
04
BAB
CHAPTER

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 4.1 dan 4.2)** 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.

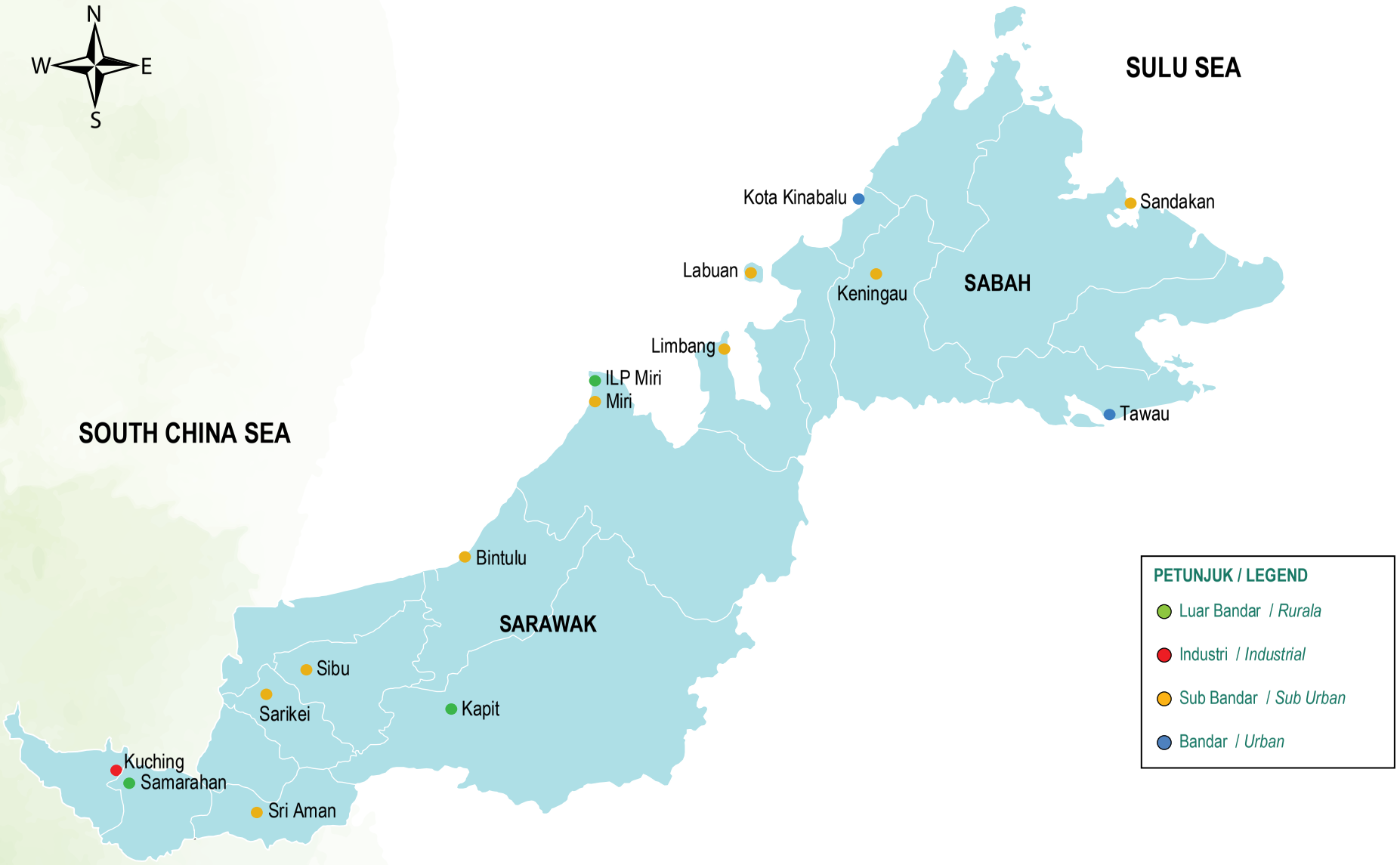
Tambahan kepada rangkaian stesen pengawasan kualiti udara automatik, stesen-stesen pengawasan kualiti udara secara manual juga ditempatkan di 14 buah lokasi yang berbeza. Pengawasan di stesen-stesen manual melibatkan pengukuran parameter-parameter seperti pepejal terampai, habuk halus bersaiz kurang 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". Semasa episod jerebu bermula pada bulan Ogos sehingga Oktober 2015, pengawasan kualiti udara dengan menggunakan alat 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 4.1 dan 4.2.

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 4.1 and 4.2)** 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 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). During the haze episode starting from August until October 2015, portable particulate samplers were also installed in certain areas to monitor the air quality status in areas which were not covered under the National Air Quality Monitoring Network such as in Map 4.1 and 4.2.

Peta 4.1 : Semenanjung Malaysia: Lokasi Stesen Pengawasan Kualti Udara Automatik, 2015
Map 4.1 : Peninsular Malaysia: Location of Continuous Air Quality Monitoring Station, 2015



Peta 4.2 : Sabah & Sarawak : Lokasi Stesen Pengawasan Kualti Udara Automatik, 2015
Map 4.2 : Sabah & Sarawak : Location of Continuous Air Quality Monitoring Station, 2015

PROGRAM PENCEGAHAN KEBAKARAN TANAH GAMBUT
PEAT LAND FIRE PREVENTION PROGRAMME

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

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 236 buah iaitu Johor (77), Pahang (57), Sarawak (31), Selangor (23), Kelantan (23), Terengganu (20) dan Sabah (5). Di samping itu juga, sebanyak 59 buah buah telaga air tanah telah dibina iaitu Pahang (13), Sarawak (12), Johor (11), Kelantan (8), Selangor (8) dan Sabah (7). Manakala sebanyak tiga (3) buah menara tinjau digunakan bagi pemantauan pembakaran terbuka pada musim panas dan kering iaitu masing-masing di Selangor, Pahang, Sarawak dan Sabah. Pada tahun 2015, sejumlah RM7,924,023.00 telah dibelanjakan bagi program ini.

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, detention pond and water piping has been identified as effective methods for water management in peatlands to prevent and control open burning.

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 236 check dams namely Johor (77), Pahang (57), Sarawak (31), Selangor (23), Kelantan (23), Terengganu (20) and Sabah (5). In addition, a total of 59 tube wells were constructed namely Pahang (13), Sarawak (12), Johor (11), Kelantan (8), Selangor (8) and Sabah (5). A total of three (3) watch towers were also constructed to monitor open burning especially during the dry season namely in Selangor, Pahang, Sarawak and Sabah. In 2015, at total of RM7,924,023.00 was allocated for the program.

Gambar foto 4.1 : Sekatan saliran di Klias, Sabah
Photo 4.1 : Check dam in Klias, Sabah

Gambar foto 4.2 : Menara tinjau di Klias, Sabah
Photo 4.2 : Watch tower in Klias, Sabah

Gambar foto 4.3 : Telaga Air Tanah di Miri, Sarawak
Photo 4.3 : Tube Well in Miri, Sarawak

Gambar foto 4.4 : Paip Saluran Air di Hutan Simpan Raja Musa, Kuala Selangor, Selangor bagi meningkatkan paras air gambut
Photo 4.3 : Water Piping in Raja Musa Forest Reserve, Kuala Selangor, Selangor to raise peat land water level

Gambar foto 4.5 : Pengoperasian telaga air tanah, sekatan saliran dan menara tinjau di Kuala Langat, Selangor
Photo 4.5 : Operatian of tube well, check dam and watch tower in Kuala Langat, Selangor.

Gambar foto 4.6 : Kolam Takungan di Pekan, Pahang
Photo 4.6 : Detention Pond in Pekan, Pahang

PROGRAM PENGAWASAN KUALITI AIR MARIN KEBANGSAAN
MARINE WATER QUALITY MONITORING PROGRAMME

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 telah diwujudkan di kuala-kuala sungai dan pantai-pantai bagi memantau status kualiti air marin berdasarkan kepada kegunaannya seperti kawasan rekreasi, perikanan dan taman-taman laut.

Pada tahun 2015, terdapat 231 stesen pengawasan di seluruh Malaysia termasuklah Perlis, 2 stesen; Kedah, 10 stesen; Pulau Pinang, 23 stesen; Perak, 11 stesen; Selangor, 14 stesen; Negeri Sembilan, 14 stesen; Melaka, 13 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 **(Rajah 4.3(a) dan 4.3 (b))**.

Di samping itu, sebagai tambahan di bawah Program Pengawasan Selat Johor, 'Jawatankuasa Bersama Malaysia-Singapura Mengenai Alam Sekitar' (MSJCE), 20 stesen turut dipantau pada tahun 2015 **(Jadual 4.2)**.

Marine water quality monitoring programme 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.

In 2015, a total of 231 monitoring stations were set up throughout Malaysia which include Perlis, 2 stations; Kedah, 10 stations; Pulau Pinang, 23 stations; Perak, 11 stations; Selangor, 14 stations; Negeri Sembilan, 14 stations; Melaka, 13 stations; Johor, 34 stations; Pahang, 20 stations; Terengganu, 20 stations; Kelantan, 10 stations; Sabah, 26 stations; W.P Labuan, 5 stations and Sarawak, 29 stations **(Figure 4.3(a) and 4.3(b))**.

Besides that, additional of 20 stations were monitored under the Malaysia-Singapore Joint Committee on the Environment (MSJCE) Monitoring Programme, in 2015 **(Table 4.2)**.

JADUAL 4.1 MALAYSIA : STESEN PEMANTAUAN KUALITI AIR MARIN KEBANGSAAN, 2015
TABLE 4.1 MALAYSIA: MARINE WATER QUALITY MONITORING STATIONS, 2015

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	16	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	KAWASAN PERINDUSTRIAN BAYAN LEPAS II	5303933	100.301266	5.315867
		PANTAI/COASTAL	KAWASAN PERINDUSTRIAN BAYAN LEPAS III	5302939	100.298443	5.30442
		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
		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

Negeri State	Bil. Stesen No. Of Station	Kawasan Area	Stesen Station	No. Stesen Station No.	Lokasi Location	
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
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

Negeri State	Bil. Stesen No. Of Station	Kawasan Area	Stesen Station	No. Stesen Station No.	Lokasi Location	
MELAKA	5	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
MELAKA	8	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
		PANTAI/COASTAL	PULAU MELAKA POINT A(II)	2122915	102.249722	2.179083
		PANTAI/COASTAL	PULAU MELAKA POINT B(I)	2121916	102.256583	2.179472
		PANTAI/COASTAL	PULAU MELAKA POINT B(II)	2122916	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
		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

Negeri State	Bil. Stesen No. Of Station	Kawasan Area	Stesen Station	No. Stesen Station No.	Lokasi Location	
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
TERENGGANU	13	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	TIOXIDE SELATAN (KSB, T. KALONG)	4234952	103.471058	4.250572
		KUALA/ESTUARY	PULAU DUYUNG	5231908	103.129083	5.334889
TERENGGANU	7	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

Negeri State	Bil. Stesen No. Of Station	Kawasan Area	Stesen Station	No. Stesen Station No.	Lokasi Location	
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
KELANTAN	5	PANTAI/COASTAL	PANTAI SERI TUJUH	6221910	102.121104	6.225154
		PANTAI/COASTAL	PANTAI CAHAYA BULAN	6122903	102.278187	6.195523
		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
SARAWAK	13	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
		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
SARAWAK	16	PANTAI/COASTAL	PANTAI SEMATAN	1898902	109.765630	1.826387
		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
		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

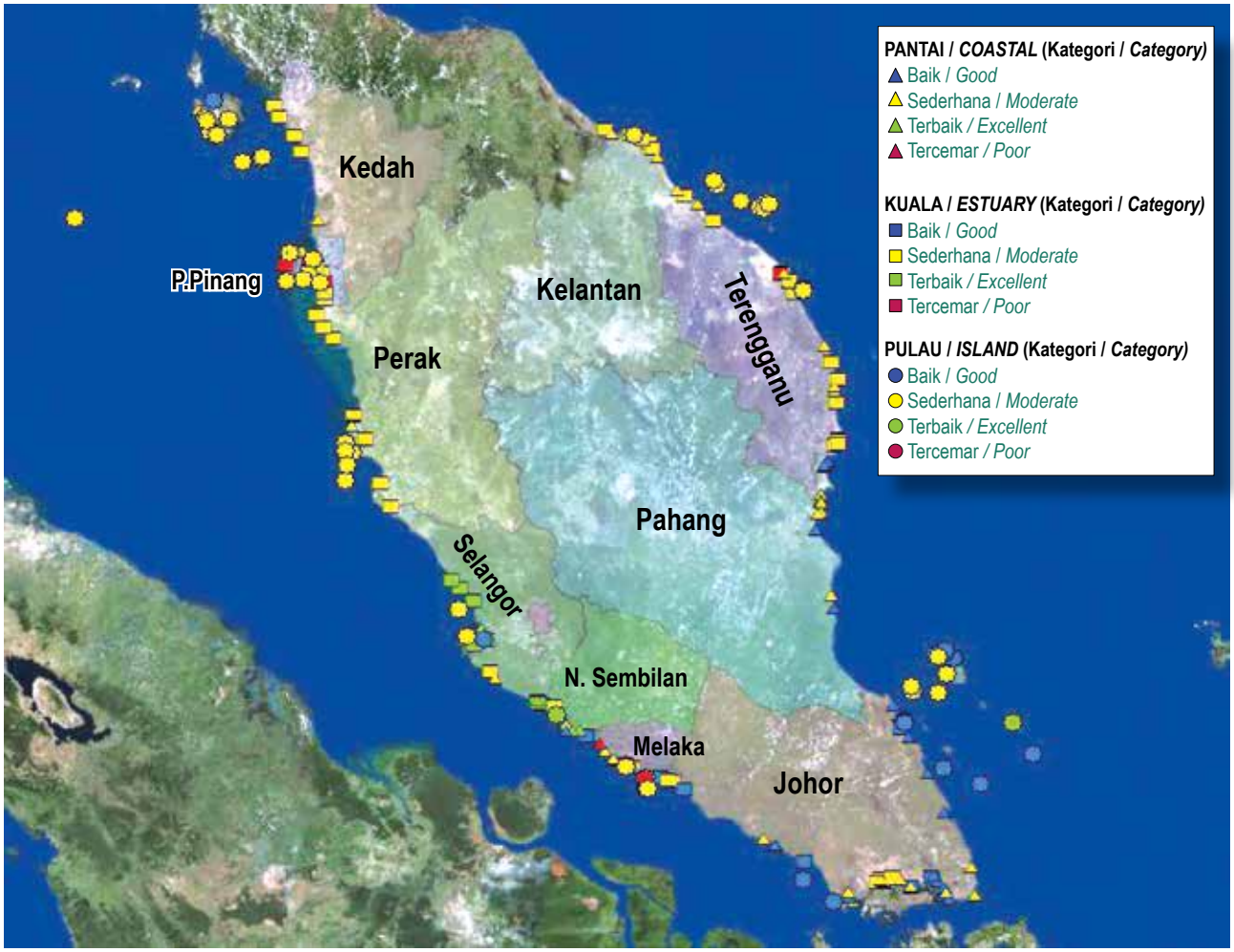
Negeri State	Bil. Stesen No. Of Station	Kawasan Area	Stesen Station	No. Stesen Station No.	Lokasi Location	
SABAH	24	PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 1	5053901	115.540582	5.0804
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 2	5053902	115.539556	5.078602
		PANTAI/COASTAL	PANTAI TELUK BRUNEI 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
		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 : 155
JUMLAH/ TOTAL : 231

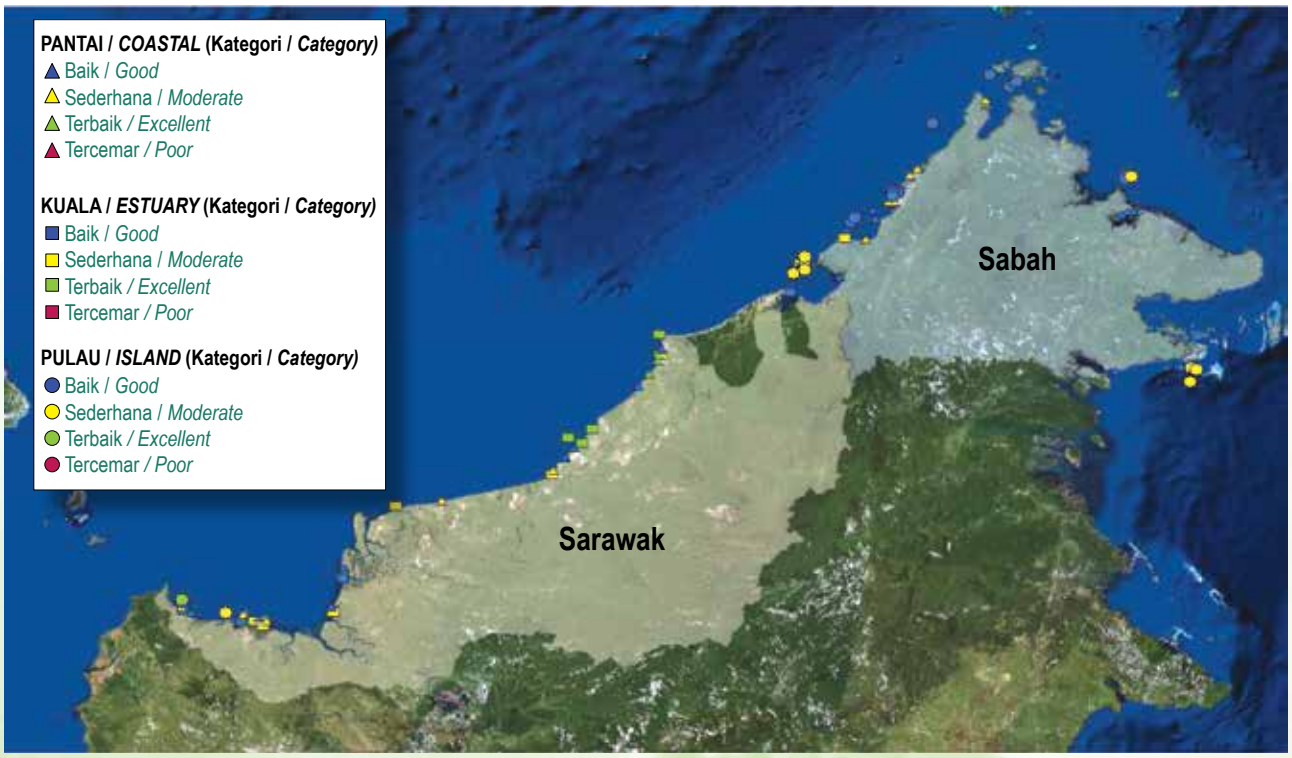
JADUAL 4.2 MALAYSIA : STESEN PEMANTAUAN 'JAWATANKUASA BERSAMA MALAYSIA-SINGAPURA MENGENAI ALAM SEKITAR – (MSJCE), 2015

TABLE 4.2 MALAYSIA: MONITORING STATIONS UNDER THE MALAYSIA-SINGAPORE JOINT COMMITTEE ON THE ENVIRONMENT (MSJCE), 2015

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



Rajah 4.3 (a) Semenanjung Malaysia : Taburan Stesen Pemantauan Kualiti Air Marin, 2015
Figure 4.3 (a) Penisular Malaysia : Distribution of Marine Water Quality Stations, 2015



Rajah 4.3 (b) Sabah dan Sarawak : Taburan Stesen Pengawasan Kualiti Air Marin, 2015
Figure 4.3 (b) Sabah and Sarawak : Distribution of Marine Water Quality Stations, 2015

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

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 2015, program ini telah dilaksanakan di sekitar 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 4.4)**. 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 Tributytin (TBT) serta Triphenyltin (TPT) **(Jadual 4.5)**. 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 2015, 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 4.4)**. 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 and 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 4.5)**. Tarball samplings on beaches were also conducted.

JADUAL 4.4 MALAYSIA : STESEN-STESEN PEMANTAUAN KUALITI AIR MARIN PULAU, 2015
TABLE 4.4 MALAYSIA: ISLAND WATER QUALITY MONITORING STATIONS, 2015

Negeri State	Bil. Pulau No. Of Island	Bil. Stesen No. Of Station	Pulau Island	No. Stesen Station No	Kategori Category	Lokasi Location	
KEDAH	7	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

Negeri State	Bil. Pulau No. Of Island	Bil. Stesen No. Of Station	Pulau Island	No. Stesen Station No	Kategori Category	Lokasi Location	
MELAKA	3	2	BESAR (A)	7MR01	R	102.331722	2.116686
			BESAR (B)	7MR01	R	102.322444	2.106722
		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
		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

Negeri State	Bil. Pulau No. Of Island	Bil. Stesen No. Of Station	Pulau Island	No. Stesen Station No	Kategori Category	Lokasi Location	
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 4.5 JAS : PARAMETER KUALITI AIR MARIN, 2015
TABLE 4.5 DOE: MARINE WATER QUALITY PARAMETERS, 2015

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 PROGRAMME

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 2015, rangkaian stesen pengawasan kualiti air sungai JAS adalah terdiri daripada 891 stesen yang terletak di 477 batang sungai di seluruh negara seperti dalam **Jadual 4.6**. 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 4.7**. Persampelan kualiti air sungai dijalankan secara berjadual dan mengikut kekerapan yang telah ditetapkan iaitu antara 4 hingga 12 kali setahun. Parameter-parameter kualiti air yang diukur merangkumi parameter fizikal, kimia dan biologikal seperti di **Jadual 4.8.**

Kualiti air sungai turut diawasi secara atas talian (on-line) melalui 13 stesen automatik yang ditempatkan di Sg. Perak (Perak), Sg. Selangor (Selangor), Sg. Langat (Cheras) (Selangor), Sg. Langat (Dengkil) (Selangor), Sg. Semenyih (Selangor), Sg. Jinjang (Kuala Lumpur), Sg Linggi (Negeri Sembilan), Sg. Labu (Negeri Sembilan), Sg. Melaka (Melaka), Sg. Putat (Melaka), Sg Skudai (Johor), Sg. Sarawak (Sarawak), dan Sg Rajang (Sarawak). Stesen-stesen automatik ini dilengkapi dengan pengesan yang berfungsi mengukur parameter in-situ iaitu pH, Kekonduksian, Oksigen Terlarut, Suhu, Kekeruhan dan Ammonium. Pada tahun 2015, stesen pengawasan kualiti air sungai automatik di Sg. Rajang, Sg. Jinjang, dan Sg. Sarawak telah dihentikan operasi masing-masing pada bulan Mei, Jun, dan Ogos dan telah ditempatkan di lokasi baru yang lebih strategik khusus bagi mengawasi kualiti air di hulu muka sauk loji rawatan air iaitu di Sg. Langat (Batu 11, Cheras dan Dengkil), serta Sg. Semenyih.

