Table H1: Laboratory Column Leach Test Results for Sample TP4/6-12 (NAF)
Highly weathered siltstone

Sample Weight (kg)	1.56	ANC (kg H_2SO_4/t)#	6
pH	6.60	NAPP (kg H_2SO_4/t)#	95
EC (µS/cm)	569	NAG (kg H_2SO_4/t)#	<0.01
Total S (%)#	3.3	NAG pH#	9.3

Date	**15-Feb-06**	**15-Mar-06**	**11-Apr-06**	**17-May-06**			
Round Number	**1**	**2**	**3**	**4**	**5**		
Volume Leached (L)	0.255	0.270	0.360	0.360			
Cum. Volume (L)	0.255	0.525	0.885	1.245			
Pore Volumes	0.2	0.4	0.7	0.9			
pH	7.76	7.88	7.71	7.84			
EC (µS/cm)	1,170	618	791	185			
Acidity (mg/L)*	4	16	5	4			
Alkalinity (mg/L)*	95	449	171	30		**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Net Alkalinity (mg/L)*	91	433	166	26			
Dissolved elements (mg/L)							
Al	<0.01	<0.01	<0.01	<0.01		**5**	
As	---	---	---	---		**0.5**	
Ca	68	36	44	8		**1,000**	
Cd	0.0005	0.0004	0.0007	0.0002		**0.01**	**0.07**
Cl	---	---	---	---		**-**	
Co	<0.001	<0.001	<0.001	<0.001		**1**	
Cr	---	---	---	---		**1**	**6**
Cu	0.02	0.002	0.003	0.003		**0.5**	**3.1**
Fe[3]	<0.05	<0.05	<0.05	<0.05		**1 (irrigation)[3]**	
Hg	---	---	---	---		**0.002**	
K	---	---	---	---		**-**	
Mg	74	32	39	6		**-**	
Mn[3]	0.017	0.001	0	<0.001		**2 (irrigation)[3]**	
Na	---	---	---	---		**-**	
Ni	0.002	<0.001	<0.001	<0.001		**1**	**6**
Pb	0.028	0.018	0.011	0.014		**0.1**	**0.6**
SO_4	336	160	198	30		**1,000**	
Sb	---	---	---	---		**-**	
Se	<0.010	<0.010	<0.010	<0.010		**0.02**	
Tl	---	---	---	---		**-**	
Zn	0.0151	0.0670	0.1590	0.0380		**20**	**122**
RESULTS**							
SO_4 Generation Rate	55	28	46	7			
Cumulative SO_4 Gen.	55	83	128	135			
Ca Generation Rate	11.1	6.2	10.2	1.8			
Cumulative Ca Gen.	11.1	17.3	27.5	29.3			
Mg Generation Rate	12.1	5.5	9.0	1.4			
Cumulative Mg Gen.	12.1	17.6	26.6	28.0			
Residual ANC (%)	100	100	100	100			
SO_4/Ca	2.1	1.9	1.9	1.6			
Cd generation rate	0.001	0.001	0.001	0.001			
Cumulative Cd Gen.	0.001	0.002	0.003	0.004			
Fe generation rate	0.002	0.002	0.002	0.002			
Cumulative Fe Gen.	0.002	0.003	0.006	0.008			
Mn generation rate	0.003	0.000	0.001	0.000			
Cumulative Mn Gen.	0.003	0.003	0.004	0.004			
Zn generation rate	0.002	0.002	0.002	0.002			
Cumulative Zn Gen.	0.002	0.003	0.006	0.008			
Hardness*	475	222	270	45		Avg. Hardness =	253

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values.

* Acidity, Alkalinity and Hardness reported as mg CaCQ/L

** SO_4, Ca, Mg, Cd, Fe, Mn and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

Total S, ANC and NAG data calculated for mix of materials in each column

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H2: Laboratory Column Leach Test Results for Sample TP4/13-18 (PAF)
Partially weathered siltstone and predominantly fresh siltstone

Sample Weight (kg)	1.78	ANC (kg H_2SO_4/t)#	10	
pH	6.00	NAPP (kg H_2SO_4/t)#	602	
EC (µS/cm)	845	NAG (kg H_2SO_4/t)#	-	
Total S (%)#	20	NAG pH#	-	

Date	**15-Feb-06**	**15-Mar-06**	**10-Apr-06**	**17-May-06**		**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Round Number	**1**	**2**	**3**	**4**	**5**		
Volume Leached (L)	0.540	0.550	0.565	0.570			
Cum. Volume (L)	0.540	1.090	1.655	2.225			
Pore Volumes	0.4	0.8	1.2	1.6			
pH	6.84	6.34	6.17	5.65			
EC (µS/cm)	1,420	994	1,560	1,380			
Acidity (mg/L)*	195	11	159	210			
Alkalinity (mg/L)*	32	15	12	3			
Net Alkalinity (mg/L)*	---	4	---	---			
Dissolved elements (mg/L)							
Al	<0.01	<0.01	<0.01	<0.01		**5**	
As	---	---	---	---		**0.5**	
Ca	121	43	81	80		**1,000**	
Cd	0.568	0.276	0.658	1.02		**0.01**	**0.13**
Cl	---	---	---	---		**-**	
Co	0.496	0.263	0.525	0.603		**1**	
Cr	---	---	---	---		**1**	**10**
Cu	0.004	0.009	0.005	0.006		**0.5**	**5.7**
Fe^3	<0.05	<0.05	<0.05	<0.05		**1 (irrigation)[3]**	
Hg	---	---	---	---		**0.002**	
K	---	---	---	---		**-**	
Mg	67	66	102	78		**-**	
Mn^3	1.95	2.02	4.45	4.29		**2 (irrigation)[3]**	
Na	---	---	---	---		**-**	
Ni	0.214	0.096	0.144	0.156		**1**	**11**
Pb	0.082	0.483	1.36	2.64		**0.1**	**1.1**
SO_4	841	594	1,040	913		**1,000**	
Sb	---	---	---	---		**-**	
Se	<0.010	<0.010	<0.010	<0.010		**0.02**	
Tl	---	---	---	---		**-**	
Zn	139	72.4	125	144		**20**	**228**
RESULTS**							
SO_4 Generation Rate	255	184	330	292			
Cumulative SO_4 Gen.	255	439	769	1061			
Ca Generation Rate	36.7	13.3	25.7	25.6			
Cumulative Ca Gen.	36.7	50.0	75.7	101.3			
Mg Generation Rate	20.3	20.4	32.4	25.0			
Cumulative Mg Gen.	20.3	40.7	73.1	98.1			
Residual ANC (%)	100	100	100	100			
SO_4/Ca	2.9	5.8	5.3	4.8			
Cd generation rate	0.002	0.002	0.002	0.002			
Cumulative Cd Gen.	0.002	0.003	0.005	0.006			
Fe generation rate	0.003	0.003	0.003	0.003			
Cumulative Fe Gen.	0.003	0.006	0.009	0.013			
Mn generation rate	0.592	0.624	1.413	1.374			
Cumulative Mn Gen.	0.592	1.216	2.628	4.002			
Zn generation rate	0.003	0.003	0.003	0.003			
Cumulative Zn Gen.	0.003	0.006	0.009	0.013			
Hardness*	578	379	622	521		Avg. Hardness =	525

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values.

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Cd, Fe, Mn and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock). Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

\# Total S, ANC and NAG data calculated for mix of materials in each column

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H3: Laboratory Column Leach Test Results for Sample PER 1 (NAF)
Hanging Wall Overburden Material - Upper Pyritic Shale 45-50 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	206
pH (1:5)	6.90	NAPP (kg H_2SO_4/t)	-60
EC (µS/cm) (1:5)	4,050	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	4.78	NAG pH	6.5

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**								
Round Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Volume Leached (L)	0.410	0.415	0.445								
Cum. Volume (L)	0.410	0.825	1.270								
Pore Volumes	0.3	0.6	0.9								
Leachate pH	4.36	5.65	5.30								
Leachate EC (µS/cm)	12,300	10,500	11,600								
Acidity (mg/L)*	1970	<1	68								
Alkalinity (mg/L)*	<1	9	13								
Net Alkalinity (mg/L)*	-1970	8	-55								
Dissolved elements (mg/L)											
Al	5.14	0.03	0.91								
As	0.0004	0.005	<0.001								
Ca	425	334	290								
Cd	0.361	0.0224	0.0417								
Cl	24	18	9								
Co	2.42	0.302	0.327								
Cr	<0.001	<0.001	<0.001								
Cu	0.036	0.002	0.038								
Fe[3]	1,030	1	7.34								
K	10	5	5								
Mg	1,960	2,140	2,280								
Mn[3]	37	12.7	13								
Na	36	19	24								
Ni	2.91	0.21	0.187								
Pb	0.002	<0.001	<0.001								
SO_4	15,500	9,840	11,200								
Se	0.047	0.053	0.068								
Zn	652	27	36								
RESULTS**											
SO_4 Generation Rate	2,118	1,361	1,661								
Cumulative SO_4 Gen.	2,118	3,480	5,141								
Ca Generation Rate	58	46	43								
Cumulative Ca Gen.	58	104	147								
Mg Generation Rate	268	296	338								
Cumulative Mg Gen.	268	564	902								
Residual ANC (%)	100	100	100								
SO_4/Ca	15.2	12.3	16.1								
Fe generation rate	141	0.13	1.09								
Cumulative Fe Gen.	141	141	142								
Mn generation rate	5.1	1.8	1.9								
Cumulative Mn Gen.	5.1	6.8	8.7								
Zn generation rate	89	3.7	5.3								
Cumulative Zn Gen.	89	93	98								
Hardness*	9,133	9,647	10,113								Avg. Hardness = 9,631

ANZECC[1]/NEPM[2] Guidelines (mg/L)	**ANZECC[1] HMTV[4] (mg/L)**
5	
1	
1,000	
0.01	**1.70**
-	
1	
1	**114**
0.5	**67.5**
1 (irrigation)[3]	
-	
-	
2 (irrigation)[3]	
-	
1	**135**
0.1	**13.5**
1,000	
0.02	
20	**2,701**

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values.

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock). Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV (H/30) $^{0.89}$, Cr(III): TV(H/30)$^{0.82}$, Cu: TV(H/30)$^{0.85}$, Pb: TV(H/30)$^{1.27}$, Ni: TV(H/30)$^{0.85}$, Zn: HMTV = TV(H/30)$^{0.85}$ where TV = trigger values, and H = hardness

Table H4: Laboratory Column Leach Test Results for Sample PER 2 (PAF)
Hanging Wall Overburden Material - Upper Pyritic Shale 25-30 m

Sample Weight (kg)	3.02	ANC (kg H_2SO_4/t)	167
pH (1:5)	6.60	NAPP (kg H_2SO_4/t)	141
EC (µS/cm) (1:5)	4,570	NAG (kg H_2SO_4/t)	61.2
Total Oxidisable S (%)	10.1	NAG pH	2.4

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**								
Round Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Volume Leached (L)	0.440	0.370	0.360								
Cum. Volume (L)	0.440	0.810	1.170								
Pore Volumes	0.3	0.6	0.9								
Leachate pH	3.65	4.18	4.60								
Leachate EC (µS/cm)	17,000	11,800	17,600								
Acidity (mg/L)*	8380	195	199								
Alkalinity (mg/L)*	<1	14	<1								
Net Alkalinity (mg/L)*	-8380	-181	-199								
Dissolved elements (mg/L)											
Al	370	2.84	4.57								
As	0.006	0.096	<0.001								
Ca	405	429	416								
Cd	2.04	0.196	0.168								
Cl	22	36	23								
Co	2.85	0.527	0.583								
Cr	0.009	0.094	<0.001								
Cu	0.316	0.158	0.044								
Fe[3]	3,530	17	31.3								
K	<1	1	2								
Mg	2,080	2,380	3,810								
Mn[3]	58.1	29.9	36.7								
Na	9	4	9								
Ni	2.86	0.288	0.249								
Pb	0.004	0.123	0.01								
SO_4	19,900	11,300	17,700								
Se	0.058	0.16	0.085								
Zn	1,150	59	67.3								
RESULTS**											
SO_4 Generation Rate	2,899	1,384	2,110								
Cumulative SO_4 Gen.	2,899	4,284	6,394								
Ca Generation Rate	59	53	50								
Cumulative Ca Gen.	59	112	161								
Mg Generation Rate	303	292	454								
Cumulative Mg Gen.	303	595	1049								
Residual ANC (%)	100	100	99								
SO_4/Ca	20	11	18								
Fe generation rate	514	2.0	3.7								
Cumulative Fe Gen.	514	516	520								
Mn generation rate	8.5	3.7	4.4								
Cumulative Mn Gen.	8.5	12.1	16.5								
Zn generation rate	168	7.2	8.0								
Cumulative Zn Gen.	168	175	183								
Hardness*	9,577	10,872	16,728								Avg. Hardness = 12,392

