

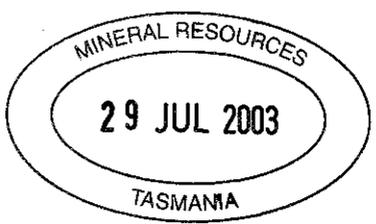
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20/7/03

Mr W Grun  
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 PO Box 56 Rosny Park  
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Dear Wojciech

**Storys Creek Water Quality Monitoring**

This brief report addresses the water quality monitoring carried out in May 2003

This sampling was carried out after the removal of the jig tails and followed a very dry summer period. Sampling is understood to have occurred at low flow conditions after some rainfall in the previous 2-3 months. The sampling followed approximately 5mm of rain the day before. This would not have caused a significant increase in runoff.

Samples were collected at the following sites;

- Storys Creek below Precipitate Dam
- Storys Creek below Side Creek
- Storys Creek below Managers Residence Station 14
- Storys Creek at Rossarden Bridge
- Storys Creek above Aberfoyle Creek
- Storys Creek below Aberfoyle Creek

MINERAL RESOURCES		
29 JUL 2003		
FILE REF:	DOC. REF:	
68081	03/03127	
29 JUL 2003		
OFFICER	FOR ACTION	FOR INFO
WJG	✓	✓

The sampling was carried out on 5 May 2003 by W Grun.

## Monitoring Results and Discussion

The results are appended as an excel spreadsheet (with all data - Table 1) and graphs.

Flow gauging was made at Station 14 (Storys Creek below Managers). Flows were low based on the gauge height.

Please note that it is now suspected that the flow characteristics have changed due to a change in the channel geography and flows at lower gauge height readings are now lower than shown on the height/flo graphs prepared by the HECEC. These have been adjusted for load calculations. It is recommended that HECEC be engaged to replace the gauge and re-rate the station.

GET REINSTALLED & DO  
A COUPLE OF READINGS

## Contaminant Concentrations

Figures 1 and 2 shows a summary of the results of the monitoring in concentrations in a graph format for all and for selected Stations.

### pH, Acidity and Sulphate

Figure 1a and 1b shows the results for pH, acidity and sulphate. No pH measurements were made on 5 May.

pH has increased markedly while in general acidity and sulphate have reduced as a general trend. "Spikes" have been attributed to mine inflows and reductions to limestone addition (see Figure 2). Trend lines are shown.

There has been an increase in acidity (and to a lesser extent sulphate) at the station below the Precipitate Dam in May 03 and downstream. This is attributed to the disturbance of the jig tails whilst being removed to the dump site. Trend lines for pH and acidity show an improving trend, in particular for station below Precipitate Dam.

LATA

## **Metals**

Figures 2a and 2b show the results for aluminium, cadmium copper and zinc, Figure 2 shows a reduced number of stations.

There is a general trend of decreasing concentrations over time, but reversed in January 2001 - December 2001 and April 2002. Metal concentrations have declined since the limestone addition and show the continued improvement in water quality.

Fig 2b shows a limited no of station with trend lines. There has been a marked improvement in the station below Precipitate Dam, but with all stations improving in metal concentrations. An increase in metal concentrations in May is attributed to the jig tails removal.

### **Station 14 (Managers Residence) Monitoring**

This Station is the one which has the most continuous records.

Figure 3 shows the results of the water quality monitoring. The data has been distorted by the mine inflows in the period November 2000 to April 2001. The December 2001 data does not reflect any effects, but April 2002 has low pH and elevated metals. There has been improvements in water quality since limestone addition as shown by trend lines. This has been distorted by elevated metal concentrations in May 03 following jig tails removal.

## **Contaminant Loads**

Figure 4, show the contaminant load trends for the Storys Creek stations from below the Precipitate Dam to the site below Managers (Station14).

The data shows that there have been significant improvement in loads below the tailings dam in all parameters. This illustrates that the removal of the tailings and the alkalinity addition has been beneficial.

The data has been distorted by the poor water quality in the summers of 2001 and 2002 but overall shows that load in almost all parameters have been declining. May 03 shows an increase.

Figure 5 shows Station 14 below Managers. It shows reducing trends for metals, but relatively constant for sulphate and acidity.

Figure 6 shows the loads in Storys Creek above Aberfoyle Creek and the South Esk. This shows significant reduction in contaminants.

## **CONCLUSIONS**

### **Conclusions**

The previous findings and conclusions appear to be confirmed by the latest data, however the first sampling since the jig tailings were removed has indicated elevated concentrations in some contaminants. As there has not been much rainfall since the jig tailings removal and the large area disturbed this is not surprising.

Regular sampling is needed to fully determine any improvements.

HECEC should be engaged to re-establish the gauging station and re-rate the station.

Yours faithfully

J .G Miedecke , Director



**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data  
(mg/L)**

LOCATION	5																6		6											
	Storys below PPT Dam																Side Creek													
PARAMETER (mg/l)	976001																10779		139653		976002									
SAMPLE DATE	Oct-97	Sep-98	Oct-98	Nov-98	May-99	May-99	Jun-00	Aug-00	Nov-00	Jan-01	Apr-01	Apr-01	May-01	Apr-02	Aug-02	May-03	Oct-97	Nov-00	Dec-01	Aug-02										
FLOW L/sec	42 see Station 14																0.3													
Observations See Station 14 comments and flows																			edit emission											
pH F	6.2																3.7													
Cond F	67																291													
pH L	5.7	6.0	7.0	7.0	6.5	6.8	6.6	6.8	6.9	7.2	7.0		6.8	6.9	7.5	7.5		3.1	3.3	3.6										
Cond mS/cm L	64	45	68	69	20	43	41	46	74	68	50		35	34	57	26		855	669	340										
TDS	54	38	44	58	19	35		17	44	48	45		1	37	64	12		452		192										
NFR (suspended solids)	11	4	721	6	8	6		9	5	1	1		1	2	1	1		10		1										
Alkalinity (CaCO3)	4	3	12	13	1	5		5	13	1	13		7	6	16	6		1	1	1										
Acidity (CaCO3)	5	4	3	3	2	2		3	2	1	4		1	1	1	1		35	145	114										
SO4	22	12	13	12	0	3		2	7	13.0	6.3		2.6	2.8	4.9	1.1		94	350	280										
DOC mg/L	0.5																2.2													
Hardness (CaCO3)	17																53		75.7											
Cl	1.8																3.4													
F	0.56	0.47															5.30													
Ca T	4.0															2.9	3.3	6.6	8.4	2.9	1.38	2.14	5.75	2.05	3.87	12.0	43.2	40.3	16.3	
K T	0.2	0.1															0.9		1.19											
Mg T	2.0	1.4															0.8	1.3	2.1	1.92	1.07	0.65	0.79	1.71	0.82	1.19	6.0	20.4	19.5	8.47
Na T	2.0	1.3															1.7	2.2	2.4	1.8	1.65	1.36	1.99	1.35	1.63	3.0	4.1	4.0	2.02	
<b>Metals</b>																	3.00		9.10		6.05		5.88							
Al F	0.10	0.57	<0.050	<0.050	0.06	0.05	0.02	0.02	0.03	0.04	0.02		0.08	0.02	0.03	0.07	0.02		3.00	9.07	9.67	5.93								
Al T	0.70	0.47	0.76	0.23	0.20	0.13	0.05	0.12	0.14	0.05	0.09		0.14	0.07	0.03	0.14	0.04		0.139	0.319	0.152	0.164								
Cd F	0.077	0.039	0.054	0.032	0.001	<0.001	0.005	0.025	0.040	0.014	0.002		0.003	0.002	0.008	0.004	0.007		0.143	0.320	0.230	0.165								
Cd T	0.083	0.040	0.055	0.029	0.001	<0.001	0.005	0.027	0.043	0.014	0.003		0.003	0.003	0.008	0.004	0.007		0.169	0.604	0.459	0.526								
Cu F	0.086	0.072	0.043	0.022	0.005	0.036	0.004	0.003	0.004	0.005	0.001		0.002	0.001	0.003	0.002	0.003		0.032	0.231	0.647	0.053								
Cu T	0.194	0.113	0.167	0.092	0.005	0.046	0.005	0.007	0.011	0.005	0.003		0.002	0.001	0.003	0.002	0.003		0.1	5.8	1.0	0.2								
Fe F	<0.1	<0.2	0.1	0.0	0.5	0.04	0.04	0.03	0.02	0.02	0.03		0.1	0.0	0.0	0.0	0.0		0.2	26.3	3.5	3.8								
Fe T	3.0	0.3	0.7	0.5	0.2	0.25	0.07	0.10	0.15	0.06	0.09		0.1	0.0	0.0	0.1	0.0		0.9	5.6	3.0	1.7								
Mn F	0.2	0.1	0.2	0.1	0.01	0.19	0.04	0.17	0.31	0.08	0.03		0.0	0.0	0.1	0.0	0.0		0.9	5.6	4.8	1.7								
Mn T	0.2	0.1	0.2	0.1	0.0	0.2	0.0	0.2	0.3	0.1	0.0		0.0	0.0	0.1	0.0	0.0		4.070	10.600	6.220	4.800								
Zn F	2.300	1.210	1.600	1.380	0.051	0.708	0.228	0.718	1.260	0.431	0.087		0.071	0.077	0.267	0.109	0.231		4.140	10.500	8.900	4.83								
Zn T	2.430	1.300	1.600	1.420	0.058	0.725	0.223	0.803	1.360	0.428	0.106		0.076	0.105	0.27	0.119	0.238													

