



ES Laboratories (M) Sdn. Bhd. (251842-A)

No. 18, Jalan Tago 11, Tago Industrial Park, Sri Damansara, 52200 Kuala Lumpur, Malaysia.
Tel: 03-62734940 Fax: 03-62722940 E-mail: general@esm.com.my Website: www.esm.com.my



Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : **UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)**
Sampling Point : 1. A1 : At an open space located at FELDA Jerangau Barat.
[N 04° 55'16.4", E 103° 06'56.3"]
2. A2 : At an open space located at Kg Gunung.
[N 04° 56'33.1", E 103° 03'45.1"]
3. A3 : At an open space located at Kg Lubuk Periuk.
[N 04° 53'29.9", E 103° 03'46.8"]
4. A4 : At an open space located at Kg Rantau Panjang.
[N 04° 47'15.8", E 103° 06'22.3"]
Sampling Date : 21/11/2018 – 24/11/2018
Receiving Date : 24/11/2018
Reporting Date : 21/12/2018

Ambient air quality monitoring results:-

Parameters	Results, ($\mu\text{g}/\text{m}^3$)				Malaysian Ambient Air Quality Standard	Method Used
	A1	A2	A3	A4		
Particulate Matter 10 μm (PM10)	54	-	50	-	150 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	ASTM D 4096,1993
	-	58	-	47		In-House Method (ESL/F/A-06) based on Manufacturer Measurement Procedure (MiniVol TM TAS)
Particulate Matter 2.5 μm (PM2.5)	20	33	28	25	75 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	
Sulphur Dioxide as SO ₂	<5	<5	<5	<5	105 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	ASTM D2914, 1993
Nitrogen Dioxide as NO ₂	<0.5	<0.5	<0.5	<0.5	75 $\mu\text{g}/\text{m}^3$ (24 hour averaging time)	ASTM D1607, 1991
Carbon Monoxide as CO	<0.1	<0.1	<0.1	<0.1	10 mg/m ³ (8 hour averaging time)	ASTM D4599-14
*Ozone as O ₃	<20	<20	<20	<20	120 $\mu\text{g}/\text{m}^3$ (8 hour averaging time)	APHA 820

.....
Ong Poh Cheng
MMIC M1429/2600/1995
(Lab Manager)

Notes:

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2. The results reported relate only to the item tested as per the details given in this Certificate of Analysis.
3. ASTM means Annual Book of ASTM Standards by American Society for Testing and Materials.
4. APHA means Method of Air Sampling and Analysis by APHA.
5. "<" means less than the minimum detectable limit or "not detected".
6. (*) means not SAMM Accredited.

Attention : Mr. Mohd Zaid Arqam
Address : **UniSZA Consultancy Sd. Bhd.**
Bangunan HEPA, Aras 1,
UniSZA Kampus Gong Badak,
21300 Kuala Terengganu, Terengganu Darul Iman.



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Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)
Sampling Point : 5. A5 : At an open space located at Kg Dendang.
[N 04° 49'15.4", E 103° 10'50.0"]
6. A6 : At an open space located at Kg Jerangau.
[N 04° 50'18.2", E 103° 11'49.3"]
7. A7 : At an open space located at FELDA Jerangau.
[N 04° 53'54.4", E 103° 11'12.5"]
Sampling Date : 21/11/2018 – 24/11/2018
Receiving Date : 24/11/2018
Reporting Date : 21/12/2018

Ambient air quality monitoring results:-

Parameters	Results, ($\mu\text{g}/\text{m}^3$)			Malaysian Ambient Air Quality Standard	Method Used
	A5	A6	A7		
Particulate Matter 10 μm (PM10)	53	60	-	150 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	ASTM D 4096,1993
	-	-	67		In-House Method (ESL/F/A-06) based on Manufacturer Measurement Procedure (MiniVol TM TAS)
Particulate Matter 2.5 μm (PM2.5)	35	36	39	75 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	
Sulphur Dioxide as SO ₂	<5	<5	<5	105 $\mu\text{g}/\text{m}^3$ (24 hours averaging time)	ASTM D2914, 1993
Nitrogen Dioxide as NO ₂	<0.5	<0.5	<0.5	75 $\mu\text{g}/\text{m}^3$ (24 hour averaging time)	ASTM D1607, 1991
Carbon Monoxide as CO	<0.1	<0.1	<0.1	10 mg/m^3 (8 hour averaging time)	ASTM D4599-14
*Ozone as O ₃	<20	<20	<20	120 $\mu\text{g}/\text{m}^3$ (8 hour averaging time)	APHA 820