ANZECC[1]/NEPM[2] Guidelines (mg/L)	**ANZECC[1] HMTV[4] (mg/L)**
5	
1	
1,000	
0.01	**2.13**
-	
1	
1	**140**
0.5	**83.7**
1 (irrigation)[3]	
-	
-	
2 (irrigation)[3]	
-	
1	**167**
0.1	**16.7**
1,000	
0.02	
20	**3,347**

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg and Se generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock). Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV (H/30) $^{0.89}$, Cr(III): $TV(H/30)^{0.82}$, Cu: $TV(H/30)^{0.85}$, Pb: $TV(H/30)^{1.27}$, Ni: $TV(H/30)^{0.85}$, Zn: $HMTV = TV(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H5: Laboratory Column Leach Test Results for Sample PER 3 (NAF)
Hanging Wall Overburden Material - Bituminous Shale 100-105 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	313
pH (1:5)	7.60	NAPP (kg H_2SO_4/t)	-177
EC (µS/cm) (1:5)	3,080	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	4.43	NAG pH	8.3

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Volume Leached (L)	0.445	0.440	0.480									
Cum. Volume (L)	0.445	0.885	1.365									
Pore Volumes	0.3	0.7	1.0									
Leachate pH	6.88	6.71	6.50									
Leachate EC (µS/cm)	2,290	3,100	3,300									
Acidity (mg/L)*	10	19	33									
Alkalinity (mg/L)*	27	14	8									
Net Alkalinity (mg/L)*	17	-5	-25									
Dissolved elements (mg/L)												
Al	0.11	<0.01	<0.01								**5**	
As	0.001	0.002	<0.001								**1**	
Ca	380	212	216								**1,000**	
Cd	0.0344	0.0111	0.0151								**0.01**	**0.43**
Cl	2	6	2								**-**	
Co	0.062	0.068	0.152								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**32**
Cu	0.005	0.001	<0.001								**0.5**	**18.2**
Fe[3]	0.25	<0.05	0.3								**1 (irrigation)[3]**	
K	6	6	8								**-**	
Mg	145	442	425								**-**	
Mn[3]	1.45	0.786	2.29								**2 (irrigation)[3]**	
Na	10	7	10								**-**	
Ni	0.064	0.07	0.128								**1**	**36**
Pb	<0.001	<0.001	<0.001								**0.1**	**3.6**
SO_4	1,450	2,240	2,170								**1,000**	
Se	<0.010	0.012	0.02								**0.02**	
Zn	1	6	16.6								**20**	**729**
RESULTS**												
SO_4 Generation Rate	215	329	347									
Cumulative SO_4 Gen.	215	544	891									
Ca Generation Rate	56	31	35									
Cumulative Ca Gen.	56	87	122									
Mg Generation Rate	22	65	68									
Cumulative Mg Gen.	22	86	154									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.6	4.4	4.2									
Fe generation rate	0.04	0.01	0.01									
Cumulative Fe Gen.	0.04	0.04	0.05									
Mn generation rate	0.22	0.12	0.37									
Cumulative Mn Gen.	0.22	0.33	0.70									
Zn generation rate	0.17	0.85	2.66									
Cumulative Zn Gen.	0.17	1.02	3.68									
Hardness*	1,546	2,350	2,290								Avg. Hardness =	2,062

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H6: Laboratory Column Leach Test Results for Sample PER 4 (PAF)
Hanging Wall Overburden Material - Bituminous shale 90-95 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	167
pH (1:5)	7.60	NAPP (kg H_2SO_4/t)	240
EC (µS/cm) (1:5)	3,210	NAG (kg H_2SO_4/t)	60.5
Total Oxidisable S (%)	13.3	NAG pH	2.2

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Volume Leached (L)	0.520	0.475	0.500									
Cum. Volume (L)	0.520	0.995	1.495									
Pore Volumes	0.4	0.7	1.1									
Leachate pH	6.97	6.71	6.40									
Leachate EC (µS/cm)	3,470	3,700	4,210									
Acidity (mg/L)*	9	19	55									
Alkalinity (mg/L)*	27	11	6								**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Net Alkalinity (mg/L)*	18	-8	-49									
Dissolved elements (mg/L)												
Al	0.1	<0.01	<0.01								**5**	
As	<0.001	0.001	<0.001								**1**	
Ca	432	178	190								**1,000**	
Cd	0.0025	0.0117	0.0222								**0.01**	**0.57**
Cl	5	4	1								**-**	
Co	0.022	0.062	0.204								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**41**
Cu	<0.001	<0.001	<0.001								**0.5**	**23.6**
Fe[3]	<0.05	<0.05	0.73								**1 (irrigation)[3]**	
K	10	6	8								**-**	
Mg	308	583	659								**-**	
Mn[3]	0.694	1.02	3.1								**2 (irrigation)[3]**	
Na	46	24	27								**-**	
Ni	0.025	0.055	0.153								**1**	**47**
Pb	<0.001	<0.001	0.003								**0.1**	**4.7**
SO_4	2,330	2,780	3,040								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	3	9	32.4								**20**	**943**
RESULTS**												
SO_4 Generation Rate	404	440	507									
Cumulative SO_4 Gen.	404	844	1351									
Ca Generation Rate	75	28	32									
Cumulative Ca Gen.	75	103	135									
Mg Generation Rate	53	92	110									
Cumulative Mg Gen.	53	146	256									
Residual ANC (%)	100	100	100									
SO_4/Ca	2.2	6.5	6.7									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.02									
Mn generation rate	0.12	0.16	0.52									
Cumulative Mn Gen.	0.12	0.28	0.80									
Zn generation rate	0.46	1.43	5.40									
Cumulative Zn Gen.	0.46	1.89	7.29									
Hardness*	2,347	2,845	3,188								Avg. Hardness =	2,794

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H7: Laboratory Column Leach Test Results for Sample PER 5 (NAF)
Hanging Wall Overburden Material - Lower Pyritic Shale 125-130 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	272
pH (1:5)	7.90	NAPP (kg H_2SO_4/t)	-95
EC (µS/cm) (1:5)	1,860	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	5.79	NAG pH	8.2

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Volume Leached (L)	0.495	0.470	0.470									
Cum. Volume (L)	0.495	0.965	1.435									
Pore Volumes	0.4	0.7	1.1									
Leachate pH	7.32	6.97	7.10									
Leachate EC (µS/cm)	1,100	1,340	1,730									
Acidity (mg/L)*	4	3	2									
Alkalinity (mg/L)*	26	12	12									
Net Alkalinity (mg/L)*	22	9	10									
Dissolved elements (mg/L)												
Al	0.05	<0.01	<0.01								**5**	
As	<0.001	0.003	<0.001								**1**	
Ca	174	87	78								**1,000**	
Cd	0.0003	0.0005	0.0014								**0.01**	**0.17**
Cl	4	4	1								**-**	
Co	0.003	0.006	0.016								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**14**
Cu	<0.001	<0.001	<0.001								**0.5**	**7.7**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	7	6	7								**-**	
Mg	29	126	183								**-**	
Mn[3]	0.132	0.07	0.146								**2 (irrigation)[3]**	
Na	18	29	47								**-**	
Ni	0.005	0.01	0.018								**1**	**15**
Pb	<0.001	<0.001	<0.001								**0.1**	**1.5**
SO_4	528	727	933								**1,000**	
Se	<0.010	0.015	0.019								**0.02**	
Zn	0.127	0.189	0.392								**20**	**307**
RESULTS**												
SO_4 Generation Rate	87	114	146									
Cumulative SO_4 Gen.	87	201	347									
Ca Generation Rate	29	14	12									
Cumulative Ca Gen.	29	42	55									
Mg Generation Rate	5	20	29									
Cumulative Mg Gen.	5	25	53									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.3	3.5	5.0									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.02									
Mn generation rate	0.02	0.01	0.02									
Cumulative Mn Gen.	0.02	0.03	0.06									
Zn generation rate	0.02	0.03	0.06									
Cumulative Zn Gen.	0.02	0.05	0.11									
Hardness*	554	736	948								Avg. Hardness =	746

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H8: Laboratory Column Leach Test Results for Sample PER 6 (PAF)
Hanging Wall Overburden Material - Lower Pyritic Shale 115-120 m

Sample Weight (kg)	3.02	ANC (kg H_2SO_4/t)	216
pH (1:5)	8.00	NAPP (kg H_2SO_4/t)	30
EC (µS/cm) (1:5)	1,760	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	8.03	NAG pH	7.4

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Volume Leached (L)	0.440	0.405	0.445									
Cum. Volume (L)	0.440	0.845	1.290									
Pore Volumes	0.3	0.6	1.0									
Leachate pH	7.41	6.94	7.00									
Leachate EC (µS/cm)	1,550	1,590	2,070									
Acidity (mg/L)*	4	4	1									
Alkalinity (mg/L)*	30	14	10								**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Net Alkalinity (mg/L)*	26	10	9									
Dissolved elements (mg/L)												
Al	0.03	<0.01	<0.01								**5**	
As	0.001	0.003	<0.001								**1**	
Ca	226	105	115								**1,000**	
Cd	0.0003	0.0004	0.0008								**0.01**	**0.22**
Cl	<1	4	<1								**-**	
Co	0.005	0.01	0.032								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**17**
Cu	<0.001	<0.001	<0.001								**0.5**	**9.6**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	9	6	9								**-**	
Mg	66	156	213								**-**	
Mn[3]	0.159	0.122	0.264								**2 (irrigation)[3]**	
Na	44	51	63								**-**	
Ni	0.013	0.019	0.046								**1**	**19**
Pb	<0.001	<0.001	<0.001								**0.1**	**1.9**
SO_4	848	922	1,160								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	0.073	0.21	0.507								**20**	**383**
RESULTS**												
SO_4 Generation Rate	124	124	171									
Cumulative SO_4 Gen.	124	247	418									
Ca Generation Rate	33	14	17									
Cumulative Ca Gen.	33	47	64									
Mg Generation Rate	10	21	31									
Cumulative Mg Gen.	10	31	62									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.6	3.7	4.2									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.01	0.02									
Mn generation rate	0.02	0.02	0.04									
Cumulative Mn Gen.	0.02	0.04	0.08									
Zn generation rate	0.01	0.03	0.07									
Cumulative Zn Gen.	0.01	0.04	0.11									
Hardness*	836	905	1164								Avg. Hardness =	968

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H9: Laboratory Column Leach Test Results for Sample PER 7 (NAF)
Hanging Wall Overburden Material - Lower Dolomitic Shale 52.8-53.6 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	196
pH (1:5)	8.30	NAPP (kg H_2SO_4/t)	-137
EC (µS/cm) (1:5)	987	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	1.93	NAG pH	8

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Volume Leached (L)	0.510	0.490	0.540									
Cum. Volume (L)	0.510	1.000	1.540									
Pore Volumes	0.4	0.7	1.1									
Leachate pH	7.32	6.92	6.90									
Leachate EC (µS/cm)	1,550	652	1,330									
Acidity (mg/L)*	4	3	1									
Alkalinity (mg/L)*	30	9	8									
Net Alkalinity (mg/L)*	26	6	7									
Dissolved elements (mg/L)												
Al	0.03	<0.01	<0.01								**5**	
As	<0.001	0.008	0.001								**1**	
Ca	68	53	69								**1,000**	
Cd	0.0002	0.0004	0.0002								**0.01**	**0.11**
Cl	2	4	1								**-**	
Co	0.048	0.025	0.065								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**9**
Cu	<0.001	<0.001	<0.001								**0.5**	**5.0**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	9	6	9								**-**	
Mg	36	44	136								**-**	
Mn[3]	2.69	1.05	1.96								**2 (irrigation)[3]**	
Na	11	7	12								**-**	
Ni	0.043	0.025	0.058								**1**	**10**
Pb	<0.001	<0.001	<0.001								**0.1**	**1.0**
SO_4	309	303	671								**1,000**	
Se	<0.010	0.016	0.048								**0.02**	
Zn	0.036	0.04	0.127								**20**	**202**
RESULTS**												
SO_4 Generation Rate	53	49	121									
Cumulative SO_4 Gen.	53	102	223									
Ca Generation Rate	12	9	12									
Cumulative Ca Gen.	12	20	33									
Mg Generation Rate	6	7	24									
Cumulative Mg Gen.	6	13	38									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.9	2.4	4.1									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.03									
Mn generation rate	0.46	0.17	0.35									
Cumulative Mn Gen.	0.46	0.63	0.98									
Zn generation rate	0.01	0.01	0.02									
Cumulative Zn Gen.	0.01	0.01	0.04									
Hardness*	318	314	732								Avg. Hardness =	455

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H10: Laboratory Column Leach Test Results for Sample PER 8 (NAF)
Footwall Overburden Material - W-Fold Shale 115.1-115.7 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	193
pH (1:5)	9.00	NAPP (kg H_2SO_4/t)	-191
EC (µS/cm) (1:5)	521	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	0.073	NAG pH	8.8

