



04.

BAB
CHAPTER

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Air Quality Monitoring and Fire Prevention and Reatland Management Programme

CHAPTER 04

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**PENGAWASAN KUALITI UDARA
DAN PROGRAM PENCEGAHAN
KEBAKARAN DAN PENGURUSAN
TANAH GAMBUT
AIR QUALITY MONITORING AND
FIRE PREVENTION AND REATLAND
MANAGEMENT PROGRAME**

PENGAWASAN KUALITI UDARA

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 jumlah pepejal terampai, habuk halus bersaiz kurang dari 10 mikron (PM10) dan beberapa parameter logam berat termasuk plumbum. Bagi stesen manual ini, pengukuran dibuat setiap enam (6) hari dalam satu bulan



AIR QUALITY MONITORING

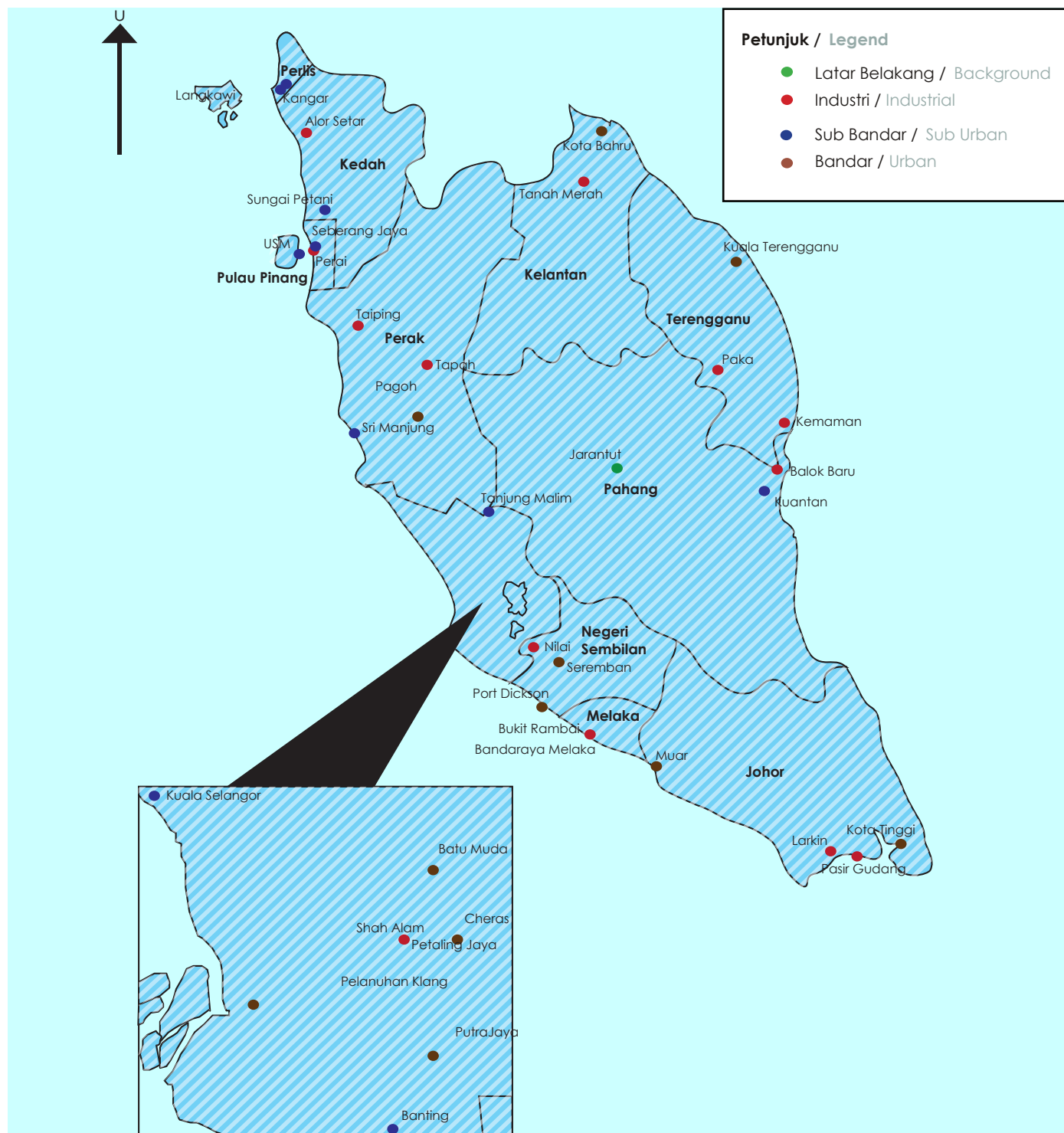
Malaysia's air quality monitoring network consisted of 52 stations located throughout the country to continuously monitor and to detect any significant change in the air quality that can cause negative impact on human health and the environment.

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 volume.

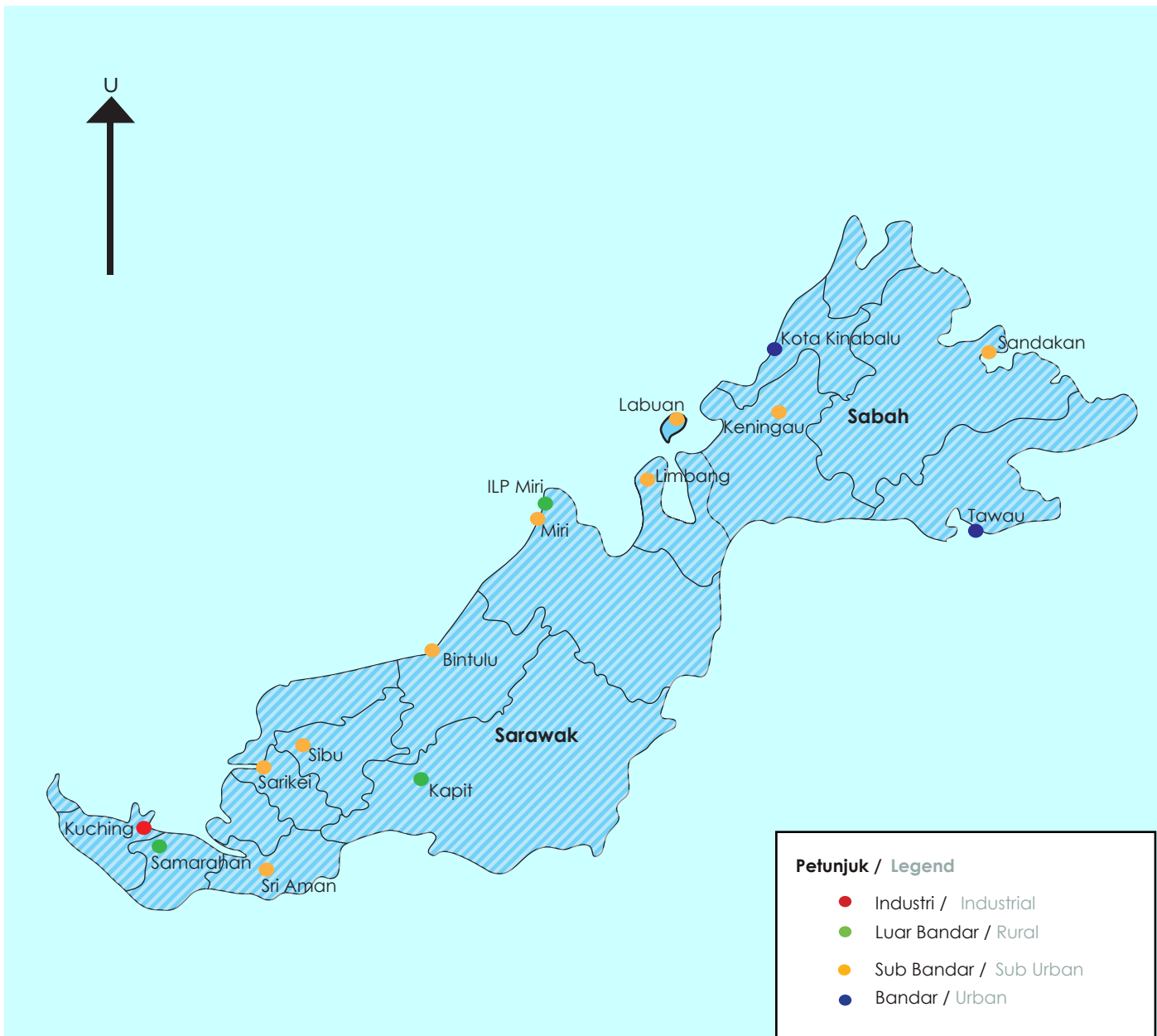
The air quality monitoring network is complemented by the manual air quality monitoring located at 14 different sites. At these sites, total suspended particulate, particulate matter with diameter of less than 10 micron (PM10) and several heavy metals including lead are measured at intervals of six (6) days a month using High Volume Samplers (HVS). During the haze episode in March 2014, portable particulate samplers were also installed in certain areas to monitor the air quality status in areas which were

dengan menggunakan alat High Volume Sampler. Semasa episod jerebu pada bulan Mac 2014, pengawasan kualiti udara dengan menggunakan pengukuran habuk mudah alih juga dilaksanakan di kawasan-kawasan tertentu bagi memantau status kualiti udara di kawasan yang tidak diliputi oleh Rangkaian Stesen Pengawasan Kualiti Udara Kebangsaan seperti di **Peta 4.1 dan 4.2**.

not covered in the National Air Quality Monitoring Network such as in **Map 4.1 and 4.2**.