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	8 Storys below Side	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	10 East Adit ?	10	
PARAMETER (mg/l)	976003							10780													
SAMPLE DATE	Oct-97	Sep-98	Nov-98	Mar-99	May-99	May-99	Jun-00	Aug-00	Nov-00	Jan-01	Apr-01	Apr-01	May-01	Dec-01	Apr-02	Aug-02	Aug-02	May-03	Aug-02	May-03	
FLOW L/sec	40																				
Observations See Station 14 comments and flows									flows from Side Ck evident						v low						
									poor quality - pptates	poor quality - pptates	low flows clear	recent high flows clear water									
pH F	5.3																				
Cond F	145																				
pH L	5.1	5.7	6.6	6.9	6.4	6.0	6.4	6.6	6.6	4.0	6.8	6.8	7.0	5.4	5.1?	6.8	7			3.6	
Cond mS/cm L	141	57	95	96	23	111	52	55	135.0	532.0	95.0	33.0	35.0	157.0	165.0	48	59			668	
TDS	99	41	55		22	103		25	93	410	71	33	30		134	41	28	111		424	384
NFR (suspended solids)	5	8	3		9	9		7	6	14	4	1	1		23	1	3	3		348	33
Alkalinity (CaCO3)	1	1	7		2	3		2	8	1	9	6	6	1	6	5	7			1	1
Acidity (CaCO3)	20	7	6	2	2	8	3	3	11	74	4	3	1	12	12	3	5	3		72	27
SO4	60	16	12	25	1	34	9	11	2	270	28	5	4	59	56	12	13	10		300	210
DOC mg/L	0.8																				
Hardness (CaCO3)	37															15.6		57.3		266	191
Cl	1.8							2.5	3.0												
F	1.40	0.58																		0.84	2.4
Ca T	9.0	4.4					4.9	4.5	13.0	60.5	8.5	1.9	2.8	13.4	17.0	4.05		15.7		54.3	40.1
K T	0.3	0.2														0.11		0.3		1.59	1.16
Mg T	3.0	1.5					1.0	1.4		18.3	2.1	0.8	0.8	4.5	4.2	1.34		4.37		31.7	22
Na T	2.0	1.4						1.9		4.7	2.0	1.6	1.4	2.1	2.5	1.32		2.05		5.99	5.66
<b>Metals</b>																					
Al F	1.00	0.14	0.05	0.05	0.08	0.22	0.02	0.01	0.12	3.88	0.02	0.28	0.07	0.36	0.18	0.18	0.03	0.35		13.00	0.95
Al T	2.00	1.14	0.75	0.85	0.27	0.89	0.34	0.65	2.19	4.14	0.09	0.35	0.16	1.25	2.29	0.53	0.53	0.70		21.50	1.04
Cd F	0.154	0.059	0.066	0.057	0.004	0.045	0.022	0.047	0.122	0.350	0.024	0.004	0.003	0.045	0.146	0.014	0.038	0.087		0.097	0.056
Cd T	0.158	0.065	0.072	0.059	0.004	0.052	0.024	0.049	0.125	0.355	0.022	0.004	0.005	0.091	0.145	0.016	0.038	0.088		0.107	0.056
Cu F	0.438	0.149	0.068	0.06	0.013	0.066	0.017	0.059	0.197	0.233	0.011	0.018	0.005	0.046	0.175	0.024	0.067	0.096		0.010	0.006
0.488	0.549	0.363	0.295	0.261	0.019	0.127	0.070	0.169	0.342	0.255	0.019	0.02	0.007	0.15	0.312	0.046	0.114	0.118		0.034	0.007
Fe F	2.0	<0.02	0.0	<0.02	0.0	0.063	0.020	0.02	0.02	7.17	0.02	0.05	0.02	0.03	0.02	0.5	0.0	0.0		0.6	0.0
Fe T	3.0	0.3	0.7	0.4	0.2	3.290	0.160	0.13	0.86	20.00	0.04	0.07	0.05	2.56	1.26	0.9	0.2	1.3		1760.0	8.2
Mn F	0.6	0.1	0.2	0.2	0.0	0.411	0.079	0.14	0.42	2.99	0.14	0.03	0.01	0.40	0.48	0.1	0.1	0.6		6.8	4.3
Mn T	0.6	0.2	0.2	0.2	0.0	0.422	0.082	0.1	0.4	3.0	0.1	0.0	0.0	0.8	0.5	0.1	0.1	0.6		9.9	4.3
Zn F	4.460	1.730	2.330	0.988	0.107	1.520	0.597	1.260	2.880	6.870	0.761	0.132	0.105	1.350	3.340	0.375	1.030	2.360		4.580	3.170
Zn T	4.540	1.810	2.510	1.910	0.127	1.680	0.666	1.370	2.970	6.920	0.750	0.136	0.154	2.460	3.360	0.462	1.01	2.37		7.56	3.15

note exit from Prec Dam ??

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	11											11	12
refer Hydro report	Storys below Eastern Hill												Nisbet Creek
PARAMETER (mg/l)	976006											976007	
SAMPLE DATE	Oct-97	Sep-98	Nov-98	May-99	Jan-01	Apr-01	Apr-01	May-01	Apr-02	Aug-02	Oct-97	Sep-98	
Gauge Ht													
FLOW L/sec												37	
Observations See Station 14 comments and flows						poor quality - pptates	poor quality - pptates	recent high flows - clear water					
pH F	4.9											6.6	
Cond F	201											39	
pH L	4.9	5.1	5.6	5.6	4.7	4.8	6.7	6.5	5.0	6.8	5.7	6.5	
Cond mS/cm L	197	121	174	163	396	269	71	66	442	53	35	35	
TDS	155	73	123	135	306	219	38	49	423	55	24	19	
NFR (suspended solids)	5	5	15	11	18	12	1	7	19	1 <1		1	
Alkalinity (CaCO3)	<1	<1	<1	1	1	1	5	3	1	5	13	9	
Acidity (CaCO3)	25	15	11	10	35	23	3	7	42	2 <1		3	
SO4	91	45	25	63	200	140	8	19	220	11	2	2	
DOC mg/L	0.4											0.8	
Hardness (CaCO3)	56									18.1		11	
Cl	2.0											2.0	
F	1.40	1.10										0.02	
Ca T	14.0	8.6			48.8	25.5	2.8	5.1	44.9	4.67	2.0	2.7	
K T	0.3	0.2								0.12	0.1	0.1	
Mg T	5.0	3.3			14.4	8.4	1.1	1.7	15.3	1.56	1.0	1.3	
Na T	3.0	1.5			4.3	2.8	1.8	1.4	3.7	1.44	2.0	1.5	
<b>Metals</b>													
Al F	2.00	0.97	0.34	0.58	1.89	1.15	0.20	0.04	2.32	0.24	0.10	0.06	
Al T	2.00	1.26	1.34	1.25	2.21	1.15	0.25	0.25	2.66	0.33	0.10	0.10	
Cd F	0.155	0.078	0.077	0.044	0.197	0.102	0.004	0.008	0.209	0.020	<0.001	0.002	
Cd T	0.158	0.079	0.077	0.059	0.197	0.100	0.005	0.013	0.212	0.020	<0.001	0.002	
Cu F	0.468	0.206	0.178	0.116	0.202	0.061	0.015	0.004	0.221	0.032	0.001	0.003	
Cu T	0.487	0.242	0.29	0.139	0.219	0.063	0.016	0.014	0.232	0.042	0.001	0.07	
Fe F	3.0	<0.02	0.1	0.4	3.3	1.6	0.3	0.0	5.3	0.5	<0.1	<0.02	
Fe T	4.0	2.4	4.9	5.1	12.7	2.7	0.4	0.6	12.4	0.9	<0.1	0.2	
Mn F	1.0	0.6	0.6	1.0	2.4	1.6	0.1	0.1	2.6	0.2	<0.1	<0.005	
Mn T	1.0	0.6	0.7	1.0	2.4	1.6	0.1	0.2	2.6	0.2	<0.1	<0.005	
Zn F	4.790	2.280	3.310	2.410	5.360	3.780	0.136	0.345	6.000	0.548	0.020	0.061	
Zn T	4.920	2.390	3.250	2.580	5.370	3.730	0.154	0.514	6.190	0.548	0.015	0.070	

