Bab
Chapter

4





AIR

PENGAWASAN KUALITI AIR MARIN KEBANGSAAN
MARINE WATER QUALITY MONITORING

Program Pengawasan Kualiti Air Marin Kebangsaan telah dimulakan di Semenanjung Malaysia pada tahun 1978 dan diperkembangkan ke Sabah dan Sarawak pada tahun 1985. Stesen-stesen pemantauan air marin diwujudkan di kuala-kuala sungai dan pantai-pantai bagi memantau status kualiti air marin berdasarkan kepada kegunaan berfaedah seperti kawasan rekreasi, perikanan dan taman-taman laut.

Marine water quality monitoring was established in Peninsular Malaysia in 1978 and was extended to cover Sabah and Sarawak in 1985. The monitoring stations were created at estuaries and coastal areas to monitor marine water quality status with respect to their beneficial uses such as recreation, fishing and marine parks.

Pada tahun 2016, terdapat 228 stesen pengawasan di seluruh Malaysia iaitu Perlis, (2) stesen; Kedah, (10) stesen; Pulau Pinang, (21) stesen; Perak, (11) stesen; Selangor, 14 stesen; Negeri Sembilan, (14) stesen; Melaka, 12 stesen; Johor, (34) stesen; Pahang, (20) stesen; Terengganu, 20 stesen; Kelantan, (10) stesen; Sabah, (26) stesen; W.P Labuan, (5) stesen dan Sarawak, (29) stesen (**Peta 4.1(a) , 4.1 (b)** dan **Jadual4.1**).

In 2016, a total of 228 monitoring stations were set up throughout Malaysia which is Perlis, (2) stations; Kedah, (10) stations; Pulau Pinang, (21) stations; Perak, (11) stations; Selangor, (14) stations; Negeri Sembilan, (14) stations; Melaka, (12) stations; Johor, (34) stations; Pahang, (20) stations; Terengganu, (20) stations; Kelantan, 10 stations; Sabah, (26) stations; F.T Labuan, (5) stations and Sarawak, (29) stations (**Map 4.1(a),4.1 (b**) and **Table 4.1)**.

Di samping itu, sebagai tambahan bagi Program Pengawasan Selat Johor di bawah Jawatankuasa Bersama Malaysia-Singapura Mengenai Alam Sekitar (MSJCE), 20 stesen turut dipantau pada tahun 2016 (**Jadual 4.2**).

Besides that, an additional of 20 stations were monitored under the Malaysia-Singapore Joint Committee on the Environment (MSJCE) Monitoring Programme, in 2016 (**Table 4.2**).



Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2016
Table 4.1 DOE: Marine Water Quality Monitoring Stations, 2016

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
PERLIS	2	KUALA/ESTUARY	KUALA SUNGAI PERLIS	6401901	100.119141	6.400074
		KUALA/ESTUARY	KUALA SUNGAI BARU	6302903	100.149536	6.332417
KEDAH	2	KUALA/ESTUARY	KUALA SUNGAI KEDAH	6102908	100.281620	6.104820
		KUALA/ESTUARY	KUALA JERLUN	6302925	100.238240	6.210590
KEDAH	8	PANTAI/COASTAL	PANTAI MERDEKA	5603905	100.377778	5.669444
		PANTAI/COASTAL	LANGKAWI ISLAND RESORT	6399914	99.860967	6.295194
		PANTAI/COASTAL	PANTAI KOK	6397922	99.678619	6.365699
		PANTAI/COASTAL	PANTAI KUAH	6398913	99.848361	6.315831
		PANTAI/COASTAL	PANTAI PASIR TENGKORAK	6497901	99.726665	6.431894
		PANTAI/COASTAL	PANTAI TELUK BURAU	6396923	99.668894	6.363907
		PANTAI/COASTAL	PANTAI TELUK NIBONG	6497915	99.702217	6.359433
		PANTAI/COASTAL	PANTAI TENGAH	6297903	99.728421	6.280536
PULAU PINANG	7	KUALA/ESTUARY	KUALA SUNGAI JAWI	5204901	100.417414	5.281718
		KUALA/ESTUARY	KUALA SUNGAI JURU	5304904	100.403095	5.337752
		KUALA/ESTUARY	KUALA SUNGAI KERIAN	5104901	100.418352	5.170868
		KUALA/ESTUARY	KUALA SUNGAI PINANG	5403934	100.334378	5.400286
		KUALA/ESTUARY	KUALA SUNGAI PERAI	5303908	100.36763	5.381279
		KUALA/ESTUARY	KUALA SUNGAI TENGAH	5204935	100.424279	5.211237
		KUALA/ESTUARY	KUALA SUNGAI PINANG (BALIK PULAU)	5202929	100.183766	5.390177
PULAU PINANG	14	PANTAI/COASTAL	GERTAK SANGGUL	5201919	100.211023	5.280743
		PANTAI/COASTAL	LUAR PANTAI TELUK BAHANG	5402930	100.211066	5.461064
		PANTAI/COASTAL	KAWASAN PERINDUSTRIAN BAYAN LEPAS I	5303932	100.306932	5.326449
		PANTAI/COASTAL	PANTAI BERSIH	5403906	100.378368	5.445793
		PANTAI/COASTAL	PANTAI MIAMI	5502901	100.266857	5.478822
		PANTAI/COASTAL	PANTAI PASIR PANJANG	5201938	100.183791	5.299731
		PANTAI/COASTAL	BATU FERINGGI (CASUARINA)	5402904	100.241542	5.470209
		PANTAI/COASTAL	PERSIARAN GURNEY	5403902	100.320039	5.432029

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	RUMAH PAM BARU PERAI	5304927	100.393126	5.348773
		PANTAI/COASTAL	RUMAH PAM LAMA PERAI	5303926	100.383445	5.359372
		PANTAI/COASTAL	SELAT PP SELATAN (JELUTONG)	5303911	100.318097	5.382039
		PANTAI/COASTAL	TANJUNG BUNGAH	5402937	100.281693	5.468008
		PANTAI/COASTAL	TELUK TEMPOYAK	5202923	100.288436	5.276081
		PANTAI/COASTAL	BATU MAUNG	5202901	100.291141	5.287004
PERAK	6	KUALA/ESTUARY	KUALA SUNGAI MANJUNG	4205930	100.661102	4.28066
		KUALA/ESTUARY	KUALA SUNGAI GULA	4906926	100.449383	4.898283
		KUALA/ESTUARY	KUALA SUNGAI KURAU	4994919	100.41333	4.987167
		KUALA/ESTUARY	KUALA SUNGAI TANJUNG PIANDANG	5003921	100.371234	5.076062
		KUALA/ESTUARY	KUALA SUNGAI SEPETANG	4806925	100.620333	4.840306
		KUALA/ESTUARY	KUALA SUNGAI PERAK	4007901	100.743714	4.015839
PERAK	5	PANTAI/COASTAL	PANTAI PASIR BOGAK	4205908	100.55138	4.21176
		PANTAI/COASTAL	PANTAI TELUK DALAM	4205928	100.5561	4.25001
		PANTAI/COASTAL	PANTAI TELUK BATIK	4205923	100.60627	4.18732
		PANTAI/COASTAL	PANTAI TANJUNG BATU	4406927	100.59487	4.42659
		PANTAI/COASTAL	PANTAI PASIR PANJANG	4305924	100.57895	4.36271
SELANGOR	10	KUALA/ESTUARY	KUALA SUNGAI SEPANG	2517922	101.711437	2.595333
		KUALA/ESTUARY	KUALA SUNGAI SEPANG (KECIL)	2612928	101.685704	2.608449
		KUALA/ESTUARY	KUALA SUNGAI SEPANG (KAWALAN)	2616926	101.690192	2.597488
		KUALA/ESTUARY	KUALA SUNGAI LANGAT (JUGRA)	2814925	101.402997	2.801426
		KUALA/ESTUARY	KUALA SUNGAI KLANG	3013909	101.386797	3.000273
		KUALA/ESTUARY	KUALA SUNGAI LANGAT (LUMUT)	2913903	101.313868	2.966527
		KUALA/ESTUARY	KUALA SUNGAI BULOH	3212930	101.297376	3.252902
		KUALA/ESTUARY	KUALA SUNGAI SELANGOR	3312915	101.225	3.333333
		KUALA/ESTUARY	KUALA SUNGAI TENGI	3311931	101.165969	3.39336
		KUALA/ESTUARY	KUALA SUNGAI BERNAM	3808924	100.813778	3.84965

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
SELANGOR	4	PANTAI/COASTAL	PANTAI BAGAN LALANG	2616927	101.686534	2.605397
		PANTAI/COASTAL	PANTAI MORIB	2712902	101.440951	2.750609
		PANTAI/COASTAL	SELAT PULAU BABI	3012929	101.374904	2.997554
		PANTAI/COASTAL	SELAT KLANG UTARA	3013908	101.35	3.066667
NEGERI SEMBILAN	2	KUALA/ESTUARY	KUALA SUNGAI LINGGI	2319901	101.971504	2.392164
		KUALA/ESTUARY	KUALA SUNGAI LUKUT	2517910	101.788202	2.577221
NEGERI SEMBILAN	12	PANTAI/COASTAL	BAGAN PINANG	2418915	101.828347	2.506916
		PANTAI/COASTAL	TELOK SINTING	2419908	101.940405	2.41444
		PANTAI/COASTAL	PORT DICKSON BANDAR	2517907	101.797286	2.519752
		PANTAI/COASTAL	PORT DICKSON BATU 4	2518937	101.836783	2.500036
		PANTAI/COASTAL	PORT DICKSON BATU 5	2418906	101.838622	2.496006
		PANTAI/COASTAL	PORT DICKSON BATU 6	2418916	101.846499	2.480002
		PANTAI/COASTAL	PORT DICKSON BATU 7	2418905	101.85079	2.461033
		PANTAI/COASTAL	PORT DICKSON BATU 8	2418912	101.854488	2.454036
		PANTAI/COASTAL	PORT DICKSON BATU 10	2418914	101.85544	2.415841
		PANTAI/COASTAL	PORT DICKSON JANAKUASA TNB	2517909	101.79697	2.546036
		PANTAI/COASTAL	TELOK PELANDUK	2419917	101.885835	2.417405
		PANTAI/COASTAL	PANTAI CERMIN	2416918	101.860477	2.414817
MELAKA	6	KUALA/ESTUARY	KUALA SUNGAI MELAKA	2122903	102.24225	2.185722
		KUALA/ESTUARY	KUALA SUNGAI SRI MELAKA	2122903	102.24225	2.185722
		KUALA/ESTUARY	KUALA SUNGAI MERLIMAU	2124912	102.41425	2.126889
		KUALA/ESTUARY	KUALA SUNGAI KESANG	2186905	102.488861	2.098139
		KUALA/ESTUARY	KUALA SUNGAI SEBATU	2186904	102.462306	2.107528
		KUALA/ESTUARY	KUALA SUNGAI LEREH	2221922	102.175608	2.219187
MELAKA	6	PANTAI/COASTAL	PANTAI ROMBANG	2221906	102.148417	2.227278
		PANTAI/COASTAL	PANTAI KUNDUR	2221908	102.140389	2.243194
		PANTAI/COASTAL	PANTAI TANJUNG BIDARA	2320909	102.087833	2.29075
		PANTAI/COASTAL	TELUK GONG	2320902	102.056472	2.339833
		PANTAI/COASTAL	PULAU MELAKA POINT A(I)	2122915	102.249722	2.179083

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	PULAU MELAKA POINT B(I)	2121916	102.256583	2.179472
JOHOR	9	KUALA/ESTUARY	KUALA SUNGAI SEGGET	1437919	103.766258	1.455715
		KUALA/ESTUARY	KUALA SUNGAI SKUDAI	1437922	103.721794	1.465049
		KUALA/ESTUARY	KUALA SUNGAI MELAYU	1437946	103.699417	1.454252
		KUALA/ESTUARY	KUALA SUNGAI TEBRAU	1438943	103.796667	1.482222
		KUALA/ESTUARY	KUALA SUNGAI KIM-KIM	1439965	103.973395	1.426349
		KUALA/ESTUARY	KUALA SUNGAI JOHOR	1440916	104.022778	1.484444
		KUALA/ESTUARY	KUALA SUNGAI BATU PAHAT	1729930	102.877514	1.791313
		KUALA/ESTUARY	KUALA SUNGAI MUAR	2024932	102.539896	2.050212
		KUALA/ESTUARY	KUALA SUNGAI MERSING	2438905	103.843056	2.436111
JOHOR	25	PANTAI/COASTAL	TANJUNG BIN	1336975	103.550442	1.332734
		PANTAI/COASTAL	PELABUHAN TANJUNG PELEPAS	1438918	103.547484	1.352898
		PANTAI/COASTAL	HADAPAN JABATAN LAUT	1438943	103.538276	1.383568
		PANTAI/COASTAL	PANTAI STULANG LAUT	1437951	103.779444	1.467222
		PANTAI/COASTAL	JETI TELUK JAWA	1438918	103.841667	1.471389
		PANTAI/COASTAL	PELABUHAN PASIR GUDANG	1428939	103.900833	1.428889
		PANTAI/COASTAL	HADAPAN HSAJB	1437920	103.745556	1.455278
		PANTAI/COASTAL	PANTAI LIDO	1437921	103.723889	1.469444
		PANTAI/COASTAL	PANTAI TELUK MAHKOTA	1841911	103.098333	1.684694
		PANTAI/COASTAL	PANTAI TANJUNG LEMAN	2140694	104.007500	2.145861
		PANTAI/COASTAL	PANTAI SRI PANTAI	2339960	103.888611	2.379167
		PANTAI/COASTAL	TANJUNG MERAK	1441968	104.109861	1.362806
		PANTAI/COASTAL	TANJUNG PENGELIH	1441967	104.088806	1.370750
		PANTAI/COASTAL	PANTAI TANJONG STAPA	1341961	104.135833	1.342500
		PANTAI/COASTAL	PANTAI TELUK GOREK	2538958	103.805000	2.582500
		PANTAI/COASTAL	PANTAI AIR PAPAN	2538959	103.833333	2.518056
		PANTAI/COASTAL	JETI KUKUP	1334925	103.441389	1.325000
		PANTAI/COASTAL	JETI TANJONG BELUNGKOR	1440963	104.067500	1.453889
		PANTAI/COASTAL	PASIR GOGOK	1441966	104.099933	1.417450

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	TANJUNG BUAI	1340973	104.045389	1.496694
		PANTAI/COASTAL	PANTAI DESARU	1542914	104.261389	1.546667
		PANTAI/COASTAL	TANJUNG SEPANG	1443969	104.279111	1.383667
		PANTAI/COASTAL	TANJUNG PENYUSUP	1444920	104.280083	1.370250
		PANTAI/COASTAL	PANTAI SUNGAI LURUS	1730962	103.028611	1.728333
		PANTAI/COASTAL	PUNGGUR	1531974	103.098333	1.684694
PAHANG	20	PANTAI/COASTAL	PANTAI CHERATING (CLUB MED A)	4434901	103.411351	4.140684
		PANTAI/COASTAL	PANTAI CHERATING (CLUB MED B)	4434902	103.406717	4.127501
		PANTAI/COASTAL	PANTAI CHERATING (LEGEND A)	3634918	103.411574	3.595327
		PANTAI/COASTAL	PANTAI CHERATING (LEGEND B)	3634917	103.398871	3.615543
		PANTAI/COASTAL	PANTAI MUHIBBAH BALOK	3934906	103.369147	3.634918
		PANTAI/COASTAL	PANTAI MUHIBBAH BALOK	3934905	103.374712	3.634917
		PANTAI/COASTAL	PANTAI BATU HITAM	3934907	103.369041	3.890134
		PANTAI/COASTAL	PANTAI BATU HITAM	3934908	103.368269	3.885497
		PANTAI/COASTAL	PANTAI BERSERAH	3934910	103.37191	3.857825
		PANTAI/COASTAL	PANTAI BERSERAH	3934909	103.370022	3.868058
		PANTAI/COASTAL	PANTAI TELUK CEMPEDAK	3834911	103.374219	3.814442
		PANTAI/COASTAL	PANTAI TELUK CEMPEDAK	3834912	103.37423	3.810213
		PANTAI/COASTAL	PANTAI TELUK GELORA	3834913	103.363641	3.801703
		PANTAI/COASTAL	PANTAI TELUK GELORA	3834914	103.35081	3.802741
		PANTAI/COASTAL	PANTAI SEPAT (A)	3733916	103.340937	3.69724
		PANTAI/COASTAL	PANTAI SEPAT (B)	3733915	103.340122	3.699688
		PANTAI/COASTAL	PANTAI LEGENDA (A)	3634918	103.411574	3.595327
		PANTAI/COASTAL	PANTAI LEGENDA (B)	3634917	103.398871	3.615543
		PANTAI/COASTAL	PANTAI KUALA API-API	3334919	103.435006	3.280982
		PANTAI/COASTAL	PANTAI TANJUNG BATU	3235920	103.448465	3.205147

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
TERENGGANU	12	KUALA/ESTUARY	KUALA SUNGAI BESUT	5825902	102.562861	5.838417
		KUALA/ESTUARY	KUALA SUNGAI DUNGUN	4734918	103.422666	4.78025
		KUALA/ESTUARY	KUALA SUNGAI IBAI	5231949	103.177139	5.287572
		KUALA/ESTUARY	KUALA SUNGAI KERTEH	4534922	103.453	4.51562
		KUALA/ESTUARY	KUALA SUNGAI MARANG	5232911	103.21335	5.212083
		KUALA/ESTUARY	KUALA SUNGAI PAKA	4634920	103.438056	4.657639
		KUALA/ESTUARY	KUALA SUNGAI SETIU	5627953	102.726	5.678944
		KUALA/ESTUARY	KUALA SUNGAI TERENGGANU	5331907	103.156972	5.337889
		KUALA/ESTUARY	KUALA SUNGAI KEMAMAN	4234929	103.451269	4.239392
		KUALA/ESTUARY	TIOXIDE UTARA (KG. BUKIT KUANG, KIJAL)	4234950	103.491	4.31566
		KUALA/ESTUARY	TIOXIDE TENGAH (PUPUK SEMANGAT, KIJAL)	4234951	103.475529	4.268256
		KUALA/ESTUARY	PULAU DUYUNG	5231908	103.129083	5.334889
TERENGGANU	8	PANTAI/COASTAL	PANTAI BATU BURUK	5331935	103.156278	5.324889
		PANTAI/COASTAL	PANTAI BUKIT KELUANG	5825903	102.605639	5.804414
		PANTAI/COASTAL	PANTAI CHENDERING	5231934	103.185983	5.270025
		PANTAI/COASTAL	PANTAI RANTAU ABANG	4833917	103.399	4.861
		PANTAI/COASTAL	KIPC UTARA	4634953	103.446442	4.617175
		PANTAI/COASTAL	KIPC TENGAH	4534954	103.461	4.58217
		PANTAI/COASTAL	KIPC SELATAN	4534955	103.47	4.5527
		PANTAI/COASTAL	KIJAL	4193530	103.485305	4.338885
KELANTAN	5	KUALA/ESTUARY	KUALA SUNGAI GOLOK	6220911	102.092109	6.237419
		KUALA/ESTUARY	KUALA SUNGAI KELANTAN	6222901	102.236759	6.22044
		KUALA/ESTUARY	KUALA SUNGAI PENGKALAN CHEPA	6223912	102.302343	6.186125
		KUALA/ESTUARY	KUALA SUNGAI PENGKALAN DATU	6123913	102.344377	6.169179
		KUALA/ESTUARY	KUALA SUNGAI KEMASIN	5824914	102.372599	6.132642

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	PANTAI SERI TUJUH	6221910	102.121104	6.225154
		PANTAI/COASTAL	PANTAI CAHAYA BULAN	6122903	102.278187	6.195523
KELANTAN	5	PANTAI/COASTAL	PANTAI SABAK	6123909	102.322674	6.179527
		PANTAI/COASTAL	PANTAI IRAMA BACHOK	6024908	102.401097	6.068344
		PANTAI/COASTAL	PANTAI BISIKAN BAYU	5825905	102.51837	5.863373
		KUALA/ESTUARY	KUALA SUNGAI SEMANTAN	1898901	109.783667	1.818362
		KUALA/ESTUARY	KUALA SUNGAI SARAWAK	1604907	110.513791	1.648484
		KUALA/ESTUARY	KUALA SUNGAI BAKO	1704905	110.419223	1.693158
		KUALA/ESTUARY	KUALA SUNGAI SANTUBONG	1702903	110.291238	1.727623
		KUALA/ESTUARY	KUALA BATANG KRIAN (KABONG)	1710924	111.096721	1.789309
		KUALA/ESTUARY	KUALA BATANG REJANG	2111909	111.186425	2.122774
SARAWAK	13	KUALA/ESTUARY	KUALA MUKAH	2920920	112.094329	2.913930
		KUALA/ESTUARY	KUALA BATANG KEMENA	3130911	113.028106	3.186867
		KUALA/ESTUARY	KUALA TANJUNG SIMILAJAU	3431903	113.300076	3.518691
		KUALA/ESTUARY	MUARA SUNGAI PANIPAH	3332904	113.286648	3.497227
		KUALA/ESTUARY	KUALA PANTAI NYALAU	3432906	113.381608	3.643886
		KUALA/ESTUARY	KUALA SUNGAI BARAM	4539919	113.970007	4.589636
		KUALA/ESTUARY	KUALA SG MIRI	4349915	113.976179	4.398636
		PANTAI/COASTAL	PANTAI SEMATAN	1898902	109.765630	1.826387
SARAWAK	16	PANTAI/COASTAL	PANTAI PANDAN	1824918	109.866413	1.764044
		PANTAI/COASTAL	PANTAI PASIR PUTIH	1604910	110.516363	1.683378
		PANTAI/COASTAL	PANTAI BAKO	1704906	110.439965	1.721591
		PANTAI/COASTAL	PANTAI DAMAI	1702904	110.312122	1.750559
		PANTAI/COASTAL	PANTAI TANJUNG KEMBANG	1810923	111.099845	1.822377
		PANTAI/COASTAL	PANTAI HARMONI MUKAH	2920921	112.060186	2.907613
		PANTAI/COASTAL	PANTAI TANJUNG BATU	3132602	113.043480	3.211189
		PANTAI/COASTAL	PANTAI LIKAU	3230915	113.148295	3.344910
		PANTAI/COASTAL	PANTAI EMAS	3331903	113.223894	3.442299
		PANTAI/COASTAL	PANTAI PIASAU	4539918	113.994855	4.438081

NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	PANTAI BRIGHTON	4449917	113.971165	4.379612
		PANTAI/COASTAL	PANTAI ESPLANED	4339920	113.962467	4.323727
		PANTAI/COASTAL	PANTAI BERAYA	4238921	113.877752	4.192483
		PANTAI/COASTAL	PANTAI BUNGAI	4137922	113.783364	4.063882
		PANTAI/COASTAL	PANTAI BELAWAI	2212913	111.205621	2.219232
SABAH	2	KUALA/ESTUARY	MUARA SUNGAI KUALA PENYU	5453901	115.599506	5.569705
		KUALA/ESTUARY	MUARA SUNGAI MENGGATAL INANAM	5050905	116.114013	6.013351
SABAH	24	PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 1	5053901	115.540582	5.0804
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 2	5053902	115.539556	5.078602
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 3	5053903	115.538447	5.076838
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 4	5053904	115.53511	5.07495
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 5	5053905	115.527711	5.067823
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 6	5053906	115.515725	5.044765
		PANTAI/COASTAL	BORNEO GOLF BONGAWAN	5355901	115.786589	5.538416
		PANTAI/COASTAL	PANTAI MANIS PAPAR	5555901	115.895735	5.734955
		PANTAI/COASTAL	PANTAI MELINSUNG PAPAR	5565902	115.983241	5.78751
		PANTAI/COASTAL	PANTAI TANJUNG ARU KK (REST LIDO)	5656901	116.042759	5.95035
		PANTAI/COASTAL	PANTAI TANJUNG ARU KK (ROLLER SKATING)	5656902	116.043789	5.945757
		PANTAI/COASTAL	PANTAI TANJUNG ARU KK (NO. 3)	5656903	116.04439	5.943499
		PANTAI/COASTAL	PANTAI LOK KAWI KK	5560904	116.041637	5.848392
		PANTAI/COASTAL	PANTAI DALIT TUARAN	6161901	116.170435	6.191302
		PANTAI/COASTAL	MANGROVE PARADISE TUARAN	6161902	116.215925	6.250856
		PANTAI/COASTAL	SABANDAR RESORT TUARAN	6161903	116.234918	6.246582
		PANTAI/COASTAL	PANTAI BAK-BAK KUDAT	6665901	116.841417	6.946222
		PANTAI/COASTAL	PANTAI PASIR PUTIH SANDAKAN	5580901	118.084164	5.823925
		PANTAI/COASTAL	PENGKALAN TLDM SANDAKAN	5580902	118.122139	5.839211

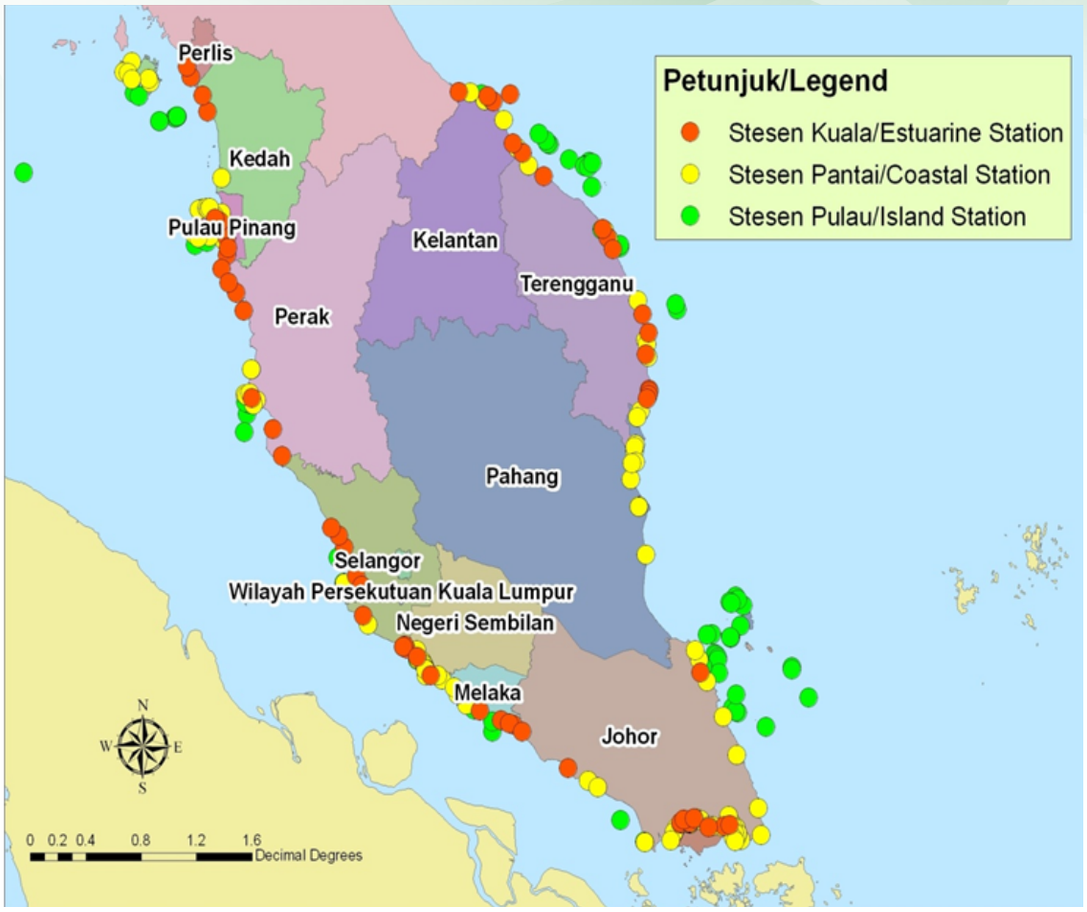
NEGERI *STATE*	BIL. STESEN *NO. OF STATION*	KAWASAN *AREA*	STESEN *STATION*	NO. STESEN *STATION NO.*	LOKASI *LOCATION*	
		PANTAI/COASTAL	PANTAI BATU SAPI SANDAKAN	5580903	118.039544	5.79484
		PANTAI/COASTAL	PANTAI ULU TUNGKU LAHAD DATU	5085901	118.888268	5.017436
		PANTAI/COASTAL	PANTAI SARINA KUNAK	4481901	118.288934	4.661534
		PANTAI/COASTAL	PANTAI KG. LAMAK LAHAD DATU	4581902	118.192778	4.944389
		PANTAI/COASTAL	PANTAI TINAGAT TAWAU	4473901	118.006537	4.226005
LABUAN	5	PANTAI/COASTAL	PULAU PAPAN	5151905	115.2675	5.256111
		PANTAI/COASTAL	KIAMSAM	5151906	115.177506	5.254343
		PANTAI/COASTAL	SUNGAI PAGAR	5151907	115.164518	5.273759
		PANTAI/COASTAL	LAYANG-LAYANGAN	5251902	115.191021	5.335105
		PANTAI/COASTAL	TANJUNG ARU	5251903	115.247832	5.351267

Kuala/ Estuarine : 76
Pantai/ Coastal : 152
Jumlah/Total : 228

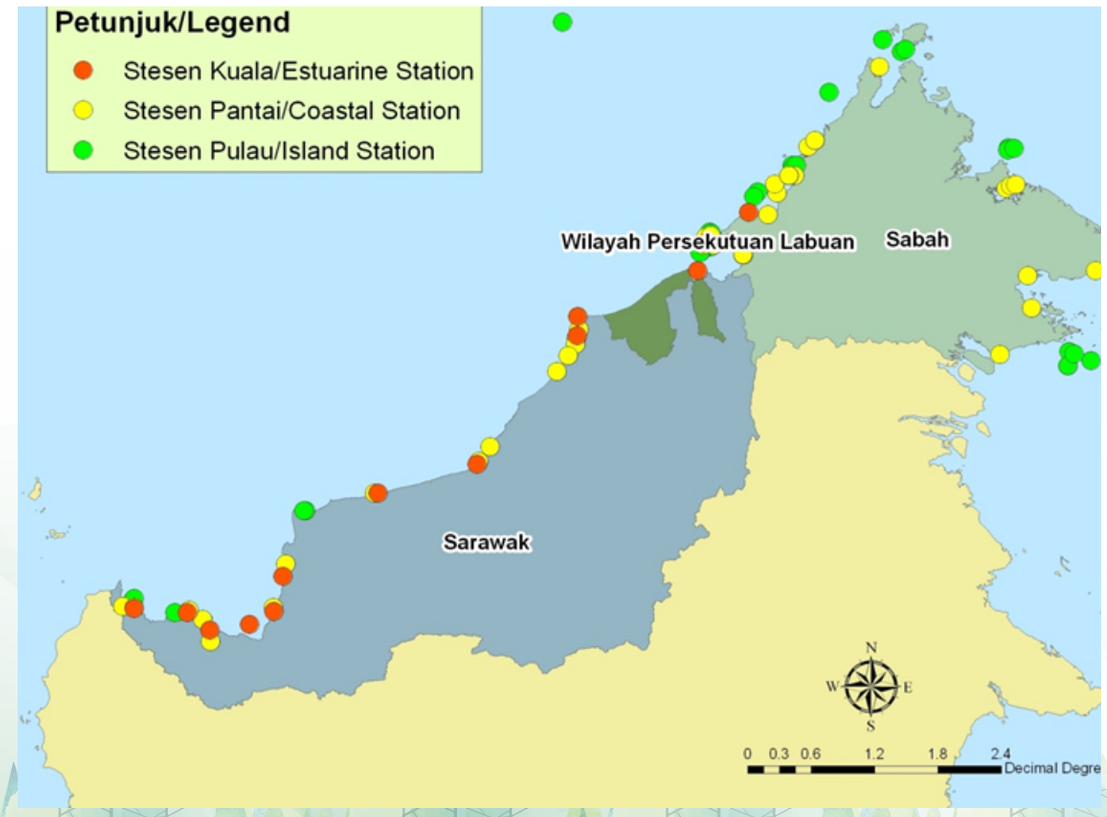
Jadual 4.2 JAS : Stesen Pemantauan 'Jawatankuasa Bersama Malaysia-Singapura Mengenai Alam Sekitar – (MSJCE), 2016

Table 4.2 DOE: Monitoring Stations under the Malaysia-Singapore Joint Committee on the Environment (MSJCE), 2016

BIL. *NO.*	NEGERI *STATE*	KAWASAN *AREA*	NAMA STESEN *STATION NAME*	NO. STESEN *STATION NO.*	LONGITUD *LONGITUDE*	LATITUD *LATITUDE*
1	JOHOR	PANTAI/*COASTAL*	KG.TANJUNG KOPOK	SJ1	104.000833	1.425278
2	JOHOR	PANTAI/*COASTAL*	KG. PASIR PUTIH	SJ2	103.927778	1.430000
3	JOHOR	PANTAI/*COASTAL*	J/K SULTAN ISKANDAR	SJ3	103.769167	1.446944
4	JOHOR	PANTAI/*COASTAL*	KG.SENIBUNG	SJ4	103.813056	1.483611
5	JOHOR	KUALA/*ESTUARINE*	KUALA SG.TEBRAU	SJ4A	103.796667	1.482222
6	JOHOR	PANTAI/*COASTAL*	TANJUNG PUTRI	SJ5	103.769167	1.455556
7	JOHOR	PANTAI/*COASTAL*	HADAPAN MPJB	SJ6	103.761944	1.452222
8	JOHOR	PANTAI/*COASTAL*	TANJUNG DANGA	SJ7	103.714444	1.456667
9	JOHOR	KUALA/*ESTUARINE*	KUALA SG.SKUDAI	SJ7A	103.722778	1.462778
10	JOHOR	PANTAI/*COASTAL*	HADAPAN PUSAT ISLAM	SJ7B	103.747500	1.455278
11	JOHOR	PANTAI/*COASTAL*	TEBING RUNTUH	SJ8	103.668333	1.419444
12	JOHOR	KUALA/*ESTUARINE*	KUALA SG.MELAYU	SJ8A	103.698056	1.448056
13	JOHOR	PANTAI/*COASTAL*	TANJUNG BUNGA	SJ9	103.650556	1.385278
14	JOHOR	PANTAI/*COASTAL*	TANJUNG KUPANG	SJ10	103.653056	1.393333
15	JOHOR	PANTAI/*COASTAL*	BELUNGKOR	EM4	104.053067	1.440500
16	JOHOR	PANTAI/*COASTAL*	PULAU TEKONG	EM5	104.076867	1.428417
17	JOHOR	PANTAI/*COASTAL*	PULAU TEKONG	EM6	104.089000	1.388667
18	JOHOR	PANTAI/*COASTAL*	JETI PULAREK	EM7	104.077958	1.357444
19	JOHOR	PANTAI/*COASTAL*	TANJUNG PENGELIH	WQ10	104.094325	1.331283
20	JOHOR	PANTAI/*COASTAL*	PULAU MERAMBONG	WM1	103.626747	1.338061



