

## CERTIFICATE OF ANALYSIS

**Work Order** : **EP1814356**  
**Client** : **GASCOYNE WATER COOPERATIVE LTD**  
**Contact** : MISS LISA HODSON  
**Address** : 50 BOUNDARY ROAD PO BOX 5  
 CARNARVON WESTERN AUSTRALIA, AUSTRALIA 6701  
**Telephone** : +61 08 9941 4488  
**Project** : DEC 2018  
**Order number** :  
**C-O-C number** : ----  
**Sampler** : KYLIE CHAPLIN  
**Site** : ----  
**Quote number** : EP/1087/18  
**No. of samples received** : 15  
**No. of samples analysed** : 15

**Page** : 1 of 8  
**Laboratory** : Environmental Division Perth  
**Contact** : Marnie Thomsett  
**Address** : 26 Rigali Way Wangara WA Australia 6065  
**Telephone** : 08 9406 1311  
**Date Samples Received** : 07-Dec-2018 10:55  
**Date Analysis Commenced** : 07-Dec-2018  
**Issue Date** : 13-Dec-2018 17:51



Accreditation No. 825  
 Accredited for compliance with  
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alini Goundar	Senior Analyst	Perth Microbiology, Wangara, WA
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- MF = membrane filtration
- CFU = colony forming unit
- EG020: It is recognised that total Boron concentration is less than dissolved for all samples except EP1814356 -009. However, the difference is within experimental variation of the methods.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 1/10	B 2/10	B 3/10	B 18/10	B 19/10
Client sampling date / time				06-Dec-2018 11:00	06-Dec-2018 10:50	06-Dec-2018 10:40	06-Dec-2018 10:30	06-Dec-2018 10:20	
Compound	CAS Number	LOR	Unit	EP1814356-001	EP1814356-002	EP1814356-003	EP1814356-004	EP1814356-005	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	7.85	7.99	7.73	8.12	7.69	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	1300	1090	1040	672	976	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	760	633	662	384	655	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	109	65	90	97	94	
Total Alkalinity as CaCO3	----	1	mg/L	109	65	90	97	94	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	87	54	52	43	75	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	329	292	254	116	222	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	53	27	48	21	60	
Magnesium	7439-95-4	1	mg/L	26	20	25	11	27	
Sodium	7440-23-5	1	mg/L	174	158	123	100	95	
Potassium	7440-09-7	1	mg/L	11	15	11	13	10	
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	----	1	mg/L	239	150	223	98	261	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.005	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.005	0.002	0.001	0.002	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	1.14	0.50	0.36	0.48	0.23	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG020T: Total Metals by ICP-MS</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 1/10	B 2/10	B 3/10	B 18/10	B 19/10
Client sampling date / time				06-Dec-2018 11:00	06-Dec-2018 10:50	06-Dec-2018 10:40	06-Dec-2018 10:30	06-Dec-2018 10:20	
Compound	CAS Number	LOR	Unit	EP1814356-001	EP1814356-002	EP1814356-003	EP1814356-004	EP1814356-005	
				Result	Result	Result	Result	Result	
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.01	<0.01	0.01	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.003	<0.001	0.006	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.009	0.003	0.002	0.004	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	1.08	0.47	0.34	0.46	0.21	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG052G: Silica by Discrete Analyser</b>									
Reactive Silica	----	0.05	mg/L	42.0	65.7	64.1	55.6	63.2	
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L	1.0	0.5	0.4	0.5	0.3	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	0.57	0.77	1.39	1.06	0.87	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.57	0.77	1.39	1.06	0.87	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	13.3	10.6	10.0	6.10	9.70	
Total Cations	----	0.01	meq/L	12.6	10.2	10.1	6.64	9.60	
Ionic Balance	----	0.01	%	2.45	1.96	0.19	4.16	0.51	
<b>MW006: Faecal Coliforms &amp; E.coli by MF</b>									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	<1	<1	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 21/10	B 11/13	B 2/14	B 3/14	B 22/14
Client sampling date / time				06-Dec-2018 10:00	06-Dec-2018 09:55	06-Dec-2018 09:50	06-Dec-2018 09:45	06-Dec-2018 09:40	
Compound	CAS Number	LOR	Unit	EP1814356-006	EP1814356-007	EP1814356-008	EP1814356-009	EP1814356-010	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	7.71	7.95	7.87	7.61	7.61	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	736	937	539	942	1080	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	425	538	324	584	662	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	75	105	100	88	81	
Total Alkalinity as CaCO3	----	1	mg/L	75	105	100	88	81	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	69	92	26	85	78	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	143	172	68	207	265	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	31	10	41	49	50	
Magnesium	7439-95-4	1	mg/L	16	7	13	24	28	
Sodium	7440-23-5	1	mg/L	90	180	48	103	127	
Potassium	7440-09-7	1	mg/L	9	10	7	9	11	
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	----	1	mg/L	143	54	156	221	240	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.004	0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.008	<0.001	<0.001	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.27	1.34	0.17	0.22	0.23	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG020T: Total Metals by ICP-MS</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 21/10	B 11/13	B 2/14	B 3/14	B 22/14
Client sampling date / time				06-Dec-2018 10:00	06-Dec-2018 09:55	06-Dec-2018 09:50	06-Dec-2018 09:45	06-Dec-2018 09:40	
Compound	CAS Number	LOR	Unit	EP1814356-006	EP1814356-007	EP1814356-008	EP1814356-009	EP1814356-010	
				Result	Result	Result	Result	Result	
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	<0.01	0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.002	0.005	0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.003	0.014	0.001	0.002	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.25	1.29	0.17	0.20	0.21	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG052G: Silica by Discrete Analyser</b>									
Reactive Silica	----	0.05	mg/L	50.3	46.4	34.0	53.0	37.5	
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L	0.6	1.6	0.2	0.2	0.3	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	1.14	0.72	3.21	0.77	1.20	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	1.14	0.72	3.21	0.77	1.20	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	6.97	8.86	4.46	9.37	10.7	
Total Cations	----	0.01	meq/L	7.01	9.16	5.38	9.13	10.6	
Ionic Balance	----	0.01	%	0.28	1.64	9.40	1.28	0.53	
<b>MW006: Faecal Coliforms &amp; E.coli by MF</b>									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	<1	<1	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 1/15	B 5/16	B 59/14	B 52/14	B 66/14
Client sampling date / time				06-Dec-2018 09:30	06-Dec-2018 09:25	06-Dec-2018 09:20	06-Dec-2018 09:00	06-Dec-2018 09:10	
Compound	CAS Number	LOR	Unit	EP1814356-011	EP1814356-012	EP1814356-013	EP1814356-014	EP1814356-015	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	7.82	7.83	7.91	7.89	7.88	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	814	544	1200	826	930	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	461	332	846	574	582	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	73	118	75	71	78	
Total Alkalinity as CaCO3	----	1	mg/L	73	118	75	71	78	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	70	34	81	43	65	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	174	100	319	197	226	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	32	19	90	46	42	
Magnesium	7439-95-4	1	mg/L	14	12	33	21	26	
Sodium	7440-23-5	1	mg/L	114	72	104	82	105	
Potassium	7440-09-7	1	mg/L	9	9	10	7	9	
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	----	1	mg/L	138	97	361	201	212	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.002	0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.003	0.005	<0.001	<0.001	0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.30	0.24	0.17	0.18	0.21	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG020T: Total Metals by ICP-MS</b>									