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

In 2015, DOE's river water quality monitoring network comprised of 891 manual stations which are located at 477 rivers in Malaysia as shown in **Table 4.6**. 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 4.7**. River water samplings are carried out periodically from four to 12 times a year and were analyzed and tested for a range of physical, chemical and biological parameters as shown in **Table 4.8**.

River water quality also being monitored on-line through 13 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. Jinjang (Kuala Lumpur), Sg Linggi (Negeri Sembilan), Sg. Labu (Negeri Sembilan), Sg. Melaka (Melaka), Sg. Putat (Melaka), Sg Skudai (Johor), Sg. Sarawak (Sarawak), dan Sg Rajang (Sarawak). These automatic stations are equipped with sensors to measure in-situ parameters such as pH, Conductivity, Dissolved Oxygen, Temperature, Turbidity and Ammonium.In 2015, the automatic river water quality monitoring stations at Sg. Rajang, Sg. Jinjang, and Sg. Sarawak were de-operated on Mei, Jun, and August and were re-located at more strategic sites to monitor water quality at upstream of water intakes in Sg. Langat (Batu 11, Cheras and Dengkil), and Sg. Semenyih.

Pada tahun 2015, sejumlah 5,469 sampel air sungai telah diuji dan sebanyak 174,029 data telah dijana merangkumi kesemua parameter air yang diukur.

Kualiti air sungai dinilai berdasarkan Indeks Kualiti Air (IKA) dan Standard Kualiti Air Kebangsaan (National Water Quality Standard for Malaysia). 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).

Jabatan Alam Sekitar turut memantau rapi 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. Jabatan Alam Sekitar berperanan dalam melaporkan kualiti air sungai- sungai yang dipantau di 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 4.9**. Aktiviti dan mesyuarat lain yang berkaitan dengan pengawasan kualiti air sungai adalah seperti di **Jadual 4.10**.

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 2015, sejumlah 45 permohonan data telah diterima oleh JAS melibatkan sejumlah 215, 399 data kualiti air sungai. Sebanyak 69% daripada permohonan data kualiti air sungai adalah daripada penuntut institusi pengajian tinggi, manakala 31% daripada pelbagai agensi kerajaan. Bilangan permohonan data kualiti air sungai yang diterima oleh JAS pada tahun 2015 adalah seperti yang ditunjukkan oleh **Rajah 4.2**.

In 2015, a total of 5,469 river water samples were tested and a sum of 174,029 data was 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. 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)

The Department of Environment is also involved in the River of Life (RoL) programme, one of the NKEAs Program for Greater Kuala Lumpur/ Klang Valley. 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 of 35 monitoring stations in the RoL programme is as shown in **Table 4.9.** Other activities and meetings attended by the DOE are shown in **Table 4.10**.

DISSEMINATION OF RIVER WATER QUALITY DATA

River water quality data were utilized by two categories of user which are government agencies, and researchers from higher learning institutions. In 2015, a total of 45 data request were received by DOE covering 215, 399 water quality data points. About 69% of the requests were from researchers and 31% from various government agencies. The number of water quality data request received by DOE in 2015 as shown in **Figure 4.2.**

JADUAL 4.6 JAS : SENARAI LEMBANGAN SUNGAI DAN SUNGAI-SUNGAI YANG DIPANTAU, 2015
TABLE 4.6 DOE : LIST OF THE CATCHMENTS AND RIVERS MONITORED, 2015

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 01PLC 03 04	Kisap Ulu Melaka	1 2	Sg. Kisap	1
							Sg. Petang	1
							Sg. Ulu Melaka	1
					Kedah	8	Sg. Janing	1
							Sg. Kedah	1
							Sg. Padang Terap	3
							Sg. Pedu	1
							Sg. Pendang	1
							Sg. Tekai	1
					Merbok	5	Sg. Bongkok	1
							Sg. Merbok	1
							Sg. Petani	1
							Sg. Tok Pawang	1
							Sg. Tupah	1
Kedah / P.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

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
P.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
				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
P.Pinang / Perak	1	3	7	08	Kerian	7	Sg. Kechil	1
							Sg. Kerian	4
							Sg. Selama	2

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
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
							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

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
Selangor	5	17	33	17	Buloh	4	Sg. Buloh	4
				19 20	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
					Sepang	2	Sg. Semenyih	1
							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 / Wpkl	1	18	38	18	Klang	38	Sg. Batu	4
							Sg. Gombak	3
							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 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
N.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
Johor / N.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

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	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
							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

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				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
							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

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
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
							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

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
Pahang				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
				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

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
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
							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
				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

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
Sarawak				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
							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

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
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
				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

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
Sabah				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 4.7 JAS : SENARAI STESEN PEMANTAUAN MUKA SAUK LOJI RAWATAN AIR
TABLE 4.7 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
P.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
			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

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

JADUAL 4.8 JAS : PARAMETER-PARAMETER PENGUKURAN KUALITI AIR SUNGAI
TABLE 4.8 DOE : RIVER WATER QUALITY PRAMETERS

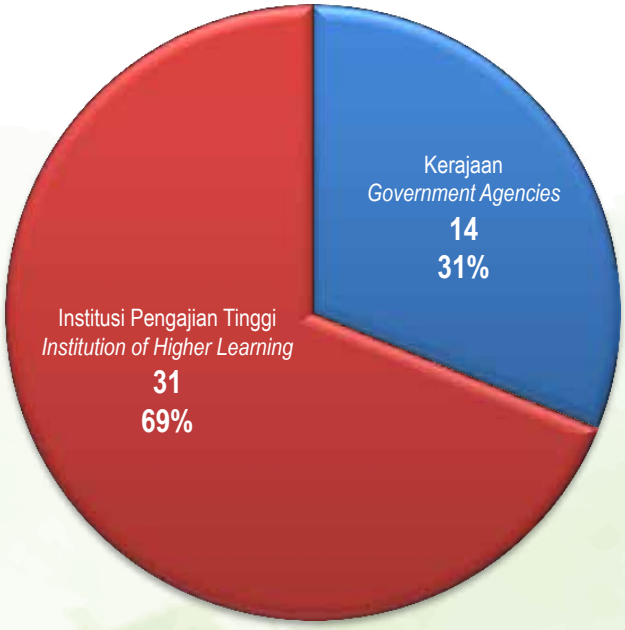
Parameter	Unit
Oksigen Terlarut / Dissolved Oxygen (DO)	mg/l, % saturated
Permintaan Oksigen Biokimia / Biological Oxygen Demand (BOD)	mg/l
Permintaan Oksigen Kimia / Chemical Oxygen Demand (COD)	mg/l
Pepejal Terampai / Suspended Solid (SS)	mg/l
pH	unit
Ammoniacal Nitrogen (NH_3-N)	mg/l
Suhu / Temperature	°C
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 4.9 JAS : SENARAI STESEN PEMANTAUAN PROJEK RIVER OF LIFE (RoL)
TABLE 4.9 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 / WPKL	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 4.10 JAS : PROGRAM DAN AKTIVITI BERKAITAN PENGAWASAN KUALITI AIR SUNGAI
TABLE 4.10 DOE : PROGRAMME AND ACTIVITIES REGARDING TO RIVER WATER QUALITY MONITORING

Tarikh Date	Aktiviti & Program Activities & Programmes	Tempat Venue
15 Januari 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 1/2015	Jabatan Pengairan dan Saliran Malaysia
18-21 Januari 2015	Minilab Projek RMK-11 Jabatan Alam Sekitar	Pullman Hotel, Putrajaya
26 Februari 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 2/2015	Jabatan Pengairan dan Saliran Malaysia
10 Mac 2015	Mesyuarat Peruntukan OE dan DE River Of Life (RoL)	Jabatan Pengairan dan Saliran Malaysia
26 Mac 2015	Seminar Amalan Industri Hijau Kepada SME di River Of Life (RoL)	Hotel Equotorial, Bangi
31 Mac 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 3/2015	Jabatan Pengairan dan Saliran Malaysia
29 April 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 4/2015	Jabatan Pengairan dan Saliran Malaysia
2 Mei 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 5/2015	Jabatan Pengairan dan Saliran Malaysia
8-12 Jun 2015	Bengkel Pemodelan Kualiti Air Sungai QUAL2K 2015	Johor Bharu, Johor
29 Jun 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 6/2015	Jabatan Pengairan dan Saliran Malaysia
29 Julai 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 7/2015	Jabatan Pengairan dan Saliran Malaysia
26 Ogos 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 8/2015	Jabatan Pengairan dan Saliran Malaysia
30 September 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 9/2015	Jabatan Pengairan dan Saliran Malaysia
29 Oktober 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 10/2015	Jabatan Pengairan dan Saliran Malaysia
24 November 2015	Bengkel Hands-On Kemasukan Data, Kalibrasi Dan Penjanaan Output Model Kualiti Air Sungai, QUAL2K	Putrajaya
2 Disember 2015	Mesyuarat Pasukan Petugas River Of Life (RoL) Bil 11/2015	Jabatan Pengairan dan Saliran Malaysia



Rajah 4.2 Pecahan bilangan permohonan data kualiti air sungai, 2015
Figure 4.2 Number of river water quality data request, 2015

PROGRAM PENGAWASAN KUALITI AIR TANAH
GROUNDWATER QUALITY MONITORING PROGRAMME

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, Sarawak dan Sabah adalah seperti dalam **Peta 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/ peralatan pengawetan, 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 2015, sebanyak 390 sampel daripada 105 buah telaga pengawasan kualiti air tanah di seluruh Malaysia telah dianalisis. 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 4.8)**

In 2015, a total of 390 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 uses type such as agriculture, industrial, golf course, solid waste landfill, animal burial sites, municipal water supply area, ex-mining (gold mine) and urban/ suburban. **(Table 4.8)**

Di antara aktiviti-aktiviti lain yang dijalankan oleh Seksyen Pengawasan Kualiti Air Tanah pada tahun 2015 adalah seperti berikut:

Among other activities carried out by the Groundwater Quality Monitoring Section in 2015 were:

Tarikh Date	Aktiviti Activity	Kumpulan Sasar Target Group	Bil. Penyertaan No. of Participant
27 Nov. – 13 Dis. / Dec 2015	Penyelenggaraan dalaman telaga di Terengganu dan Kuala Lumpur Internal well maintainance in Terengganu and Kuala Lumpur	Pegawai-pegawai JAS DOE officers	3
19-21 Mei / May 2015	Lawatan Stesen bermasalah di Perak dan Pulau Pinang Visits to problematic Stations in Perak and Penang *a)* 2 stesen di Jalong, Perak 2 stations in Jalong, Perak *b)* 1 stesen di Tambun, Perak 1 Stations in Tambun, Perak *c)* 2 stesen di Mak Mandin, P.Pinang 2 Stations in Mak Mandin, Penang *d)* 3 stesen di Valdor, P.Pinang 3 stations in Valdor, Penang	Pegawai-pegawai JAS DOE officers	6
9 - 13 Mac / March 2015	Lawatan Stesen bermasalah di Sabah Visits to problematic stations in Sabah *a)* 2 stesen di Tawau 2 stations in Tawau *b)* 2 stesen di Sandakan 2 stations in Sandakan *c)* 1 stesen di Inanam 1 station in Inanam	Pegawai-pegawai JAS DOE officers	6

JADUAL 4.8 JAS: TABURAN TELAGA PEMANTAUAN AIR TANAH MENGIKUT JENIS KATEGORI GUNA TANAH, 2015
TABLE 4.8 DOE : DISTRIBUTION OF GROUNDWATER MONITORING WELLS BY LAND USE CATEGORY, 2015

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**

PROGRAM PENGAWASAN BUNYI BISING AMBIEN
AMBIENT NOISE MONITORING PROGRAMME

PUNCA PENCEMARAN BUNYI BISING DAN KESANNYA

Aktiviti manusia seperti aktiviti perindustrian, projek pembinaan dan pembangunan, dan aktiviti pengangkutan menyebabkan bunyi bising yang berlebihan. Pencemaran bunyi boleh menjejaskan kesihatan, produktiviti dan menyebabkan gangguan psikologi. Kesan kepada kesihatan termasuklah kebimbangan dan tekanan perasaan dan dalam kes yang lebih serius boleh menyebabkan kebimbangan yang melampau. Selain daripada menjadi kacauganggu terhadap kehidupan sosial, ianya juga boleh memusnahkan struktur binaan seperti jalan dan bangunan, sekiranya disertai oleh getaran yang kuat seperti letupan batu dari aktiviti kuari.

Langkah kawalan yang wajar perlu dilaksanakan bagi mengurangkan potensi bunyi bising bagi sesuatu aktiviti. Bunyi bising daripada aktiviti pembinaan dan pembangunan serta aktiviti perindustrian boleh dikurangkan dengan mematuhi waktu bekerja yang ditetapkan, menggunakan peralatan yang diselenggara dengan baik dan menggunakan alat penghalang bunyi.

PROGRAM PENGAWASAN BUNYI BISING AMBIEN

Pada tahun 2015, Jabatan Alam meneruskan lagi Program Pengawasan Bunyi Bising Ambien untuk mewujudkan data garis dasar bagi tujuan perancangan dan merangka peraturan bunyi bising pada masa akan datang. Pengukuran paras bunyi bising ambien tertumpu kepada tiga (3) kategori utama gunatanah iaitu trafik/ jalanraya (41 stesen), perindustrian (41 stesen) dan kawasan sensitif seperti hospital, sekolah, tempat ibadat dan lapangan terbang (53 stesen) **(Jadual 1)**. Bagi kes aduan, pengawasan berkala telah dijalankan oleh JAS Negeri.

SOURCES AND EFFECT OF NOISE POLLUTION

Human activities such as industrial activities, construction and development projects as well as transportation activities generate excessive noise. Noise pollution has an impact on health, psychology and reduces productivity. Health effects of noise include anxiety and stress reaction and in extreme cases fright. The physiological manifestations are headaches, irritability and nervousness, feeling of fatigue and decreases in work efficiency. Besides being a nuisance to the public, noise together with vibrations of very high amplitudes from activities such as blasting of rocks during quarrying can cause damage to infrastructure such as roads and buildings.

Suitable mitigating measures need to be implemented to reduce potential noise of certain activities. Noise from construction and development activities and also industrial activities can be reduced by complying to dedicated working hours, to use well maintained equipment and the use of noise barrier.

AMBIENT NOISE MONITORING PROGRAMME

In 2015, the Department of Environment continues to conduct Ambient Noise Monitoring Programme which aims to collect baseline data for planning purposes and the development of regulations for noise limits in the future. The ambient noise monitoring programme focused on three (3) major landuse: road traffic (41 stations), industrial areas (41 stations) and noise sensitive areas such as hospitals, schools, places of worship and airports (53 stations) **(Table 1)**. For complaint cases, periodic monitoring had also been carried out by the DOE States.

Pematuhan bunyi bising ambien adalah berdasarkan had-had yang disyorkan dalam "The Planning Guidelines for Environmental Noise Limits and Control". Hasil pengukuran menunjukkan kebanyakan kawasan daripada ketiga-tiga kategori gunatanah tersebut mencatatkan bacaan bunyi bising melebihi had yang ditetapkan dalam garispanduan berkenaan.

Compliance to the noise level was based on the limits recommended in "The Planning Guidelines for Environmental Noise Limits and Control". Generally, the results showed that most areas within the above three major landuse had exceeded the guideline limits.

JADUAL 1 JAS : PROGRAM PENGAWASAN BUNYI BISING AMBIEN, 2015
TABLE 1 DOE : AMBIENT NOISE MONITORING PROGRAMME, 2015

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Trafik Traffic	Lebuhraya Highway	Perlis	Kuala Perlis – Changloon	1	0	0
		Kedah	Kawasan Rehat R&R Gurun, Lebuhraya Utara Selatan Gurun R&R Area, North South Highway	2	0	0
		Pulau Pinang	Tun Lim, Jelutong	1	50	50
		Perak	Lebuh Raya Utara Selatan (Taman Tambon, Ipoh) North South Highway (Tambon Park, Ipoh)	2	0	25
		Selangor	Lebuhraya Federal, Shah Alam Federal Highway, Shah Alam	2	75	25
		Melaka	Taman Asia Selatan, Jasin South Asia Park, Jasin	2	0	0
		Negeri Sembilan	Lebuhraya LEKAS (Taman Bukit Margosa) LEKAS Highway (Taman Bukit Margosa)	2	0	0
		Kuala Lumpur	Lebuhraya Persekutuan (Jalan Kuching) Federal Highway (Jalan Kuching)	2	25	25
		Johor	Horizon Hill	2	50	25
		Kelantan	Jalan Utama Kota Bharu – Kuala Krai/ Gua Musang Kota Bharu – Kuala Krai/Gua Musang Main Road	1	100	100
		Pahang	Kawasan Rehat R&R Gambang, Lebuhraya Pantai Timur Gambang R&R Area, East Coast Highway	2	50	25
		Terengganu	Lebuhraya Pantai Timur (Bukit Payung) East Coast Expressway (Bukit Payung)	1	0	0
		Sabah	Tuaran Bypass	2	0	0
		Sarawak	Jalan Batu Kawa Batu Kawa Road	1	0	0
	Jalan Persekutuan Federal Road	Perlis	Jalan Kangar – Alor Setar Kangar-Alor Setar Road	1	0	0
		Kedah	Jalan Persekutuan Sultan Abdul Halim Sultan Abdul Halim Road	2	0	0
		Perak	Taman Merdeka, Jln. Kuala Kangsar, Ipoh	2	0	0
		Selangor	Jalan Klang-Banting Klang-Banting Road	2	0	0

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Trafik Traffic	Jalan Persekutuan Federal Road	Melaka	Lebuhraya AMJ, Jalan Tun Razak, Cheng AMJ Highway, Tun Razak Road, Cheng	2	0	0
		Negeri Sembilan	Jalan Lingkaran Tengah Seremban (Kampung Dato' Mansor) Seremban Middle Ring Road (Kampung Dato' Mansor)	2	0	0
		Kuala Lumpur	Jalan Tun Razak Tun Razak Road	2	0	0
		Johor	Jalan Skudai Skudai Road	2	0	0
		Kelantan	Jalan Peng.Chepa-Kota Bharu Peng.Chepa-Kota Bharu Road	1	0	0
		Pahang	Jalan Tanah Putih Tanah Putih Road	2	0	0
		Terengganu	Kompleks Seri Iman Seri Iman Complex	2	0	0
		Sabah	Jalan Pantai Pantai Road	2	0	0
		Sarawak	Jalan Datuk Mohammad Musa, Kota Samarahan Datuk Mohammad Musa, Kota Samarahan Road	2	0	0
		Labuan	Jalan Mustapha Mustapha Road	1	0	0
	Jalan Kampung Suburban Road	Perlis	Jalan Kampung Longboh Kampung Longboh Road	1	0	0
		Kedah	Jalan Kg Charok Mokkan Napoh Kg Charok Mokkan Napoh Road	2	0	0
		Perak	Kampong Manjoi, Ipoh	2	50	0
		Selangor	Jalan Batu 8, Sijangkang Kuala Langat Batu 8 Road, Sijangkang Kuala Langat	2	100	100
		Melaka	Kampung Pengkalan Batu, Batu Berendam	2	0	0
		Negeri Sembilan	Jalan Kampung Gadong Jaya, Labu Kampung Gadong Jaya Road, Labu	2	50	25
		Johor	Jalan Kampung Danga Kampung Danga Road	2	0	0
		Kelantan	Jalan Bachok-Tok Bali-K.Besut Bachok-Tok Bali-K.Besut Road	1	0	0
		Pahang	Jalan Felda Bukit Goh Felda Bukit Goh Road	2	0	0
		Terengganu	Kampung Tanjung Bunut	1	100	0
		Sabah	Jln Kokol Kokol Road	1	0	0
		Sarawak (Jalan Negeri)	Jalan Matang, Kuching Matang Road, Kuching	2	0	0
		Labuan	Jln Sg Buton	1	0	0

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Industri Industry	Industri Berat Heavy Industry	Perlis	Kilang Simen Plant Cement	1	50	100
		Kedah	Industri berat Gurun Gurun Heavy Industry	2	100	0
		Perak	Kawasan Industri Kamunting Kamunting Industrial Park	2	100	100
		Selangor	Kawasan Industri Bukit Raja, Klang Bukit Raja Klang Industrial Park	2	50	0
		Melaka	Kawasan Industri Lipat Kajang Lipat Kajang Industrial Park	2	75	100
		Negeri Sembilan	Kawasan Perindustrian Arab Malaysian Arab Malaysian Industrial Park	2	100	100
		Johor	Kawasan Perindustrian Pasir Gudang Pasir Gudang Industrial Park	2	75	0
		Kelantan	Kawasan Industri Pengkalan Chepa Pengkalan Chepa Industrial Area	1	100	100
		Pahang	Kawasan Perindustrian Gebeng Gebeng Industrial Park	2	100	50
		Terengganu	Kuari Bukit Jong, Tepoh Bukit Jong Quary, Tepoh	1	100	100
		Sabah	Janakuasa Rugading KKIP Rugading KKIP Power Plant	2	50	0
		Sarawak	Kawasan Perindustrian Demak Laut Damak Laut Industrial Park	2	50	0
		Labuan	Kawasan Perindustrian Rancha-Rancha Rancha-Rancha Industrial Park	1	50	0
	Industri Sederhana Medium Industry	Perlis	Kawasan Perindustrian Kuala Perlis Kuala Perlis Industrial Park	1	100	100
		Kedah	Industri Sederhana Jitra Jitra Medium Industry	2	100	100
		Perak	Kawasan Perindustrian Zarib, (Tmn. Pinji Mewah, Ipoh) Zarib Industrial Park (Tmn. Pinji Mewah, Ipoh)	2	100	100
		Selangor	Kawasan Perindustrian di Seksyen 16, Shah Alam Industrial Park in Section 16, Shah Alam	2	100	100
		Melaka	Taman Rembia Sutera, Rumbia	2	100	100
		Negeri Sembilan	Kawasan Perindustrian Senawang Senawang Industrial Park	2	100	100
		Kuala Lumpur	Kawasan Industri di Jalan Segambut Industrial Area at Jalan Segambut	2	50	0
		Johor	Kawasan Perindustrian Senai Senai Industrial Park	2	100	50
		Kelantan	Kawasan Industri Meil Lundang Meil Lundang Industrial Park	1	100	100
		Pahang	Kawasan Perindustrian Semambu Semambu Industrial Park	2	100	100