Peta 4.1 (a) Semenanjung Malaysia : Taburan Stesen Pemantauan Kualiti Air Marin, 2016
Map 4.1 (a) Peninsular Malaysia: Distribution of Marine Water Quality Stations, 2016



Peta 4.1 (b) Sabah dan Sarawak : Taburan Stesen Pengawasan Kualiti Air Marin, 2016
Map 4.1 (b) Sabah and Sarawak : Distribution of Marine Water Quality Stations, 2016

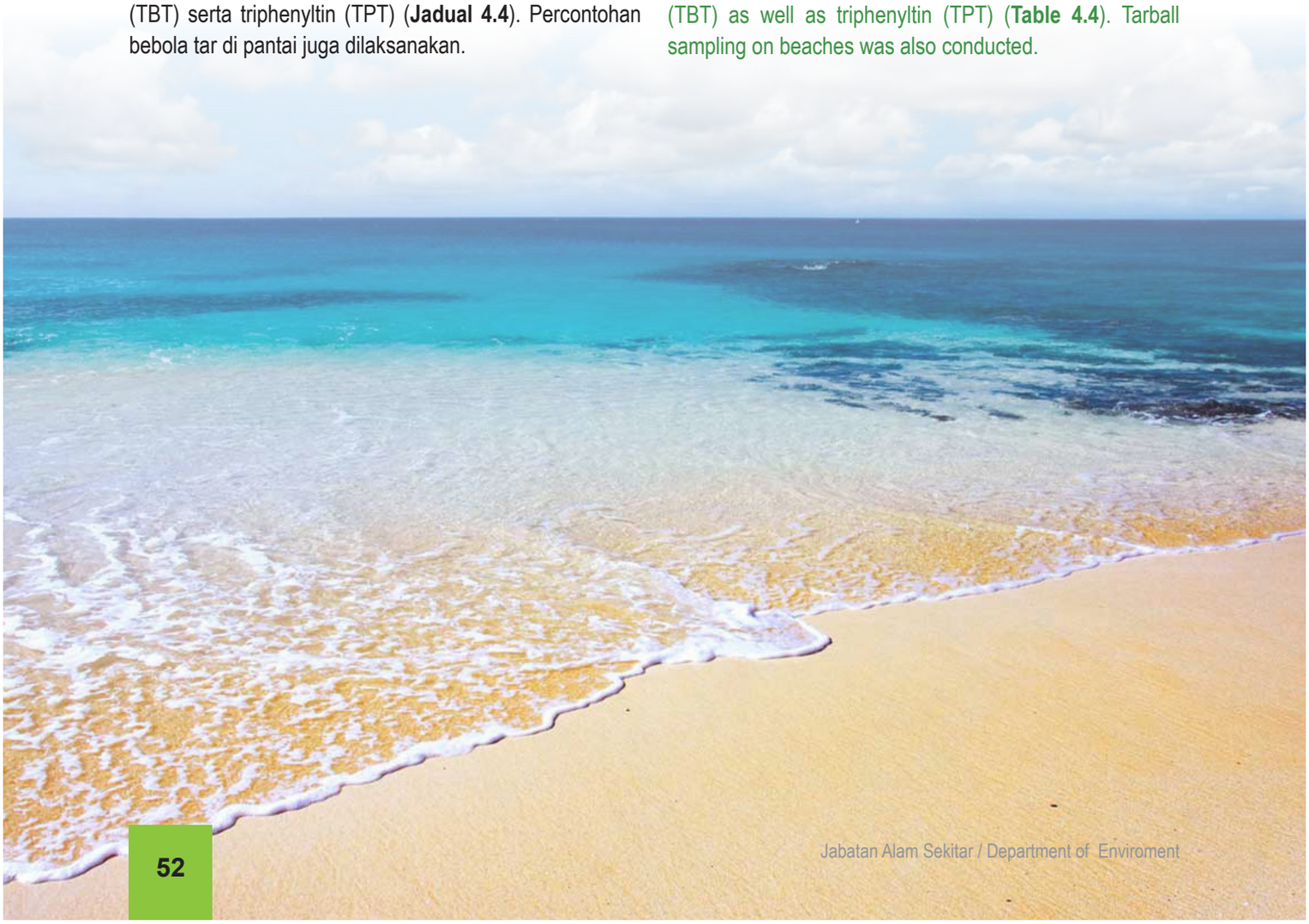
PENGAWASAN KUALITI AIR MARIN PULAU-PULAU
ISLAND MARINE WATER QUALITY MONITORING

Malaysia dikurniakan dengan banyak pulau yang kaya dengan sumber akuatik. Kualiti air marin pula merupakan aspek yang penting dalam pemuliharaan sumber semulajadi ini. Sehubungan dengan itu, Program Pengawasan Kualiti Air Marin Pulau-Pulau telah dimulakan pada Julai 1998. Pada tahun 2016, program ini telah dilaksanakan di 75 buah pulau terpilih dan melibatkan 90 stesen pengawasan. Pulau-pulau ini dikelaskan mengikut empat kategori iaitu pulau Pembangunan (3), pulau Peranginan (30), pulau Taman Laut (29) , dan pulau yang Dilindungi (13) (**Jadual 4.3**). Kekerapan persampelan bagi pulau pembangunan adalah sebanyak enam (6) kali setahun manakala bagi pulau yang lainnya adalah sebanyak empat (4) kali setahun.

Pengukuran parameter-parameter fizikal kualiti air marin dibuat secara in-situ seperti suhu, pH, konduktiviti, kemasinan, oksigen terlarut dan kekeruhan manakala 14 parameter yang dianalisis di makmal pula adalah seperti jumlah pepejal terampai, escherichia coli (E.coli), nitrat, fosfat, jumlah karbon organik, minyak dan gris logam berat termasuklah merkuri (Hg), kadmium (Cd), kromium (Cr), kuprum (Cu), plumbum (Pb), arsenik (As) dan tributiltin (TBT) serta triphenyltin (TPT) (**Jadual 4.4**). Percontohan bebola tar di pantai juga dilaksanakan.

Malaysia is endowed with many islands with rich marine aquatic resources. The quality of marine water plays an important aspect in the conservation of such resources. As a step towards this, The Island Marine Water Quality Monitoring Programme was established in July 1998. In 2016, the programme was conducted at 75 selected islands covering 90 monitoring stations. The islands are classified into four categories; Development islands (3); Resort islands (30); Marine Park islands (29); and Protected islands (13) (**Table 4.3**). The sampling frequency for development island was six (6) times per year, while the frequency for the others island categories was four (4) times per year.

Marine water quality monitoring includes measurement of in-situ parameters such as temperature, pH, conductivity, salinity, dissolved oxygen, turbidity. Meanwhile, laboratory analysis involves 14 other parameters such as total suspended solids, escherichia coli (E. coli), nitrate, phosphate, total organic carbon, oil and grease, heavy metals including mercury (Hg), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), arsenic (As) and tributyltin (TBT) as well as triphenyltin (TPT) (**Table 4.4**). Tarball sampling on beaches was also conducted.



Jabatan Alam Sekitar / Department of Enviroment

Jadual 4.3 JAS : Stesen-Stesen Pemantauan Kualiti Air Marin Pulau, 2016
Table 4.3 DOE: Island Water Quality Monitoring Stations, 2016

NEGERI *STATE*	BIL. PULAU *NO. OF ISLAND*	BIL. STESEN *NO. OF STATION*	PULAU *ISLAND*	NO. STESEN *STATION NO*	KATEGORI *CATEGORY*	LOKASI *LOCATION*	
KEDAH	8	4	LANGKAWI (PANTAI KUAH)	7KD07	D	99.850661	6.308232
			LANGKAWI (TELUK EWA)	7KD08	D	99.768845	6.429267
			LANGKAWI (PANTAI CHENANG)	7KD09	D	99.713766	6.308803
			LANGKAWI (TANJUNG RHU)	7KD10	D	99.826316	6.459711
		1	SINGA BESAR	7KR01	R	99.734724	6.225588
		1	DAYANG BUNTING	7KR02	R	99.780881	6.207304
		1	PAYAR	7KM03	M	100.042679	6.062973
		1	KACA	7KM04	M	100.051804	6.071466
		1	LEMBU	7KM05	M	100.057344	6.076143
		1	SIGANTANG	7KM06	M	99.926366	6.042960
		1	PERAK	7KP01	P	98.937817	5.68231
PULAU PINANG	6	3	PULAU PINANG (BATU MAUNG)	7PD01	D	100.29102	5.286736
			PULAU PINANG (TELUK BAHANG)	7PD03	D	100.204709	5.462599
			PULAU PINANG (PADANG KOTA)	7PD04	D	100.343243	5.422912
		1	AMAN	7PR05	R	100.387819	5.26716
		1	JEREJAK	7PR06	R	100.308477	5.317916
		1	KENDI	7PR07	R	100.181691	5.232786
		1	RIMAU	7PR08	R	100.272832	5.249167
		1	GEDONG	7PR09	R	100.385721	5.285184
PERAK	4	2	PANGKOR (TELOK GEDONG)	7AR01	R	100.580804	4.194214
			PANGKOR (PANTAI PUTERI DEWI)	7AR02	R	100.54425	4.252972
		1	PANGKOR LAUT	7AR03	R	100.546627	4.20159
		1	SEMBILAN	7AR04	R	100.544	4.008528
		1	TUKUN PERAK	7AP05	P	100.556154	4.127236
SELANGOR	3	1	KETAM	7BR01	R	101.268739	3.024554
		1	ANGSA	7BR02	R	101.218639	3.185556
		1	LUMUT	7BR03	R	101.361833	2.9985
NEGERI SEMBILAN	1	1	ARANG	7NP01	P	101.794544	2.517963
MELAKA	3	2	BESAR (A)	7MR01	R	102.331722	2.116686
			BESAR (B)	7MR01	R	102.322444	2.106722

NEGERI *STATE*	BIL. PULAU *NO. OF ISLAND*	BIL. STESEN *NO. OF STATION*	PULAU *ISLAND*	NO. STESEN *STATION NO*	KATEGORI *CATEGORY*	LOKASI *LOCATION*	
		2	UPEH (A)	7MR02	R	102.204583	2.194889
			UPEH (B)	7MR02	R	102.203222	2.18975
		2	UNDAN (A)	7MR03	R	102.332	2.048944
			UNDAN (B)	7MR03	R	102.335139	2.047278
JOHOR	8	1	SETINDAN	7JR01	R	103.857972	2.476639
		1	BABI TENGAH	7JR02	R	103.861639	2.472333
		1	DAYANG	7JM03	M	104.50439	2.469912
		1	NANGA BESAR	7JM08	M	104.125062	2.271527
		1	SIBU TENGAH	7JM11	M	104.095944	2.181917
		1	PEMANGGIL	7JM15	M	104.328086	2.565569
		1	KUKUP	7JP17	P	1.46833	103.2625
		1	PISANG	7JP18	P	1.327944	103.420083
PAHANG	8	2	TIOMAN (KG. NIPAH)	7CM01	M	104.15225	2.876273
			TIOMAN (TELOK SALANG)	7CM02	M	104.117264	2.774981
		1	SERI BUAT	7CM03	M	103.907288	2.670922
		1	CEBEH	7CM04	M	104.098805	2.930086
		1	TULAI	7CM05	M	104.097845	2.90551
		1	SEPUI	7CM06	M	104.052741	2.895142
		1	LABAS	7CM07	M	104.066903	2.885627
		1	SEMBILANG	7CM08	M	103.891463	2.698851
		1	TOKONG BAHARA	7CM09	M	104.064756	2.664081
TERENGGANU	9	2	PERHENTIAN BESAR (SOUTH)	7TM04	M	102.7505	5.889306
			PERHENTIAN BESAR (WEST)	7TM05	M	102.737556	5.899397
		1	PERHENTIAN KECIL	7TM06	M	102.725111	5.917917
		2	REDANG (NORTH)	7TM07	M	103.037056	5.775611
			REDANG (SOUTH)	7TM08	M	103.03685	5.775466
		1	KAPAS	7TM09	M	103.259833	5.216972
		1	LANG TENGAH	7TM11	M	102.890861	5.792472
		1	PINANG	7TM12	M	103.002611	5.747972
		1	EKOR TEBU	7TM13	M	103.029278	5.740444
		1	LIMA	7TM14	M	103.059056	5.769861

NEGERI *STATE*	BIL. PULAU *NO. OF IS-LAND*	BIL. STESEN *NO. OF STATION*	PULAU *ISLAND*	NO. STESEN *STATION NO*	KATEGORI *CATEGORY*	LOKASI *LOCATION*	
		1	GUMIA	7TR01	R	103.262194	5.230833
KELANTAN	2	1	PANJANG	7DP01	P	102.308456	6.186284
		1	KUNDUR	7DP02	P	102.257855	6.207073
SARAWAK	3	1	SATANG	7QP01	P	110.165353	1.778218
		1	TALANG-TALANG KECIL	7QP02	P	109.769193	1.890324
		1	TALANG-TALANG BESAR	7QP03	P	109.781162	1.911304
SABAH	16	1	GAYA	7SR01	R	116.053361	6.016562
		1	MABUL	7SR03	R	118.634129	4.251368
		2	SIPADAN (NORTH)	7SR04	R	118.626571	4.11871
			SIPADAN (WEST)	7SR05	R	118.62508	4.113953
		1	SAPI	7SM08	M	116.014046	6.007339
		1	MANUKAN	7SR09	R	116.012343	5.977846
		1	TIGA	7SR10	R	115.651821	5.716015
		1	KALAMPUNIAN BESAR	7SM11	M	115.686184	5.762202
		1	KAPALAI	7SR12	R	118.684712	4.236162
		1	MOLLEANGAN BESAR	7SR14	R	117.05078	7.094316
		1	BANGGI (SOUTH)	7SR15	R	117.091792	7.112553
		1	BALAMBANGAN	7SR16	R	116.878567	7.197014
		1	SILINGAN	7SP17	P	118.063435	6.178876
		1	GULISAN	7SP18	P	118.058167	6.158361
		1	BAKUNGAN KECIL	7SP19	P	118.112639	6.17525
		1	BANGGI (EAST)	7SR20	R	117.107167	7.137355
		1	MANTANANI BESAR	7SR21	R	116.367246	6.700757
LABUAN	4	4	LABUAN (POHON BATU)	7LD01	D	115.226969	5.381358
			LABUAN (WATER FRONT)	7LD02	D	115.248351	5.271487
			LABUAN (LUBUK TEMIANG)	7LD03	D	115.248928	5.371834
			LABUAN (RANCHA-RANCHA)	7LD04	D	115.239076	5.239096
		1	KURAMAN	7LM05	M	115.140088	5.214822
		1	RUSUKAN BESAR	7LM06	M	115.149568	5.203497
		1	RUSUKAN KECIL	7LM07	M	115.144014	5.190995

Jadual 4.4 JAS : Parameter Kualiti Air Marin, 2016
Table 4.4 DOE: Marine Water Quality Parameters, 2016

BIL. NO.	PARAMETER PARAMETERS	KOD CODE	UNIT UNIT
PENGUKURAN IN-SITU/ IN-SITU MEASUREMENTS			
1	Oksigen Terlarut / *Dissolved Oxygen*	DO	mg/l
2	Kemasinan / *Salinity*	*Sal*	ppt
3	Suhu / *Temperature*	Temp	°C
4	Konduktiviti / *Conductivity*	Cond	mS/cm
5	Kekeruhan / *Turbidity*	Turb	NTU/FTU
6	pH	pH	-
PENGUKURAN MAKMAL/ LABORATORY MEASUREMENT			
1	Jumlah Pepejal Terampai / *Total Suspended Solid*	TSS	mg/l
2	*Escherichia coli*	*E.coli*	cfu/100 ml
3	Minyak dan Gris / *Oil and Grease*	O&G	mg/l
4	Kuprum / *Copper*	Cu	µg/l
5	Kadmium / *Cadmium*	Cd	µg/l
6	Plumbum / *Lead*	Pb	µg/l
7	Arsenik / *Arsenic*	As	µg/l
8	Merkuri / *Mercury*	Hg	µg/l
9	Kromium / *Chromium*	Cr	µg/l
10	Bebola Tar / *Tarball*	Tar	g/100m
11	Jumlah Karbon Organik / *Total Organic Carbon*	TOC	mg/l
12	Nitrat / *Nitrate*	NO_3^-	mg/l
13	Fosfat / *Phosphate*	PO_4	mg/l
14	Tributiltin / *Tributyltin*	TBT	µg/l
15	Trifeniltin / *Triphenyltin*	TPT	µg/l

PROGRAM PENGAWASAN KUALITI AIR SUNGAI
RIVER WATER QUALITY MONITORING

Jabatan Alam Sekitar (JAS) melaksanakan Program Pengawasan Kualiti Air Sungai sejak tahun 1978 dan secara komprehensif bermula tahun 1995 bertujuan menentukan status terkini kualiti air sungai-sungai dan mengesan perubahannya dari semasa ke semasa.

Pada tahun 2016, rangkaian stesen pengawasan kualiti air sungai JAS adalah terdiri daripada 891 stesen yang terletak di 477 batang sungai di seluruh negara seperti dalam **Jadual 4.5**. Sejumlah 55 stesen daripada rangkaian stesen pengawasan kualiti air sungai tersebut adalah khusus bagi memantau kualiti air sungai di hulu muka sauk yang terpilih seperti dalam **Jadual 4.6**. Persampelan kualiti air sungai dijalankan secara berjadual dan mengikut kekerapan yang telah ditetapkan iaitu antara empat hingga 12 kali setahun. Parameter-parameter kualiti air yang diukur merangkumi parameter fizikal, kimia dan biologikal seperti di **Jadual 4.7.**

Kualiti air sungai turut diawasi secara atas talian melalui 10 stesen automatik yang ditempatkan di Sg. Perak (Perak), Sg. Selangor (Selangor), Sg. Langat (Cheras) (Selangor), Sg. Langat (Dengkil) (Selangor), Sg. Semenyih (Selangor), Sg Linggi (Negeri Sembilan), Sg. Labu (Negeri Sembilan), Sg. Melaka (Melaka), Sg. Putat (Melaka), dan Sg. Skudai (Johor). Stesen-stesen automatik ini dilengkapi dengan pengesan yang berfungsi mengukur parameter in-situ iaitu pH, kekonduksian, oksigen terlarut, suhu, kekeruhan dan ammonium.

Pada tahun 2016, sejumlah 5,256 sampel air sungai telah diuji dan sebanyak 166,257 data telah dijana merangkumi kesemua parameter kualiti air yang diukur.

Kualiti air sungai dinilai berdasarkan Indeks Kualiti Air (IKA) dan Standard Kualiti Air Kebangsaan. IKA ditentukan dengan mengambilkira kepentingan enam parameter penunjuk pencemaran utama iaitu oksigen terlarut (DO), keperluan oksigen biokimia (BOD), keperluan oksigen kimia (COD), ammonia nitrogen (NH3N), pH, dan pepejal terampai (SS).

JAS turut memantau kualiti air sungai di bawah Program River of Life (RoL) iaitu salah satu Program National Key Economic Area (NKEA) bagi Greater Kuala Lumpur/ Klang Valley (GK/KV). Antara objektif utama RoL adalah untuk membersihkan dan memperbaiki kualiti air di sepanjang 110 km bahagian-bahagian Sungai Klang dan Sungai Gombak pada tahun 2020. JAS berperanan dalam melaporkan kualiti air sungai- sungai yang dipantau di

The Department of Environment (DOE) has implemented River Water Quality Monitoring Program since 1978 and comprehensively starting 1995 to determine the river water quality status and detect changes over time.

In 2016, DOE's river water quality monitoring network comprised of 891 manual stations which were located at 477 rivers in Malaysia as shown in **Table 4.5**. 55 stations from the network are specifically for the purpose of monitoring river water quality at upstream of selected water intakes for water supply facilities as listed in **Table 4.6**. River water samplings are carried out periodically from four to 12 times a year. The water quality parameters were analysed and tested for a range of physical, chemical and biological parameters as shown in **Table 4.7.**

River water quality also being monitored on-line via ten automatic monitoring stations which are located at Sg. Perak (Perak), Sg. Selangor (Selangor), Sg. Langat (Cheras) (Selangor), Sg. Langat (Dengkil) (Selangor), Sg. Semenyih (Selangor), Sg Linggi (Negeri Sembilan), Sg. Labu (Negeri Sembilan), Sg. Melaka (Melaka), Sg. Putat (Melaka), and Sg Skudai (Johor). These automatic stations are equipped with sensors to measure in-situ parameters such as pH, conductivity, dissolved oxygen, temperature, turbidity and ammonium.

In 2016, a total of 5,256 river water samples were tested and a sum of 166,257 data were generated covering all of the water quality parameters.

River water quality is appraised based on Water Quality Index (WQI) and National Water Quality Standard for Malaysia (NWQS). The WQI is calculated by a formula which is derived for six principal parameters namely dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), ammoniacal nitrogen (NH3N), pH, and suspended solids (SS)

DOE is also involved in the program River of Life (RoL), one of the NKEAs Program for Greater Kuala Lumpur/ Klang Valley (GK/KV). Among the main objectives of the RoL is to clean and improve water quality along 110 km of the Klang and Gombak rivers in 2020. DOE's role is to report the water quality monitored for the rivers in the Klang River Water Quality Regional, namely Sungai Klang, Sungai Gombak, Sungai Batu and Sungai Jinjang. The list

dalam Lembangan Sungai Klang, iaitu Sungai Klang, Sungai Gombak, Sungai Batu dan Sungai Jinjang. Senarai 35 stesen pemantauan bagi Program River of Life (RoL) adalah seperti di **Jadual 4.8.**

of 35 monitoring stations in the RoL program is as shown in **Table 4.8.**

Aktiviti dan mesyuarat lain yang berkaitan dengan pengawasan kualiti air sungai yang dihadiri oleh JAS adalah seperti di **Jadual 4.9.**

Other activities and meetings related to river water quality monitoring attended by the DOE are shown in **Table 4.9.**

Sebaran Data Kualiti Air Sungai

Data-data kualiti air sungai telah digunakan oleh dua kategori pengguna utama iaitu agensi/ jabatan kerajaan dan penuntut institusi pengajian tinggi yang menjalankan kajian berkaitan kualiti air sungai. Pada tahun 2016, sejumlah 45 permohonan data telah diterima oleh JAS melibatkan sejumlah 488,473 data kualiti air sungai. Sebanyak 73% permohonan adalah daripada penuntut institusi pengajian tinggi, manakala 27% daripada pelbagai agensi kerajaan. Bilangan permohonan data kualiti air sungai yang diterima oleh JAS pada tahun 2016 adalah seperti yang ditunjukkan oleh **Rajah 4.1.**

Dissemination of River Water Quality Data

River water quality data was utilized by two categories of user which are government agencies, and researchers from higher learning institutions. In 2016, a total of 45 data request were received by DOE covering 488,473 water quality data points. About 73% of the requests were from researchers and 27% from various government agencies. The number of water quality data request received by DOE in 2016 as shown in **Figure 4.1.**



Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2016

Table 4.5 DOE : List of the Catchments and Rivers Monitored, 2016

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
Perlis	1	6	6	01	Perlis	6	Sg. Jarum	1
							Sg. Jernih	1
							Sg. Ngulang	1
							Sg. Pelarit	1
							Sg. Perlis	1
							Sg. Wang Kelian	1
Kedah	4	14	16	01PLA	Kisap	1	Sg. Kisap	1
				01PLC	Ulu Melaka	2	Sg. Petang	1
							Sg. Ulu Melaka	1
				03	Kedah	8	Sg. Janing	1
							Sg. Kedah	1
							Sg. Padang Terap	3
							Sg. Pedu	1
							Sg. Pendang	1
							Sg. Tekai	1
				04	Merbok	5	Sg. Bongkok	1
							Sg. Merbok	1
							Sg. Petani	1
							Sg. Tok Pawang	1
							Sg. Tupah	1
Kedah/ Pulau Pinang	1	7	11	05	Muda	11	Sg. Chepir	1
							Sg. Jerung	1
							Sg. Karangan	1
							Sg. Ketil	2
							Sg. Muda	4
							Sg. Pegang	1
							Sg. Sedim	1
Pulau Pinang	6	22	37	06PP	Pinang	9	Sg. Air Itam	5
							Sg. Air Terjun	1
							Sg. Dondang	1
							Sg. Jelutong	1
							Sg. Pinang	1
				06J	Juru	8	Sg. Juru	2
							Sg. Kilang Ubi	4
							Sg. Pasir	1
							Sg. Rambai	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
				06K	Kluang	3	Sg. Ara	2
							Sg. Relau	1
				06P	Perai	11	Sg. Jarak	3
							Sg. Keladi	1
							Sg. Kereh	2
							Sg. Kulim	2
							Sg. Perai	2
							Sg. Pertama	1
				06T	Bayan Lepas	3	Sg. Bayan Lepas	1
							Sg. Tiram	2
				07	Jawi	3	Sg. Jawi	1
							Sg. Junjong	1
							Sg. Machang Bubok	1
Pulau Pinang/ Perak	1	3	7	08	Kerian	7	Sg. Kechil	1
							Sg. Kerian	4
							Sg. Selama	2
Perak	6	38	72	12	Raja Hitam	5	Sg. Manjong	2
							Sg. Nyior	1
							Sg. Raja Hitam	2
				12W	Wangi	2	Sg. Deralik	1
							Sg. Wangi	1
				09	Kurau	6	Sg. Ara	2
							Sg. Kurau	4
				10	Sepetang	10	Sg. Batu Tegoh	3
							Sg. Jana	1
							Sg. Limau	1
							Sg. Sepetang	2
							Sg. Temerloh	2
							Sg. Trong	1
				11	Bruas	5	Sg. Bruas	3
							Sg. Dandang	1
							Sg. Rotan	1
				13	Perak	44	Sg. Batang Padang	3
							Sg. Bidor	3
							Sg. Chenderiang	1
							Sg. Chepor	1
							Sg. Kampar	2
							Sg. Kangsar	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Kepayang	2
							Sg. Kerdah	1
							Sg. Kinjang	1
							Sg. Kinta	6
							Sg. Klah	1
							Sg. Kuang	1
							Sg. Nyamok	1
							Sg. Pari	1
							Sg. Pelus	2
							Sg. Perak	8
							Sg. Pinji	2
							Sg. Raia	2
							Sg. Seluang	1
							Sg. Serokai	1
							Sg. Sungkai	2
							Sg. Tumboh	1
Perak/ Selangor	1	4	8	14	Bernam	8	Sg. Bernam	4
							Sg. Inki	1
							Sg. Slim	2
							Sg. Trolak	1
Selangor	5	17	33	17	Buloh	4	Sg. Buloh	4
				19	Langat	15	Sg. Anak Chuau	1
							Sg. Batang Nilai	1
							Sg. Chuau	2
							Sg. Jijan	1
							Sg. Langat	7
							Sg. Lui	1
							Sg. Pajam	1
							Sg. Semenyih	1
				20	Sepang	2	Sg. Sepang	2
				15	Tengi	3	Sg. Tengi	3
				16	Selangor	9	Sg. Batang Kali	1
							Sg. Kanching	1
							Sg. Kerling	1
							Sg. Selangor	4
							Sg. Sembah	1
							Sg. Serendah	1
Selangor/ W.P.Kuala Lumpur	1	18	38	18	Klang	38	Sg. Batu	4
							Sg. Gombak	3

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Jinjang	3
							Sg. Klang	8
							Sg. Semelah	1
							Sg. Air Busuk	1
							Sg. Ampang	2
							Sg. Belongkong	1
							Sg. Bunos	3
							Sg. Kerayong	2
							Sg. Keroh	2
							Sg. Toba	1
							Sg. Untut	1
							Sg. Anak Air Batu	1
							Sg. Damansara	2
							Sg. Kuyoh	1
							Sg. Rasau	1
							Sg. Penchala	1
Negeri Sembilan	1	9	14	21	Linggi	14	Sg. Batang Penar	1
							Sg. Chembong	1
							Sg. Kepayong	1
							Sg. Kundur Besar	1
							Sg. Linggi	5
							Sg. Pedas	1
							Sg. Rembau	2
							Sg. Simin	1
							Sg. Siput	1
Melaka	5	13	24	21SM	Seri Melaka	1	Sg. Seri Melaka	1
				22	Melaka	12	Sg. Btg.Melaka	2
							Sg. Durian Tunggal	1
							Sg. Kemunting	1
							Sg. Dusun/Keru	1
							Sg. Melaka	5
							Sg. Rembia	1
							Sg. Tampin	1
				24	Kesang	5	Sg. Chohong	2
							Sg. Kesang	3
				24A	Merlimau	2	Sg. Merlimau	2
				23	Duyong	4	Sg. Duyong	3
							Sg. Gapam	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
Johor/ Negeri Sembilan	1	8	15	25	Muar	15	Sg. Air Panas	1
							Sg. Gemencheh	1
							Sg. Juasseh	1
							Sg. Labis	1
							Sg. Meda	1
							Sg. Muar	8
							Sg. Sarang Buaya	1
							Sg. Segamat	1
Johor	22	91	157	26	Batu Pahat	20	Sg. Amran	1
							Sg. Bantang	1
							Sg. Batu Pahat	1
							Sg. Bekok	5
							Sg. Berlian	1
							Sg. Chaah	1
							Sg. Lenik	1
							Sg. Merek	1
							Sg. Merpo	1
							Sg. Semberong	2
							Sg. Simpang Kanan	2
							Sg. Simpang Kiri	3
				27A	Air Baloi	3	Sg. Air Baloi	3
				28	Segget	5	Sg. Segget	5
				28D	Tebrau	10	Sg. Bala	1
							Sg. Pandan	1
							Sg. Plentong	1
							Sg. Sebulung	1
							Sg. Sengkuang	1
							Sg. Tampoi	1
							Sg. Tebrau	4
				28F	Danga	2	Sg. Danga	2
				28G	Rambah	2	Sg. Rambah	2
				29B	Kaw. Pasir Gudang	5	Sg. Buluh	1
							Sg. Latoh	1
							Sg. Masai	1
							Sg. Perembi	1
							Sg. Tukang Batu	1
				27B	Benut	7	Sg. Benut	4

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Parit Hj. Yassin	1
							Sg. Pinggan	1
							Sg. Ulu Benut	1
				28A	Pontian Besar	7	Sg. Air Hitam	1
							Sg. Ayer Merah	1
							Sg. Pontian Besar	5
				28B	Pontian Kecil	2	Sg. Pontian Kecil	2
				28C	Skudai	11	Sg. Melana	2
							Sg. Skudai	9
				28E	Kempas	2	Sg. Kempas	2
				29C	Sanglang	1	Sg. Sanglang	1
				29D	Pulai	3	Sg. Pulai	2
							Sg. Ulu Choh	1
				31C	Kim-Kim	2	Sg. Kim-Kim	2
				29	Johor	34	Sg. Anak Sg. Sayong	1
							Sg. Belitong	1
							Sg. Bukit Besar	1
							Sg. Chemangar	1
							Sg. Johor	4
							Sg. Layang	1
							Sg. Layau Kiri	1
							Sg. Lebam	1
							Sg. Linggiu	1
							Sg. Panti	1
							Sg. Papan	1
							Sg. Pelepah	2
							Sg. Penggeli	2
							Sg. Remis	1
							Sg. Santi	1
							Sg. Sayong	4
							Sg. Sebol	1
							Sg. Seluyut	1
							Sg. Semangar	1
							Sg. Semenchu	1
							Sg. Telor	1
							Sg. Temoh	1
							Sg. Tiram	4
				30A	Sedili Besar	9	Sg. Ambat	1
							Sg. Dohol	1
							Sg. Pasir Panjang	1
							Sg. Sedili Besar	5