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	13											
refer Hydro report	Storys below Nisbet											
PARAMETER (mg/l)	10781											
SAMPLE DATE	Oct-97	Sep-98	Nov-98	May-99	Jun-00	Aug-00	Nov-00	Apr-01	Apr-01	May-01	Apr-02	Aug-02
Gauge Ht												
FLOW L/sec	98											
Observations See Station	14 comments and flows											
							cloudy -	pptates				
							pptates					
pH F	5.9											
Cond F	115											
pH L	5.4	5.6	6.1	6.0	5.8	6.2	6.5	4.9	6.7	6.4	5.8	7
Cond mS/cm L	109	84	135	125	117	82	132	241	52	71	220	48
TDS	85	67	98	328		39	90	202	41	54	182	51
NFR (suspended solids)	7	5	18	15		14	5	1	1	8	13	1
Alkalinity (CaCO3)	2	1	2	2		1	6	1	6	3	2	7
Acidity (CaCO3)	6	8	8	5	7	6	10	20	3	1	13	2
SO4	40	26	39	43	38	23	41	130	9	20	90	7.9
DOC mg/L	0.4											
Hardness (CaCO3)	32											16.5
Cl	2.0						2.8					
F	0.77	0.56										
Ca T	8.0	6.5			11.1	3.3	12.2	21.5	4.5	5.9	22.0	4.05
K T	0.2	0.3										0.14
Mg T	3.0	2.6			3.3	1.3	3.7	6.4	1.4	1.9	7.8	1.55
Na T	2.0	1.6				1.7	2.5	2.8	2.1	1.5	2.82	1.54
<b>Metals</b>												
Al F	0.40	0.28	0.12	0.23	0.14	0.18	0.01	0.41	0.21	0.02	0.33	0.21
Al T	1.00	0.94	1.50	1.25	0.77	0.57	0.97	0.72	0.25	0.15	0.94	0.49
Cd F	0.077	0.049	0.054	0.044	0.049	0.061	0.057	0.081	0.005	0.01	0.091	0.013
Cd T	0.080	0.050	0.054	0.046	0.050	0.062	0.061	0.840	0.014	0.013	0.093	0.015
Cu F	0.223	0.143	0.098	0.115	0.079	0.12	0.14	0.065	0.014	0.002	-0.043	0.019
Cu T	0.259	0.172	0.244	0.117	0.103	0.152	0.136	0.062	0.058	0.1	0.089	0.031
Fe F	0.3	<0.02	0.0	0.2	0.0	0.02	0.02	0.0	0.2	0.0	0.0	0.4
Fe T	1.0	1.1	3.0	1.6	1.2	0.21	2.73	0.0	0.3	0.3	4.7	0.6
Mn F	0.5	0.3	0.5	0.4	0.4	0.32	0.45	0.4	0.1	0.1	1.0	0.1
Mn T	0.6	0.7	0.2	0.5	0.4	0.3	0.5	0.4	0.1	0.2	1.0	0.1
Zn F	2.434	1.490	2.100	1.400	1.540	1.690	1.400	2.950	0.166	0.388	2.630	0.366
Zn T	2.500	1.540	2.320	1.420	1.580	1.740	1.540	2.930	0.380	0.516	2.730	0.407

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	14																	14	14			
refer Hydro report	Storys below pumphouse (managers)																					
PARAMETER (mg/l)	976009	After Lstone																10782				
SAMPLE DATE	Oct-97	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Mar-99	Apr-99	May-99	Jun-00	Aug-00	Sep-00	Nov-00	Jan-01	Jan-01	Apr-01	Apr-01	May-01	Apr-02	Aug-02	Aug-02	May-03
Gauge Ht		0.39	0.3	0.3	0.3	0.35	0.3	0.28	0.28	0.34	0.42		0.3	0.27	0.26	0.26	0.45	0.34	0.22	0.48	0.35	0.305
FLOW L/sec	260	420	284	284	284	360	285	253	253	345	465	NR	284	238	223	223	513	345	180	530	350	225
Observations See Station 14 comments and flows	MADE up to suit 153 is B?S	clear falling after rain	clear no rain	clear low rain	low,clear, some rain prev wend	low,clear, some rain prev 2 days	low clear no rain obvious ppt.	low clear little rain obvious ppt.	clear after rain prev few days	clear mod flow falling	clear strong rain in last few days		pptates	pptates	clear low flow	clear low flow	recnt high flow clear	recnt high flow clear	v low clear with pptes	0.48		dry ?? No rain ?
pH F	5.8																					
Cond F	100																					low flow
pH L	5.3	5.8	5.3	6.9	5.7	6.3	5.8	5.5	5.4	5.8	6.5	6.6	6.3	5.8	5.2	5.3	6.7	6.4	5.6	6.9	6.9	
Cond mS/cm L	98	59	92		128	68	143	146	127	102	63	82	119	191	123	179	54	71	209	53	79	
TDS	63		65		84			90	257		13	78	88	147	86	139	44	54	180	47	42	110
NFR (suspended solids)	6	5	5		7			5	8		6	1	3	1	6	2	2	3	1	1	2	1
Alkalinity (CaCO3)	1		1	3	1			1	1		2	4	3	1	1	1	5	3	1	6	4	1
Acidity (CaCO3)	8		9	3	8	2	2	8	8	4	3	1	10	14	2	10	3	6	10	2	4	6
SO4	36	15	30		65	16		44	48	31	14	20	36	75	56	89	11	21	86	10	22	42
DOC mg/L	1.2																					
Hardness (CaCO3)	27																					
Cl	2.3																			17.4		42.3
F	0.56		0.53					1.9			3.0											
Ca T	6.0		6.5						8.6		4.7	6.2	10.5	21.7	21.3	15.6	4.5	5.9	20.5	4.31		0.25
K T	0.3		0.2																	0.14		11.5
Mg T	3.0		2.7										3.2	6.1	6.2	4.8	1.5	1.9	0.7	1.61		3.32
Na T	3.0		1.6								2.2	2.4	3.3	3.9	3.4	2.8	2.0	1.7	3.1	1.65		2.21
<b>Metals</b>																						
Al F	0.40	0.08	0.47	<0.05	0.15	0.05	0.47	0.26	0.16	0.03	0.12	0.01	0.04	0.27	0.36	0.41	0.23	0.14	0.33	0.24	0.04	0.05
Al T	0.90	0.38	1.00	1.38	0.81	0.05	0.82	0.94	0.65	0.54	0.45	1.10	0.43	0.49	0.54	0.41	0.33	0.25	0.35	0.38	0.39	0.12
Cd F	0.075	0.034	0.067	0.059	0.059	0.016	0.071	0.067	0.036	0.05	0.034	0.047	0.060	0.109	0.116	0.085	0.007	0.015	0.124	0.020	0.036	0.069
Cd T	0.079	0.034	0.072	0.062	0.068	0.02	0.074	0.080	0.055	0.051	0.037	0.049	0.063	0.110	0.128	0.085	0.022	0.024	0.128	0.021	0.038	0.069
Cu F	0.238	0.064	0.222	0.074	0.187	0.012	0.167	0.139	0.079	0.07	0.052	0.043	0.061	0.151	0.089	0.067	0.023	0.12	0.14	0.036	0.021	0.096
Cu T	0.262	0.093	0.249	0.288	0.254	0.017	0.192	0.193	0.185	0.119	0.11	0.197	0.111	0.165	0.194	0.068	0.056	0.18	0.142	0.045	0.072	0.099
Fe F	0.4	0.02	0.0	0.0	0.029	0.02	0.3	1.4	0.1	0.0	0.19	0.02	0.08	0.07	0.26	0.02	0.2	0.1	0.2	0.3	0.0	0.0
Fe T	0.8	0.33	0.8	1.4	1.75	0.075	1.2	0.5	0.9	1.1	0.38	1.48	0.75	0.70	0.74	0.02	0.3	0.2	0.2	0.4	0.9	0.0
Mn F	0.4	0.15	0.3		0.338	0.136	0.5	0.5	0.4	0.3	0.16	0.24	0.26	0.29	0.41	0.44	0.4	0.1	0.2	0.1	0.2	0.1
Mn T	0.4	0.16	0.4		0.384	0.152	0.5	0.5	0.4	0.3	0.2	0.2	0.3	0.3	0.4	0.4	0.1	0.2	0.2	0.1	0.2	0.1
Zn F	2.280	0.934	1.910	1.580	2.29	0.501	2.240	1.960	0.966	1.530	1.260	1.220	1.410	2.650	3.40	2.950	0.225	0.568	3.100	0.529	0.993	1.870
Zn T	2.330	0.959	1.890	1.570	2.43	0.697	2.230	2.400	2.040	1.580	1.370	1.330	1.490	2.660	3.240	2.930	0.568	0.889	3.210	0.559	1.06	1.87