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Industri Industry	Industri Sederhana Medium Industry	Terengganu	Kawasan Perindustrian Gong Badak Gong Badak Industrial Park	1	100	0
		Sabah	Perindustrian Getah di Inanam Rubber Industri in Inanam	1	0	100
		Sarawak	Kawasan Perindustrian Samajaya Samajaya Industrial Park	2	50	50
	Industri Ringan Light Industry	Labuan	Jalan Sg. Keling Sg. Keling Road	1	100	0
		Perlis	Kawasan Perindustrian Jejawi Jejawi Industrial Area	1	100	0
		Kedah	Industri Ringan IKS Napoh Napoh IKS Light Industry	2	100	100
		Perak	Kawasan Industri Ringan Kinta Jaya, Ipoh Kinta Jaya Light Industrial Area, Ipoh	2	100	100
		Selangor	Seksyen 7, Shah Alam Section 7, Shah Alam	2	100	100
		Melaka	IKS Malim	2	75	50
		Negeri Sembilan	Kawasan Perindustrian Galla, Labu Galla Industrial Park, Labu	2	100	100
		Kuala Lumpur	Kawasan Industri di Jalan Ipoh Industrial Area in Jalan Ipoh	2	100	0
		Johor	Kawasan Perindustrian Taman Universiti Taman Universiti Industrial Area	2	100	50
		Kelantan	Kawasan Industri MARA Kota Bharu MARA Industrial Area, Kota Bharu	1	100	100
		Pahang	Kawasan Perindustrian Indera Mahkota Indera Mahkota Industrial Area	2	100	100
		Terengganu	Kawasan Perindustrian Chendering Chendering Industrial Area	1	100	100
		Sabah	Kompleks Kastam Customs Complex	1	0	100
		Sarawak	Kawasan Perindustrian Batu Kitang Kitang Industrial Area Batu	2	50	0
		Labuan	Jalan Patau-Patau Patau-Patau Road	1	100	0
Sensitif Bunyi Noise Sensitive	Sekolah School	Perlis	Sekolah Menengah Sains Tuanku Syed Putra	1	0	0
		Kedah	SM Sultanah Bahiyah Alor Setar	2	25	0
		Perak	SK Chepor, Ipoh	2	0	0
		Selangor	SR TTDI Jaya	2	0	50
		Melaka	SK Batu Berendam 2	2	0	0

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Sensitif Bunyi Noise Sensitive	Sekolah School	Negeri Sembilan	Sekolah Kebangsaan Sikamat, Seremban	2	0	50
		Kuala Lumpur	SJCK Chiaonan	2	0	0
		Johor	Sekolah Kebangsaan Taman Perling	1	0	0
		Kelantan	Kompleks Persekolahan Peng.Chepa	1	0	0
		Pahang	SK Galing, Kuantan	2	25	0
		Terengganu	SM Sultan Sulaiman	1	0	0
		Sabah	SJK Shan Tao	1	0	0
		Sarawak	SMK St Joseph	2	0	0
		Labuan	SJKC Chi Wen	1	0	0
	Hospital Hospitals	Perlis	Hospital Tuanku Fauziah, Kangar Tuanku Fauziah Hospital, Kangar	1	0	0
		Kedah	Hospital Sultanah Bahiyah Alor Star Sultanah Bahiyah Hospital, Alor Star	2	25	0
		Perak	Hospital Raja Permaisuri Bainun, Ipoh Raja Permaisuri Bainun Hospital, Ipoh	2	0	0
		Selangor	Hospital Tengku Ampuan Rahimah, Klang Tengku Ampuan Rahimah Hospital, Klang	2	25	0
		Melaka	Hospital Besar Melaka General Hospital Melaka	2	0	0
		Negeri Sembilan	Hospital Tunku Jaafar, Seremban Tunku Jaafar Hospital, Seremban	2	25	0
		Kuala Lumpur	Hospital Besar Kuala Lumpur General Hospital Kuala Lumpur	2	0	0
		Johor	Hospital Sultanah Aminah Sultanah Aminah Hospital	1	0	0
		Kelantan	HUSM Kubang Kerian	2	0	0
		Pahang	Hospital Tengku Ampuan Afzan, Kuantan	2	0	0
		Terengganu	Hospital Sultanah Nur Zahirah Sultanah Nur Zahirah Hospital	1	0	0
		Sabah	Hospital Queen Elizabeth Queen Elizabeth Hospital	1	0	0
		Sarawak	Hospital Umum Sarawak General Hospital Sarawak	2	0	0
		Labuan	Hospital Labuan Labuan Hospital	1	0	0
	Tempat Ibadat Place of Worship	Perlis	Masjid Syed Alwi / Syed Alwi Mosque	1	0	50
		Kedah	Masjid Al-Muttaqin Jitra Al-Muttaqin Mosque Jitra	2	0	0
		Perak	Masjid China (Muhammadiah), Tasek China (Muhammadiah) Mosque, Tasek	2	0	0
		Selangor	Masjid Kg Sijangkang, Kuala Langat Kg Sijangkang Mosque, Kuala Langat	2	0	0

Kategori Categories		Negeri States	Lokasi Location	Bilangan Pengukuran (Sukuan) No. Of Measurement (Quarter)	Peratus Pematuhan (%) Compliance (%)	
					Siang Day Time	Malam Night Time
Sensitif Bunyi Noise Sensitive	Tempat Ibadat Place of Worship	Melaka	Masjid Al-Azim / Al-Azim Mosque	2	0	0
		Negeri Sembilan	Masjid Hussain Seremban 2 Hussain Mosque Seremban 2	2	50	0
		Kuala Lumpur	Masjid Negara / National Mosque	2	0	0
		Johor	Masjid Taman Perling Taman Perling Mosque	1	0	0
		Kelantan	Masjid Al-Sultan Ismail Petra, Kubang Kerian	1	0	0
		Pahang	Masjid Negeri Sultan Ahmad Shah1, Kuantan Sultan Ahmad Shah1 State Mosque, Kuantan	2	0	0
		Terengganu	Masjid Banggol Tuan Muda Masjid Banggol Tuan Muda Mosque	1	0	0
		Sabah	Masjid Negeri, Sabah State Mosque, Sabah	1	0	0
		Sarawak	Masjid Besar Negeri Sarawak	2	0	0
		Labuan	Masjid Labuan / Labuan Mosque	1	0	0
	Lapangan Terbang Airport	Kedah	Lapangan Terbang Sultan Abdul Halim Kepala Batas Sultan Abdul Halim Kepala Batas Airport	2	0	0
		Perak	Lapangan Terbang Sultan Azlan Shah, Ipoh Sultan Azlan Shah Aiport, Ipoh	2	0	0
		Selangor	Lapangan Terbang Subang Subang Airport	2	0	0
		Melaka	Lapangan Terbang Malaka Melaka Airport	1	0	0
		Johor	Lapangan Terbang Senai / Senai Airport	2	0	0
		Kelantan	Lapangan Terbang Sultan Ismail Petra, Kota Bharu Sultan Ismail Petra Airport, Kota Bharu	1	0	0
		Pahang	Lapangan Terbang Sultan Ahmad Shah Sultan Ahmad Shah Airport	2	0	0
		Terengganu	Lapangan Terbang Sultan Mahmud, Kuala Terengganu Sultan Mahmud Airport, Kuala Terengganu	1	0	0
		Sabah	Lapangan Terbang Antarabangsa Kota Kinabalu Kota Kinabalu International Airport	1	0	0
		Sarawak	Lapangan Terbang Antarabangsa Kuching Kuching International Airport	2	0	0
		Labuan	Lapangan Terbang Labuan (Jalan Kerupang) Labuan Airport (Kerupang Road)	1	0	0

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 akan dihapuskan pengimportan mulai 2015 dan penghapusan hidroklorofluorokarbon (HCFC) 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 be phased out by 2015 while hydrochlorofluorocarbon (HCFC) 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 1** menunjukkan jadual strategi dan polisi dalam pelaksanaan HPMP. **Rajah 1** 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 2 menunjukkan pengimportan HCFC pada tahun 2015 yang berjumlah 6571.2 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 1** shows the policies and strategies of HPMP. **Figure 1** 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 on HCFC will be imposed by 2040. Figure 2 shows the importation of HCFC in 2015 amounted to 6571.2 metric tonnes.

Pada 1 Januari 2013, selaras dengan pewartaan Perintah Kastam (Larangan Import) 2012 pada 31 Disember 2012

On 1st January 2013, Malaysia implemented the quota system for the importation of HCFC. Application for

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.

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.

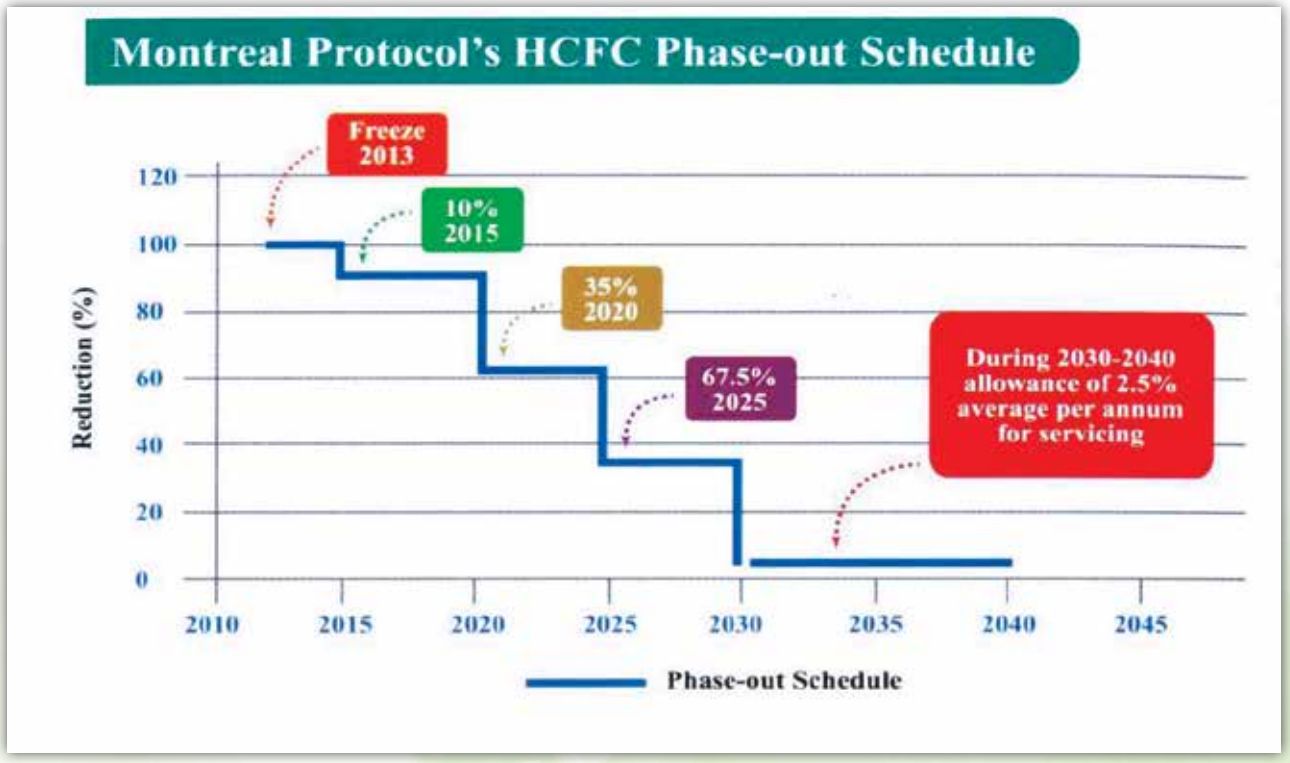
Sistem atas talian, e-Permit, telah diwujudkan untuk memproses dan seterusnya meluluskan permohonan import dan eksport HCFC. Sistem atas talian ini melibatkan jaringan di antara pengimport/ pengeskport berdaftar HCFC, Jabatan Alam Sekitar dan Sistem Maklumat Kastam (SMK), Jabatan Kastam DiRaja Malaysia. Sistem ini diwujudkan selaras dengan kehendak strategi HPMP iaitu pelaksanaan sistem Kelulusan Permit (AP) dan kuota bagi kawalan import HCFC. Bagi tahun 2015, sebanyak 440 permohonan untuk mengimport HCFC telah diterima dari 19 pengimport berdaftar dan sebanyak 7 permohonan untuk mengeksport HCFC telah diterima melalui e-Permit.

The on-line system, e-Permit, was developed to process and approve import and export of HCFC from 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. For the year 2015, 440 application to import HCFC received via e-Permit from 19 registered importers and 7 application to export HCFC were received via the system.

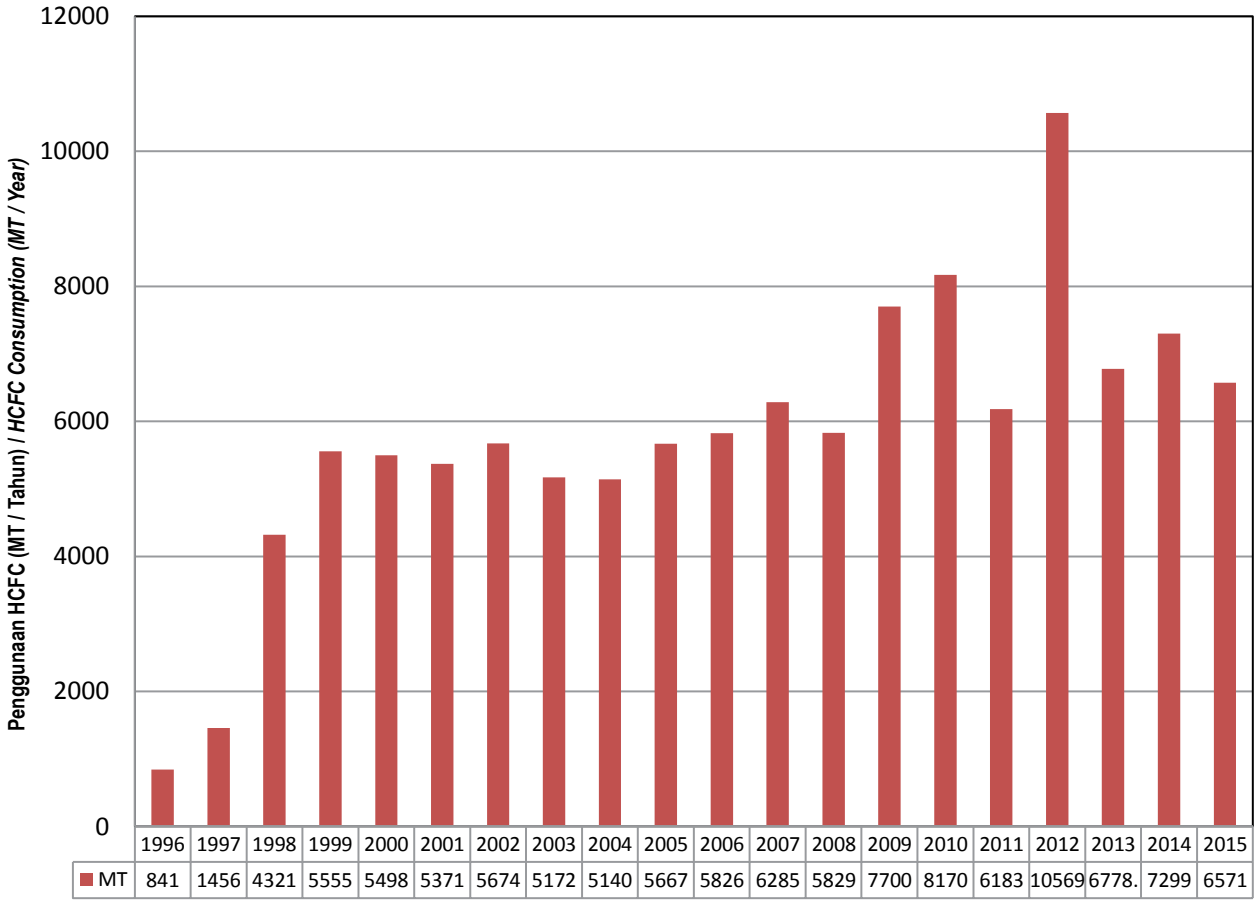
JADUAL 1: POLISI DAN STRATEGI PERUNDANGAN PELAN PENGHAPUSAN HCFC (HPMP) (2012-2040)
TABLE 1: POLICIES AND REGULATORY ACTIONS OF HCFC PHASE OUT MANAGEMENT PLAN (HPMP) (2012-2040)

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

Tahun Year	Polisi dan Tindakan Perundangan Policies/ Regulatory Actions
2015	Larangan bagi membuat, memasang dan mengimport peralatan penyaman udara menggunakan HCFC yang berkuasa 2.5hp 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 HCFC 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.



Rajah 1: Jadual Penghapusan HCFC Di Malaysia
Figure 1: HCFC Phase Out Schedule Consumption in Malaysia



Rajah 2: Tren Penggunaan HCFC Di Malaysia, 1996-2015
Figure 2: HCFC Consumption Trend in Malaysia, 1996-2015

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. Kesemua 17 projek dalam sektor busa telah selesai pada Jun 2015. Senarai dan status kemajuan projek penukaran teknologi dalam sektor busa adalah seperti di **Jadual 2** .

Projek-projek di bawah sektor penyejukbekuan dan penyaman udara (RAC) terbahagi kepada 4 komponen utama iaitu Pengurusan Refigeran, Latihan Juruteknik Servis, Latihan Pegawai Penguatkuasaan dan Demonstrasi

THE HCFC PHASE-OUT MANAGEMENT PLAN (HPMP)

Malaysia received funding assistance from the Multilateral Fund of the Montreal Protocol (MLF) amounting to USD9,587,470 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 completed in June 2015. The list of industries and progress status of these projects are shown in **Table 2.**

There are 4 main components of projects under the refrigeration and air-conditioning sector (RAC) namely Refrigeration Management, Technician Training, Enforcement Officials Training and Pilot Retrofitting/

Gantian Teknologi sistem penyaman udara. Pihak UNDP Kuala Lumpur telah melantik 2 orang perunding bagi membantu JAS melaksanakan projek-projek tersebut.

Jabatan Alam Sekitar telah menerbitkan Training Manual For Technician in Refrigeration and Air-conditioning Service Sector serta Kit Latihan untuk digunapakai oleh 41 Pusat Latihan Bertauliah (ATC) yang menjalankan kursus Pensijilan Juruteknik. Di samping itu sejumlah 30 unit mesin kitar semula refrigeran telah diagihkan kepada 30 ATC Kerajaan. Latihan bagi juruteknik dan tenaga pengajar di adakan pada 20 Februari dan 27-28 Mei 2015.

Selain itu, satu projek demonstrasi penukaran sistem penyaman udara domestik daripada refrigeran R22 kepada R32 (bebas HCFC) telah dimulakan dengan pemasangan 37 unit penyaman udara R32 di dua tapak projek yang dipilih iaitu UniKL dan Institut Latihan Alam Sekitar (EiMAS). Projek ini bertujuan untuk menggalakkan orang ramai menukar sistem penyaman udara mereka kepada sistem yang bebas HCFC. Projek ini telah mendapat kerjasama daripada syarikat Daikin Malaysia (OYL) sebagai pembuat sistem penyaman udara jenis R32.

Beberapa siri latihan dan seminar telah diadakan untuk memberi maklumat mengenai teknologi terkini dalam usaha menghapuskan penggunaan HCFC. Dua siri latihan kepada 80 orang pegawai penguatkuasaan dari Jabatan Kastam DiRaja Malaysia (JKDM) dan JAS telah diadakan pada 8-12 Jun 2015 di Akedemi Kastam Malaysia (AKMAL), Sabah dan pada 7-11 Disember 2015 di Pulau Pinang. Siri latihan ini memberi pendedahan mengenai kawalan import dan eksport bahan pemusnah ozon terutamanya bagi mencegah penyeludupan. Para peserta juga didedahkan mengenai tatacara penggunaan alat pengesan refrigeran (Refrigerant Identifiers) serta menggalakkan operasi bersepadu antara JAS dengan JKDM.

Pada keseluruhannya pelaksanaan projek di bawah HPMP Peringkat 1 berjalan lancar dan dijangka selesai pada Disember 2016. 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) menjelang 2016.

PENGURUSAN HALON

Halon tidak lagi digunakan bagi pemasangan baru sistem mengawal kebakaran dan alat-alat pemadam api di Malaysia. Sebaliknya, air, karbon dioksida, gas lengai

Replacement Demonstration for air-conditioning system. The UNDP has appointed 2 consultants to assist DOE in executing these projects.

The Department of Environment had published a Training Manual for Technician in Refrigeration and Air-conditioning Service Sector as well as Training Kit to be used by 41 Authorized Training Centres (ATCs) to carry out training for Certification of Technicians. In addition, 30 Reclaim and Recycle machines had been distributed to 30 Government ATCs. A program for Master Trainers for Technician in Refrigeration and Air-conditioning Servicing Sector was conducted on 20th February and 27-18 February 2015.

A demonstration project on replacement of domestic air-conditioning system using R22 with air-conditioning units using R32 has been carried out at two selected sites that are at University Kuala Lumpur, Malaysian – France Institute (UniKL – MFI) Bangi and Environmental Institutes of Malaysia (EiMAS), 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 Malaysia (OYL) as the R32 air-conditioning system manufacturer.

A few series of seminar and training sessions had been organized to disseminate information on new technology in phasing-out HCFC. Two series of training were conducted for 80 officers from Malaysia Royal Custom Department and DOE on 8-12 Jun 2015 at Royal Malaysian Custom Academy (AKMAL), Sabah and 7-11 December 2015 in Pulau Pinang. The training course has to give better understanding on import and export of ODS especially on illegal trade together with hands-on training in using Refrigerant Identifiers.

The implementation of project under HPMP Stage 1 runs according to the schedule and is expected to complete by December 2016. Upon successful completion of the HPMP Stage 1, there will be sustainable reduction of 77.36 ODP Tonnes of HCFC consumption which is equivalent to reduction of 1.35 million tonnes of CO2eq, (carbon dioxide equivalent) direct emission annually from 2016.

