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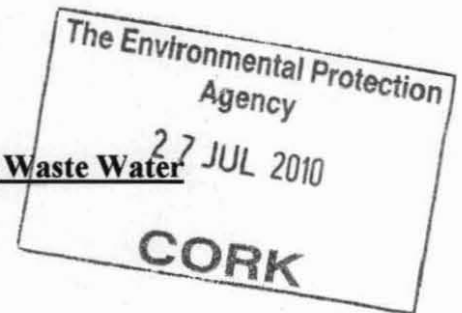
Mr. Stuart Huskisson,
Inspector,
Environmental Protection Agency,
Office of Climate, Licensing & Resource Use,
Regional Inspectorate,
Inniscarra,
County Cork.

26/07/2010

D0450-01

**Re: Notices in accordance with Regulation 18(3)(b) of the Waste Water
Discharge**

(Authorisation) Regulations 2007)



Dear Mr. Huskisson,

Your notices dated 31st. May and 1st. June last and previous correspondence regarding the following Waste Water Discharge Licence applications refer.

Reg No.	Agglomeration Name	Date of Application
D0437-01	Boherbue	22/06/2009
D0438-01	Bweeng	22/06/2009
D0439-01	Conna	22/06/2009
D0445-01	Glanworth	22/06/2009
D0450-01	Clondulane	22/06/2009

Attached find an assessment of the impact of the discharge in relation to the requirements of the Environmental Quality Objectives regulations (S.I. No. 272 of 2009 for Clondulane WWTP. CD – ROM also attached.

Yours truly,
Paddy O' Friel
Substitute Senior Engineer
Email: paddy.ofriel@corkcoco.ie



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Mobile 087/2700065



Clondulane Waste Water Treatment Plant

Review of the Impact of the Discharge in relation to the requirements of the Environmental Quality Objectives.

Provide a comparison of the predicted receiving water concentrations (based on the waste water treatment plant discharging at maximum average discharge concentration) with the values included in the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 SI No 272/2009

The River Blackwater into which the WWTP discharges has a “high status” . Therefore the lower “good” standard contained in the surface water regulations was used for comparison purposes.

The upstream and downstream sampling results for 2008 at aSW01 CLON d were compared to the relevant EQR/S from the surface water regulations in the following tables. The sample results and the EQR/S were included only if there were values for both, to allow comparison.

The upstream and downstream sample results incorporated in the following tables are those laid out in the upstream and downstream sheets of the Revised Table E. However many of these results are at the limit of detection, or are results based on averages that include assumed figures. Therefore additional upstream and downstream tables with actual results for metals have been included. These “actual results for metals” are laid out on a separate “metal analysis” sheet in the Revised Table E.

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UPSTREAM COMPARISON TABLE

Physico-chemical conditions	Ecological quality ratio/standard	2009 upstream ambient sampling results at aSW01 CLON u
	Good boundary	
	Rivers (All Types)	
Oxygenation conditions Table 9	River water body	Ambient sampling results
Biochemical Oxygen Demand (BOD) (mgO ₂ /l)	Good status ≤1.3 (mean) or ≤2.2(95%ile)	1.75mg/L (mean) 2.41mg/L (95%ile)
Acidification Status Table 9	River Water Body	Ambient sampling results
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.6-8.1
Nutrient conditions Table 9	River Water body	Ambient sampling results
Total Ammonia (mg N/l)	Good status ≤0.04(mean) or ≤0.09 (95%ile)	0.067mg/L (mean) 0.09mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤0.025(mean) or ≤0.045(95%ile)	0.04mg/L (mean) 0.06mg/L (95%ile)
Specific pollutants Table 10	Inland surface waters AA-EQS	Ambient sampling results
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20µg/L
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	<20µg/L
Priority Substances Table 11	Inland surface waters AA-EQS	Ambient sampling results
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	20µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	Inland surface waters AA-EQS	Ambient sampling results
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	0.2 µg/L

Note the following:

The black results are within the EQR/S.
 The red results break the EQR/S.
 The blue results may break the EQR/S.
 The results highlighted grey are at the limit of detection.

**UPSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)**

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2009 upstream ambient sampling results at aSW01 CLON u</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<i>Specific pollutants Table 10</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Total Chromium	8.1	1.34µg/L
Copper (depending on water hardness)	30	<1µg/L
Zinc (depending on water hardness)	100	<1µg/L
<i>Priority Substances Table 11</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Lead and its compounds	7.2	8µg/L
Nickel and its compounds	20	2.56µg/L
<i>Priority Hazardous Substances Table 12</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Cadmium and its compounds (depending on water hardness)	0.25	<1µg/L

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DOWNSTREAM COMPARISON TABLE

Physico-chemical conditions	Ecological quality ratio/standard	2009 Downstream ambient sampling results at aSW01CLON d
	Good boundary	
	Rivers (All Types)	
Oxygenation conditions Table 9	River water body	Ambient sampling results
Biochemical Oxygen Demand (BOD) (mgO ₂ /l)	Good status ≤1.3 (mean) or ≤2.2(95%ile)	1.753mg/L (mean) 2.41mg/L (95%ile)
Acidification Status Table 9	River Water Body	Ambient sampling results
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.6-8.1 (range)
Nutrient conditions Table 9	River Water body	Ambient sampling results
Total Ammonia (mg N/l)	Good status ≤0.04(mean) or ≤0.09 (95%ile)	<0.067mg/L (mean) <0.077mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤0.025(mean) or ≤0.045(95%ile)	0.049mg/L (mean) 0.09mg/L (95%ile)
Specific pollutants Table 10	Inland surface waters AA-EQS	Ambient sampling results
Phenol	8	<0.1µg/L
Toulene	10	<0.28µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20µg/L Chromium
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	<20µg/L
Priority Substances Table 11	Inland surface waters AA-EQS	Ambient sampling results
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	Inland surface waters AA-EQS	Ambient sampling results
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	0.8 µg/L

Note the following:

The black results are within the EQR/S.
 The red results break the EQR/S.
 The blue results may break the EQR/S.
 The results highlighted grey are at the limit of detection.

**DOWNSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)**

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2009 Downstream ambient sampling results at aSW01CLON d</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<i>Specific pollutants Table 10</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Total Chromium	8.1	2.78µg/L
Copper (depending on water hardness)	30	3.83µg/L
Zinc (depending on water hardness)	100	6.21µg/L
<i>Priority Substances Table 11</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Lead and its compounds	7.2	18µg/L
Nickel and its compounds	20	2.49µg/L
<i>Priority Hazardous Substances Table 12</i>	<i>Inland surface waters AA-EQS</i>	<i>Ambient sampling results</i>
Cadmium and its compounds (depending on water hardness)	0.25	<1µg/L

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PREDICTED IMPACTS

MASS BALANCE EQUATIONS FOR BOD:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum BOD in Discharge.

Flow of River (95%ile) = 0.06m³/sec
Mean BOD in River (upstream) = 1.5mg/L
Max volume of discharge = 0.0069m³/sec
Max value for BOD in discharge = 37mg/L

$$C_{\text{final}} = \frac{(0.06 \times 1.5) + (0.0069 \times 37)}{(0.06 + 0.0069)}$$

$$C_{\text{final}} = 5.15\text{mg/l BOD}$$

This is in breach of the 2.6mg/L 95%ile EQS for BOD

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean BOD in Discharge.

Flow of River (Median) = 0.296m³/sec
Mean BOD in River (upstream) = 1.5mg/L
Normal volume of discharge = 0.001m³/sec
Mean value for BOD in discharge = 10.2mg/L

$$C_{\text{final}} = \frac{(0.296 \times 1.5) + (0.001 \times 10.2)}{(0.296 + 0.01)}$$

$$C_{\text{final}} = 1.48\text{mg/l BOD}$$

This is under the 1.5mg/L mean EQS for BOD

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MASS BALANCE EQUATIONS FOR AMMONIA:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum Ammonia in Discharge.