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	15 Storys at Rossarden Bridge					15 after Istne					14					15					22 Aberfoyle above Storys				
PARAMETER (mg/l)	dpiwe	dpiwe	dpiwe	dpiwe	median	976010 dpiwe	dpiwe	15	15 dpiwe	15	15	10783 wgrun	976017	22	22	22	976017	22	22	22					
SAMPLE DATE Gauge Ht	Nov-96	Dec-96	Feb-97	Aug-97	Oct-97	Apr-98	Aug-98	Sep-98	Apr-99	Jul-99	Sep-99	Jun-00	Aug-00	Dec-01	Apr-02	Aug-02	May-03	Oct-97	Sep-98	Nov-98	Apr-02	May-03			
FLOW L/sec Observations See Station 14 comments and flows					216													174					VLOW		
pH F					5.9																				
Cond F					84																				
pH L					5.7			5.2	5.3			5.7	6.5	6.4	5.6										
Cond mS/cm L					82			92	136			104	63	81	177										
TDS					61			64	93				13		170										
NFR (suspended solids)					3			5	5				6		1										
Alkalinity (CaCO3)					1			<1	1				2		3										
Acidity (CaCO3)					5			9	8			6	3		2										
SO4					26			28	41			33	14		21										
DOC mg/L					2.4																				
Hardness (CaCO3)					13																				
Cl					3.0																				
F					0.40			0.51					3.0												
Ca T					5.0			6.5			5.9	8.9	4.0	5.9	16.8										
K T					0.4			0.6			0.3														
Mg T					2.0			2.7			1.9	2.6	1.5	2.1	5.5										
Na T					3.0			2.8			2.8		3.4	3.0	3.4										
<b>Metals</b>																									
Al F					0.3			0.5	0.4			0.2	0.12	0.1	0.3	0.24	0.06	0.1	0.1	0.05	0.02	0.02			
Al T					0.6	1.4	0.6	0.9	0.4	1.1		0.4	0.45	0.1	0.3	0.35	0.08	0.2	0.2	0.05	0.02	0.04			
Cd F					0.060			0.069	0.091			0.058	0.034	0.039	0.14	0.021	0.064	0.012	0.011	0.006	0.006	0.009			
Cd T	0.043	0.090	0.140	0.032	0.07	0.060	0.118	0.067	0.068	0.087	0.024	0.060	0.037	0.035	0.130	0.022	0.065	0.014	0.015	0.008	0.008	0.009			
Cu F					0.172			0.242	0.205			0.1	0.052	0.028	0.140	0.039	0.056	0.013	0.014	0.012	0.005	0.010			
Cu T	0.138	0.23	0.37	0.101	0.18	0.193	0.396	0.215	0.248	0.208	0.134	0.119	0.11	0.044	0.144	0.046	0.056	0.028	0.057	0.028	0.005	0.012			
Fe F					0.2			0.2	0.3			0.0	0.19	0.1	0.1	0.3	0.03	<0.1	0.02	0.03	0.02	0.05			
Fe T	0.7	1.5	1.1	0.5	0.93	0.4	1.2	0.6	0.8	0.3	0.9	0.9	0.38	0.2	0.1	0.4	0.04	0.5	0.81	0.58	0.02	0.13			
Mn F					0.3			0.3	0.4			0.3	0.16	0.1	0.1	0.1	0.05	0.4	0.34	0.30	0.03	0.02			
Mn T	0.3	0.5	0.7	0.1	0.39	0.3	0.6	0.3	0.3	0.6	0.1	0.3	0.2	0.1	0.1	0.1	0.0	0.4	0.36	0.31	0.03	0.02			
Zn F					1.770			1.910	2.550		1.190	1.720	1.260	0.593	2.740	0.548	1.700	0.457	0.485	0.276	0.241	0.322			
Zn T	1.400	2.800	4.300	0.998	2.10	1.810	3.940	1.710	1.890	3.110	0.740	1.220	1.780	1.370	0.765	2.720	0.568	1.730	0.549	0.646	0.412	0.246	0.338		

note exit from Prec Dam ??

5.9

0.3

1.9

2.8

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	21 Storys above Aberfoyle				21				23 Storys below Aberfoyle				23				27 Storys above South Esk	24 South Esk above Storys	24	24					
PARAMETER (mg/l)	976018	21	21				dpive	dpive	dpive	dpive	975997	dpive	dpive	23	23	dpive	23	JMP	976022	976019					
SAMPLE DATE Gauge Ht	Oct-97	Sep-98	Oct-98	Nov-98	Apr-02	Aug-02	May-03	Nov-96	Dec-96	Feb-97	Aug-97	Oct-97	Apr-98	Aug-98	Sep-98	Nov-98	Jul-99	Apr-02	Aug-02	May-03	Oct-97	Oct-97	Sep-98	Nov-98	Apr-02
FLOW L/sec	220											394						NOT MIXED ?? SEEM HIGH			470	10230			
Observations See Station 14 comments and flows																									
pH F	6.0											6.9									6.9	7.2			
Cond F	72											109									122	76			
pH L	5.6	5.4	7.3	5.8	5.8	6.8						6.0			6.8	7.5		7.8	6.9		6.4	6.5	6.6	6.9	7.8
Cond mS/cm L	71	83	70	110	145	72						107			147	183		297	77		119	74	67	109	115
TDS	47	71	56	83	122	37	106					80			109	115		240	48	126	87	48	58	58	101
NFR (suspended solids) <1		2	1	5	1	1	1					<1			2	7		3	1	1	<1	2	6	22	6
Alkalinity (CaCO3)	1	1	2	1	1	4	2					13			18	3		41	4	15	<1	16	17	10	2
Acidity (CaCO3)	6	7	2	6	6	3	5					<1			3	2		1	3	3	<1	<1	3	5	1
SO4	19	24	17	48	51	18	31					27			35	50		88	18	41	30	2	2	45	2
DOC mg/L	2.0											2.3									1.7	2.4			
Hardness (CaCO3)	17						34.6					35								62	42	17			
Cl	3.7											3.7									3.7	11.0			
F	0.29	0.44					0.9					0.47			0.88					0.58	0.48	<0.02		0.02	
Ca T	4.0	5.6			12.4		18.2					8.0			13.5			28.7		13.9	9.0	3.0	3.0		6.0
K T	0.5	0.3					0.76					0.6			0.5					0.65	0.6	0.8	0.5		
Mg T	2.0	2.3			4.3		10.3					4.0			6.9					6.62	5.0	2.0	2.2		3.9
Na T	4.0	2.4			4.0		4.3					4.0			2.9					5.3	3.98	4.0	7.0	5.7	10.1
<b>Metals</b>																									
Al F	0.2	0.3	0.1	0.1	0.2	0.08	0.06					0.1			0.075	0.1		0.0	0.08	0.04	0.1	0.2	0.099	0.1	0.0
Al T	0.4	0.7	0.4	0.2	0.2	0.18	0.09					0.4	0.6	0.3	0.332	0.1	0.3	0.0	0.18	0.07	0.3	0.3	0.211	0.2	0.0
Cd F	0.046	0.058	0.043	0.064	0.086	0.031	0.048					0.034			0.027	0.03		0.011	0.030	0.029	0.030	<0.001	<0.001	0.001	0.001
Cd T	0.048	0.065	0.046	0.063	0.087	0.032	0.049	0.041	0.050	0.080	0.022	0.038	0.081	0.041	0.034	0.034	0.035	0.011	0.031	0.030	0.033	<0.001	<0.001	0.001	0.001
Cu F	0.080	0.187	0.048	0.135	0.075	0.021	0.010					0.044			0.032	0.030		0.006	0.021	0.016	0.029	0.002	0.010	0.006	0.001
Cu T	0.087	0.215	0.073	0.157	0.078	0.031	0.028	0.072	0.09	0.17	0.059	0.067	0.219	0.106	0.126	0.085	0.072	0.007	0.030	0.018	0.058	0.001	0.007	0.009	0.001
Fe F	<0.1	0.1	0.0	0.0	0.0	0.1	0.0					<0.1			0.261	0.0		0.0	0.1	0.0	<0.1	0.1	0.075	0.1	0.1
Fe T	0.1	0.3	0.3	0.1	0.0	0.3	0.0	0.5	0.3	0.1	0.4	0.3	0.3	0.4	0.654	0.4	0.4	0.0	0.2	0.1	0.3	0.3	0.203	0.5	0.2
Mn F	0.2	0.2	0.2	0.2	0.1	0.1	0.0					0.3			0.004	0.3		0.0	0.1	0.0	0.2	<0.1	0.005	0.0	0.0
Mn T	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.4	0.3	0.4	0.1	0.3	0.4	0.3	0.28	0.3	0.2	0.0	0.1	0.0	0.2	<0.1	0.028	0.1	0.0
Zn F	1.380	1.740	1.100	2.270	2.140	0.837	1.280					1.030			0.893	0.854		0.311	0.814	0.830	0.896	0.007	0.027	0.005	0.003
Zn T	1.280	1.760	1.100	2.170	2.180	0.877	1.31	1.200	1.480	2.200	0.737	1.120	2.890	1.110	0.990	1.010	1.040	0.312	0.856	0.859	0.991	0.003	0.004	0.004	0.004