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

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 2015, Pusat Bank Halon Kebangsaan yang dikelolakan oleh Jabatan Bomba dan Penyelamat telah melaporkan sebanyak 268,955 kg jenis Halon 1211 dan 7,114 kg Halon 1301 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.

being used as alternatives. However, halon is still allowed but restricted only for use in military and civil aviation fire safety protection systems, as agreed under the Montreal Protocol. In 2015 the National Halon Bank managed by the Fire and Rescue Department in Bandar Baru Enstek, Negeri Sembilan recorded that 268,955 kg Halon 1211 and 7,114 kg Halon 1301 were stored at the Bank Centre. Prior written approval from the Fire and Rescue Department of Malaysia is required for the use of alternatives to halon in any new firefighting system.

JADUAL 2: STATUS KEMAJUAN PROJEK PENUKARAN TEKNOLOGI SEKTOR BUSA
TABLE 2: PROGRESS STATUS OF TECHNOLOGY CONVERSION PROJECTS IN FOAM SECTOR

No.	Foam Enterprises	MoA Signed	Date of Completion	HCFC-141b phased out (ODP tonnes)	Product	System Installed
1	Berjaya	21-Sep-12	5-Nov-14	4.73	Refrigerator	CANNON
2	Cycleworld	12-Sep-12	2-Apr-15	17.6	Sandwich Panel	CANNON
3	Insafoam	3-Feb-13	27-Jul-15	4.51	Insulated Piping	GMA
4	Kwangtai	2-Jan-13	28-Jul-15	4.29	Sandwich Panel	GMA
5	Linear Panel	3-Oct-12	28-May-15	4.18	Sandwich Panel	CANNON
6	Ocean Roto	30-Sep-12	23-Dec-14	5.39	Insulated Boxes	GMA
7	Pangkat	21-Sep-12	14-Nov-14	6.71	Sandwich Panel	CANNON
8	Rigidfoam	27-Sep-12	22-Dec-14	6.05	Sandwich Panel	GMA
9	Saicond	12-Sep-12	31-Apr-15	3.85	Sandwich Panel	GMA
10	Supiera	21-Sep-12	4-Nov-14	3.96	Sandwich Panel	GMA
11	United Panel	30-Oct-12	27-Nov-13	22.77	Sandwich Panel	HENNECKE
12	Zun Utara	4-Mar-13	6-May-15	3.63	Refrigerator	OMS
13	Ricwil	28-Sep-12	22-Dec-14	6.93	Insulated Piping	OMS

No.	Polyol System Houses	MoA Signed	Date Of Completion	Product Name	Blowing Agent
1	Colorex	6-Dec-12	22-Apr-12	Colorex RG101-1E	Methyl formate
2	Maskimi	2-Oct-12	23-Jun-14	Maskimifoam 778B / 2HW	1233zd (E)
3	Oriken	4-Dec-12	29-Sep-14	Orithane RG4340M	Methylal
4	PPT	2-Oct-12	30-Sep-14	RG1504H6	Methyl formate






Gambarfoto 2: Projek penukaran teknologi menggunakan cyclopantane dalam pembuatan busa.
Photo 2: Technology conversion project using cyclopantane in foam making.

PERSIJILAN SEKTOR SERVIS REFRIGERAN.

Persijilan 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 dari institut latihan awam dan swasta menganjurkan siri latihan persijilan 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.

Sepanjang tahun 2015, sebanyak 93 siri latihan telah dijalankan oleh ATC untuk melatih dan mentauliahkan juruteknik-juruteknik atau pengendali refrigeran selaras dengan kehendak Peraturan 5, Peraturan-Peraturan Kualiti Alam Sekeliling (Pengurusan Refrigeran) 1999. Jabatan Alam Sekitar pula mengadakan lawatan audit ke ATC yang terpilih semasa mereka menjalankan latihan bagi memastikan sesi berjalan lancar dan mematuhi kehendak Jabatan. Selaras dengan pemakaian buku manual terbaru Training Manual for Technician in Refrigeration and Air Conditioning Service Sector (RACs), Program Regional Master Trainer for Technician in Refrigeration and Air Conditioning Servicing Sector yang merupakan latihan kepada 'master trainer' baru telah didakan pada 27-28 Mei 2015 di Hotel Concorde, Shah Alam. Seramai dua puluh enam (26) 'master trainer' dari institut latihan awam dan swasta termasuklah dari Cambodia dan Timor Leste telah menghadiri program ini.

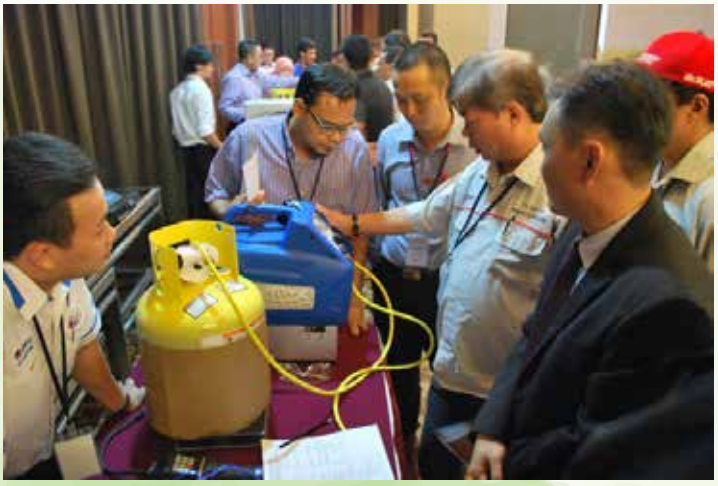
Objektif bengkel ini diadakan adalah untuk melatih 'master trainer' mengenai Good Practices and Proper Handling and Servicing of Refrigerants. Selain itu, bengkel ini juga memberi pendedahan kepada peserta mengenai refrigeran alternatif Hidrokarbon (HC) termasuk ciri-ciri keselamatan dan kesesuaian penggunaannya di Malaysia.

CERTIFICATION ON REFRIGERATION SERVICE SECTOR (RSS)

Certification to technicians or to the person handling the refrigeration service sector is one of the requirements under the Environmental Quality Act (Refrigerant Management) 1999. The Department of Environment Malaysia together with The Authorized Training Centre (ATC) from the government and private training institutes had organized series of certification training for technicians in this field while Department of Environment will do auditing at the selected ATC during the training conducted to ensure that the session runs smoothly and according to department's need . Emphasis on the methodologies and code of ethics in handling refrigerants were given in the trainings to avoid accidental release of refrigerant to the atmosphere.

In 2015, 93 series of courses had been organized by ATC to train and certify technicians and refrigerant handlers in accordance to the Regulation 5, Environmental Quality Act (Refrigerant Management) 1999. Department of Environment audit visits to selected ATC during their training sessions to ensure a smooth and comply with the requirements of the department. In line with the usage of the new Training Manual for Technician in Refrigeration & Air Conditioning Service Sector (RACs), a regional workshop for Master Trainer for Technician in Refrigeration and Air Conditioning Servicing Sector was held on 27-28 May 2015 in Concorde Hotel, Shah Alam as a training for the new master trainers. A total of twenty six (26) master trainers from the government and private training institutes including Cambodia and Timor Leste had attended the workshop.

Objectives of the workshop were to train the master trainer on Good Practices and Proper Handling and Servicing of Refrigerants. In addition, the workshop introduced alternative refrigerant such as hydrocarbon including on its safety and applicability in Malaysia.



Gambarfoto : Sesi latihan praktikal semasa Bengkel untuk Master Trainer Servicing Sector di Concorde Hotel,Shah Alam.
Photo : Hands-on session during the Workshop for Master Trainer Servicing Sector at Concorde Hotel, Shah Alam.

Gambarfoto : Bengkel untuk Master Trainer for Technician in Refrigeration and Air Conditioning Servicing Sector anjuran Jabatan Alam Sekitar Malaysia yang telah diadakan pada 27-28 Mei di Concorde Hotel, Shah Alam.
Photo : Master Trainer Workshop for Technician in Refrigeration and Air Conditioning (RACs) Servicing Sector organised Department of Environment was held from 27 – 28 May 2015 at Concorde Hotel, Shah Alam.

PROGRAM DAN KEMPEN KESEDARAN

Hari Ozon Antarabangsa iaitu pada 16 September 2015 telah disambut dengan tema '30 Tahun Kita Bersama Memulihara Lapisan Ozon (30 years of healing the ozone together)". Tema ini disokong dengan slogan 'Ozon: Semua di sana antara anda dan UV' (Ozone: All There between you and UV) mencerminkan usaha kolektif semua negara-negara parti kepada Konvensyen Vienna dan Protokol Montreal dalam memulihara lapisan ozon selama 3 dekad. Majlis sambutan telah diadakan di Hotel Shangri-La, Putrajaya dan dirasmikan oleh YB Timbalan Menteri Sumber Asli dan Alam Sekitar, Datuk Ir. Haji Hamim bin Samuri. Ketua Pengarah Alam Sekitar, Dato' Halimah Hassan juga hadir menyampaikan ucapan aluan kepada lebih 100 orang tetamu dari industri busa dan refrigeran dan termasuk wakil UNDP, Malaysian Air Conditioning & Refrigeration Association (MACRA) dan NGOs. Sempena Hari Ozon Antarabangsa 2015, sijil dan plak penghargaan diberikan kepada 13 industri busa dan 4 industri pembuat polyol yang telah menyempurnakan projek pertukaran teknologi mesra ozon. Satu taklimat kemajuan HPMP Peringkat Pertama telah disampaikan oleh Jabatan Alam Sekitar. Di samping itu taklimat mengenai HPMP Peringkat kedua akan dimaklumkan kepada industri-industri yang menggunakan bahan pemusnah ozon dalam proses pembuatan produk mereka. Kelulusan dana bagi penyediaan dokumen permohonan projek bagi HPMP

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. This year marks the 30th anniversary of the Vienna Convention for the Protection of the Ozone Layer. Therefore, the theme for this year's celebration is "30 years of healing the ozone together" and supported by the slogan, "Ozone: All there is between you and UV." Special message from the Honourable Minister of Natural Resources and Environment on International Ozone Day was published in local newspapers and at the websites of the Ministry and the Department of Environment.

The National Ozone Unit (NOU) of the Department of Environment Malaysia had successfully organised the International Ozone Day Celebration 2015 on the 29th September at the Shangri-La Hotel Putrajaya. The event was officiated by the Honourable Deputy Minister of Natural Resources and Environment Malaysia, Datuk Ir. Haji Hamim bin Samuri. The Director General of Department of Environment Malaysia, Dato' Halimah Hassan was also present to deliver the welcome speech. Approximately 100 guests from various sector and stakeholders including representative from UNDP, Malaysian Air Conditioning & Refrigeration Association (MACRA) and NGOs were present at the event. The grand finale of the celebration was the presentation of certificate and token of appreciation

Peringkat Kedua telah diluluskan oleh Mesyuarat ExCom ke 72 pada 12-16 Mei 2014. Poster tema Hari Ozon dari UNEP diserahkan kepada YB Timbalan Menteri selepas majlis pelancaran Hari Ozon Antarabangsa. Risalah-risalah mengenai perlindungan lapisan ozon, penghapusan bahan pemusnah lapisan ozon HCFC, HPMP dan sistem e-Permit serta Buletin Ozon juga diedarkan kepada para tetamu dan pengunjung pameran. Perincian program kesedaran yang dijalankan sepanjang tahun 2015, latihan dan mesyuarat antarabangsa serta serantau yang dihadiri oleh JAS adalah seperti di **Jadual 3** dan **Jadual 4.**

to the 17 companies that had successfully completed the project under HCFC Phase out Management Plan-Stage 1 (HPMP). They were 13 foam companies that had been benefited from the Multilateral Funds in converting their manufacturing facilities into the latest pentane technology and 4 polyol system houses that developed the ODS free alternatives. The aim of the project was to phase out the uses of HCFC141b in foam manufacturing process. The ceremony was followed by presentation on the latest development of activities under HPMP Malaysia and the introduction of HPMP stage 2 which targeted on the small enterprises in foam manufacturing. Pamphlets on ozone layer protection and HCFC phase- out, HPMP and e- Permit as well as the published Ozone Bulletin were distributed. Details of awareness programmes carried out in 2015 are listed in **Table 3**. Meetings and trainings at regional and international levels attended by the DOE officers are listed in **Table 4**.

Gambarfoto 6. Majlis Sambutan Hari Ozon pada 29 September 2015
Photo 6.: Ozone Day Celebration on 29 September 2015

JADUAL 3: MESYUARAT DAN LATIHAN PERINGKAT SERANTAU DAN ANTARABANGSA 2015
TABLE 3: PROGRESS STATUS OF TECHNOLOGY CONVERSION PROJECTS IN FOAM SECTOR

Tarikh Date	Aktiviti & Program Activities & Programme	Tempat Venue
19-22 Januari / January	Mesyuarat Panel Modul dan Kit Latihan Kursus Persijilan Juruteknik Bertauliah bagi Sektor Penyejukbekuan dan Penyamanan Udara Meeting of Panel on Training Module and Kit for Certification of Technicians in Refrigeration and Air-conditioning Sector	Marina Cove, Perak
11 Februari / February	Taklimat Pelan Penghapusan HCFC kepada OEM tentang pelaksanaan Larangan Membuat, Memasang, Mengimport Penghawa Dingin Berkuasa 2.5 HP dan Kebawah Briefing to OEM on HCFC Phase out Plan and the Prohibition on manufacturing, assembly and import of HCFC-based Air Conditioner of 2.5 hp and below	Bilik Cempaka, JAS Putrajaya
26 Februari / February	Bengkel Program Kursus Persijilan juruteknik Bertauliah Bagi Sektor Penyejukbekuan Dan Penyamanan Udara Workshop on Technician Certification Program in Refrigeration and Air Conditioning (RACS) Sector	IOI Palm Garden, Putrajaya
27-28 Mei / May	Bengkel Bagi Tenaga Pengajar Sektor Penyejukbekuan dan Penyamanan Udara (RACs) Workshop for Master Trainer on Good Practice for Refrigeration & Air Conditioning Sector (RACs)	Concorde Hotel Shah Alam
4 Jun / June	Sesi Dialog Berkaitan Strategi Penghapusan Metil Bromida dalam Sektor bukan Kuarantin dan Pra-Perkapalan Dialogue Session on Strategy to Phase out Methyl Bromide in Non-quarantine and Pre-shipment Sector	Concorde Hotel Shah Alam
8-12 Jun / June	Latihan Kastam Bagi Kawalan Import Hidroklorofluorokarbon (HCFC) Customs training on Hydrochlorofluorocarbons (HCFCs) Import Control	AKMAL, Sabah
14 Sep / Sept	Notis Pemberitahuan mulai 1 Januari 2016, pengimportan pra campuran polyol dengan HCFC akan dikawal oleh Kerajaan Malaysia dan diurustadbir oleh Jabatan Alam Sekitar Malaysia Notice on Control of Importation of Pre Blended Polyol with HCFC by the Government of Malaysia and administer by DOE	NST, Berita Harian, Nan Yang Siang Pau
16 Sep / Sept	Perutusan Menteri Tentang Hari Ozon Antarabangsa Minister's Message on International Ozone Day	NST, Berita Harian
29 Sep / Sept	Sambutan Hari Ozon nternational Ozone Day Celebration	Shangri-La Hotel, Putrajaya
	Taklimat Kemajuan Pelaksanaan Pelan Pengurusan Penghapuasan HCFC Peringkat 1 (HPMP 1) dan Pengenalan HPMP 2. Briefing on Implementation Progress of HPMP Stage 1 and Introduction of HPMP Stage 2	
21-22 Okt / Oct	Bengkel Penyerahan Alat RI Kepada JAS Negeri Workshop for Delivery of Refrigerant Identifier to the DOE State Offices.	IOI Palm Garden, Putrajaya
7-11 Dis / Dec	Latihan Kastam berkaitan Kawalan Pengimportan Hidroklorofluorokarbon (HCFC) Custom Training on Hydrochlorofluorocarbons (HCFCs) Import Control	Hotel Sunway, Seberang Jaya Pulau Pinang

JADUAL 4: AKTIVITI-AKTIVITI LATIHAN DAN KESEDARAN 2015
TABLE 4: TRAINING AND AWARENESS ACTIVITIES 2015

Tarikh Date	Aktiviti & Program Activities & Programme	Tempat Venue
10-13 Mac / Mar	Ozone2Climate Industry Roundtable and the Green Public Procurement Workshop for promoting Ozone and Climate Friendly Technologies	Goyang City, Republic of Korea
20-24 April	Open Ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, and the Workshop on Hydroflourocarbon Management	Bangkok, Thailand
8-10 April	UNEP/WCO Workshop	Melaka, Malaysia
18-22 Mei / May	The 74th Meeting of the Executive (ExCom)	Montreal, Canada
23 Mei / May	Compliance Action Program (CAP) Advisory Meeting	Montreal, Canada
16 Julai / July	The 36th meeting of the Open Ended Working Group On Substances that Deplete the Ozone Layer	Paris, France
20-24 Julai / July	Cool Training: Use of Natural Refrigerants in Commercial Refrigeration Plants	Frankfurt, Germany
24-27 Ogos / Aug.	Study Tour on Reclamation and Destruction of ODS	Tokyo, Japan
20-29 Sep / Sept	Thematic Meeting of Southeast Asia and the pacific (SEAP) Network of Ozone officers and the Coordination Meeting for the EC Destruction Project	Bangkok, Thailand
5-9 Okt / Oct	Resumed 36th meeting of the Open Ended Working Group	Dubai, UEA
29-30 Okt / Oct	The 27th Meeting of the Montreal Protocol on Substances that Deplete the Ozone Layer	Dubai, UEA
16-20 Nov.	The 75th Meeting of the Executive Committee (ExCom)	Montreal, Canada
21 Nov.	Cold Chain Workshop	Montreal, Canada

Gambarfoto : Delegasi Malaysia diketuai oleh YB Dato' Sri Wan Junaidi Tuanku Jaafar, Menteri Sumber Asli dan Alam Sekitar di Mesyuarat ke 27 Parti kepada Protokol Montreal 1-5 November, di Dubai, Emirate Arab Bersatu.

Photo : Malaysian Delegates headed by Hon. Dato' Sri Wan Junaidi bin Tuanku Jaafar, Minister of Natural Resources and the Environment, at the 27th Meeting of Parties to the Montreal Protocol 1-5 November, Dubai, United Arab Emirates.

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 titik panas juga diperolehi melalui satelit yang dipantau dan dilaporkan oleh *ASEAN Specialised Meteorological Centre* (ASMC) yang berpusat di Singapura. Pada tahun 2015 sebanyak 2,335 kes hotspots di seluruh negara telah dilaporkan melalui satelit **(Jadual 1)**.

Sebanyak 3,459 kes pembakaran terbuka telah dikesan pada tahun 2015 **(Jadual 2 & Jadual 3)** dan dilaporkan oleh setiap JAS Negeri melalui sistem e-KAS (Modul Pembakaran Terbuka dan Modul Aduan). Kejadian pembakaran terbuka yang utama sering berlaku adalah di kawasan yang dikategorikan sebagai lain-lain (847), belukar (617), hutan (606) dan pertanian (542) terutamanya semasa cuaca panas dan kering iaitu pada bulan Februari (461), Mac (848) dan April (488). 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 3,459 kes pembakaran terbuka tersebut, 281 kes telah dikompaun dengan jumlah kompaun yang dikutip ialah sebanyak RM412,050.00.

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 2015, a total of 2,335 hotspots were detected via satellites **(Table 1)**.

A total 3,459 open burning cases were detected in 2015 and these cases were reported in e-KAS reporting system (Open Burning Module and Complaint Module) by the DOE state offices **(Table 2 & Table 3)**. Cases of open burning recorded are mainly 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) (847), bushes (617), forests (606) and agriculture areas (542), that normally occured during the hot and dry period in the months of February (461), Mac (848) and April (488). Out of 3,459 open burning cases detected, 281 cases were issued compounds amounting to RM412,050.00

PENGAWASAN MELALUI UDARA

Pada tahun 2015, Program Pengawasan Melalui Udara telah diteruskan di Semenanjung Malaysia, Sarawak dan Sabah melalui penawaran kontrak perkhidmatan yang baru. 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, 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.

Sejumlah RM2,302,729.57 bajet telah diperuntukkan pada tahun 2014 untuk pelaksanaan program ini. Untuk tahun 2015, sebanyak 38 penerbangan dijalankan di Semenanjung Malaysia, 17 penerbangan di Sabah dan 11 penerbangan di Sarawak. Sepanjang program ini, 322 penerbangan telah dilaksanakan.

AERIAL SURVEILLANCE

The Aerial Surveillance Programme continued in 2015 in Peninsular Malaysia, Sarawak and Sabah as the new contract had been awarded. The surveillance mainly focus on open burning activities, illegal clearing of forest, emission from industries, land clearing, land developement, coastal and marine pollutions. Information on the environmental pollution activities detected from the aerial surveillance would be transmitted directly to the DOE operation room for immediate follow up actions by the ground surveillance staff.

In 2014, RM2,302,729.57 budget has been awarded for the implementation of this air surveillance programme. For the year 2015, 38 flights had been carried out in Peninsular Malaysia, 17 flights in Sabah while in Sarawak was 11 flights. A total of 322 flights had been carried out throughout this programme.