Peta 4.1 : Semenanjung Malaysia: Lokasi Stesen Pengawasan Kualiti Udara Automatik, 2014
Map 4.1 : Peninsular Malaysia: Location of Continuous Air Quality Monitoring Station, 2014



Peta 4.2 : Sabah & Sarawak: Lokasi Stesen Pengawasan Kualiti Udara Automatik, 2014
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PROGRAM PENCEGAHAN KEBAKARAN TANAH GAMBUS

Pengurusan tanah gambut yang lestari adalah sangat penting bagi mencegah berlakunya pembakaran terbuka tanah gambut yang boleh menyebabkan jerebu setempat. Pembinaan sekatan saluran (check dam) dan telaga air tanah (tube well) 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 saluran (check dam) berjumlah 204 buah iaitu Johor (77), Pahang (49), Sarawak (27), Selangor (23), Kelantan (13), Terengganu (10) dan Sabah (5). Di samping itu juga, sebanyak 51 buah telaga air tanah telah dibina iaitu Pahang (12), Sarawak (10), Johor (10), Kelantan (7), Selangor (7) dan Sabah (5). Manakala sebanyak tiga (3) buah menara tinjau digunakan bagi pemantauan pembakaran terbuka pada musim panas dan kering iaitu masing-masing di Selangor, Pahang dan Sarawak. Pada tahun 2014, sejumlah RM7,332,870.00 telah dibelanjakan bagi program ini.



Sekatan saluran di Muar, Johor
Check dam in Muar, Johor

PEAT LAND FIRE PREVENTION PROGRAM

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) and tube wells 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 204 check dams namely Johor (77), Pahang (49), Sarawak (27), Selangor (23), Kelantan (13), Terengganu (10) and Sabah (5). In addition, a total of 39 tube wells were constructed namely Pahang (12), Sarawak (10), Johor (10), Kelantan (7), Selangor (7) and Sabah (5). A total of three (3) watch towers were also constructed to monitor open burning especially during the dry season namely Selangor, Pahang and Sarawak. In 2014, a total of RM7,332,870.00 was spent for the program.



Telaga Air Tanah di Bachok, Kelantan
Tube Well in Bachok, Kelantan



Menara Tinjau di Penur, Pahang
Watch Tower in Penur, Pahang



Paip Saluran Air di Hutan Simpan Raja Musa, Kuala
Selangor, Selangor bagi meningkatkan paras air gambut
Water Piping in Raja Musa Forest Reserve, Batang
Berjuntai, Selangor to raise peat land water level



Lawatan kerja Y.B Menteri Sumber Asli dan Alam Sekitar
ke Johan Setia, Klang, Selangor pada 5 September 2014
Working Visit Minister Of Natural Resources and
Environment in Johan Setia, Klang, Selangor 5
September 2014



Kolam Takungan di Penur, Pahang
Water Pond in Penur, Pahang

PENGAWASAN KUALITI AIR MARIN KEBANGSAAN

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

Pada tahun 2014, 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). **(Peta 4.3(a) dan 4.3 (b)).(Jadual 4.1).**

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 2014 **(Jadual 4.2).**

NATIONAL MARINE WATER QUALITY MONITORING

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

In 2014, a total of 231 monitoring stations were set up throughout Malaysia including 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). **(Map 4.3(a) and 4.3(b). (Table 4.1)**

Besides that, under the Malaysia-Singapore Joint Committee on the Environment (MSJCE) Monitoring Programme, additional 20 stations were monitored in year 2014 **(Table 4.2).**

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO.	LONGITUDE	LATITUDE
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 TENGGORAK	6497901	99.726665	6.431894

Jadual 4.1JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan,2014 (sambungan)
Table 4.1DOE : Marine Water Quality Monitoring Stations ,2014 (contineud)

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO	LONGITUDE	LATITUDE
		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

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

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

Jadual 4.1JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan,2014 (sambungan)
Table 4.1DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO	LONGITUDE	LATITUDE
		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

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO	LONGITUDE	LATITUDE
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
		PANTAI/COASTAL	TANJUNG BIN	1336975	103.550442	1.332734
		PANTAI/COASTAL	PELABUHAN TANJUNG PELEPAS	1438918	103.547484	1.352898

Jadual 4.1JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan,2014 (sambungan)
Table 4.1DOE : Marine Water Quality Monitoring Stations ,2014 (contineud)

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO	LONGITUDE	LATITUDE
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

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI STATE	BIL. STESEN NO. OF STATION	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO	LONGITUD LONGITUDE	LATITUD LATITUDE
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 (A)	3934906	103.369147	3.634918
		PANTAI / COASTAL	PANTAI MUHIBBAH BALOK (B)	3934905	103.374712	3.634917
		PANTAI / COASTAL	PANTAI BATU HITAM (A)	3934907	103.369041	3.890134
		PANTAI / COASTAL	PANTAI BATU HITAM (B)	3934908	103.368269	3.885497
		PANTAI / COASTAL	PANTAI BERSERAH (A)	3934910	103.37191	3.857825
		PANTAI / COASTAL	PANTAI BERSERAH (B)	3934909	103.370022	3.868058
		PANTAI / COASTAL	PANTAI TELUK CEMPEDAK (A)	3834911	103.374219	3.814442
		PANTAI / COASTAL	PANTAI TELUK CEMPEDAK (B)	3834912	103.37423	3.810213
		PANTAI / COASTAL	PANTAI TELUK GELOLA (A)	3834913	103.363641	3.801703
		PANTAI / COASTAL	PANTAI TELUK GELOLA (B)	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

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI STATE	BIL. STESEN NO. OF STATION	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO	LONGITUD LONGITUDE	LATITUD LATITUDE
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 (PUKUK 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
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

Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI	BIL. STESEN	KAWASAN	NAMA STESEN	NO. STESEN	LONGITUD	LATITUD
STATE	NO. OF STATION	AREA	STATION NAME	STATION NO	LONGITUDE	LATITUDE
		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 SE-MANTAN	1898901	109.783667	1.818362
		KUALA/ESTUARY	KUALA SUNGAI SAR-AWAK	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

Jadual 4.1JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan,2014 (sambungan)
Table 4.1DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI STATE	BIL. STESEN NO. OF STATION	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO	LONGITUD LONGITUDE	LATITUD LATITUDE
		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 BUNGA	4137922	113.783364	4.063882
		PANTAI/COASTAL	PANTAI BELAWAI	2212913	111.205621	2.219232
SABAH	2	KUALA/ESTUARY	MUARA SUNGAI KUALA PENYU	5453901	115.599506	5.569705
		KUALA/ESTUARY	MUARA SUNGAI MENGGATAL INANAM	5050905	116.114013	6.013351
SABAH	24	PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 1	5053901	115.540582	5.0804
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 2	5053902	115.539556	5.078602
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 3	5053903	115.538447	5.076838
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 4	5053904	115.53511	5.07495
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 5	5053905	115.527711	5.067823
		PANTAI/COASTAL	PANTAI TELUK BRUNEI SIPITANG 6	5053906	115.515725	5.044765
		PANTAI/COASTAL	BORNEO GOLF BONGAWAN	5355901	115.786589	5.538416
		PANTAI/COASTAL	PANTAI MANIS PAPAR	5555901	115.895735	5.734955
		PANTAI/COASTAL	PANTAI MELINSUNG PAPAR	5565902	115.983241	5.78751
		PANTAI/COASTAL	PANTAI TANJUNG ARU KK (REST LIDO)	5656901	116.042759	5.95035
		PANTAI/COASTAL	PANTAI TANJUNG ARU KK (ROLLER SKATING)	5656902	116.043789	5.945757