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Volume Leached (L)	0.460	0.455	0.480									
Cum. Volume (L)	0.460	0.915	1.395									
Pore Volumes	0.3	0.7	1.0									
Leachate pH	8.04	7.27	7.20									
Leachate EC (µS/cm)	138	116	82									
Acidity (mg/L)*	<1	<1	1									
Alkalinity (mg/L)*	31	16	9									
Net Alkalinity (mg/L)*	31	15	8									
Dissolved elements (mg/L)												
Al	0.12	0.02	0.03								**5**	
As	<0.001	0.001	0.002								**1**	
Ca	8	6	4								**1,000**	
Cd	<0.0001	<0.0001	<0.0001								**0.01**	**0.01**
Cl	1	4	3								**-**	
Co	0.002	<0.001	<0.001								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**1**
Cu	<0.001	<0.001	<0.001								**0.5**	**0.4**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	9	6	6								**-**	
Mg	3	2	2								**-**	
Mn[3]	0.108	0.036	0.007								**2 (irrigation)[3]**	
Na	8	3	4								**-**	
Ni	0.002	<0.001	<0.001								**1**	**1**
Pb	<0.001	<0.001	<0.001								**0.1**	**0.1**
SO_4	26	26	21								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	0.008	<0.005	0.022								**20**	**17**
RESULTS**												
SO_4 Generation Rate	4	4	3									
Cumulative SO_4 Gen.	4	8	11									
Ca Generation Rate	1	1	1									
Cumulative Ca Gen.	1	2	3									
Mg Generation Rate	0	0	0									
Cumulative Mg Gen.	0	1	1									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.4	1.8	2.2									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.02									
Mn generation rate	0.02	0.01	0.00									
Cumulative Mn Gen.	0.02	0.02	0.02									
Zn generation rate	0.00	0.00	0.00									
Cumulative Zn Gen.	0.00	0.00	0.00									
Hardness*	32	23	18								Avg. Hardness =	25

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H11: Laboratory Column Leach Test Results for Sample PER 9 (NAF)
Footwall Overburden Material - Teena Dolomite 133.6-134.9 m

Sample Weight (kg)	3	ANC (kg H_2SO_4/t)	693
pH (1:5)	9.20	NAPP (kg H_2SO_4/t)	-691
EC (µS/cm) (1:5)	594	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	0.075	NAG pH	9.3

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Volume Leached (L)	0.560	0.550	0.570									
Cum. Volume (L)	0.560	1.110	1.680									
Pore Volumes	0.4	0.8	1.2									
Leachate pH	8.75	7.66	7.50									
Leachate EC (µS/cm)	183	212	250									
Acidity (mg/L)*	<1	2	1									
Alkalinity (mg/L)*	36	23	12									
Net Alkalinity (mg/L)*	36	21	11									
Dissolved elements (mg/L)												
Al	0.06	<0.01	<0.01								**5**	
As	<0.001	0.002	0.001								**1**	
Ca	12	8	7								**1,000**	
Cd	<0.0001	<0.0001	<0.0001								**0.01**	**0.02**
Cl	15	20	16								**-**	
Co	<0.001	<0.001	<0.001								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**2**
Cu	0.001	<0.001	<0.001								**0.5**	**1.0**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	3	4	4								**-**	
Mg	7	12	16								**-**	
Mn[3]	0.016	0.035	0.024								**2 (irrigation)[3]**	
Na	11	10	10								**-**	
Ni	0.001	<0.001	<0.001								**1**	**2**
Pb	<0.001	<0.001	<0.001								**0.1**	**0.2**
SO_4	25	51	64								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	0.008	<0.005	0.016								**20**	**41**
RESULTS**												
SO_4 Generation Rate	5	9	12									
Cumulative SO_4 Gen.	5	14	26									
Ca Generation Rate	2	1	1									
Cumulative Ca Gen.	2	4	5									
Mg Generation Rate	1	2	3									
Cumulative Mg Gen.	1	4	7									
Residual ANC (%)	100	100	100									
SO_4/Ca	0.9	2.7	3.8									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.03									
Mn generation rate	0.00	0.01	0.00									
Cumulative Mn Gen.	0.00	0.01	0.01									
Zn generation rate	0.00	0.00	0.00									
Cumulative Zn Gen.	0.00	0.00	0.00									
Hardness*	59	69	83								Avg. Hardness =	71

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H12: Laboratory Column Leach Test Results for Sample PER 10 (NAF)
Diversion Material - Dolomitic Sandstone 11.1-12.4 m

Sample Weight (kg)	3.06	ANC (kg H_2SO_4/t)	652
pH (1:5)	9.20	NAPP (kg H_2SO_4/t)	-649
EC (µS/cm) (1:5)	731	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	0.096	NAG pH	9

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Volume Leached (L)	0.580	0.500	0.545									
Cum. Volume (L)	0.580	1.080	1.625									
Pore Volumes	0.4	0.8	1.2									
Leachate pH	8.98	7.56	7.60									
Leachate EC (µS/cm)	166	100	149									
Acidity (mg/L)*	<1	2	2									
Alkalinity (mg/L)*	45	22	15									
Net Alkalinity (mg/L)*	45	20	13									
											ANZECC[1]/NEPM[2] Guidelines (mg/L)	**ANZECC[1] HMTV[4] (mg/L)**
Dissolved elements (mg/L)												
Al	0.05	<0.01	<0.01								**5**	
As	<0.001	0.001	<0.001								**1**	
Ca	10	6	8								**1,000**	
Cd	<0.0001	<0.0001	0.0002								**0.01**	**0.02**
Cl	14	8	6								**-**	
Co	<0.001	<0.001	<0.001								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**2**
Cu	<0.001	<0.001	<0.001								**0.5**	**0.8**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	3	1	1								**-**	
Mg	7	5	10								**-**	
Mn[3]	0.008	0.038	0.027								**2 (irrigation)[3]**	
Na	10	4	4								**-**	
Ni	<0.001	<0.001	<0.001								**1**	**2**
Pb	<0.001	<0.001	<0.001								**0.1**	**0.2**
SO_4	13	24	39								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	0.006	<0.005	0.016								**20**	**31**
RESULTS**												
SO_4 Generation Rate	2	4	7									
Cumulative SO_4 Gen.	2	6	13									
Ca Generation Rate	2	1	1									
Cumulative Ca Gen.	2	3	4									
Mg Generation Rate	1	1	2									
Cumulative Mg Gen.	1	2	4									
Residual ANC (%)	100	100	100									
SO_4/Ca	0.5	1.7	2.0									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.03									
Mn generation rate	0.00	0.01	0.00									
Cumulative Mn Gen.	0.00	0.01	0.01									
Zn generation rate	0.00	0.00	0.00									
Cumulative Zn Gen.	0.00	0.00	0.00									
Hardness*	54	36	61								Avg. Hardness =	50

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H13: Laboratory Column Leach Test Results for Sample PER 11 (NAF)
Diversion Material - Breccia 7.5-9.2 m

Sample Weight (kg)	3.02	ANC (kg H_2SO_4/t)	581
pH (1:5)	9.30	NAPP (kg H_2SO_4/t)	-581
EC (µS/cm) (1:5)	537	NAG (kg H_2SO_4/t)	<0.1
Total Oxidisable S (%)	0.002	NAG pH	9.1

Date	**29-Apr-06**	**17-May-06**	**14-Jun-06**									
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Volume Leached (L)	0.505	0.480	0.490									
Cum. Volume (L)	0.505	0.985	1.475									
Pore Volumes	0.4	0.7	1.1									
Leachate pH	9.03	7.51	7.70									
Leachate EC (µS/cm)	164	68	65									
Acidity (mg/L)*	<1	3	1									
Alkalinity (mg/L)*	43	21	34								**ANZECC[1]/NEPM[2] Guidelines (mg/L)**	**ANZECC[1] HMTV[4] (mg/L)**
Net Alkalinity (mg/L)*	43	18	33									
Dissolved elements (mg/L)												
Al	0.05	0.03	0.26								**5**	
As	0.004	0.002	0.003								**1**	
Ca	6	2	2								**1,000**	
Cd	<0.0001	<0.0001	<0.0001								**0.01**	**0.01**
Cl	10	8	6								**-**	
Co	<0.001	<0.001	<0.001								**1**	
Cr	<0.001	<0.001	<0.001								**1**	**1**
Cu	<0.001	<0.001	<0.001								**0.5**	**0.4**
Fe[3]	<0.05	<0.05	<0.05								**1 (irrigation)[3]**	
K	4	2	3								**-**	
Mg	6	2	2								**-**	
Mn[3]	0.004	0.005	0.011								**2 (irrigation)[3]**	
Na	15	6	7								**-**	
Ni	<0.001	<0.001	<0.001								**1**	**1**
Pb	<0.001	<0.001	0.002								**0.1**	**0.1**
SO_4	15	8	8								**1,000**	
Se	<0.010	<0.010	<0.010								**0.02**	
Zn	0	<0.005	0.026								**20**	**15**
RESULTS**												
SO_4 Generation Rate	3	1	1									
Cumulative SO_4 Gen.	3	4	5									
Ca Generation Rate	1	0	0									
Cumulative Ca Gen.	1	1	2									
Mg Generation Rate	1	0	0									
Cumulative Mg Gen.	1	1	2									
Residual ANC (%)	100	100	100									
SO_4/Ca	1.0	1.7	1.7									
Fe generation rate	0.01	0.01	0.01									
Cumulative Fe Gen.	0.01	0.02	0.02									
Mn generation rate	0.00	0.00	0.00									
Cumulative Mn Gen.	0.00	0.00	0.00									
Zn generation rate	0.00	0.00	0.00									
Cumulative Zn Gen.	0.00	0.00	0.01									
Hardness*	40	13	13								Avg. Hardness =	22

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H14: Laboratory Column Leach Test Results for Sample Lab 1 (PAF)
Lower Pyritic/Dolomitic Shale

Sample Weight (kg)	3.24	ANC (kg H_2SO_4/t)	385
pH	7.11	NAPP (kg H_2SO_4/t)	255
EC (µS/cm)	2,177	NAG (kg H_2SO_4/t)	81
Total S (%)	20.9	NAG pH	2.3