JADUAL 1 JAS : BILANGAN KES TITIK PANAS MENGIKUT NEGERI, 2015
TABLE 1 DOE : NUMBER OF HOTSPOTS BY STATES, 2015

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	23	32	64	21	2	9	9	4	5	6	1	3	179
Kedah	21	34	25	14	4	1	1	0	0	0	0	0	100
Kelantan	7	32	60	43	15	5	7	1	7	0	0	1	178
Melaka	1	0	1	1	2	1	0	0	0	0	0	0	6
Negeri Sembilan	3	2	12	3	1	5	4	0	0	5	0	0	35
Pahang	34	68	189	119	53	44	115	26	27	20	2	9	706
Perak	9	19	16	5	0	3	3	0	0	0	1	0	56
Perlis	2	4	0	0	0	0	0	0	0	0	0	0	6
P. Penang	1	0	1	0	0	0	0	0	0	0	0	0	2
Sabah	2	22	145	77	63	36	35	39	6	9	2	19	455
Sarawak	19	27	121	92	40	42	65	18	9	7	1	2	443
Selangor	4	8	0	2	1	2	4	0	0	0	0	1	22
Terengganu	0	12	45	37	17	12	10	6	4	3	1	0	147
W.P. KL / Putrajaya	0	0	0	0	0	0	0	0	0	0	0	0	0
W.P. Labuan	0	0	0	0	0	0	0	0	0	0	0	0	0
Jumlah / Total	**126**	**260**	**679**	**414**	**198**	**160**	**253**	**94**	**58**	**50**	**8**	**35**	**2,335**
JUMLAH KESELURUHAN / TOTAL : 2,335													

JADUAL 2 JAS: BILANGAN KES PEMBAKARAN TERBUKA MENGIKUT NEGERI, 2015
TABLE 2 DOE: NUMBER OF OPEN BURNING CASES BY STATES,2015

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	93	29	36	37	19	20	0	77
Kedah	41	32	14	31	4	0	0	21
Kelantan	69	20	35	64	3	4	7	27
Melaka	14	12	11	0	8	7	1	38
Negeri Sembilan	30	2	14	2	3	7	2	94
Pahang	127	49	307	168	7	4	3	24
Perak	16	7	13	35	11	3	3	69
Perlis	1	5	2	1	1	2	0	0
P. Penang	0	9	7	4	9	6	0	115
Sabah	85	308	34	56	1	1	0	31
Sarawak	138	50	71	176	4	8	0	55
Selangor	12	7	5	5	8	10	1	199
Terengganu	25	8	64	27	0	0	4	23
W.P. KL / Putrajaya	0	9	4	0	5	7	0	75
W.P. Labuan	0	0	0	0	1	2	0	1
Jumlah / Total	**661**	**542**	**617**	**606**	**84**	**81**	**21**	**847**
JUMLAH KESELURUHAN / TOTAL : 3,459								

JADUAL 3 JAS: BILANGAN KES PEMBAKARAN TERBUKA BULANAN, 2015
TABLE 3 DOE: NUMBER OF OPEN BURNING CASES BY MONTH, 2015

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	40	20	40	33	5	8	1	125
Februari / February	82	78	65	89	8	17	3	119
Mac / March	188	191	191	157	4	16	9	92
April / April	102	91	103	116	5	5	2	64
Mei / May	59	46	55	49	7	6	2	38
Jun / June	51	14	43	30	10	8	1	59
Julai / July	65	31	44	72	8	7	1	47
Ogos / August	18	13	24	18	5	3	0	72
September / September	19	17	25	18	12	3	2	73
Oktober / October	20	19	16	16	11	3	0	51
November / November	7	7	4	1	1	4	0	43
Disember / December	10	15	7	7	8	1	0	64
Jumlah / Total	**661**	**542**	**617**	**606**	**84**	**81**	**21**	**847**
JUMLAH KESELURUHAN / TOTAL : 3,459								

* Lain-lain: pembakaran sampah sarap di kawasan perumahan, tepi jalan dan aktivti keagamaan/penyembahan
Others: the burning of garbage at residential areas, road sides and religious rites/worshipping activities

RANCANGAN KONTIGENSI 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, dan dipengerusikan oleh Ketua Pengarah Jabatan Alam Sekitar Malaysia. Kesiapsiagaan kawalan tumpahan minyak adalah melalui peralatan mengawal tumpahan minyak yang ditempatkan di lokasi-lokasi strategik seperti **Peta 1**. 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.

Sepanjang tahun 2015, sebanyak 6 aktiviti berkaitan dengan kawalan tumpahan minyak telah dianjurkan/ dihadiri/ dilaksanakan oleh pegawai-pegawai JAS bagi tujuan peningkatan kemahiran dan perkongsian kepakaran dalam bidang ini.

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, 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 1. 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 our NOSCP response system.

Throughout 2015, a total of 12 activities related to oil spill were organized/ attended/ conducted by DOE officers for capacity building and sharing of expertise in this field.

Antara aktiviti tersebut ialah: The activities are:

Bil / No	Aktiviti / Activities	Tarikh / Date
i.	Mesyuarat Kerjasama Jabatan Alam Sekitar dan Jabatan Laut Malaysia. Department of Environment and Marine Department Malaysia Partnership Cooperation Meeting.	12 Januari / January 2015
ii.	ASEAN Regional Forum Disaster Relief Exercises (ARF DiREx) 2015 ASEAN Regional Forum Disaster Relief Exercises (ARF DiREx) 2015	25-28 Mei / May 2015
iii.	Latihan Table-Top Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak (JKKTM) di Port Dickson, Negeri Sembilan Table-Top Exercise National Oil Spill Control Committee (NOSCC) in Port Dickson, Negeri Sembilan	3-5 Jun / June 2015
iv.	Mesyuarat Kerjasama Jabatan Alam Sekitar dan Agensi Penguatkuasaan Maritim Malaysia. Department of Environment and Malaysia Maritime Enforcement Agency Partnership Cooperation Meeting.	24 Ogos / August 2015
v.	Kursus Analisis Teknik Pembersihan Pantai (SCAT) Akibat Pencemaran Minyak Untuk Pegawai-Pegawai Jabatan Alam Sekitar di: Shoreline Clean-Up Assessment Technique (SCAT) Course for Department of Environment Officer in: a. Selangor b. Pahang	 12-14 Oktober / October 2015 20-22 Oktober / October 2015
vi.	Mesyuarat Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak (JKKTM) yang melibatkan 17 agensi kerajaan dan swasta di bawah RKKKTM. National Oil Spill Control Committee (NOSCC) Meeting which involved 17 government and private agencies under the NOSCP.	11 November / November 2015

Peta 1: Lokasi Peralatan Melawan Tumpahan Minyak Dan Keupayaan Di Malaysia, 2015.
Map 1: Location Of Oil Spill Equipment Stockpile And Capability In Malaysia, 2015.

Kursus Analisis Teknik Pembersihan Pantai (SCAT) Akibat Pencemaran Minyak Untuk Pegawai-Pegawai Jabatan Alam Sekitar.
Shoreline Clean-Up Assessment Technique (SCAT) Course for Department of Environment Officers.

Latihan Table-Top Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak (JKKTM) pada 3-5 Jun 2015 di Port Dickson, Negeri Sembilan.
Table-Top Exercise National Oil Spill Control Committee (NOSCC) on 3-5 June 2015 in Port Dickson, Negeri Sembilan.

JAWATANKUASA TABUNG PUSINGAN BAGI SELAT MELAKA DAN SELAT SINGAPURA (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.

Tabung ini adalah ditadbir 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.

Di antara aktiviti yang dilaksanakan oleh Jawatankuasa Tabung Pusingan pada tahun 2015 adalah seperti berikut:

i. Mesyuarat Teknikal Jawatankuasa Tabung Pusingan di Jakarta, Indonesia pada 26 Februari 2015.

ii. Mesyuarat Pengurusan Jawatankuasa Tabung Pusingan di Bukit Tinggi, Padang, Indonesia pada 15 hingga 16 Oktober 2015.

iii. Tiga (3) orang peserta masing-masing dari Malaysia, Singapura dan Indonesia telah dibiayai untuk menghadiri *"International Chemical and Oil Pollution Conference and Exhibition Singapore"* pada 21-24 April 2015.

STRAITS OF MALACCA AND SINGAPORE REVOLVING FUND COMMITTEE (RFC)

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.

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.

Among the activities carried out by the RFC in the year 2015 are:

i. RFC Technical Meeting convened in Jakarta on 26th February 2015.

ii. Revolving Fund Committee Management Meeting was held in Bukit Tinggi, Padang, Indonesia from 15th to 16th October 2015.

iii. Three (3) participants from Malaysia, Singapore and Indonesia respectively were sponsored to attend "International Chemical and Oil Pollution Conference and Exhibition Singapore" on 21-24 April 2015.

Mesyuarat Teknikal Jawatankuasa Tabung Pusingan Ke-35 telah diadakan di Jakarta, Indonesia pada 26 Febuari 2015.
The 35th Revolving Fund Committee Technical Meeting was held in Jakarta, Indonesia on 26th February 2015.

PENCEMARAN MARIN

Sepanjang tahun 2015, sejumlah 17 kes aduan pencemaran tumpahan minyak telah dilaporkan kepada Jabatan Alam Sekitar iaitu 15 kes berlaku di Laut China Selatan dan 2 kes di Selat Johor **(Jadual 4.14)**.

Daripada 17 jumlah kes tumpahan minyak yang berlaku pada tahun 2015, 6 kes berpunca daripada kapal, 10 kes daripada punca yang tidak diketahui dan 1 kes daripada pelantar minyak.

MARINE POLLUTION

Throughout 2015, there were 17 cases of marine pollution from oil spills were reported to Department of Environment whereby 15 cases occurred in the South China Sea and 2 cases in the Straits of Johore **(Table 4.14)**.

Out of 17 cases of oil spill in 2015, 6 cases originated from ships, 10 cases from unknown sources and 1 case from oil rig.

JADUAL 4.14 : KEJADIAN PENCEMARAN MINYAK, 2015
TABLE 4.14 : OIL POLLUTION INCIDENTS, 2015

Lokasi / Location	Kawasan / Area		Bil. Kes / No. of Cases	Negeri / State
Laut China Selatan South China Sea	Perairan Malaysia Malaysia Territory	Semenanjung Peninsular	11	Pahang (2) Terengganu (7) Johor (2)
		Malaysia Timur East Malaysia	4	Sabah (3) Sarawak (1)
	Zon Ekonomi Ekslusif (EEZ) Exclusive Economic Zone (EEZ)		0	-
Laut Sulu Sulu Sea	Perairan Malaysia Malaysia Territory	Sabah	0	-
Selat Melaka Straits of Malacca	Perairan Malaysia Malaysia Territory		0	-
Selat Johor Straits of Johor	Perairan Malaysia Malaysia Territory	Barat West	2	Johor
		Timur East	0	-
Jumlah / Total			**17**	

PENGURUSAN BUANGAN TERJADUAL
SCHEDULED WASTE MANAGEMENT

KEBENARAN BERTULIS DAN LESEN PREMIS YANG DITETAPKAN

Sebanyak 23 Kebenaran Bertulis telah dikeluarkan oleh Ketua Pengarah untuk pembinaan kemudahan pemerolehan kembali, pengolahan dan pelupusan buangan terjadual pada tahun 2015. Kebenaran Bertulis berkenaan telah dikeluarkan kepada 2 kemudahan penunu buangan terjadual, 8 kemudahan pemerolehan kembali (bukan e-waste), 1 kemudahan pemerolehan kembali penuh (e-waste), 6 kemudahan pemerolehan kembali separa (e-waste), 5 kemudahan penstoran luar tapak, dan 1 tapak pelupusan selamat **(Jadual 4.15).**

Di samping itu, sejumlah 760 lesen dikeluarkan kepada kemudahan baru dan sediada pada tahun 2015 yang terdiri daripada 174 kemudahan pemerolehan kembali luar tapak (bukan e-waste), 31 kemudahan pemerolehan kembali luar tapak (penuh e-waste), 108 kemudahan pemerolehan kembali luar tapak (separa e-waste), 32 kemudahan penunu buangan terjadual, 1 kemudahan pengolahan di tanah, 6 kemudahan pengolahan luar tapak, 6 kemudahan tapak pelupusan selamat, dan 47 kemudahan penstoran luar tapak. Sejumlah 355 lesen dikeluarkan kepada pembawa yang ditetapkan. **(Jadual 4.16).**

WRITTEN PERMISSION AND LICENCES FOR PRESCRIBED PREMISES

23 Written Permissions were issued by the Director-General in 2015 for the construction of recovery, treatment and disposal facility for scheduled wastes, 2 scheduled waste incinerator, 8 off-site recovery plants (non e-waste), 1 off-site full recovery plants (e-waste), 6 off-site partial recovery plants (e-waste), 5 off-site storage facilities, and 1 secured landfill **(Table 4.15)**.

In addition, a total number of 760 licenses were issued for both existing and new facilities in 2015 which consists of 174 licenses for off-site recovery (non e-waste), 31 licenses for off-site full recovery plants (e-waste), 108 licenses for off-site partial recovery plants (e-waste), 32 licenses for scheduled wastes incinerators, 1 licenses for land treatment facilities, 6 licenses for off-site treatment, 6 licenses for secured landfills and 47 licenses for off-site storage facilities. A total of 355 licenses were issued for prescribed conveyance **(Table 4.16)**.

JADUAL 4.15 JAS: KEBENARAN BERTULIS (KB) YANG DILULUSKAN OLEH JAS NEGERI BAGI KEMUDAHAN PEMEROLEHAN KEMBALI, PENGOLAHAN & PELUPUSAN BUANGAN TERJADUAL, 2015

TABLE 4.15 DOE : WRITTEN PERMISSION (KB) APPROVED BY DOE SHARE RECOVERY FACILITIES, PROCESSING AND DISPOSAL OF WASTES, 2015

Bil. No.	Kemudahan Facilities		Jumlah Kebenaran Bertulis Mengikut Negeri Total Of Written Permissions According To States															
			JHR	KDH	KLN	MLK	N.S	PHG	PRK	PRS	PP	SBH	SRK	SLG	TRG	WP (KL)	WP (LAB)	Jumlah Total
1.	Penunu Buangan Terjadual Scheduled Waste Incinerator		0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
2.	Kemudahan Pemerolehan Kembali Luar Tapak / Off Site Recovery Facilities																	
	a.	Pemerolehan Kembali Luar Tapak (bukan e-Waste) Off Site Recovery (none e-waste)	1	3	0	0	1	0	2	0	0	0	0	1	0	0	0	8
	b.	Pemerolehan Kembali Luar Tapak (penuh e-Waste) Off Site Recovery (full e-Waste)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	c.	Pemerolehan Kembali Luar Tapak (Separa e-Waste) Off Site Recovery (Partial e-Waste)	1	0	0	0	1	0	0	0	1	0	2	2	0	1	0	6
3.	Kemudahan Penstoran Luar Tapak Off Site Storage Facitities		0	0	1	0	0	0	0	0	0	2	1	0	0	0	1	5
4.	Kemudahan Pengolahan Luar Tapak / Off site Treatment Facilities																	
	a.	Loji rawatan Fizikal & Kimia Chemical & Physical Treatment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	b.	Loji Solidifikasi Solidification Plant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	c.	Loji Rawatan Air Resapan Diffusion Water Treatment Plant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.	Kemudahan Pengolahan Di Tanah Land Treatment Facility		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.	Tapak Pelupusan Selamat Secured Landfill		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Bil. KB Yang Dikeluarkan No. of Writen Permision			3	3	1	1	3	0	3	0	1	2	3	3	0	1	1	23

Jadual 4.16 JAS: Lesen-Lesen Yang Dikeluarkan Bagi Kemudahan Pemerolehan Kembali, Pengolahan & Pelupusan Buangan Terjadual Yang Diluluskan Oleh Jabatan Alam Sekitar, 2015

Table 4.16 DOE : Licenses Issued for Recovery Facilities , Processing & Disposal of Wastes Approved by the Department of Environment , 2015

Bil. No.	Kemudahan Facilities	Jumlah Lesen Dikeluarkan Mengikut Negeri Licenses Issued According To States															
		JHR	KDH	KLN	MLK	N.S	PHG	PRK	PRS	PP	SBH	SRK	SLG	TRG	WP (KL)	WP (LAB)	Jumlah Total
1	Pembawa Yang Ditetapkan Prescribed Conveyance	52	23	0	23	19	9	28	1	61	7	34	78	7	7	6	355
	Penstoran Luar Tapak Off Site Storage	6	1	0	0	2	2	2	0	0	2	22	4	1	0	5	47
2	Pemerolehan Kembali Luar Tapak / Off Site Recovery																
	a. Pemerolehan Kembali Luar Tapak (bukan e-Waste) Off Site Recovery (none e-waste)	29	11	0	4	12	8	22	1	22	4	6	47	6	0	1	174
	b. Pemerolehan Kembali Luar Tapak (penuh e-Waste) Off Site Recovery (full e-Waste)	7	1	0	5	3	0	0	0	10	0	1	4	0	0	0	31
	c. Pemerolehan Kembali Luar Tapak (separa e-Waste) Off Site Recovery (partial e-Waste)	13	10	0	12	3	0	1	0	23	0	7	19	0	7	0	108
3	Penunu Buangan Terjadual Schedule Waste Incinerator	2	1	0	1	4	1	3	0	3	3	8	3	2	0	1	32
4	Pengolahan Di Tanah Land Treatment Facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Pengolahan Luar Tapak Off Site Treatment Facilities	0	0	0	0	4	0	0	0	0	0	2	0	0	0	0	6
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		111	48	0	46	49	20	58	2	126	16	81	158	17	14	14	760
Bil. Premis / No. of Premises		53	25	0	23	20	10	30	1	64	7	41	80	10	7	8	379

NOTA / *NOTE:*

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

SKIM NOTIFIKASI DAN PENDAFTARAN

Benda-Benda Berbahaya Kepada Alam Sekeliling (Ehsnr)

Skim Notifikasi dan Pendaftaran Benda-Benda Berbahaya Kepada Alam Sekeliling (EHSNR) telah dibangunkan oleh Jabatan Alam Sekitar (JAS) semenjak tahun 2009. Skim notifikasi dan pendaftaran ini diwujudkan bertujuan untuk membekalkan maklumat kepada Kerajaan Malaysia bagi membolehkan JAS dan agensi-agensi lain yang terlibat dalam pengurusan kimia bagi mengenalpasti benda-benda berbahaya yang membimbangkan dalam Negara dan membuat keputusan untuk menguruskan benda-benda berbahaya ini secara selamat.

Berdasarkan kepada maklumat yang dikemukakan oleh pihak industri, JAS akan menghasilkan satu senarai Pendaftaran Bahan Kimia di Malaysia. Senarai Pendaftaran Bahan Kimia ini akan mengandungi maklumat mengenai identiti benda-benda berbahaya yang telah dinotifikasi kepada JAS, kegunaannya di Malaysia, pengkelasan tahap berbahaya dan jumlah keseluruhan yang terdapat di pasaran Malaysia. Jabatan juga telah menghasilkan edisi kedua dokumen panduan bertajuk '*Guidance for the Industry on the Notification & Registration Scheme of Environmentally Hazardous Substances (EHS) in Malaysia*' pada tahun 2012.

Sehingga 31 Disember 2015, sebanyak 543 syarikat kimia berpotensi sebagai pengilang dan pengimport benda-benda berbahaya kepada alam sekeliling telah mendaftar secara atas talian menerusi laman web EHSNR. Hasil daripada pendaftaran tersebut, sebanyak 2,986 EHS telah pun didaftarkan di bawah skim ini. Sebanyak 390 bahan kimia berbahaya kepada alam sekitar telah dinotifikasi di dalam sistem ini. Kebanyakan syarikat yang membuat notifikasi bahan kimia ini adalah dari sektor cat, lakuer dan varnish, elektrikal dan elektronik, getah, kimia asas dan polimer, industri gas dan minyak dan industri pertanian. Di samping itu, 19 syarikat telah mendaftar sebagai pembekal luar negara untuk notifikasi bahan kimia.

ENVIRONMENTALLY HAZARDOUS SUBSTANCES

Notification And Registration (Ehsnr) Scheme

The Environmentally Hazardous Substances Notification and Registration (EHSNR) Scheme has been developed by the Department of Environment (DOE) since the year 2009. This notification and registration scheme has been developed to provide information to the Malaysian Government to enable the Department of Environment and other agencies involved in chemicals management to identify substances of concern in the country and make decisions about how to manage these substances in a safe and sound manner.

Based on the information submitted by various industries, the Department of Environment (DOE) will establish a Malaysian Chemicals Register List. This Malaysian Chemicals Register List will contain informations about the identity of substances that have been notified to DOE, their uses in Malaysia, their hazard classification and the accumulated amounts placed in Malaysian market. The department had also published the second edition of the guidance document entitled 'Guidance for the Industry on the Notification & Registration Scheme of Environmentally Hazardous Substances (EHS) in Malaysia' in the year 2012.

Until 31 December 2015, 543 chemical companies had registered online through the EHSNR web page. From the registered companies, about 2,986 EHS notifications had been received under the scheme. 390 numbers of EHS had been notified in this system. Most of the industries sector that voluntary notify their chemicals was in paint, lacquers and varnishes industry, electrical and electronic industry, rubber industry, basic chemicals and polymer industry, mineral oil and fuel industry and agricultural industry. On the other hand, 19 companies had registered as the overseas suppliers.

PERJANJIAN MULTILATERAL ANTARABANGSA ALAM SEKITAR (MEAS) BAGI BAHAN KIMIA.

Bahan kimia digunakan secara meluas dalam kehidupan seharian dan lebih banyak bahan kimia dari segi jenis dan jumlah telah dicipta dan dihasilkan untuk memenuhi keperluan pasaran global. Kesedaran ini meningkat apabila keputusan untuk mengharamkan dan menghadkan penggunaan bahan kimia di negara pengeksport adalah berdasarkan kepada bukti-bukti saintifik di mana sekiranya risiko kimia melebihi tahap yang membimbangkan, penggunaan berterusan bahan kimia tersebut boleh menyebabkan kesan buruk kepada kesihatan manusia dan alam sekitar. Dalam hal ini, perjanjian antarabangsa yang mengikat secara sah antara tiga negara Parti atau lebih berkaitan dengan alam sekitar telah memperkenalkan Perjanjian Multilateral Alam Sekitar (MEA). Kebanyakan MEA ini ditubuhkan dan ditadbirurus oleh Pertubuhan Bangsa-Bangsa Bersatu (PBB). Ia dipanggil perjanjian alam sekitar dua hala jika perjanjian itu adalah di antara dua negara sahaja.

Perjanjian antarabangsa MEAs ini ditubuhkan berdasarkan fokus dan pendekatan masing-masing. Konvensyen Stockholm bertujuan untuk menghapuskan bahan pencemar organik yang *persistent* dan ianya adalah unik kerana melarang penggunaan sebarang bahan kimia yang baru yang mempunyai ciri-ciri POPs. Konvensyen Rotterdam pula menyediakan mekanisme kawalan untuk mengharamkan import bahan kimia sekiranya membahayakan kesihatan manusia dan alam sekitar. Ianya juga menyediakan satu mekanisme untuk pertukaran maklumat saintifik, maklumat perundangan dan ekonomi mengenai bahaya, risiko, toksikologi dan ekotoksikologi bahan-bahan kimia tertentu. MEAs terkini yang telah diperkenalkan di peringkat antarabangsa ialah Konvensyen Minamata mengenai Merkuri . Objektif konvensyen baru ini adalah untuk melindungi kesihatan manusia dan alam sekitar daripada pengeluaran antropogenik dan pelepasan Merkuri serta sebatian Merkuri.

Malaysia telah meratifikasi Konvensyen Rotterdam pada 4 September 2002, dan Kementerian Sumber Asli dan Alam Sekitar (NRE) telah dilantik sebagai *focal point* manakala Jabatan Alam Sekitar (JAS) dilantik sebagai Pihak Berkuasa Kebangsaan yang ditetapkan (DNA) bagi bahan kimia industri. Untuk Konvensyen Minamata mengenai Merkuri, negara Malaysia telah menandatanganinya pada 24 September 2014 dan Kementerian Sumber Asli dan Alam Sekitar (NRE) dilantik sebagai *focal point* dan dalam usaha untuk meratifikasi konvensyen tersebut dalam masa terdekat.