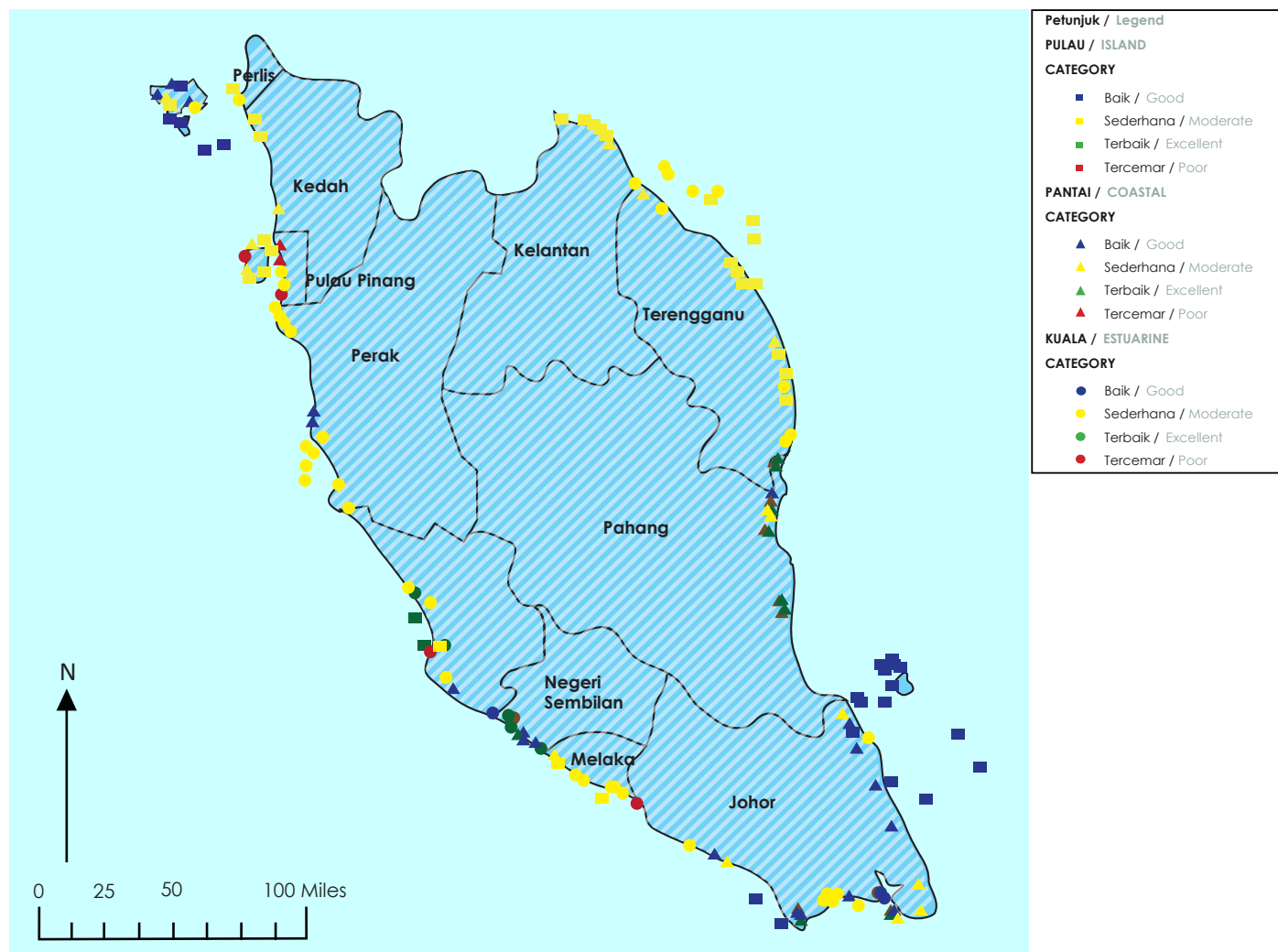
Jadual 4.1 JAS : Stesen Pemantauan Kualiti Air Marin Kebangsaan, 2014 (sambungan)
Table 4.1 DOE : Marine Water Quality Monitoring Stations ,2014 (continueud)

NEGERI STATE	BIL. STESEN NO. OF STATION	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO	LONGITUD LONGITUDE	LATITUD LATITUDE
		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 TU-ARAN	6161901	116.170435	6.191302
		PANTAI/COASTAL	MANGROVE PARA-DISE 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

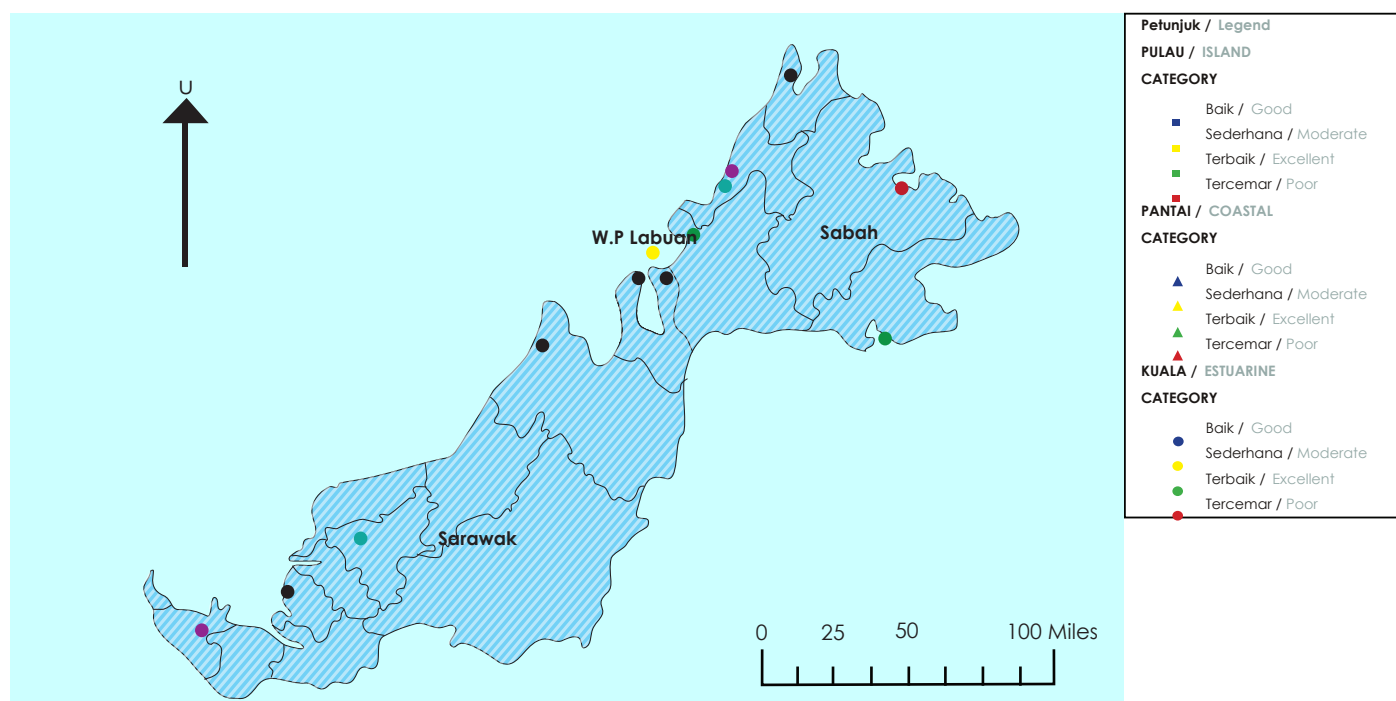
Kuala/ESTUARINE : 76
Pantai/COASTAL : 155
Jumlah/Total : 231

Jadual 4.2 JAS :Stesen Pemantauan 'Jawatankuasa Bersama Malaysia-Singapura Mengenai Alam Sekitar(MSJCE),2014
Table 4.2 DOE :Monitoring Stations under the Malaysia-Singapore Joint Committee on the Environment (MSJCE),2014