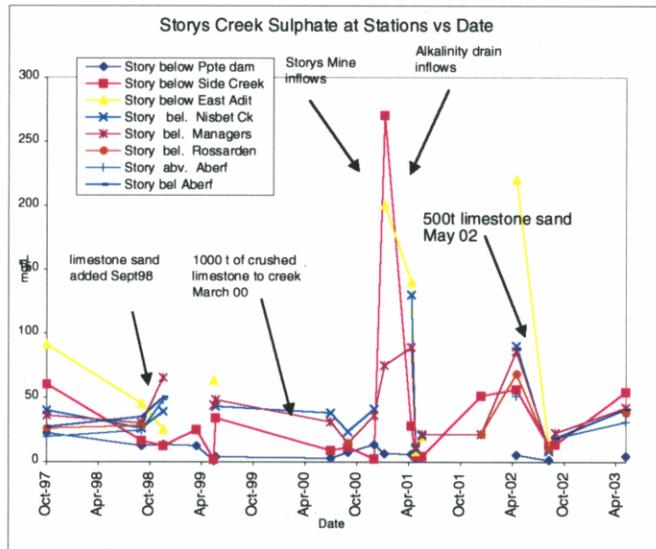
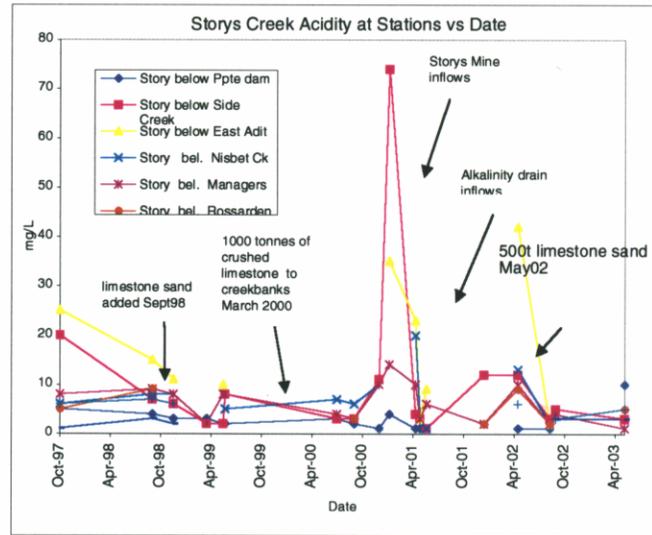
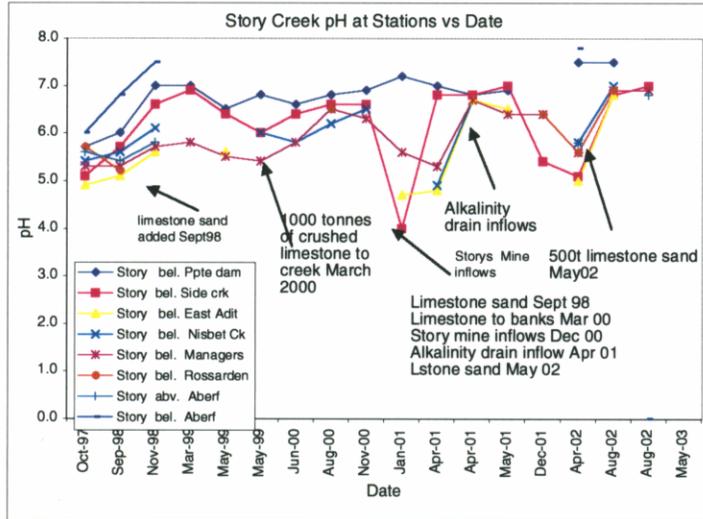
lowest recorded

**Table 1 : Storys and Aberfoyle Creek Water Quality Monitoring All Data (mg/L)**

LOCATION	25 South Esk below Storys										South Esk At Avoca			26 South Esk at Lewellyn		28 Channel above PPT Dam			
PARAMETER (mg/l)	976020										dpiwe	dpiwe	dpiwe	dpiwe	dpiwe	dpiwe	dpiwe	976021	976023
SAMPLE DATE	Oct-97		Nov-98	Apr-02	Nov-96	Dec-96	Feb-97	Aug-97	Apr-98	Aug-98	Jul-99	Oct-97	Oct-97						
Gauge Ht																			
FLOW L/sec	10701											12540	0.12						
Observations See Station 14 comments and flows																			
pH F	7.2											7.3	5.0						
Cond F	78											83	290						
pH L	6.4	6.7	4.6	7.4								6.4	4.8						
Cond mS/cm L	76	71	109	117								81	285						
TDS	56	65	71	69								59	246						
NFR (suspended solids)	2		11	12								1	11						
Alkalinity (CaCO3)	17	10	21	25								18	<1						
Acidity (CaCO3)	<1	4	4	3								<1	35						
SO4	3	2	2	3								3	132						
DOC mg/L	2.3											2.6	1.4						
Hardness (CaCO3)	18											20	85						
Cl	10.0											11.0	3.5						
F	0.03	0.04										0.03	0.59						
Ca T	3.0	3.0		6.0								4.0	17.0						
K T	0.6	0.5										0.6	0.8						
Mg T	2.0	2.2		3.9								3.0	10.0						
Na T	7.0	5.3		9.7								8.0	3.0						
<b>Metals</b>																			
Al F	0.2	0.1	0.1	0.0								0.2	2.0						
Al T	0.3	0.2	0.2	0.0					0.1	0.1	0.1	0.4	3.0						
Cd F	0.001	0.002	0.001	0.001								0.001	0.328						
Cd T	0.001	0.002	0.001	0.001	0.003	0.005	0.005	0.001	0.005	0.002	0.001	0.001	0.339						
Cu F	0.004	0.01	0.008	0.001								0.004	0.014						
Cu T	0.004	0.019	0.008	0.001	0.009	0.005	0.005	0.005	0.014	0.018	0.003	0.005	0.014						
Fe F	0.1	0.1	0.1	0.2								0.1	<0.1						
Fe T	0.3	0.2	0.3	0.2	0.3	0.3	0.9	0.5	0.2	0.2	0.2	0.3	<0.1						
Mn F	<0.1	0.0	0.0	0.0								<0.1	3.0						
Mn T	<0.1	0.0	0.0	0.0	0.3	0.0	0.1	0.3	0.0	0.0	0.0	<0.1	3.0						
Zn F	0.034	0.046	0.027	0.024								0.035	17.700						
Zn T	0.040	0.050	0.020	0.025	0.096	0.070	0.060	0.049	0.169	0.052	0.049	0.032	17.000						

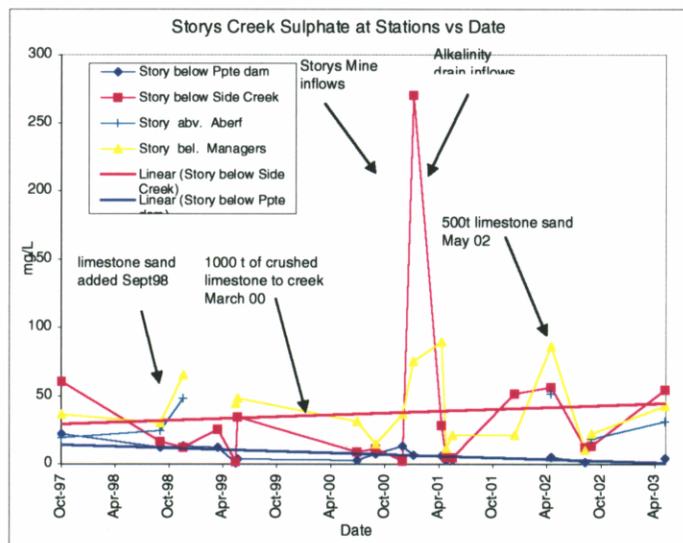
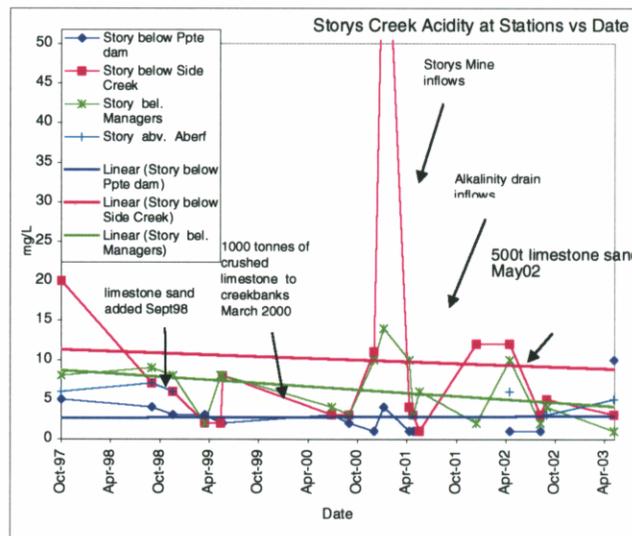
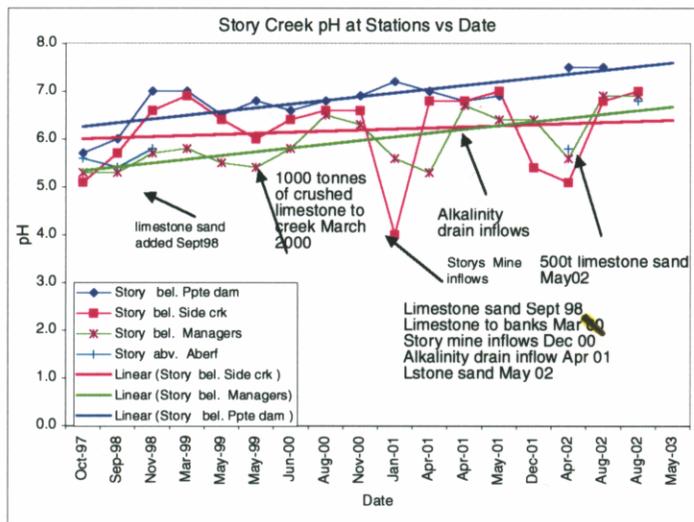
nothing exceeds EQO  
CD limits too high