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Ong Poh Cheng
MMIC M1429/2600/1995
(Lab Manager)

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Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)
Sampling Point : 1. WQ2 : Water sample was collected at Sg Aluk (after project site boundary)
 [N 04° 54'32.1", E 103° 04'07.4"]
 2. WQ3 : Water sample was collected at Sg Merung (after project site boundary)
 [N 04° 49'08.8", E 103° 05'55.4"]
 3. WQ4 : Water sample was collected at Sg Melung (before entering Sg Dungun)
 [N 04° 47'34.4", E 103° 06'26.9"]
Sampling Date : 22/11/2018 – 23/11/2018
Receiving Date : 23/11/2018
Reporting Date : 21/12/2018

Result(s) analysis:-

Parameter	Unit	Results			Class III	Method Used
		WQ2	WQ3	WQ4		
pH value (In-situ reading)	-	5.19 (26.3°C)	5.70 (28.9°C)	6.07 (26.1°C)	5 - 9	APHA 4500- H B, 2005
Dissolved Oxygen (In-situ reading)	mg/l	4.92	3.68	5.24	3 - 5	APHA 4500-O G, 2005
Total Suspended Solids (tested on 23/11/2018)	mg/l	5078	13	22	150	APHA 2540 D, 2005
Biochemical Oxygen Demand @ 5 days at 20 °C (tested on 23/11/2018)	mg/l	<2	<2	<2	6	} APHA 5210 B, 2005 } APHA 4500 O G, 2005
Chemical Oxygen Demand (tested on 23/11/2018)	mg/l	38	14	35	50	In-House Method (EST/L/W-07) based on APHA 5220 B, 2005
Turbidity	NTU	1565	5	19	-	APHA 2130 B, 2005
Ammoniacal Nitrogen as N	mg/l	1.0	0.7	0.8	0.9	In-House Method (EST/L/W-05) based on APHA 4500- NH ₃ C, 1992
Phosphate as PO ₄	mg/l	0.1	<0.1	<0.1	0.1	APHA 4500 -P D, 2005
*Sulphate as SO ₄	mg/l	8	4	7	-	APHA 4500 SO ₄ E, 2005
Chloride as Cl ⁻	mg/l	7.8	3.5	2.9	-	APHA 4500-Cl ⁻ B, 2005
Fluoride as F ⁻	mg/l	0.6	0.9	0.9	10	APHA 4500-F ⁻ D, 2005
Nitrite as NO ₂	mg/l	<0.1	<0.1	<0.1	0.4	APHA 4500 -NO ₂ B, 2005
Nitrate as NO ₃	mg/l	<0.1	<0.1	<0.1	-	APHA 4500 -NO ₃ B, 2005
Chromium as Cr	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Cadmium as Cd	mg/l	<0.01	<0.01	<0.01	0.01	APHA 3111 B, 2005
Copper as Cu	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Nickel as Ni	mg/l	<0.01	<0.01	<0.01	0.90	APHA 3111 B, 2005
Iron as Fe	mg/l	46.0	1.51	0.90	1.0	APHA 3111 B, 2005
Lead as Pb	mg/l	<0.02	<0.02	<0.02	0.02	APHA 3111 B, 2005
Manganese as Mn	mg/l	0.94	0.07	0.02	0.10	APHA 3111 B, 2005
Arsenic as As	mg/l	<0.001	<0.001	<0.001	0.40	APHA 3114 C, 2005
Mercury as Hg	mg/l	<0.001	<0.001	<0.001	0.004	APHA 3112 B, 2005
Oil & Grease (tested on 23/11/2018)	mg/l	<1	<1	<1	N	APHA 5520 B, 2005
Feacal Coliform	Count/ 100ml	<1	<1	7	5000	APHA 9222 D, 2005
<i>E.Coli</i>	Count/ 100ml	<1	<1	<1	-	APHA 9222 G, 2005

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MS ISO/IEC 17025
TESTING
SAMM No:076

Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)

Continue...