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Temubor Kanan	1
				30B	Sedili Kecil	5	Sg. Anak Sedili Kecil	1
							Sg. Bahan	2
							Sg. Sedili Kecil	2
				30C	Paloi	1	Sg. Paloi	1
				31A	Mersing	2	Sg. Mersing	2
				31B	Jemaluang	2	Sg. Jemaluang	2
				32	Endau	22	Sg. Endau	3
							Sg. Jasin	1
							Sg. Jebong	1
							Sg. Kahang	1
							Sg. Lenggor	1
							Sg. Mamai	1
							Sg. Melatai	1
							Sg. Mengkibol	3
							Sg. Paloh	1
							Sg. Pamol	1
							Sg. Selai	1
							Sg. Semberong	5
							Sg. Singol	1
							Sg. Tamok	1
Pahang	9	63	99	32AE	Anak Endau	2	Sg. Anak Endau	2
				33	Rompin	9	Sg. Aur	1
							Sg. Keratong	2
							Sg. Pontian	1
							Sg. Pukin	1
							Sg. Rompin	4
				34M	Merchong	1	Sg. Merchong	1
				35P	Pahang	67	Sg. Bentong	1
							Sg. Benus	2
							Sg. Bera	2
							Sg. Berkapor	1
							Sg. Bertam	1
							Sg. Burung	1
							Sg. Chini	1
							Sg. Habu	1
							Sg. Jelai	2
							Sg. Jempol	2
							Sg. Jengka	2
							Sg. Kelau	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Kertam	1
							Sg. Koyan	1
							Sg. Kundang	1
							Sg. Lenggok	1
							Sg. Lepar	3
							Sg. Lipis	3
							Sg. Luit	1
							Sg. Maran	1
							Sg. Mentiga	1
							Sg. Pahang	8
							Sg. Perting	1
							Sg. Ringlet	1
							Sg. Semantan	4
							Sg. Serting	2
							Sg. T. Paya Bungor	1
							Sg. Tahan	1
							Sg. Tanglir	1
							Sg. Tasik Bera	1
							Sg. Tasik Chini	1
							Sg. Tekal	1
							Sg. Tekam	2
							Sg. Telang	1
							Sg. Telom	2
							Sg. Tembeling	1
							Sg. Teranum	1
							Sg. Teras	1
							Sg. Teris	3
							Sg. Terla	1
							Sg. Triang	2
							Sg. Tringkap	1
				34B	Bebar	4	Sg. Bebar	1
							Sg. Merba	1
							Sg. Serai	2
				36	Kuantan	11	Sg. Belat	1
							Sg. Charu	1
							Sg. Kenau	1
							Sg. Kuantan	5
							Sg. Pandan	1
							Sg. Riau	1
							Sg. Talam	1
				37	Balok	3	Sg. Balok	2
							Sg. Panjang	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
				37A	Cherating	1	Sg. Cherating	1
				37B	Tonggok	1	Sg. Tonggok	1
Terengganu	13	24	35	38	Kemaman	4	Sg. Cherul	1
							Sg. Kemaman	2
							Sg. Ransan	1
				39K	Kertih	1	Sg. Kertih	1
				40	Paka	2	Sg. Paka	1
							Sg. Rasau	1
				41	Dungun	4	Sg. Dungun	4
				42M	Marang	1	Sg. Marang	1
				43	Terengganu	7	Sg. Berang	1
							Sg. Nerus	1
							Sg. Pueh	1
							Sg. Telemong	1
							Sg. Terengganu	3
				44	Setiu	4	Sg. Chalok	2
							Sg. Setiu	2
				46	Besut	2	Sg. Besut	2
				47	Kluang	1	Sg. Kluang	1
				39C	Chukai	4	Sg. Bungkus	1
							Sg. Chukai	1
							Sg. Ibok	1
							Sg. Ruang	1
				42I	Ibai	3	Sg. Ibai	3
				42L	Merchang	1	Sg. Merchang	1
				45	Merang	1	Sg. Merang	1
Kelantan	5	24	52	47K	Kemasin	4	Sg. Kemasin	2
							Sg. Semerak	2
				48	Kelantan	33	Sg. Belatop	2
							Sg. Ber	1
							Sg. Berok	3
							Sg. Betis	1
							Sg. Galas	5
							Sg. Kelantan	3
							Sg. Kerilla	1
							Sg. Lebir	3
							Sg. Nal	2
							Sg. Nenggiri	3
							Sg. Pergau	6
							Sg. Relai	1
							Sg. Sokor	1
							Sg. Tuang	1
				49	Golok	6	Sg. Golok	5

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Lanas	1
				48C	Pengkalan Chepa	6	Sg. Alor B	1
							Sg. Alor Lintah	1
							Sg. Keladi	1
							Sg. Pengkalan Chepa	2
							Sg. Raja Gali	1
				48D	Pengkalan Datu	3	Sg. Pengkalan Datu	3
Sarawak	22	54	104	50	Kayan	3	Sg. Kayan	3
				50S	Semunsam	1	Sg. Semunsam	1
				51	Sarawak	15	Sg. Kuap	1
							Sg. Maong Kiri	1
							Sg. Samarahan	2
							Sg. Sarawak	6
							Sg. Sarawak Kanan	1
							Sg. Sarawak Kiri	1
							Sg. Semadang	1
							Sg. Semenggoh	1
							Sg. Tabuan	1
				59	Balingian	2	Sg. Balingian	2
				62	Similajau	2	Sg. Similajau	2
				64	Niah	3	Sg. Niah	2
							Sg. Sekaloh	1
				68	Limbang	5	Sg. Limbang	5
				69	Trusan	1	Sg. Trusan	1
				70	Lawas	3	Sg. Lawas	3
				52	Sadong	6	Sg. Karangan	2
							Sg. Sadong	4
				53	Lupar	8	Sg. Ai	2
							Sg. Lupar	3
							Sg. Sekerang	1
							Sg. Seterap	1
							Sg. Undup	1
				54	Saribas	3	Sg. Layar	2
							Sg. Saribas	1
				55	Kerian	3	Sg. Kerian	2
							Sg. Seblak	1
				56	Rajang	19	Sg. Baloi	1
							Sg. Binatang	1
							Sg. Julau	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
							Sg. Kanowit	1
							Sg. Meradong	1
							Sg. Rajang	11
							Sg. Salim	1
							Sg. Sarikei	2
				57	Oya	3	Sg. Oya	3
				58	Mukah	4	Sg. Mukah	4
				60	Tatau	1	Sg. Tatau	1
				61	Kemena	4	Sg. Kemena	3
							Sg. Sibiu	1
				63	Suai	1	Sg. Suai	1
				65	Sibuti	6	Sg. Kabuloh	2
							Sg. Kejapil	1
							Sg. Satap	1
							Sg. Sibuti	2
				66	Miri	6	Sg. Adong	1
							Sg. Dalam	1
							Sg. Lutong	1
							Sg. Miri	2
							Sg. Padang Liku	1
				67	Baram	5	Sg. Baram	4
							Sg. Tutuh	1
Sabah	36	62	108	71	Menggalong	2	Sg. Menggalong	2
				71A	Lakutan	1	Sg. Lakutan	1
				71B	Lingkungan	2	Sg. Bukau	1
							Sg. Lingkungan	1
				72	Padas	10	Sg. Bunsit	1
							Sg. Liawan	1
							Sg. Padas	3
							Sg. Pangatan	1
							Sg. Pegalan	3
							Sg. Tandulu	1
				73	Membakut	1	Sg. Membakut	1
				74	Kimanis	1	Sg. Kimanis	1
				74A	Bongawan	1	Sg. Bongawan	1
				75	Papar	3	Sg. Papar	3
				76	Moyog	4	Sg. Moyog	4
				77	Tuaran	5	Sg. Damit	2
							Sg. Song Sai	1
							Sg. Tuaran	2
				78	Kedamaian	4	Sg. Kedamaian	1
							Sg. Tempasuk	2
							Sg. Wariu	1

Negeri/ State	Jumlah Lembangan/ Total River Basin	Jumlah Sungai Diawasi/ Total River Monitored	Jumlah Stesen/ Total Stations	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
				78T	Tenghilan	1	Sg. Tenghilan	1
				79	Bingkongan	6	Sg. Bandau	1
							Sg. Bingkongan	2
							Sg. Menggaris	2
							Sg. Tandek	1
				80	Bengkoka	2	Sg. Bengkoka	2
				82	Paitan	1	Sg. Paitan	1
				83	Sugut	6	Sg. Bongkud	1
							Sg. Lohan	1
							Sg. Merali	1
							Sg. Sugut	3
				84	Labok	7	Sg. Kinipir	2
							Sg. Labok	1
							Sg. Liwagu	2
							Sg. Maliau	1
							Sg. Tungud	1
				84A	Sapi	4	Sg. Sapi	3
							Sg. Sualong	1
				85	Mounad	2	Sg. Mounad	2
				87	Segama	3	Sg. Segama	3
				88	Tungku	2	Sg. Tungku	2
				88A	Silabukan	2	Sg. Silabukan	2
				89	Tingkayu	2	Sg. Tingkayu	2
				91	Tawau	4	Sg. Tawau	4
				91A	Apas	1	Sg. Apas	1
				91B	Balung	1	Sg. Balung	1
				92	Merotai	3	Sg. Merotai	3
				93	Umas-Umas	1	Sg. Umas-Umas	1
				94	Brantian	1	Sg. Brantian	1
				95	Kalabakan	3	Sg. Kalabakan	3
				76A	Sembulan	2	Sg. Sembulan	2
				76B	Likas	7	Sg. Inanam	3
							Sg. Likas	2
							Sg. Menggatal	2
				76C	Telipok	2	Sg. Telipok	2
				85A	Segaliud	2	Sg. Segaliud	2
				86	Kinabatangan	6	Sg. Karamuak	1
							Sg. Kinabatangan	3
							Sg. Koyah	1
							Sg. Menanggul	1
				90	Kalumpang	3	Sg. Kalumpang	3
JUMLAH/ TOTAL	140	477	836	140	140	836	477	836

Jadual 4.6 JAS : Senarai Stesen Pemantauan Muka Sauk Loji Rawatan Air

Table 4.6 DOE : List of the Water Intake Monitoring Station

Negeri/ State	Lembangan Sungai/ River Basin	Kod WKA/ Code WQR	Sungai/ River	ID Stesen/ Station ID	Lokasi Muka Sauk / Water Intake Location
Perlis	Perlis	01	Terusan Mada	2PS13	Muka sauk Loji Rawatan Air Arau Fasa IV
				2PS14	Muka sauk Loji Rawatan Air TTPC, Sg. Baru
Kedah	Melaka	01PLC	Sg. Melaka	2LG05	Ulu Melaka
			Sg. Saga	2LG06	Padang Saga
	Kedah	03	Sg. Temin	2KD10	Changloon
			Sg. Ahning	2KD11	Padang Sanai
			Sg. Padang Terap	2KD12	Kuala Nerang
	Muda	05	Sg. Muda	2MD16	Jeneri
				2MD17	Jeniang
				2MD18	Bukit Selambau
				2MD20	Pinang Tunggal
			Sg. Nami	2MD21	Nami
			Sg. Sedim	2MD19	Bikan
Pulau Pinang	Pinang	06PP	Sg. Satu	2PG12	Batu Feringgi
Perak	Kurau	9	Sg. Air Hitam	2KU07	Muka sauk Loji Rawatan Air Jelai
	Sepetang	10	Sg. Batu Tegoh	2SP18	Muka sauk Loji Rawatan Air Bukit Larut
	Perak	13	Sg. Sauk	2PK61	Muka sauk Loji Rawatan Air Sauk
			Sg. Manong	2PK62	Muka sauk Loji Rawatan Air Manong
			Sg. Woh	2PK63	Muka sauk Loji Rawatan Air Kuala Woh
			Sg. Tesong	2PK64	Muka sauk Loji Rawatan Air Sg. Klah
Selangor/Perak	Bernam		Sg. Trolak	2BM14	Muka sauk Loji Rawatan Air Trolak Timur
			Sg. Gelinting	2BM15	Muka sauk Loji Rawatan Air Ulu Slim
Selangor	Klang	18	Sg. Gombak	1K53	Muka sauk Loji Rawatan Air Gombak
	Langat	19	Sg. Semenyih	1L09	Muka sauk Loji Rawatan Air Semenyih
			Sg. Batang Labu	1L26	Muka sauk Loji Rawatan Air Salak Tinggi
Melaka	Kesang	24	Sg. Chin-Chin	1KA08	Muka sauk Loji Rawatan Air Chin-chin
Johor	Muar	25	Sg. Jelai	1MN23	Muka sauk Loji Rawatan Air Dangi

Negeri/ State	Lembangan Sungai/ River Basin	Kod WKA/ Code WQR	Sungai/ River	ID Stesen/ Station ID	Lokasi Muka Sauk / Water Intake Location
			Sg. Muar	3MR38	Muka sauk Loji Rawatan Air Gombang
			Sg. Jementah	3MR39	Muka sauk Loji Rawatan Air Jementah
	Batu Pahat	26	Sg. Semberong Dam	3BP27	Semberong Dam, Jalan Air Hitam-Kluang
	Benut	27B	Sg. Machap Dam	3BN10	Machap Dam, Pekan Machap
	Pulai	29D	Sg. Pulai Dam	3PU04	Pulai Dam, Pekan Ulu Choh, Kangkar Pulai
	Endau	32	Sg. Kahang	3ED38	Jalan Felda Kahang Timur, Kluang
Pahang	Bertam	35P	Sg. Terla	2CH14	Muka sauk Loji Rawatan Air Kuala Terla (WTSI)
			Sg. Bertam	2CH15	Muka sauk Loji Rawatan Air Habu (WWB)
			Sg. Ulong	2CH16	Brinchang Dam (WTBH)
	Pahang		Sg. Triang	4PH93	Muka sauk Loji Rawatan Air Sg. Triang
			Sg. Gapoi	4PH95	Muka sauk Loji Rawatan Air Gapoi
			Sg. Jempol	4PH96	Jmbtn Sg Jempol Jln Ladang Getah Lubuk Yu ~ Loji Air Sg Jerik
				4PH97	Jmbtn Sg Jempol Jln Bkt Tajau ~ Jengka 3 (Loji Air Jengka 3)
			Sg. Mentiga	4PH98	Jmbtn Sg Metiga Jln Muadzam ~ Felda Chini (Loji Air Chini)
Terengganu	Terengganu	43	Sg. Terengganu	4TE14	Kg Serada Up Stream Muka Loji Air Serada
Kelantan	Kelantan	48	Sg. Chiku	4KE66	Muka sauk Felda Ciku 2 (Syarikat Air Kelantan)
			Sg. Pahi	4KE67	Muka Sauk Loji Air Pahi (Syarikat Air Kelantan)
			Sg. Kelantan	4KE68	Muka Sauk Loji Air Kelar Pasir Mas (syarika Air Kelantan)
	Golok	49	Sg. Jeduk	4GL10	Jamb. Sg Jeduk Kg Bt Gajah Jln Tnh Merah ~ Jeli (Sykt Air Kelantan)
Sarawak	Kerian	55	Sg. Selalang	55SG01	Selalang Water Intake
	Rajang	56	Sg. Pakan	56PN01	Pakan Water Intake
			Sg. Daro	56DR01	Daro Water Intake
			Sg. Jemoreng	56JG01	Jemoreng Water Intake

Negeri/ State	Lembangan Sungai/ River Basin	Kod WKA/ Code WQR	Sungai/ River	ID Stesen/ Station ID	Lokasi Muka Sauk / Water Intake Location
			Sg. Pila Parit	56PL01	Igan Water Intake
	Mukah	58	Sg. Mukah	58MH05	Mukah Water Intake
Sabah	Padas	72	Sg. Padas	72PD04	Water Intake Jabatan Air Beaufort
	Papar	75	Sg. Papar	75PP04	Jambatan Sekolah Kebangsaan Mandalipau
				75PP05	Water Intake Kogopon, Jabatan Air Papar
JUMLAH/ TOTAL	**55**	**25**	**49**	**55**	

Jadual 4.7 JAS : Parameter-Parameter Pengukuran Kualiti Air Sungai
Table 4.7 DOE: River Water Quality Parameters

Parameter	Unit
Oksigen Terlarut / Dissolved Oxygen (DO)	mg/l, % saturated
Permintaan Oksigen Biokimia / Biological Oxygen Demand (BOD)	mg/l
Permintaan Oksigen Kimia / Chemical Oxygen Demand (COD)	mg/l
Pepejal Terampai / Suspended Solid (SS)	mg/l
pH	unit
Ammoniacal Nitrogen (NH_3-N)	mg/l
Suhu / Temperature	ºc
Konduktiviti / Conductivity	µS
Kemasinan / Salinity	ppt
Kekeruhan / Turbidity	NTU
Pepejal terlarut / Dissolved solids	mg/l
Pepejal / Total solids	mg/l
Nitrat / Nitrate (NO_3)	mg/l
Klorida / Chloride (Cl)	mg/l
Fosfat / Phosphate (PO_4)	mg/l
Arsenik / Arsenic (As)	mg/l
Merkuri / Mercury (Hg)	mg/l
Kadmium / Cadmium (Cd)	mg/l
Kromium / Chromium (Cr)	mg/l
Plumbum / Lead (Pb)	mg/l
Zink / Zinc (Zn)	mg/l
Kalsium / Calsium (Ca)	mg/l
Ferum / Ferum (Fe)	mg/l
Kalium / Potassium (K)	mg/l
Magnesium / Magnesium (Mg)	mg/l
Natrium / Sodium (Na)	mg/l
Minyak dan Gris / Oil and Grease (O&G)	mg/l
Methylene Blue Active Substances (MBAS)	mg/l
E-coli	cfu/100ml
Total Coliform	cfu/100ml

Jadual 4.8 JAS : Senarai Stesen Pemantauan Projek River Of Life (RoL)

Table 4.8 DOE : List of the River of Life (RoL) Monitoring Station

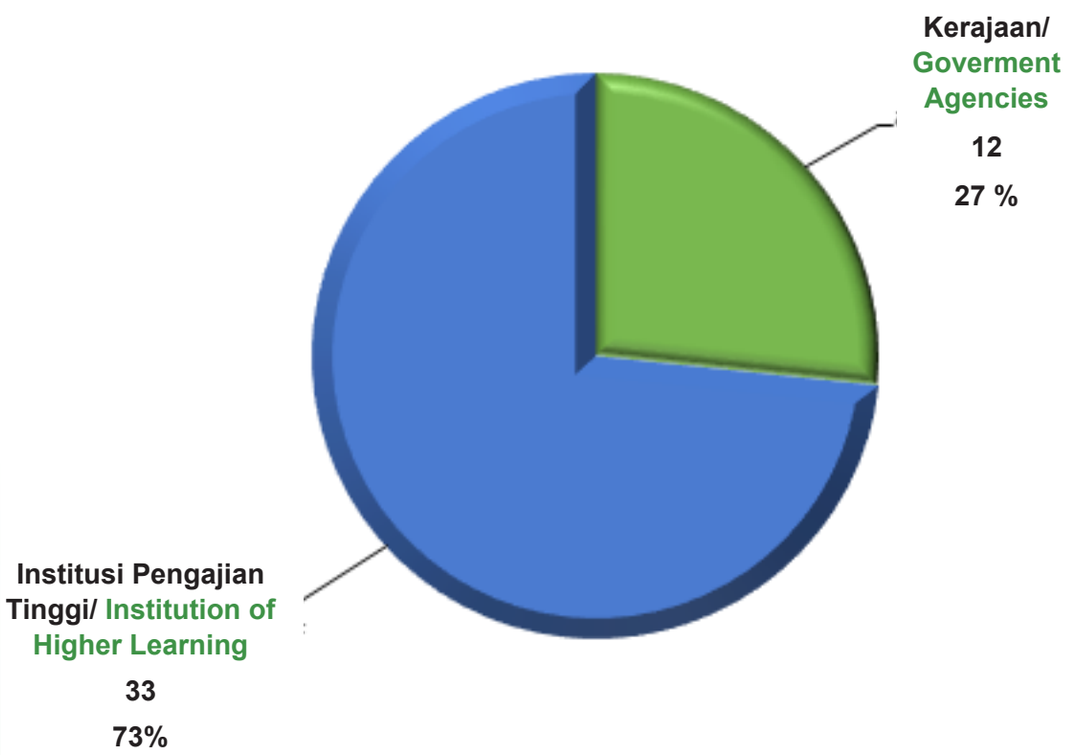
Negeri/ State	Jumlah Sungai Diawasi/ Total River Monitored	Kod WKA/ Code WQR	Lembangan Sungai/ River Basin	Bilangan Stesen/ No. of Stations	Sungai Diawasi/ River Monitored	Bilangan Stesen/ No. of Stations
SELANGOR/ W.P.KUALA LUMPUR	18	18	Klang	35	Sg. Batu	4
					Sg. Gombak	3
					Sg. Jinjang	3
					Sg. Klang	6
					Sg. Semelah	1
					Sg. Air Busuk	1
					Sg. Ampang	2
					Sg. Belongkong	1
					Sg. Bunos	3
					Sg. Kerayong	2
					Sg. Keroh	2
					Sg. Toba	1
					Sg. Untut	1
					Sg. Anak Air Batu	1
					Sg. Kuyoh	1
					Sg. Rasau	1
					Sg. Payong	1
					Sg. Penchala	1
JUMLAH/TOTAL					18	35

Jadual 4.9 : JAS : Aktiviti dan Program Pengawasan Kualiti Air Sungai

Table 4.9 : DOE : River Water Quality Monitoring Activities and Programmes

Tarikh/ Date	Aktiviti & Program/ Activities & Programmes	Tempat/ Venue
12 Januari 2016	Mesyuarat Inisiatif Utama Ke-10 River Of Life (RoL)	Jabatan Kerajaan Tempatan, KPKT
27 Januari 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 1/2016	Jabatan Pengairan dan Saliran Malaysia
2-5 Februari 2016	Bengkel Perunding Projek RMK-11 Jabatan Alam Sekitar	Hotel Palm Garden IOI Putra-jaya
29 Februari 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 2/2016	Jabatan Pengairan dan Saliran Malaysia
4 April 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 3/2016	Jabatan Pengairan dan Saliran Malaysia
20 April 2016	Mesyuarat Pemantauan Keputusan MSAN	Kementerian Sumber Asli dan Alam Sekitar
20-22 April 2016	Bengkel Jawatankuasa Teknikal Pemantauan Kualiti Air Tasik Chini	Bangi, Selangor
27-28 April 2016	Bengkel *Hands-on* Pemodelan Kualiti Air Sungai	Putrajaya
13 Mei 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 4/2016	Jabatan Pengairan dan Saliran Malaysia
14 Jun 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 5/2016	Jabatan Pengairan dan Saliran Malaysia
21 Jun 2016	Mesyuarat Pemurnian Resolusi dibawah KI3 hingga KI3	PEMANDU, JPM
29 Jun 2016	Mesyuarat JK Pasukan Petugas Dasar Sumber Air Negara	Jabatan Pengairan dan Saliran Malaysia
14 Julai 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 6/2016	Jabatan Pengairan dan Saliran Malaysia
26 Julai 2016	Mesyuarat Peruntukan OE dan DE RoL	Jabatan Pengairan dan Saliran Malaysia
15 Ogos 2016	Mesyuarat JK Pemandu IRBM Lembangan Sg Muar	Kementerian Sumber Asli dan Alam Sekitar
22 Ogos 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 7/2016	Jabatan Pengairan dan Saliran Malaysia
19 September 2016	Mesyuarat JK Pengurusan Sumber Air Negara Bil 1/2016	Kementerian Sumber Asli dan Alam Sekitar
27-28 September 2016	Bengkel Penyelarasan Dasar Sumber Air Negara	Putri Resort Melaka
21 September 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 8/2016	Jabatan Pengairan dan Saliran Malaysia
5-7 Oktober 2016	Bengkel Hala Tuju Projek RoL KI 10	Ramada Hotel Plaza Melaka
19 Oktober 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 9/2016	Jabatan Pengairan dan Saliran Malaysia

Tarikh/ Date	Aktiviti & Program/ Activities & Programmes	Tempat/ Venue
19 Oktober 2016	Mesyuarat kekerapan persampelan Projek River of Life	Jabatan Pengairan dan Saliran Malaysia
25-27 Oktober 2016	Bengkel Analisis Statistik Dan Intrepetasi Data Kualiti Air Sungai Bagi Pelaksanaan Total Maximum Daily Load (TMDL)	UNITEN
28 Oktober 2016	Mesyuarat Penyelarasan WG4 DSAN	Hotel Equatorial Melaka
11-13 November 2016	Bengkel Hala Tuju KPI dan Resolusi Projek River of Life	Imperial Heritage Hotel Melaka
28 November 2016	Mesyuarat JK Pengurusan Sumber Air Negara Bil 2/2016	Kementerian Sumber Asli dan Alam Sekitar
22 November 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 10/2016	Jabatan Pengairan dan Saliran Malaysia
20 Disember 2016	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 11/2016	Jabatan Pengairan dan Saliran Malaysia
23 Disember 2016	Mesyuarat Jk Pelaksana dan Penyelarasan NKEA Greater KL/KV	Hotel Putrajaya Shangri La



Rajah 4.1 JAS: Pecahan Bilangan Permohonan Data Kualiti Air Sungai, 2016

Figure 4.1 DOE : The Number Of Applications For River Water Quality Data, 2016

PENGAWASAN KUALITI AIR TANAH
GROUNDWATER QUALITY MONITORING

Program Pengawasan Kualiti Air Tanah Kebangsaan telah dimulakan pada tahun 1997 di Semenanjung Malaysia dan diperkembangkan ke Sabah dan Sarawak pada tahun 2003. Kedudukan stesen air tanah di Semenanjung Malaysia serta Sarawak dan Sabah adalah seperti dalam **Rajah 4.4 (a)** dan **4.4 (b).**

Groundwater water quality monitoring was established in 1997 for Peninsular Malaysia and extended to cover Sabah and Sarawak in 2003. The location map of groundwater stations in Peninsular Malaysia, Sarawak and Sabah are shown in **Map 4.4 (a)** and **4.4 (b).**

Pengukuran parameter-parameter fizikal kualiti air tanah dijalankan secara in-situ untuk menentukan tahap ukuran bagi suhu, pH, konduktiviti, kekeruhan, kemasinan dan oksigen terlarut. Parameter-parameter yang dianalisis di makmal adalah bagi menentukan tahap kandungan sebatian organik meruap (VOC), hidrokarbon, racun perosak, logam berat, anion, kolifom, sebatian berfenol, radioaktif, jumlah keliatan dan jumlah pepejal terlarut.

In-situ measurements were taken to determine the temperature, pH, conductivity, turbidity, salinity and dissolved oxygen. Laboratory analysis were carried out to determine the total volatile organic compounds (VOCs), hydrocarbons, pesticides, heavy metals, anions, total coliform, phenolic compounds, radioactivity, total hardness and total dissolved solids.

Peralatan yang digunakan semasa persampelan air tanah termasuklah pam 'hydrolift", tiub hdpe, alat ukur kedalaman air, generator, botol persampelan/ larutan pengawetan-alat ujian, kotak kedap ais dan multiprob.

The equipments used in groundwater sampling were hydrolift pump, hdpe tubing, water depth sensor, generator, sampling bottle/ preservative kit, coolbox and multiprobe.

Pada tahun 2016, sebanyak 381 sampel daripada 105 buah telaga pengawasan kualiti air tanah di seluruh Malaysia telah di analisis. Telaga pengawasan ini telah dibina di kawasan-kawasan mengikut jenis guna tanah iaitu pertanian, perindustrian, padang golf, tapak pelupusan sampah, tapak pelupusan bangkai haiwan, kawasan bekalan air, bekas tapak perlombongan, perbandaran dan luar bandar di seluruh Malaysia (**Jadual 4.10**)

In 2016, a total of 381 groundwater samples were taken on a quarterly basis from 105 monitoring wells in Malaysia for analysis. The monitoring wells had been constructed in areas categorised according to land use type such as agriculture, industrial, golf course, solid waste landfill, animal burial, municipal water supply, ex- mining (gold mine) and urban/suburban. (**Table 4.10**)

Di antara aktiviti-aktiviti lain yang dijalankan oleh Seksyen Pengawasan Air Tanah pada tahun 2016 adalah seperti **Jadual 4.11** berikut:

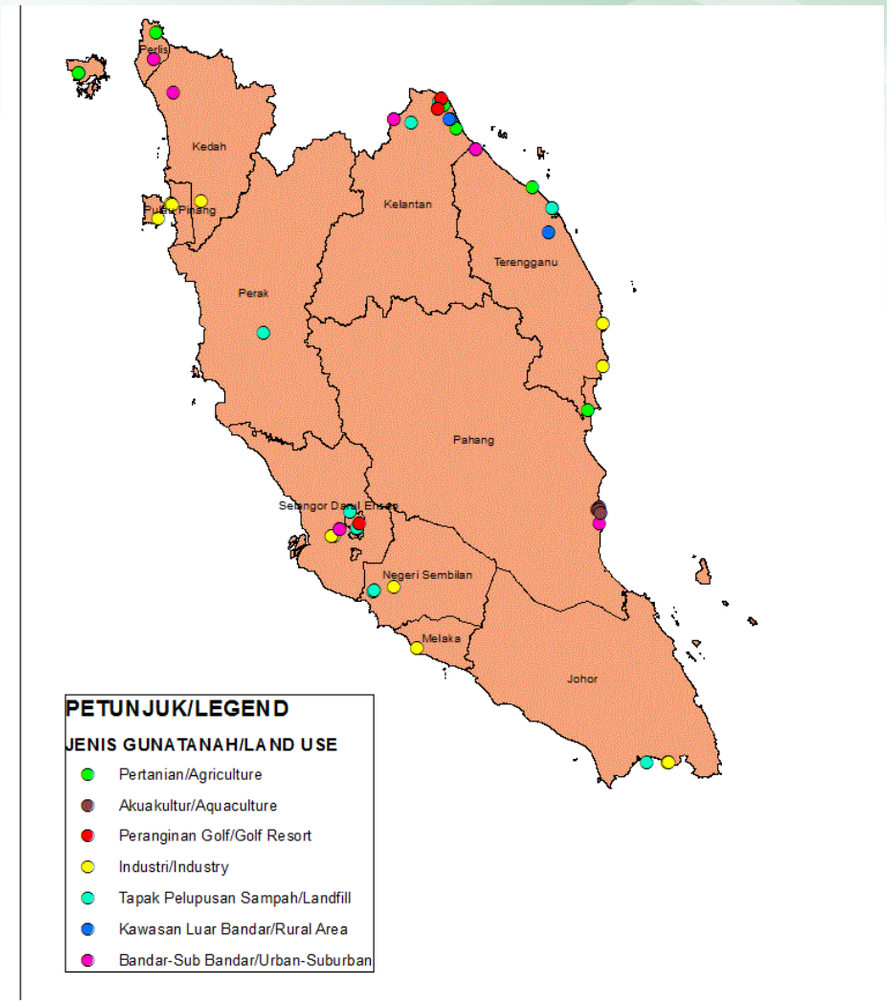
Among other activities carried out by the Groundwater Monitoring Section in 2016 were **Table 4.11**

Jadual 4.11 JAS : Program Dan Aktiviti Pengawasan Kualiti Air Tanah
Table 4.11 DOE : Groundwater Monitaring Programme And Activities

Tarikh/Date	Aktiviti/Activity	Kumpulan Sasar/ Target Group	Bil. Penyertaan/ No. of Participant
1 Ogos – 5 Ogos 2016	Penyelenggaraan dalaman telaga di Terengganu, Kelantan dan Selangor	Pegawai-pegawai JAS/ JAS officers	3
1-5 Februari 2016	Lawatan Stesen bermasalah di Kuala Lumpur dan Selangor	Pegawai-pegawai JAS/ JAS officers	6
19 - 23 September 2016	Telah menjalankan kursus/ bengkel Air Tanah	Pegawai-pegawai JAS/ JAS officers	Pegawai JAS seluruh negeri

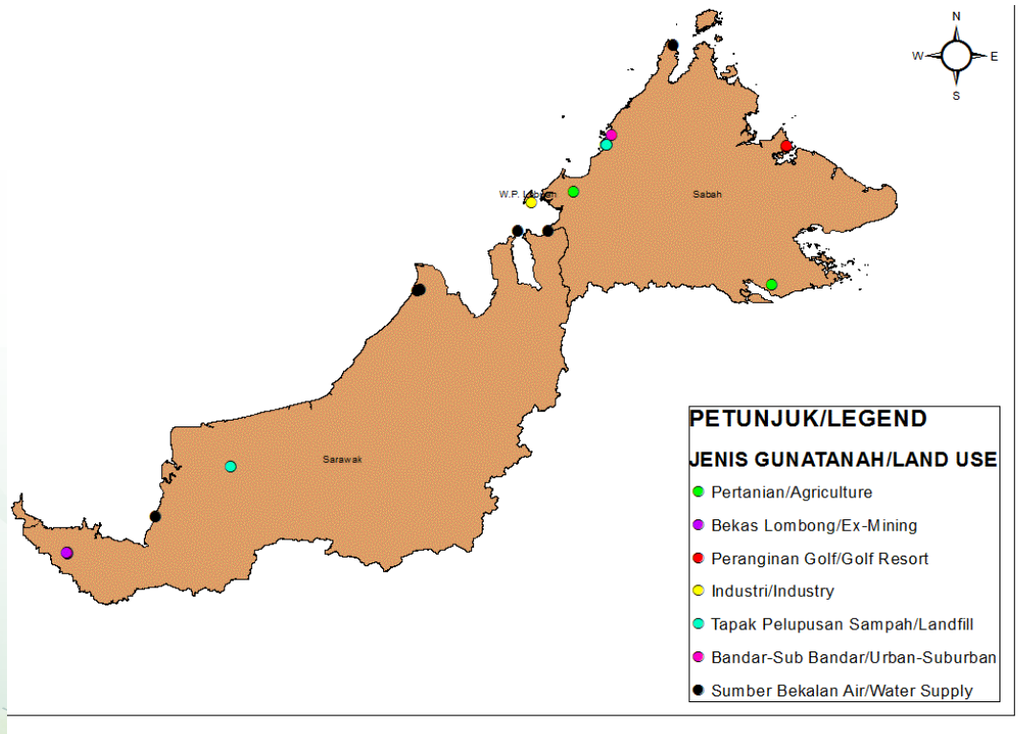
Jadual 4.10 JAS: Taburan Telaga Pemantauan Air Tanah Mengikut Jenis Kategori Guna Tanah, 2016
Table 4.10 DOE : Distribution Of Groundwater Monitoring Wells By Land Use Category, 2016

Kategori/Category	Bilangan Telaga/ Numbers of Wells
Kawasan Pertanian/ Agricultural Areas	12
Bandar & Pinggir Bandar/ Urban & Suburban Areas	11
Tapak Perindustrian/ Industrial Sites	18
Tapak Pelupusan Sampah/ Landfills	23
Padang Golf/ Golf Courses	7
Luar Bandar/ Rural Areas	3
Bekas lombong/ Ex- Mining	3
Bekalan Air Tempatan/Municipal Water Supply	6
Tapak Pelupusan Bangkai Haiwan/ Animal Burial	14
Kolam Akuakultur/ Aquaculture Farms	6
Tapak Pelupusan Radioaktif/ Radioactive Landfill	1
Peranginan/ Resorts	1
Jumlah/Total	105



Rajah 4.4 (a) Semenanjung Malaysia: Taburan Stesen Pemantauan Air Tanah, 2016

Figure 4.4 (a) Peninsular Malaysia: Distribution of Groundwater Monitoring Stations, 2016



Rajah 4.4 (b) Sabah & Sarawak: Taburan Stesen Pemantauan Air Tanah, 2016

Figure 4.4 (b) Sabah & Sarawak: Distribution of Groundwater Monitoring Stations, 2016

RANCANGAN KONTINGENSI KEBANGSAAN KAWALAN TUMPAHAN MINYAK
NATIONAL OIL SPILL CONTINGENCY PLAN

Rancangan Kontingensi Kebangsaan Kawalan Tumpahan Minyak (RKKKTM) merupakan pelan kontingensi yang menyediakan garis panduan bagi menghadapi kejadian tumpahan minyak yang berlaku di perairan Malaysia. RKKKTM ditadbir oleh Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak (JKKTM) yang dianggotai oleh tujuh belas (17) Jabatan dan agensi. Jawatankuasa ini dipengerusikan oleh Ketua Pengarah Jabatan Alam Sekitar Malaysia. Kesiapsiagaan kawalan tumpahan minyak adalah melalui penempatan peralatan mengawal tumpahan minyak yang ditempatkan di lokasi-lokasi strategik seperti **Peta 4.3**. Jabatan Alam Sekitar (JAS) juga memberi penekanan terhadap latihan-latihan berstruktur dan berkala bagi semua kakitangan yang terlibat dalam tindakbalas tumpahan minyak. Latihan-latihan berkenaan adalah bagi memastikan semua kakitangan JAS dan agensi-agensi yang akan terlibat dalam tindakbalas tumpahan minyak dibekalkan dengan pengetahuan dan kemahiran yang mencukupi dalam pengendalian peralatan dan pengurusan krisis. Resolusi 6 di dalam International *Convention on Oil Spill Preparedness and Response* (OPRC) 1990 telah menggariskan obligasi negara terhadap komitmen di peringkat antarabangsa berhubung hal-ehwal berhubung dengan latihan. Keperluan latihan ini telah dimasukkan ke dalam mekanisma tindakbalas RKKKTM dan dilaksanakan secara berterusan.