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 IS-LAM	SJ7B	103.747500	1.455278
11	JOHOR	PANTAI/COASTAL	TEBING RUNTUH	SJ8	103.668333	1.419444
12	JOHOR	KUALA/ESTUARINE	KUALA SG.MELAYU	SJ8A	103.698056	1.448056
13	JOHOR	PANTAI/COASTAL	TANJUNG BUNGA	SJ9	103.650556	1.385278
14	JOHOR	PANTAI/COASTAL	TANJUNG KUPANG	SJ10	103.653056	1.393333
15	JOHOR	PANTAI/COASTAL	BELUNGKOR	EM4	104.053067	1.440500
16	JOHOR	PANTAI/COASTAL	PULAU TEKONG	EM5	104.076867	1.428417
17	JOHOR	PANTAI/COASTAL	PULAU TEKONG	EM6	104.089000	1.388667
18	JOHOR	PANTAI/COASTAL	JETI PULAREK	EM7	104.077958	1.357444
19	JOHOR	PANTAI/COASTAL	TANJUNG PENGELIH	WQ10	104.094325	1.331283
20	JOHOR	PANTAI/COASTAL	PULAU MERAMBONG	WM1	103.626747	1.338061

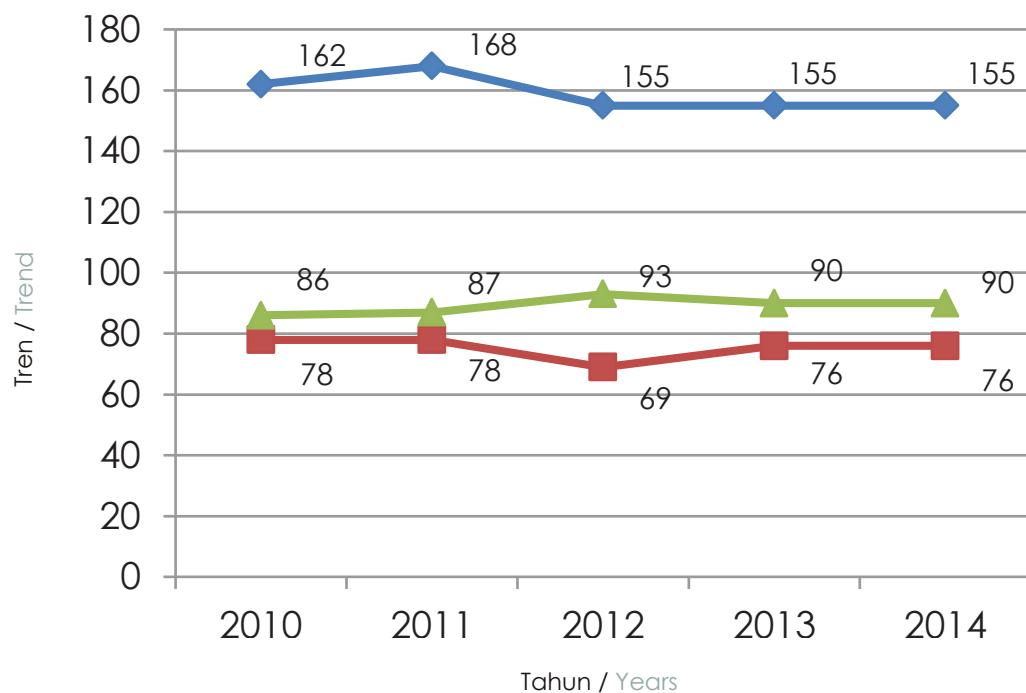


Peta 4.3 (a) Semenanjung Malaysia : Taburan Stesen Pemantauan Kualiti Air Marin, 2014
Figure 4.3 (a) Peninsular Malaysia : Distribution of Marine Water Quality Stations, 2014



Peta 4.3 (b) Sabah dan Sarawak : Taburan Stesen Pemantauan Kualiti Air Marin, 2014
Figure 4.3 (b) Sabah and Sarawak : Distribution of Marine Water Quality Stations, 2014

NEGERI STATE	KUALA / ESTUARY	PANTAI / COASTAL
	BIL. STESEN / NO. OF STATION	BIL. STESEN / NO. OF STATION
PERLIS	2	-
KEDAH	2	8
PULAU PINANG	7	16
PERAK	6	5
SELANGOR	10	4
NEGERI SEMBILAN	2	12
MELAKA	5	8
JOHOR	9	25
PAHANG	-	20
TERENGGANU	13	7
KELANTAN	5	5
SARAWAK	13	16
SABAH	2	24
LABUAN	-	5
JUMLAH / TOTAL	76	155



Rajah 4.1 Malaysia : Tren bilangan stesen pengawasan 2010-2014
Figure 4.1 Malaysia : The number of trend of monitoring station 2010-2014

PENGAWASAN KUALITI AIR MARIN PULAU-PULAU

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 2014, program ini telah dilaksanakan di sekitar 74 buah pulau terpilih dan melibatkan 90 stesen pengawasan. Pulau-pulau ini dikelaskan mengikut tempat kategori iaitu Pulau Pembangunan (3) ; Pulau Peranginan (30) ; Pulau Taman Laut (29) ; dan Pulau Yang Dilindungi (12) (**Jadual 4.3**). Kekerapan persampelan bagi Pulau Pembangunan adalah sebanyak enam (6) kali setahun manakala bagi pulau yang lainnya adalah sebanyak empat (4) kali setahun.

Pengukuran parameter-parameter fizikal kualiti air marin dibuat secara in-situ seperti suhu, pH, konduktiviti, kemasinan, oksigen terlarut dan kekeruhan manakala 14 parameter yang dianalisis di makmal pula adalah seperti jumlah pepejal terampai, *Escherichia coli* (E.coli), nitrat, fosfat, jumlah karbon organik, minyak dan gris logam berat termasuklah Merkuri (Hg), Kadmium (Cd), Kromium (Cr), Kuprum (Cu), Plumbum (Pb), Arsenik (As) dan Tributyltin (TBT) serta Triphenyltin (TPT) (**Jadual 4.4**). Percontohan bebola tar di pantai juga dilaksanakan.

ISLAND MARINE WATER QUALITY MONITORING

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 2014, the programme was conducted at 74 selected islands covering 90 monitoring stations. Islands are classified into four categories; Development Islands (3); Resort Islands (30); Marine Park Islands (29); and Protected islands (12) (**Table 4.3**). The sampling frequency for Development Island was six (6) times per year, while the frequency for the others island categories was four (4) times per year.

Marine water quality monitoring includes measurement of in-situ parameters such as temperature, pH, conductivity, salinity, dissolved oxygen, turbidity. Meanwhile laboratory analysis involves 14 other parameters such as total suspended solids, *Escherichia coli* (E. coli), nitrate, phosphate, total organic carbon, oil and grease, heavy metals including Mercury (Hg), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Arsenic (As) and Tributyltin (TBT) as well as Triphenyltin (TPT) (**Table 4.4**). Tarball sampling on beaches were also conducted.

Jadual 4.3 JAS : Stesen-Stesen Pemantauan Kualiti Air Marin Pulau, 2014
Table 4.3 DOE : Island Water Quality Monitoring Stations, 2014

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
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

Jadual 4.3 JAS :Stesen-Stesen Pemantauan Kualiti Air Marin Pulau, 2014 (Sambungan)
Table 4.3 DOE :Island Water Quality Monitoring Stations,2014 (Continued)

NEGERI STATE	BIL. PULAU NO. OF ISLAND	BIL. STESEN NO. OF STATION	PULAU ISLAND	NO. STESEN STATION NO	KATEGORI CATEGORY	LOKASI LOCATION	
NEGERI SEMBILAN	1	1	ARANG	7NP01	P	101.794544	2.517963
MELAKA	3	2	BESAR (A)	7MR01	R	102.331722	2.116686
			BESAR (B)	7MR01	R	102.322444	2.106722
		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

Jadual 4.3 JAS : Stesen-Stesen Pemantauan Kualiti Air Marin Pulau, 2014 (Sambungan)

Table 4.3 DOE : Island Water Quality Monitoring Stations, 2014 (Continued)

NEGERI STATE	BIL. PULAU NO. OF ISLAND	BIL. STESEN NO. OF STATION	PULAU ISLAND	NO. STESEN STATION NO	KATEGORI CATEGORY	LOKASI LOCATION	
		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
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