Flow of River (95%ile) = 0.06m³/sec
Mean Ammonia in River (upstream) = 0.067mg/L
Max volume of discharge = 0.0069m³/sec
Max value for Ammonia in discharge = 0.24mg/L

$$C_{\text{final}} = \frac{(0.06 \times 0.067) + (0.0069 \times .24)}{(0.06 + 0.0069)}$$

$$C_{\text{final}} = 0.084\text{mg/l Ammonia}$$

This is under the 0.14mg/L 95%ile EQS for Ammonia

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean Ammonia in Discharge.

Flow of River (Median) = 0.296m³/sec
Mean Ammonia in River (upstream) = 0.067mg/L
Normal volume of discharge = 0.001m³/sec
Mean value for Ammonia in discharge = 0.157mg/L

$$C_{\text{final}} = \frac{(0.296 \times 0.067) + (0.001 \times 0.157)}{(0.296 + 0.001)}$$

$$C_{\text{final}} = 0.067\text{mg/l Ammonia}$$

This is in breach of the 0.065mg/L mean EQS for Ammonia

However it is worth noting that the mean upstream Ammonia value is 0.067mg/L, which is already in breach of the EQS of 0.065mg/L.

MASS BALANCE EQUATIONS FOR ORTHOPHOSPHATE:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum Orthophosphate in Discharge.

Flow of River (95%ile) = 0.06m³/sec
Mean Orthophosphate in River (upstream) = 0.044mg/L
Max volume of discharge = 0.006m³/sec
Max value for Orthophosphate in discharge = 4.52mg/L

$$C_{\text{final}} = \frac{(0.06 \times 0.044) + (0.006 \times 4.52)}{(0.06 + 0.006)}$$

$$C_{\text{final}} = 0.45\text{mg/l Orthophosphate}$$

This is in breach of the 0.075mg/L 95%ile EQS for Orthophosphate

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean Orthophosphate in Discharge.

Flow of River (Median) = 0.296m³/sec
Mean Orthophosphate in River (upstream) = 0.044mg/L
Normal volume of discharge = 0.001m³/sec
Mean value for Orthophosphate in discharge = 3.80mg/L

$$C_{\text{final}} = \frac{(0.296 \times 0.044) + (0.001 \times 3.8)}{(0.296 + 0.001)}$$

$$C_{\text{final}} = 0.057\text{mg/l Orthophosphate}$$

This is in breach of the 0.035mg/L mean EQS for Orthophosphate

However it is worth noting that the mean upstream Orthophosphate value is 0.044mg/L, which is greater than the EQS of 0.035mg/L.

D0445-01 Attachment E4 tabulation of monitoring results for compliance purposes against SI 272 of 2009 for comparison purposes where results are below LOD for analytical method

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	Average	95% percentile
Sample	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River		
Sample Code	GT266	GT471	GT705	GT668	GT799		
NH ₃ mg/L	0.06	*	0.05	0.1	0.06	0.0675	0.094
O-PO4-P mg/L	0.06	0.021	0.06	0.016	0.05	0.0414	0.06
Chromium ug/L	<1	<1	<1	1.341	<1	1.341	n/a
Copper ug/L	<1	<1	<1	<1	<1	<1	n/a
Lead ug/L	8	<1	<1	<1	<1	8	n/a
Nickel ug/L	3	<1	3.298	<1	1.40	2.566	n/a
Zinc ug/L	<1	<1	<1	<1	<1	<1	n/a
Boron ug/L	9.5	<1	<1	<1	<1	9.5	n/a
Cadmium ug/L	<1	<1	<1	<1	<1	<1	n/a
Barium ug/L	22	43.9	<1	46.68	8.473	30.26325	n/a

