionella testing. Note-if there is a non-conformance in the plant/test data, then corrective action would have already been taken, along with another sample for Legionella testing. See items 1/. and 2/. above. Therefore this Legionella result would no longer be relevant. Therefore consider this result only if corrective action had not been already been taken.</p> <p>Action level 2- subsequent Legionella test also 100 to 1000cfu/ml. Site advised by Station Chemist to wear P2 masks in vicinity* of effected tower[s] until Legionella results show less than 10cfu/ml. Double chlorination for 48 hours and subsequent sampling for Legionella.</p>
3.		<p>Retest water within 3 to 7 days of plant operation</p> <p>a) If not detected, continue to retest water every 3 to 7 days until two consecutive samples return readings of not detected and repeat control strategy (1)</p> <p>(b) If detected at <100 cfu/mL repeat control strategy (2)</p> <p>c) If detected at ³100 cfu/mL investigate problem and review water treatment program, immediately carry out on-line decontamination in accordance with Paragraph C2 of Appendix C and repeat control strategy (3)</p> <p>(d) If detected at ³1000 cfu/mL undertake control strategy (4)</p>
4.	Detected as >1000	<p>(4 <u>Legionella Results greater than 1000cfu/ml.[After chlorination]</u>)</p> <p>Action Level 2- Site advised by Station Chemist to wear P2 masks within vicinity* of the effected tower[s] until Legionella results show less than 10 cfu/ml. All plant and test data reviewed to identify fault. Double chlorination for 48 hours and subsequently sampled for Legionella testing.</p> <p>Note-as for 3/. Action Level 1, corrective action would have already been taken, and so this result would no longer be relevant. Therefore consider this result only if corrective action had not already been taken.</p>

		<p>Vicinity Areas-</p> <p>[a] B tower problem. Southern workshop [except within the workshop if all doors/louvres kept closed on the eastern side and roof vents closed], Chemical plant along Turbot St., any equipment on/around the tower, e.g. screens, float valves etc.</p>
		<p>[b] C3 tower problem. Southern Workshop [except within the workshop if all doors/louvres kept closed on the western side and roof vents closed], CPP polisher regen and BD Water treatment plant, any equipment on/around C3 tower.</p>
		<p>[c] C4 tower problem. BD Water treatment plant. Any equipment on/around C4 tower.</p>
5.		<p>Retest water within 2 days of precautionary double chlorination.</p> <p>(a) If not detected, continue to retest water every 2 days until two consecutive samples return readings of not detected and repeat control strategy (1)</p> <p>(b) If detected at <100 cfu/mL, repeat control strategy (2)</p> <p>(c) If detected at $\geq 100 < 1000$ cfu/mL investigate problem and review water treatment program, immediately carry out on-line decontamination in accordance with Paragraph C2 of Appendix C and repeat control strategy (5)</p>
		<p>(d) If detected at >1000 cfu/mL investigate problem and review water treatment program, immediately carry out system decontamination in accordance with Paragraph C3 of Appendix C and repeat control strategy (5)</p>

16.3 Flow Chart