Jadual 4.3 JAS :Stesen-Stesen Pemantauan Kualiti Air Marin Pulau, 2014 (Sambungan)
Table 4.3 DOE :Island Water Quality Monitoring Stations, 2014 (Continued)

NEGERI STATE	BIL. PULAU NO. OF ISLAND	BIL. STESEN NO. OF STATION	PULAU ISLAND	NO. STESEN STATION NO	KATEGORI CATEGORY	LOKASI LOCATION	
		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	LABUAN (POHON BATU)	7LD01	D	115.226969	5.381358
			LABUAN (WATER FRONT)	7LD02	D	115.248351	5.271487
			LABUAN (LUBUK TEMIANG)	7LD03	D	115.248928	5.371834
			LABUAN (RANCHA-RANCHA)	7LD04	D	115.239076	5.239096
		1	KURAMAN	7LM05	M	115.140088	5.214822
		1	RUSUKAN BESAR	7LM06	M	115.149568	5.203497
		1	RUSUKAN KECIL	7LM07	M	115.144014	5.190995

Jadual 4.4 JAS : Parameter Kualiti Air Marin 2014
Table 4.4 DOE : Marine Water Quality Parameters, 2014

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	<i>E.coli</i>	cfu/100 ml
3	Minyakdan 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 DARATAN (SUNGAI)

Jabatan Alam Sekitar (JAS) melaksanakan Program Pengawasan Kualiti Air Sungai sejak tahun 1978 untuk menentukan status terkini kualiti air sungai-sungai dan mengesan perubahan dari semasa ke semasa.

Rangkaian stesen pengawasan kualiti air sungai pada tahun 2013 terdiri daripada 891 stesen manual yang terletak di 477 batang sungai seluruh negara seperti dalam **Jadual 4.5**. Pada tahun 2014 juga, Jabatan Alam Sekitar telah menambah sebanyak 55 stesen kepada rangkaian stesen pengawasan kualiti air sungai seperti dalam **Jadual 4.6**. Stesen-stesen ini diwujudkan khusus bagi memantau sungai-sungai yang mempunyai muka sauq loji rawatan bekalan air. Parameter-parameter kualiti air yang diukur terdiri daripada parameter fizikal, kimia dan biologiikal seperti di **Jadual 4.7**. Pada tahun 2014, sejumlah 6,076 sampel air sungai telah diambil di stesen-stesen MWQM dan sebanyak 200, 632 data telah dijana merangkumi kesemua parameter air yang diukur.

Indeks Kualiti Air (IKA) dibentuk berdasarkan enam parameter utama seperti berikut :-

- Keperluan Oksigen Biokimia (BOD)
- Keperluan Oksigen Kimia (COD)
- Ammoniakal Nitrogen (NH₃N)
- pH
- Oksigen Terlarut (DO)
- Pepejal Terampai (SS)

Kualiti air sungai juga dipantau secara atas talian (on-line) melalui 10 stesen automatik yang ditempatkan di Sg. Perak (Perak), Sg. Selangor (Selangor), Sg. Kelang (Kuala Lumpur), Sg. Linggi (Negeri Sembilan), Sg. Melaka (Melaka), Sg. Skudai (Johor), Sg. Sarawak (Sarawak), Sg. Labu (N. Sembilan), Sg. Putat (Melaka) dan Sg Rajang (Sarawak). Parameter-parameter yang diukur di stesen-stesen automatik ini adalah terhad kepada parameter pH, Oksigen Terlarut, Suhu, Kekeruhan dan Ammonium.

RIVER WATER QUALITY MONITORING

The Department of Environment (DOE) has implemented the National River Water Monitoring Program since 1978 to determine the river water quality status and detect changes from time to time.

In 2014, DOE's river water quality monitoring network comprised of a total of 891 manual water quality monitoring (MWQM) station which were located at 477 rivers in Malaysia as shown in **Table 4.5**. DOE has also added another 55 stations to the water quality monitoring network as shown in **Table 4.6**. These stations were established specifically meant to monitor the rivers at selected water intakes for water supply purposes. Water samples from the stations were analyzed and tested for a range of physical, chemical and biological parameters as shown in **Table 4.7**. In 2014, a total of 6,076 river water samples were taken at the MWQM stations and a sum of 200,632 data were generated covering all of the water quality parameters.

River water quality is determined from Water Quality Index (WQI) which is derived based on six principal parameters namely;

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Ammoniacal Nitrogen (NH₃N)
- pH
- Dissolved Oxygen (DO)
- Suspended Solids (SS)

River water quality also being monitored on-line through automatic monitoring stations which are located at Sg. Perak (Perak), Sg. Selangor (Selangor), Sg Kelang (Kuala Lumpur), Sg. Linggi (Negeri Sembilan), Sg. Melaka (Melaka), Sg Skudai (Johor), Sg. Sarawak (Sarawak), Sg. Labu (N. Sembilan), Sg. Putat (Melaka) and Sg Rajang (Sarawak). The measured parameters from the automatic stations are limited to pH, Dissolved Oxygen, Temperature, Turbidity and Ammonium.

Jabatan Alam Sekitar turut memantau rapi kualiti air sungai dibawah 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 4.8**. Aktiviti dan mesyuarat lain yang berkaitan dengan pengawasan kualiti air sungai adalah seperti di **Jadual 4.9**.

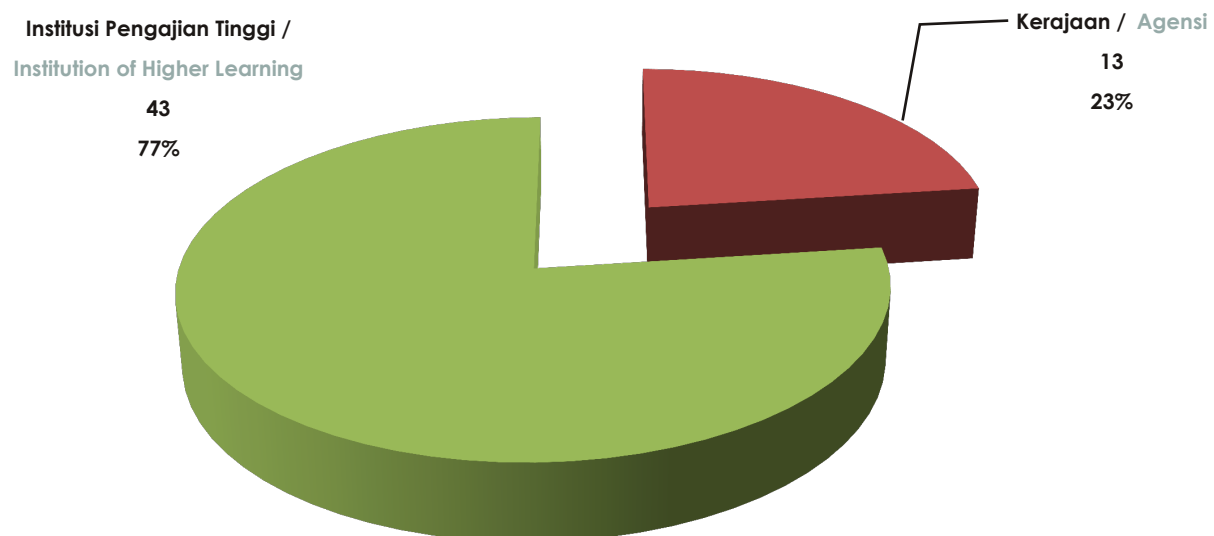
SEBARAN DATA KUALITI AIR SUNGAI

Data-data kualiti air sungai telah digunakan oleh tiga kategori pengguna iaitu agensi/jabatan kerajaan, penuntut institusi pengajian tinggi, dan perunding yang menjalankan projek-projek kerajaan. Pada tahun 2014, sejumlah 56 permohonan data telah diterima oleh JAS. Permohonan terbanyak yang diterima adalah daripada penuntut institusi pengajian tinggi (77%), diikuti oleh agensi kerajaan (23%) Bilangan permohonan data kualiti air sungai yang diterima oleh JAS dari tahun 2010 hingga 2014 adalah seperti yang ditunjukkan oleh carta pai dibawah.

The Department of Environment is also involved in the program River of Life (RoL), 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. A List of 35 monitoring stations in the RoL program is as shown in **Table 4.8**. Other activities and meetings attended by the DOE are shown in **Table 4.9**.