Figure 1 Storys Creek Water Quality over Time  
All stations. Non Metals updated 5/03



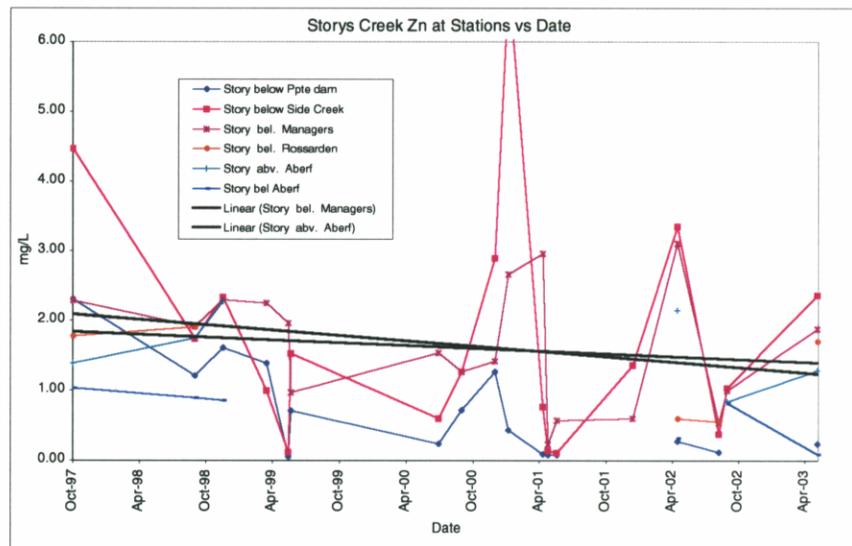
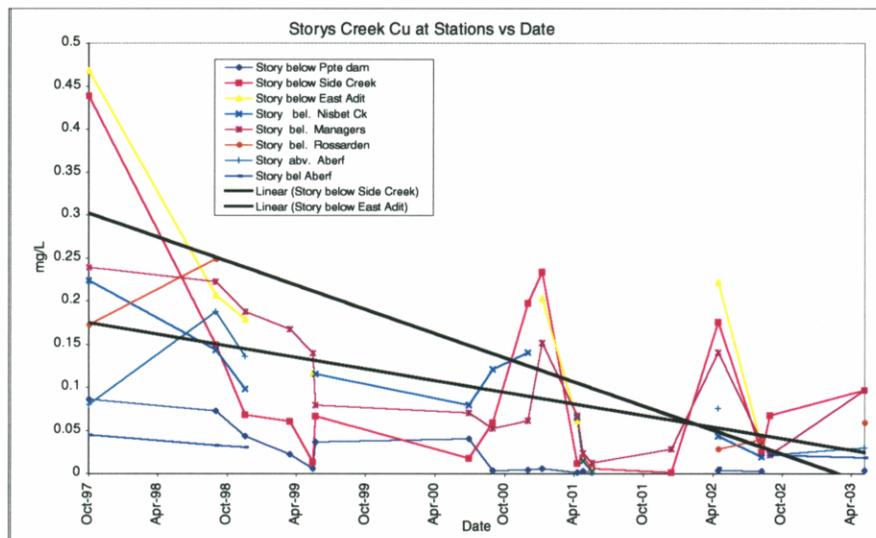
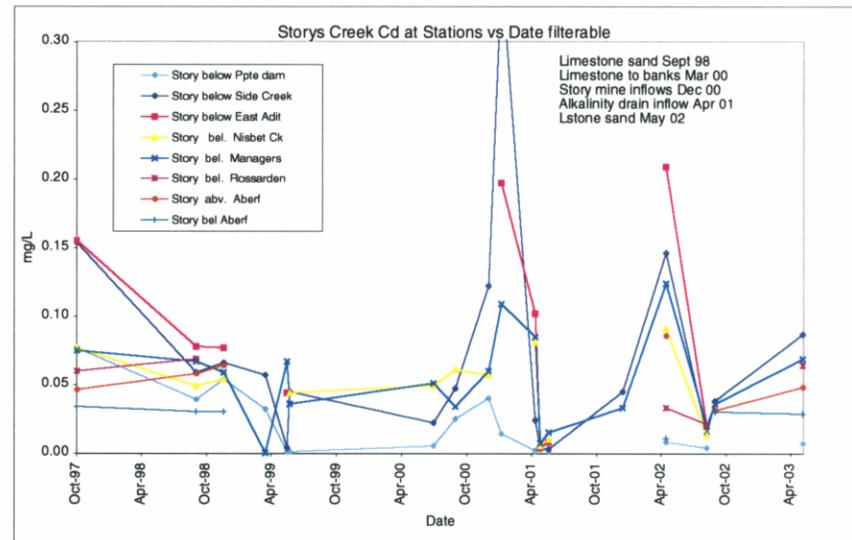
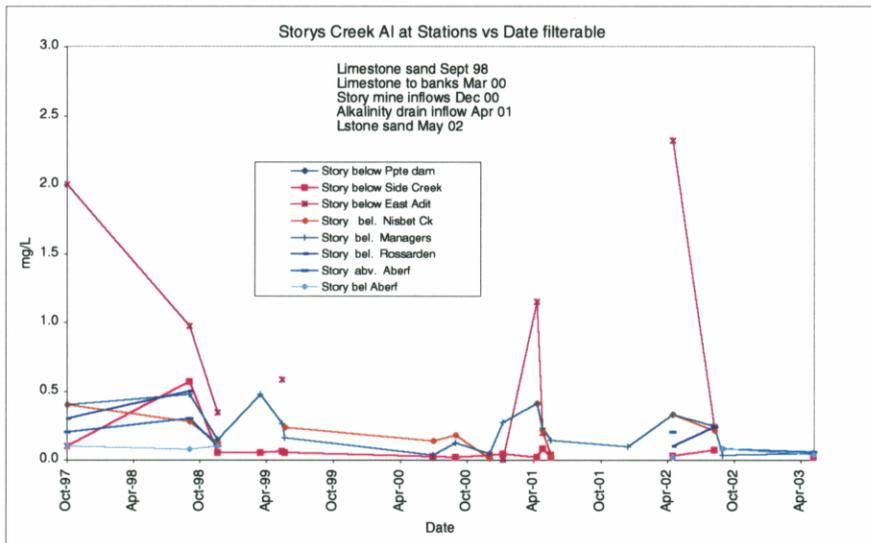
Shows trend of increasing pH over time, except since Dec 01. Limestone added in September 1998 had demonstrable effects, now declining.  
pHs decline down the creek as influence of limestone declines  
Addition of crushed limestone to creek banks increased pH's  
Storys Mine inflows affected water quality Nov - March 01  
Anoxic alkalinity added to mine January 2001 - improvements.  
Limestone sand addition (02) has raised pH at all stations and reduced acidity and sulphate.

Figure 1b Storys Creek Water Quality over Time  
Selected Stations. Non Metals updated 5/03



Shows trend of increasing pH over time, except since Dec 01. Limestone added in September 1998 had demonstrable effects, now declining.  
 pHs decline down the creek as influence of limestone declines  
 Addition of crushed limestone to creek banks increased pH's  
 Storys Mine inflows affected water quality Nov - March 01  
 Anoxic alkalinity added to mine January 2001 - improvements.  
 Limestone sand addition (02) has raised pH at all stations and reduced acidity and sulphate.  
 May 03 shows increased acidity and sulphate due to disturbance.