.....
Ong Poh Cheng
MMIC M429/2600/1995
(Laboratory Manager)

.....
Ummu Sa'odah Binti Md.Shah
(Microbiologist)

Notes:

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5. NTU means Nephelometric Turbidity Unit.
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MS ISO/IEC 17025
TESTING
SAMM No:076

Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)
Sampling Point : 4. WQ5 : Water sample was collected at Sg Dungun (main basin from project site)
[N 04° 48'27.8", E 103° 08'57.2"]
5. WQ6 : Water sample was collected at Sg Lok (after project site boundary)
[N 04° 50'28.0", E 103° 09'16.2"]
6. WQ8 : Water sample was collected at Sg Dungun (before Jerangau WTP Intake)
[N 04° 49'11.7", E 103° 12'58.2"]
Sampling Date : 22/11/2018 – 23/11/2018
Receiving Date : 23/11/2018
Reporting Date : 21/12/2018

Result(s) analysis:-

Parameter	Unit	Results			Class III	Method Used
		WQ5	WQ6	WQ8		
pH value (In-situ reading)	-	6.08 (28.5°C)	5.18 (27.0°C)	5.92 (28.5°C)	5 - 9	APHA 4500- H B, 2005
Dissolved Oxygen (In-situ reading)	mg/l	5.89	3.82	5.08	3 - 5	APHA 4500-O G, 2005
Total Suspended Solids (tested on 23/11/2018)	mg/l	48	46	20	150	APHA 2540 D, 2005
Biochemical Oxygen Demand @ 5 days at 20 °C (tested on 23/11/2018)	mg/l	<2	<2	<2	6	} APHA 5210 B, 2005 } APHA 4500 O G, 2005
Chemical Oxygen Demand (tested on 23/11/2018)	mg/l	20	16	13	50	In-House Method (EST/L/W-07) based on APHA 5220 B, 2005
Turbidity	NTU	14	10	12	-	APHA 2130 B, 2005
Ammoniacal Nitrogen as N	mg/l	0.7	0.2	0.4	0.9	In-House Method (EST/L/W-05) based on APHA 4500- NH ₃ C, 1992
Phosphate as PO ₄	mg/l	<0.1	<0.1	<0.1	0.1	APHA 4500 -P D, 2005
*Sulphate as SO ₄	mg/l	5	4	5	-	APHA 4500 SO ₄ E, 2005
Chloride as Cl ⁻	mg/l	2.7	2.2	8.2	-	APHA 4500-Cl ⁻ B, 2005
Fluoride as F ⁻	mg/l	0.9	1.6	0.9	10	APHA 4500-F ⁻ D, 2005
Nitrite as NO ₂	mg/l	<0.1	<0.1	<0.1	0.4	APHA 4500 -NO ₂ B, 2005
Nitrate as NO ₃	mg/l	<0.1	<0.1	<0.1	-	APHA 4500 -NO ₃ B, 2005
Chromium as Cr	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Cadmium as Cd	mg/l	<0.01	<0.01	<0.01	0.01	APHA 3111 B, 2005
Copper as Cu	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Nickel as Ni	mg/l	<0.01	<0.01	<0.01	0.90	APHA 3111 B, 2005
Iron as Fe	mg/l	5.33	1.27	0.54	1.0	APHA 3111 B, 2005
Lead as Pb	mg/l	<0.02	<0.02	<0.02	0.02	APHA 3111 B, 2005
Manganese as Mn	mg/l	0.16	0.01	0.02	0.10	APHA 3111 B, 2005
Arsenic as As	mg/l	<0.001	<0.001	<0.001	0.40	APHA 3114 C, 2005
Mercury as Hg	mg/l	<0.001	<0.001	<0.001	0.004	APHA 3112 B, 2005
Oil & Grease (tested on 23/11/2018)	mg/l	<1	<1	<1	N	APHA 5520 B, 2005
Feacal Coliform	Count/ 100ml	2	43	<1	5000	APHA 9222 D, 2005
E.Coli	Count/ 100ml	2	32	<1	-	APHA 9222 G, 2005

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Continue...