DISSEMINATION OF RIVER WATER QUALITY DATA

River water quality data were utilized by three categories of user which are government agencies, researchers from higher learning institutions, and consultant who are contracted for government projects. In 2014, a total of 56 data request were received by DOE. The most frequent water quality data users were from higher learning institutions (77%), followed by government agencies (23%). The number of water quality data applications received by DOE is as shown in pie chart below.



Pecahan Permohonan Data Kualiti Air Sungai, 2014
Number of River Water Quality Data Application, 2014

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014

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	7	8	01	PERLIS	8	JARUM	1
							JERNIH	1
							NGULANG	1
							PELARIT	1
							PERLIS	1
							WANG KELIAN	1
							TERUSAN MADA	2
KEDAH	4	17	21	01PLA	KISAP	1	KISAP	1
				01PLC	ULU MELAKA	4	PETANG	1
							ULU MELAKA	2
							SAGA	1
				03	KEDAH	11	JANING	1
							KEDAH	1
							PDG TERAP	4
							PEDU	1
							PENDANG	1
							TEKAI	1
							TEMIN	1
							AHNING	1
				04	MERBOK	5	BONGKOK	1
							MERBOK	1
							PETANI	1
							TOK PAWANG	1
KEDAH/ P.PINANG	1	8	17	05	MUDA	17	CHEPIR	1
							JERUNG	1
							KARANGAN	1
							KETIL	2
							MUDA	8
							PEGANG	1
							SEDIM	2
							NAMI	1
P.PINANG	6	23	38	06PP	PINANG	10	AIR ITAM	5
							AIR TERJUN	1
							DONDANG	1
							JELUTONG	1
							PINANG	1
							SATU	1
				06J	JURU	8	JURU	2
							KILANG UBI	4
							PASIR	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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
							RAMBAI	1
				06K	KLUANG	3	ARA	2
							RELAU	1
				06P	PERAI	11	JARAK	3
							KELADI	1
							KEREH	2
							KULIM	2
							PERAI	2
							PERTAMA	1
				06T	BAYAN LEPAS	3	BAYAN LEPAS	1
							TIRAM	2
				07	JAWI	3	JAWI	1
							JUNJONG	1
							MACHANG BUBOK	1
P.PINANG/ PERAK	1	3	7	08	KERIAN	7	KECHIL	1
							KERIAN	4
							SELAMA	2
PERAK	6	43	78	12	RAJA HITAM	5	MANJONG	2
							NYIOR	1
							RAJA HITAM	2
				12W	WANGI	2	DERALIK	1
							WANGI	1
				09	KURAU	7	ARA	2
							KURAU	4
							AIR HITAM	1
				10	SEPETANG	11	BATU TEGOH	4
							JANA	1
							LIMAU	1
							SEPETANG	2
							TEMERLOH	2
							TRONG	1
				11	BRUAS	5	BRUAS	3
							DANDANG	1
							ROTAN	1
				13	PERAK	48	BATANG PADANG	3
							BIDOR	3
							CHENDERANG	1
							CHEPOR	1
							KAMPAR	2
							KANGSAR	1
							KEPAYANG	2

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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
							KERDAH	1
							KINJANG	1
							KINTA	6
							KLAH	1
							KUANG	1
							NYAMOK	1
							PARI	1
							PELUS	2
							PERAK	8
							PINJI	2
							RAIA	2
							SELUANG	1
							SEROKAI	1
							SUNGKAI	2
							TUMBOH	1
							SAUK	1
							MANONG	1
							WOH	1
							TESONG	1
PERAK / SELANGOR	1	5	10	14	BERNAM	10	BERNAM	4
							INKI	1
							SLIM	2
							TROLAK	2
							GELINTING	1
SELANGOR	5	18	35	17	BULOH	4	BULOH	4
				19	LANGAT	17	ANAK CHUAU	1
							BATANG NILAI	1
							BATANG LABU	1
							CHUAU	2
							JIJAN	1
							LANGAT	7
							LUI	1
							PAJAM	1
							SEMENYIH	2
				20	SEPANG	2	SEPANG	2
				15	TENGI	3	TENGI	3
				16	SELANGOR	9	BATANG KALI	1
							KANCHING	1
							KERLING	1
							SELANGOR	4
							SEMBAH	1
							SERENDAH	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)
Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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 /WPKL	1	18	39	18	KLANG	39	BATU	4
							GOMBAK	4
							JINJANG	3
							KLANG	8
							SEMELAH	1
							AIR BUSUK	1
							AMPANG	2
							BELONGKONG	1
							BUNOS	3
							KERAYONG	2
							KEROH	2
							TOBA	1
							UNTUT	1
							ANAK AIR BATU	1
							DAM- ANSARA	2
							KUYOH	1
							RASAU	1
							PENCHALA	1
NEGERI SEMBILAN	1	9	14	21	LINGGI	14	BATANG PENAR	1
							CHEMBONG	1
							KEPAYONG	1
							KUNDUR BESAR	1
							LINGGI	5
							PEDAS	1
							REMBAU	2
							SIMIN	1
							SIPUT	1
MELAKA	5	14	25	21SM	SERI MELAKA	1	SERI MELAKA	1
				22	MELAKA	12	BTG.MELAKA	2
							DURIAN TUNGGAL	1
							KEMUNTING	1
							DUSUN/ KERU	1
							MELAKA	5
							REMBIA	1
							TAMPIN	1
				24	KESANG	6	CHOHONG	2
							KESANG	3

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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
							CHIN-CHIN	1
				24A	MERLIMAU	2	MERLIMAU	2
				23	DUYONG	4	DUYONG	3
							GAPAM	1
JOHOR/ N.SEMBILAN	1	10	18	25	MUAR	18	AIR PANAS	1
							GEMENCHEH	1
							JUASSEH	1
							LABIS	1
							MEDA	1
							MUAR	9
							SARANG BUAYA	1
							SEGAMAT	1
							JELAI	1
							JEMENTAH	1
				26	BATU PAHAT	21	AMRAN	1
JOHOR	22	92	161				BANTANG	1
							BATU PAHAT	1
							BEKOK	5
							BERLIAN	1
							CHAAH	1
							LENIK	1
							MEREK	1
							MERPO	1
							SEMBERONG	3
							SIMPANG KANAN	2
							SIMPANG KIRI	3
				27A	AIR BALOI	3	AIR BALOI	3
				28	SEGGET	5	SEGGET	5
				28D	TEBRAU	10	BALA	1
							PANDAN	1
							PLENTONG	1
							SEBULUNG	1
							SENGKUANG	1
							TAMPOI	1
							TEBRAU	4
				28F	DANGA	2	DANGA	2
				28G	RAMBAH	2	RAMBAH	2
				29B	KAW. PASIR	5	BULUH	1
					GUDANG		LATOH	1
							MASAI	1
							PEREMBI	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)
Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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							TUKANG BATU	1
				27B	BENUT	8	BENUT	4
							PARIT HJ. YASSIN	1
							PINGGAN	1
							ULU BENUT	1
							MACHAP	1
				28A	PONTIAN BESAR	7	AIR HITAM	1
							AYER MERAH	1
							PONTIAN BESAR	5
				28B	PONTIAN KECIL	2	PONTIAN KECIL	2
				28C	SKUDAI	11	MELANA	2
							SKUDAI	9
				28E	KEMPAS	2	KEMPAS	2
				29C	SANGLANG	1	SANGLANG	1
				29D	PULAI	4	PULAI	3
							ULU CHOH	1
				31C	KIM-KIM	2	KIM-KIM	2
				29	JOHOR	34	ANAK SG. SAYONG	1
							BELITONG	1
							BUKIT BESAR	1
							CHEMANGAR	1
							JOHOR	4
							LAYANG	1
							LAYAU KIRI	1
							LEBAM	1
							LINGGIU	1
							PANTI	1
							PAPAN	1
							PELEPAH	2
							PENGGEI	2
							REMIS	1
							SANTI	1
							SAYONG	4
							SEBOL	1
							SELUYUT	1
							SEMANGAR	1
							SEMENCHU	1
							TELOR	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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							TEMOH	1
							TIRAM	4
				30A	SEDILI BESAR	9	AMBAT	1
							DOHOL	1
							PASIR PANJANG	1
							SEDILI BESAR	5
							TEMUBOR KANAN	1
				30B	SEDILI KECIL	5	ANAK SEDILI KECIL	1
							BAHAN	2
							SEDILI KECIL	2
				30C	PALOI	1	PALOI	1
				31A	MERSING	2	MERSING	2
				31B	JEMALUANG	2	JEMALUANG	2
				32	ENDAU	23	ENDAU	3
							JASIN	1
							JEBONG	1
							KAHANG	2
							LENGGOR	1
							MAMAI	1
							MELATAI	1
							MENGKIBOL	3
							PALOH	1
							PAMOL	1
							SELAI	1
							SEMBERONG	5
							SINGOL	1
							TAMOK	1
PAHANG	9	65	107	32AE	ANAK ENDAU	2	ANAK ENDAU	2
				33	ROMPIN	9	AUR	1
							KERATONG	2
							PONTIAN	1
							PUKIN	1
							ROMPIN	4
				34M	MERCHONG	1	MERCHONG	1
				35P	PAHANG	75	BENTONG	1
							BENUS	2
							BERA	2
							BERKAPOR	1
							BERTAM	2

