

## Disinfection of Water Mains - Using Sodium Hypochlorite with a Water Truck

The information below is to be used as a guide only. Disinfection must conform with all the requirements of the Power and Water Connection Code. The disinfection requirements of the Code are performance based and need not necessarily be achieved using the method detailed below, however methods differing from those detailed in the Connection Code may only be used with written approval from Land Development.

1. Flush the new water main at high flow using mains water through an approved Power and Water meter to remove debris.
2. Isolate the main.
3. Calculate the water required to fill the main using this equation:

$$V_{wm} = 3.142 \times L \times \left(\frac{D}{2}\right)^2$$

Where:

$V_{wm}$  = Volume of water (m<sup>3</sup>) required in the truck to fill water main.

L = Length of water main (m).

D = Nominal diameter of water main (m).

(Note: m<sup>3</sup> is equal to kilolitres.)

4. Required Sodium Hypochlorite in truck:  
The volume of Sodium Hypochlorite<sup>1</sup> required is equal to:  
 $V_{SH} = 0.83 \times V_{wm}$  (the resulting volume is in litres)  
This will produce a chlorine (Cl<sub>2</sub>) concentration of about 100mg/L.
5. Add the Sodium Hypochlorite to water truck using all access hatches evenly. Ensure adequate mixing by 'driving' the truck to, or around the site.
6. Fill the water main with the chlorinated water.
7. Test the Cl<sub>2</sub> levels using a chlorine comparator<sup>2</sup> at various points along the main to ensure that the chlorinated water has filled the main. The Cl<sub>2</sub> levels should be reasonably close to the level in the water truck.
8. Leave for 24 hours.
9. Test Cl<sub>2</sub> levels again. The Cl<sub>2</sub> level must be at least 10mg/L. If not, the disinfection procedure must be repeated.
10. Flush the main with mains water through an approved Power and Water meter until the Cl<sub>2</sub> residual equals that of mains water (usually < 1 mg/L). Discharge the chlorinated water (in preferred order) either to:
  - a) Sewer, with written approval of Power and Water; or
  - b) Stormwater, with written approval of the relevant authority; or
  - c) The environment, with written approval of the relevant agency.
11. After flushing is complete collect a single water sample for bacteriological analysis and take to a microbiological laboratory<sup>3</sup>. If the sample fails the bacteriological analysis, the disinfection must be repeated.
12. Submit the laboratory results to Land Development, Power and Water and include details on test location.

13. The consulting engineer must certify as witness to the above procedure. Second party certification will not be accepted.
14. Connection to Power and Water's system will not be approved until the certificate and test results are submitted to Land Development.

### Example Calculation

Water Main dimensions:

Nominal diameter = DN 300 = 300mm = 0.3m

L = 400 m

$$V_{wm} = 3.142 \times 400 \times \left(\frac{0.3}{2}\right)^2$$

$V_{wm} = 28.3 \text{ m}^3 = 28.3 \text{ kL}$  required in water truck.

Sodium Hypochlorite required:

$$V_{SH} = 0.83 \times V_{wm}$$

$$V_{SH} = 0.83 \times 28.3$$

$V_{SH} \approx 24$  litres of Sodium Hypochlorite.

### Water & Sodium Hypochlorite Table

		Pipe Nominal Diameter							
		DN100		DN150		DN225		DN300	
		H <sub>2</sub> O	SH	H <sub>2</sub> O	SH	H <sub>2</sub> O	SH	H <sub>2</sub> O	SH
Pipe Length (m)	10	0.1	0.1	0.2	0.1	0.4	0.3	0.7	0.6
	20	0.2	0.1	0.4	0.3	0.8	0.7	1.4	1.2
	30	0.2	0.2	0.5	0.4	1.2	1.0	2.1	1.8
	40	0.3	0.3	0.7	0.6	1.6	1.3	2.8	2.3
	50	0.4	0.3	0.9	0.7	2.0	1.7	3.5	2.9
	60	0.5	0.4	1.1	0.9	2.4	2.0	4.2	3.5
	70	0.5	0.5	1.2	1.0	2.8	2.3	4.9	4.1
	80	0.6	0.5	1.4	1.2	3.2	2.6	5.7	4.7
	90	0.7	0.6	1.6	1.3	3.6	3.0	6.4	5.3
	100	0.8	0.7	1.8	1.5	4.0	3.3	7.1	5.9
	200	1.6	1.3	3.5	2.9	8.0	6.6	14.1	11.7
	300	2.4	2.0	5.3	4.4	11.9	9.9	21.2	17.6
	400	3.1	2.6	7.1	5.9	15.9	13.2	28.3	23.5
	500	3.9	3.3	8.8	7.3	19.9	16.5	35.3	29.3
	600	4.7	3.9	10.6	8.8	23.9	19.8	42.4	35.2
	700	5.5	4.6	12.4	10.3	27.8	23.1	49.5	41.1
800	6.3	5.2	14.1	11.7	31.8	26.4	56.5	46.9	
900	7.1	5.9	15.9	13.2	35.8	29.7	63.6	52.8	
1000	7.9	6.5	17.7	14.7	39.8	33.0	70.7	58.7	

Water (H<sub>2</sub>O) in kilolitres, Sodium Hypochlorite (SH) in litres

<sup>1</sup> Sodium Hypochlorite solution should contain 12 per cent Cl<sub>2</sub> by weight, but this concentration will degrade with time and elevated temperatures. Ensure that the Sodium Hypochlorite has been recently acquired from suppliers.

<sup>2</sup> A chlorine-testing device that can be purchased at laboratory supply stores.

<sup>3</sup> The labs presently operating are the DBI&RD Water Microbiological Lab at Berrimah Research Farm in Darwin (contact Greg Paterson on 8999 2347), Top End Biocheck at Bees Creek (contact Robyn Tait on 8988 2074), & the DIPE Water Resources Laboratory in Alice Springs (contact Virginia Garner on 8951 8610). Ensure you call the lab to give one days notice and pick up a sterilised bottle for sample collection (the lab may sample for you at an additional cost). Allow 1 week for sample results to come in. (A surcharge may apply to samples delivered on Thursdays or Fridays, weekend sampling may not be possible – call first to confirm.)