Figure 2 Storys Creek Metal Concentrations  
All stations updated 5/03



## Figure 2b Storys Creek Metal Concentrations Selected stations updated 5/03

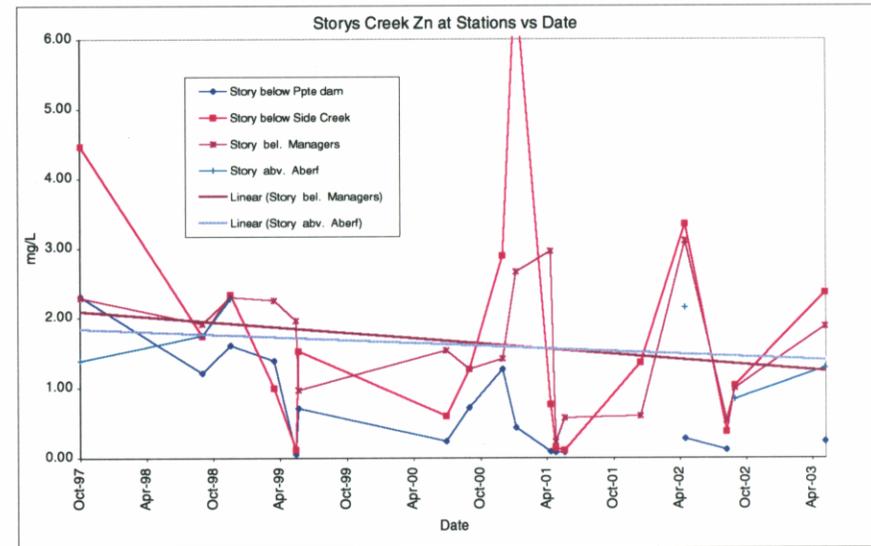
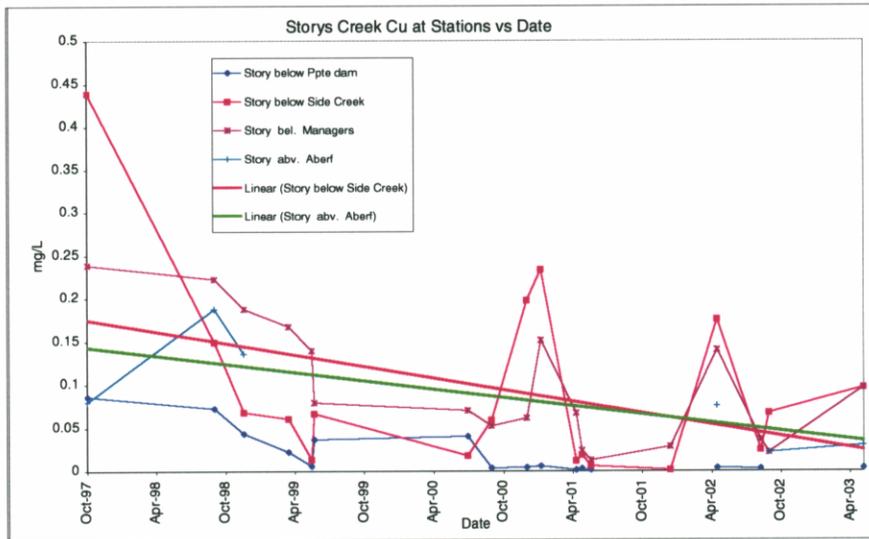
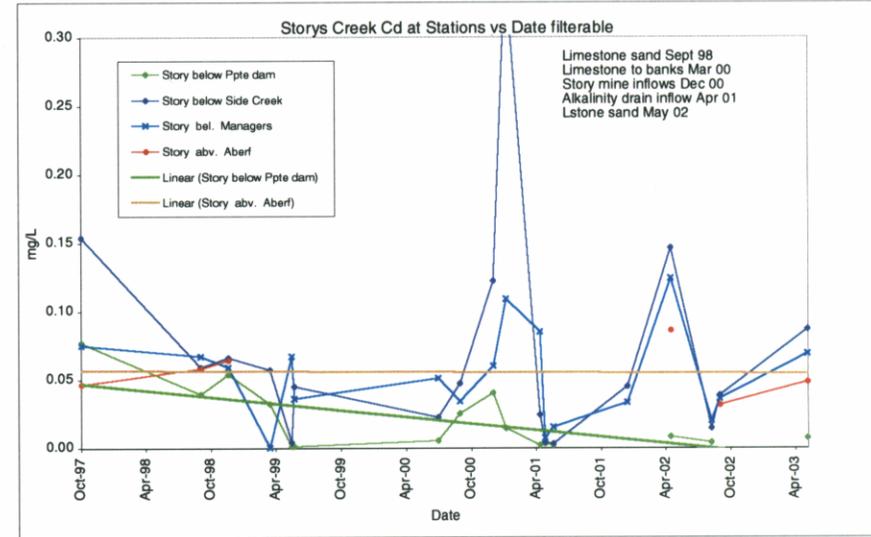
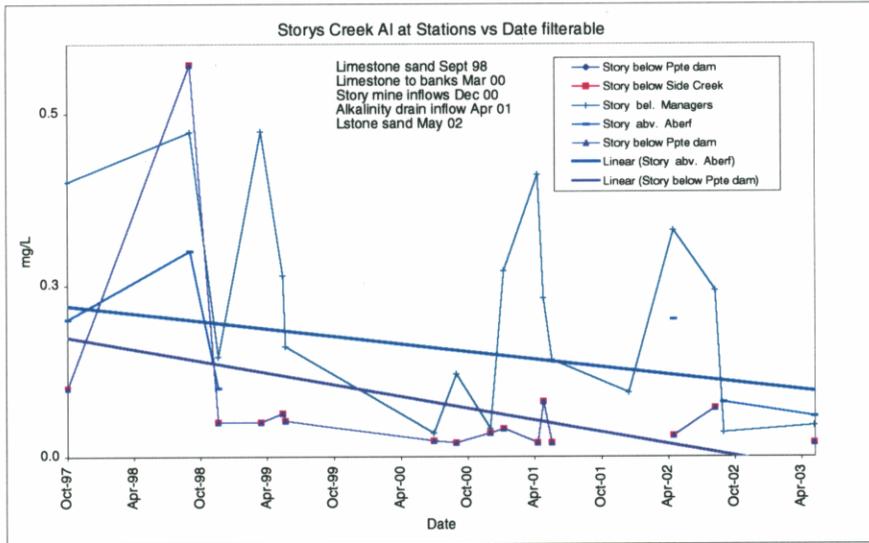


Figure 3 Station 14 Contaminant Concentration Trends 5/03

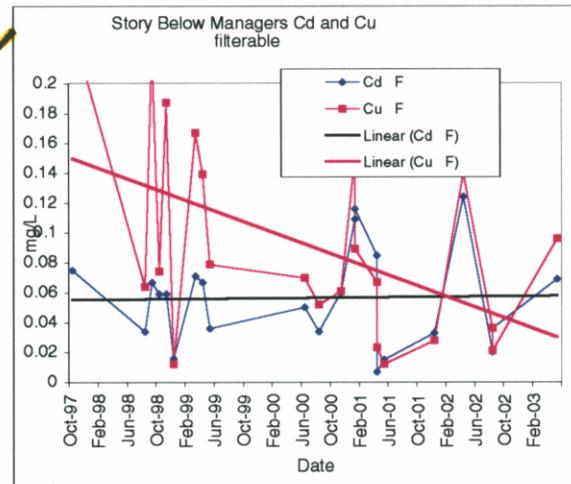
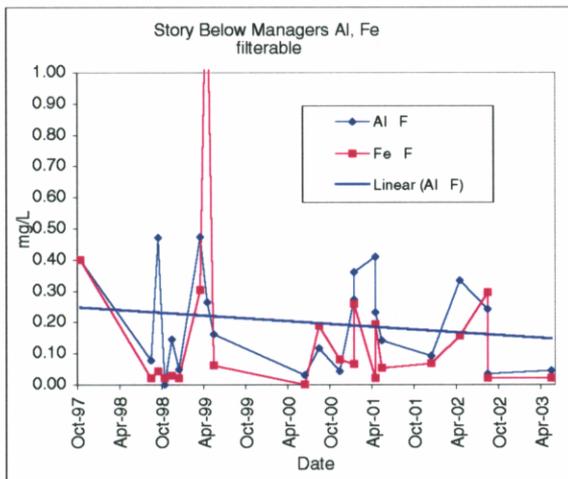
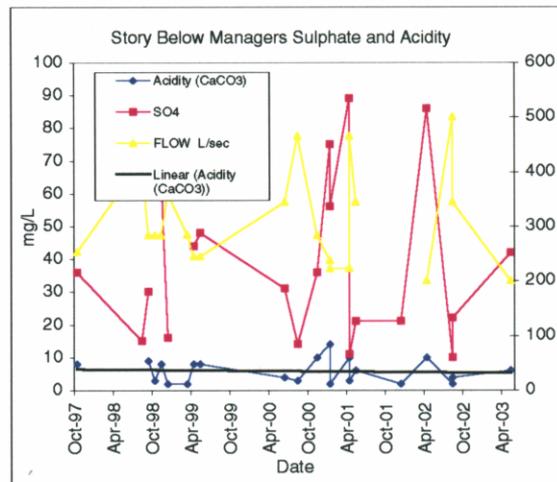
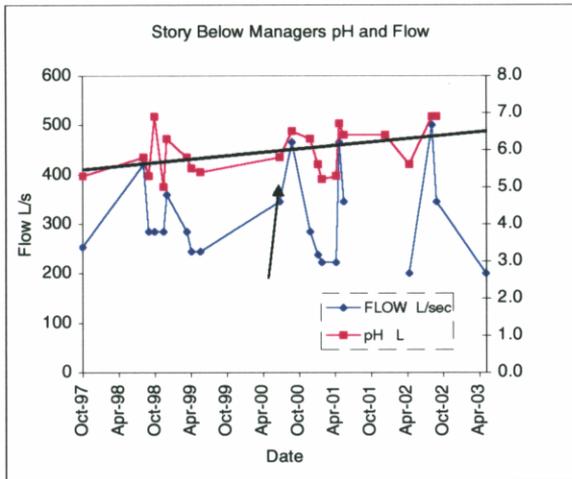