The National Oil Spill Contingency Plan (NOSCP) is a contingency plan which provides guidelines to address oil spill incident in Malaysian waters. The NOSCP is administered by the National Oil Spill Control Committee (NOSCC) consisting of seventeen (17) member departments and agencies. The committee is chaired by the Director General of Department of Environment Malaysia (DOE). Oil spill control preparedness is executed by positioning the Oil Spill Response Equipment (OSRE) at strategic locations as shown in **Map 4.3**. DOE places equal emphasis on scheduled and periodical training activities for personnel involved in oil spill response. Such training is aimed to ensure DOE officers involved in oil spill response are well equipped with necessary knowledge and skills in equipment handling and crisis management. Resolution 6 of the International Convention on Oil Spill Preparedness and Response (OPRC) 1990 provides a Country obligation for an International Commitment to training and preparedness. This preparedness and training requirement has been incorporated into NOSCP response system and continuously implemented.

Di sepanjang tahun 2016, sebanyak 10 aktiviti berkaitan dengan Kawalan tumpahan minyak telah dianjurkan/ dihadiri/ dilaksanakan oleh pegawai-pegawai JAS bagi tujuan peningkatan kemahiran dan perkongsian kepakaran dalam bidang ini (**Jadual 4.12**).

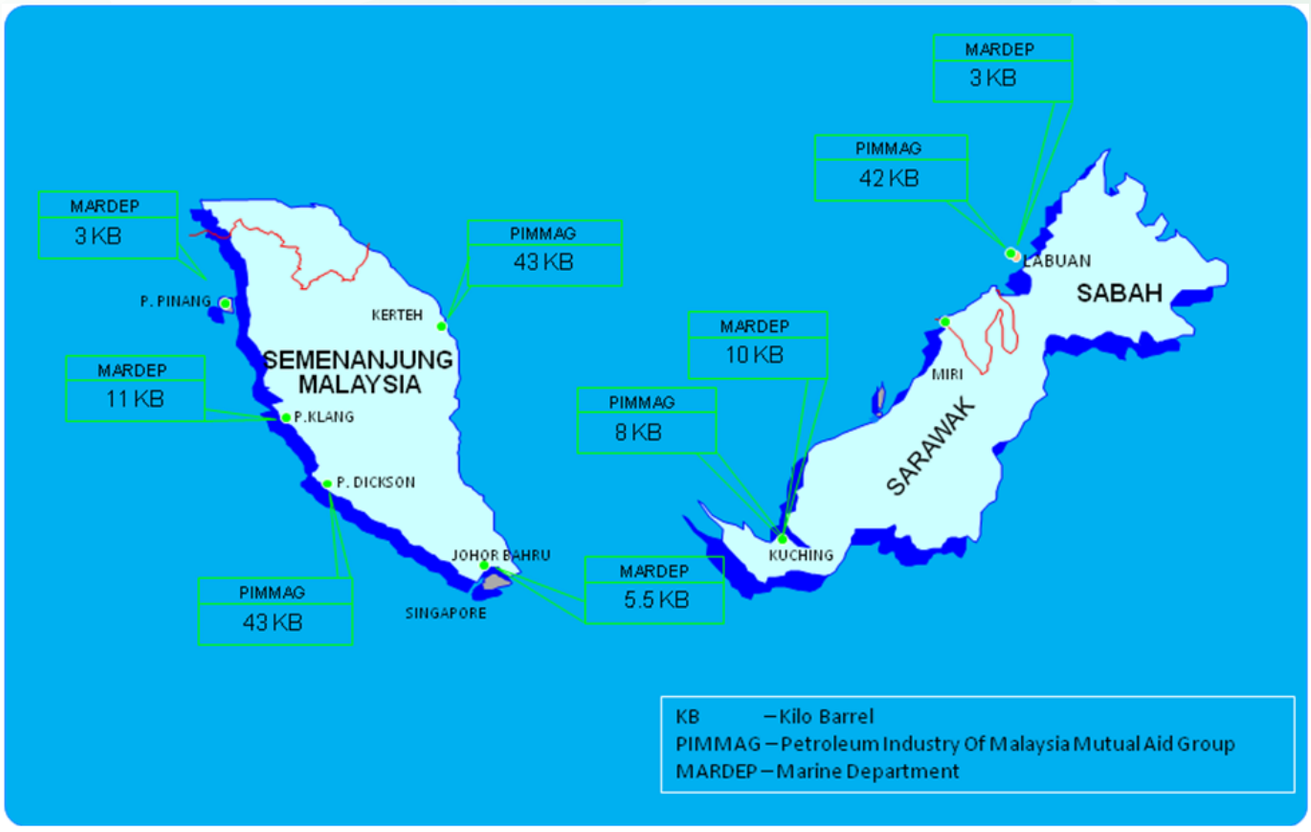
Throughout 2016, a total of 10 activities related to oil spill were organized/ attended/ conducted by DOE officers for capacity building and sharing of expertise in this field (**Table 4.12**)



Jabatan Alam Sekitar / Department of Enviroment

Jadual 4.12 JAS: Program dan aktiviti Kontigensi Kebangsaan Kawalan Tumpahan Minyak
Table 4.12 DOE : National Oil Spill Contigency Programme and Activities

Bil/ No	Aktiviti / Activities	Tarikh/ Dates
i.	Simposium Kebangsaan Pengurusan Pencemaran Marin di Hotel Concorde Shah Alam, Selangor National Symposium on Marine Pollution Management	18-19 Januari 2016 18-19 January 2016
ii.	Latihan Melawan Tumpahan Minyak Peringkat Kebangsaan di Ramada Plaza, Melaka National Oil Spill Combat Exercise in Ramada Plaza, Malacca	3-5 Mei 2016 3-5 May 2016
iii.	Mesyuarat dan Lawatan Kerja Jabatan Alam Sekitar Bersama Eastern Sabah Security Command (ESSCOM) di Lahad Datu, Sabah Meeting and Working Visit by Department of Environment and Eastern Sabah Security Command (ESSCOM) in Lahad Datu, Sabah	25 Mei 2016 25 May 2016
iv.	Perolehan Perisian Oil Spill Trajectory –OilMap RPS ASA Oil Spill Trajectory –OilMap RPS ASA Software Acquisition	16 Ogos 2016 16 August 2016
v.	Bengkel Penggunaan Aplikasi OilMap Oil Spill Trajectory Workshop on OilMap Oil Spill Trajectory Application	22-23 Ogos 2016 22-23 Ogos 2016
vi.	Bengkel Penggunaan Peralatan Komunikasi Radio HF/VHF di Bilik Kawalan Ibu Pejabat Putrajaya Workshop on Application of HF/VHF Radio Communication in Headquarters Control Room	1-2 September 2016 1-2 September 2016
vii.	Bengkel Penyediaan SOP Pusat Kawalan Tumpahan Minyak Kebangsaan 2016 di Everly Putrajaya Workshop on Development of SOP Oil Spill Control Centre in Everly Hotel Putrajaya	5-6 September 2016 5-6 September 2016
viii.	Bengkel Oil Spill Fingerprinting Profiling 2016 di Hotel Everly Putrajaya Workshop on Oil Spill Fingerprinting Profiling 2016 in Everly Hotel Putrajaya	6-7 September 2016 6-7 September 2016
ix.	Bengkel Unmanned Aerial Vehicle (UAV) di Hotel Everly Putrajaya Workshop on Unmanned Aerial Vehicle (UAV) in Everly Hotel Putrajaya	7-8 September 2016 7-8 September 2016
x.	Program Melawan Tumpahan Minyak (Pembangunan Pangkalan Data Hydrocarbon Fingerprinting) di LEMIGAS, Indonesia Programme on Oil Spill Combat (Development of Hydrocarbon Fingerprinting Database) in LEMIGAS, Indonesia	25 – 27 Oktober 2016 25 – 27 October 2016



Peta 4.3 JAS : Lokasi Peralatan Melawan Tumpahan Minyak Dan Keupayaan Di Malaysia, 2016.
Map 4.3 DOE : Location Of Oil Spill Equipment Stockpile And Capability In Malaysia, 2016.



Simposium Kebangsaan Pengurusan Pencemaran Marin di Hotel Concorde Shah Alam, Selangor pada 18-19 Januari 2016
National Symposium on Marine Pollution Management on 18-19 January 2016



Bengkel Penggunaan Aplikasi *OilMap Oil Spill Trajectory*
Workshop on OilMap Oil Spill Trajectory Application





Mesyuarat dan Lawatan Kerja Jabatan Alam Sekitar Bersama Eastern Sabah Security Command (ESSCOM) di Lahad Datu, Sabah pada 25 Mei 2016
Meeting and Working Visit by Department of Environment and Eastern Sabah Security Command (ESSCOM) in Lahad Datu, Sabah on 25 May 2016









Latihan Melawan Tumpahan Minyak Peringkat Kebangsaan di Ramada Plaza, Melaka pada 3-5 Mei 2016
National Oil Spill Combat Exercise in Ramada Plaza, Malacca on 3-5 May 2016

JAWATANKUASA TABUNG PUSINGAN BAGI SELAT MELAKA DAN SELAT SINGAPURA (RFC)
STRAITS OF MALACCA AND SINGAPORE REVOLVING FUND COMMITTEE (RFC)

Tabung RFC ini telah ditubuhkan pada 11 Februari 1981 bagi tujuan kegunaan dalam melawan kejadian tumpahan minyak dari kapal-kapal yang melalui Selat Melaka dan Selat Singapura

RFC Fund was established on February 11, 1981 for the purpose to be used in of combating oil spills from ships passing through the Straits of Malacca and Singapore.

Pengurusan Tabung ini dilaksanakan secara bergilir-gilir dikalangan tiga (3) buah negara anggota iaitu Malaysia, Singapura dan Indonesia bagi tempoh lima (5) tahun setiap giliran. Pada tahun 2011, pengurusan tabung ini ditadbir oleh *Directorate General Sea Transportation* di bawah Kementerian Pengangkutan negara Indonesia untuk tempoh lima (5) tahun.

The Fund is administered on a rotation basis among the three (3) member countries, namely Malaysia, Singapore and Indonesia for a period of five (5) years each. In 2011, the fund is administered by Directorate General Sea Transportation under Ministry of Transportation, Indonesia for duration of five (5) years.

Di antara aktiviti yang dilaksanakan oleh Jawatankuasa Tabung Pusingan pada tahun 2016 adalah seperti berikut:

Among the activities carried out by the RFC in the year 2016 are:

i. Proses peralihan pengurusan Tabung Pusingan kepada Malaysia pada 1 April 2016 sehingga 31 Mac 2021 untuk tempoh lima (5) tahun.

i. Transitioning the RFC management from Indonesia to Malaysia starting on 1st April 2016 to 31st March 2016 for five (5) years duration.

ii. Penubuhan Akaun Amanah Tabung Pusingan Selat Melaka dan Selat Singapura oleh Malaysia pada 15 Mac 2016.

ii. Establishment of Trust Fund for Strait of Malacca and Strait of Singapore Revolving Fund.

iii. Pemindahan Tabung Pusingan daripada Indonesia kepada Malaysia pada 29 Disember 2016 oleh pihak Indonesia.

iii. Revolving Fund transfer from Indonesia to Malaysia on 29th December 2016.



PENCEMARAN MARIN
MARINE POLLUTION

Sepanjang tahun 2016, sejumlah 20 kes aduan pencemaran tumpahan minyak telah dilaporkan kepada Jabatan Alam Sekitar. Daripada jumlah tersebut, 10 kes dilapor berlaku di Laut China Selatan, 1 kes di Laut Sulu, 6 kes di Selat Melaka dan 3 kes di Selat Johor (**Jadual 4.13**).

Daripada 20 jumlah kes tumpahan minyak yang berlaku pada tahun 2016, 13 kes adalah daripada punca yang tidak dapat dikenalpasti, 5 kes berpunca daripada kapal, 1 kes daripada pelantar minyak dan 1 kes daripada single buoy mooring (SBM).

Throughout 2016, there were 20 cases of marine pollution from oil spills reported to the Department of Environment. Out of the 20 cases, 10 cases occurred in the South China Sea, 1 case in the Sulu Sea, 6 cases in the Straits of Malacca and 3 cases in the Straits of Johore (**Table 4.13**).

Out of the 20 cases of oil spill in 2016, 13 cases from unknown sources, 5 cases originated from ships, 1 case from oil rig and 1 case from single buoy mooring (SBM).

Jadual 4.13 JAS : Pelaporan Kejadian Pencemaran Minyak 2016
Table 4.13 DOE : Oil Pollution Incidents Reporting 2016

Lokasi/ Location	Kawasan /Area		Bil. Kes/ No. of Cases	Negeri/State
Laut China Selatan/ South China Sea	Perairan Malaysia/ Malaysia Territory	Semenanjung/ Peninsular	8	Johor (5) Terengganu (1) Pahang (2)
		Malaysia Timur/ East Malaysia	1	Sabah (1)
	Zon Ekonomi Ekslusif (EEZ)/ Exclusive Economic Zone (EEZ)		1	Terengganu (1)
Laut Sulu/Sulu Sea	Perairan Malaysia/ Malaysia Territory	Sabah	1	Sabah (1)
Selat Melaka/ Straits of Malacca	Perairan Malaysia/Malaysia Territory		6	Perak (1) Negeri Sembilan (1) Melaka (1) Selangor (1) Pulau Pinang (1) Johor (1)
Selat Johor/ Straits of Johor	Perairan Malaysia/ Malaysia Territory	Barat/West	3	Johor (3)
		Timur/East-	0	-
Jumlah/Total			20	

PUNCA PENCEMARAN
POLLUTION SOURCES

Pencemaran air umumnya berpunca daripada pelepasan punca-punca pencemaran tetap dan punca tidak tetap. Pencemaran daripada punca tetap berlaku akibat pelepasan effluen samada terawat, separa terawat ataupun mentah, yang dilepaskan ke alur air atau sungai melalui limpahan atau paip.

Water pollution is generally due to the discharge contributed by point sources and non-point sources. Point sources (PS) are referred as the source of polluted water or discharges, and channeled into a water body through outfalls or pipes.

Akta Kualiti Alam Sekeliling 1974 mengawal pelepasan pencemar daripada punca tetap seperti industri pembuatan, industri berasaskan pertanian seperti kilang getah dan kilang kelapa sawit dan loji rawatan kumbahan. Pelepasan pencemaran daripada aktiviti ternakan haiwan seperti ternakan babi dan pasar basah dilesenkan dan di kawal oleh agensi lain seperti Jabatan Perkhidmatan Veterinar dan Pihak Berkuasa Tempatan.

Environmental Quality Act (EQA) 1974 controlling pollution's discharge from point sources includes manufacturing industries, agro-based industries including rubber mill and palm oil mill and sewage treatment plant. Whereas discharge from animal farming such as piggery and wet market were licensed and controlled by other agency as Veterinary Services Department and Local Authorities.

Punca tidak tetap adalah punca pencemaran yang tidak mempunyai takat pelepasan yang tetap dan ianya hanya berlaku ketika dan selepas hujan serta kejadian banjir, mengakibatkan aliran permukaan membawa pencemar ke hilir sungai atau ke laut.

Non-point sources are diffuse source that do not have specific discharge point, and normally occurs during rainfall and in the event of floods, which cause surface run-off to sweep all pollutants and wash it downstream.

Pada tahun 2016, daripada sejumlah 1,310,697 punca pencemaran tetap yang direkodkan sebanyak 3,255 punca adalah industri pembuatan, 1,305,338 punca merupakan loji rawatan kumbahan, 698 punca ladang ternakan babi, 517 punca industri berasaskan pertanian dan 889 punca pasar basah. Perincian jenis punca tetap dan jumlah punca ditunjukkan seperti di dalam **Jadual 4.14**.

In 2016, a total of 1,310,697 water pollution sources were recorded, which comprises of 3,255 manufacturing industries, 1,305,338 sewage treatment plants, 698 piggeries, 517 agro-based manufacturing mills and 889 wet markets The composition of water pollution sources is shown in **Table 4.14**.

Jadual 4.14 JAS : Pecahan Punca-Punca Pencemaran Mengikut Sektor, 2016
Table 4.14 DOE : Composition Of Water Pollution Sources By Sector, 2016

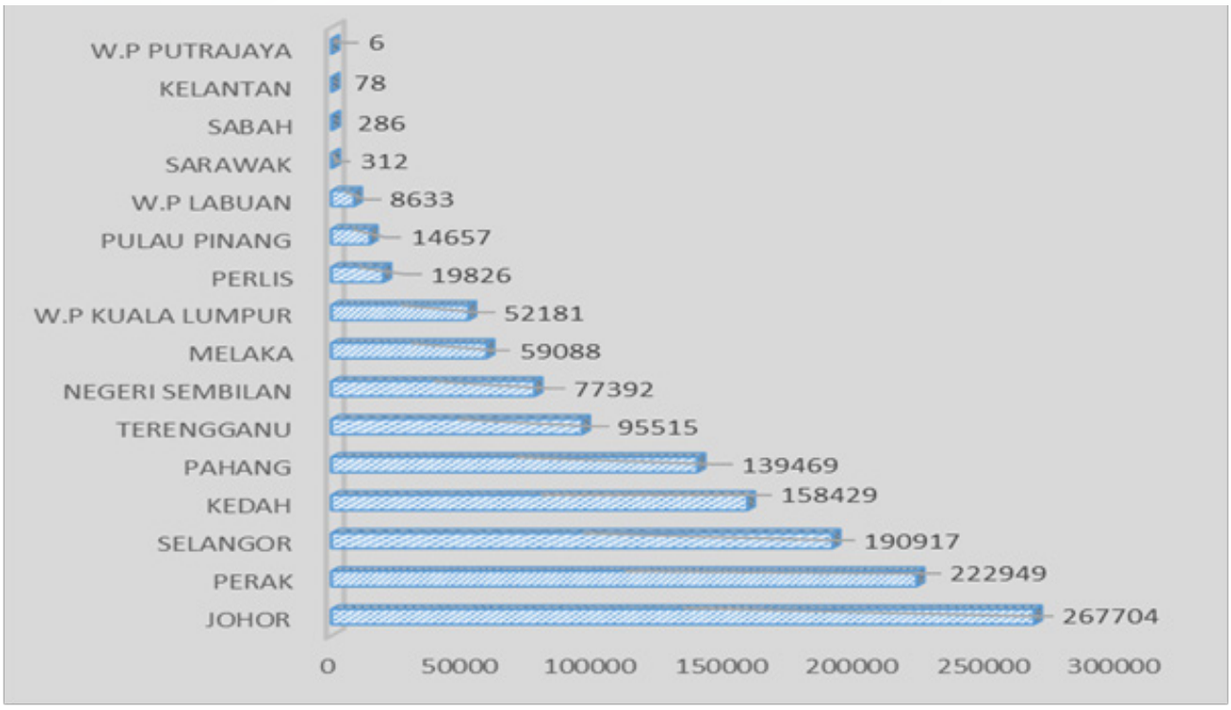
Bil. No	Jenis Punca Type of sources	Bilangan punca No. of sources
1	Industri pembuatan / Manufacturing industries	3255
2	Industri berasaskan pertanian / Agro-based industries	
	i. Kilang getah / Rubber mills	61
	ii. Kilang kelapa sawit / Palm oil mills	456
3	Ladang ternakan (babi) / Animal farms (Pig	698
4	Loji pengolahan kumbahan / Sewage treatment plants	
	i. Awam / Public	6577
	ii. Tangki Septik Individu / Individual Septic Tanks (IST)	1,295,124
	iii. Tangki Septik Berpusat / Communal Septic Tanks (CST)	3637
5	Pasar basah / Wet markets"	889
	Jumlah/ Total	1,310,697

Bilangan punca-punca pencemaran air mengikut negeri adalah di tunjukkan seperti di **Rajah 4.2**.

Numbers of water pollution sources in accordance with state is shown as **Figure 4.2**.

Sumber maklumat berkaitan punca pencemaran air diperolehi daripada sumber-sumber seperti di **Jadual 4.15**.

Data on water pollution sources were acquired from sources as shown in **Table 4.15**.



Rajah 4.2 JAS : Malaysia; Bilangan Punca-Punca Pencemaran Air Mengikut Negeri, 2016
Figure 4.2 DOE : Malaysia; Numbers Of Water Pollution Sources In Accordance With State

Jadual 4.15 JAS : Malaysia; Sumber Data Punca Pencemaran
Table 4.15 DOE : Malaysia; Pollution Information Sources

Bil/ No.	Punca Pencemaran /Pollution Sources	Sumber Data/ Data Sources
1	• Industri pembuatan Manufacturing in dustries • Industri berasaskan pertanian Agro-based industries	JAS Negeri State DOE
2	Loji Kumbahan Sewage Treatment	IWK/ Indah Water Consortium
3	Pasar Basah Wet Market	Pihak Berkuasa Tempatan/ Local Authority
4	Ladang Babi Animal Farming	Jabatan Perkhidmatan Veterinar/ Veterinary Services Department


Jabatan Alam Sekitar / Department of Environment



UDARA

PENGAWASAN KUALITI UDARA
AIR QUALITY MONITORING

Sebanyak 52 buah stesen pengawasan kualiti udara automatik ditempatkan di seluruh Negara bagi memantau secara berterusan status kualiti udara sesuatu tempat atau kawasan. Sebarang perubahan ketara ke atas kualiti udara dikesan melalui stesen-stesen ini yang mana mungkin memberi kesan kepada kesihatan awam dan alam sekitar.

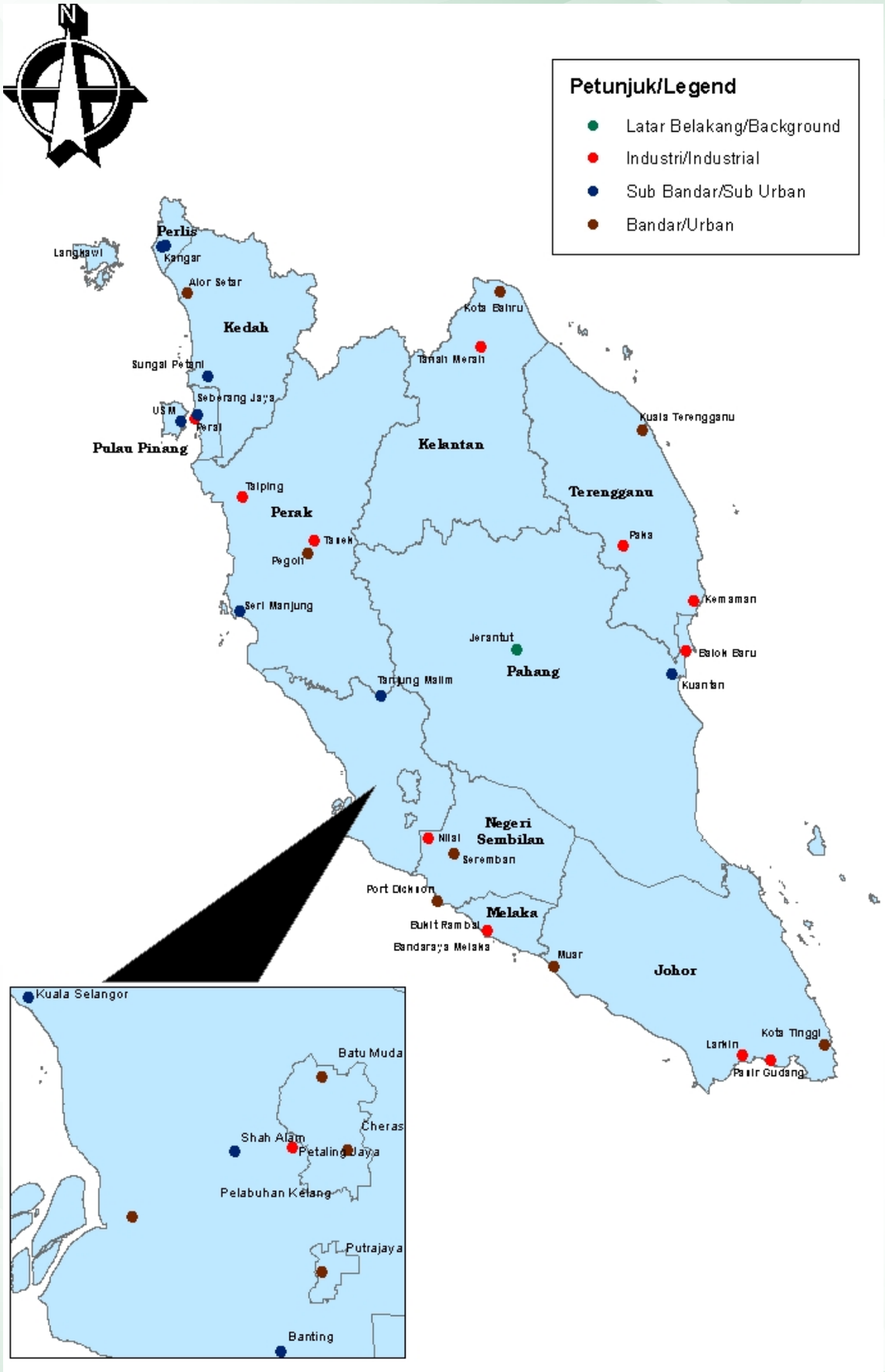
Lokasi-lokasi yang strategik (**Peta 4.4** dan **4.5**) dipilih bagi penempatan stesen-stesen pengawasan kualiti udara ini sejajar dengan objektif program pengawasan yang spesifik. Bagi memastikan tahap pendedahan pencemar udara kepada orang awam sentiasa diawasi, kebanyakan penempatan stesen diutamakan dalam kawasan perumahan dan selebihnya ditempatkan dalam kawasan industri dan kawasan bandar yang padat dengan trafik.

Tambahan kepada rangkaian stesen pengawasan kualiti udara automatik, stesen-stesen pengawasan kualiti udara secara manual juga ditempatkan di 14 buah lokasi yang berbeza. Pengawasan di stesen-stesen manual melibatkan pengukuran parameter-parameter seperti pepejal terampai, habuk halus bersaiz kurang dari 10 mikron (PM_{10}) dan beberapa parameter logam berat termasuk plumbum. Bagi stesen manual ini, pengukuran dibuat setiap enam (6) hari dalam satu bulan dengan menggunakan alat "High Volume Sampler". Pengawasan kualiti udara dengan menggunakan pengukuran habuk mudah alih juga dilaksanakan di kawasan-kawasan tertentu bagi memantau status kualiti udara di kawasan yang tidak diliputi oleh Rangkaian Stesen Pengawasan Kualiti Udara Kebangsaan seperti di **Peta 4.4** dan **4.5**.

Malaysia's air quality monitoring network consists of 52 stations that are located throughout the country to continuously monitor and to detect any significant changes in the air quality that can cause negative impact on human health and the environment.

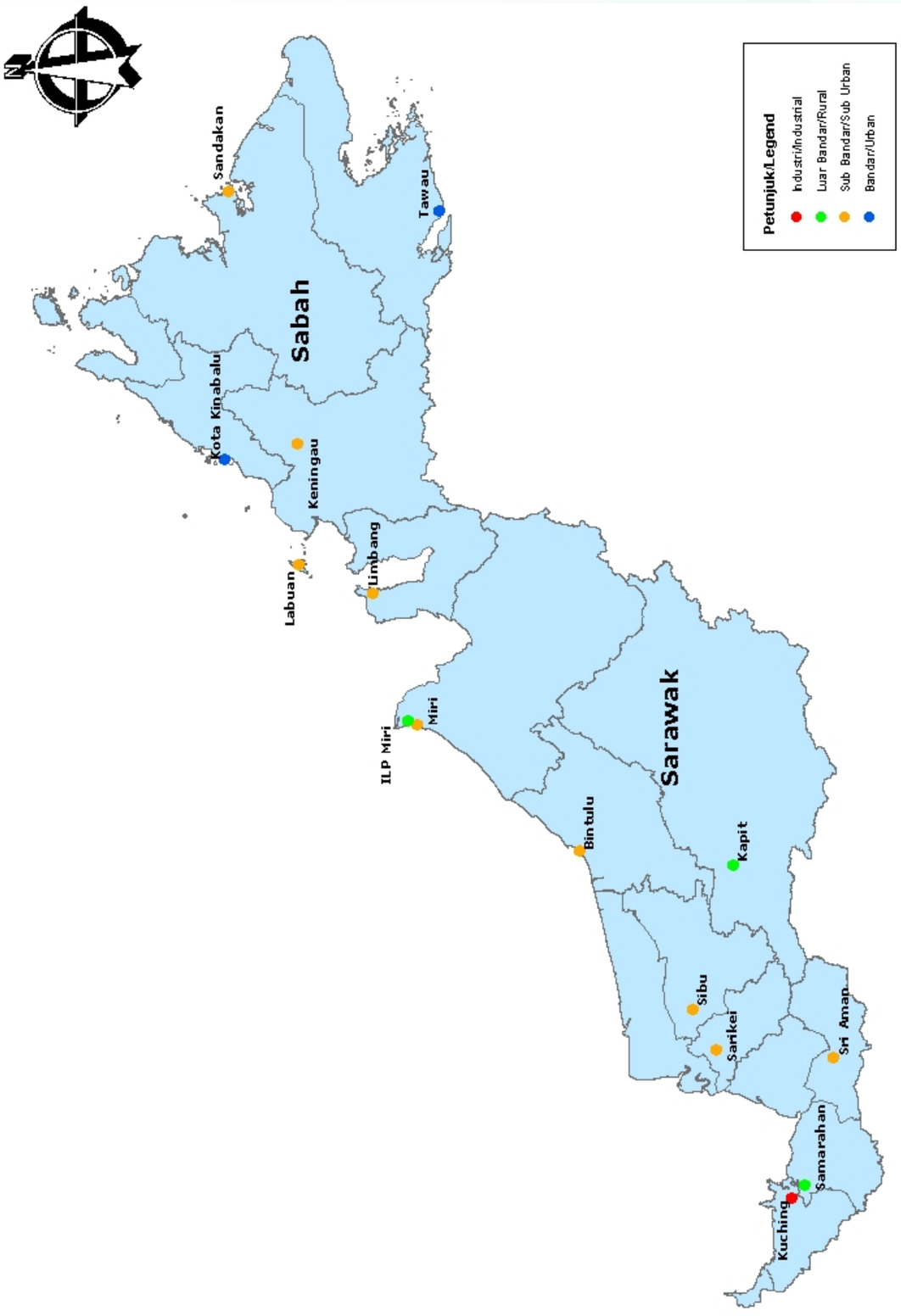
These monitoring stations are strategically located (**Map 4.4** and **4.5**) to meet specific monitoring objectives. Most stations are located in residential areas to ensure the air quality exposed to the public is continuously monitored. The rest of the stations are located within industrial areas and in city areas with high traffic volumes.

The National air quality monitoring stations network is complemented with the manual air quality monitoring stations which are located at 14 different sites. At these sites, total suspended particulate, particulate matter (PM_{10}) and several heavy metals including lead are measured at interval of six (6) days a month using High Volume Samplers (HVS). Portable particulate samplers were also installed in certain areas to monitor the air quality status in areas which are not covered under the National Air Quality Monitoring Network such as in **Map 4.4** and **4.5**.



Peta 4.4 : Semenanjung Malaysia: Lokasi Stesen Pengawasan Kualti Udara Automatik, 2016

Map 4.4 : Peninsular Malaysia: Location of Continuous Air Quality Monitoring Station, 2016



Peta 4.5 : Sabah & Sarawak: Lokasi Stesen Pengawasan Kualti Udara Automatik, 2016 *Map 4.1 : Peninsular Malaysia:*
Map 4.5 : Sabah & Sarawak: Location of Continuous Air Quality Monitoring Station, 2016

PROGRAM PENCEGAHAN KEBAKARAN TANAH GAMBUT
PEAT LAND FIRE PREVENTION PROGRAM

Pengurusan tanah gambut yang lestari adalah sangat penting bagi mencegah berlakunya pembakaran terbuka tanah gambut yang boleh menyebabkan jerebu setempat. Pembinaan sekatan saliran (*check dam*) dan telaga air tanah (*tube well*), kolam takungan air (*water pond*) dan pemasangan paip saluran air (*water piping*) telah dikenalpasti sebagai kaedah pengurusan air di tanah gambut yang berkesan untuk mencegah dan mengawal pembakaran terbuka.