Date	**16-Jan-03**	**23-Jan-03**	**30-Jan-03**	**6-Feb-03**	**13-Feb-03**	**6-Mar-03**	**3-Apr-03**	**24-Apr-03**	**22-May-03**	**19-Jun-03**	**15-Oct-03**	**17-Dec-03**	**4-Mar-04**	**16-Jun-04**	**10-Nov-04**	**9-Feb-05**	**11-May-05**	**3-Aug-05**	**14-Nov-05**	**15-Feb-06**	**17-May-06**		
Leach Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**		
Volume Leached (L)	0.380	0.140	0.440	0.420	0.460	0.380	0.340	0.400	0.400	0.420	0.4	0.39	0.38	0.382	0.372	0.400	0.415	0.336	0.375	0.407	0.390		
Cum. Volume (L)	0.380	0.520	0.960	1.380	1.840	2.220	2.560	2.960	3.360	3.780	4.180	4.570	4.950	5.332	5.704	6.104	6.519	6.855	7.230	7.637	8.027		
Pore Volumes	0.3	0.4	0.7	1.0	1.4	1.6	1.9	2.2	2.5	2.8	3.1	3.39	3.67	3.95	4.23	4.52	4.83	5.08	5.36	5.66	5.95		
pH	7.11	6.38	7.01	6.81	5.86	6.49	6.29	5.17	5.36	5.51	5.73	6.12	4.38	3.98	4.09	4.04	3.58	3.30	3.51	3.20	3.11		
EC (uS/cm)	2,177	4,730	4,770	3,740	3,160	5,560	5,500	5,770	7,250	4,610	4,340	2,350	10,200	10,300	9,180	8,550	9,270	14,230	11,800	13,300	14,600		
Acidity (mg/L)*	17	---	---	7	---	29	50	46	---	53	304	500	613	559	961	1,550	1,230	987	1430	1750	1,250		
Alkalinity (mg/L)*	<1	---	---	<1	---	<1	<1	<1	---	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Net Alkalinity (mg/L)*	-17	---	---	-7	---	-29	-50	-46	---	-53	-304	-500	-613	-559	-961	-1,550	-1,230	-987	-1430	-1750	-1,250		
Dissolved elements (mg/L)																							
Al	<0.1	---	---	0.1	---	<0.1	<0.1	<0.1	---	<0.1	---	---	1.63	3.86	---	---	11.1	9.27	9.23	21.5	11.1	**5**	
As	<0.01	---	---	<0.1	---	<0.01	<0.01	0.01	---	<0.01	0.005	0.01	0.004	0.006	---	---	---	---	---	---	---	**0.5**	
Ca	207	---	---	226	---	352	219	205	---	185	251	256.00	279	358	389	360	386	402	382	406	365	**1,000**	
Cd	<0.005	---	---	<0.005	---	<0.005	<0.005	<0.005	---	0.006	0.014	0.02	0.0358	0.0631	0.0933	0.112	0.133	0.152	0.153	0.195	0.165	**0.01**	**1.50**
Cl	49	---	---	90	---	29	7	34	---	25	---	---	8	1	---	---	---	---	---	---	---	**-**	
Co	0.2	---	---	0.04	---	0.48	0.43	0.24	---	0.26	0.457	0.55	0.69	0.871	1.03	0.937	0.932	1.00	0.86	1.01	0.693	**1**	
Cr	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	0.001	---	---	---	---	---	---	---	**1**	**101**
Cu	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	0.012	0.03	0.037	0.058	---	---	0.086	0.136	0.2	0.179	0.157	**0.5**	**59.7**
Fe[3]	17	---	---	2.9	---	0.12	17	10	---	12.4	92	190	275	307	416	883	553	346	729	762	480	**1 (irrigation)[3]**	
Hg	<0.0001	---	---	0.0002	---	<0.0001	<0.0001	<0.0001	---	<0.0001	---	---	<0.0001	<0.0001	---	---	---	---	---	---	---	**0.002**	
K	22	---	---	19	---	17	12	5	---	7	---	---	3.1	4	---	---	---	---	---	---	---	**-**	
Mg	221	---	---	692	---	956	859	1120	---	856	876	1,560	1980	2,560	2,730	2,570	2,740	2,870	3,010	2,900	2,710	**-**	
Mn[3]	10.8	---	---	5.8	---	44	27	23	---	22.2	35.2	57	73.8	111	130	126	110	115	119	132	105	**2 (irrigation)[3]**	
Na	22	---	---	17	---	9	6	5	---	63	---	---	3.7	6	---	---	---	---	---	---	---	**-**	
Ni	0.66	---	---	0.11	---	0.59	0.45	0.28	---	0.23	0.491	0.53	0.567	0.63	---	0.68	0.632	0.648	0.698	0.6	0.396	**1**	**119**
Pb	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	0.038	0.04	0.287	0.286	0.215	0.152	0.223	0.246	0.185	0.259	0.278	**0.1**	**11.9**
SO_4	1,400	---	---	3,800	---	4,870	3,990	5,100	---	3,970	4,030	7,430	11,000	12,600	12,500	12,300	13,200	13,800	21,200	17,700	16,600	**1,000**	
Sb	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	<0.001	---	---	---	---	---	---	---	**-**	
Se	0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	<0.01	0.03	<0.01	0.02	< 0.050	< 0.050	0.029	0.029	0.031	0.031	0.02	**0.02**	
Tl	0.03	---	---	0.04	---	0.086	0.109	0.095	---	0.154	---	---	0.198	0.337	---	---	---	---	---	---	---	**-**	
Zn	4.9	---	---	0.5	---	9.2	15.3	9.9	---	11.1	40.5	48.40	90.4	134	157	230	224	232	260	311	217	**20**	**2,387**
RESULTS**																							
SO_4 Generation Rate	164	---	---	493	---	571	419	630	---	515	498	894	1,290	1,486	1,435	1,519	1,691	1,431	2,454	2,223	1,998		
Cumulative SO_4 Gen.	164	---	---	657	---	1,228	1,647	2,276	---	2,791	3,288	4,183	5,473	6,958	8,394	9,912	11,603	13,034	15,488	17,711	19,709		
Ca Generation Rate	24	---	---	29	---	41	23	25	---	24	31	31	33	42	45	44	49	42	44	51	44		
Cumulative Ca Gen.	24	---	---	54	---	95	118	143	---	167	198	229	262	304	349	393	442	484	528	579	623		
Mg Generation Rate	26	---	---	90	---	112	90	138	---	111	108	188	232	302	313	317	351	298	348	364	326		
Cumulative Mg Gen.	26	---	---	116	---	228	318	456	---	567	675	863	1,095	1,397	1,711	2,028	2,379	2,676	3,025	3,389	3,715		
Residual ANC (%)	100	---	---	99.8	---	99.7	99.6	99.4	---	99.3	99.2	99.0	98.7	98.3	98.0	97.6	97.2	96.9	96.5	96.1	95.7		
SO_4/Ca	2.8	---	---	7.0	---	5.8	7.6	10.4	---	8.9	6.7	12.1	16.4	14.7	13.4	14.2	14.2	14.3	23.1	18.2	18.9		
Fe generation rate	1.99	---	---	0.38	---	0.01	1.74	1.23	---	1.61	11.3	22.9	32.3	36.2	47.8	109.0	70.8	35.9	84.4	95.7	57.8		
Cumulative Fe Gen.	1.99	---	---	2.37	---	2.38	4.13	5.36	---	6.97	18.3	41.2	73.4	110	157	266	337	373	457	553	611		
Mn generation rate	1.27	---	---	0.75	---	5.18	2.84	2.84	---	2.88	4.35	6.83	8.66	13.1	14.9	15.6	14.1	11.9	13.8	16.6	12.6		
Cumulative Mn Gen.	1.27	---	---	2.02	---	7.21	10.0	12.9	---	15.8	20.1	26.9	35.6	48.7	63.6	79.2	93.3	105	119	136	148		
Zn generation rate	0.58	---	---	0.06	---	1.08	1.61	1.22	---	1.44	5.00	5.83	10.6	15.8	18.0	28.4	28.7	24.1	30.1	39.1	26.1		
Cumulative Zn Gen.	0.58	---	---	0.64	---	1.72	3.33	4.55	---	5.99	11.0	16.8	27.4	43.2	61.2	89.6	118	142	172	212	238		
Hardness*	1,427	---	---	3,414	---	4,816	4,084	5,124	---	3,987	4,234	7,063	8,850	11,436	12,213	11,482	12,247	12,822	13,349	12,956	12,071	Avg. Hardness =	8,328

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg CaCO/L

** SO_4, Ca, Mg, Fe, Mn, and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.

2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.

3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV (H/30)$^{0.89}$, Cr(III): TV(H/30)$^{0.82}$, Cu: TV(H/30)$^{0.85}$, Pb: TV(H/30)$^{1.27}$, Ni: TV(H/30)$^{0.85}$, Zn: HMTV = TV(H/30)$^{0.85}$ where TV = trigger values, and H = hardness

Table H15: Laboratory Column Leach Test Results for Sample Lab 4 (NAF)
Upper Pyritic/Dolomitic Shale

Sample Weight (kg)	2.66	ANC (kg H_2SO_4/t)	246
pH	8.34	NAPP (kg H_2SO_4/t)	-119
EC (µS/cm)	282	NAG (kg H_2SO_4/t)	0
Total S (%)	4.4	NAG pH	8.3

Date	**16-Jan-03**	**23-Jan-03**	**30-Jan-03**	**6-Feb-03**	**13-Feb-03**	**6-Mar-03**	**3-Apr-03**	**24-Apr-03**	**29-May-03**	**19-Jun-03**	**15-Oct-03**	**17-Dec-03**	**4-Mar-04**	**16-Jun-04**	**10-Nov-04**	**8-Feb-05**	**11-May-05**	**3-Aug-05**	**14-Nov-05**	**15-Feb-06**	**17-May-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Round Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**		
Volume Leached (L)	0.240	0.095	0.380	0.340	0.500	0.320	0.300	0.380	0.400	0.340	0.4	0.38	0.38	0.374	0.38	0.375	0.395	0.37	0.37	0.38	0.34		
Cum. Volume (L)	0.240	0.335	0.715	1.055	1.555	1.875	2.175	2.555	2.955	3.295	3.695	4.075	4.455	4.829	5.209	5.584	5.979	6.349	6.719	7.099	7.439		
Pore Volumes	0.2	0.2	0.5	0.8	1.2	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.4	4.7	5.0	5.3	5.5		
pH	8.34	6.67	7.10	7.70	6.45	6.91	7.56	6.21	6.16	5.87	7.42	7.55	7.17	7.17	7.2	7.07	7.08	7.39	7.01	7.45	7.02		
EC (µS/cm)	282	1,941	1,620	1,340	1,540	2,480	1,504	1,350	1,587	1,419	1,361	1,279	1,600	1,840	1,940	2,450	2,155	2,463	1,680	1,610	1,470		
Acidity (mg/L)*	<1	---	---	---	<1	<1	<1	<1	---	<1	<1	<1	16	6	<1	<1	9	11	7	14	10		
Alkalinity (mg/L)*	168	---	---	---	63	40	25	22	---	24	26	34	8	23	27	34	44	43	28	97	20		
Net Alkalinity (mg/L)*	168	---	---	---	63	40	25	22	---	24	26	34	-8	17	26	33	35	32	21	83	10		
Dissolved elements (mg/L)																							
Al	<0.1	---	---	---	<0.1	<0.1	<0.1	<0.1	---	<0.1	---	---	0.01	<0.01	---	---	<0.01	<0.01	<0.01	0.01	<0.01	**5**	
As	0.1	---	---	---	0.02	0.02	<0.01	<0.01	---	<0.01	0.006	0.005	0.004	0.003	---	---	---	---	---	---	---	**0.5**	
Ca	7	---	---	---	97	237	136	125	---	130	161	178	186	185	211	364	314	335	251	230	162	**1,000**	
Cd	<0.005	---	---	---	<0.005	<0.005	<0.005	<0.005	---	<0.005	0.0018	0.0015	0.0023	0.0025	0.0045	0.0069	0.0052	0.0064	0.006	0.0036	0.0056	**0.01**	**0.21**
Cl	25	---	---	---	18	64	11	29	---	5	---	---	2	2	---	---	---	---	---	---	---	**-**	
Co	<0.01	---	---	---	<0.01	0.01	<0.01	<0.01	---	<0.01	0.009	0.009	0.008	0.01	0.013	0.025	0.027	0.037	0.018	0.016	0.013	**1**	
Cr	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	<0.001	---	---	---	---	---	---	---	**1**	**16**
Cu	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	0.003	0.003	0.001	0.003			0.002	0.002	0.002	0.006	0.002	**0.5**	**9.1**
Fe[3]	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.39	0.65	0.54	0.75	0.26	**1 (irrigation)[3]**	
Hg	<0.0001	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	---	---	<0.0001	<0.0001	---	---	---	---	---	---	---	**0.002**	
K	11	---	---	---	31	55	35	32	---	30	---	---	32.3	39	---	---	---	---	---	---	---	**-**	
Mg	3	---	---	---	49	118	56	69	---	80	79	113	94.4	121	142	192	147	161	117	98	93	**-**	
Mn[3]	<0.01	---	---	---	0.06	0.16	0.09	0.09	---	0.13	0.151	0.184	0.156	0.211	0.266	0.442	0.508	0.666	0.462	0.442	0.332	**2 (irrigation)[3]**	
Na	46	---	---	---	157	203	78	76	---	57	---	---	73.1	43	---	---	---	---	---	---	---	**-**	
Ni	0.01	---	---	---	<0.01	0.02	<0.01	<0.01	---	<0.01	0.008	0.007	0.005	0.005	0.011	0.018	0.025	0.047	0.011	0.01	0.012	**1**	**18**
Pb	<0.01	---	---	---	<0.01	0.01	<0.01	<0.01	---	<0.01	0.002	<0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.1**	**1.8**
SO_4	73	---	---	---	771	1,420	701	719	---	753	744	952	900	998	1,140	1,640	1,370	1,460	1,120	870	753	**1,000**	
Sb	0.02	---	---	---	<0.01	<0.01	0.01	0.01	---	<0.01	---	---	0.008	0.009	---	---	---	---	---	---	---	**-**	
Se	0.01	---	---	---	0.04	0.06	0.01	0.03	---	0.02	0.02	0.03	0.02	0.02	0.024	0.03	0.024	0.025	0.016	0.012	0.015	**0.02**	
Tl	<0.001	---	---	---	0.005	0.009	0.006	0.006	---	0.007	---	---	0.011	0.013	---	---	---	---	---	---	---	**-**	
Zn	<0.01	---	---	---	0.07	0.55	0.34	0.25	---	0.29	0.681	0.593	0.992	1.26	1.66	3.44	4.36	5.6	3.59	2.87	3.1	**20**	**362**
RESULTS**																							
SO_4 Generation Rate	6.6	---	---	---	145	171	79	103	---	96	112	136	129	140	163	231	203	203	156	124	96		
Cumulative SO_4 Gen.	6.6	---	---	---	152	322	401	504	---	600	712	848	977	1,117	1,280	1,511	1,715	1,918	2,074	2,198	2,294		
Ca Generation Rate	0.6	---	---	---	18	29	15	18	---	17	24	25	27	26	30	51	47	47	35	33	21		
Cumulative Ca Gen.	0.6	---	---	---	19	47	63	81	---	97	121	147	173	199	230	281	327	374	409	442	463		
Mg Generation Rate	0.3	---	---	---	9	14	6	10	---	10	12	16	13	17	20	27	22	22	16	14	12		
Cumulative Mg Gen.	0.3	---	---	---	9	24	30	40	---	50	62	78	92	109	129	156	178	200	216	230	242		
Residual ANC (%)	100	---	---	---	100	99.9	99.9	99.9	---	99.8	99.8	99.8	99.7	99.7	99.7	99.6	99.5	99.5	99.4	99.4	99.4		
SO_4/Ca	4.3	---	---	---	3.31	2.50	2.15	2.40	---	2.41	1.93	2.23	2.02	2.25	2.25	1.88	1.82	1.82	1.86	1.58	1.94		
Se generation rate	0.001	---	---	---	0.008	0.007	0.001	0.004	---	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.004	0.003	0.002	0.002	0.002		
Cumulative Se Gen.	0.001	---	---	---	0.008	0.016	0.017	0.021	---	0.024	0.027	0.031	0.034	0.037	0.040	0.044	0.048	0.051	0.053	0.055	0.057		
Hardness*	30	---	---	---	444	1,078	570	596	---	654	727	910	853	960	1,112	1,700	1,389	1,499	1,109	978	787	Avg. Hardness =	906