THE INTERNATIONAL MULTILATERAL ENVIRONMENTAL AGREEMENTS (MEAS) FOR CHEMICALS

As far as chemicals are concerned in daily life, more chemicals in terms of types and volumes have been formulated and manufactured to accommodate the needs of global market. This is particularly concern when the decision to ban and severely restrict the use of the chemicals in exporter's country is based on scientific evidences where the chemical risks cannot be tolerated and accepted, and continuous use of such chemicals can cause adverse effects to human health and the environment. In this regards, a multilateral environmental agreement (MEA) is a legally binding agreement between three or more states relating to the environment been introduced. They are predominantly produced by the United Nations. It is called a bilateral environmental agreement if the agreement is between two nation states.

These MEAs can be grouped according to their focus and approach. The Stockholm Convention aims to eliminate persistent organic pollutants and is unique in that it prohibits the production of any new chemicals with POPs characteristics. The Rotterdam Convention provides both a mechanism for banning the import of a chemical on the grounds of human health and environmental concerns, but it is also important in providing a mechanism for exchange of scientific, legal and economic information regarding the hazards, risks, toxicology and ecotoxicology of certain substances. The latest MEAs that been introduce is a Minamata Convention on Mercury. The objective of this new convention is to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

Malaysia ratified Rotterdam Convention on 4 September 2002, and the Ministry of Natural Resources and Environment (NRE) served as the focal point while Department of Environment (DOE) served as Designated National Authority (DNA) for industrial chemicals. For the Minamata Convention on Mercury, Malaysia had become signatory party on 24 September 2014 and the Ministry of Natural Resources and Environment (NRE) as the focal point are looking forward to ratify the convention soon.

Penyelarasan untuk pelaksanaan perjanjian multilateral alam sekitar (MEAs) menyediakan ruang untuk pengurusan kitaran bahan kimia yang menyeluruh di peringkat kebangsaan, serantau dan antarabangsa. Selain itu, terdapat juga peluang untuk penyelarasan dan pengharmonian dasar, pengurusan maklumat, kemahiran teknikal, pembangunan kapasiti dan latihan, serta bidang perundangan. Sinergi antara MEAs bahan kimia adalah salah satu cara untuk membina rangka kerja antarabangsa dan serantau yang berkesan untuk mengurangkan dan mencegah kesan bahan kimia toksik dan buangan berbahaya.

The coordinated implementation of chemical multilateral environmental agreements (MEAs) can provide real opportunities for full life cycle management of chemicals at a national, regional and international level. There are opportunities for coordination and harmonisation in policy, information management, technical skills, capacity building and training, as well as legislation. The synergy between the chemical MEAs is one way of building effective international and regional frameworks to minimise and prevent the impacts of toxic chemicals and hazardous waste.

Basel Convention

Rotterdam Convention

Stockholm Convention

UNEP MINAMATA CONVENTION ON MERCURY

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

Sepanjang tahun 2015, sejumlah 1006 ahli 3P telah dilantik di seluruh negara yang melibatkan 79 kawasan parlimen yang telah dikenalpasti. JAS telah menerima sejumlah 88 pelaporan daripada ahli 3P berhubung kes pencemaran seperti berikut:

3P

Pollution Monitoring Team (PMT) is one of the programmes under Friends of the Environment (RAS) which acts as the 'eyes' and 'ears' to assist, monitor and report local pollution problems to the DOE. This will enable DOE to take fast and efficient action on complaint cases particularly recurring complaints.

Membership of PMT includes representatives from members of the JKKK, Village Leaders, Penghulus, Religious Communities, Resident Association and also Politicians.

Throughout 2015, a total of 1006 members of PMT were appointed nation wide involving 79 parliamentary constituencies. DOE received 88 reports from PMTs related to pollution cases as follows:

Jenis Pencemaran Type Of Pollution	Bil. Maklumat Diterima Jas No. Of Information Cases 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

Bengkel kepimpinan dan pemurnian 3P
Leadership workshops and purification 3P

Penyerahan kelengkapan keselamatan kepada ahli 3P
Safety equipment delivery to members 3P

Demo penggunaan drone untuk mengesan aktiviti pembakaran terbuka
Demo on how to used drone to detect activities open burning

Penerangan penggunaan alat pm 2.5 Kepada ahli 3P, ngo dan agensi kerajaan
Instruction on how to use of the tools pm 2.5 3P for ngo and government agency

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 2015, sejumlah 63 buah kilang getah asli mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Getah Asli Mentah), 1978. Daripada jumlah ini, 47 buah kilang telah dilesenkan bagi melepaskan efluen yang telah diolah ke alur air, sebuah kilang telah dilesenkan untuk melepaskan effluen ke atas tanah, manakala 15 buah kilang dibenarkan untuk mengitar semula efluen. Tempoh lesen yang diberikan adalah berbeza bagi setiap premis dari satu hingga tiga tahun dan bergantung kepada prestasi pematuhan kilang-kilang tersebut terhadap syarat-syarat lesen. **Rajah 4.4** menunjukkan bilangan kilang getah asli mentah mengikut negeri.

Dalam tahun 2015, pegawai-pegawai penguatkuasa JAS Negeri telah menjalankan sejumlah 175 pemeriksaan ke atas 63 buah kilang getah asli mentah yang telah dilesenkan. 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 4.4.**

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.

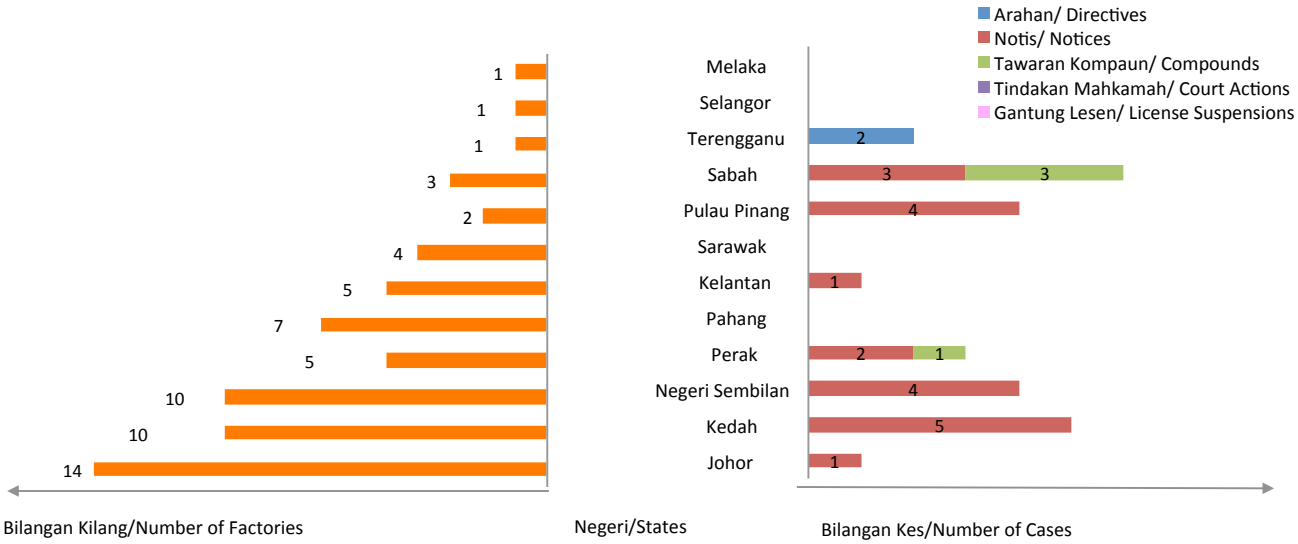
RAW NATURAL RUBBER

In 2015, there were 63 raw natural rubber factories licensed under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978. Out of these, 47 factories were licensed to discharge treated effluent into inland watercourse, one (1) was permitted to practise land disposal, while the remaining 15 were allowed to recycle their effluent. The licensing periods of these premises vary from one to three years depending on the level of compliance to the conditions of the licences. **Figure 4.4** shows the distribution of raw natural rubber factories according to States.

Throughout 2015, state DOE enforcement officers has conducted 175 inspections on 63 licensed raw natural rubber factories. Those factories with low compliance record previously were given priority for inspections. Follow up actions were taken as a result of these inspections are as shown in **Figure 4.4**.

Sejumlah 2 arahan lapangan dan 20 notis arahan telah dikeluarkan kepada premis-premis tersebut supaya mengambil tindakan pembaikan bagi mematuhi keperluan perundangan. Sebanyak empat (4) kompaun telah dikeluarkan bagi kesalahan-kesalahan yang telah dilakukan. Manakala dua (2) premis dalam tindakan mahkamah **(Rajah 4.4)**.

A total of 2 field citations and 20 notices were issued to the concerned premises to take corrective actions in order to comply with the legal requirements. Four (4) compounds were issued for the offences committed. Meanwhile legal action was taken against two (2) premises. **(Figure 4.4).**



Rajah 4.4 JAS : Tindakan Undang-Undang Terhadap Kilang Getah Asli Mentah, 2015
Figure 4.4 DOE : Legal Actions Against Raw Natural Rubber Factories, 2015

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (PREMIS YANG DITETAPKAN) (GETAH ASLI MENTAH), 1978

Pada tahun 2015, 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 2015, 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 2015, 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 2015, the overall compliance performance by the raw natural rubber factories was 100%.

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (BUANGAN TERJADUAL), 2005

Pada tahun 2015, 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 2015, overall compliance performance by the raw natural rubber factories for the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 100%.

KILANG KELAPA SAWIT MENTAH

Sejumlah 450 buah kilang kelapa sawit mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Kelapa Sawit Mentah), 1977 pada tahun 2015 seperti ditunjukkan di jadual berikut:

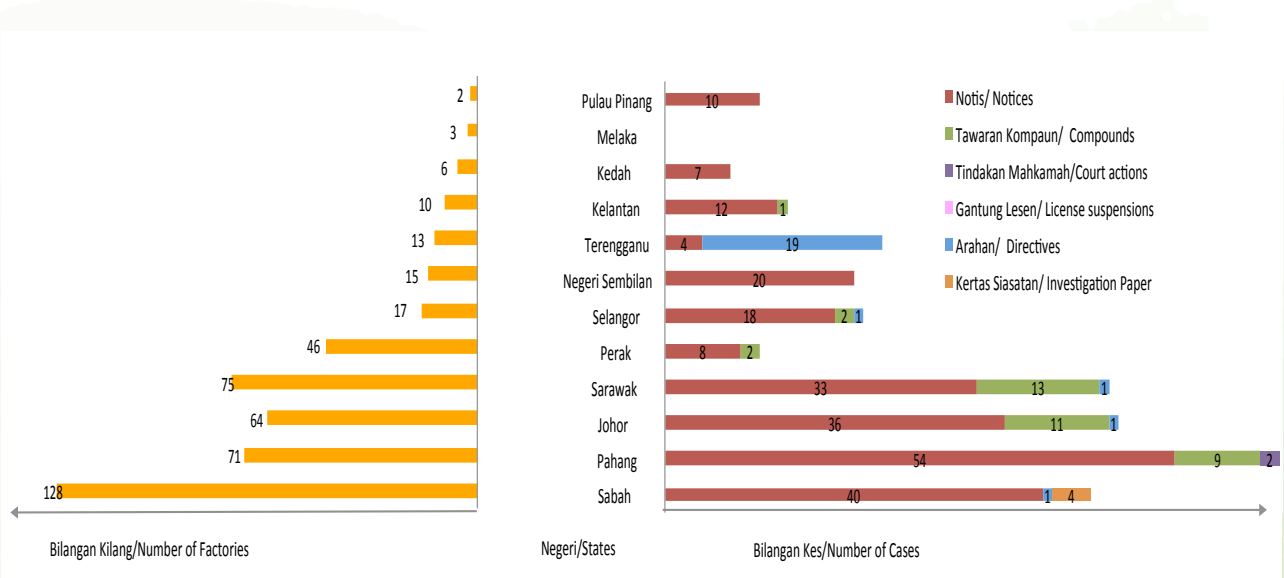
CRUDE PALM OIL

There were 450 palm oil mills licensed under the Environmental Quality (Prescribed Premises) (Crude Palm Oil Mill) Regulations, 1977 in the year 2015 as shown in the table below:

Jenis Lesen Type of License	Bilangan kilang dilesenkan No.Of Premises
Pelepasan effluent yang diolah ke alur air Discharge treated effluent intoland watercourse	313
Pelupusan effluent ke atas tanah Land disposal	84
Pelupusan effluent secara gabungan kaedah alur air dan atas tanah Discharge effluebt by combination into inland watercourse and land disposal	23
Pelupusan effluent effluent kaedah kompos Composting	7
Pelupusan secara gabungan kaedah alur air dan kompos Combination of inland watercourse and composting	23
Jumlah / Total	**450**

Rajah 4.5 menunjukkan taburan bilangan kilang kelapa sawit mentah di Malaysia mengikut negeri.

Figure 4.5 shows the distribution of palm oil mills in Malaysia according to states.



Rajah 4.5 JAS : Tindakan Undang-Undang Terhadap Kilang Minyak Kelapa Sawit Mentah, 2015
Figure 4.5 DOE : Legal Actions Against Crude Palm Oil Mills, 2015

Sepanjang tahun 2015, sejumlah 1,066 pemeriksaan ke atas 450 kilang kelapa sawit yang dilesenkan telah dilaksanakan oleh pegawai-pegawai penguatkuasa JAS Negeri. Tindakan susulan hasil pemeriksaan tersebut adalah seperti yang ditunjukkan dalam **Rajah 4.5** dan seperti di **Jadual 4.21**.

Throughout 2015, a total of 1,066 inspections on 450 licensed palm oil mills were conducted by State DOE enforcement officers. Follow-up actions taken as a result from these inspections are as shown in Figure 4.5 and in **Table 4.21**.

JADUAL 4.21: TINDAKAN SUSULAN HASIL PEMERIKSAAN, 2015
TABLE 4.21: FOLLOW UP ACTIONS TAKEN, 2015

Tindakan susulan hasil pemeriksaan / Follow up actions taken	Jumlah / Total
Arahan lapangan / Field Citation	23
Notis arahan / Notices	242
Kompaun / Compounds	38
Kertas Siasatan / Investigation Paper	4
Mahkamah / Court	2
Denda / Fines	RM 14,000

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (PREMIS YANG DITETAPKAN) (MINYAK KELAPA SAWIT MENTAH), 1977

Pada tahun 2015, pencapaian pematuhan keseluruhan kilang kelapa sawit mentah yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Minyak Kelapa Sawit Mentah) 1977 adalah 98%.

STATUS OF COMPLIANCE WITH THE ENVIRONMENTAL QUALITY (PRESCRIBED PREMISES) (CRUDE PALM OIL) REGULATIONS, 1977

In 2015, 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 98%.

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (UDARA BERSIH), 1978

Kilang minyak kelapa sawit mentah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978. Pada tahun 2015, pencapaian pematuhan keseluruhan oleh kilang minyak kelapa sawit mentah adalah 99%.

STATUS OF COMPLIANCE WITH THE ENVIRONMENTAL QUALITY (CLEAN AIR) REGULATIONS, 1978

Palm oil mills are also subjected under the Environmental Quality (Clean Air) Regulations, 1978. In 2015, the overall compliance performance by palm oil mills was 99%.

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (BUANGAN TERJADUAL), 2005

Pada tahun 2015 pencapaian pematuhan keseluruhan kilang minyak kelapa sawit di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 adalah 98%.

STATUS OF COMPLIANCE WITH THE ENVIRONMENTAL QUALITY (SCHEDULED WASTES) REGULATIONS, 2005

In 2015, the overall compliance performance by the palm oil mills under the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 98%.

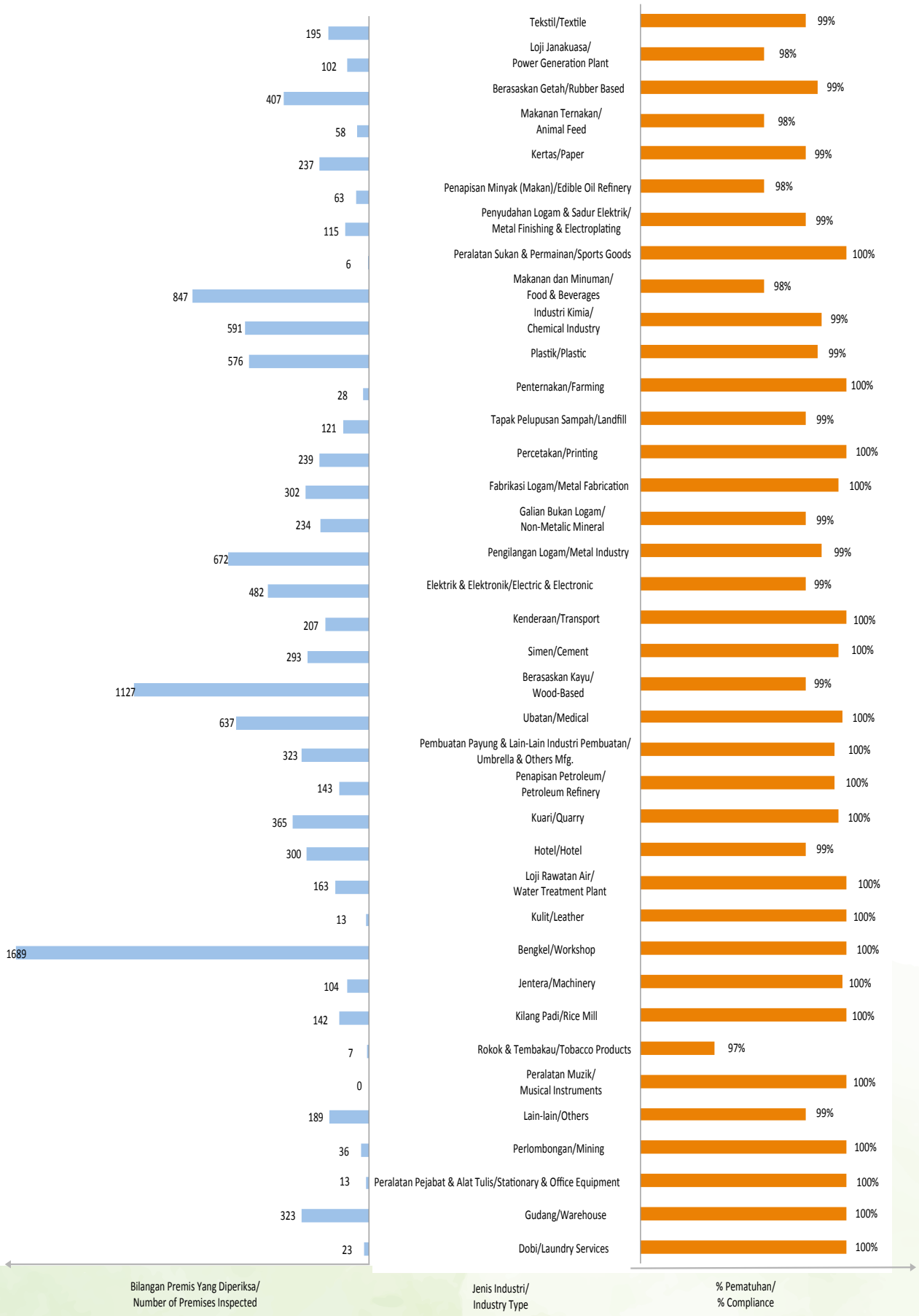
KAWALAN PREMIS YANG BUKAN DITETAPKAN
CONTROL OF NON-PRESCRIBED PREMISES

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 tahun 2015 JAS telah menjalankan 11,372 pemeriksaan ke atas 38 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009. Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 99%. Terdapat 20 kategori industri mencapai pematuhan 100%, pada tahun 2015 **(Rajah 4.6).**

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. In 2015 DOE conducted 11,372 inspections on 38 categories of industrial premises and other non-prescribed premises that were subjected to the Environmental Quality (Industrial Effluents) Regulations, 2009. The overall compliance achievement by the non-prescribed premises was 99%. There were 20 categories of industries achieved 100% compliance in 2015 **(Figure 4.6)**.