Figure 4 Storys Creek Loads over Time  
All stations. Non Metals updated 5/03

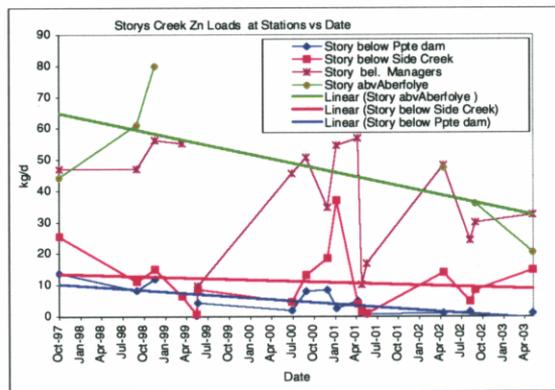
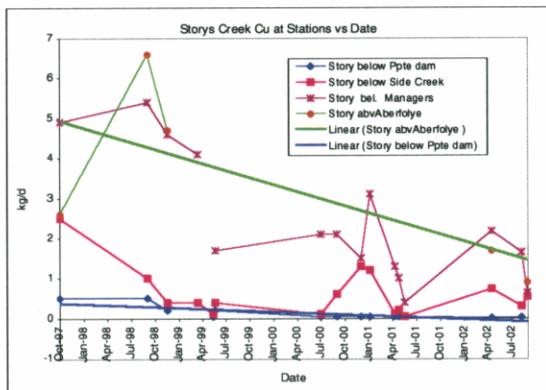
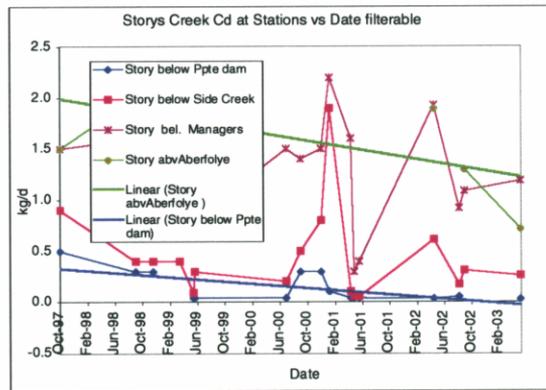
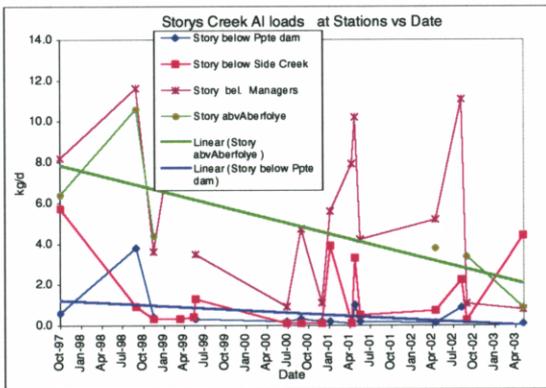
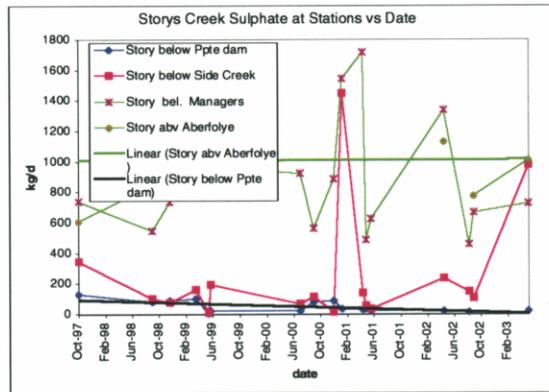
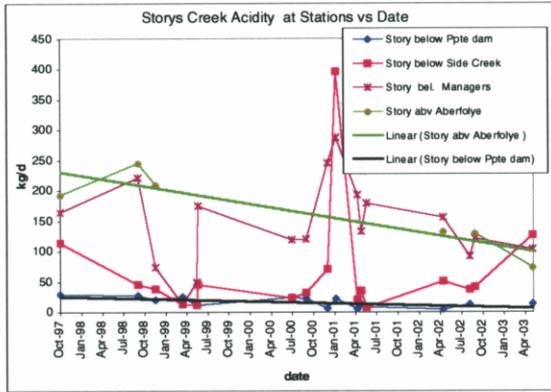


Fig 5 Storys at Station 14 Contaminant Load Trends 5/03

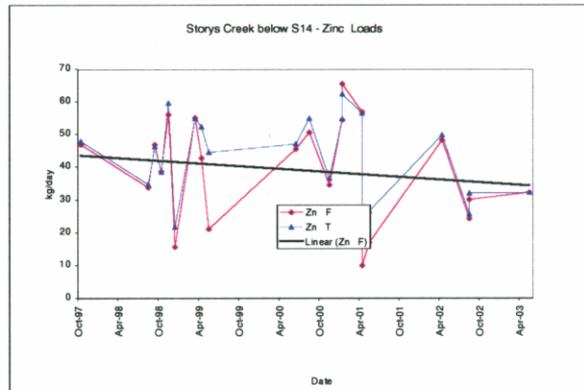
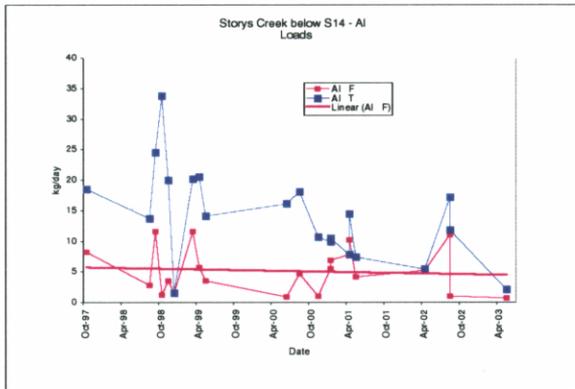
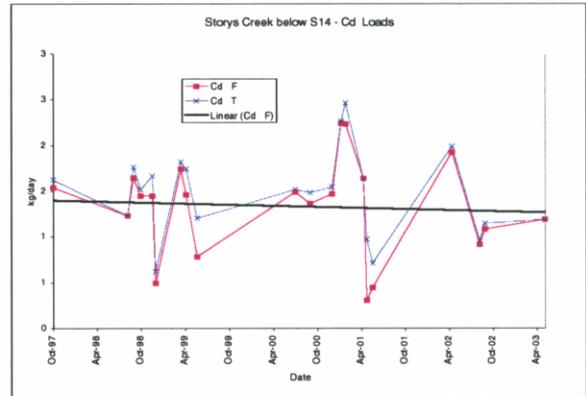
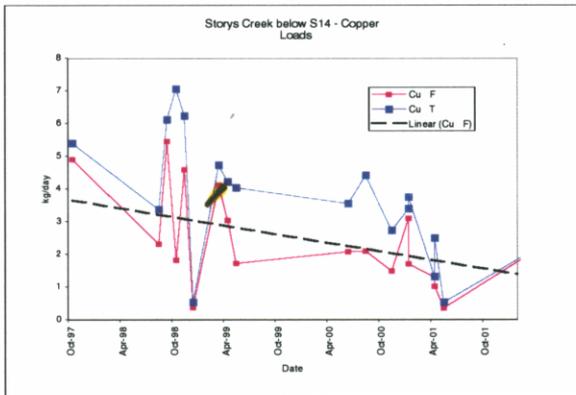
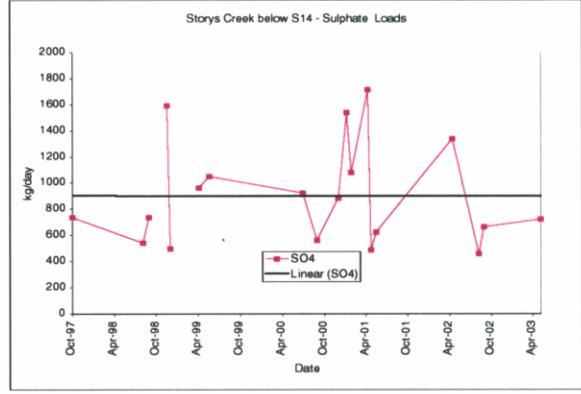
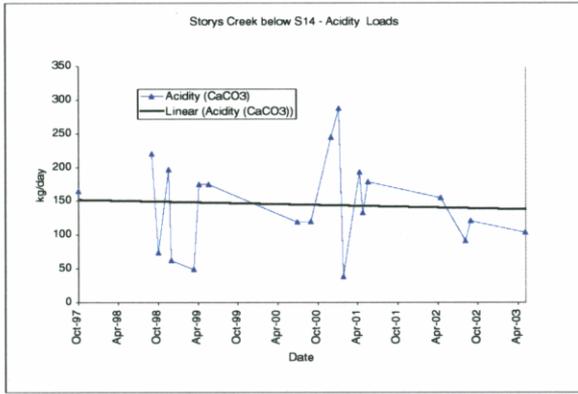


Figure 6 Storys above Aberfoyle Contaminant Load Trends 5/03