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

** SO_4, Ca, Mg and Se generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H16: Laboratory Column Leach Test Results for Sample Lab 5 (AC / PAF / AC)
AC Cooley Dolomite / PAF Lower Pyritic/Dolomitic Shale / AC W-fold Shale

Sample Weight (kg)	3.4	ANC (kg H_2SO_4/t)#	586
pH	7.99	NAPP (kg H_2SO_4/t)#	-370
EC (µS/cm)	481	NAG (kg H_2SO_4/t)#	0
Total S (%)#	7.1	NAG pH#	7.0

Date	**16-Jan-03**	**23-Jan-03**	**30-Jan-03**	**6-Feb-03**	**13-Feb-03**	**6-Mar-03**	**3-Apr-03**	**24-Apr-03**	**29-May-03**	**19-Jun-03**	**15-Oct-03**	**17-Dec-03**	**4-Mar-04**	**16-Jun-04**	**10-Nov-04**	**8-Feb-05**	**11-May-05**	**3-Aug-05**	**14-Nov-05**	**15-Feb-06**	**17-May-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Round Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**		
Volume Leached (L)	0.400	0.170	0.520	0.460	0.520	0.480	0.480	0.460	0.480	0.380	0.46	0.44	0.48	0.505	0.435	0.442	0.455	0.458	0.425	0.435	0.43		
Cum. Volume (L)	0.400	0.570	1.090	1.550	2.070	2.550	3.030	3.490	3.970	4.350	4.810	5.250	5.730	6.235	6.670	7.112	7.567	8.025	8.450	8.885	9.315		
Pore Volumes	0.3	0.4	0.8	1.1	1.5	1.9	2.2	2.6	2.9	3.2	3.6	3.9	4.2	4.6	4.9	5.3	5.6	5.9	6.3	6.6	6.9		
pH	7.99	6.51	6.90	8.31	6.63	6.64	7.42	6.80	6.00	5.95	7.21	6.89	5.81	6.1	5.11	4.83	5.36	5.93	4.59	5.76	5.51		
EC (µS/cm)	481	2,282	2,459	1,885	2,037	2,214	2,422	2,627	2,138	3,090	2,754	1,891	3,780	3,830	3,620	3,900	4,220	7,200	4,510	2,930	5,600		
Acidity (mg/L)*	<1	---	---	---	<1	<1	<1	<1	---	<1	13	18	<1	39	70	223	219	252	233	115	145		
Alkalinity (mg/L)*	63	---	---	---	401	30	25	24	---	26	<1	<1	82	3	<1	<1	<1	1	<1	9	8		
Net Alkalinity (mg/L)*	63	---	---	---	401	30	25	24	---	26	-13	-18	82	-36	-69	-222	-219	-251	-233	-106	-137		
Dissolved elements (mg/L)																							
Al	<0.1	---	---	---	<0.1	<0.1	<0.1	<0.1	---	<0.1	---	---	<0.01	<0.01	---	---	0.65	0.04	0.36	<0.01	0.22	**5**	
As	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	<0.001	<0.001	<0.001	<0.001	---	---	---	---	---	---		**0.5**	
Ca	36	---	---	---	122	168	155	140	---	132	157	144	185	193	247	281	289	344	252	262	200	**1,000**	
Cd	<0.005	---	---	---	<0.005	<0.005	<0.005	<0.005	---	<0.005	0.0095	0.0096	0.018	0.0177	0.0291	0.0378	0.0399	0.0781	0.05	0.0221	0.0393	**0.01**	**0.57**
Cl	13	---	---	---	42	73	7	34	---	9	---	---	<1	4	---	---	---	---	---	---		**-**	
Co	<0.01	---	---	---	<0.01	0.03	<0.01	0.01	---	0.02	0.049	0.043	0.085	0.066	0.1	0.132	0.148	0.382	0.12	0.086	0.09	**1**	
Cr	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	<0.001	---	---	---	---	---	---		**1**	**41**
Cu	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	0.001	0.004	<0.001	<0.001	---	---	0.033	<0.001	0.046	0.002	0.002	**0.5**	**23.6**
Fe[3]	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	0.02	1.52	8.06	11.7	10.7	79.2	67.6	75.7	94.2	39.1	44.5	**1 (irrigation)[3]**	
Hg	<0.0001	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001	---	<0.0001	---	---	<0.0001	<0.0001	---	---	---	---	---	---		**0.002**	
K	12	---	---	---	22	22	20	18	---	17	---	---	9.9	9	---	---	---	---	---	---		**-**	
Mg	30	---	---	---	254	266	276	384	---	498	368	390	588	608	692	715	820	1190	838	674	951	**-**	
Mn[3]	0.12	---	---	---	0.32	3.0	2.0	1.3	---	2.0	4.07	4.13	8.04	6.88	8.92	12.8	11.6	26.3	10.6	8.41	8.91	**2 (irrigation)[3]**	
Na	11	---	---	---	21	14	8	9	---	7	---	---	3.8	4	---	---	---	---	---	---		**-**	
Ni	<0.01	---	---	---	<0.01	0.03	0.02	0.01	---	0.02	0.041	0.033	0.06	0.041	0.061	0.077	0.084	0.212	0.06	0.041	0.048	**1**	**47**
Pb	<0.01	---	---	---	0.07	0.07	0.02	0.02	---	0.03	0.001	<0.001	0.011	0.004	0.097	0.073	0.119	0.007	0.044	<0.001	0.017	**0.1**	**4.7**
SO_4	155	---	---	---	1,310	1,410	1,460	1,820	---	2,300	1,700	1,820	2,740	2,810	3,290	3,580	3,860	5,750	4,530	3,320	4,710	**1,000**	
Sb	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	<0.001	---	---	---	---	---	---		**-**	
Se	<0.01	---	---	---	<0.01	<0.01	<0.01	<0.01	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.10	0.013	<0.010	<0.010	<0.010	**0.02**	
Tl	0.004	---	---	---	0.025	0.029	0.024	0.027	---	0.043	---	---	0.058	0.067	---	---	---	---	---	---		**-**	
Zn	<0.01	---	---	---	0.11	1.04	1.56	1.1	---	2.3	7.91	7.06	22.4	17.3	25.8	39.8	41.4	92.8	41.2	25.3	28.8	**20**	**944**
RESULTS**																							
SO_4 Generation Rate	18	---	---	---	200	199	206	246	---	257	230	236	387	417	421	465	517	0	0	0	0		
Cumulative SO_4 Gen.	18	---	---	---	219	418	624	870	---	1,127	1,357	1,593	1,979	2,397	2,818	3,283	3,800	3,800	3,800	3,800	3,800		
Ca Generation Rate	4.2	---	---	---	19	24	22	19	---	15	21	19	26	29	32	37	39	0	0	0	0		
Cumulative Ca Gen.	4.2	---	---	---	23	47	68	87	---	102	123	142	168	197	228	265	304	304	304	304	304		
Mg Generation Rate	3.5	---	---	---	39	38	39	52	---	56	50	50	83	90	89	93	110	0	0	0	0		
Cumulative Mg Gen.	3.5	---	---	---	42	80	119	171	---	227	276	327	410	500	589	682	791	791	791	791	791		
Residual ANC (%)	100	---	---	---	100.0	99.9	99.9	99.8	---	99.8	99.7	99.7	99.6	99.5	99.3	99.2	99.1	99.1	99.1	99.1	99.1		
SO_4/Ca	1.8	---	---	---	4.5	3.5	3.9	5.4	---	7.3	4.5	5.3	6.2	6.1	5.5	5.3	5.6	7.0	7.5	5.3	9.8		
Cd generation rate	0.010	---	---	---	0.001	0.001	0.001	0.001	---	0.001	0.001	0.001	0.003	0.003	0.004	0.005	0.005	0.000	0.000	0.000	0.000		
Cumulative Cd Gen.	0.010	---	---	---	0.011	0.012	0.013	0.013	---	0.014	0.015	0.016	0.019	0.022	0.025	0.030	0.036	0.036	0.036	0.036	0.036		
Fe generation rate	0.001	---	---	---	0.002	0.001	0.001	0.001	---	0.001	0.003	0.20	1.14	1.74	1.37	10.30	9.05	0.00	0.00	0.00	0.00		
Cumulative Fe Gen.	0.001	---	---	---	0.003	0.004	0.006	0.007	---	0.008	0.011	0.21	1.35	3.08	4.45	14.7	23.8	23.8	23.8	23.8	23.8		
Mn generation rate	0.014	---	---	---	0.049	0.43	0.28	0.17	---	0.22	0.55	0.53	1.14	1.02	1.14	1.66	1.55	0.00	0.00	0.00	0.00		
Cumulative Mn Gen.	0.014	---	---	---	0.063	0.49	0.77	0.94	---	1.17	1.72	2.25	3.39	4.41	5.55	7.21	8.77	8.77	8.77	8.77	8.77		
Zn generation rate	0.001	---	---	---	0.017	0.15	0.22	0.15	---	0.26	1.07	0.91	3.16	2.57	3.30	5.17	5.54	0.00	0.00	0.00	0.00		
Cumulative Zn Gen.	0.001	---	---	---	0.018	0.16	0.39	0.53	---	0.79	1.86	2.77	5.94	8.51	11.8	17.0	22.5	22.5	22.5	22.5	22.5		
Hardness*	213	---	---	---	1,351	1,515	1,524	1,931	---	2,380	1,907	1,966	2,883	2,986	3,466	3,646	4,098	5,759	4,080	3,430	4,416	Avg. Hardness =	2,797

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg CaCQ/L

** SO_4, Ca, Mg, Cd, Fe, Mn and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

\# Total S, ANC and NAG data calculated for mix of materials in each column

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H17: Laboratory Column Leach Test Results for Sample Lab 6 (AC / PAF / AC)
AC Cooley Dolomite / PAF Upper Pyritic/Dolomitic Shale / AC W-fold Shale

Sample Weight (kg)	3.16	ANC (kg H_2SO_4/t)#	525
pH	8.20	NAPP (kg H_2SO_4/t)#	-454
EC (µS/cm)	395	NAG (kg H_2SO_4/t)#	0
Total S (%)#	4.02	NAG pH#	7.0