Rajah 4.6 JAS : Status Pematuhan Industri Terhadap Peraturan- Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009, 2015

Figure 4.6 DOE : Status of Compliance to the Environmental Quality (Industrial Effluent) Regulations 2009, 2015

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 2015, JAS telah menjalankan 12,828 pemeriksaan kepada 40 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 99%. Terdapat 13 kategori industri mencapai pematuhan 100% peraturan tersebut pada tahun 2015. **(Rajah 4.7)**

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 2015, DOE conducted 12,828 inspections on 40 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 13 categories of industries achieved 100% compliance to the regulation in 2015. **(Figure 4.7)**

Rajah 4.7 JAS : Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978, 2015

Figure 4.7 DOE : Status of Compliance to the Environmental Quality (Clean Air) Regulations 1978, 2015

STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (BUANGAN TERJADUAL), 2005

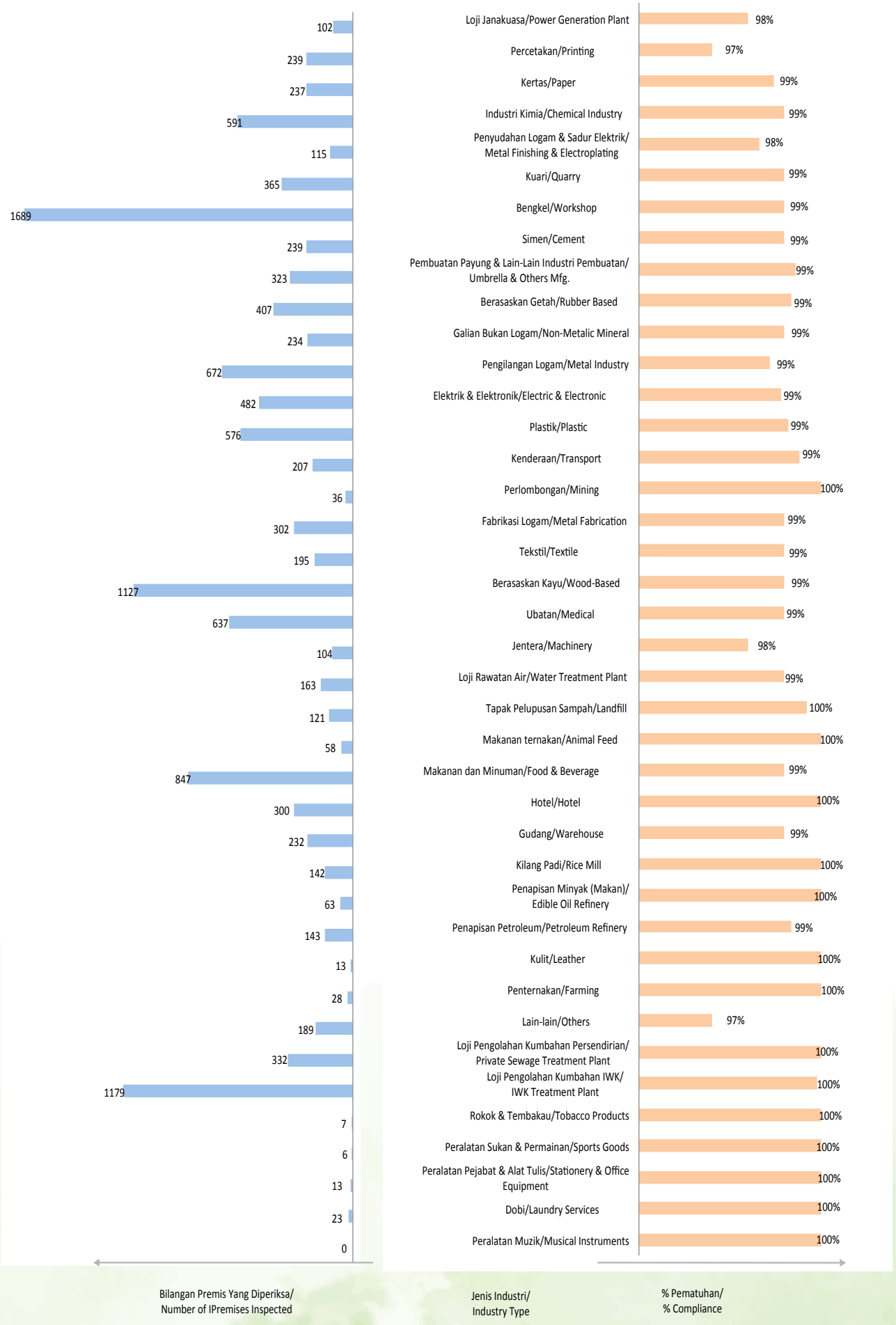
Premis-premis yang bukan ditetapkan adalah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005. Pada tahun 2015, JAS telah menjalankan 12,738 pemeriksaan ke atas 40 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan. Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 99%. Antara kegagalan pematuhan yang direkodkan adalah 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 2015, terdapat 15 kategori industri mencapai pematuhan 100% terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual), 2005 **(Rajah 4.8)**.

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 2015, the DOE conducted 12,738 inspections on 40 categories of industrial premises and other non-prescribed premises. The overall compliance achieved by the non-prescribed premises was 99%. Among the non-compliances recorded were (i) failure to submit notifications of scheduled wastes generation (ii) improper storage and improper labelling of scheduled wastes and, (iii) failure to keep accurate and up-to-date inventory records of scheduled wastes (Regulations 3, 8, 9, 10 and 11).

In 2015, there were 15 categories of industries that were subjected under the Environmental Quality (Scheduled Wastes) Regulations, 2005 achieved 100% compliance **(Figure 4.8).**



Rajah 4.8 JAS: Status Pematuhan Industri Tehadap Peraturan-Peranturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005, 2015

Figure 4.8 DOE: Compliance Status to the Enviromental Quality (Scheduled Waste) Regulations 2005, 2015

TINDAKAN PENGUATKUASAAN

Sejumlah 259 kes bagi premis yang tidak patuh telah dituduh di mahkamah bagi RM 7,546,600 denda telah dipungut. Tindakan-tindakan penguatkuasaan lain yang diambil adalah pengeluaran 223 arahan lapangan, 2,121 notis arahan dan 1,520 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 :

(i) memasang alat kawalan pencemaran yang sesuai dan efisien,
(ii) meningkatkan keupayaan kemudahan kawalan pencemaran yang sedia ada; dan
(iii) 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 pencemaran 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.

ENFORCEMENT ACTIONS

A total of 259 cases of non-compliance premises were charged in courts with a fine of RM 7,546,600 collected. Other enforcement actions taken against the non-complying industries were issuance of 223 field citations, 2,121 notices and 1,520 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.

To further improve compliance to regulations, DOE issued directives to the industries to :

(i) install appropriate and efficient control equipment,

(ii) upgrade existing pollution control facilities; and

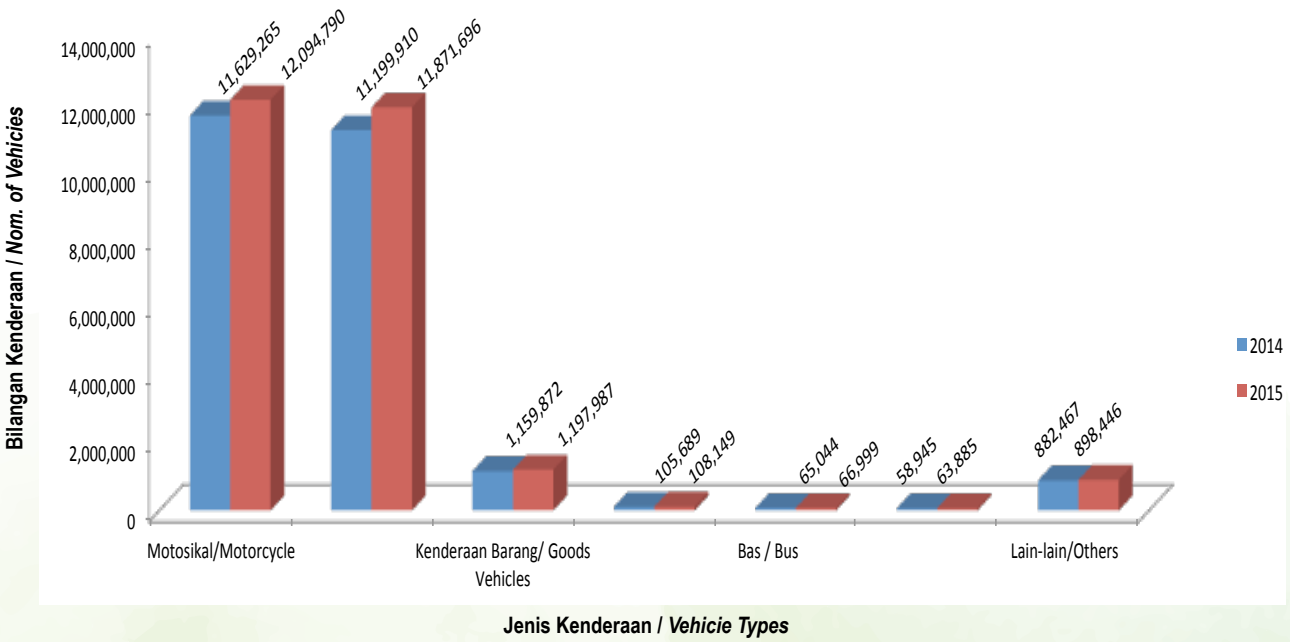
(iii) to have a good planning and implementation schedule of environmental management systems.

In addition, various awareness activities were conducted 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 DOE, in its effort to ensure full compliance, also promoted the adoption of more efficient pollution control technologies, cleaner production practices as well as self-regulation. The industries were also advised to set up a good environmental management system and be ISO 14000-certified.

KENDERAAN BERMOTOR
MOTOR VEHICLES

Sehingga akhir tahun 2015, sebanyak 26,301,952 buah kenderaan bermotor telah berdaftar di Malaysia, iaitu pertambahan sebanyak 1,200,760 buah kenderaan (4.78%) berbanding tahun 2014. Pecahan keseluruhan kenderaan bermotor yang berdaftar mengikut jenis kenderaan adalah seperti di **Rajah 4.14**.

As of end of 2015, a total of 26,301,952 motor vehicles were registered in Malaysia, an increase of 1,200,760 units (4.78%) compared to 2014. The breakdown of the total registered vehicles according to vehicle types is given in **Figure 4.14**.



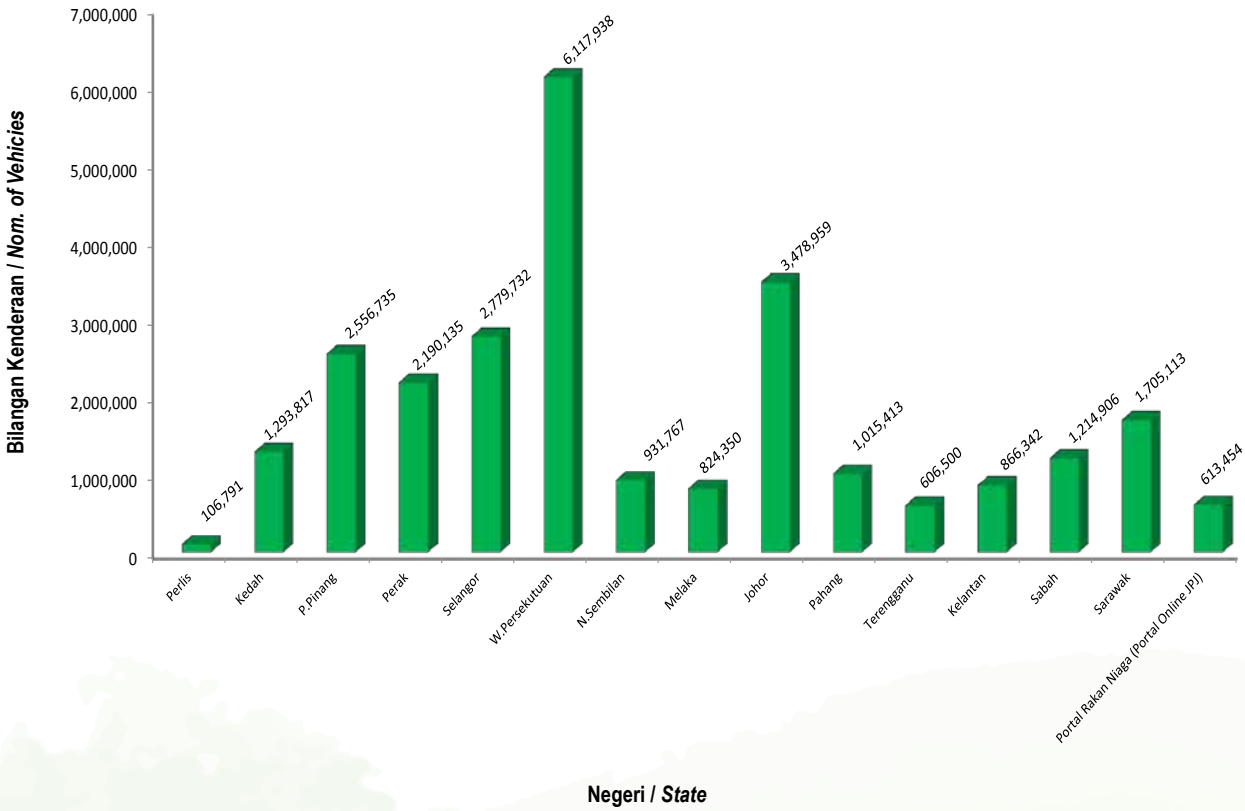
Rajah 4.14 JAS: Bilangan Kenderaan Bermotor Mengikut Jenis, 2015 (Sumber : Jabatan Pengangkutan Jalan, 2015)
Figure 4.14 DOE: Number of Motor Vehicles by Type, 2015 (Source : Road Transport Department, 2015)

Dari sejumlah 1,200,760 buah kenderaan baru yang didaftarkan dalam tahun 2015, kategori kereta merupakan yang tertinggi iaitu sebanyak 671,786 unit (55.95%) diikuti motosikal sebanyak 465,525 unit (38.77%), manakala sebanyak 63,441 unit (5.28%) adalah dari lain-lain jenis kenderaan termasuk lori, bas, van dan sebagainya.

Taburan bilangan kenderaan bermotor di Malaysia mengikut negeri adalah seperti di **Rajah 4.15**. Wilayah Persekutuan Kuala Lumpur mendahului negeri-negeri lain dengan mempunyai bilangan kenderaan yang tertinggi iaitu sebanyak 6,117,938 unit (atau 23.26%) daripada keseluruhan bilangan kenderaan yang berdaftar di negara ini, diikuti oleh negeri Johor, Selangor, P. Pinang dan Perak.

Out of 1,200,760 new vehicles registered in 2015, motorcars comprise the highest number with 671,786 units (55.95%) followed by motorcycles 465,525 units (38.77%). Meanwhile the remaining 63,441 units (5.28%) were from the other vehicle types such as lorries, buses, vans and others.

The distribution of registered vehicles throughout the states is given in Figure 4.15. The Federal Territory of Kuala Lumpur recorded the highest number of vehicles registered, with 6,117,938 units (atau 23.26%) followed by Johor, Selangor, Penang and Perak.



Rajah 4.15 JAS: Bilangan Kenderaan Bermotor Mengikut Negeri, 2015
Figure 4.15 DOE: Number of Motor Vehicles by State, 2015

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 (NO_x) 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 ujian 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.

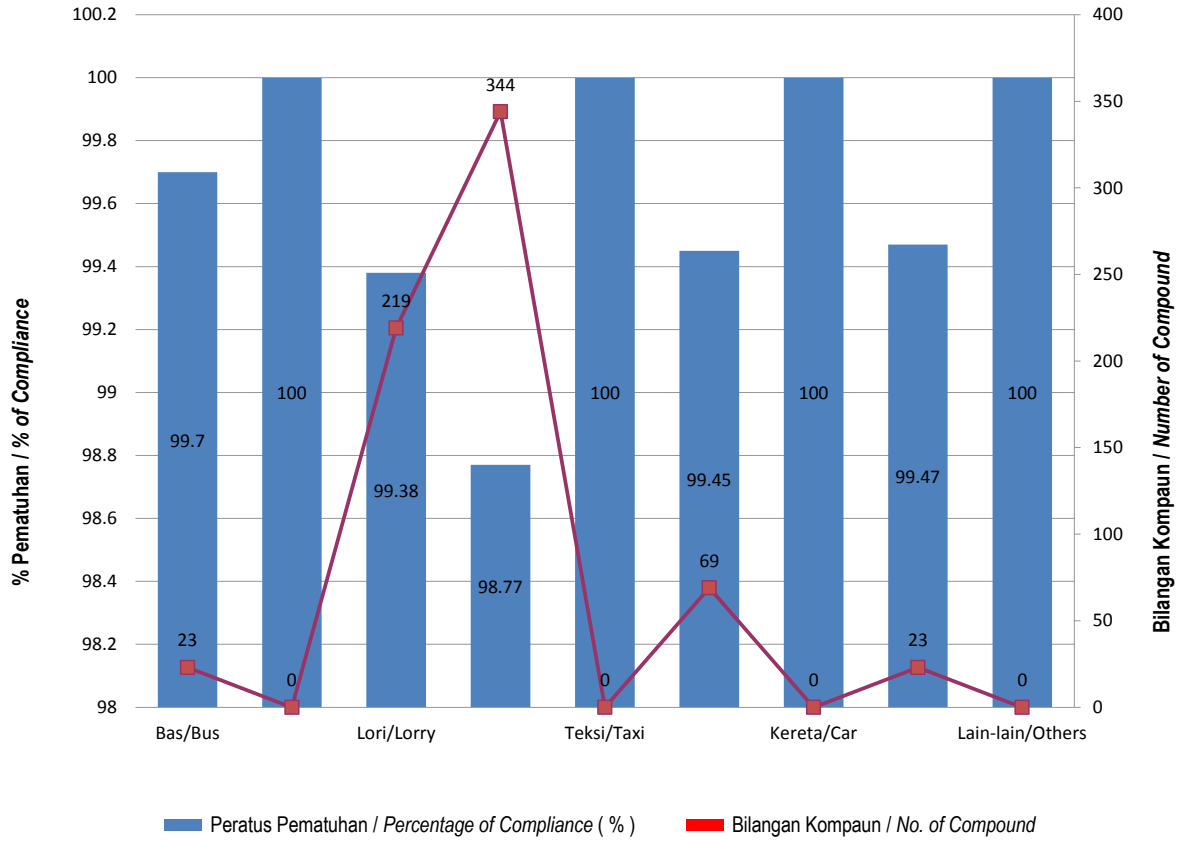
Compounds were issued on-the-spot to the drivers and owners if their vehicles fail to comply with the stipulated smoke limit of 50 HSU. A prohibition order (prohibiting vehicle use) will be issued if the smoke limit exceeds 70 HSU.

Pada tahun 2015, sebanyak 4,028 program penguatkuasaan telah dilaksanakan di bandar-bandar di seluruh negara. Sejumlah 546,343 buah kenderaan diesel telah diperiksa secara visual. Dari jumlah tersebut, sebanyak 684 buah kenderaan telah dikompaun kerana gagal mematuhi had pelepasan asap hitam sebanyak 50 HSU. Manakala 181 kenderaan telah dikenakan perintah larangan beroperasi sehingga lulus ujian asap semula oleh JAS. Pada keseluruhannya, peratus pematuhan oleh kenderaan diesel adalah 99%. Ini adalah penurunan sebanyak 0.71% berbanding dengan tahun 2014.

In 2015, a total of 4,028 enforcement programmes were conducted in the cities throughout the country. A total of 546,343 diesel vehicles were visually inspected. Out of these, 684 vehicles were compounded for failing to comply with the 50 HSU smoke limit while 181 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%.This is an decrease of 0.71% compared to 2014.

Bilangan kenderaan diesel yang dikompaun dan peratus pematuhannya mengikut jenis kenderaan adalah seperti di **Rajah 4.16. Rajah 4.17** pula menunjukkan bilangan kenderaan dikompaun, pengeluaran perintah larangan serta peratus pematuhan mengikut negeri. Tindakan mahkamah telah juga diambil ke atas 35 pemandu serta pemilik kenderaan kerana gagal menjelaskan kompaun yang telah dikenakan. Sejumlah 4,689 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 4.16. Figure 4.17 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 35 drivers and vehicle owners for failing to settle the compounds issued. A total of 4,689 diesel vehicles were instructed to undergo smoke retest at PUSPAKOM.



Rajah 4.16 JAS : Peratus Pematuhan Mengikut Jenis Kenderaan Dan Bilangan Kompaun, 2015
Figure 4.16 DOE : Percentage of Compliance, According To Type Vehicles And Number of Compound 2015

Rajah 4.17 : Bilangan Kenderaan Dikompaun, Pengeluaran Perintah Larangan & Peratus Pematuhan, 2015
Figure 4.17 : Number of Vehicles Compounded, Number of Prohibition Orders Issued & Percentage of Compliance, 2015

KAWALAN PELEPASAN GAS CO DAN HC DARI KENDERAAN PETROL

Sepanjang tahun 2015, sejumlah 3,153 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% iaitu peningkatan sebanyak 0.86% berbanding dengan tahun 2014. 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 2015, a total of 3,153 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% i.e. a increase of 0.86% compared to 2014. 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 yang dikeluarkan 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 2015, Jabatan Alam Sekitar telah mengeluarkan 74 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan petrol yang akan dipasarkan di Malaysia.

TYPE APPROVAL TEST (PETROL VEHICLES)

Malaysia had established exhaust emission standard for new petrol vehicles in order to improve exhaust emission by utilising 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 2015, the Department of Environment has issued 74 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 2015, Jabatan Alam Sekitar telah mengeluarkan 87 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan diesel yang akan dipasarkan di Malaysia.

TYPE APPROVAL TEST (DIESEL VEHICLES)

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 2015, the Department of Environment has issued 87 Type Approval Test Certificates 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 2015, sejumlah 123 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 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 2015, a total of 123 certificates of accreditation were issued to the workshops and vehicle testing centres throughout the country as "Approved Testing Facilities" by DOE.

KAWALAN PELEPASAN ASAP DARIPADA MOTOSIKAL

Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Motosikal), 2003 telah diwartakan dan mula dikuatkuasa mulai 1 Januari 2004. Peraturan ini telah menggariskan piawai pelepasan seperti berikut:-

- Standard Kelulusan Jenis bagi motosikal baru: 97/24/EC; dan
- Standard pelepasan (*idling*) bagi motosikal terpakai: 4.5 % CO (Karbon Monoksida)

Pengimport motosikal adalah dikehendaki mematuhi standard baru pelepasan berkuatkuasa 1 Januari 2005 bagi model baru dan 1 Julai 2005 bagi model sedia ada. Manakala pembuat tempatan hendaklah mematuhi standard pelepasan baru berkuatkuasa 1 Julai 2005 bagi model baru dan 1 Julai 2006 bagi model sedia ada. Pada tahun 2015, sebanyak 102 Sijil Kelulusan Jenis telah dikeluarkan kepada pembuat, pemasang dan pengimport motosikal untuk pasaran tempatan.

CONTROL OF EMISSION FROM MOTORCYCLES

The Environmental Quality (Control of Emission from Motorcycles) Regulations, 2003 has entered into force on 1 January 2004. Under this regulation, the emission standards adopted are as follows:-

- Type Approval Emission Standard for new motorcycles : 97/24/EC; and
- Idling Emission Standard for in-use motorcycles : 4.5 % CO (Carbon Monoxide)

Motorcycle importers are required to comply with the new emission standards effective from 1 January 2005 for new models and 1 July 2005 for current models. While the local manufacturers have to comply with the new emission standards effective from 1 July 2005 for new models and 1 July 2006 for current models. In 2015, a total of 102 Type Approval Test Certificates were issued to the manufacturers, assemblers and importers of motorcycles for the domestic market.

