

CERTIFICATE OF ANALYSIS

Work Order : **EW2002501**
Client : **KIAMA COUNCIL**
Contact : **MS JULIE MILEVSKI**
Address : **11 MANNING STREET**
KIAMA NSW, AUSTRALIA 2533

Telephone : **+61 02 4232 0557**
Project : **Minnamurra Landfill**
Order number : **141275**
C-O-C number : **----**
Sampler : **Arrian Zautsen, Robert DaLio**
Site : **Minnamurra Landfill**
Quote number : **WO/029/19**
No. of samples received : **20**
No. of samples analysed : **20**

Page : 1 of 10
Laboratory : Environmental Division NSW South Coast
Contact : Glenn Davies
Address : 1/19 Ralph Black Dr, North Wollongong 2500
 4/13 Geary Pl, North Nowra 2541
 Australia NSW Australia

Telephone : 02 42253125
Date Samples Received : 28-May-2020 13:46
Date Analysis Commenced : 28-May-2020
Issue Date : 04-Jun-2020 15:46



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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- ED041G: LOR raised for Sulfate on samples 13 and 16 due to sample matrix.
- EK057G: LOR raised for Nitrite on various samples due to sample matrix.
- EK058G/EK059G: LOR raised for Nitrate and NOx on various samples due to sample matrix.
- EP002: It has been noted that DOC is greater than TOC for various samples, however this difference is within the limits of experimental variation.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling.
- Sampling completed by ALS Wollongong in accordance with in-house sampling method EN/67.6 Rivers and Streams.
- Temperature performed by ALS Wollongong via in-house method EA016 and EN67 PK.
- Dissolved oxygen (DO) performed by ALS Wollongong via in-house method EA025FD and EN67 PK.
- Salinity performed by ALS Wollongong via in-house method EA020FD and EN67 PK.
- 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	MD 1A	MD 1B	MD 2A	MD 2B	MD 2C
Client sampling date / time				28-May-2020 00:00	28-May-2020 12:40	28-May-2020 11:40	28-May-2020 11:45	28-May-2020 11:50	
Compound	CAS Number	LOR	Unit	EW2002501-001	EW2002501-002	EW2002501-003	EW2002501-004	EW2002501-005	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	----	7.6	7.1	6.9	6.9	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	611	1840	35500	48500	
EA020FD: Field Salinity									
Salinity	----	0.2	g/L	----	0.3	11.2	22.4	31.7	
EA116: Temperature									
Temperature	----	0.1	°C	----	20.7	17.2	17.8	17.4	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	226	973	739	586	
Total Alkalinity as CaCO3	----	1	mg/L	----	226	973	739	586	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	17	705	1740	2440	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	42	5220	12100	16200	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	52	297	433	512	
Magnesium	7439-95-4	1	mg/L	----	9	410	811	1180	
Sodium	7440-23-5	1	mg/L	----	34	3010	6420	9600	
Potassium	7440-09-7	1	mg/L	----	14	182	268	363	
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	----	0.054	0.066	0.115	0.138	
Iron	7439-89-6	0.05	mg/L	----	0.76	0.47	1.28	1.53	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	----	0.2	0.8	0.6	0.6	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	11.7	21.2	9.74	3.40	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	----	<0.01	<0.10	<0.10	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	----	<0.01	3.65	<0.10	<0.01	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 1A	MD 1B	MD 2A	MD 2B	MD 2C
Client sampling date / time				28-May-2020 00:00	28-May-2020 12:40	28-May-2020 11:40	28-May-2020 11:45	28-May-2020 11:50	
Compound	CAS Number	LOR	Unit	EW2002501-001	EW2002501-002	EW2002501-003	EW2002501-004	EW2002501-005	
				Result	Result	Result	Result	Result	
EP059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	<0.01	3.65	<0.10	<0.01	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	6.05	181	392	519	
∅ Total Cations	----	0.01	meq/L	----	6.01	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	----	184	374	550	
∅ Ionic Balance	----	0.01	%	----	0.42	----	----	----	
∅ Ionic Balance	----	0.01	%	----	----	0.76	2.33	2.81	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	DESTROYED	----	----	----	----	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	----	4	37	28	18	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	5	46	30	16	
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L	----	1.23	0.79	0.40	0.41	
Dissolved Oxygen - % Saturation	----	0.1	% saturation	----	13.8	8.7	4.8	5.2	