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Ong Poh Cheng
MMIC M1429/2600/1995
(Laboratory Manager)

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Ummu Sa'odah Binti Md.Shah
(Microbiologist)

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Certificate of Analysis

Registration No. : L-GB-TA1811CUN-0363
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)
Sampling Point : 7. WQ10 : Water sample was collected at Sg Dungun (main basin before project site)
 [N 04° 45'02.4", E 103° 06'45.9"]
 8. WQ12 : Water sample was collected at Sg Dungun (main basin after project site)
 [N 04° 51'11.3", E 103° 12'01.2"]
 9. WQ14 : Water sample was collected at Sg Dungun (after entering project site)
 [N 04° 47'44.5", E 103° 07'55.6"]
Sampling Date : 22/11/2018 – 23/11/2018
Receiving Date : 23/11/2018
Reporting Date : 21/12/2018

Result(s) analysis:-

Parameter	Unit	Results			Class III	Method Used
		WQ10	WQ12	WQ14		
pH value (In-situ reading)	-	5.98 (27.5°C)	6.06 (26.9°C)	5.88 (27.5°C)	5 - 9	APHA 4500- H B, 2005
Dissolved Oxygen (In-situ reading)	mg/l	5.85	3.91	5.41	3 - 5	APHA 4500-O G, 2005
Total Suspended Solids (tested on 23/11/2018)	mg/l	12	30	8	150	APHA 2540 D, 2005
Biochemical Oxygen Demand @ 5 days at 20 °C (tested on 23/11/2018)	mg/l	<2	<2	<2	6	} APHA 5210 B, 2005 } APHA 4500 O G, 2005
Chemical Oxygen Demand (tested on 23/11/2018)	mg/l	12	26	14	50	In-House Method (EST/L/W-07) based on APHA 5220 B, 2005
Turbidity	NTU	5	39	6	-	APHA 2130 B, 2005
Ammoniacal Nitrogen as N	mg/l	0.6	0.8	0.1	0.9	In-House Method (EST/L/W-05) based on APHA 4500- NH ₃ C, 1992
Phosphate as PO ₄	mg/l	<0.1	<0.1	<0.1	0.1	APHA 4500 -P D, 2005
*Sulphate as SO ₄	mg/l	4	12	5	-	APHA 4500 SO ₄ E, 2005
Chloride as Cl ⁻	mg/l	3.2	8.1	2.6	-	APHA 4500-Cl ⁻ B, 2005
Fluoride as F	mg/l	0.7	0.7	0.8	10	APHA 4500-FD, 2005
Nitrite as NO ₂	mg/l	<0.1	<0.1	<0.1	0.4	APHA 4500 -NO ₂ B, 2005
Nitrate as NO ₃	mg/l	<0.1	<0.1	<0.1	-	APHA 4500 -NO ₃ B, 2005
Chromium as Cr	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Cadmium as Cd	mg/l	<0.01	<0.01	<0.01	0.01	APHA 3111 B, 2005
Copper as Cu	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Nickel as Ni	mg/l	<0.01	<0.01	<0.01	0.90	APHA 3111 B, 2005
Iron as Fe	mg/l	0.55	1.18	0.42	1.0	APHA 3111 B, 2005
Lead as Pb	mg/l	<0.02	<0.02	<0.02	0.02	APHA 3111 B, 2005
Manganese as Mn	mg/l	0.02	<0.01	<0.01	0.10	APHA 3111 B, 2005
Arsenic as As	mg/l	<0.001	<0.001	<0.001	0.40	APHA 3114 C, 2005
Mercury as Hg	mg/l	<0.001	<0.001	<0.001	0.004	APHA 3112 B, 2005
Oil & Grease (tested on 23/11/2018)	mg/l	<1	<1	<1	N	APHA 5520 B, 2005
Feacal Coliform	Count/ 100ml	3	620	<1	5000	APHA 9222 D, 2005
<i>E. Coli</i>	Count/ 100ml	2	25	<1	-	APHA 9222 G, 2005

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(Laboratory Manager)

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Ummu Sa'odah Binti Md. Shah
(Microbiologist)

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Certificate of Analysis

Registration No. : L-GB-TA1901CUN-0149
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)
Sampling Point : 1. WQ7 : Water sample was collected at Sg Lok (before entering Sg Dungun)
 [N 04° 50'35.5", E 103° 10'40.1"]
 2. WQ11 : Water sample was collected at Sg Berang (main basin from project site)
 [N 04° 56'10.3", E 103° 03'49.9"]
 3. WQ13 : Water sample was collected at Sg Dungun (main basin after project site)
 [N 04° 50'44.2", E 103° 12'27.8"]
Sampling Date : 09/01/2019
Receiving Date : 10/01/2019
Reporting Date : 11/02/2019