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 2015, sejumlah

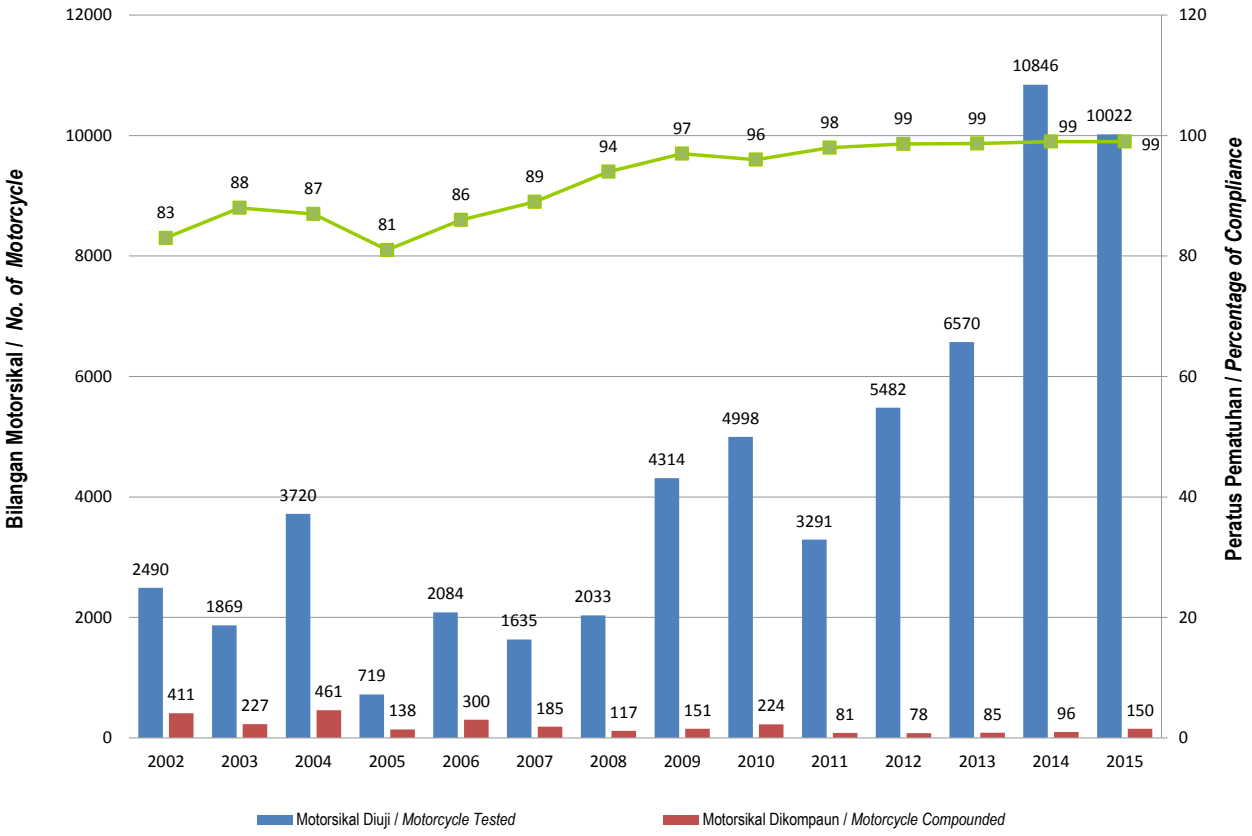
NOISE FROM MOTOR VEHICLES

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 2015, a total of 10,022 motorcycles were detained for the noise inspection. Out of this, 150

10,022 buah motosikal telah ditahan bagi menjalani ujian pelepasan bunyi bising. Dari jumlah ini, 150 penunggang motosikal telah dikompaun oleh pihak polis kerana melanggar had bunyi bising yang dibenarkan. Peratus pematuhan secara keseluruhannya ialah 99% **(Rajah 4.18)** yang mana menurun 0.1% berbanding pada 2014.

motorcyclists were summoned for violating the stipulated noise limits. The overall percentage of compliance is 99% **(Figure 4.18)** which is an decrease of 0.1% compared to 2014.



Rajah 4.18 : Peratus Pematuhan Bilangan Motorsikal Diuji dan Bilangan Kompaun (2001 - 2015)
Figure 4.18 : Percentage of Compliance, Number Of Motorcycle Tested And Compound Issued (2001 - 2015)

TINDAKAN UNDANG-UNDANG
LEGAL ACTION

PENDAKWAAN

Pada tahun 2015, sejumlah 272 kes kesalahan di bawah Akta Kualiti Alam Sekeliling (AKAS) 1974 telah didakwa di mahkamah dengan denda yang dikenakan berjumlah RM 4,031,900. **(Rajah 4.15).**

Daripada jumlah keseluruhan kes tersebut, sebanyak 67 (24.63%) kes mahkamah adalah melibatkan kesalahan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009 dengan jumlah denda sebanyak RM 1,369,000.00 Sebanyak 61 (22.47%) 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 157,000.00

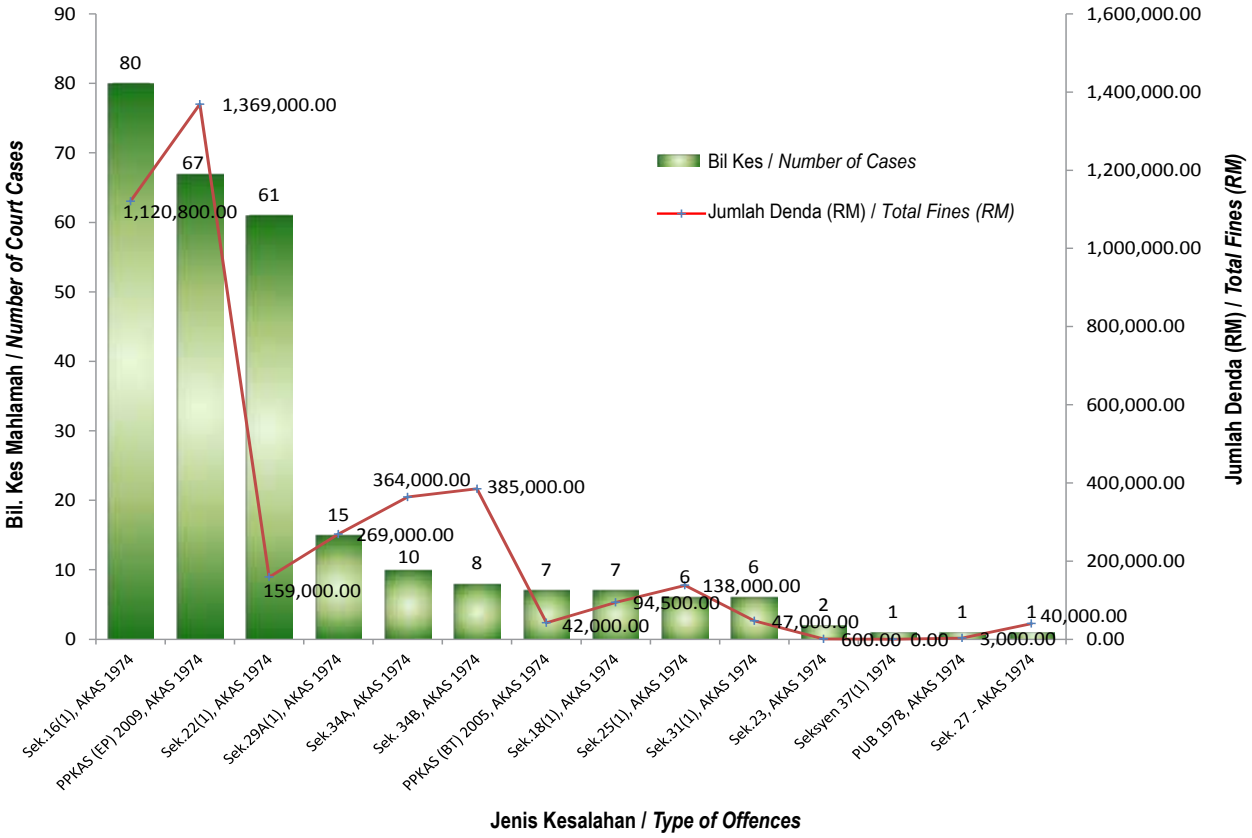
Selain itu, sebanyak 80 (29.41%) kes adalah melibatkan kesalahan pelanggaran syarat lesen di bawah Seksyen 16, AKAS, 1974 dengan jumlah denda sebanyak RM 1,120,800.00 sementara 64 (23.53%) kes yang selebihnya melibatkan kesalahan-kesalahan lain di bawah *AKAS 1974*.

PROSECUTION

In 2015, a total of 272 offences were prosecuted under the Environmental Quality Act (EQA) 1974 with a total fine of RM 4,031,900.**(Figure 4.15).**

Out of this total, 67 (24.63%) court cases involved offences under Environmental Quality (Industrial Effluent) Regulations 2009 with a total fine of RM1,369,000.00. There were 61 (22.47%) 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 157,000.00

Apart from that, 80 (29.41%) cases were violating conditions of licences under Section 16 of the Act with a total fine of RM 1,120,800,00 while the remaining 64 (23.53%) cases were prosecuted for various other offences under the EQA 1974.



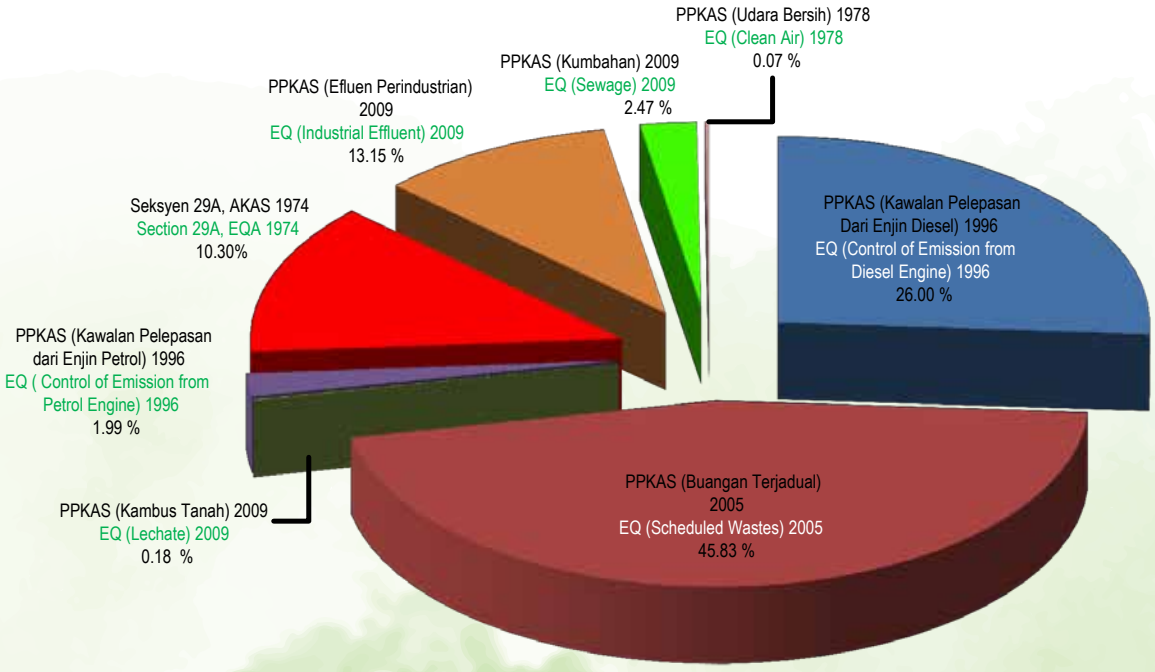
Rajah 4.15 JAS : Bilangan Kes Mahkamah dan Denda, 2015
Figure 4.15 DOE : Number of Court Cases and Fines, 2015

KOMPAUN

Sejumlah 2,708 kompaun telah dikeluarkan sepanjang tahun 2015 kepada premis dan syarikat untuk pelbagai kesalahan di bawah AKAS, 1974. Pecahan mengikut kesalahan adalah seperti di **Rajah 4.16** .

COMPOUNDS

A total of 2,708 compounds were issued in 2015 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 Peraturan Peraturan Kualiti Alam Sekeliling 2015
Figure 4.16 DOE : Number of Compound Cases According to Enviromental Quality Regulations, 2015

MAKLUMBALAS TERHADAP PENGADUAN AWAM
RESPONSE TO PUBLIC COMPLAINTS

Pada tahun 2015, sejumlah 5,624 aduan pencemaran alam sekitar telah diterima oleh Jabatan Alam Sekitar. Sejumlah 4,872 kes aduan telah diambil tindakan di bawah peruntukan Akta Kualiti Alam Sekeliling (AKAS), 1974 dan peraturan-peraturan di bawahnya oleh pejabat JAS Negeri, manakala 751 kes aduan adalah di luar bidangkuasa JAS dan telah dirujuk kepada agensi lain yang berkaitan untuk diambil tindakan. **(Rajah 4.21)**

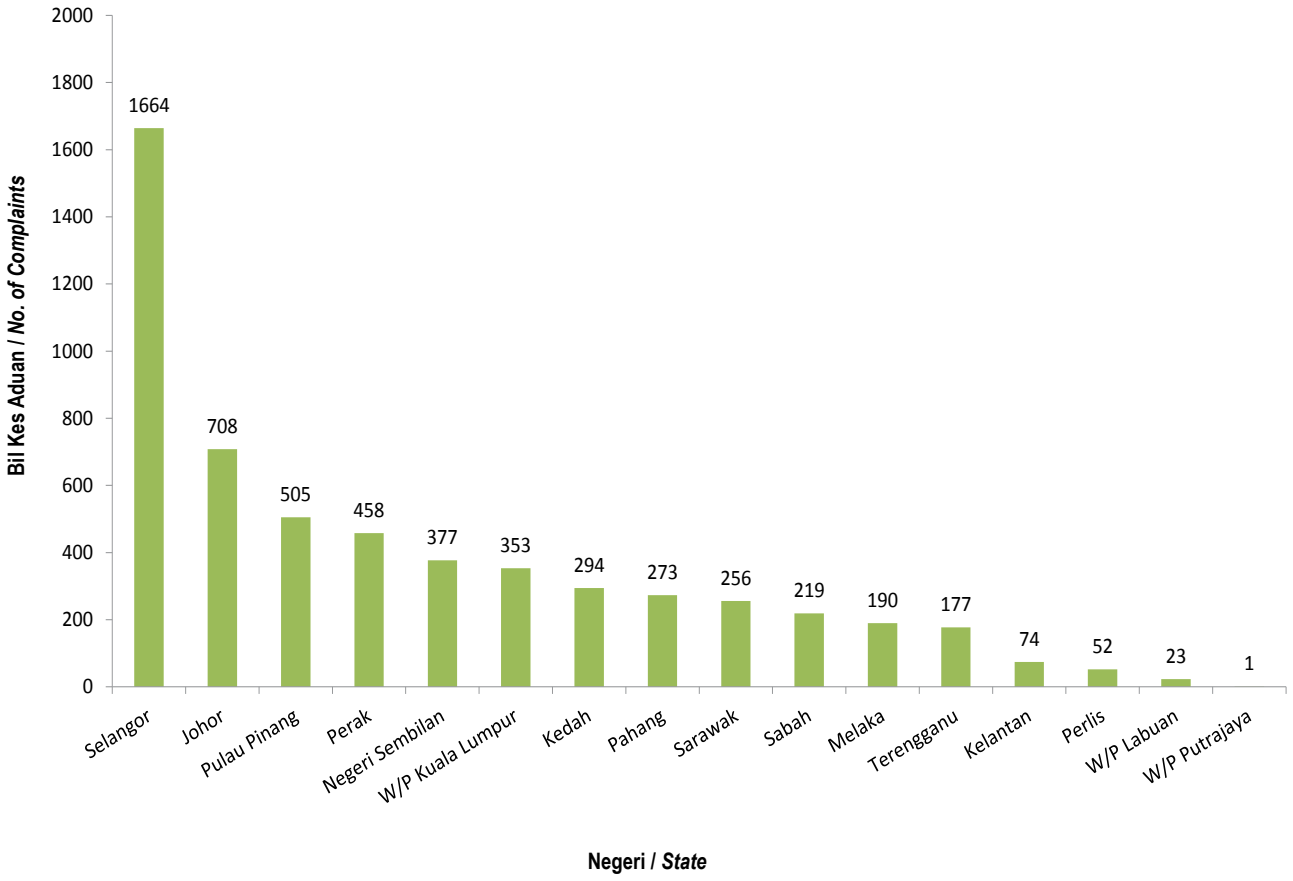
The Department of Environment received 5,624 environmental pollution complaints in 2015. Out of these, 4,872 were under the Environmental Quality Act, 1974 and investigated by the State DOE Officers. Meanwhile, the remaining 751 cases were outside the jurisdiction of DOE and was referred to other relevant agencies. **(Figure 4.21)**

Pada tahun 2015, Selangor menerima aduan yang tertinggi iaitu sebanyak 1,664 (28.9%) kes, diikuti oleh Johor sebanyak 708 (12.3%) kes dan Pulau Pinang sebanyak 505 (8.8%) kes. Wilayah Persekutuan Putrajaya menerima aduan yang paling sedikit iaitu sebanyak 1 (0.02%) kes dan diikuti dengan Wilayah Persekutuan Labuan iaitu sebanyak 23 (0.4%) kes.

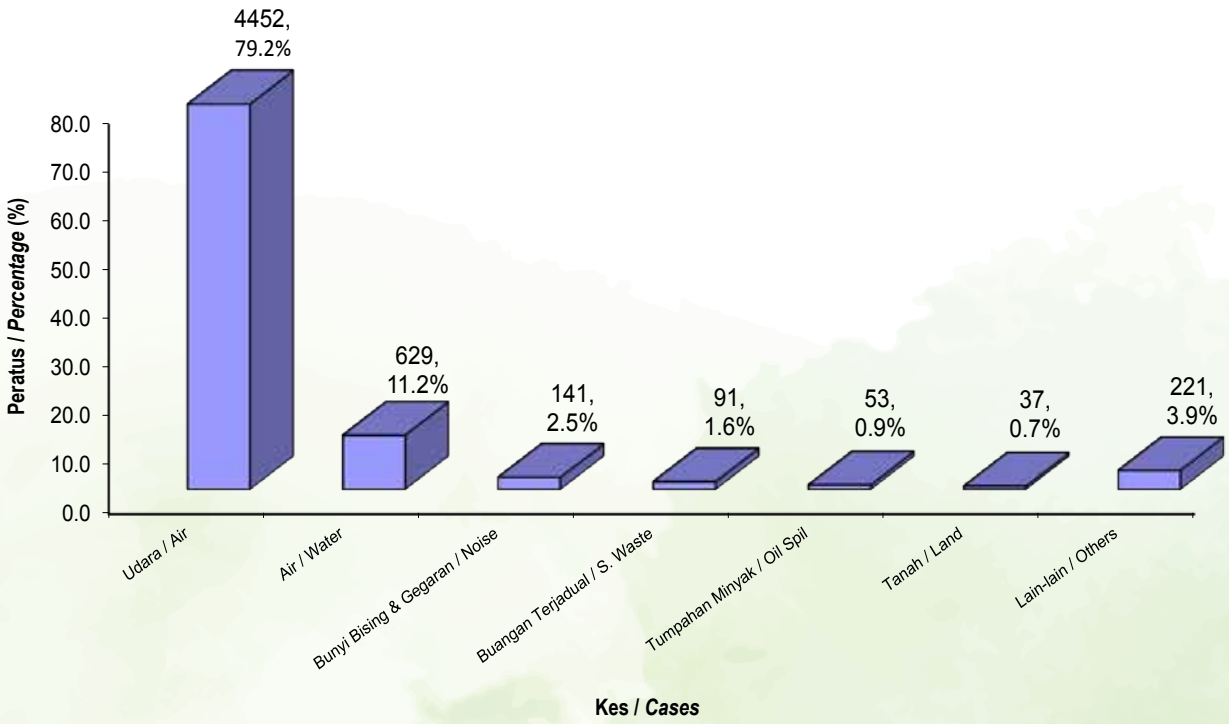
In the year 2015, Selangor recorded 1,664 (28.9%) complaints - the highest number received; followed by Johor 708 (12.3%) and Pulau Pinang 505 (8.8%). Federal Territory of Putrajaya recorded the least number of complaints received with 1 (0.02%) complaints and followed by Federal Territory of Labuan 23 (0.4%).

Seperti tahun-tahun yang sebelumnya, bilangan aduan pencemaran yang tertinggi adalah berkaitan dengan pencemaran udara iaitu sebanyak 4,452 (79.2%) kes, sebanyak 629 (11.2%) kes berkaitan pencemaran air, sebanyak 141 (2.5%) kes berkaitan pencemaran bunyi, sebanyak 91 (1.6%) kes berkaitan buangan terjadual, sebanyak 53 (0.9%) kes berkaitan tumpahan minyak, sebanyak 37 (0.6%) kes berkaitan pencemaran tanah dan sebanyak 221 (3.9%) kes lain-lain aduan **(Rajah 4.22).**

As in the previous years, most of the complaints received were related to air pollution 4,452 (79.2%) cases, followed by 629 (11.2%) water pollution cases, 141 (2.5%) noise pollution cases, 91 (1.6%) on illegal dumping of scheduled or toxic wastes cases, 53 (0.9%) oil spillage cases, 37 (0.6%) land pollution cases and 221 (3.9%) being other complaints cases **(Figure 4.22).**



Rajah 4.21 - JAS : Bilangan Aduan Mengikut Negeri, 2015
Figure 4.21 - DOE : Number of Complaints by State, 2015



Rajah 4.22 JAS: Data Kes Aduan Mengikut Jenis 2015
Figure 4.22 DOE: Data Complaint Cases by Type 2015

Lawatan kerja Timbalan Ketua Pengarah (Operasi) ke Premis Pyrolisis Taman Botani
(Kes Aduan Berulang)
- Ipoh, Perak 14 Januari 2015
Deputy Director-General (Operation) visits to Premises of Geochemical Botanical Garden (Complaint Case Repeats)
- Ipoh , Perak January 14, 2015

Lawatan Kerja Timbalan Ketua Pengarah (Operasi) bagi isu Pencemaran Sungai Rui.
(*Complaint Case Repeats*)
- Gerik, Perak. 16 Februari 2015
Deputy Director-General (Operation) visits to Sungai Rui for pollution issues
- Gerik, perak. 16 February 2015

Lawatan Kerja Ketua Pengarah ke Premis Pyrolisis Taman Botani
- Ipoh, Perak 14 April 2015
Director-General Visit to the Premises of Geochemical breath Botanical Garden
- Ipoh , Perak 14 April 2015

Lawatan kerja Timbalan Ketua Pengarah (Operasi) ke Loji Rawatan Air Semangar
- Kota Tinggi, Johor 15 Mei 2015
Deputy Director-General (Operation) visits to Water Treatment Plant in Semangar
- Kota Tinggi, Johor May 15, 2015

Lawatan ke Premis Biocryst Greentech Sdn. Bhd.
- Sungai Gadut, Negeri Sembilan 01 Julai 2015
Visit to the Premises of BioCryst Greentech Sdn. Bhd.
- Gadut River, Negeri Sembilan July 1, 2015

Lawatan ke Premis Latexx Man. Sdn. Bhd.
- Taiping, Perak 12 Oktober 2015
Visit to the Premises of Latexx Man . Sdn . Bhd .
- Taiping , Perak October 12, 2015