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L	----	<0.05	<0.05	<0.05	<0.05	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	----	1.34	0.22	0.57	0.59	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 4A	MD 4B	MD 4C	MD 6A	MD 6B
Client sampling date / time				28-May-2020 00:00	28-May-2020 11:10	28-May-2020 11:20	28-May-2020 12:10	28-May-2020 12:15	
Compound	CAS Number	LOR	Unit	EW2002501-006	EW2002501-007	EW2002501-008	EW2002501-009	EW2002501-010	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	----	6.7	6.9	7.4	7.0	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	----	24800	47100	1850	1600	
EA020FD: Field Salinity									
Salinity	----	0.2	g/L	----	15.1	30.7	0.9	0.8	
EA116: Temperature									
Temperature	----	0.1	°C	----	17.9	17.6	19.9	20.3	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	877	750	732	808	
Total Alkalinity as CaCO3	----	1	mg/L	----	877	750	732	808	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	1120	2370	78	40	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	9280	16900	189	85	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	450	510	130	117	
Magnesium	7439-95-4	1	mg/L	----	524	1130	46	46	
Sodium	7440-23-5	1	mg/L	----	4020	8900	148	94	
Potassium	7440-09-7	1	mg/L	----	190	337	50	45	
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	----	0.130	0.133	0.037	0.101	
Iron	7439-89-6	0.05	mg/L	----	2.31	1.42	0.28	0.20	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	----	0.5	0.8	0.7	0.5	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	30.5	2.16	24.8	31.1	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	----	<0.10	<0.10	0.05	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	----	<0.10	<0.10	2.63	0.02	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 4A	MD 4B	MD 4C	MD 6A	MD 6B
Client sampling date / time				28-May-2020 00:00	28-May-2020 11:10	28-May-2020 11:20	28-May-2020 12:10	28-May-2020 12:15	
Compound	CAS Number	LOR	Unit	EW2002501-006	EW2002501-007	EW2002501-008	EW2002501-009	EW2002501-010	
				Result	Result	Result	Result	Result	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	<0.10	<0.10	2.68	0.02	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	303	541	21.6	19.4	
∅ Total Cations	----	0.01	meq/L	----	247	----	----	17.1	
∅ Total Cations	----	0.01	meq/L	----	----	514	18.0	----	
∅ Ionic Balance	----	0.01	%	----	10.0	----	----	6.32	
∅ Ionic Balance	----	0.01	%	----	----	2.54	9.08	----	
EN67 PK: Field Tests									
Field Observations	----	0.01	--	DESTROYED	----	----	----	----	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	----	22	23	26	15	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	33	22	26	22	
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L	----	2.02	2.34	1.65	1.62	
Dissolved Oxygen - % Saturation	----	0.1	% saturation	----	23.3	29.5	18.2	18.0	
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L	----	<0.05	<0.05	<0.05	<0.05	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	----	0.98	1.00	1.03	1.13	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 6C	MD 9A	MD 9B	MD 9C	MD 10A
Client sampling date / time				28-May-2020 12:20	28-May-2020 10:37	28-May-2020 10:45	28-May-2020 10:52	28-May-2020 10:12	
Compound	CAS Number	LOR	Unit	EW2002501-011	EW2002501-012	EW2002501-013	EW2002501-014	EW2002501-015	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.2	7.2	7.0	7.0	7.0	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	38500	6490	3210	14000	34500	
EA020FD: Field Salinity									
Salinity	----	0.2	g/L	24.6	3.6	1.7	8.1	21.7	
EA116: Temperature									
Temperature	----	0.1	°C	19.1	18.1	19.0	18.9	17.7	
ED037P: Alkalinity by PC Titrator									
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	410	474	1250	1030	455	
Total Alkalinity as CaCO3	----	1	mg/L	410	474	1250	1030	455	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1920	253	<10	349	1790	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	12700	1930	350	4540	12800	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	384	112	143	256	658	
Magnesium	7439-95-4	1	mg/L	926	124	73	229	688	
Sodium	7440-23-5	1	mg/L	7200	970	270	2100	5950	
Potassium	7440-09-7	1	mg/L	248	74	108	155	162	
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	0.050	0.017	0.180	0.186	0.451	