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	Average	95% percentile
Sample	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River		
Sample Code	GT267	GT472	GT706	GT669	GT800		
NH ₃ mg/L	0.06	*	0.06	0.078	0.07	0.067	0.0768
O-PO4-P mg/L	0.04	0.0225	0.1	0.032	0.05	0.0489	0.09
Chromium ug/L	<1	<1	2.786	<1	<1	2.786	n/a
Copper ug/L	<1	<1	3.839	<1	<1	3.839	n/a
Lead ug/L	18	<1	<1	<1	<1	18	n/a
Nickel ug/L	4	1.822	<1	<1	1.662	2.494666667	n/a
Zinc ug/L	<1	<1	6.209	<1	<1	6.209	n/a
Boron ug/L	5	<1	<1	<1	<1	5	n/a
Cadmium ug/L	<1	<1	<1	<1	<1	<1	n/a
Barium ug/L	21	40.1	30	<1	5.336	24.109	n/a

<1 Note values of 0ug/l recorded as <1ug/l

Attachment E4 Clondulane Discharge Outlet Table E4

Sample Date	28/01/2009	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Average
Sample Code	GT156	GT265	GT470	GT704	GT667	GT798	
Flow M ³ /Day	*	*	*	*	*	*	
pH	*	7.3	8.4	7.5	7.2	7.6	7.6
Temperature °C	*	*	*	*	*	*	
Cond 20°C	*	640	*	666	773	724	700.75
SS mg/L	3	4	*	140	15	5	33.4
NH ₃ mg/L	*	0.06	*	0.24	0.2	0.13	0.1575
BOD mg/L	2	1	*	37	10	1	10.2
COD mg/L	10.5	7	28	190	52	31	53.08333
TN mg/L	*	19	19.2	20	59.5	43.1	32.16
Nitrite mg/L	*	*	*	*	0.214	*	0.214
Nitrate mg/L	*	*	*	*	47.416	*	47.416
TP mg/L	*	2.2	1.55	6.5	5.03	3.7	3.796
O-PO4-P mg/L	*	*	*	3.2	4.52	3.7	3.80667
SO4 mg/L	*	*	*	*	45	*	45
Phenols µg/L	*	*	*	*	<0.10	*	<0.10
Atrazine µg/L	*	*	*	*	<0.01	*	<0.01
Dichloromethane	*	*	*	*	<1	*	<1
Simazine µg/L	*	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	*	*	not required	*	not required
Xylenes µg/L	*	*	*	*	<1	*	<1
Arsenic µg/L	*	*	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20	<20	<20
Copper ug/L	10	10	10	133.4	10	10	51.13333
Cyanide µg/L	*	*	*	*	13	*	13
Fluoride µg/L	*	*	*	*	455	*	455
Lead ug/L	<20	<20	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20	<20	<20
Zinc ug/L	10	10	10	101.4	10	10	40.46667
Boron ug/L	<20	<20	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20	<20	<20
Mercury µg/L	*	*	*	*	<0.2	*	<0.2
Selenium µg/L	*	*	*	*	2.6	*	2.6
Barium ug/L	10	10	10	21.4	49.41	10	26.93667

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Attachment E4 Clondulane Upstream Table E4

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	River	River	River	River	River	Average
Sample Code	GT266	GT471	GT705	GT668	GT799	
Flow M ³ /Day	*	*	*	*	*	
pH	7.6	*	8.1	8.1	8	7.95
Temperature °C	*	*	*	*	*	
Cond 20°C	307	*	306	279	323	303.75
SS mg/L	3	*	7.8	4	6	5.2
NH ₃ mg/L	0.06	*	0.05	0.1	0.06	0.0675
BOD mg/L	1	*	3	1	1	1.5
COD mg/L	7	*	2.5	10.5	7	6.75
TN mg/L	7	*	5	8.93	8.54	7.3675
Nitrite mg/L	*	*	*	<0.10	*	<0.10
Nitrate mg/L	*	*	*	7.22	*	7.22
TP mg/L	0.06	*	0.08	0.025	0.06	0.05625
O-PO4-P mg/L	0.06	0.025	0.06	0.025	0.05	0.044
SO4 mg/L	*	*	*	<30	*	<30
Phenols µg/L	*	*	*	<0.10	*	<0.10
Atrazine µg/L	*	*	*	<0.01	*	<0.01
Dichloromethane	*	*	*	<1	*	<1
Simazine µg/L	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	*	not required	*	not required
Xylenes µg/L	*	*	*	<1	*	<1
Arsenic µg/L	*	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20	<20
Copper ug/L	<20	<20	<20	<20	<20	<20
Cyanide µg/L	*	*	*	<5	*	<5
Fluoride µg/L	*	*	*	<100	*	<100
Lead ug/L	<20	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20	<20
Zinc ug/L	<20	<20	<20	<20	<20	<20
Boron ug/L	<20	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20	<20
Mercury µg/L	*	*	*	<0.2	*	<0.2
Selenium µg/L	*	*	*	3	*	3
Barium ug/L	22	43.9	10	46.68	10	26.516