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)
Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

NEGERI / STATE	JUMLAH LEMBAGAN / 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 MOTORED	BILANGAN STESEN / NO. OF STATIONS
PAHANG							BURUNG	1
							CHINI	1
							HABU	1
							GAPOI	1
							JELAI	2
							JEMPOL	4
							JENGKA	2
							KELAU	1
							KERTAM	1
							KOYAN	1
							KUNDANG	1
							LENGGOK	1
							LEPAR	3
							LIPIS	3
							LUIT	1
							MARAN	1
							MENTIGA	2
							PAHANG	8
							PERTING	1
							RINGLET	1
							SEMANTAN	4
							SERTING	2
							T. PAYA BUNGOR	1
							TAHAN	1
							TANGLIR	1
							TASIK BERA	1
							TASIK CHINI	1
							TEKAL	1
							TEKAM	2
							TELANG	1
							TELOM	2
							TEMBELING	1
							TERANUM	1
							TERAS	1
							TERIS	3
							TERLA	2
							TRIANG	3
							TRINGKAP	1
							ULONG	1
				34B	BEBAR	4	BEBAR	1
							MERBA	1
							SERAI	2
				36	KUANTAN	11	BELAT	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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							CHARU	1
							KENAU	1
							KUANTAN	5
							PANDAN	1
							RIAU	1
							TALAM	1
				37	BALOK	3	BALOK	2
							PANJANG	1
				37A	CHERATING	1	CHERATING	1
				37B	TONGGOK	1	TONGGOK	1
TERENGGANU	13	24	36	38	KEMAMAN	4	CHERUL	1
							KEMAMAN	2
							RANSAN	1
				39K	KERTIH	1	KERTIH	1
				40	PAKA	2	PAKA	1
							RASAU	1
				41	DUNGUN	4	DUNGUN	4
				42M	MARANG	1	MARANG	1
				43	TERENGGANU	8	BERANG	1
							NERUS	1
							PUEH	1
							TELEMONG	1
							TERENGGANU	4
				44	SETIU	4	CHALOK	2
							SETIU	2
				46	BESUT	2	BESUT	2
				47	KLUANG	1	KLUANG	1
				39C	CHUKAI	4	BUNGKUS	1
							CHUKAI	1
							IBOK	1
							RUANG	1
				42I	IBAI	3	IBAI	3
				42L	MERCHANG	1	MERCHANG	1
				45	MERANG	1	MERANG	1
KELANTAN	5	27	56	47K	KEMASIN	4	KEMASIN	2
							SEMERAK	2
				48	KELANTAN	36	BELATOP	2
							BER	1
							BEROK	3
							BETIS	1
							CHIKU	1
							GALAS	5
							KELANTAN	4
							KERILLA	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)
Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

NEGERI / STATE	JUMLAH LEMBAGAN / 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 MOTORED	BILANGAN STESEN / NO. OF STATIONS
KELANTAN							LEBIR	3
							NAL	2
							NENGGIRI	3
							PEHI	1
							PERGAU	6
							RELAI	1
							SOKOR	1
							TUANG	1
				49	GOLOK	7	GOLOK	5
							LANAS	1
							JEDUK	1
				48C	PENGKALAN CHEPA	6	ALOR B	1
							ALOR LINTAH	1
							KELADI	1
							PENGKALAN CHEPA	2
							RAJA GALI	1
				48D	PENGKALAN DATU	3	PENGKALAN DATU	3
SARAWAK	22	59	110	50	KAYAN	3	KAYAN	3
				50S	SEMUNSAM	1	SEMUNSAM	1
				51	SARAWAK	15	KUAP	1
							MAONG KIRI	1
							SAMARAHAN	2
							SARAWAK	6
							SARAWAK KANAN	1
							SARAWAK KIRI	1
							SEPADANG	1
							SEMENGGOH	1
							TABUAN	1
				59	BALINGIAN	2	BALINGIAN	2
				62	SIMILAJAU	2	SIMILAJAU	2
				64	NIAH	3	NIAH	2
							SEKALOH	1
				68	LIMBANG	5	LIMBANG	5
				69	TRUSAN	1	TRUSAN	1
				70	LAWAS	3	LAWAS	3
				52	SADONG	6	KARANGAN	2
							SADONG	4
				53	LUPAR	8	AI	2

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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							LUPAR	3
							SEKERANG	1
							SETERAP	1
							UNDUP	1
				54	SARIBAS	3	LAYAR	2
							SARIBAS	1
				55	KERIAN	4	KERIAN	2
							SEBLAK	1
							SELALANG	1
				56	RAJANG	23	BALOI	1
							BINATANG	1
							DARO	1
							JEMORENG	1
							JULAU	1
							KANOWIT	1
							MERADONG	1
							RAJANG	11
							PAKAN	1
							PILA PARIT	1
							SALIM	1
							SARIKEI	2
				57	OYA	3	OYA	3
				58	MUKAH	5	MUKAH	5
				60	TATAU	1	TATAU	1
				61	KEMENA	4	KEMENA	3
							SIBIU	1
				63	SUAI	1	SUAI	1
				65	SIBUTI	6	KABULOH	2
							KEJAPIL	1
							SATAP	1
							SIBUTI	2
				66	MIRI	6	ADONG	1
							DALAM	1
							LUTONG	1
							MIRI	2
							PADANG LIKU	1
				67	BARAM	5	BARAM	4
							TUTUH	1
SABAH	36	62	111	71	MENGALONG	2	MENGALONG	2
				71A	LAKUTAN	1	LAKUTAN	1
				71B	LINGKUNGAN	2	BUKAU	1
							LINGKUNGAN	1

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)
Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

NEGERI / STATE	JUMLAH LEMBAGAN / 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 MOTORED	BILANGAN STESEN / NO. OF STATIONS
				72	PADAS	11	BUNSIT	1
							LIAWAN	1
							PADAS	4
							PANGATAN	1
							PEGALAN	3
							TANDULU	1
				73	MEMBAKUT	1	MEMBAKUT	1
				74	KIMANIS	1	KIMANIS	1
				74A	BONGAWAN	1	BONGAWAN	1
				75	PAPAR	5	PAPAR	5
				76	MOYOG	4	MOYOG	4
				77	TUARAN	5	DAMIT	2
							SONG SAI	1
							TUARAN	2
				78	KEDAMAIAN	4	KEDAMAIAN	1
							TEMPASUK	2
							WARIU	1
				78T	TENGHILAN	1	TENGHILAN	1
				79	BINGKONGAN	6	BANDAU	1
							BINGKONGAN	2
							MENGGARIS	2
							TANDEK	1
				80	BENGKOKA	2	BENGKOKA	2
				82	PAITAN	1	PAITAN	1
				83	SUGUT	6	BONGKUD	1
							LOHAN	1
							MERALI	1
							SUGUT	3
				84	LABOK	7	KINIPIR	2
							LABOK	1
							LIWAGU	2
							MALIAU	1
							TUNGUD	1
				84A	SAPI	4	SAPI	3
							SUALONG	1
				85	MOUNAD	2	MOUNAD	2
				87	SEGAMA	3	SEGAMA	3
				88	TUNGKU	2	TUNGKU	2
				88A	SILABUKAN	2	SILABUKAN	2
				89	TINGKAYU	2	TINGKAYU	2
				91	TAWAU	4	TAWAU	4

Jadual 4.5 JAS : Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2014 (Sambungan)

Table 4.5 DOE : List of the River Catchment And River Monitored, 2014 (Continueud)