Date	**16-Jan-03**	**23-Jan-03**	**30-Jan-03**	**6-Feb-03**	**13-Feb-03**	**6-Mar-03**	**3-Apr-03**	**24-Apr-03**	**29-May-03**	**19-Jun-03**	**15-Oct-03**	**17-Dec-03**	**4-Mar-04**	**16-Jun-04**	**10-Nov-04**	**8-Feb-05**	**11-May-05**	**3-Aug-05**	**14-Nov-05**	**15-Feb-06**	**17-May-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
Round Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**		
Volume Leached (L)	0.400	0.120	0.480	0.440	0.520	0.440	0.480	0.460	0.460	0.440	0.48	0.45	0.43	0.368	0.448	0.451	0.437	0.436	0.435	0.45	0.43		
Cum. Volume (L)	0.400	0.520	1.000	1.440	1.960	2.400	2.880	3.340	3.800	4.240	4.720	5.170	5.600	5.968	6.416	6.867	7.304	7.740	8.175	8.625	9.055		
Pore Volumes	0.3	0.4	0.7	1.1	1.5	1.8	2.1	2.5	2.8	3.1	3.5	3.8	4.1	4.4	4.8	5.1	5.4	5.7	6.1	6.4	6.7		
pH	8.20	6.59	7.20	8.50	7.05	6.87	7.74	6.09	5.99	6.08	7.1	7.38	7.3	7	7.04	6.37	6.25	6.33	5.95	6.97	5.89		
EC (µS/cm)	395	2,121	1,918	1,608	1,776	2,036	1,981	2,111	2,124	1,942	2,061	1,849	3,000	2,850	3,050	3,610	3,330	5,460	3,480	2,930	3,950		
Acidity (mg/L)*	<1	---	---	<1	---	<1	<1	<1	---	<1	<1	<1	<1	33	<1	<1	60	191	76	53	67		
Alkalinity (mg/L)*	112	---	---	48	---	35	25	22	---	20	20	27	23	21	27	7	21	11	20	51	6		
Net Alkalinity (mg/L)*	112	---	---	48	---	35	25	22	---	20	20	27	23	-12	26	6	-39	-180	-56	-2	-61		
Dissolved elements (mg/L)																							
Al	<0.1	---	---	<0.1	---	<0.1	<0.1	<0.1	---	<0.1	---	---	<0.01	<0.01	---	---	<0.01	0.02	0.02	<0.01	0.05	**5**	
As	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	<0.001	<0.001	0.001	<0.001	---	---	---	---	---	---		**0.5**	
Ca	27	---	---	128	---	169	130	123	---	120	131	143	168	151	192	284	274	302	236	232	196	**1,000**	
Cd	<0.005	---	---	<0.005	---	<0.005	<0.005	<0.005	---	<0.005	0.0129	0.0168	0.0305	0.0283	0.0361	0.1000	0.0590	0.1360	0.0820	0.0270	0.0601	**0.01**	**0.43**
Cl	49	---	---	36	---	54	21	44	---	15	---	---	<1	3	---	---	---	---	---	---		**-**	
Co	<0.01	---	---	<0.01	---	0.08	0.03	0.02	---	0.02	0.053	0.046	0.056	0.05	0.055	0.14	0.081	0.252	0.092	0.063	0.059	**1**	
Cr	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	---	---	<0.001	<0.001	---	---	---	---	---	---		**1**	**32**
Cu	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	0.003	0.005	0.003	0.001	---	---	---	---	---	---	<0.001	**0.5**	**18.2**
Fe[3]	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	<0.01	0.03	0.11	0.01	<0.01	2.24	0.06	8.08	6.26	<0.05	1.38	**1 (irrigation)[3]**	
Hg	<0.0001	---	---	<0.0001	---	<0.0001	<0.0001	<0.0001	---	<0.0001	---	---	<0.00010	<0.0001	---	---	---	---	---	---		**0.002**	
K	15	---	---	22	---	27	20	20	---	17	---	---	15.1	12	---	---	---	---	---	---		**-**	
Mg	19	---	---	170	---	203	184	266	---	232	231	347	427	405	506	609	552	820	627	470	597	**-**	
Mn[3]	0.03	---	---	0.16	---	0.80	0.48	0.42	---	0.48	0.782	1.02	1.24	1.33	1.46	3.79	1.96	6.65	2.67	1.99	1.95	**2 (irrigation)[3]**	
Na	17	---	---	42	---	33	18	18	---	12	---	---	39.3	7	---	---	---	---	---	---		**-**	
Ni	<0.01	---	---	<0.01	---	0.06	0.02	0.01	---	0.01	0.053	0.034	0.04	0.037	0.036	0.108	0.066	0.193	0.052	0.042	0.038	**1**	**36**
Pb	0.02	---	---	0.07	---	0.09	0.09	0.040	---	0.03	0.016	0.006	0.007	0.004	0.008	0.016	0.003	0.011	0.009	<0.001	0.009	**0.1**	**3.6**
SO_4	113	---	---	1,030	---	1,230	1,040	1,340	---	1,210	1,140	1,670	2,040	1,890	2,400	3,110	2,720	4,100	3,220	2,400	2,840	**1,000**	
Sb	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	<0.01	---	---	0.001	<0.001	---	---	---	---	---	---		**-**	
Se	<0.01	---	---	<0.01	---	<0.01	<0.01	<0.01	---	0.02	0.01	0.02	0.02	0.02	0.018	0.025	0.022	0.034	0.024	0.013	0.016	**0.02**	
Tl	0.004	---	---	0.018	---	0.023	0.02	0.02	---	0.027	---	---	0.03	0.026	---	---	---	---	---	---		**-**	
Zn	<0.01	---	---	0.07	---	2.1	1.7	1.35	---	2.1	9.98	11.2	23.8	20.8	16.8	88.2	39.7	141	49.3	29.3	31.2	**20**	**727**
RESULTS**																							
SO_4 Generation Rate	14	---	---	143	---	171	158	195	---	168	173	238	278	220	340	444	376	566	443	342	386		
Cumulative SO_4 Gen.	14	---	---	158	---	329	487	682	---	851	1,024	1,261	1,539	1,759	2,099	2,543	2,919	3,485	3,928	4,270	4,657		
Ca Generation Rate	3	---	---	18	---	24	20	18	---	17	20	20	23	18	27	41	38	42	32	33	27		
Cumulative Ca Gen.	3	---	---	21	---	45	65	82	---	99	119	139	162	180	207	248	285	327	360	393	419		
Mg Generation Rate	2	---	---	24	---	28	28	39	---	32	35	49	58	47	72	87	76	113	86	67	81		
Cumulative Mg Gen.	2	---	---	26	---	54	82	121	---	153	188	238	296	343	415	502	578	691	778	844	926		
Residual ANC (%)	100.0	---	---	100.0	---	99.9	99.9	99.9	---	99.8	99.8	99.7	99.6	99.6	99.5	99.4	99.3	99.1	99.0	98.9	98.8		
SO_4/Ca	1.7	---	---	3.4	---	3.0	3.3	4.5	---	4.2	3.6	4.9	5.1	5.2	5.2	4.6	4.1	5.7	5.7	4.3	6.0		
Fe generation rate	0.001	---	---	0.001	---	0.001	0.002	0.001	---	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001		
Cumulative Fe Gen.	0.001	---	---	0.003	---	0.004	0.006	0.007	---	0.008	0.010	0.011	0.013	0.014	0.015	0.017	0.018	0.019	0.021	0.022	0.024		
Mn generation rate	0.004	---	---	0.022	---	0.11	0.073	0.06	---	0.067	0.12	0.15	0.17	0.15	0.21	0.54	0.27	0.92	0.37	0.28	0.27		
Cumulative Mn Gen.	0.004	---	---	0.026	---	0.14	0.21	0.27	---	0.34	0.46	0.60	0.77	0.93	1.13	1.67	1.94	2.86	3.23	3.51	3.78		
Zn generation rate	0.001	---	---	0.010	---	0.30	0.26	0.20	---	0.292	1.52	1.59	3.24	2.42	2.38	12.6	5.49	19.45	6.79	4.17	4.25		
Cumulative Zn Gen.	0.001	---	---	0.011	---	0.31	0.57	0.77	---	1.06	2.58	4.17	7.41	9.83	12.2	24.8	30.3	49.7	56.5	60.7	65.0		
Hardness*	146	---	---	1,020	---	1,258	1,082	1,403	---	1,255	1,278	1,786	2,178	2,045	2,563	3,217	2,957	4,131	3,171	2,515	2,948	Avg. Hardness =	2,056

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

Total S, ANC and NAG data calcuated for mix of materials in each column

* Acidity, Alkalinity and Hardness reported as mg CaCO3/L

** SO_4, Ca, Mg, Fe, Mn and Zn generation rates calculated in mg/kg/flush.

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.

2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.

3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

Total S, ANC and NAG data calculated for mix of materials in each column

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H18: Site Column Leach Test Results for Sample Site 2 (PAF)
Lower Pyritic/Dolomitic Shale

Sample Weight (kg)	2.46	**ANC (kg H_2SO_4/t)**	202
pH	7.35	**NAPP (kg H_2SO_4/t)**	159
EC (µS/cm)	984	**NAG (kg H_2SO_4/t)**	81
Total S (%)	11.8	**NAG pH**	2.2

Date	**08-Jan-03**	**09-Jan-03**	**17-Jan-03**	**27-Jan-03**	**17-Feb-03**	**3-Mar-03**	**21-Nov-04**	**7-Jan-03**	**20-Jan-04**	**29-Jan-04**	**9-Feb-04**	**10-Feb-05**	**16-Mar-05**	**18-Nov-05**	**14-Mar-06**	**20-Mar-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
pH	5.46	---	---	2.60	4.51	3.17	3	3.4	5.6	5.5	5.5	2.45	2.28	1.86	2.31	2.83		
EC (uS/cm)	19,370	---	---	3,920	22,210	8,860	31,000	10,700	7,830	3,090	5,440	31,400	4,990	15,900	17,800	4,900		
Acidity (mg/L)*	<1	38	128	403	2390	564	388	87.4	<1	<1	<1	16100	6150	---	---	---		
Alkalinity (mg/L)*	209	<1	<1	<1	<1	<1	<1	<1	38	1	24	<1	<1	---	---	---		
Net Alkalinity (mg/L)*	209	-38	-128	-403	-2390	-564	-388	-87.4	38	1	24	-16099	-6149	---	---	---		
Dissolved elements (mg/L)																		
Al	<1	<1	<0.1	<0.1	<1.0	<1.0	0.894	0.101	0.17	0.0201	0.215	---	---	---	---	---	**5**	
As	0.02	<0.1	<0.01	<0.01	<0.1	<0.1	0.0225	0.046	0.0089	0.00215	0.00585	---	---	---	---	---	**0.5**	
Ca	570	537	591	531	485	493	498	484	520	545	538	520	510	518	470	586	**1,000**	
Cd	0.56	0.05	0.03	0.07	1.7	0.39	0.191	3.34	0.78	0.167	0.043	11.4	2.36	4.97	1.42	0.212	**0.01**	**2.30**
Cl	830	80	<1	23	62	34	37.6	3.2	5.4	1.4	4.5	---	---	---	---	---	**-**	
Co	13.9	0.3	0.06	0.48	10	0.9	---	---	---	---	---	3.66	0.963	1.44	1.41	0.145	**1**	
Cr	0.1	<0.1	0.02	0.02	<0.10	<0.10	---	---	---	---	---	---	---	---	---	---	**1**	**150**
Cu	0.1	<0.1	<0.01	<0.01	<0.10	<0.10	0.00382	0.0103	0.00056	0.0011	0.00104	---	---	---	---	---	**0.5**	**89.9**
Fe[3]	61	<0.1	<0.01	1.1	2.5	1.8	3410	18.4	2.88	<0.2	5.4	5520	2200	1980	7920	901	**1 (irrigation)[3]**	
Hg	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<1	0.005	0.0002	<0.0002	0.0007	---	---	---	---	---	**0.002**	
K	7	2	2	3	1	2	<1	2	4	14.9	6	---	---	---	---	---	**-**	
Mg	16,800	987	113	217	8,780	1,600	8,190	3	808	203	475	5,380	789	1,770	1,030	173	**-**	
Mn[3]	632	69	42	26	512	129	650	233	57.3	12	32.1	428	64.9	125	79.2	12.5	**2 (irrigation)[3]**	
Na	47	7	2	5	14	10	10	9	7	6.4	5	---	---	---	---	---	**-**	
Ni	10.5	0.4	0.28	0.26	3.5	0.6	5.72	1.02	0.161	0.028	0.0754	1.53	0.275	0.453	0.296	0.028	**1**	**180**
Pb	2.4	0.2	0.41	0.78	1.6	1.3	1.41	0.509	0.0368	0.0774	0.134	0.172	0.017	0.064	0.014	0.058	**0.1**	**18.0**
SO_4	69,900	5,290	1,970	3,250	39,900	9,800	49,870	17,560	5,420	2,460	3,450	42,400	10,800	24,500	21,500	3,780	**1,000**	
Sb	<0.1	<0.1	<0.01	<0.01	0.1	<0.10	<0.0025	<0.001	0.0021	<0.0005	<0.001	---	---	---	---	---	**-**	
Se	0.2	<0.01	0.02	0.03	0.2	<0.10	0.299	0.109	0.00342	0.0076	0.0272	0.255	0.046	0.174	0.029	<0.10	**0.02**	
Tl	0.408	0.085	0.106	0.275	0.45	0.367	523	0.476	0.45	0.614	0.685	---	---	---	---	---	**-**	
Zn	881	7	56	46	0.1	297	5660	1700	495	34.1	0.236	5950	916	2430	748	89.7	**20**	**3,597**
SO_4/Ca Ratio	51.1	4.1	1.4	2.6	34	8	42	15	4	2	3	34	9	20	19	3		
Hardness*	70,606	5,405	1,941	2,220	37,367	7,820	34,970	1,223	4,626	2,197	3,299	23,453	4,523	8,582	5,415	2,176	Avg. Hardness =	13,489

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.

2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.