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 1/15	B 5/16	B 59/14	B 52/14	B 66/14
Client sampling date / time				06-Dec-2018 09:30	06-Dec-2018 09:25	06-Dec-2018 09:20	06-Dec-2018 09:00	06-Dec-2018 09:10	
Compound	CAS Number	LOR	Unit	EP1814356-011	EP1814356-012	EP1814356-013	EP1814356-014	EP1814356-015	
				Result	Result	Result	Result	Result	
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
Aluminium	7429-90-5	0.01	mg/L	0.01	0.02	0.01	<0.01	0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	<0.001	0.002	0.002	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.006	0.011	0.001	0.002	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.29	0.22	0.15	0.16	0.20	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EG052G: Silica by Discrete Analyser</b>									
Reactive Silica	----	0.05	mg/L	36.0	45.2	40.0	50.7	40.0	
<b>EK040P: Fluoride by PC Titrator</b>									
Fluoride	16984-48-8	0.1	mg/L	0.6	0.9	0.2	0.2	0.3	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	0.65	0.86	0.55	0.75	0.62	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	0.65	0.86	0.55	0.75	0.62	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	7.82	5.89	12.2	7.87	9.29	
Total Cations	----	0.01	meq/L	7.94	5.30	12.0	7.77	9.03	
Ionic Balance	----	0.01	%	0.72	5.26	0.82	0.65	1.38	
<b>MW006: Faecal Coliforms &amp; E.coli by MF</b>									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	<1	<1	