Sustainable management of peatlands is very important to prevent burning or fire on peatlands which can cause localized haze. Construction of drainage blocks (check dams), tube wells, water pond and water piping has been identified as effective methods for water management in peatlands to prevent and control open burning.

Program ini dilaksanakan dengan semangat 1NRE yang melibatkan kerjasama erat pelbagai agensi yang bernaung di bawah Kementerian Sumber Asli dan Alam Sekitar (NRE) iaitu Jabatan Alam Sekitar (JAS), Jabatan Pengairan dan Saliran (JPS), Jabatan Mineral dan Geosains (JMG) dan Jabatan Perhutanan Semenanjung Malaysia (JPSM). Projek ini telah dilaksanakan di tujuh (7) buah negeri iaitu Johor, Pahang, Selangor, Kelantan, Sarawak,Sabah dan Terengganu. Projek ini merangkumi aktiviti-aktiviti seperti pembinaan sekatan saliran (check dam) berjumlah 254 buah iaitu Johor (77), Pahang (63), Sarawak (36), Terengganu (27), Selangor (23), Kelantan (23), dan Sabah (5). Di samping itu juga, sebanyak 67 buah buah telaga air tanah telah dibina iaitu Sarawak (14), Pahang (13), Johor (12), Kelantan (10), Selangor (9), Sabah (7) dan Terengganu (2). Manakala sebanyak tiga (4) buah menara tinjau digunakan bagi pemantauan pembakaran terbuka pada musim panas dan kering iaitu masing-masing di Selangor, Pahang, Sarawak dan Sabah. Pada tahun 2016, Selain daripada itu pembinaan lima (5) buah kolam takungan di Selangor dan Pahang serta pemasangan 2 km saluran paip air di Hutan Simpan Raja Musa, Kuala Selangor. Bagi tahun 2016 sejumlah RM3,580,500.00 telah dibelanjakan bagi program ini.

The program was conducted under the spirit of 1NRE, involving various agencies under the Ministry of Natural Resource and Environment, which included Department of Environment (DOE), Department of Irrigation and Drainage (DID), Minerals and Geoscience Department (MGD) and Forestry Department Peninsular Malaysia (FDPM). The project has been implemented in seven (7) states which include Johor, Pahang, Selangor, Kelantan, Sarawak, Sabah and Terengganu. The project includes construction of 254 check dams namely Johor (77), Pahang (63), Sarawak (36), Terengganu (27), Selangor (23), Kelantan (23), and Sabah (5). In addition, a total of 67 tube wells were constructed namely Sarawak (14), Pahang (13), Johor (12), Kelantan (10), Selangor (9) and Sabah (7). A total of four (4) watch towers were also constructed to monitor open burning especially during the dry season namely Selangor, Pahang, Sarawak and Sabah. Other that, five (5) water pond was constructed at Pahang (2), Selangor (2) and Terengganu (1) and then 2 km water piping was install at Raja Musa Forest Reserve, Selangor. In 2016, at total of RM3,580,500.00 was spent for the program.



Sekatan Saliran Di Muar, Johor
Check Dam In Muar, Johor



Menara Tinjau Di Miri, Sarawak
Watch Tower In Miri, Sarawak



Telaga Air Tanah Di Dungun, Terengganu
Tube Well In Dungun, Terengganu







Paip Saluran Air Di Hutan Simpan Raja Musa, Kuala Selangor, Selangor Bagi Meningkatkan Paras Air Gambut

Water Piping In Raja Musa Forest Reserve, Batang Berjuntai, Selangor To Raise Peat Land Water Level



Kombinasi Menara Tinjau, Telaga Air Tanah, Sekatan Saliran Dan Papan Tanda Larangan Pembakaran Terbuka Di Kuala Langat, Selangor

Combination Of Tube Well. Check Dam, Watch Tower And Open Burning Prohibed Sign At Kuala Langat, Selangor



Kolam Takungan Di Pekan, Pahang

Water Pond In Pekan, Pahang

PENGUATKUASAAN TERHADAP AKTIVITI PEMBAKARAN TERBUKA
ENFORCEMENT AGAINST OPEN BURNING ACTIVITIES

Kes pembakaran terbuka dikesan melalui operasi rondaan mencegah pembakaran terbuka yang dilaksanakan oleh JAS Negeri di kawasan-kawasan yang dikenalpasti sebagai kawasan yang berisiko berlaku kebakaran dan sering menerima aduan daripada orang awam. Di samping itu maklumat hotspots juga diperolehi melalui satelit yang dipantau dan dilaporkan oleh *ASEAN Specialised Meteorological Centre* (ASMC) yang berpusat di Singapura. Pada tahun 2016 sebanyak 1,283 kes hotspots di seluruh negara telah dilaporkan melalui satelit (**Jadual 4.16**).

Open burning cases were detected during daily ground surveillance conducted by DOE State Offices at fire-prone areas, which have frequent public complaints and also through hotspots detected via satellites reported by the ASEAN Specialised Meteorological Centre (ASMC) based in Singapore. Throughout the year 2016, a total of 1,283 hotspots were detected via satellites (**Table 4.16**).

Sebanyak 2,910 kes pembakaran terbuka pula telah dikesan pada tahun 2016 (**Jadual 4.17** dan **Jadual 4.18**) dan dilaporkan oleh setiap JAS Negeri melalui sistem dalaman JAS iaitu Sistem e-KAS (Modul Pembakaran Terbuka dan Modul Aduan). Kejadian pembakaran terbuka yang utama sering berlaku adalah di kawasan yang dikategorikan sebagai lain-lain (1083), belukar (586), pertanian (361) dan hutan (344) terutamanya semasa cuaca panas dan kering iaitu pada bulan Mac (590) dan April (541). Kes-kes pembakaran terbuka yang termasuk dalam kategori lain-lain antaranya adalah pembakaran sampah sarap di kawasan perumahan, pembakaran sampah sarap di tepi bahu jalan dan pembakaran untuk aktiviti keagamaan atau penyembahan. Daripada 2,910 kes pembakaran terbuka tersebut, 326 kes telah dikompaun dengan jumlah kompaun yang dikutip ialah sebanyak RM 432,524.00.

Meanwhile, a total of 2,910 open burning cases were detected in 2016 and these cases were reported in DOE's internal system, which is e-KAS reporting system (Open Burning Module and Complaint Module) by the DOE state offices (**Table4.17** and **Table 4.18**). Frequent open burning incidents were found to occur from activities such as burning of garbage in residential area, garbage burning by roadside and the burning of any article as part of religious rites or worshipping activities (categorized as other activities) (1083), bushes (586), agricultural areas (361) and forests (344), that normally occured during the hot and dry period in the months of Mac (590) and April (541). Out of 2,910 open burning cases detected, 326 cases were issued compounds amounting to RM 432,524.00.

Pengawasan Melalui Udara

Pada tahun 2016, Program Pengawasan Melalui Udara telah dilaksanakan bagi negeri di Semenanjung Malaysia, Sarawak dan Sabah. Program ini dilaksanakan untuk mengawasi dan mengesan dari udara kejadian pencemaran alam sekitar seperti pembakaran terbuka, penerokaan hutan secara haram, pelepasan dari industri, aktiviti pembukaan tanah serta pembangunan di kawasan tanah tinggi dan pencemaran air marin dan pulau-pulau. Maklumat mengenai kejadian pencemaran alam sekitar yang dikesan melalui pengawasan dari udara disalurkan terus ke bilik operasi JAS untuk diambil tindakan segera oleh pegawai penguatkuasa di lapangan.

Aerial Surveillance

The Aerial Surveillance Programme continued in 2016 in Peninsular Malaysia, Sarawak and Sabah. The surveillance is to monitor and detect environmental pollution such as open burning activities, illegal clearing of forest, emission from industries, land clearing activities on highland, coastal and marine pollution surveillance. Information on the environmental pollution activities detected during the aerial surveillance would be transmitted directly to the DOE operation room for follow-up on enforcement actions by the ground surveillance staff.

Sejumlah RM330,000.00 telah diperuntukkan pada tahun 2016 untuk pelaksanaan program ini. Untuk tahun 2016, sebanyak 15 penerbangan dijalankan di Semenanjung Malaysia, 6 penerbangan di Sabah dan 4 penerbangan di Sarawak. Sepanjang program ini, sebanyak 25 jumlah penerbangan telah dilaksanakan.

In 2016, a total of RM 330,000.00 budget was allocated for the implementation of air surveillance programme. For the year 2016, 15 flights had been carried out in Peninsular Malaysia, 6 flights in Sabah while in Sarawak was 4 flights. A total of 25 flights had been conducted throughout this programme.

Jadual 4.16 JAS : Bilangan Kes Hotspots Dikesan Melalui Satelit Mengikut Negeri, 2016 (Sumber: ASMC)

Table 4.16 DOE: Number of Hotspots Detected through Satellite by States, 2016 (Source: ASMC)

Negeri/ State	Bulan/ Month												Jumlah/ Total
	Jan Jan	Feb Feb	Mac March	April April	Mei May	Jun June	Julai July	Ogos Aug	Sep Sept	Okt Oct	Nov Nov	Dis Dec	
Johor	3	5	15	14	7	8	2	5	5	1	1	0	66
Kedah	2	16	19	5	4	1	1	1	0	0	0	0	49
Kelantan	15	6	30	31	14	4	1	0	2	0	1	1	105
Melaka	1	0	1	2	0	0	0	0	0	0	0	0	4
Negeri Sembilan	3	9	10	4	1	0	1	0	0	0	1	0	29
Pahang	25	21	135	137	32	15	19	30	6	4	0	0	424
Perak	0	6	17	7	0	10	1	0	0	0	0	1	42
Perlis	0	7	1	0	0	3	0	0	0	0	0	0	11
Penang	0	0	0	0	0	1	0	0	0	0	0	0	1
Sabah	14	45	78	50	17	7	7	26	5	7	1	0	257
Sarawak	6	9	15	12	2	10	15	79	39	20	4	4	215
Selangor	0	2	2	3	3	2	1	0	0	0	1	1	15
Terengganu	1	0	12	24	19	5	1	1	1	0	0	1	65
W.P. KL/ Putrajaya	0	0	0	0	0	0	0	0	0	0	0	0	0
W.P. La-buan	0	0	0	0	0	0	0	0	0	0	0	0	0
Jumlah/ Total	70	126	335	289	99	66	49	142	58	32	9	8	1,283
JUMLAH KESELURUHAN /TOTAL : 1,283													

Jadual 4.17 JAS: Bilangan Kes Pembakaran Terbuka Mengikut Negeri, 2016

Table 4.17 DOE: Number Of Open Burning Cases By States,2016

Negeri/ State	Kategori / Categories							
	Ladang Plantation	Pertanian Agriculture	Belukar Bushes	Hutan Forest	Tapak Pembinaan Construction Sites	Tapak Pelupusan Disposal Sites	Industri Industry	Lain-lain others
Johor	32	33	21	20	8	7	1	68
Kedah	3	33	28	13	4	5	1	48
Kelantan	42	10	25	43	5	1	3	33
Melaka	7	17	14	5	2	3	0	52
Negeri Sembilan	24	8	12	8	1	2	0	87
Pahang	91	19	263	105	10	16	3	47
Perak	11	15	14	11	5	8	4	80
Perlis	0	6	8	3	1	2	0	9
P.Pinang	2	7	21	2	7	11	0	116
Sabah	59	168	12	33	3	3	0	31
Sarawak	48	36	32	78	3	2	6	55
Selangor	7	0	10	7	15	19	0	307
Terengganu	13	1	118	15	0	4	3	55
W.P. KL / Putrajaya	0	8	4	1	2	22	0	95
W.P. Labuan	0	0	4	0	3	2	0	0
Jumlah / Total	339	361	586	344	69	107	21	1083
JUMLAH KESELURUHAN / TOTAL : 2,910								

Jadual 4.18 JAS: Bilangan Kes Pembakaran Terbuka Bulanan, 2016

Table 4.18 DOE: Number of Open Burning Cases by Month, 2016

Negeri/ State	Kategori / Categories							
	Ladang Plantation	Pertanian Agriculture	Belukar Bushes	Hutan Forest	Tapak Pembinaan Construction Sites	Tapak Pelupusan Disposal Sites	Industri Industry	Lain-lain others
Januari / January	28	15	26	25	9	4	2	124
Februari / February	39	41	28	38	0	18	0	88
Mac / March	102	86	133	82	17	25	6	139
April / April	65	71	171	69	4	11	0	150
Mei / May	21	20	104	19	11	4	4	62
Jun / June	19	10	20	16	2	2	2	57
Julai / July	9	16	19	15	3	2	2	86
Ogos / August	26	48	47	54	7	10	2	113
September / September	5	24	16	14	6	9	2	87
Oktober / October	13	19	16	8	3	12	0	83
November / November	5	8	1	3	3	4	1	47
December / December	7	3	5	1	4	6	0	47
Jumlah / Total	339	361	586	344	69	107	21	1083
JUMLAH KESELURUHAN / TOTAL : 2,910								

Nota/Note :

*Lain-lain - Pembakaran sampah sarap di kawasan perumahan, tepi jalan dan aktiviti keagamaan/penyembahan

*Others - Burning garbage in residential areas, streets and religious activities / worship

PROTOKOL MONTREAL DAN PERLINDUNGAN LAPISAN OZON
MONTREAL PROTOCOL AND PROTECTION OF THE OZONE LAYER

Latarbelakang

Malaysia telah meratifikasi Konvensyen Vienna bagi Perlindungan Lapisan Ozon dan Protokol Montreal mengenai Bahan-bahan Pemusnah Lapisan Ozon pada 29 Ogos 1989. Sebagai negara Parti kepada Protokol Montreal, Malaysia telah memenuhi obligasi untuk menghentikan pengimportan klorofluorokarbon (CFC), halon dan karbon tetraklorida (CTC) mulai 1 Januari 2010. Manakala bahan pemusnah ozon seperti Metil Bromida telah dikawal pengimportan mulai 1 Januari 2015 untuk kegunaan kuarantin dan pra perkapalan. Manakala penghapusan hidroklorofluorokarbon (HCFC) sedang dijalankan dan akan diberhentikan pengimportan menjelang tahun 2030.

Background

Malaysia ratified the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer on 29 August 1989. As a Party to the Montreal Protocol, Malaysia has complied with the obligation to stop importing chlorofluorocarbon (CFC), halon and carbon tetrachloride (CTC) as of 1st January 2010. Other ozone depleting substances such as methyl bromide will only be allowed for quarantine and pre shipment activities from January 2015 while hydrochlorofluorocarbon (HCFC) will be phased out by 2030.

Pematuhan Terhadap Protokol Montreal

Bagi fasa seterusnya Malaysia perlu menghapuskan penggunaan HCFC secara berperingkat mulai 2013 sehingga dihapuskan sepenuhnya menjelang 2030 seperti yang telah ditetapkan di bawah Protokol Montreal. Bagi mencapai sasaran ini, Pelan Pengurusan Penghapusan HCFC (HPMP) telah digubal yang menggariskan polisi dan strategi jangka panjang untuk menghapuskan penggunaan HCFC mulai tahun 2012 hingga 2040. **Jadual 4.19** menunjukkan jadual strategi dan polisi dalam pelaksanaan HPMP. **Rajah 4.3** menunjukkan jadual penghapusan HCFC dalam mematuhi Protokol Montreal di mana HCFC akan dikurangkan sebanyak 10% menjelang 2015, 35% pada 2020, 67.5 % pada 2025, 97.5 % pada tahun 2030 (dengan 2.5 % dihadkan kepada penggunaan untuk penyenggaraan sahaja) dan HCFC menjadi larangan mutlak pada tahun 2040. **Rajah 4.4** menunjukkan pengimportan HCFC pada tahun 2016 yang berjumlah 4776.52 metrik tan.

Compliance to Montreal Protocol

Malaysia is obligated to phase out HCFC in stages by 2030 under the Montreal Protocol starting from 2013. To meet the phase out target, the HCFC Phase-out Management Plan (HPMP) was formulated that outlined the policies and long term strategies for the phase-out of HCFC starting from 2012 until 2040. **Table 4.19** shows the policies and strategies of HPMP. **Figure 4.3** shows the HCFC phase out schedule for Malaysia whereby HCFC will be reduced by 10 % in 2015, 35% in 2020, 67.5% in 2025 , 97.5% by 2030 (2.5% is strictly for servicing sector) and subsequently total ban of HCFC will be imposed by 2040. **Figure 4.4** shows the importation of HCFC in 2016 amounted to 4776.52 metric tonnes.

Pada 1 Januari 2013, selaras dengan pewartaan Perintah Kastam (Larangan Import) 2012 pada 31 Disember 2012 yang berkuatkuasa pada 1 Januari 2013, Malaysia telah melaksanakan sistem kuota bagi mengimport HCFC oleh pengimport yang berdaftar dengan JAS. Permohonan permit kelulusan atau *Approval Permit* (AP) diproses melalui sistem atas talian, e-Permit mengikut agihan kuota HCFC yang diperuntukkan berdasarkan garis dasar atau tahap pembekuan berjumlah sebanyak 515.8 ODPT (*Ozone Depleting Potential Tonnes*) atau sebanyak 7900 Metrik Tan.

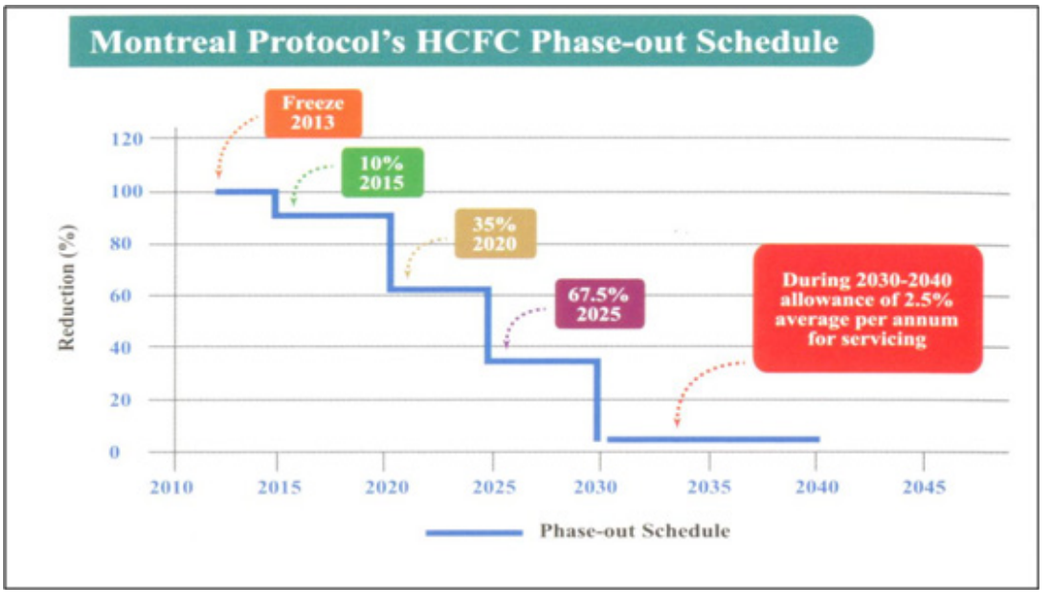
On 1st January 2013, Malaysia implemented the quota system for the importation of HCFC. Application for Approval Permit (AP) was processed by DOE through an online 'e-Permit' system within the quota given with the total amount of HCFC allocated according to baseline level or freeze limit of 515.8 ODPT (ozone depleting potential tonnes) or 7900 metric tonnes.

Sistem atas talian,"e-Permit", telah diwujudkan untuk memproses dan seterusnya meluluskan permohonan

The on-line system, "e-Permit", was developed to process and approve import and export of HCFC from

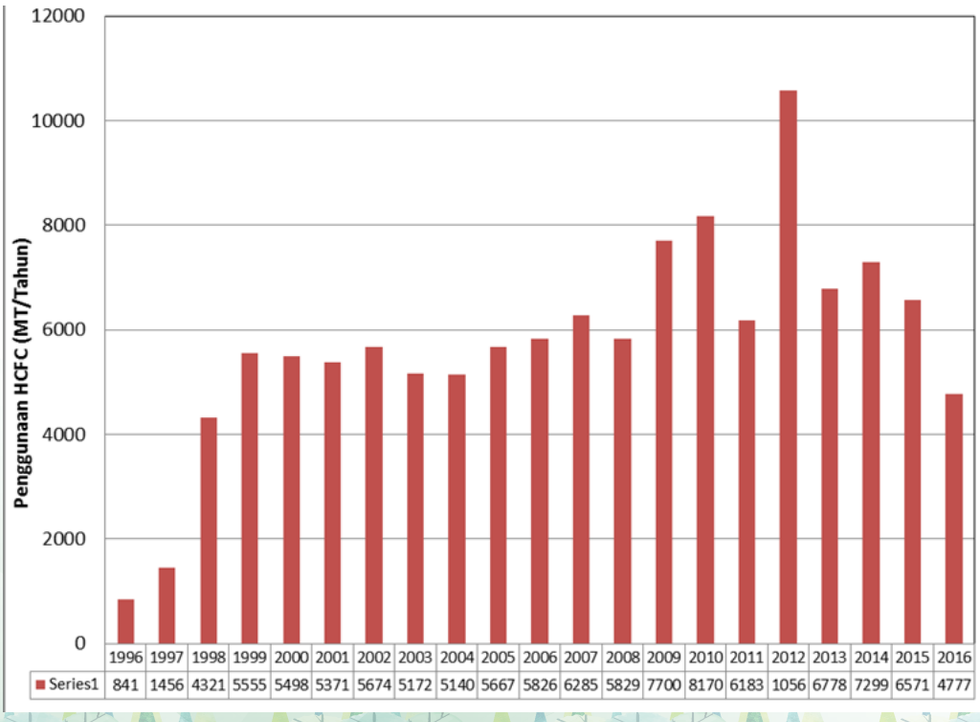
import dan eksport HCFC. Sistem atas talian ini melibatkan jaringan diantara pengimport/pengeskport berdaftar HCFC, Jabatan Alam Sekitar dan Sistem Maklumat Kastam (SMK), Jabatan Kastam DiRaja Malaysia. Sistem ini diwujudkan selaras dengan kehendak strategi HPMP iaitu pelaksanaan sistem Kelulusan Permit (AP) dan kuota bagi kawalan import HCFC. Bagi tahun 2016, sebanyak 328 permohonan untuk mengimport HCFC telah diterima dari 18 pengimport berdaftar dan sebanyak 8 permohonan untuk mengeksport HCFC telah diterima melalui sistem e-Permit.

registered importers and exporters. The on-line system is a linkage network between the HCFC importers/exporters, Department of Environment Malaysia and the Customs Information System of the Royal Customs of Malaysia. The establishment of this system is in line with the HPMP strategy which is the implementation of Approved Permit (AP) and quota system for import of HCFC. In 2016, 328 applications to import HCFC from 18 registered importers and 8 applications to export HCFC were received via the system.



Rajah 4.3 JAS: Jadual Penghapusan HCFC

Figure 4.3 DOE: HCFC Phase Out Schedule Consumption



Rajah 4.4 JAS: Tren Penggunaan HCFC Di Malaysia, 1996-2016

Figure 4.4 DOE: HCFC Consumption Trend in Malaysia, 1996-2016

Jadual 4.19 JAS: Polisi dan strategi perundangan Pelan Penghapusan HCFC (HPMP) (2012-2040)
Table 4.19 DOE: Policies and regulatory actions of HCFC Phase Out Management Plan (HPMP) (2012-2040)

Tahun/ Year	Polisi dan Tindakan Perundangan/ Policies/ Regulatory Actions
2012	Mewujudkan sistem AP bagi pengagihan kuota import HCFC berdasarkan baseline atau purata import 2009/2010 Establishment of AP for HCFC import quota based on National average consumption for 2009/2010
	Meminda perundangan sedia ada untuk mengawal penggunaan, import, pembuatan, pemasangan produk dan peralatan yang menggunakan HCFC Amend existing legislation for control on the use, import, manufacture, assembly or installation of products and equipment using HCFCs
2013	Mewujudkan sistem perlesenan untuk mengeksport semula gas HCFC Licence re-export of HCFC chemicals
	Pelaksanaan sistem AP pada 1 Januari 2013 mengikut Jadual Pembekuan Protokol Montreal Implement Approved Permit (AP) system for HCFC import (by Jan 2013)
	Larangan menambah (expansion) atau membina fasiliti pembuatan baru menggunakan HCFC Prohibit expansion of new manufacturing facilities using HCFCs
	Promosi menggunakan bahan alternatif melalui pemberian insentif Promote the use of alternatives through incentives
	Latihan dan Pensijilan bagi pekerja yang mengendalikan HCFC Undertake certification of skilled workers trained to handle HCFCs
2015	Larangan bagi membuat, memasang dan mengimport peralatan penyaman udara menggunakan HCFC yang berkuasa 2.5 hp dan ke bawah (untuk penggunaan dalam Malaysia) Prohibit the manufacture, assembly and import of HCFC-based air-con equipment of 2.5hp and below (for use in Malaysia)
	Mewartakan HCFC sebagai bahan terkawal Include HCFCs as restricted gas
	Larangan ke atas pengimportan polyol yang mengandungi HCFC Prohibit import of pre-blended polyols with HCFCs
2020	Larangan membuat, memasang dan mengimport semua barangan dan peralatan yang menggunakan HCFC kecuali bagi penggunaan khas (essential use) Prohibit the manufacture, assembly and import of all products and equipment using HCFCs (except for essential uses)
	Larangan menggunakan HCFC 141b sebagai agen pengembang Prohibit the use of HCFC 141b as blowing agent
	Larangan pembuatan dan pemasangan baru sistem pemadam api yang menggunakan HCFC Prohibit the use of HCFC in the manufacturing and installation of new fire extinguishing systems
2025	Larangan pemasangan baru semua barangan dan peralatan yang menggunakan No more new installation of products and equipment using HCFCs
2030	Pemberian AP terhad kepada 2.5% daripada jumlah baseline dan hanya untuk sektor servis sahaja AP limited to 2.5% of baseline and for servicing use only
2040	Larangan mutlak pengimportan HCFC mulai 1 Januari 2040 Total ban on the import and use of HCFCs.

Pelan Pengurusan Penghapusan HCFC (HPMP)

Malaysia menerima bantuan kewangan sejumlah USD 9,587,470 dari Tabung Multilateral Protokol Montreal (MLF) bagi pelaksanaan polisi dan strategi yang digariskan dalam HPMP Peringkat 1. Ini termasuk projek penukaran teknologi bebas HCFC bagi 17 industri dari sektor busa, latihan juruteknik servis dan projek-projek bantuan teknikal dalam sektor penyejukbekuan dan penyamanan udara.

Projek-projek penukaran teknologi dalam sektor busa telah dijalankan di 13 industri pembuatan busa dan 4 industri pembuatan polyol telah selesai pada Jun 2015.

Projek-projek di bawah sektor penyejukbekuan dan penyaman udara (RACs) terbahagi kepada 4 komponen utama iaitu Pengurusan Refigeran, Latihan Juruteknik Servis, Latihan Pegawai Penguatkuasaa dan Demonstrasi Gantian Teknologi sistem penyaman udara dan sistem penyejukan. Pihak UNDP Kuala Lumpur telah melantik 2 orang konsultan bagi membantu JAS melaksanakan projek-projek tersebut.

Pada September 2016, Jabatan Alam Sekitar telah melantik 10 lagi institusi Kerajaan sebagai Pusat Latihan Bertauliah (ATC) yang menjadikan jumlah ATC diseluruh negara sebanyak 51 pusat yang menjalankan Program Pentauliahan Juruteknik Servis (CSTP) bagi sektor (RACs). Semua ATC telah dibekalkan dengan mesin kitar semula refrigeran bersama kit pembelajaran untuk melaksanakan program CSTP tersebut. JAS dengan kerjasama Daikin (M) Sdn. Bhd telah menganjurkan 7 Siri Road show berkaitan Refrigeran HFC 32 kepada juruteknik servis RACs seluruh Malaysia bermula pada 2 Ogos hingga 13 Oktober 2016 di 7 lokasi seperti di Jadual 2. Latihan semula bagi tenaga pengajar dan pelantikan ATC baru telah diadakan pada 26-30 September 2016 di Hotel Dorsett Grand, Subang Jaya.

Bagi memudahkan pelaksanaan Program Pentauliahan Juruteknik Servis (CSTP) bagi sektor (RACs), satu sistem atas talian iaitu sistem eCSTP telah dibangunkan dan mula beroperasi pada Ogos 2016. Tenaga pengajar ATC telah diberi latihan untuk menggunakan sistem eCSTP bagi membiasakan mereka dengan sistem tersebut.

Selain itu, satu projek demonstrasi penukaran sistem penyaman udara domestik daripada refrigeran R22 kepada R32 (bebas HCFC) telah dijalankan dengan pemasangan 66 unit penyaman udara R32 di Institut Latihan Alam Sekitar (EiMAS) dan 16 unit di Universiti Kuala Lumpur-

The HCFC Phase-out Management Plan (HPMP)

Malaysia received funding assistance from the Multilateral Fund of the Montreal Protocol (MLF) amounting to USD 9,587,470 to implement the policy and strategy outlined in the HPMP-Stage 1 including investment project to phase out HCFC in 17 industries in foam sector and technical assistance for refrigeration and air-conditioning sector.

Technology conversion projects using cyclopantane at 13 foam manufacturing industries and 4 system houses manufacturing HCFC-free polyol had been completed in June 2015.

There are 4 main components of projects under the refrigeration & air-conditioning sector (RACs) namely Refrigeration Management, Technician Training, Enforcement Officials Training and Pilot Retrofitting/ Replacement Demonstration for air-conditioning system. The UNDP has appointed 2 consultants to assist DOE in executing these projects.

In September 2016, the Department of Environment appointed 10 more Government Institutes as Authorized Training Centre (ATC) that made up the total of 51 ATCs to run the Certification of Service Technicians Programme (CSTP). The ATCs had been supplied with a set of R&R machines and Training Kits to organize the CSTP program. DOE had cooperated with Daikin (M) Sdn. Bhd. in organizing 7 series of road shows on Management of Refrigerant HFC 32 intended for service technician in Malaysia from 2 August until 13 October 2016 at seven locations as in Table 2. Refresher course for Master Trainers in CSTP Program and the appointment of new ATCs were conducted on 26-30th September 2016 at Grand Dorsett Hotel, Subang Jaya.

On line system for CSTP Programme (eCSTP) had been developed to help the implementation of the programme and it was in operation on August 2016. Master Trainers from all ATCs have been trained to use the system in order to get them familiarize with the system.

A demonstration project on replacement of domestic air-conditioning system using R22 with air-conditioning units using R32 was completed with 66 units installed at Environment Institutes of Malaysia (EiMAS), Bangi and 16 units at University Kuala Lumpur, Malaysian – France

Malaysia France Institute (UniKL-MFI), Bangi. Projek ini bertujuan untuk menggalakkan orang ramai bagi menukar sistem penyaman udara mereka kepada sistem yang bebas HCFC. Projek ini dilaksanakan dengan kerjasama daripada syarikat Daikin (M) Sdn. Bhd. sebagai pengeluar sistem penyaman udara jenis R32.

Institute (UniKL – MFI) Bangi. The objective of the project is to promote the ozone friendly R32 air-conditioning system which is being introduced to Malaysian market to replace R22 system. This project has been supported by Daikin (M) Sdn. Bhd. as the R32 air-conditioning system manufacturer.

Beberapa siri latihan telah diadakan untuk memberi maklumat mengenai teknologi terkini kepada agensi penguatkuasa dalam usaha menghapuskan penggunaan HCFC. Dua siri latihan kepada 65 orang pegawai penguatkuasaan dari Jabatan Kastam DiRaja Malaysia (JKDM) dan JAS telah diadakan pada 8-12 Mei Langkawi, Kedah dan pada 24-28 Oktober di Shah Alam, Selangor. Siri latihan ini memberi pendedahan mengenai kawalan import dan eksport bahan pemusnah ozon dan memberi penekanan kepada pencegahan penyeludupan bahan tersebut. Para peserta juga didedahkan mengenai tatacara penggunaan alat pengesan refrigeran (*Refrigerant Identifier*) serta menggalakkan operasi bersepadu antara JAS dengan JKDM.

There were several training sessions had been organized to disseminate information on new technology to enforcement agencies in an effort to phase-out HCFC. Two series of training were conducted for 65 officers from Malaysia Royal Custom Department and DOE on 8-12 May 2016 at Langkawi, Kedah and 24-28 October at Shah Alam, Selangor. The objective of the training is to give better understanding on import and export of ODS especially on illegal trade. The training also included hands-on training on using Refrigerant Identifiers as well as promoting the cooperation between DOE and Malaysia Royal Custom Department.

Pada keseluruhannya, pelaksanaan projek di bawah HPMP Peringkat 1 berjalan lancar dan dijangka selesai pada Jun 2017 dimana projek bagi Pusat Kitar Semula ODS dan projek demonstrasi sistem penyejukan CO2 yang sedang dijalankan akan disempurnakan. Kejayaan pelaksanaan HPMP ini akan membolehkan pengurangan sebanyak 77.36 ODP tan penggunaan HCFC dan akan mengurangkan sebanyak 1.35 juta tan pelepasan langsung karbon dioksida (*CO2 equivalent*).

Overall, the implementation of project under HPMP Stage 1 runs according to the schedule and is expected to be completed by June 2017 when the recycle and reclamation of ODS project as well as the carbon dioxide (CO2) refrigeration system demonstration project is completed. Upon successful completion of the HPMP Stage 1, there will be a sustainable reduction of 77.36 ODP Tonnes of HCFC consumption which is equivalent to a reduction of 1.35 million tonnes of CO2eq, (carbon dioxide equivalent) direct emission in 2016.





Projek demonstrasi penyaman udara R32 di EiMAS.
Demonstration project on R32 Air conditioning system at EiMAS.



Projek Demonstrasi Penyaman Udara R32 Di Unikl-Mfi.
Demonstration Project On R32 Air Conditioning System At Unikl-Mfi.