3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H19: Site Column Leach Test Results for Sample Site 4 (NAF)
Lower Pyritic/Dolomitic Shale

Sample Weight (kg)	2.66	**ANC (kg H_2SO_4/t)**	254
pH	8.34	**NAPP (kg H_2SO_4/t)**	-119
EC (µS/cm)	282	**NAG (kg H_2SO_4/t)**	0
Total S (%)	4.4	**NAG pH**	8.1

Date	**08-Jan-03**	**09-Jan-03**	**17-Jan-03**	**27-Jan-03**	**17-Feb-03**	**3-Mar-03**	**21-Nov-03**	**7-Jan-04**	**20-Jan-04**	**29-Jan-04**	**9-Feb-04**	**10-Feb-05**	**16-Mar-05**	**18-Nov-05**	**14-Mar-06**	**20-Mar-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
pH	6.49	---	---	7.47	7.14	7.59	7.5	6.9	6.9	7.4	7.2	7.17	7.37	6.96	6.74	6.95		
EC (uS/cm)	5,020	---	---	1,050	7,300	3,660	1,050	4,260	2,550	1,340	1,340	7,350	2,640	3,430	3,900	2,290		
Acidity (mg/L)*	13	33	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	6	---	---	---		
Alkalinity (mg/L)*	<1	<1	48	50	38	43	61	34	61	66	44	50	54	---	---	---		
Net Alkalinity (mg/L)*	-13	-33	48	50	38	43	61	34	61	66	44	40	48	---	---	---		
Dissolved elements (mg/L)																		
Al	<0.1	<0.1	<0.1	<0.1	<1.0	<0.1	0.0161	0.0102	0.024	0.0199	0.0261	---	---	---	---	---	**5**	
As	0.04	<0.01	<0.01	<0.01	0.2	<0.01	0.0039	0.0033	0.0015	0.0011	0.0001	---	---	---	---	---	**0.5**	
Ca	526	262	104	175	4720	526	485	482	445	238	233	545	574	564	571	623	**1,000**	
Cd	<0.005	<0.005	<0.005	<0.005	<0.050	<0.005	0.0019	0.00128	0.00086	0.0004	0.0004	0.0094	0.0011	0.0011	0.0017	0.0008	**0.01**	**1.35**
Cl	25	1	<1	<1	<1	29	14	5.3	0.6	0.7	0.2	---	---	---	---	---	**-**	
Co	0.08	<0.01	<0.01	<0.01	1.8	0.05	---	---	---	---	---	0.049	0.009	0.002	0.009	0.003	**1**	
Cr	0.01	<0.01	<0.01	<0.01	0.1	<0.01	---	---	---	---	---	---	---	---	---	---	**1**	**91**
Cu	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	0.00159	0.00172	0.00108	0.00066	0.00056	---	---	---	---	---	**0.5**	**54.0**
Fe[3]	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.2	0.12	<0.1	<0.1	<0.1	1.68	2.91	<0.05	2.11	0.24	**1 (irrigation)[3]**	
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	---	---	---	---	---	**0.002**	
K	69	11	6	9	234	18	8	2	4	5.1	3	---	---	---	---	---	**-**	
Mg	640	14	9	34	15,900	485	1,710	598	173	53	59	1,200	271	406	432	40	**-**	
Mn[3]	7	0.61	0.39	1.19	242	9.81	24.1	10.3	4.25	3.07	2.13	17.1	3.61	0.118	4.16	1.58	**2 (irrigation)[3]**	
Na	58	<1	<1	5	127	6	10	4	3	1.2	<1	---	---	---	---	---	**-**	
Ni	0.17	<0.01	<0.01	0.05	3.2	0.1	0.143	0.057	0.105	0.0184	0.0052	0.065	0.012	<0.001	0.01	0.002	**1**	**108**
Pb	0.02	<0.01	<0.01	<0.01	<0.10	<0.01	0.00614	0.0317	0.0322	0.00151	0.00136	<0.001	<0.001	0.002	<0.001	<0.001	**0.1**	**10.8**
SO4	3,860	619	245	520	7,501	3,180	7,840	3,390	1,920	824	750	5,900	2,340	3,020	2,950	1,450	**1,000**	
Sb	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	0.002	0.0025	0.0026	0.00135	<0.00025	---	---	---	---	---	**-**	
Se	0.02	<0.01	<0.01	0.02	0.4	0.01	0.0188	0.0106	0.016	0.0016	0.0018	<0.01	<0.010	<0.010	<0.010	<0.010	**0.02**	
Tl	0.047	0.001	0.007	0.013	0.043	0.045	0.0331	0.0238	0.0306	0.0414	0.0247	---	---	---	---	---	**-**	
Zn	0.22	0	0	0	12.5	0.06	0.0362	0.644	0.254	0.114	0.116	3.85	0.271	0.458	0.219	0.103	**20**	**2,159**
SO4/Ca	3.1	1.0	1.0	1.2	0.7	2.5	6.7	2.9	1.8	1.4	1.3	4.5	1.7	2.2	2.2	1.0		
Hardness*	3,949	712	297	577	77,262	3,311	8,253	3,666	1,824	814	825	6,302	2,549	3,080	3,205	1,720	Avg. Hardness =	7,397

< indicates less than the analytical detection limit.

Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.

2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.

3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H20: Site Column Leach Test Results for Sample Site 6 (PAF)
Upper Pyritic/Dolomitic Shale

Sample Weight (kg)	9.34	**ANC (kg H_2SO_4/t)#**	206
pH	6.84	**NAPP (kg H_2SO_4/t)#**	128
EC (µS/cm)	7,020	**NAG (kg H_2SO_4/t)#**	57
Total S (%)#	10.9	**NAG pH#**	2.4

Date	8-Jan-03	9-Jan-03	17-Jan-03	27-Jan-03	17-Feb-03	3-Mar-03	21-Nov-03	7-Jan-04	20-Jan-04	29-Jan-04	9-Feb-04	10-Feb-05	16-Mar-05	18-Nov-05	14-Mar-06	20-Mar-06	ANZECC[1]/NEPM[2] Guidelines	ANZECC[1] HMTV[4] (mg/L)
pH	6.84	---	---	7.33	7.51	7.72	7	7	6.7	7.4	7.1	6.77	4.91	6.01	3.23	3.66		
EC (uS/cm)	7,020	---	---	2,218	6,470	4,370	7,090	7,150	3,570	1,860	2,830	16,200	3,250	5,390	7,900	3,200		
Acidity (mg/L)*	<1	45	<1	<1	<1	<1	<1	<1	<1	<1	<1	368	453	---	---	---		
Alkalinity (mg/L)*	108	<1	50	53	40	60	30	39	78	61	68	58	<1	---	---	---		
Net Alkalinity (mg/L)*	108	-45	50	53	40	60	30	39	78	61	68	58	-451	---	---	---		
Dissolved elements (mg/L)																		
Al	<1	<0.1	<0.1	<0.1	<1.0	<0.1	0.0118	0.0166	0.0104	0.0222	0.0053	---	---	---	---	---	**5**	
As	<0.1	0.01	0.02	<0.01	<0.10	<0.01	0.00555	0.005	0.0035	0.0011	0.0022	---	---	---	---	---	**0.5**	
Ca	490	384	482	383	453	479	456	486	473	359	467	544	482	497	510	572	**1,000**	
Cd	<0.05	<0.005	<0.005	<0.005	<0.050	<0.005	0.0128	0.0156	0.0176	0.00718	0.0142	0.107	0.72	0.191	0.706	0.23	**0.01**	**0.89**
Cl	230	7	<1	<1	2	49	8.7	4.7	1.1	0.6	0.8	---	---	---	---	---	**-**	
Co	0.1	0.03	0.03	<0.01	0.2	0.09	---	---	---	---	---	1.67	1.77	0.679	1.27	0.206	**1**	
Cr	<0.1	<0.01	0.01	<0.01	<0.10	<0.01	---	---	---	---	---	---	---	---	---	---	**1**	**63**
Cu	<0.1	<0.01	<0.01	<0.01	<0.10	<0.01	0.00162	0.00114	0.00073	0.00038	0.00049	---	---	---	---	---	**0.5**	**36.4**
Fe[3]	0.2	<0.01	<0.01	<0.01	<0.10	<0.01	<0.2	<0.2	0.12	<0.1	<0.1	2.27	2.38	<0.05	210.0	50.8	**1 (irrigation)[3]**	
Hg	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	---	---	---	---	---	**0.002**	
K	227	69	69	38	98	65	17	7	6	11.8	11	---	---	---	---	---	**-**	
Mg	1,500	342	279	114	1,150	597	1,320	990	380	75	216	3,460	746	1,040	1,110	182	**-**	
Mn[3]	3.3	0.9	1.1	0.8	6.9	4.01	7.58	9.69	9.09	4.58	---	58.7	37.5	19	38.8	7.66	**2 (irrigation)[3]**	
Na	1200	115	53	16	30	15	7	5	5	2.1	3	---	---	---	---	---	**-**	
Ni	0.1	0.04	0.08	0.08	0.3	0.12	0.0606	0.16	0.253	0.153	0.138	1.31	2.29	0.605	1.79	0.375	**1**	**73**
Pb	0.2	<0.1	<0.01	<0.01	<0.10	<0.01	0.0109	0.0214	0.0138	0.00113	0.00291	0.057	0.042	<0.001	0.013	0.006	**0.1**	**7.3**
SO_4	9,230	2,380	2,370	1,380	5,670	3,550	6,400	4,830	2,700	1,180	1,960	15,000	4,680	5,920	7,190	2,320	**1,000**	
Sb	<0.1	<0.01	<0.01	<0.01	<0.10	<0.01	0.00055	0.00475	0.00085	0.0008	0.00065	---	---	---	---	---	**-**	
Se	0.1	<0.01	0.02	<0.01	<0.10	0.02	0.0326	0.0244	0.0138	0.0028	0.008	0.038	0.029	0.021	0.033	<0.010	**0.02**	
Tl	0.053	0.018	0.022	0.015	0.052	0.043	0.0262	0.0198	0.0188	0.0277	0.0297	---	---	---	---	---	**-**	
Zn	2.8	47	0.7	0.7	6	2	6	0.0134	26.2	8.63	10.6	239	374	108	348	65.5	**20**	**1,454**
SO_4/Ca Ratio	7.8	2.6	2.0	1.5	5.2	3.1	5.8	4.1	2.4	1.4	1.7	11.5	4.0	5.0	5.9	1.7		
Hardness*	7,401	2,367	2,352	1,426	5,867	3,655	6,574	5,290	2,746	1,205	2,056	15,607	4,276	5,524	5,844	2,178	Avg. Hardness =	4,648

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.

2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.

3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

Total S, ANC, NAPP and NAG data calculated for mix of materials in leach column.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H21: Site Column Leach Test Results for Sample Site 7 (NAF)
Upper Pyritic/Dolomitic Shale

Sample Weight (kg)	8.26	**ANC (kg H_2SO_4/t)**	203
pH	6.78	**NAPP (kg H_2SO_4/t)**	-53
EC (µS/cm)	2,900	**NAG (kg H_2SO_4/t)**	0
Total S (%)#	4.9	**NAG pH**	7.3

Date	**8-Jan-03**	**9-Jan-03**	**17-Jan-03**	**27-Jan-03**	**17-Feb-03**	**3-Mar-03**	**21-Nov-04**	**7-Jan-04**	**20-Jan-04**	**29-Jan-04**	**9-Feb-04**	**10-Feb-05**	**16-Mar-05**	**18-Nov-05**	**14-Mar-06**	**20-Mar-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
pH	6.78	---	---	7.87	7.64	7.93	6.7	7.6	7.4	6.8	7.5	---	---	7.36	6.66	6.92		
EC (uS/cm)	2,900	---	---	1,085	3,610	2,064	4,410	3,990	1,670	4,200	1,190	---	---	5,650	4250	2,740		
Acidity (mg/L)*	25	40	<1	<1	<1	<1	<1	<1	<1	<1	48	---	---	---	---	---		
Alkalinity (mg/L)*	<1	<1	35	40	33	32	21	42	61	10	<1	---	---	---	---	---		
Net Alkalinity (mg/L)*	-25	-40	35	40	33	32	21	42	61	10	-48	---	---	---	---	---		
Dissolved elements (mg/L)																		
Al	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0094	0.0053	0.0488	0.0019	0.0194	---	---	---	---	---	**5**	
As	<0.01	0.03	0.02	0.03	0.02	0.01	0.0165	0.0087	0.00415	0.0022	0.0034	---	---	---	---	---	**0.5**	
Ca	272	52	23	118	488	293	482	524	276	493	176	---	---	492	532	615	**1,000**	
Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.00284	0.00422	0.00166	0.185	0.00112	---	---	0.007	0.0127	0.005	**0.01**	**0.45**
Cl	15	6	<1	<1	<1	34	7.4	4	0.5	2.2	0.2	---	---	---	---	---	**-**	
Co	0.02	<0.01	<0.01	<0.01	0.07	0.02	---	---	---	---	---	---	---	0.057	0.086	0.028	**1**	
Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	---	---	---	---	---	---	---	---	**1**	**34**
Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0018	0.00125	0.00058	0.00087	0.00098	---	---	---	---	---	**0.5**	**19.1**
Fe[3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.100	<0.1	<0.1	<0.2	<0.2	---	---	<0.05	0.27	0.07	**1 (irrigation)[3]**	
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	---	---	---	---	---	**0.002**	
K	50	18	10	17	40	26	20	31	5	5.3	6	---	---	---	---	---	**-**	
Mg	296	30	14	62	374	150	569	471	97.3	530	65	---	---	1220	487	119	**-**	
Mn[3]	0.5	0.06	<0.01	0.14	2.01	0.73	3.42	1.08	1.37	12.5	0.653	---	---	0.608	7.3	2.98	**2 (irrigation)[3]**	
Na	78	5	1	3	13	5	9	8	3	5.8	2	---	---	---	---	---	**-**	
Ni	0.02	<0.01	<0.01	<0.01	0.09	0.01	0.037	0.0298	0.00115	0.0264	0.0122	---	---	0.024	0.05	0.02	**1**	**38**
Pb	<001	<0.01	<0.01	<0.01	<0.01	<0.01	0.0461	0.0181	0.00275	0.0663	0.00071	---	---	0.003	0.004	<0.001	**0.1**	**3.8**
SO_4	1,930	218	87	509	2,660	1,280	3,540	2,980	1,030	3,310	655	---	---	6,540	3140	1,760	**1,000**	
Sb	0.02	0.01	<0.01	0.01	0.01	<0.01	0.0064	0.0047	0.025	<0.0005	0.00265	---	---	---	---	---	**-**	
Se	0.04	<0.01	0.01	0.02	0.04	0.01	0.0532	0.0264	0.0106	0.0138	0.0062	---	---	0.055	0.015	<0.010	**0.02**	
Tl	0.011	0.003	0.002	0.004	0.016	0.012	0.0137	0.0187	0.00835	0.14	0.00729	---	---	---	---	---	**-**	
Zn	3.1	0.03	0.01	0.09	1.4	0.33	1.9	2.2	0.894	53	0.507	---	---	0.898	10.9	3.3	**20**	**765**
SO_4/Ca Ratio	3.0	1.7	1.6	1.8	2.3	1.8	3.1	2.4	1.6	2.8	1.6	---	---	5.5	2.5	1.2		
Hardness*	1,898	253	115	550	2,759	1,349	3,547	3,248	1,090	3,414	707	---	---	6,252	3,334	2,026	Avg. Hardness =	2,182