HALF LOD FOR STATISTICAL PURPOSES

Attachment E4 Clondulane Inlet Table E4

Sample Date	05/02/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	Influent	Influent	Influent	Influent	Average
Sample Code	GT264	GT703	GT666	GT797	
Flow M ³ /Day	*	*	*		
pH	7.2	8.6	8.3	7.1	7.8
Temperature °C	*	*	*	*	
Cond 20°C	786	1157	886	1349	1044.5
SS mg/L	110	592	367	3985	1263.5
NH ₃ mg/L	18	56	50.8	51.5	44.075
BOD mg/L	155	500	179	1400	558.5
COD mg/L	373	1500	536	6940	2337.25
TN mg/L	30	94	93.4	162.1	94.875
Nitrite mg/L	*	*	<0.10	*	<0.10
Nitrate mg/L	*	*	<0.50	37.5	37.5
TP mg/L	4.7	14.8	11.44	13	10.985
O-PO ₄ -P mg/L	2.8	10.4	9.34	*	7.513333333
SO ₄ mg/L	*	*	42.4	*	42.4
Phenols µg/L	*	*	<0.10		<0.10
Atrazine µg/L	*	*	<0.01		<0.01
Dichloromethane µg/L	*	*	<1	*	<1
Simazine µg/L	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	not required	*	not required
Xylenes µg/L	*	*	<1	*	<1
Arsenic µg/L	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20
Copper ug/L	127.9	275.6	183	53.2	159.925
Cyanide µg/L	*		8	*	8
Fluoride µg/L	*		686	*	686
Lead ug/L	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20
Zinc ug/L	30.72	205.7	100	47.5	95.98
Boron ug/L	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20
Mercury µg/L	*		<0.2	*	<0.2
Selenium µg/L	*		4.2	*	4.2
Barium ug/L	<20	33.2	25	<20	29.1

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Attachment E4 Clondulane Discharge Outlet Table E4

Sample Date	28/01/2009	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Average
Sample Code	GT156	GT265	GT470	GT704	GT667	GT798	
Flow M ³ /Day	*	*	*	*	*	*	
pH	*	7.3	8.4	7.5	7.2	7.6	7.6
Temperature °C	*	*	*	*	*	*	
Cond 20°C	*	640	*	666	773	724	700.75
SS mg/L	3	4	*	140	15	5	33.4
NH ₃ mg/L	*	0.06	*	0.24	0.2	0.13	0.1575
BOD mg/L	2	1	*	37	10	1	10.2
COD mg/L	10.5	7	28	190	52	31	53.08333
TN mg/L	*	19	19.2	20	59.5	43.1	32.16
Nitrite mg/L	*	*	*	*	0.214	*	0.214
Nitrate mg/L	*	*	*	*	47.416	*	47.416
TP mg/L	*	2.2	1.55	6.5	5.03	3.7	3.796
O-PO4-P mg/L	*	*	*	3.2	4.52	3.7	3.80667
SO4 mg/L	*	*	*	*	45	*	45
Phenols µg/L	*	*	*	*	<0.10	*	<0.10
Atrazine µg/L	*	*	*	*	<0.01	*	<0.01
Dichloromethane	*	*	*	*	<1	*	<1
Simazine µg/L	*	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	*	*	not required	*	not required
Xylenes µg/L	*	*	*	*	<1	*	<1
Arsenic µg/L	*	*	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20	<20	<20
Copper ug/L	10	10	10	133.4	10	10	51.13333
Cyanide µg/L	*	*	*	*	13	*	13
Fluoride µg/L	*	*	*	*	455	*	455
Lead ug/L	<20	<20	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20	<20	<20
Zinc ug/L	10	10	10	101.4	10	10	40.46667
Boron ug/L	<20	<20	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20	<20	<20
Mercury µg/L	*	*	*	*	<0.2	*	<0.2
Selenium µg/L	*	*	*	*	2.6	*	2.6
Barium ug/L	10	10	10	21.4	49.41	10	26.93667