Kursus Kawalan Bahan Pemusnah Ozon Bagi Pegawai Penguatkuasa Dari Jkdm Dan Jas.
Course On Control Of Ozone Depleting Substances For Enforcement Officer From Jkdm And Doe.

Pengurusan Halon

Halon tidak lagi digunakan bagi pemasangan baru sistem mengawal kebakaran dan alat-alat pemadam api di Malaysia. Sebaliknya, air, karbon dioksida, gas "inert" atau bahan kimia HFC kini digunakan sebagai alternatif. Walau bagaimanapun kegunaan halon masih dibenarkan untuk tujuan terhad kepada sistem keselamatan kawalan kebakaran tentera dan penerbangan awam sepertimana dipersetujui di bawah Protokol Montreal. Pada tahun 2016, Pusat Bank Halon Kebangsaan yang dikelolakan oleh Jabatan Bomba dan Penyelamat telah telah melaporkan sebanyak 268,955 kg jenis Halon 1301 dan 7,144 kg Halon

Halon Management

Halon is no longer used in Malaysia for new installation of fire protection systems and fire extinguishers. Instead, water, carbon dioxide, inert gas or chemical powders are now being used as alternatives. However, halon usage is still allowed but it is restricted only for use in fire safety protection systems in military and civil aviation industries, as agreed under the Montreal Protocol. In 2016, the National Halon Bank managed by the Fire and Rescue Department in Bandar Baru Enstek, Negeri Sembilan recorded that 268,955 kg Halon 1301 and 7,144 kg Halon 1211 were stored at the Bank Centre. Prior written approval from the

1211 disimpan di Pusat tersebut. Penggunaan sebarang sistem pencegahan kebakaran yang menggunakan alternatif kepada halon perlu mendapatkan kelulusan bertulis daripada Jabatan Bomba dan Penyelamat Malaysia terlebih dahulu sebelum sistem tersebut digunakan.

Fire and Rescue Department of Malaysia is required for the use of alternatives to halon in any new fire-fighting system.

JAS telah mengambil inisiatif untuk mengadakan lawatan ke bank halon Australia bagi sesi perbincangan mengenai pengurusan halon kebangsaan. Lawatan ini dihadiri oleh seorang pegawai JAS dan 2 orang pegawai daripada Jabatan Bomba dan Penyelamat Malaysia. Lawatan ini bertujuan untuk membincangkan isu-isu dan inisiatif yang telah dilaksanakan oleh negara Australia berkaitan dengan operasi dan pengurusan Bank Halon Kebangsaan. Hasil daripada lawatan tersebut mendapati bahawa operasi Bank Halon Australia adalah lebih komprehensif berbanding Bank Halon Malaysia. Operasi Bank Halon Australia tidak terhad kepada simpanan Halon sahaja seperti di Malaysia tetapi pelbagai operasi termasuk operasi pemusnahan Halon dan proses rawatan dengan meningkatkan tahap ketulenan Halon untuk digunakan semula.

DOE had taken the initiative to organize a study visit to discuss on National Halon Management operated at Halon Bank Australia. The visit was attended by an officer from DOE and 2 officers from Malaysia Fire and Rescue Department. The objectives of the visit amongst others were to discuss the issues and initiatives implemented by Australia in relation to the operation and management of the National Halon Bank. The outcome of the visit showed that the operation of Halon Bank Australia was more comprehensive than Halon Bank Malaysia. Operation in Halon Bank Australia was not only limited to Halon storage as in the case for Malaysia, but also included destruction of the unused Halon and Halon reclamation process.

Program Pentauliahan Juruteknik Servis (CSTP) Bagi Sektor Penyejukbekuan dan Penyaman Udara (RACs)

Pentauliahan kepada juruteknik atau pengendali servis sektor refrigeran merupakan salah satu keperluan di dalam Peraturan – Peraturan Kualiti Alam Sekeliling (Pengurusan Refrigeran) 1999. Sektor servis refrigeran merupakan penyumbang utama kepada penggunaan HCFC dalam negara. Sehubungan itu, Jabatan Alam Sekitar melalui Pusat Latihan Bertauliah (ATC) yang terdiri daripada institut latihan awam dan swasta menganjurkan siri latihan CSTP khusus kepada juruteknik sektor ini mengenai pematuhan terhadap Protokol Montreal. Penekanan terhadap tatacara dan kod etika yang betul di dalam pengendalian refrigeran juga diberikan semasa sesi latihan sebagai usaha untuk mengelakkan pelepasan refrigeran ke persekitaran secara sengaja ataupun tidak sengaja.

Certified Service Technician Program (CSTP) for Refrigeration and Air-Conditioning Sectors (RACs)

Certification to technicians or the person handling refrigerants in service sector is one of the requirements under the Environmental Quality Act (Refrigerant Management) 1999. The Department of Environment Malaysia through the appointed Authorized Training Centre (ATC) which consists of the government and private training institutes organized series of certification training program for the technicians in this sector. The certification training program focuses on the country's obligation in Montreal Protocol and best practices in refrigerant management during servicing to prevent the release of refrigerant to the atmosphere.

Sepanjang tahun 2016, sebanyak 126 siri latihan telah dijalankan oleh ATC untuk melatih dan mentauliahkan juruteknik-juruteknik atau pengendali sistem refrigeran selaras dengan kehendak Peraturan 5, Peraturan – Peraturan Kualiti Alam Sekeliling (Pengurusan Refrigeran) 1999. Jabatan Alam Sekitar juga mengadakan lawatan audit ke ATC yang terpilih semasa mereka menjalankan latihan bagi memastikan sesi latihan dijalankan dengan lancar dan mematuhi kehendak Jabatan.

In 2016, 126 series of training had been organized by ATC to train the technicians and refrigerant handlers and certify them with regards to the requirement of Regulation 5, Environmental Quality (Refrigerant Management) Regulations 1999. Department of Environment also did auditing on the selected ATCs to ensure that the CSTP programmes were handled smoothly and comply with the Department's requirement.

Di samping itu, bersempena dengan sambutan Hari Ozon Antarabangsa 2016, satu bengkel bagi tenaga pengajar baru (Master Trainer) dari 41 ATC serta 10 ATC yang baru dilantik telah diadakan pada 25-30 September 2016 di Hotel Dorsett Grand, Subang Jaya yang bertujuan untuk memberi fokus kepada prosedur pengendalian sistem penyaman udara R32.

In conjunction with the International Ozone Day 2016, a new Master Trainer from 41 ATC and 10 newly appointed ATCs was held on 25-30 September 2016 at Hotel Dorset Grand, Subang Jaya, focusing in the R32 air conditioning system operating procedures





Bengkel Master Trainer For Technician In Refrigeration And Air Conditioning Servicing Sector Anjuran Jabatan Alam Sekitar Malaysia Yang Telah Diadakan Pada 25-30 September 2016 Di Hotel Dorsett Grand, Subang Jaya

Master Trainer Workshop For Technician In Refrigeration And Air Conditioning (Racs) Servicing Sector Organized By Department Of Environment Was Held From 25-30 September 2016 At Dorsett Grand Hotel, Subang Jaya

Program dan Kempen Kesedaran

Hari Ozon Antarabangsa pada 16 September 2016 telah disambut dengan tema "Ozon dan Iklim: Terpelihara apabila seluruh dunia bersatu (Ozone and Climate: Restored by a world united)". Tema ini disokong dengan slogan "Berusaha mengurangkan Hidrofluorokarbon (HFC) s di bawah Montreal Protokol (Working towards reducing Global Warming HFCs under the Montreal Protocol)" yang mencerminkan usaha kolektif semua negara-negara parti kepada Konvensyen Vienna dan Protokol Montreal dalam menyelamatkan bumi daripada kesan penipisan lapisan ozon dan pemanasan global. Sambutan Hari Ozon Antarabangsa pada setiap tahun mencerminkan usaha bersepadu masyarakat antarabangsa untuk menghasilkan persekitaran yang sihat demi kepentingan generasi akan datang.

Perutusan YB Menteri Sumber Asli dan Alam Sekitar telah dikeluarkan dalam akhbar tempatan dan laman web NRE/DOE pada 16 September 2016. Majlis sambutan telah diadakan di Hotel Grand Dorsett, Subang Jaya dan dirasmikan oleh YB Dato Sri Dr. Hj. Wan Junaidi Bin Tuanku Jaafar, Menteri Sumber Asli dan Alam Sekitar. Timbalan Ketua Pengarah Alam Sekitar, Encik Mokthar Bin Abdul Majid juga hadir bagi menyampaikan ucapan aluan

Awareness Programme and Campaign

The International Ozone Day for the Preservation of the Ozone Layer is celebrated annually on the 16th September to raise the awareness in protecting ozone layer by phasing out ozone depleting substances. The theme for 2016 celebration was "Ozone and climate: Restored by a world united" and supported by the slogan, "Working towards reducing Global Warming HFCs under the Montreal Protocol". This theme reflected concerted effort of all parties to the Vienna Convention and Montreal Protocol in saving the earth from the effects of depletion of ozone layer and global warming. The annual International Ozone Day celebration also reflects the efforts from global in preserving the environment for the next generation.

A special message from the Honorable Minister of Natural Resources and Environment on International Ozone Day was published in local newspapers as well as in the Ministry and the Department of Environment websites on 16 September. The International Ozone Day Celebration 2016 was organized on the 30th September at the Dorsett Grand Hotel, Subang Jaya. The event was officiated by the Honourable Minister of Natural Resources and Environment

kepada lebih 300 orang tetamu yang hadir terdiri daripada agensi Kerajaan dan pihak industri termasuk wakil UNDP, Malaysian Air Conditioning & Refrigeration Association (MACRA), Pusat Latihan Bertauliah (ATC) dan NGOs.

Malaysia, Dato Sri Dr. Hj. Wan Junaidi bin Tuanku Jaafar. The Deputy Director General of Department of Environment Malaysia, Mr. Mokthar Bin Abdul Majid was also present to deliver the welcome speech to 300 guests from various stakeholders involving the government agencies, private sectors and representative from UNDP, Malaysian Air Conditioning & Refrigeration Association (MACRA) and other NGOs.

Bersempena majlis perasmian Hari Ozon Antarabangsa, YB Menteri juga telah melancarkan sistem pengurusan Program Pentauliahan Juruteknik Servis (CSTP) Bagi Sektor Penyejukbekuan dan Penyaman Udara (RACs) secara atas talian iaitu sistem eCSTP dan menyampaikan sijil pentauliahan kepada 10 Pusat Latihan Bertauliah (ATC) yang baru dilantik.

During this event, the Honorable Minister also launched the online system for Certification of Service Technician Programme (eCSTP) and delivered the certification for the appointment of 10 new authorized training centres (ATC). In conjunction of the Ozone Day celebration, a training workshop was organized for master trainers from 51 ATCs including the new ATCs from 25-30th September 2016 at Dorsett Grand Hotel, Subang Jaya which focused on the servicing of the R32 air-conditioning system.

Di samping itu, poster tema Hari Ozon Antarabangsa dari United Nation Environment Program (UNEP) telah diserahkan kepada YB Menteri Sumber Asli dan Alam Sekitar selepas majlis perasmian Hari Ozon Antarabangsa. Risalah-risalah mengenai perlindungan lapisan ozon, penghapusan bahan pemusnah lapisan ozon HCFC, HPMP dan sistem e-Permit serta Buletin Ozon dan poster tema Hari Ozon juga telah diedarkan kepada para tetamu dan pengunjung pameran.

International Ozone Day theme posters were also handed out to the Honourable Minister of Natural Resources and Environment Malaysia at the end of the event. Pamphlets and brochures on ozone layer protection, HCFC phase-out, HPMP and e- Permit as well as the posters and Ozone Bulletin were distributed to the participants.

Perincian program kesedaran dan latihan yang telah dijalankan serta mesyuarat antarabangsa yang telah dihadiri oleh pegawai JAS sepanjang tahun 2016 adalah seperti di **Jadual 4.20** dan **Jadual 4.21**.

Details of awareness programmes carried out in 2016 are listed in **Table 4.20**. Meetings and trainings at regional and international levels attended by the DOE officers are listed in **Table 4.21**.



Majlis Sambutan Hari Ozon Antarabangsa 2016 Yang Dirasmikan Oleh Yb Menteri Sumber Asli Dan Alam Sekitar Pada 30 September 2016.

International Ozone Day 2016 Celebration Officiated By The Honorable Minister Of Natural Resources And Environment On 30Th September 2016.



Lawatan Ke Pameran Sempena Majlis Sambutan Hari Ozon Antarabangsa 2016 Yang Dirasmikan Oleh Yb Menteri Sumber Asli Dan Alam Sekitar Pada 30 September 2016.

Visit To Exhibition During The International Ozone Day 2016 Celebration Officiated By The Honourable Minister Of Natural Resources And Environment On 30Th September 2016.



Penerima Anugerah Semasa Majlis Sambutan Hari Ozon Antarabangsa 2016 Di Hotel Dorsett Grand, Subang Jaya.

Award Receivers During International Ozone Day 2016 Celebration At Dorsett Grand Hotel, Subang Jaya

Jadual 4.20 JAS: Aktiviti-Aktiviti Latihan Dan Kesedaran 2016
Table 4.20 DOE: Training And Awareness Activities 2016

Tarikh Date	Aktiviti & Program Activities & Programmes	Tempat Venue
26 Jan	Bengkel Pelan Pengurusan Penghapusan Hidroflurokarbon (HPMP) Peringkat 2 Workshop on Hydroclorofluorocarbons Phase out Management Plan (HPMP) Stage 2	Holiday Villa, Subang Jaya
15 February	Bengkel Konsultatif HPMP 2 Bagi Sektor Kebakaran Consultative Workshop on HPMP 2 for Fire Sector	Putrajaya
21-25 February	Latihan Pengurusan Refigeran HFC 32 Training on Refrigerant Management of HFC 32	Blue Wave, Shah Alam, Malaysia
29 Feb- 3 March	Workshop on Flammable Refrigeration in Room Air Conditioner (RAC) and Field Trip to RAC and Compressor Manufacture Plant, Shenzen, Guangdong Province China	Shenzen, Guangdong Province, China
21-23 March	Bengkel HS Code bagi bahan pemusnah ozon Workshop on HS code ozone depleting substances	Hatten Hotel, Melaka
18-22 April	Latihan Tenaga Pengajar Sektor Refrigeran Training for Master Trainer in Refrigeration and Air Conditioning Sector	Concorde Hotel, Shah Alam, Malaysia
8-12 May	Latihan Kastam 1/2016 Custom Training 1/2016	Langkawi, Malaysia
26 May	Bengkel Konsultatif bagi HPMP 2 Consultative Workshop for HPMP 2	Holiday Villa, Shah Alam, Malaysia
31 May -2 June	Latihan sistem eCSTP kepada ATC Training to ATC on eCSTP system	Dorsette Hotel, Putrajaya
2, 4, 8,10, 16,18 August & 13 October	Siri Latihan Juruteknik bagi Pengurusan Refrigeran HFC 32 Roadshow on Technician Training on Refrigerant Management of HFC 32 (R32)	Kedah, Ipoh, Shah Alam, Johor, Kuching, Kota Kinabalu & Kota Bharu
22-23 August	Bengkel HS Code bagi bahan pemusnah ozon Workshop on HS code ozone depleting substances	Cyberjaya, Malaysia
5-8 September	Bengkel Kebangsaan bagi Kawalan Perdagangan Haram Bahan Kimia The National Capacity Building Workshop on Controlling illegal Trade in Chemicals and Waste Training	Malacca, Malaysia
17 September	Sambutan Hari Ozon Peringkat Negeri Ozone Day Celebration at State Level	Kuching, Sarawak
29 September	Sambutan Hari Ozon Antarabangsa – Pelancaran system atas talian eCSTP Ozone Day Celebration – Launching of on line system of eCSTP	Dorsett Grand, Subang
21 October	Sambutan Hari Ozon Peringkat Negeri Ozone Day Celebration at State Level	Terengganu
24-28 Oktober	Latihan Kastam 2/2016 Custom Training 2/2016	Concorde Hotel, Shah Alam

Jadual 4.21 JAS: Mesyuarat Yang Dihadiri 2016
Jadual 4.21 DOE: Meetings Attended In 2016

Tarikh Date	Mesyuarat Meeting	Tempat Venue
4 - 8 April 2016	The Thirty-Seventh Meeting of the Open-Ended Working Group of the Parties to the Montreal Protocol	Geneva, Switzerland
14-20 June 2016	Network Meeting and Thematic Workshops for Asia and the Pacific National Ozone Officers	Suva, Fiji
15-23 July 2016	The 37th Open-Ended Working Group Meeting and the 38th Extraordinary Meeting of Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer	Vienna
19-20 September	Informal Meeting on HFC	Beijing, China
6-8 October 2016	Informal Meeting and Resumed 38th Open Ended Working Group Meeting	Kigali, Rwanda
10-15 October 2016	The 28th Meeting of Parties to the Montreal Protocol	
28 Nov – 2 Dec 2016	The 77th Meeting of the Executive Committee of Multilateral Fund of Montreal Protocol	Montreal, Canada

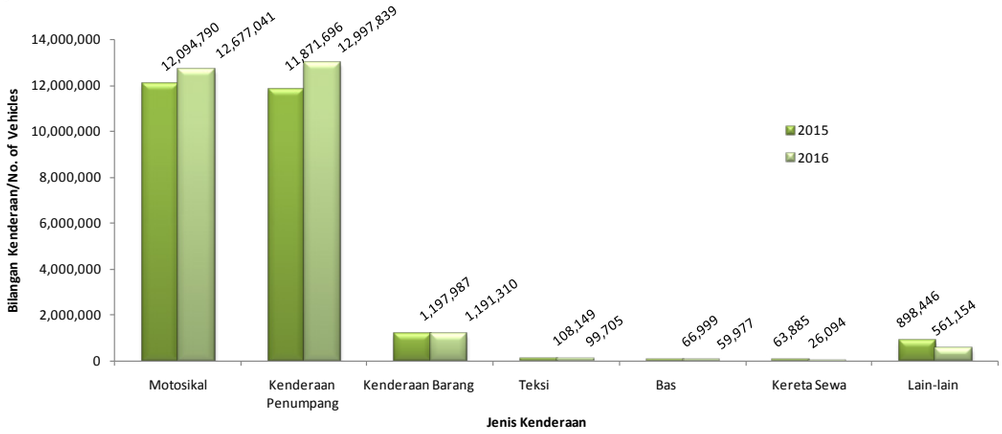


Delegasi Malaysia di Mesyuarat ke 28 Parti kepada Protokol Montreal pada 10-14 Oktober 2016 di Kigali, Rwanda.
Malaysian Delegates at the 28th Meeting of Parties to the Montreal Protocol on 14-15 October at Kigali, Rwanda.

KENDERAAN BERMOTOR
MOTOR VEHICLES

Sehingga akhir tahun 2016, sebanyak 27,613,120 buah kenderaan bermotor telah berdaftar di Malaysia, iaitu pertambahan sebanyak 1,311,168 buah kenderaan (4.99%) berbanding tahun 2015. Pecahan keseluruhan kenderaan bermotor yang berdaftar mengikut jenis kenderaan adalah seperti di **Rajah 4.5**.

As of end 2016, a total of 27,613,120 motor vehicles were registered in Malaysia, an increase of 1,311,168 units (4.99%) compared to 2015. The breakdown of the total registered vehicles according to vehicle types is given in **Figure 4.5**.



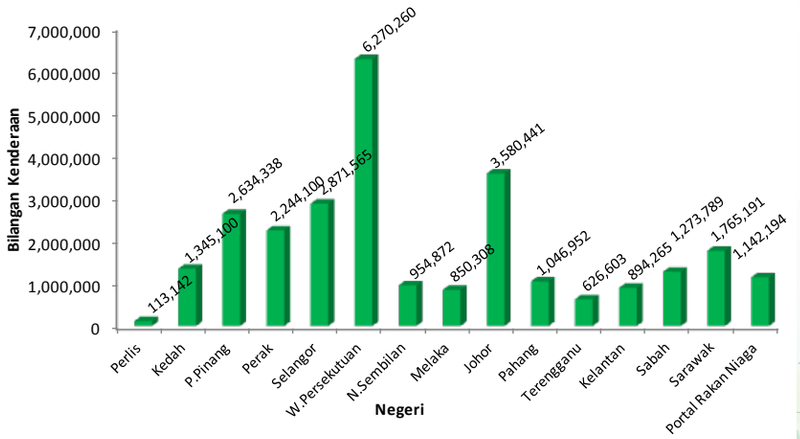
Rajah 4.5 JAS: Bilangan Kenderaan Bermotor Mengikut Jenis, 2016 (Sumber : Jabatan Pengangkutan Jalan, 2016)
Figure 4.5 DOE: Number of Motor Vehicles by Type, 2016 (Source : Road Transport Department, 2016)

Dari sejumlah 1,102,035 buah kenderaan baru yang didaftarkan dalam tahun 2016, kategori kereta merupakan yang tertinggi iaitu sebanyak 579,529 unit (52.59%) diikuti motosikal sebanyak 465,200 unit (42.21%), manakala sebanyak 57,306 unit (5.20%) adalah dari lain-lain jenis kenderaan termasuk lori, bas, van dan sebagainya.

Out of 1,102,035 new vehicles registered in 2016, motorcars made up the highest number with 579,529 units (52.59%) followed by motorcycles 465,200 units (42.21%). While the remaining 57,306 units (5.20%) were from the other vehicle types such as lorries, buses, vans and others.

Taburan bilangan kenderaan bermotor di Malaysia mengikut negeri adalah seperti di **Rajah 4.6**. Wilayah Persekutuan Kuala Lumpur mendahului negeri-negeri lain dengan mempunyai bilangan kenderaan yang tertinggi iaitu sebanyak 6,270,260 unit (atau 22.71%) daripada keseluruhan bilangan kenderaan yang berdaftar di negara ini, diikuti oleh negeri Johor, Selangor, P. Pinang dan Perak.

The distribution of registered vehicles throughout the states is given in **Figure 4.6**. The Federal Territory of Kuala Lumpur recorded the highest number of vehicles registered, with 6,270,260 units (or 22.71%) and followed by Johor, Selangor, P. Pinang and Perak.



Rajah 4.6 JAS : Bilangan Kenderaan Bermotor Mengikut Negeri, 2016
Figure 4.6 DOE : No. of Vehicles By States, 2016

Kawalan Pelepasan Asap dan Gas dari Kenderaan Bermotor

Pelepasan asap serta gas-gas pencemar seperti karbon monoksida (CO), hidrokarbon (HC), oksida-oksida nitrogen (NOx) serta partikulat (PM) yang dilepaskan melalui ekzos kenderaan bermotor adalah dikawal di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Enjin Diesel) 1996 dan Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Enjin Petrol) 1996.

Control of Smoke and Gaseous Emissions From Motor Vehicles

Emission of smoke and gaseous pollutants such as carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NOx) and particulate matters (PM) emitted from motor vehicle exhausts are controlled under the Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 and the Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996.

Kawalan Pelepasan Asap Hitam Dari Kenderaan Diesel

Kawalan pelepasan asap hitam berlebihan dari ekzos kenderaan diesel dipantau melalui Program AWASI (Area Watch And Sanction Inspection). Melalui program ini, skuad peronda JAS akan menjalankan rondaan, pemerhatian pelepasan asap hitam dari ekzos kenderaan dan memberhentikan kenderaan untuk menjalankan uijan asap ke atas kenderaan-kenderaan diesel yang diperhatikan mengeluarkan asap hitam berlebihan.

Control of Black Smoke Emission From Diesel Vehicles

The control of excessive black smoke emission emitted from diesel vehicle exhausts is monitored through the AWASI (Area Watch And Sanction Inspection) Programme. Through this programme the DOE's mobile squad would patrol the streets, observing, stop and testing diesel vehicles belching excessive smoke.

Tindakan kompaun akan diambil serta merta kepada pemandu dan tuan punya kenderaan yang didapati gagal mematuhi had pelepasan asap 50 Unit Asap Hartridge (HSU). Kompaun serta perintah larangan (larangan mengunakan kenderaan) akan dikeluarkan sekiranya kenderaan didapati melepaskan asap melebihi 70 HSU.

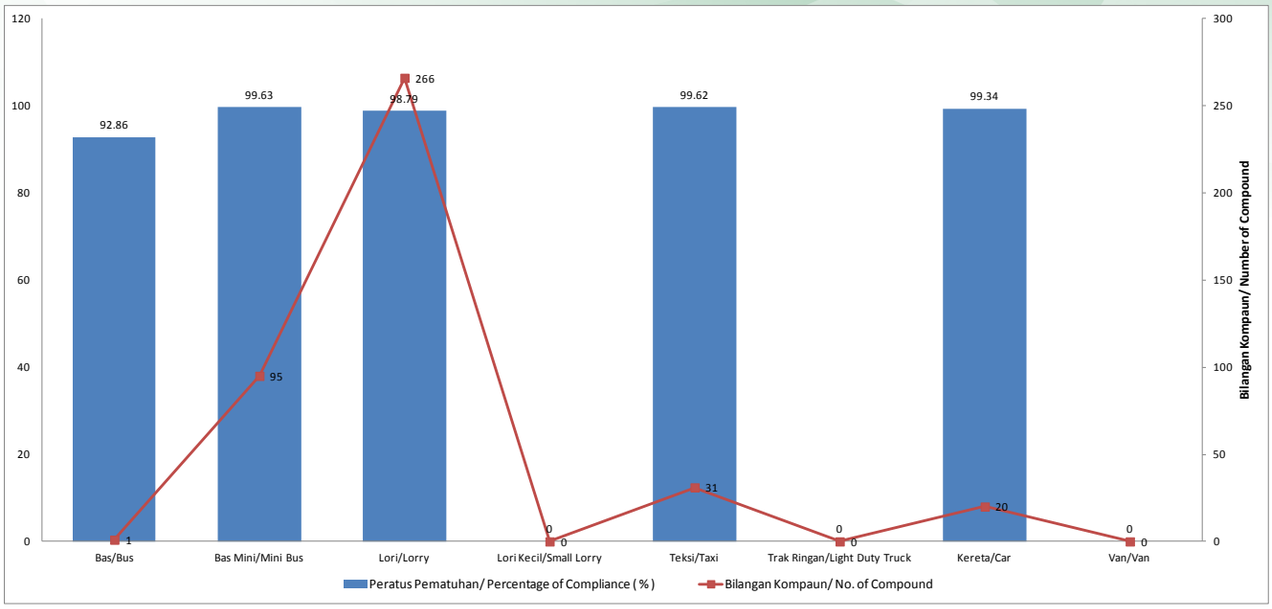
Compounds were issued on-the-spot to the drivers and owners if their vehicles fail to comply with the stipulated smoke limit of 50 HSU. A prohibition order (prohibiting vehicle use) will be issued if the smoke limit exceeds 70 HSU.

Pada tahun 2016, sebanyak 2,253 program penguatkuasaan telah dilaksanakan di bandar-bandar di seluruh negara. Sejumlah 274,279 buah kenderaan diesel telah diperiksa secara visual. Dari jumlah tersebut, sebanyak 427 buah kenderaan telah dikompaun kerana gagal mematuhi had pelepasan asap hitam sebanyak 50 HSU. Manakala 190 kenderaan telah dikenakan perintah larangan beroperasi sehingga lulus ujian asap semula oleh JAS. Pada keseluruhannya, peratus pematuhan oleh kenderaan diesel adalah 99.35%. Ini adalah penurunan sebanyak 0.35% berbanding dengan tahun 2015.

In 2015, a total of 2,253 enforcement programmes were conducted in the cities throughout the country. A total of 274,279 diesel vehicles were visually inspected. Out of these, 427 vehicles were compounded for failing to comply with the 50 HSU smoke limit while 190 vehicles issued with the prohibition order until passed or undergo smoke retest by the DOE. Generally, the percentage of compliance of diesel vehicles was 99.35%.This is an decrease of 0.35% compared to 2015.

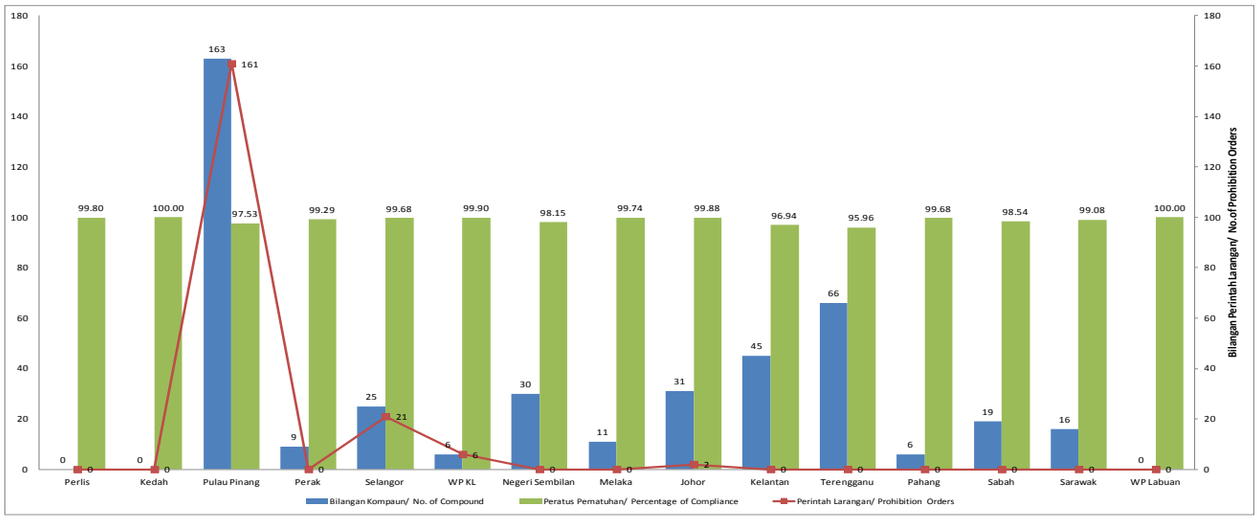
Bilangan kenderaan diesel yang dikompaun dan peratus pematuhannya mengikut jenis kenderaan adalah seperti di **Rajah 4.7** dan **4.8** pula menunjukkan bilangan kenderaan dikompaun, pengeluaran perintah larangan serta peratus pematuhan mengikut negeri. Tindakan mahkamah telah juga diambil ke atas 14 pemandu serta pemilik kenderaan kerana gagal menjelaskan kompaun yang telah dikenakan. Sejumlah 4,891 kenderaan diesel juga telah diarahkan untuk menjalankan ujian semula di PUSPAKOM.

The number of diesel vehicles summoned and their percentage of compliance according to vehicle types is given in **Figure 4.7** and **4.8** shows the number of vehicles compounded, number of prohibition orders issued and the percentage of compliance according to the states. Court actions were also taken against 14 drivers and vehicle owners for failing to settle the compounds issued. A total of 4,891 diesel vehicles were instructed to undergo smoke retest at PUSPAKOM.



Rajah 4.7 JAS : Peratus Pematuhan Mengikut Jenis Kenderaan & Bilangan Kompaun, 2016

Figure 4.7 DOE : Percentage of Compliance, According To Type Vehicles And Number of Compound 2016



Rajah 4.8 JAS : Bilangan Kenderaan Dikompaun, Pengeluaran Perintah Larangan & Peratus Pematuhan, 2016

Figure 4.8 DOE : Number of Vehicles Compounded, Number of Prohibition Orders Issued & Percentage of Compliance, 2016

Kawalan Pelepasan Gas CO dan HC Dari Kenderaan Petrol

Sepanjang tahun 2016 sejumlah 1,889 buah kenderaan berenjin petrol telah diuji pelepasan CO dan HC dengan menggunakan meter gas CO-HC Analyzer melalui kaedah ujian "idling" di jalan raya. Dari jumlah ini, sebanyak 50 buah kenderaan telah dikompaun kerana gagal mematuhi had pelepasan yang ditetapkan. Peratus pematuhan keseluruhannya adalah 98.25% iaitu peningkatan sebanyak 0.25% berbanding dengan tahun 2015. Surat amaran juga telah dikeluarkan kepada pemandu-pemandu kenderaan yang gagal mematuhi had-had pelepasan CO dan HC supaya segera menyenggara kenderaan bagi memastikan kenderaan sentiasa mematuhi had pelepasan yang ditetapkan oleh undang-undang.

Control of CO and HC Gas Emissions from Petrol Vehicles

Throughout 2016, a total of 1,189 petrol engine vehicles were inspected using the CO-HC gas analyzer via the idling test method conducted at the road side. From the above total, 50 vehicles were compounded for failing to comply with the stipulated CO and HC limits. The overall percentage of compliance is 98.25% i.e. a increase of 0.25% compared to 2015. Warning letters were also issued to drivers for immediate servicing of their vehicles to ensure compliance with the emission limits stipulated in the law.

Ujian Kelulusan Jenis (Kenderaan Petrol)

Malaysia telah memperkenalkan standard pelepasan pencemar untuk model baru kenderaan yang menggunakan petrol dengan tujuan memperbaiki pelepasan pencemar menggunakan rekabentuk enjin baru dan teknologi kawalan pelepasan.

Mana-mana model baru kenderaan bermotor pada atau selepas 1 Januari 2000 adalah dikehendaki mematuhi standard pelepasan pencemar yang ditetapkan dalam Jadual Ketiga, Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Enjin Petrol),1996 yang berdasarkan Arahan Majlis 94/12/EEC dan 93/59/EEC. Pada tahun 2016, Jabatan Alam Sekitar telah mengeluarkan 126 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan petrol yang akan dipasarkan di Malaysia.

Type Approval Test (Petrol Vehicle)

Malaysia had established exhaust emission standard for new petrol vehicles in order to improve exhaust emission by utilizing new engine design and emission control technology.

Any new model of motor vehicle that is commissioned on or after 1 January 2000 is required to comply with emission standards prescribed in the Third Schedule of the Environmental Quality (Control of Emission from Petrol Engines) Regulations, 1996 which is based on Council Directive 94/12/EEC and 93/59/EEC. In 2016, the Department of Environment has issued 126 Type Approval Test Certificates for new models of petrol vehicles to be marketed in Malaysia.