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.
4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H22: Site Column Leach Test Results for Sample Site 9 (AC / PAF / AC)
AC Cooley Dolomite / PAF Lower Pyritic/Dolomitic Shale / AC W-fold Shale

Sample Weight (kg)	9.00	**ANC (kg H_2SO_4/t)#**	468
pH	4.18	**NAPP (kg H_2SO_4/t)#**	-157
EC (µS/cm)	17,780	**NAG (kg H_2SO_4/t)#**	0
Total S (%)#	10.16	**NAG pH#**	-

Date	**8-Jan-03**	**9-Jan-03**	**17-Jan-03**	**27-Jan-03**	**17-Feb-03**	**3-Mar-03**	**21-Nov-03**	**7-Jan-04**	**20-Jan-04**	**29-Jan-04**	**9-Feb-04**	**10-Feb-05**	**16-Mar-05**	**18-Nov-05**	**14-Mar-06**	**20-Mar-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
pH	4.18	---	---	7.31	6.97	7.36	6.8	6.4	6.8	7.6	6.9	---	---	2.83	3.05	3.89		
EC (uS/cm)	17,780	---	---	5,670	10,790	5,200	6,470	7,590	5,250	1,220	2,780	---	---	17,600	15100	5,080		
Acidity (mg/L)*	108	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	---	---	---	---	---		
Alkalinity (mg/L)*	<1	55	33	35	68	40	1	9	25	52	30	---	---	---	---	---		
Net Alkalinity (mg/L)*	-108	55	33	35	68	40	1	9	25	52	30	---	---	---	---	---		
Dissolved elements (mg/L)																		
Al	<1	<1	<1.0	<0.1	<1.0	<0.1	0.0807	0.0031	0.0278	0.0211	0.0056	---	---	---	---	---	**5**	
As	<0.01	<0.1	<0.10	<0.01	<0.10	<0.01	0.023	0.0079	0.0024	0.00295	0.00225	---	---	---	---	---	**0.5**	
Ca	545	441	426	482	438	488	471	481	478	191	502	---	---	474	478	526	**1,000**	
Cd	0.06	<0.05	<0.05	0.01	0.1	0.03	0.91	0.21	0.18	0.00	0.11	---	---	5.03	2.35	0.45	**0.01**	**1.80**
Cl	145	150	<1	33	<1	83	22.4	5.1	2.2	0.7	0.4	---	---	---	---	---	**-**	
Co	1.4	0.2	0.2	0.15	0.9	0.24	---	---	---	---	---	---	---	2.34	1.5	0.416	**1**	
Cr	<0.1	<0.1	<0.10	0.01	<0.10	<0.01	---	---	---	---	---	---	---	---	---	---	**1**	**120**
Cu	<0.1	<0.1	<0.10	<0.01	<0.10	<0.01	0.0049	0.00077	0.00095	0.00034	0.00072	---	---	---	---	---	**0.5**	**71.3**
Fe[3]	0.4	<0.1	<0.10	<0.01	<0.10	<0.01	<0.4	0.26	<0.2	<0.1	<0.1	---	---	86.3	1230	43.7	**1 (irrigation)[3]**	
Hg	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0004	<0.0002	<0.0002	<0.0001	<0.0001	---	---	---	---	---	**0.002**	
K	109	77	53	31	34	22	21	8	4	5.4	4	---	---	---	---	---	**-**	
Mg	5,610	3,300	2,580	954	2,700	907	4,470	1,750	692	62	173	---	---	4,790	2,440	587	**-**	
Mn[3]	65	35	33	16	44	16	224	49	20	1	7	---	---	243	153	42	**2 (irrigation)[3]**	
Na	152	82	49	19	18	7	12	6	5	1.5	2	---	---	---	---	---	**-**	
Ni	0.6	2	<0.10	0.07	0.2	0.06	0.989	0.0823	0.0342	0.0185	0.00905	---	---	0.884	0.61	0.176	**1**	**143**
Pb	0.6	0.5	0.1	0.1	0.5	0.13	1.13	0.142	0.105	0.0005	0.077	---	---	0.414	0.453	0.016	**0.1**	**14.3**
SO_4	22,700	14,100	11,500	4,860	11,510	4,710	20,890	8,010	4,120	715	1,940	---	---	35,400	14,900	3,940	**1,000**	
Sb	<0.1	<0.1	<0.10	<0.01	<0.10	<0.01	<0.001	0.00085	<0.0005	0.003	<0.00025	---	---	---	---	---	**-**	
Se	0.1	<0.1	<0.10	0.01	<0.10	0.02	0.088	0.0354	0.0126	0.0066	0.0086	---	---	0.209	0.015	0.011	**0.02**	
Tl	0.101	0.049	0.037	0.128	0.231	0.113	0.156	0.0082	0.0696	0.0066	0.0993	---	---	---	---	---	**-**	
Zn	69	31	25	13	86.1	23.3	2.42	135	100	0.478	39.5	---	---	2390	10.9	224	**20**	**2,853**
SO_4/Ca Ratio	17.4	13.3	11.2	4.2	10.9	4.0	18.5	6.9	3.6	1.6	1.6	---	---	31.1	13.0	3.1		
Hardness*	24,463	14,691	11,688	5,132	12,212	4,954	19,584	8,408	4,043	733	1,966	---	---	20,909	11,241	3,731	Avg. Hardness =	10,268

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

Total S, ANC, NAPP and NAG data calculated for mix of materials in leach column.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV (H/30) $^{0.89}$, Cr(III): $TV(H/30)^{0.82}$, Cu: $TV(H/30)^{0.85}$, Pb: $TV(H/30)^{1.27}$, Ni: $TV(H/30)^{0.85}$, Zn: $HMTV = TV(H/30)^{0.85}$ where TV = trigger values, and H = hardness

Table H23: Site Column Leach Test Results for Sample Site 10 (AC / PAF / AC)
AC Cooley Dolomite / PAF Upper Pyritic/Dolomitic Shale / AC W-fold Shale

Sample Weight (kg)	8.14	**ANC (kg H_2SO_4/t)#**	438
pH	7.24	**NAPP (kg H_2SO_4/t)#**	-324
EC (µS/cm)	4,420	**NAG (kg H_2SO_4/t)#**	0
Total S (%)#	3.72	**NAG pH#**	-

Date	**8-Jan-03**	**9-Jan-03**	**17-Jan-03**	**27-Jan-03**	**17-Feb-03**	**3-Mar-03**	**21-Nov-03**	**7-Jan-04**	**20-Jan-04**	**29-Jan-04**	**9-Feb-04**	**10-Feb-05**	**16-Mar-05**	**18-Nov-05**	**14-Mar-06**	**20-Mar-06**	**ANZECC[1]/NEPM[2] Guidelines**	**ANZECC[1] HMTV[4] (mg/L)**
pH	7.24	---	---	7.91	7.73	7.93	6.8	6.9	7.5	7.3	7.5	7.26	6.56	7.02	5.98	6.74		
EC (uS/cm)	4,420	---	---	1,415	3,970	2,880	6,470	4,560	2,860	2,340	1,430	8,860	2,640	4630	6490	3040		
Acidity (mg/L)*	38	45	<1	<1	<1	<1	<1	<1	<1	<1	<1	27	174	---	---	---		
Alkalinity (mg/L)*	<1	<1	53	48	45	44	28	32	41	28	47	47	8	---	---	---		
Net Alkalinity (mg/L)*	-38	-45	53	48	45	44	28	32	41	28	47	20	-166	---	---	---		
Dissolved elements (mg/L)																		
Al	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0271	0.0037	0.0245	0.0152	0.0077	---	---	---	---	---	**5**	
As	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.0068	0.0027	0.0011	0.001	0.00125	---	---	---	---	---	**0.5**	
Ca	450	125	40	179	479	462	440	398	484	401	240	437	457	494	468	589	**1,000**	
Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0086	0.00612	0.00932	0.00596	0.00384	0.0322	0.144	0.0478	0.0803	0.022	**0.01**	**0.59**
Cl	45	5	<1	4	<1	49	11.3	5	0.6	1	<0.1	---	---	---	---	---	**-**	
Co	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	---	---	---	---	---	0.162	0.533	0.14	0.184	0.056	**1**	
Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	---	---	---	---	---	---	---	---	**1**	**43**
Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.00288	0.00175	0.00105	0.00054	0.00043	---	---	---	---	---	**0.5**	**24.7**
Fe[3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	0.1	0.22	<0.2	<0.1	0.72	0.03	0.06	0.95	0.06	**1 (irrigation)[3]**	
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0002	<0.0002	<0.0001	---	---	---	---	---	**0.002**	
K	87	27	14	23	41	34	26	10	6	6.2	5	---	---	---	---	---	**-**	
Mg	411	50	24	64	387	277	1180	744	227	162	71.5	1680	358	870	1020	232	**-**	
Mn[3]	0.53	0.08	0.28	0.13	0.82	0.91	3.79	1.54	2.3	0.721	0.573	10.2	17.6	4.87	13.6	5.14	**2 (irrigation)[3]**	
Na	152	11	3	5	14	7	10	7	3	2.3	<1	---	---	---	---	---	**-**	
Ni	<0.01	<0.01	<0.01	<0.01	0.03	0.01	0.0327	0.0122	0.0229	0.00575	0.00212	0.068	0.436	0.084	0.122	0.046	**1**	**49**
Pb	0.04	0.03	<0.01	0.02	0.05	0.04	0.17	0.0575	0.02	0.0164	0.0198	0.043	0.003	0.003	<0.001	<0.001	**0.1**	**4.9**
SO_4	2,860	476	158	657	2,680	2,180	5,750	3,700	2,280	1,780	819	7,510	2,620	4,980	5,410	2,160	**1,000**	
Sb	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0036	0.0006	0.0185	<0.0005	0.00055	---	---	---	---	---	**-**	
Se	0.01	<0.01	0.01	0.02	0.03	<0.01	0.035	0.0188	0.0098	0.0068	0.0022	0.021	0.012	0.015	0.011	<0.010	**0.02**	
Tl	0.013	0.003	0.003	0.004	0.01	0.011	0.0155	0.0164	0.0118	0.0101	0.0103	---	---	---	---	---	**-**	
Zn	0.18	0.02	0.06	0.08	0.33	0.3	2.42	1.59	3.07	1.39	1.31	15.2	109	20.8	32.7	6.7	**20**	**990**
SO_4/Ca Ratio	2.6	1.6	1.6	1.5	2.3	2.0	5.4	3.9	2.0	1.8	1.4	7.2	2.4	4.2	4.8	1.5		
Hardness*	2,816	518	199	711	2,790	2,294	5,958	4,058	2,143	1,668	894	8,009	2,615	4,816	5,369	2,426	Avg. Hardness =	2,955

< indicates less than the analytical detection limit. Shaded cells indicate values which exceed applied ANZECC / NEPM livestock drinking water guideline values and HMTV values

* Acidity, Alkalinity and Hardness reported as mg $CaCO_3$/L

1. Australian and New Zealand Environment and Conservation Council (ANZECC). Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock Drinking Water). October 2000.
2. National Environment Protection Measure (Assessment of Site Contamination) Measure (NEPM). Guideline on Investigation Levels for Soil and Groundwater. December 1999.
3. ANZECC / NEPM livestock drinking water guideline values are not available for Fe and Mn (i.e. these metals are insuffently toxic to livestock).
   Fe and Mn guideline values shown are for recommended concentrations of these elements in water to be used for irrigation.

Total S, ANC, NAPP and NAG data calculated for mix of materials in leach column.

4. HMTV = Hardness-modified Trigger Values. Algorithms used include the following: Cd: HMTV = TV $(H/30)^{0.89}$, Cr(III): TV$(H/30)^{0.82}$, Cu: TV$(H/30)^{0.85}$, Pb: TV$(H/30)^{1.27}$, Ni: TV$(H/30)^{0.85}$, Zn: HMTV = TV$(H/30)^{0.85}$ where TV = trigger values, and H = hardness