Iron	7439-89-6	0.05	mg/L	18.6	<0.05	2.88	4.93	1.00	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.4	0.1	0.6	0.5	0.6	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	35.4	7.96	77.9	106	0.28	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.10	<0.10	<0.10	<0.10	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	1.38	0.26	0.15	3.17	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 6C	MD 9A	MD 9B	MD 9C	MD 10A
Client sampling date / time				28-May-2020 12:20	28-May-2020 10:37	28-May-2020 10:45	28-May-2020 10:52	28-May-2020 10:12	
Compound	CAS Number	LOR	Unit	EW2002501-011	EW2002501-012	EW2002501-013	EW2002501-014	EW2002501-015	
				Result	Result	Result	Result	Result	
EPK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	1.38	0.26	0.15	3.17	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	406	69.2	34.8	156	407	
∅ Total Cations	----	0.01	meq/L	----	----	33.2	----	----	
∅ Total Cations	----	0.01	meq/L	415	59.9	----	127	352	
∅ Ionic Balance	----	0.01	%	----	----	2.44	----	----	
∅ Ionic Balance	----	0.01	%	1.03	7.21	----	10.2	7.24	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	10	54	53	66	56	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	10	55	52	67	54	
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L	0.55	3.92	1.44	1.08	5.25	
Dissolved Oxygen - % Saturation	----	0.1	% saturation	6.9	42.5	15.6	12.2	62.8	
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	1.28	0.28	0.67	0.74	0.38	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 10B	Rocklow Down	Rocklow Middle	Rocklow Up	BLANK
Client sampling date / time				28-May-2020 10:20	28-May-2020 09:00	28-May-2020 09:55	28-May-2020 09:40	28-May-2020 08:55	
Compound	CAS Number	LOR	Unit	EW2002501-016	EW2002501-017	EW2002501-018	EW2002501-019	EW2002501-020	
				Result	Result	Result	Result	Result	
EA005FD: Field pH									
pH	----	0.1	pH Unit	7.1	7.0	7.1	7.3	----	
EA010FD: Field Conductivity									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	1880	32700	32500	22000	----	
EA020FD: Field Salinity									
Salinity	----	0.2	g/L	1.0	20.5	20.3	13.3	----	
EA116: Temperature									
Temperature	----	0.1	°C	20.6	14.5	14.8	14.9	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	697	159	153	103	----	
Total Alkalinity as CaCO3	----	1	mg/L	697	159	153	103	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	1580	1730	606	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	199	10800	12000	5660	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	86	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	35	----	----	----	----	
Sodium	7440-23-5	1	mg/L	120	----	----	----	----	
Potassium	7440-09-7	1	mg/L	70	----	----	----	----	
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L	----	272	286	138	----	
Magnesium	7439-95-4	1	mg/L	----	720	748	324	----	
Sodium	7440-23-5	1	mg/L	----	5880	6220	2670	----	
Potassium	7440-09-7	1	mg/L	----	215	228	100	----	
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	0.283	----	----	----	<0.001	
Iron	7439-89-6	0.05	mg/L	0.68	----	----	----	<0.05	
EG020T: Total Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L	----	0.055	0.057	0.048	----	
Iron	7439-89-6	0.05	mg/L	----	0.28	0.23	0.55	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MD 10B	Rocklow Down	Rocklow Middle	Rocklow Up	BLANK
Client sampling date / time				28-May-2020 10:20	28-May-2020 09:00	28-May-2020 09:55	28-May-2020 09:40	28-May-2020 08:55	
Compound	CAS Number	LOR	Unit	EW2002501-016	EW2002501-017	EW2002501-018	EW2002501-019	EW2002501-020	
				Result	Result	Result	Result	Result	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.9	0.7	0.6	0.4	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	63.1	1.03	0.58	0.06	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.10	0.01	<0.01	<0.01	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.10	0.02	0.04	0.02	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.10	0.03	0.04	0.02	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	19.5	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	18.7	----	----	----	----	
∅ Ionic Balance	----	0.01	%	2.28	----	----	----	----	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	33	8	9	4	<1	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	32	8	13	3	----	
EP025FD: Field Dissolved Oxygen									
Dissolved Oxygen	----	0.01	mg/L	1.90	5.39	4.53	7.67	----	
Dissolved Oxygen - % Saturation	----	0.1	% saturation	21.3	59.9	50.7	82.3	----	
EP035G: Total Phenol by Discrete Analyser									
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	0.70	----	----	----	----	