Ujian Kelulusan Jenis (Kenderaan Diesel)

Bagi mengawal pelepasan dari kenderaan berenjin diésel di Malaysia, setiap model baru kenderaan bermotor pada atau selepas 1 Januari 1997 adalah dikehendaki mematuhi standard pelepasan pencemar yang ditetapkan dalam Jadual Kedua, Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Enjin Diesel),1996 yang berdasarkan Peraturan No. 49.02 ECE dan Arahan Majlis 93/59/EEC. Pada tahun 2014, Jabatan Alam Sekitar telah mengeluarkan 66 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan diesel yang akan dipasarkan di Malaysia.

Type Approval Test (Diesel Vehicle)

To control emissions from diesel vehicles in Malaysia, each new model of motor vehicle on or after January 1, 1997 is required to comply with emission standards prescribed in the Second Schedule, Environmental Quality (Control of Emission from Diesel Engines) Regulations, 1996, which is based on ECE Regulation No.49.02 and Council Directive 93/59/EEC. In 2016, the Department of Environment has issued 66 Certificate of Type Approval Test for the new model diesel vehicles to be marketed in Malaysia.

Pengwujudan Kemudahan Yang Diluluskan

Bagi memudahkan orang awam menghantar kenderaan mereka untuk menjalani ujian pelepasan asap dan gas, Jabatan Alam Sekitar melalui program “Kemudahan Yang Diluluskan” (KYDL) telah memberi pengiktirafan kepada bengkel-bengkel kenderaan yang memenuhi kriteria-kriteria yang telah ditetapkan. Kemudahan ini boleh bertindak sebagai pusat pengujian segera dan kenderaan yang tidak mematuhi diperbaiki di pusat-pusat ini bagi memastikan kenderaan sentiasa mematuhi had pelepasan asap.

Sehingga akhir tahun 2016, sejumlah 131 sijil pengiktirafan telah dikeluarkan kepada bengkel serta pusat-pusat pemeriksaan kenderaan di seluruh negara sebagai sebagai “Kemudahan Yang Diluluskan” oleh JAS.

Establishment of Approved Testing Facilities

To facilitate convenient public access to workshops for smoke and gaseous emission testing, DOE accredited a number of workshops that fulfilled the prescribed criteria as “Approved Testing Facilities”. These testing facilities could also serve as immediate testing and repair centres for the non-complying vehicles, to ensure they are always in compliance with the emission limits stipulated.

By the end of 2016, a total of 131 certificates of accreditation were issued to the workshops and vehicle testing centres throughout the country as “Approved Testing Facilities” by DOE.

Kawalan Pelepasan Gas Pencemar Daripada Motosikal

Mulai 1 Januari 2016 semua model baru motosikal adalah dikehendaki mematuhi standard EURO3 bagi pelepasan gas pencemar daripada motosikal yang berdasarkan *European Committee 97/24/EC amendments 2002/51/EC Chapter 5 ANNEX II sec. 2.2.1.1.5. of 19 July 2002* atau *World motorcycle emission test cycle "WMTC" under the European Committee ("EC") 2006/72/EC of 18 August 2006*.

Pada tahun 2016, sebanyak 102 Sijil Kelulusan Jenis telah dikeluarkan kepada pembuat, pemasang dan pengimport motosikal untuk pasaran tempatan.

Bunyi Bising Kenderaan Bermotor

Pelepasan bunyi bising daripada kenderaan bermotor dikawal di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Bunyi Bising Kenderaan Bermotor) 1987.

Operasi penguatkuasaan bagi mengawal pelepasan bunyi bising dari motorsikal telah dilaksanakan oleh Pejabat-pejabat JAS negeri dengan kerjasama Polis DiRaja Malaysia (Cawangan Trafik). Pada 2016, sejumlah 6,679 buah motosikal telah ditahan bagi menjalani ujian pelepasan bunyi bising. Dari jumlah ini, 118 penunggang motosikal telah dikompaun oleh pihak polis kerana melanggar had bunyi bising yang dibenarkan. Peratus pematuhan secara keseluruhannya ialah 98.23% (**Rajah 4.9**) yang mana menurun 0.77% berbanding pada 2015.

Control of Emission from Motorcycles

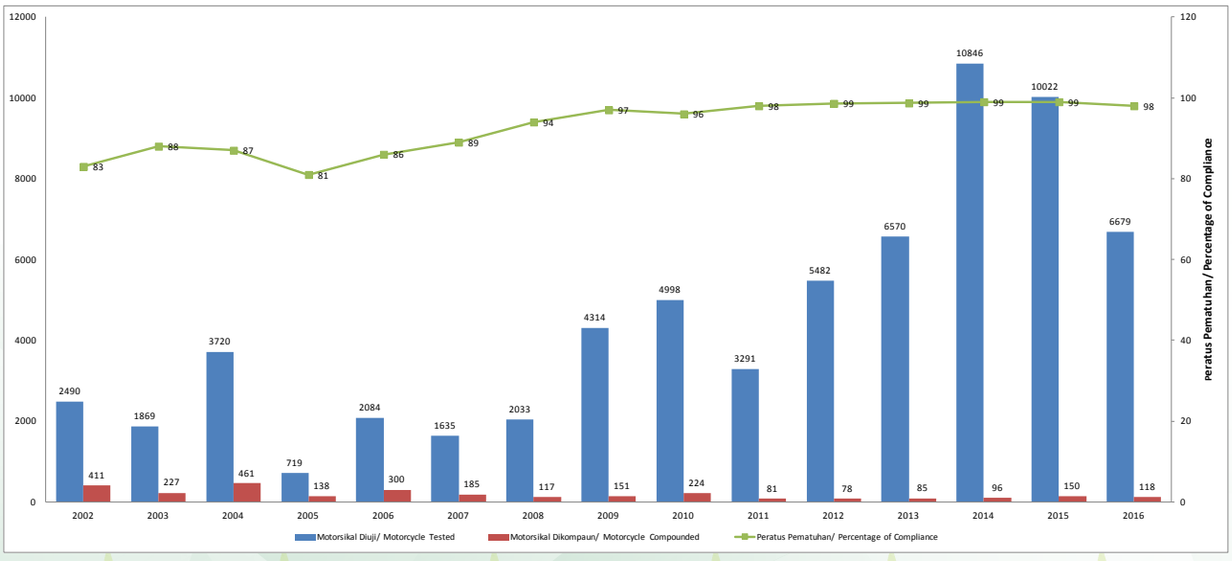
From 1 January 2016, all new models of motor motorcycles are required to comply with the standards EURO3 for gaseous emissions from motorcycles by referring to European Committee 97/24/EC amendments 2002/51/EC Chapter 5 ANNEX II sec. 2.2.1.1.5. of 19 July 2002 or World of motorcycle emission test cycle "WMTC" under the European Committee ("EC") 2006/72 / EC of 18 August 2006.

In 2016, a total of 102 Type Approval Test Certificates were issued to the manufacturers, assemblers and importers of motorcycles for the domestic market.

Noise from Motor Vehicles

The emission of noise from motor vehicles is enforced under the Environmental Quality (Motor Vehicle Noise) Regulations 1987.

Enforcement operations to control excessive noise from motorcycles were jointly conducted by the DOE and the Traffic Police. In 2016, a total of 6,679 motorcycles were detained for the noise inspection. Out of this, 118 motorcyclists were summoned for violating the stipulated noise limits. The overall percentage of compliance is 98.23% (**Figure 4.9**) which is an decrease of 0.77% compared to 2015.



Rajah 4.9 JAS : Peratus Pematuhan Bilangan Motorsikal Diuji dan Bilangan Kompaun (2001 - 2016)

Figure 4.9 DOE : Percentage of Compliance, Number of Motorcycle Tested and Compound Issued (2001 - 2016)

PENGURUSAN BUANGAN TERJADUAL
SCHEDULED WASTE MANAGEMENT

Lesen Premis Yang Ditetapkan

Di samping itu, sejumlah 753 lesen dikeluarkan kepada kemudahan baru dan sediada pada tahun 2016 yang terdiri daripada 176 kemudahan pemerolehan kembali luar tapak (bukan e-waste), 37 kemudahan pemerolehan kembali luar tapak (penuh e-waste), 104 kemudahan pemerolehan kembali luar tapak (separa e-waste), 34 kemudahan penunu buangan terjadual, 2 kemudahan pengolahan luar tapak, 6 kemudahan tapak pelupusan selamat, dan 52 kemudahan penstoran luar tapak. Sejumlah 348 lesen dikeluarkan kepada pembawa yang ditetapkan. (**Jadual 4.22**).

Licences for Prescribed Premises

In addition, a total number of 753 licenses were issued for both existing and new facilities in 2016 which consists of 176 licenses for off-site recovery (non e-waste), 37 licenses for off-site full recovery plants (e-waste), 104 licenses for off-site partial recovery plants (e-waste), 34 licenses for scheduled wastes incinerators, 2 licenses for off-site treatment, 6 licenses for secured landfills and 52 licenses for off-site storage facilities. A total of 348 licenses were issued for prescribed conveyance (**Table 4.22**).

Jadual 4.22 JAS: Lesen-Lesen Yang Dikeluarkan Bagi Kemudahan Pemerolehan Kembali, Pengolahan & Pelupusan Buangan Terjadual Yang Diluluskan Oleh Jabatan Alam Sekitar, 2016

BIL	KEMUDAHAN	JUMLAH LESEN DIKELUARKAN MENGIKUT NEGERI															
		JHR	KDH	KLN	MLK	N.S	PHG	PRK	PRS	PP	SBH	SRK	SLG	TRG	WP (KL)	WP (LAB)	JUMLAH
1	**Pembawa Yang Ditetapkan / Prescribed Conveyance**	53	24	0	21	17	4	23	1	55	11	37	85	6	5	6	348
	Penstoran Luar Tapak / Off Site Storage	5	1	0	0	2	2	2	0	0	7	25	3	1	0	4	52
2	**Pemerolehan Kembali Luar Tapak / Off Site Recovery**																
	a. **Pemerolehan Kembali Luar Tapak (bukan e-Waste) / Off Site Recovery (none e-waste)**	30	11	0	4	14	7	20	1	20	2	5	50	5	0	1	176
	b. **Pemerolehan Kembali Luar Tapak (penuh e-Waste) / Off Site Recovery (full e-Waste)**	8	2	0	5	3	0	3	0	9	0	1	6	0	0	0	37
	c. **Pemerolehan Kembali Luar Tapak (separa e-Waste) /Off Site Recovery (partial e-Waste)**	12	10	0	11	5	0	1	0	27	0	7	25	0	5	1	104
3	**Penunu Buangan Terjadual / Schedule Waste Incinerator**	5	1	0	1	3	1	4	0	3	3	7	4	2	0	0	34
4	**Pengolahan Di Tanah / Land Treatment Facilities**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pengolahan Luar Tapak / Off Site Treatment Facilities	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
5	**Tapak Pelupusan Selamat / Secured Landfill**	1	1	0	0	2	0	0	0	0	0	1	0	1	0	0	6
	Bil. Lesen / No. of License	115	50	0	43	46	14	53	2	114	23	83	173	15	10	12	753
	Bil. Premis / No. of Premises	62	26	0	22	23	10	30	1	59	12	48	88	10	5	6	402

JHR - JOHOR
KDH - KEDAH
KLN - KELANTAN
MLK - MELAKA
N.S - NEGERI SEMBILAN
PRK - PERAK
PRS - PERLIS
PP - PULAU PINANG
PHG - PAHANG
SBH - SABAH
SLG - SELANGOR
SRK - SARAWAK
TRG - TERENGGANU
WP (KL) - WILAYAH PERSEKUTUAN KUALA LUMPUR
WP (LAB) - WILAYAH PERSEKUTUAN LABUAN





TINDAKAN PENGUATKUASAAN

PASUKAN PEMANTAU PENCEMARAN (3P)
POLLUTION MONITORING TEAM

3P

Pasukan Pemantau Pencemaran (3P) merupakan salah satu program di bawah Rakan Alam Sekitar (RAS) yang bertindak selaku mata dan telinga bagi membantu, memantau dan melaporkan masalah pencemaran setempat kepada JAS. Ini bagi membolehkan JAS mengambil tindakan cepat dan cekap ke atas kes aduan terutamanya aduan berulang.

Keahlian ahli 3P boleh terdiri daripada ahli JKKK, Ketua Kampung, Penghulu, Komuniti Agama, Persatuan Taman Perumahan, Rukun Tetangga dan juga Ahli Politik.

Sepanjang tahun 2016, sejumlah 1006 ahli 3P telah dilantik di seluruh negara yang melibatkan 89 kawasan parlimen yang telah dikenalpasti. JAS telah menerima sejumlah 88 maklumat daripada ahli 3P berhubung kes pencemaran seperti berikut :

3P

Pollution Monitoring Team (3P) is one of the programmes under Environment's Friends (RAS) acting as eyes and ears to help, monitor and report local pollution issues to DOE. This will enable DOE to take fast and efficient actions to complaint cases particularly repeated complaints.

Membership of 3P may include members of JKKK, Village's Leader, Penghulu, Religious Community, Community Housing Association and also Politician.

Throughout the year of 2016, a total of 1006 members of 3P were appointed in the whole country involving 89 parliamentaries identified. DOE has received 88 information from 3P's members with relation to pollution cases as follows :

JENIS PENCEMARAN TYPE OF POLLUTION	BIL. MAKLUMAT DITERIMA JAS NO. OF INFORMATION RECEIVED BY DOE
Pembakaran terbuka Open burning	49
Pelepasan efluen Effluent discharge	15
Pencemaran udara Air pollution	13
Pembukaan tanah Land clearing	2
Pelupusan sisa pepejal Domestic waste disposal	1
Lain-lain Others	8



Pasukan Pemantau Pencemaran (3P)
Pollution Monitoring Team (3P)



Siasatan Pembakaran Terbuka Berdasarkan Maklumat Ahli 3P
Investigation Of Open Burning Based On Information From 3P's Member



Siasatan Pembakaran Terbuka Berdasarkan Maklumat Ahli 3P
Investigation Of Open Burning Based On Information From 3P's Member



Pemantauan Pembakaran Terbuka Oleh Ahli 3P
Monitoring Of Open Burning By 3P's Member

KAWALAN TERHADAP PREMIS YANG DITETAPKAN
CONTROL OF PRESCRIBED PREMISES

Kilang Getah Asli Mentah dan Kilang Kelapa Sawit Mentah dikategorikan sebagai premis yang ditetapkan masing-masing di bawah Perintah Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Getah Asli Mentah) 1978 dan Perintah Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Kelapa Sawit Mentah) 1977. Operasi premis-premis ini adalah tertakluk kepada keperluan Seksyen 18, Akta Kualiti Alam Sekeliling, 1974 di mana pemilik premis ini perlu mempunyai lesen daripada Jabatan Alam Sekitar bagi menduduki dan menggunakan premis.

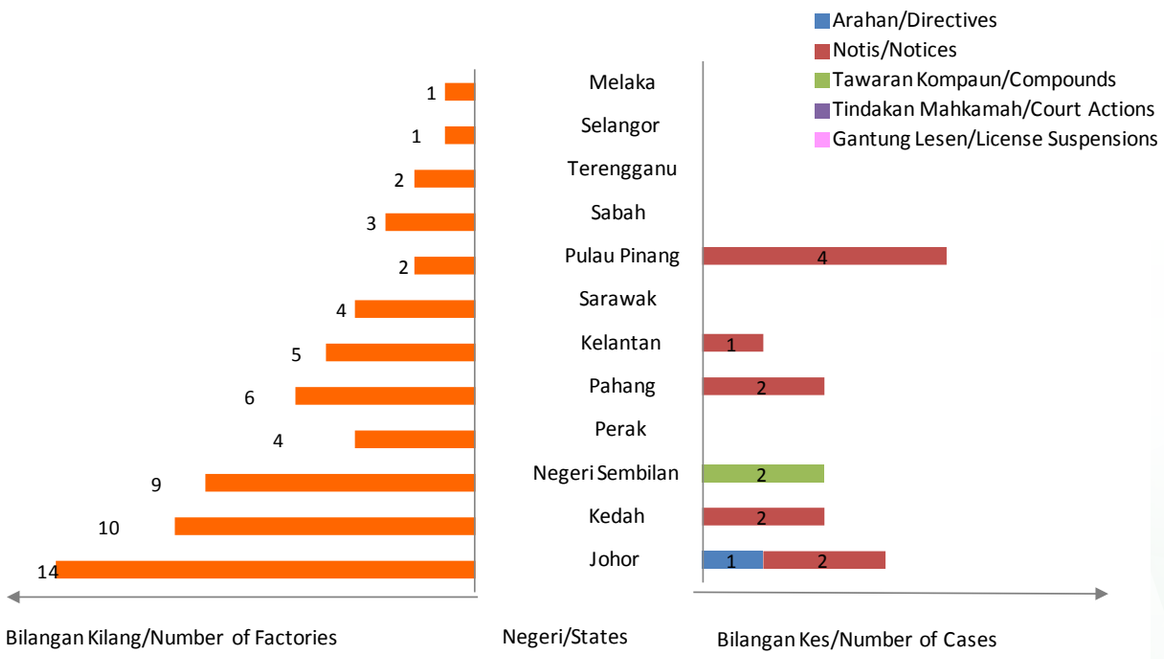
Kilang Getah Asli Mentah

Pada tahun 2016, sejumlah 61 buah kilang getah asli mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Getah Asli Mentah), 1978. Daripada jumlah ini, 46 buah kilang telah dilesenkan bagi melepaskan efluen yang telah diolah ke alur air, sebuah kilang telah dilesenkan untuk melepaskan effluen ke atas tanah, manakala 14 buah kilang dibenarkan untuk mengitar semula efluen. Tempoh lesen yang diberikan adalah berbeza bagi setiap premis; kurang dari setahun bagi premis yang tidak bermasalah dan setahun bagi premis yang bermasalah. **Rajah 4.10** menunjukkan bilangan kilang getah asli mentah mengikut negeri.

Raw natural rubber factories and crude palm oil mills are classified as prescribed premises under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order, 1978 and the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order, 1977 respectively. The operation of these premises are subjected to the requirement of Section 18 of the Environmental Quality Act, 1974 whereby the owners of the premises are required to obtain a licence from the Department of Environment for the occupation and/or use of the said premises.

Raw Natural Rubber

In 2016, there were 61 raw natural rubber factories licensed under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978. Out of these, 46 factories were licensed to discharge treated effluent into inland watercourse, one (1) was permitted to practise land disposal, while the remaining 14 were allowed to recycle their effluent. The licensing periods of these premises varies; less than one year for **Figure 4.10** shows the distribution of raw natural rubber factories according to states.Status Of Compliance With The Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978



Rajah 4.10 JAS: Bilangan Kilang Getah Asli Mentah Tindakan Undang-Undang Terhadap Kilang Getah Asli Mentah, 2016

Figure 4.10 DOE: Raw Natural Rubber Factories and Legal Action Agains Natural Rubber Factories, 2016

Pada Januari hingga Jun 2016, pegawai-pegawai penguatkuasa JAS Negeri telah menjalankan sejumlah 83 pemeriksaan lapangan ke atas 61 buah kilang getah asli mentah yang telah dilesenkan.
Pada Julai hingga Disember 2016 selari dengan Hala Tuju Baharu JAS, pegawai-pegawai penguatkuasa JAS Negeri telah menjalankan sejumlah 149 pemeriksaan ke atas 61 buah kilang getah asli mentah yang telah dilesenkan. Hala Tuju Baharu JAS yang diperkenalkan adalah dengan melakukan transformasi daripada *Command and Control* (CAC) kepada *Self Regulation* (SR) dimana kedua-duanya menyokong antara satu sama lain. Kaedah pelaksanaan adalah melibatkan pemeriksaan di lapangan dan pemeriksaan desktop.

In 2016, the overall compliance performance by the raw natural rubber factories that were subjected to the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978 was 97%.
From July to December 2016, in conjuction with DOE's new strategic plan, state DOE enforcement officers has conducted 149 inspections on 61 licensed raw natural rubber factories. The DOE's new strategic plan is a transformational from Command and Control (CAC) to Self Regulation (SR) where it complement each other. Through this strategic plan, enforcement involve inspection at premises as well as dekstop inspection.

Kilang-kilang yang mempunyai rekod pematuhan yang rendah sebelum ini telah diberi keutamaan pemeriksaan. Tindakan susulan pemeriksaan penguatkuasaan yang diambil adalah seperti yang ditunjukkan dalam **Rajah 4.10**.

Those factories with low compliance record previously were given priority for inspections. Follow up actions taken as a result of these inspections are as shown in **Figure 4.10**.

Sejumlah 1 arahan lapangan dan 11 notis arahan telah dikeluarkan kepada premis-premis tersebut supaya mengambil tindakan pembaikan bagi mematuhi keperluan perundangan. Sebanyak 2 kompaun telah dikeluarkan bagi kesalahan-kesalahan yang telah dilakukan. Tiada premis dalam tindakan mahkamah (**Rajah 4.10**).

A total of 1 field citations and 11 notices were issued to the concerned premises to take corrective actions in order to comply with the legal requirements. 2 compounds were issued for the offences committed. While (2) in the premises of the court action (**Figure 4.10**).

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Getah Asli Mentah) 1978

Pada tahun 2016, pencapaian pematuhan keseluruhan kilang getah asli mentah yang tertakluk di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Getah Asli Mentah) 1978 adalah 97%.

Status Of Compliance With The Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978

In 2016, the overall compliance performance by the raw natural rubber factories that were subjected to the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978 was 97%.

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978

Kilang getah asli mentah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978. Pada tahun 2016, pencapaian pematuhan keseluruhan oleh kilang getah asli mentah adalah 100%.

Status Of Compliance With The Environmental Quality (Clean Air) Regulations, 1978

Raw natural rubber factories are also subjected to the Environmental Quality (Clean Air) Regulations, 1978. In 2016, overall compliance performance by the raw natural rubber factories was 100%.

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005

Pada tahun 2016, pencapaian pematuhan keseluruhan oleh kilang getah asli mentah bagi Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 adalah 100%.

Status Of Compliance With The Environmental Quality (Scheduled Wastes) Regulations, 2005

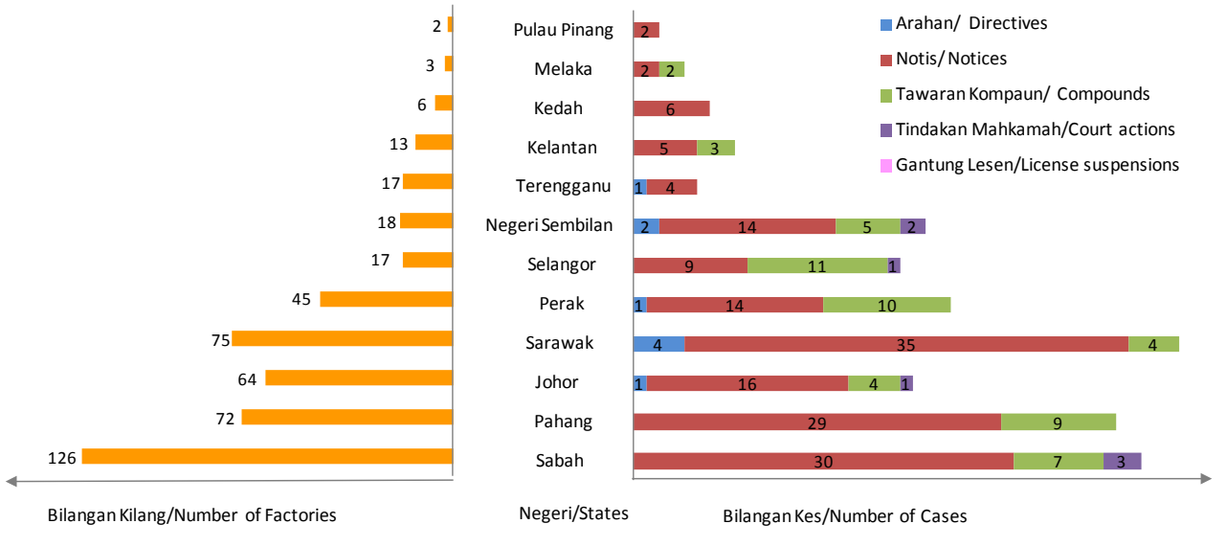
In 2016, overall compliance performance by the raw natural rubber factories for the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 100%.

Kilang Kelapa Sawit Mentah

Sejumlah 458 buah kilang kelapa sawit mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Kelapa Sawit Mentah), 1977 pada tahun 2016. Dari 458 buah kilang yang dilesenkan, 309 buah kilang telah dilesenkan bagi melepaskan efluen yang diolah ke dalam alur air, 84 buah kilang melupuskan efluen ke atas tanah, 23 buah kilang melupuskan efluen dengan menggunakan gabungan kaedah alur air dan atas tanah. Manakala, 4 buah kilang menggunakan kaedah kompos, 32 buah kilang menggunakan gabungan kaedah alur air dan kompos serta 6 buah kilang menggunakan gabungan kaedah atas tanah dan kompos. **Rajah 4.11** menunjukkan taburan bilangan kilang kelapa sawit mentah di Malaysia mengikut negeri.

Crude Palm Oil

There were 458 palm oil mills licensed under the Environmental Quality (Prescribed Premises) (Crude Palm Oil Mill) Regulations, 1977 in the year 2016. Of these 458 licensed prescribed premises, 309 were granted permission to discharge treated effluent into inland watercourse, 84 to practice land disposal, 23 to discharge effluent by combination into inland watercourse and land disposal. While, 4 to practice composting, 32 to discharge treated effluent using a combination of inland watercourse and composting and the other 6 using a combination land disposal and composting. **Figure 4.11** shows the distribution of palm oil mills in Malaysia according to states.



Rajah 4.11 JAS: Tindakan Undang-Undang Terhadap Kilang Minyak Kelapa Sawit Mentah, 2015
Figure 4.11 DOE: Legal Actions Against Crude Palm Oil Mills,2015

Pada Januari hingga Jun 2016, sejumlah 482 pemeriksaan ke atas 458 kilang kelapa sawit yang dilesenkan telah dilaksanakan oleh pegawai-pegawai penguatkuasa JAS Negeri.

From January to June 2016, a total of 482 inspections on 458 licensed palm oil mills were conducted by State DOE enforcement officers.

Pada Julai hingga Disember 2016 selari dengan Hala Tuju Baharu JAS, pegawai-pegawai penguatkuasa JAS Negeri telah menjalankan sejumlah 792 pemeriksaan ke atas

From July to December 2016, in conjuction with DOE's new strategic plan, state DOE enforcement officers has conducted 792 inspections on 458 licensed raw natural

458 buah kilang getah asli mentah yang telah dilesenkan. Hala Tuju Baharu JAS yang diperkenalkan adalah dengan melakukan transformasi daripada *Command and Control* (CAC) kepada *Self Regulation* (SR) dimana kedua-duanya menyokong antara satu sama lain. Kaedah pelaksanaan adalah melibatkan pemeriksaan di lapangan dan pemeriksaan desktop.

rubber factories. The DOE's new strategic plan is a transformational from Command and Control (CAC) to Self Regulation (SR) where it complement each other. Through this strategic plan, enforcement involve inspection at premises as well as dekstop inspection.

Tindakan susulan pemeriksaan penguatkuasaan yang diambil adalah seperti yang ditunjukkan dalam **Rajah 4.11**.

Throughout 2016, Follow up actions taken as a result from these inspections are shown in **Figure 4.11**.

Sejumlah 9 arahan lapangan dan 166 notis arahan telah dikeluarkan kepada premis-premis tersebut supaya mematuhi keperluan perundangan. Sebanyak 55 kompaun dikeluarkan bagi kesalahan yang dilakukan. Manakala, 7 tindakan mahkamah telah diambil bagi kegagalan mematuhi syarat-syarat lesen dan denda sebanyak RM 174,200 telah dikenakan. Sejumlah 1 premis akan disebut semula kes.

A total of 9 field citations and 131 notices were issued to the mills to comply with the legal requirements. 51 compounds were issued for offences committed. While, 7 court actions were taken with a total fine of RM 174,200 for failure to comply with conditions of the licences. A total of 1 premises is still under investigation.

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Minyak Kelapa Sawit Mentah) 1977

Status Of Compliance With The Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977

Pada tahun 2016, pencapaian pematuhan keseluruhan kilang kelapa sawit mentah yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Minyak Kelapa Sawit Mentah) 1977 adalah 99%.

In 2016, the overall compliance performance by the crude palm oil mills that were subjected under the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977 was 99%.

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978

Status Of Compliance With The Environmental Quality (Clean Air) Regulations, 1978

Kilang minyak kelapa sawit mentah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978. Pada tahun 2016, pencapaian pematuhan keseluruhan oleh kilang minyak kelapa sawit mentah adalah 99%.

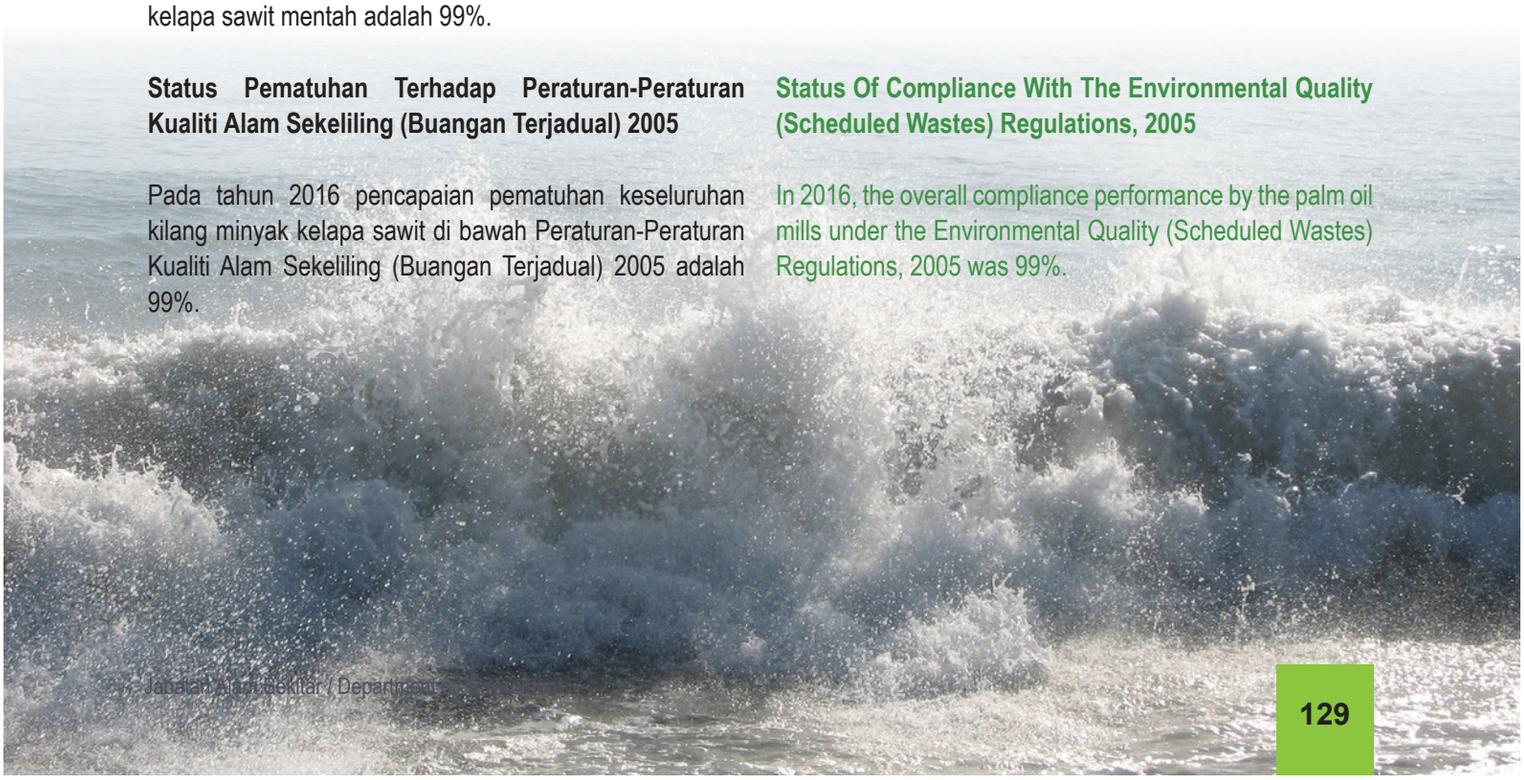
Palm oil mills are also subjected under the Environmental Quality (Clean Air) Regulations, 1978. In 2016, the overall compliance performance by palm oil mills was 99%.

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005

Status Of Compliance With The Environmental Quality (Scheduled Wastes) Regulations, 2005

Pada tahun 2016 pencapaian pematuhan keseluruhan kilang minyak kelapa sawit di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 adalah 99%.

In 2016, the overall compliance performance by the palm oil mills under the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 99%.



KAWALAN PREMIS YANG BUKAN DITETAPKAN
CONTROL OF NON-PRESCRIBED PREMISES

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009

Premis-premis yang bukan ditetapkan yang melepaskan efluen adalah tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009.

Pada Januari hingga Jun 2016, JAS telah menjalankan pemeriksaan ke atas 4,844 premis daripada 44 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009.

Pada Julai hingga Disember 2016 selari dengan Hala Tuju Baharu JAS, JAS telah menjalankan pemeriksaan ke atas 10,151 premis daripada 44 kategori premis yang bukan ditetapkan yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009. Hala Tuju Baharu JAS yang diperkenalkan adalah dengan melakukan transformasi daripada *Command and Control* (CAC) kepada *Self Regulation* (SR) dimana kedua-duanya menyokong antara satu sama lain. Kaedah pelaksanaan adalah melibatkan pemeriksaan di lapangan dan pemeriksaan desktop.

Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 99%. Terdapat 12 kategori industri mencapai pematuhan 100%, pada tahun 2016 (**Rajah 4.12**).

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978

Premis-premis yang bukan ditetapkan adalah juga tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978 . Pada tahun 2016, JAS telah menjalankan 2714 pemeriksaan kepada 44 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978. Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 98%. Terdapat 10 kategori industri mencapai pematuhan 100% peraturan tersebut pada tahun 2016. (**Rajah 4.13**).