HALF LOD FOR STATISTICAL PURPOSES

Attachment E4 Clondulane Upstream Table E4

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	River	River	River	River	River	Average
Sample Code	GT266	GT471	GT705	GT668	GT799	
Flow M ³ /Day	*	*	*	*	*	
pH	7.6	*	8.1	8.1	8	7.95
Temperature °C	*	*	*	*	*	
Cond 20°C	307	*	306	279	323	303.75
SS mg/L	3	*	7.8	4	6	5.2
NH ₃ mg/L	0.06	*	0.05	0.1	0.06	0.0675
BOD mg/L	1	*	3	1	1	1.5
COD mg/L	7	*	2.5	10.5	7	6.75
TN mg/L	7	*	5	8.93	8.54	7.3675
Nitrite mg/L	*	*	*	<0.10	*	<0.10
Nitrate mg/L	*	*	*	7.22	*	7.22
TP mg/L	0.06	*	0.08	0.025	0.06	0.05625
O-PO4-P mg/L	0.06	0.025	0.06	0.025	0.05	0.044
SO4 mg/L	*	*	*	<30	*	<30
Phenols µg/L	*	*	*	<0.10	*	<0.10
Atrazine µg/L	*	*	*	<0.01	*	<0.01
Dichloromethane	*	*	*	<1	*	<1
Simazine µg/L	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	*	not required	*	not required
Xylenes µg/L	*	*	*	<1	*	<1
Arsenic µg/L	*	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20	<20
Copper ug/L	<20	<20	<20	<20	<20	<20
Cyanide µg/L	*	*	*	<5	*	<5
Fluoride µg/L	*	*	*	<100	*	<100
Lead ug/L	<20	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20	<20
Zinc ug/L	<20	<20	<20	<20	<20	<20
Boron ug/L	<20	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20	<20
Mercury µg/L	*	*	*	<0.2	*	<0.2
Selenium µg/L	*	*	*	3	*	3
Barium ug/L	22	43.9	10	46.68	10	26.516

