



Guidance, Procedures and Training on Licensing of Discharges to Surface Waters and to Sewer

Worked Examples



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Example 1

- **Discharge characteristics**
 - 50 p.e.
 - Max discharge flow 9 m³/d
 - Effluent Concentration
 - BOD 10mg/l, Ammonia 4 mg/l, OrthoP 1.5mg/l
- **Receiving Water**
 - Status – Good
 - 95%ile flow – 0.7 m³/s
 - Background Concentration
 - BOD 1.24mg/l, Ammonia 0.058 mg/l, OrthoP 0.024mg/l
 - Max permissible concentration (Good Status 95%ile EQS)
 - BOD 2.6mg/l, Ammonia 0.14 mg/l, OrthoP 0.075mg/l
 - Percentage Headroom permitted - 25%



Example 1 Calculations

- Use mass balance to estimate Resultant Concentration in Receiving Water
 - Is the resultant concentration less than 95%ile Good Status Standard?

	Background Conc (mg/l)	Resultant Conc (mg/l)	Standard (mg/l)
BOD	1.2400	1.2413	2.6
Total Ammonia	0.0580	0.0586	0.14
MRP	0.0240	0.0242	0.075

- Calculate Headroom and percentage Headroom utilised by discharge
 - Will the discharge utilise >25% of Headroom?

	Headroom (mg/l)	% headroom permitted to be used	actual increase (mg/l)	% of headroom used
BOD	1.36	25	0.00130	0.10
Total Ammonia	0.082	25	0.00059	0.72
MRP	0.051	25	0.00022	0.43

Application may be granted following assessment of catchment



Example 2

- **Discharge characteristics**
 - 100 p.e.
 - Max discharge flow 18 m³/d
 - Effluent Concentration
 - BOD 10mg/l, Ammonia 4 mg/l, OrthoP 1.5mg/l
- **Receiving Water**
 - Status – Moderate
 - 95%ile flow – 0.009 m³/s
 - Background Concentration
 - BOD 1.2 mg/l, Ammonia 0.03 mg/l, OrthoP 0.0195 mg/l
 - Max permissible concentration (Good Status 95%ile EQS)
 - BOD 2.6mg/l, Ammonia 0.14 mg/l, OrthoP 0.075mg/l
 - Percentage Headroom permitted - 25%



Example 2 Calculations

- Use mass balance to estimate Resultant Concentration in Receiving Water
 - Is the resultant concentration less than 95%ile Good Status Standard?
- Calculate Headroom and percentage Headroom utilised by discharge
 - Will the discharge utilise >25% of Headroom?

	Background Conc (mg/l)	Resultant Conc (mg/l)	Standard (mg/l)
BOD	1.2	1.40	2.6
Total Ammonia	0.03	0.12	0.14
MRP	0.0195	0.05	0.075

	Headroom (mg/l)	% headroom permitted to be used	actual increase (mg/l)	% of headroom used
BOD	1.4	25	0.199	14.2
Total Ammonia	0.11	25	0.090	81.7
MRP	0.0555	25	0.033	60.4

Application utilises >25% Headroom. Assess other catchment factors. Application may be refused.



Example 3

- **Discharge characteristics**
 - 250 p.e.
 - Max discharge flow 45 m³/d
 - Effluent Concentration
 - BOD 20mg/l, Ammonia 4 mg/l, OrthoP 1mg/l
- **Receiving Waters**
 - Status – Moderate
 - 95%ile flow – 0.0005 m³/s
 - Background Concentration
 - BOD 2.3 mg/l, Ammonia 0.11 mg/l, OrthoP 0.06 mg/l
 - Max permissible concentration (Good Status 95%ile EQS)
 - BOD 2.6mg/l, Ammonia 0.14 mg/l, OrthoP 0.075mg/l
 - Percentage Headroom permitted - 25%



Example 3 Calculations

- Use mass balance to estimate Resultant Concentration in Receiving Water
 - Is the resultant concentration less than 95%ile Good Status Standard?

	Background Conc (mg/l)	Resultant Conc (mg/l)	Standard (mg/l)
BOD	2.3	2.75	2.6
Total Ammonia	0.11	0.21	0.14
MRP	0.06	0.08	0.075

Application should be refused as EQS is exceeded downstream of discharge

- Headroom Calculation

	Headroom (mg/l)	% headroom permitted to be used	actual increase (mg/l)	% of headroom used
BOD	0.3	25	0.45	149.7
Total Ammonia	0.03	25	0.10	329.1
MRP	0.015	25	0.02	159.1



Example 4

- **Discharge characteristics**
 - 180 p.e.
 - Max discharge flow 32 m³/d
 - Effluent Concentration
 - BOD 20mg/l, Ammonia 4 mg/l, OrthoP 1mg/l
- **Receiving Waters**
 - Status – Poor
 - 95%ile flow – 0.0004 m³/s
 - Background Concentration
 - BOD 2.8 mg/l, Ammonia 0.16 mg/l, OrthoP 0.082 mg/l (MEASURED)
 - BOD 2.4 mg/l, Ammonia 0.115 mg/l, OrthoP 0.06 mg/l (ADJUSTED)
 - Max permissible concentration (Good Status 95%ile EQS)
 - BOD 2.6mg/l, Ammonia 0.14 mg/l, OrthoP 0.075mg/l
 - Percentage Headroom permitted - 25%



Example 4 Calculations

- Use mass balance to estimate Adjusted Resultant Concentration in Receiving Water
 - Is the adjusted resultant concentration less than 95%ile Good Status Standard?
- Calculate Headroom and percentage Headroom utilised by discharge
 - Will the discharge utilise >25% of Headroom?

	Background Conc (mg/l)	Resultant Conc (mg/l)	Standard (mg/l)
BOD	2.4	2.47	2.6
Total Ammonia	0.115	0.13	0.14
MRP	0.06	0.06	0.075

	Headroom (mg/l)	% headroom permitted to be used	actual increase (mg/l)	% of headroom used
BOD	0.2	25	0.07	32.9
Total Ammonia	0.025	25	0.01	58.1
MRP	0.015	25	0.00	23.4

Application utilises >25% Headroom. Assess other catchment factors. Application may be refused.