Result(s) analysis:-

Parameter	Unit	Results			Class III	Method Used
		WQ7	WQ11	WQ13		
pH value (tested on 10/01/2019)	-	7.5 (25.6°C)	7.6 (26.1°C)	7.3 (25.7°C)	5 - 9	APHA 4500- H B, 2005
Dissolved Oxygen	mg/l	5.9	6.3	5.8	3 - 5	APHA 4500-O G, 2005
Total Suspended Solids (tested on 10/01/2019)		19	27	14	150	APHA 2540 D, 2005
Biochemical Oxygen Demand @ 5 days at 20 °C (tested on 10/01/2019)	mg/l	<2	<2	<2	6	} APHA 5210 B, 2005 } APHA 4500 O G, 2005
Chemical Oxygen Demand (tested on 10/01/2019)	mg/l	17	21	18	50	In-House Method (EST/L/W-07) based on APHA 5220 B, 2005
Turbidity	NTU	14	25	13	-	APHA 2130 B, 2005
Ammoniacal Nitrogen as N	mg/l	0.4	0.6	0.7	0.9	In-House Method (EST/L/W-05) based on APHA 4500- NH ₃ C, 1992
Phosphate as PO ₄	mg/l	0.1	0.1	0.3	0.1	APHA 4500 -P D, 2005
*Sulphate as SO ₄	mg/l	5	3	3	-	APHA 4500 SO ₄ E, 2005
Chloride as Cl ⁻	mg/l	55	41	45	-	APHA 4500-Cl ⁻ B, 2005
Fluoride as F	mg/l	0.3	0.2	0.2	10	APHA 4500-FD, 2005
Nitrite as NO ₂	mg/l	<0.1	<0.1	<0.1	0.4	APHA 4500 -NO ₂ B, 2005
Nitrate as NO ₃	mg/l	<0.1	0.2	0.1	-	APHA 4500 -NO ₃ B, 2005
Chromium as Cr	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Cadmium as Cd	mg/l	<0.01	<0.01	<0.01	0.01	APHA 3111 B, 2005
Copper as Cu	mg/l	<0.01	<0.01	<0.01	-	APHA 3111 B, 2005
Nickel as Ni	mg/l	<0.01	<0.01	<0.01	0.90	APHA 3111 B, 2005
Iron as Fe	mg/l	1.14	1.17	0.83	1.0	APHA 3111 B, 2005
Lead as Pb	mg/l	<0.02	<0.02	<0.02	0.02	APHA 3111 B, 2005
Manganese as Mn	mg/l	0.02	0.03	0.02	0.10	APHA 3111 B, 2005
Arsenic as As	mg/l	<0.001	<0.001	<0.001	0.40	APHA 3114 C, 2005
Mercury as Hg	mg/l	<0.001	<0.001	<0.001	0.004	APHA 3112 B, 2005
Oil & Grease (tested on 10/01/2019)	mg/l	<1	<1	<1	N	APHA 5520 B, 2005
Feecal Coliform	Count/ 100ml	<1	260	<1	5000	APHA 9222 D, 2005
E.Coli	Count/ 100ml	<1	200	<1	-	APHA 9222 G, 2005

Notes:

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- The results reported relate only to the item tested as per the details given in this Certificate of Analysis.



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Certificate of Analysis

Registration No. : L-GB-TA1901CUN-0149
Customer : UniSZA Consultancy Sdn. Bhd. (Dungun-Jerangau)

Continue...

.....
Ong Poh Cheng
MMIC M1429/2600/1995
(Laboratory Manager)

.....
Ummu Sa'odah Binti Md.Shah
(Microbiologist)

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2. The results reported relate only to the item tested as per the details given in this Certificate of Analysis.
3. Class III means parameter limits stipulated under Class III in the Interim National Water Quality Standards for Malaysia by Department of Environment (DOE).
4. APHA means Standard Methods for Examination of Water & Wastewater by APHA, AWWA & WEF.
5. NTU means Nephelometric Turbidity Unit.
6. "<" means 'less than the minimum detectable limit' or 'not detected'.
7. (*) means not SAMM Accredited.
8. All the tests above are subcontracted except Chromium, Phosphate, Sulphate, Fluoride, Nitrate, Nitrite, E.Coli and Feecal Coliform.

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