HALF LOD FOR STATISTICAL PURPOSES

County	Costello	19/05/2009	Atrazine	21	Clondulane Downstream
County	Costello	19/05/2009	Simazine	21	Clondulane Downstream
County	Costello	19/05/2009 (Eff.)		21	Clondulane Downstream
County	Costello	19/05/2009 (Total)		21	Clondulane Downstream
County	Costello	19/05/2009	Xylene	21	Clondulane Downstream
County	Costello	19/05/2009 (Eff.)		21	Clondulane Downstream
County	Costello	19/05/2009	ethane	21	Clondulane Downstream
County	Costello	19/05/2009	Arsenic	21	Clondulane Downstream
County	Costello	19/05/2009	Mercury	21	Clondulane Downstream
County	Costello	19/05/2009	Selenium	21	Clondulane Downstream
County	Costello	19/05/2009	Cyanide	21	Clondulane Downstream
County	Costello	19/05/2009 (Total)		21	Clondulane Downstream
County	Costello	19/05/2009	Atrazine	22	Clondulane Upstream
County	Costello	19/05/2009 (Eff.)		22	Clondulane Upstream
County	Costello	19/05/2009 (Total)		22	Clondulane Upstream
County	Costello	19/05/2009	Xylene	22	Clondulane Upstream
County	Costello	19/05/2009 (Eff.)		22	Clondulane Upstream
County	Costello	19/05/2009	ethane	22	Clondulane Upstream
County	Costello	19/05/2009	Arsenic	22	Clondulane Upstream
County	Costello	19/05/2009	Mercury	22	Clondulane Upstream
County	Costello	19/05/2009	Selenium	22	Clondulane Upstream
County	Costello	19/05/2009	Cyanide	22	Clondulane Upstream
County	Costello	19/05/2009 (Total)		22	Clondulane Upstream
County	Costello	19/05/2009	Atrazine	23	Clondulane STP
County	Costello	19/05/2009	Simazine	23	Clondulane STP
County	Costello	19/05/2009 (Eff.)		23	Clondulane STP
County	Costello	19/05/2009 (Total)		23	Clondulane STP
County	Costello	19/05/2009	Xylene	23	Clondulane STP
County	Costello	19/05/2009 (Eff.)		23	Clondulane STP
County	Costello	19/05/2009	ethane	23	Clondulane STP
County	Costello	19/05/2009	Arsenic	23	Clondulane STP
County	Costello	19/05/2009	Mercury	23	Clondulane STP
County	Costello	19/05/2009	Selenium	23	Clondulane STP
County	Costello	19/05/2009	Cyanide	23	Clondulane STP
County	Costello	19/05/2009 (Total)		23	Clondulane STP
County	Costello	19/05/2009	Atrazine	24	Clondulane Inlet
County	Costello	19/05/2009	Simazine	24	Clondulane Inlet
County	Costello	19/05/2009 (Eff.)		24	Clondulane Inlet
County	Costello	19/05/2009 (Total)		24	Clondulane Inlet
County	Costello	19/05/2009	Xylene	24	Clondulane Inlet
County	Costello	19/05/2009 (Eff.)		24	Clondulane Inlet
County	Costello	19/05/2009	ethane	24	Clondulane Inlet
County	Costello	19/05/2009	Arsenic	24	Clondulane Inlet
County	Costello	19/05/2009	Mercury	24	Clondulane Inlet
County	Costello	19/05/2009	Selenium	24	Clondulane Inlet

<0.01	ug/L
<0.01	ug/L
<0.28	ug/L
<1	ug/L
<0.73	ug/L
<0.35	ug/L
<1	ug/L
	ug/L
	ug/L
	ug/L
	ug/L
<0.10	ug/L
<0.01	ug/L
<0.01	ug/L
<0.28	ug/L
<1	ug/L
<0.73	ug/L
<0.35	ug/L
<1	ug/L
	ug/L
	ug/L
	ug/L
	ug/L
<0.10	ug/L
<0.01	ug/L
<0.01	ug/L
<0.28	ug/L
<1	ug/L
<0.73	ug/L
<0.35	ug/L
<1	ug/L
	ug/L
	ug/L
	ug/L
	ug/L
<0.10	ug/L
<0.01	ug/L
<0.01	ug/L
<0.28	ug/L
<1	ug/L
<0.73	ug/L
<0.35	ug/L
<1	ug/L
	ug/L
	ug/L
	ug/L

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Attachment E4 Clondulane Downstream Table E4