Status of Compliance with the Environmental Quality (Industrial Effluents) Regulations, 2009

The non-prescribed premises that discharge effluents are subjected under the Environmental Quality (Industrial Effluents) Regulations, 2009.

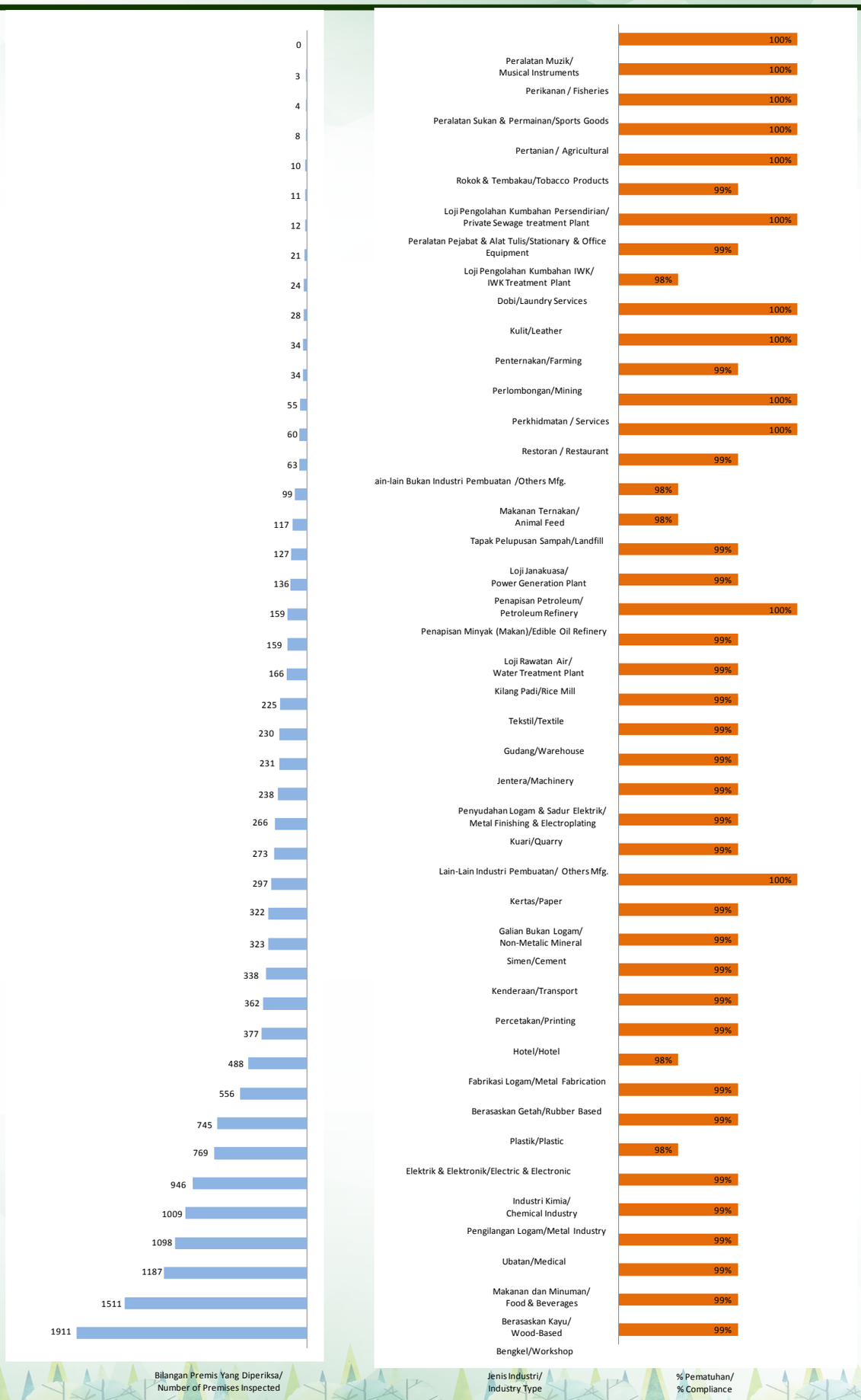
From January to June 2016, DOE conducted inspections on 4,844 premises from 44 categories of industrial premises and other non-prescribed premises that were subjected to the Environmental Quality (Industrial Effluents) Regulations, 2009.

From July to December 2016, in conjuction with DOE's new strategic plan, state DOE enforcement officers had conducted inspections on 10,151 premises from 44 categories of industrial premises and other non-prescribed premises that were subjected to the Environmental Quality (Industrial Effluents) Regulations, 2009. The DOE's new strategic plan is a transformational from Command and Control (CAC) to Self Regulation (SR) where it complement each other. Through this strategic plan, enforcement involve inspection at premises as well as dekstop inspection.

The overall compliance achievement by the non-prescribed premises was 99%. There were 12 categories of industries achieved 100% compliance in 2016 (**Figure 4.12**).

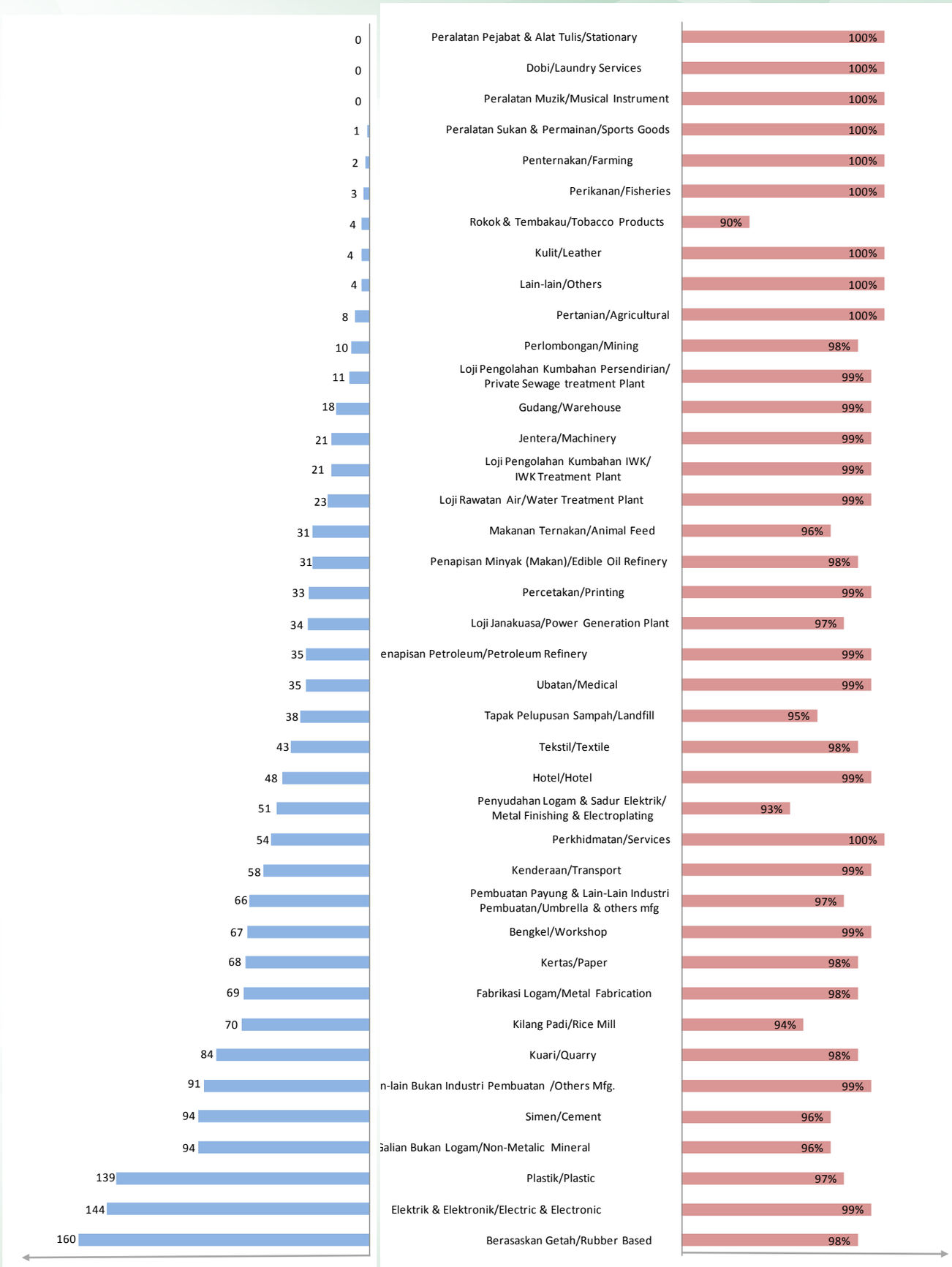
Status of Compliance with the Environmental Quality (Clean Air) Regulations, 1978

The non-prescribed premises are also subjected to the Environmental Quality (Clean Air) Regulations, 1978. In 2016, DOE conducted 2714 inspections on 44 categories of industrial premises and other non-prescribed premises that were subjected to the Environmental Quality (Clean Air) Regulations, 1978. The overall compliance by the non-prescribed premises was 99%.
There were 10 categories of industries achieved 100% compliance to the regulation in 2016. (**Figure 4.13**).



Rajah 4.12 JAS: Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009,2014

Figure 4.12 DOE: Compliance Status to the Enviromental Quality (Industrial Effluent) Regulations 2009, 2014



Bilangan Premis Yang Diperiksa/ Number of Premises Inspected

Jenis Industri/ Industry Type

% Pematuhan/ % Compliance

Rajah 4.13 JAS: Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978,2014

Figure 4.13 DOE: Compliance Status to the Enviromental Quality (Clean Air) Regulations 1978, 2014

Status Pematuhan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005

Premis-premis yang bukan ditetapkan adalah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005. Pada tahun 2016, JAS telah menjalankan 3446 pemeriksaan ke atas 44 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan. Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 98%. Antara kegagalan pematuhan yang direkodkan adalah termasuk gagal mengemukakan pemberitahuan mengenai pengeluaran buangan terjadual kepada JAS, buangan terjadual tidak distor dan tidak dilabel dengan sempurna selain gagal menyimpan rekod inventori buangan terjadual dengan tepat dan terkini (Peraturan-Peraturan 3, 8, 9, 10 dan 11).

Pada tahun 2016, terdapat 11 kategori industri mencapai pematuhan 100% terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 (**Rajah 4.14**).

TINDAKAN PENGUATKUASAAN

Sejumlah 383 kes premis yang tidak patuh telah dituduh di mahkamah dengan RM 13,666,600 denda telah dipungut. Tindakan-tindakan penguatkuasaan lain yang diambil adalah pengeluaran 288 arahan lapangan, 3,196 notis arahan dan 2,258 kompaun kepada industri supaya mengambil tindakan yang sewajarnya bagi mematuhi Akta Kualiti Alam Sekeliling, 1974 dan Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009, Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978 dan Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005.

Bagi meningkatkan pematuhan kepada peraturan, JAS telah mengeluarkan arahan-arahan kepada industri supaya memasang alat kawalan pencemaran yang sesuai dan efisien, meningkatkan keupayaan kemudahan kawalan pencemaran yang sedia ada dan juga menyediakan jadual perancangan dan pelaksanaan sistem pengurusan alam sekitar yang baik. Sebagai tambahan, pelbagai aktiviti kesedaran dilaksanakan sepanjang tahun untuk kumpulan sasaran yang spesifik. Aktiviti-aktiviti tersebut termasuklah dialog, seminar dan bengkel untuk industri dengan tujuan untuk meningkatkan tahap pematuhan undang-undang. Jabatan Alam Sekitar juga dalam usaha memastikan pematuhan sepenuhnya, mempromosi penggunaan teknologi kawalan yang efisien, amalan pengeluaran bersih serta pematuhan kendiri. Pihak industri juga dinasihatkan untuk mewujudkan sistem pengurusan alam sekitar yang baik dan digalakkan untuk mendapatkan pensijilan ISO 14000.

Status of Compliance with the Environmental Quality (Scheduled Wastes) Regulations, 2005

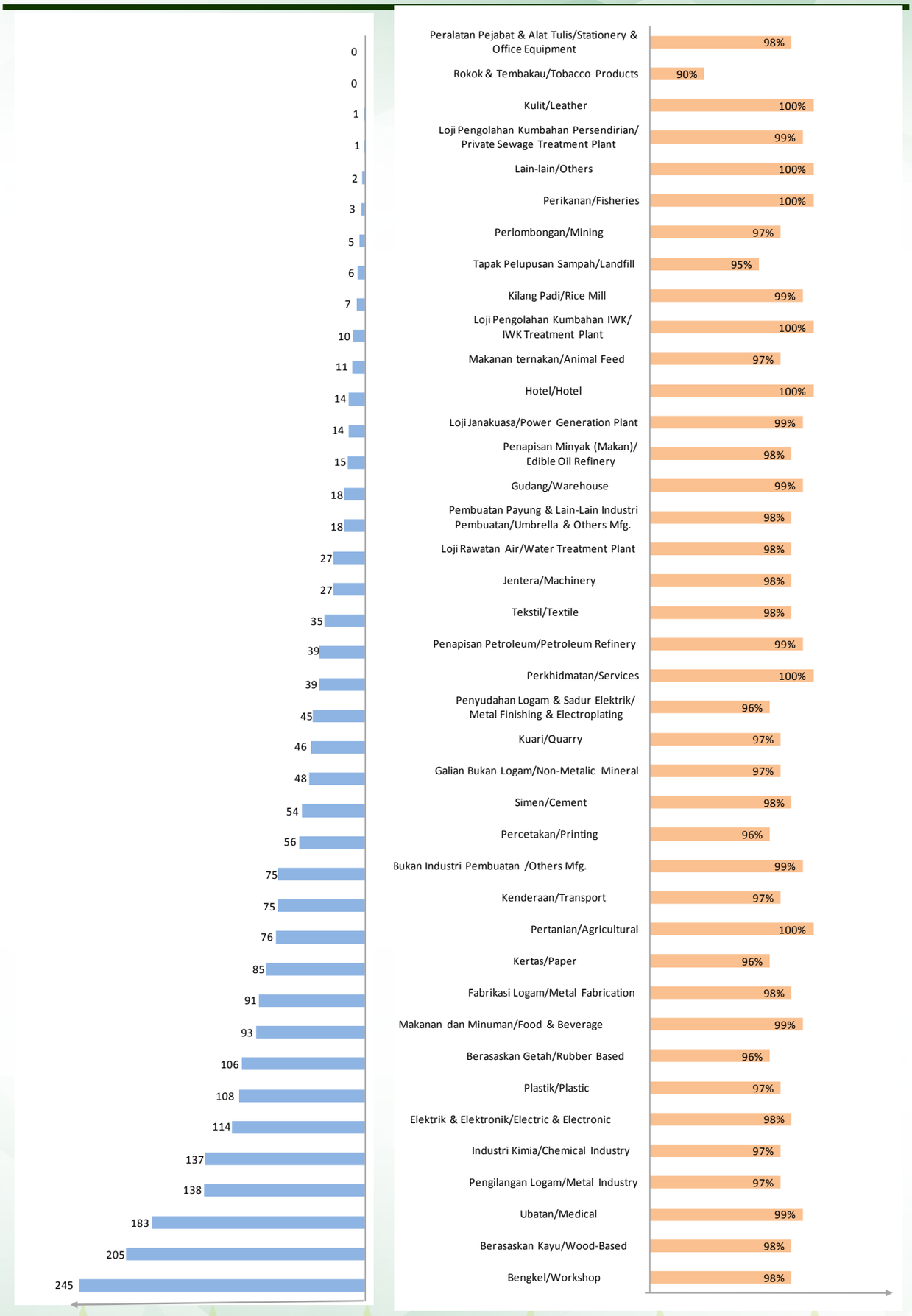
The non-prescribed premises are also subjected to the Environmental Quality (Scheduled Wastes) Regulations, 2005. In 2016, the DOE conducted 3446 inspections on 44 categories of industrial premises and other non-prescribed premises. The overall compliance achieved by the non-prescribed premises was 98%. Among the non-compliances recorded including failure to submit notifications of scheduled wastes generation to DOE, improper storage and improper labelling of scheduled wastes beside failure to keep accurate and up-to-date inventory records of scheduled wastes (Regulations 3, 8, 9, 10 and 11).

In 2016, there were 11 categories of industries that were subjected under the Environmental Quality (Scheduled Wastes) Regulations, 2005 achieved 100% compliance (**Figure 4.14**).

ENFORCEMENT ACTIONS

A total of 383 cases of non-compliance premises were charged in courts with a fine of RM 13,666,600 collected. Other enforcement actions taken against the non-complying industries were issuance of 288 field citations, 3,196 notices and 2,258 compounds to industries for them to take appropriate actions in order to comply with the Environmental Quality Act, 1974 and the Environmental Quality (Industrial Effluents) Regulations, 2009, Environmental Quality (Clean Air) Regulations, 1978 and Environmental Quality (Scheduled Wastes) Regulations, 2005.

In order to improve compliance to regulations, DOE has issued directives to the industries to install appropriate and efficient control equipment, upgrade existing pollution control facilities and to have a good planning and implementation schedule of environmental management systems. In addition, various awareness activities were implemented throughout the year for specific target groups. Such activities included dialogues, seminars and workshops for industries, with the aim of improving the level of regulatory compliance. The Department of Environment, in its effort to ensure full compliance, also promoted the adoption of more efficient control technologies, cleaner production practices as well as self-regulations. The industries were also advised to set up a good environmental management system and be ISO 14000 certified.



Rajah 4.14 JAS: Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005,2014

Figure 4.14 DOE: Compliance Status to the Enviromental Quality (Scheduled Wastes) Regulations 20058, 2014

TINDAKAN UNDANG-UNDANG
LEGAL ACTION

Pendakwaan

Pada tahun 2016, sejumlah 286 kes kesalahan di bawah Akta Kualiti Alam Sekeliling (AKAS) 1974 telah didakwa di mahkamah dengan denda yang dikenakan berjumlah RM 4,501,000.00 (**Rajah 4.15**).

Daripada jumlah keseluruhan kes tersebut, sebanyak 91 (31.81%) kes mahkamah adalah melibatkan kesalahan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009 dengan jumlah denda sebanyak RM 2,671,500.00 Sebanyak 37 (12.93%) kes mahkamah melibatkan kesalahan pencemaran udara daripada kenderaan bermotor iaitu pelepasan bendasing ke udara melebihi had yang ditetapkan di bawah Seksyen 22(1), AKAS 1974 dengan jumlah denda sebanyak RM 26,500.00

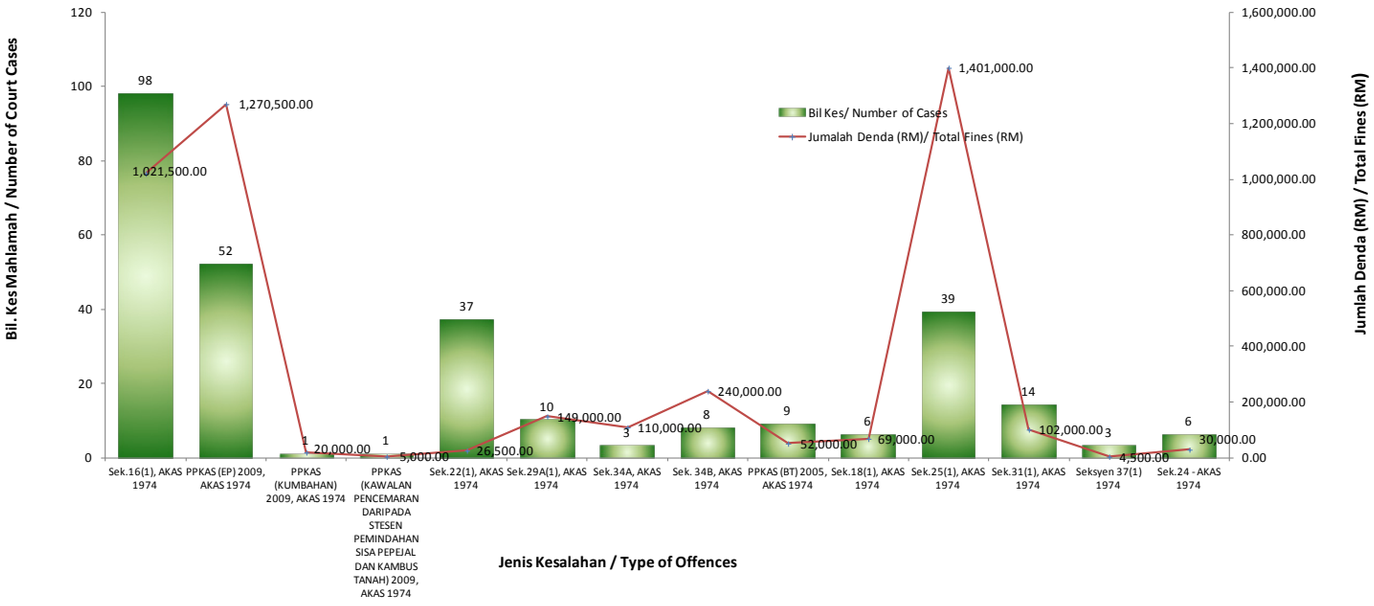
Selain itu, sebanyak 98 (34.26%) kes adalah melibatkan kesalahan pelanggaran syarat lesen di bawah Seksyen 16, AKAS 1974 dengan jumlah denda sebanyak RM 1,021,500.00 sementara 60 (20.97%) kes yang selebihnya melibatkan kesalahan-kesalahan lain di bawah AKAS 1974.

Prosecution

In 2016, a total of 286 offences were prosecuted under the Environmental Quality Act (EQA) 1974 with a total fine of RM 4,501,000.00(**Figure 4.15**).

Out of this total, 91 (31.81%) court cases involved offences under Environmental Quality (Industrial Effluent) Regulations 2009 with a total fine of RM2,671,500.00. There were 37 (12.93%) court cases involved offences related to air pollution from motor vehicle emissions exceeding the stipulated standards under Section 22(1) of the EQA 1974 with a total fine of RM 26,500.00

Apart from that, 98 (34.26%) cases were violating conditions of licences under Section 16 of the Act with a total fine of RM 1,021,500,00 while the remaining 60 (20.97%) cases were prosecuted for various other offences under the EQA 1974.



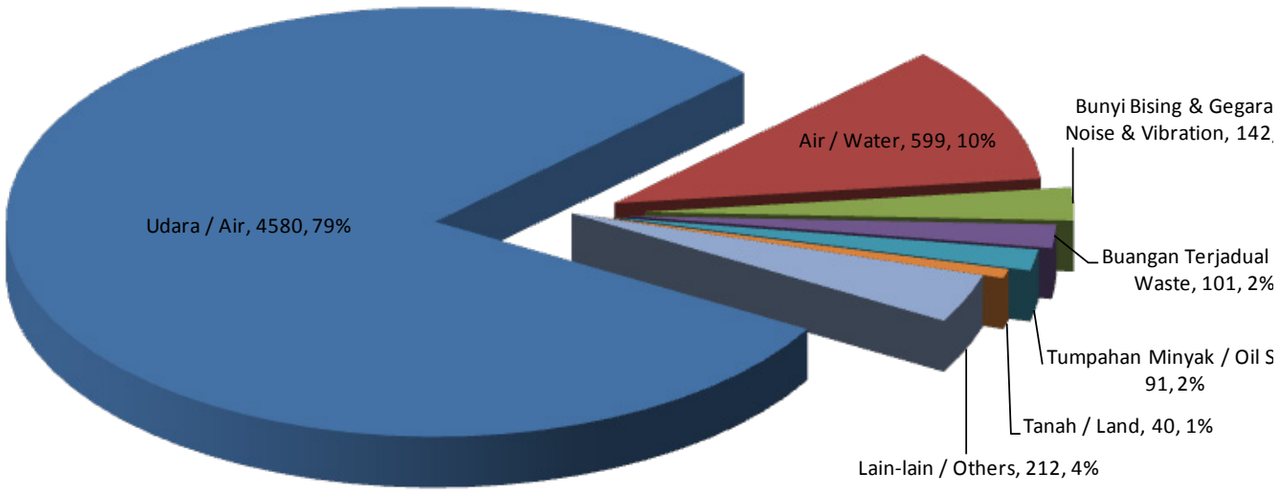
Rajah 4.15 JAS : Bilangan Kes Mahkamah dan Denda, 2015
Figure 4.15 DOE : Number of Court Cases and Fines, 2015

Kompaun

Sejumlah 2,006 kompaun telah dikeluarkan sepanjang tahun 2016 kepada premis dan syarikat untuk pelbagai kesalahan di bawah AKAS 1974. Pecahan mengikut kesalahan adalah seperti di **Rajah 4.16** .

Compounds

A total of 2,006 compounds were issued in 2016 against premises and companies for various offences under the EQA 1974. Breakdown by offences is shown in **Figure 4.16** .



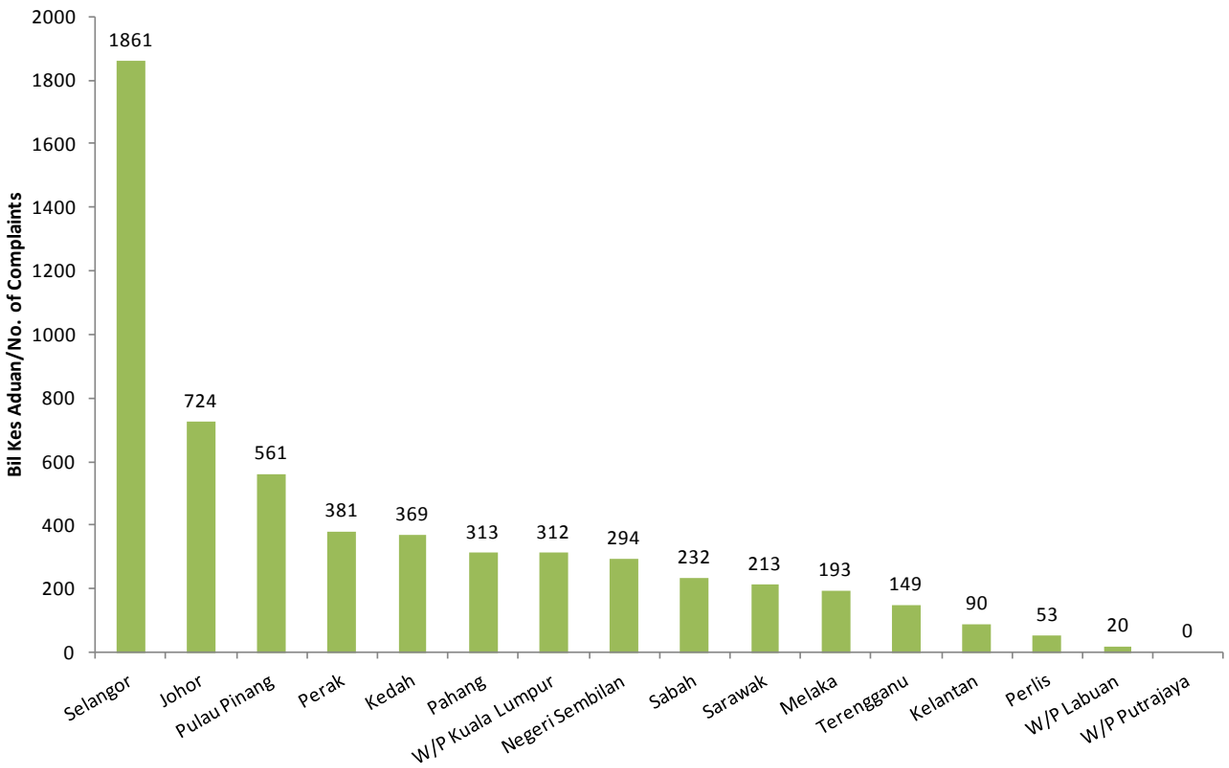
Rajah 4.16 JAS : Bilangan Kes Kompaun Mengikut Pecahan PPKAS, 2016

Figure 4.16 DOE : Number of Compound Cases According to Environmental Quality Regulations, 2016

MAKLUMBALAS TERHADAP PENGADUAN AWAM
RESPONSE TO PUBLIC COMPLAINTS

Pada tahun 2016, sejumlah 5,765 aduan pencemaran alam sekitar telah diterima oleh Jabatan Alam Sekitar. 4,970 kes aduan telah diambil tindakan di bawah peruntukan Akta Kualiti Alam Sekeliling (AKAS) 1974 dan peraturan-peraturan di bawahnya oleh pejabat JAS Negeri, manakala 795 kes aduan adalah diluar bidangkuasa JAS dan telah dirujuk kepada agensi lain yang berkaitan untuk diambil tindakan. (**Rajah 4.17**)

In 2016, the Department of Environment received 5,765 number of complaints pertaining to environmental pollution. 4,970 cases were under the preview of the Environmental Quality Act, 1974 and regulations made under it and actions were taken by the State DOE Offices, while the remaining 795 cases were outside the jurisdiction of DOE and were referred to other relevant agencies. (**Figure 4.17**)



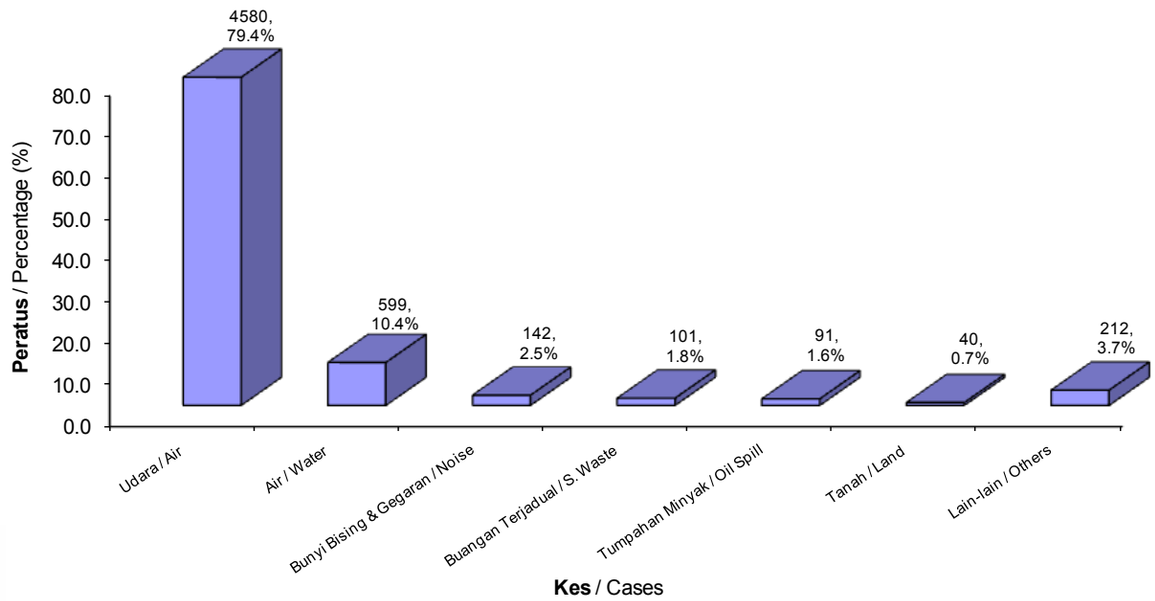
Rajah 4.17 JAS : Bilangan Aduan Mengikut Negeri, 2016
Figure 4.17 DOE : Number of Complaints by State, 2016

Pada tahun 2016, Selangor menerima aduan yang tertinggi iaitu sebanyak 1,861 kes (31.6%), diikuti oleh Johor sebanyak 724 kes (12.3%) dan Pulau Pinang sebanyak 561 kes (9.5%). Wilayah Persekutuan Labuan menerima aduan yang paling sedikit iaitu sebanyak 20 kes (0.3%) dan diikuti dengan Perlis iaitu sebanyak 53 kes (0.9%).

Seperti tahun-tahun yang sebelumnya, bilangan aduan pencemaran yang tertinggi adalah berkaitan dengan pencemaran udara iaitu sebanyak 4,580 kes (79.4%), sebanyak 599 kes (10.4%) berkaitan pencemaran air, sebanyak 142 kes (2.5%) berkaitan pencemaran bunyi, sebanyak 101 kes (1.8%) berkaitan buangan terjadual, sebanyak 91 kes (1.6%) berkaitan tumpahan minyak, sebanyak 40 kes (0.7%) berkaitan pencemaran tanah dan sebanyak 212 kes (3.7%) lain-lain aduan (**Rajah 4.18**).

In the year 2016, Selangor recorded 1,861 (31.6%) complaints, the highest number received, followed by Johor 724 (12.3%) and Pulau Pinang 561 (9.5%). Federal Territory of Labuan recorded the least number of complaints received with 20 (0.3%) complaints and followed by Perlis 53 (0.9%).

As in the previous years, the highest number of complaints received were related to air pollution amounting to 4,580 (79.4%), followed by 599 (10.4%) for water pollution, 142 (2.5%) for noise pollution, 101 (1.8%) on illegal dumping of scheduled or toxic wastes, 91 (1.6%) for oil spillage, 40 (0.7%) for land pollution and 212 (3.7%) of other complaints (**Figure 4.18**).



Rajah 4.18 JAS : Bilangan Kes Aduan Mengikut Jenis, 2016

Figure 4.18 DOE : Number of Complaint Cases by Types, 2016



Pemeriksaan Ke Premis Asta Chemicals Sdn. Bhd.
Seberang Perai, Pulau Pinang 30 Mac 2016



Pemeriksaan Ke Premis Yew Lean Foundry &
Co Sdn. Bhd.
Seberang Perai, Pulau Pinang 30 Mac 2016



Pemeriksaan Ke Premis Dwz Industries(Johor) Sdn. Bhd.
Ulu Tiram, Johor 10 Oktober 2016



Lawatan Ke Agensi Pengurusan Bencana Negara
Pulau Meranti, Selangor 12 Januari 2016



Lawatan Ke Bilik Kawalan, Jabatan Perikanan Malaysia
Presint 4, Putrajaya 20 Januari 2016



Pertemuan Ybhg. Dato' Kpas Bersama Pengurusan
Tertinggi Sime Darby Plantation
Pualu Carey, Klang, Selangor 17 Ogos 2016