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	
Sample	River	River	River	River	River	Average
Sample Code	GT267	GT472	GT706	GT669	GT800	
Flow M ³ /Day	*	*	*	*	*	
pH	7.6	*	8.1	8.1	8	7.95
Temperature °C	*	*	*	*	*	
Cond 20°C	308	*	306	295	323	308
SS mg/L	3	*	7.2	8	6	6.05
NH ₃ mg/L	0.06	*	0.06	0.05	0.07	0.06
BOD mg/L	1	*	3	2	1	1.75
COD mg/L	2.5	*	6	10.5	13	8
TN mg/L	7	*	6	9.16	8.61	7.6925
Nitrite mg/L	*	*	*	<0.10	*	<0.10
Nitrate mg/L	*	*	*	7.23	*	7.23
TP mg/L	0.06	*	0.11	<0.05	0.06	0.076666667
O-PO ₄ -P mg/L	<0.05	<0.05	0.1	<0.05	0.05	0.075
SO ₄ mg/L	*	*	*	<30	*	<30
Phenols µg/L	*	*	*	<0.10	*	<0.10
Atrazine µg/L	*	*	*	<0.01	*	<0.01
Dichloromethane	*	*	*	<1	*	<1
Simazine µg/L	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	<0.28	*	<0.28
Tributyltin µg/L	*	*	*	not required	*	not required
Xylenes µg/L	*	*	*	<1	*	<1
Arsenic µg/L	*	*	*	<0.96	*	<0.96
Chromium ug/L	<20	<20	<20	<20	<20	<20
Copper ug/L	<20	<20	<20	<20	<20	<20
Cyanide µg/L	*	*	*	<5	*	<5
Fluoride µg/L	*	*	*	46	*	46
Lead ug/L	<20	<20	<20	<20	<20	<20
Nickel ug/L	<20	<20	<20	<20	<20	<20
Zinc ug/L	<20	<20	<20	<20	<20	<20
Boron ug/L	<20	<20	<20	<20	<20	<20
Cadmium ug/L	<20	<20	<20	<20	<20	<20
Mercury µg/L	*	*	*	<0.2	*	<0.2
Selenium µg/L	*	*	*	2.4	*	2.4
Barium ug/L	21	40.1	30	10	10	22.22

 HALF LOD FOR STATISTICAL PURPOSES

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D0445-01 Attachment E4 tabulation of monitoring results for compliance purposes against SI 272 of 2009 for comparison purposes where results are below LOD for analytical method

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	Average	95% percentile
Sample	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River		
Sample Code	GT266	GT471	GT705	GT668	GT799		
NH ₃ mg/L	0.06	*	0.05	0.1	0.06	0.0675	0.094
O-PO4-P mg/L	0.06	0.021	0.06	0.016	0.05	0.0414	0.06
Chromium ug/L	<1	<1	<1	1.341	<1	1.341	n/a
Copper ug/L	<1	<1	<1	<1	<1	<1	n/a
Lead ug/L	8	<1	<1	<1	<1	8	n/a
Nickel ug/L	3	<1	3.298	<1	1.40	2.566	n/a
Zinc ug/L	<1	<1	<1	<1	<1	<1	n/a
Boron ug/L	9.5	<1	<1	<1	<1	9.5	n/a
Cadmium ug/L	<1	<1	<1	<1	<1	<1	n/a
Barium ug/L	22	43.9	<1	46.68	8.473	30.26325	n/a

Sample Date	05/02/2009	02/04/2009	17/04/2009	14/05/2009	25/05/2009	Average	95% percentile
Sample	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River		
Sample Code	GT267	GT472	GT706	GT669	GT800		
NH ₃ mg/L	0.06	*	0.06	0.078	0.07	0.067	0.0768
O-PO4-P mg/L	0.04	0.0225	0.1	0.032	0.05	0.0489	0.09
Chromium ug/L	<1	<1	2.786	<1	<1	2.786	n/a
Copper ug/L	<1	<1	3.839	<1	<1	3.839	n/a
Lead ug/L	18	<1	<1	<1	<1	18	n/a
Nickel ug/L	4	1.822	<1	<1	1.662	2.494666667	n/a
Zinc ug/L	<1	<1	6.209	<1	<1	6.209	n/a
Boron ug/L	5	<1	<1	<1	<1	5	n/a
Cadmium ug/L	<1	<1	<1	<1	<1	<1	n/a
Barium ug/L	21	40.1	30	<1	5.336	24.109	n/a

<1 Note values of 0ug/l recorded as <1ug/l