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
				91A	APAS	1	APAS	1
				91B	BALUNG	1	BALUNG	1
				92	MEROTAI	3	MEROTAI	3
				93	UMAS-UMAS	1	UMAS-UMAS	1
				94	BRANTIAN	1	BRANTIAN	1
				95	KALABAKAN	3	KALABAKAN	3
				76A	SEMBULAN	2	SEMBULAN	2
				76B	LIKAS	7	INANAM	3
							LIKAS	2
							MENGGATAL	2
				76C	TELIPOK	2	TELIPOK	2
				85A	SEGALIUD	2	SEGALIUD	2
				86	KINABATANGAN	6	KARAMUAK	1
							KINABATANGAN	3
							KOYAH	1
							MENANGGUL	1
				90	KALUMPANG	3	KALUMPANG	3
JUMLAH TOTAL	140						504	891

Jadual 4.6 JAS : Senarai Stesen Pemantauan Muka Sauk Loji Rawatan Air
Table 4.6 DOE : List of the Water Intake Monitoring Station

NEGERI STATE	LEMBANGAN SUNGAI RIVER BASIN	KOD WKA CODE WQR	SUNGAI DIAWASI RIVER MONITORED	LOKASI MUKA SAUK WATER INTAKE LOCATION
PERLIS	PERLIS	01	TERUSAN MADA	Muka sauks Loji Rawatan Air Arau Fasa IV Muka sauks Loji Rawatan Air TTPC, Sg. Baru
KEDAH	MELAKA	01PLC	MELAKA	Ulu Melaka
			SAGA	Padang Saga
	KEDAH	03	TEMIN	Changloon
			AHNING	Padang Sanai
			PADANG TERAP	Kuala Nerang
	MUDA	05	MUDA	Jeneri
				Jeniang
				Bukit Selambau
				Pinang Tunggal
			SEDIM	Bikan
			NAMI	Nami
P.PINANG	PINANG	06PP	SATU	Batu Feringgi
PERAK	KURAU	9	AIR HITAM	Muka sauks Loji Rawatan Air Jelai
	SEPETANG	10	BATU TEGOH	Muka sauks Loji Rawatan Air Bukit Larut
	PERAK	13	SAUK	Muka sauks Loji Rawatan Air Sauk
			MANONG	Muka sauks Loji Rawatan Air Manong
			WOH	Muka sauks Loji Rawatan Air Kuala Woh
			TESONG	Muka sauks Loji Rawatan Air Sg. Klah
SELANGOR	BERNAM	14	TROLAK	Muka sauks Loji Rawatan Air Trolak Timur
			GELINTING	Muka sauks Loji Rawatan Air Ulu Slim
	KLANG	18	GOMBAK	Muka sauks Loji Rawatan Air Gombak
	LANGAT	19	SEMENYIH	Muka sauks Loji Rawatan Air Semenyih
			BATANG LABU	Muka sauks Loji Rawatan Air Salak Tinggi
MELAKA	KESANG	24	CHIN-CHIN	Muka sauks Loji Rawatan Air Chin-chin
N.SEMBILAN	MUAR	25	JELAI	Muka sauks Loji Rawatan Air Dangi
JOHOR			MUAR	Muka sauks Loji Rawatan Air Gombang
			JEMENTAH	Muka sauks Loji Rawatan Air Jementah
	BATU PAHAT	26	SEMBERONG	Semberong Dam, Jalan Air Hitam-Kluang
	BENUT	27B	MACHAP	Machap Dam, Pekan Machap
	PULAI	29D	PULAI	Pulai Dam, Pekan Ulu Choh, Kangkar Pulai
	ENDAU	32	KAHANG	Jalan Felda Kahang Timur, Kluang
PAHANG	PAHANG(BERTAM)	35P	TERLA	Muka sauks Loji Rawatan Air Kuala Terla (WTSI)
			BERTAM	Muka sauks Loji Rawatan Air Habu (WWB)
			ULONG	Brinchang Dam (WTBH)
	PAHANG		TRIANG	Muka sauks Loji Rawatan Air Sg. Triang
			GAPOI	Muka sauks Loji Rawatan Air Gapoi
			JEMPOL	Jmbtn Sg Jempol Jln Ladang Getah Lubuk Yu ~ Loji Air Sg Jerik
				Jmbtn Sg Jempol Jln Bkt Tajau ~ Jengka 3 (Loji Air Jengka 3)
			MENTIGA	Jmbtn Sg Metiga Jln Muadzam ~ Felda Chini (Loji Air Chini)
TERENGGANU	TERENGGANU	43	TERENGGANU	Kg Serada Up Stream Muka Loji Air Serada
KELANTAN	KELANTAN	48	CHIKU	Muka sauks Felda Ciku 2 (Syarikat Air Kelantan)
			PEHI	Muka Sauks Loji Air Pahi (Syarikat Air Kelantan)
			KELANTAN	Muka Sauks Loji Air Kelar Pasir Mas (syarika Air Kelantan)
	GOLOK	49	JEDUK	Jamb. Sg Jeduk Kg Bt Gajah Jln Tnh Merah ~ Jeli (Sykt Air Kelantan)
SARAWAK	KERIAN	55	SELANGANG	Selangang Water Intake
	RAJANG	56	PAKAN	Pakan Water Intake
			DARO	Daro Water Intake
			JEMORENG	Jemoreng Water Intake
			PILA PARIT	Igan Water Intake
	MUKAH	58	MUKAH	Mukah Water Intake
SABAH	PADAS	72	PADAS	Water Intake Jabatan Air Beaufort
	PAPAR	75	PAPAR	Jambatan Sekolah Kebangsaan Mandalipau Water Intake Kogopon, Jabatan Air Papar
JUMLAH/TOTAL	27		49	55

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

Parameter	Unit
Oksigen Terlarut / Dissolved Oxygen (DO)	mg/l, % saturated
Permintaan Oksigen Biokimia / Biological Oxygen Demand (BOD)	mg/l
Permintaan Oksigen Kimia / Chemical Oxygen Demand (COD)	mg/l
Pepejal Terampai / Suspended Solid (SS)	mg/l
pH	unit
Ammoniacal Nitrogen (NH ₃ -N)	mg/l
Ammonium (NH ₄)	mg/l
Cyanide	mg/l
Suhu / Temperature	°C
Konduktiviti / Conductivity	µS
Kemasanan / 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
Mekuri / 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 / Calcium (Ca)	mg/l
Ferum / Ferum (Fe)	mg/l
Kalium / Potassium (K)	mg/l
Magnesium / Magnesium (Mg)	mg/l
Natrium / Sodium (Na)	mg/l
Minyak dan Gris / Oil and Grease (O&G)	mg/l
Methylene Blue Active Substances (MBAS)	mg/l
E-coli	cfu/100ml
Total Coliform	cfu/100ml

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

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

NEGERI STATE	JUMLAH 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/ WPKL	1	18	35	18	KLANG	35	BATU	4
							GOMBAK	3
							JINJANG	3
							KLANG	6
							SEMELAH	1
							AIR BUSUK	1
							AMPANG	2
							BELONGKONG	1
							BUNOS	3
							KERAYONG	2
							KEROH	2
							TOBA	1
							UNTUT	1
							ANAK AIR BATU	1
							KUYOH	1
							RASAU	1
							PAYONG	1
							PENCHALA	1
JUMLAH TOTAL							18	35

Jadual 4.9 JAS : Program dan Aktiviti Program Pengawasan Kualiti Air Daratan (Sungai)

Table 4.9 DOE : Programs and Activities Surface Water (River) Quality Monitoring Programme

TARIKH DATE	AKTIVITI & PROGRAM ACTIVITIES & PROGRAMMES	TEMPAT VENUE
7 Januari / January 7	Mesyuarat Pasukan Petugas RoL Bil 1/2014	Jabatan Pengairan dan Saliran Malaysia
20 Januari / January 20	Mesyuarat Penyelarasan Inisiatif 11 RoL JAS	Jabatan Alam Sekitar WPKL
13 Februari / February 13	Mesyuarat Pasukan Petugas RoL Bil 2/2014	Jabatan Pengairan dan Saliran Malaysia
19 Mac / March 19	Mesyuarat RoL (River Cleaning)	Jabatan Pengairan dan Saliran Malaysia
10 April / April 10	Mesyuarat Peruntukan RoL	Kementerian Wilayah
24 April / April 24	Mesyuarat Pasukan Petugas RoL Bil 3/2014	Jabatan Pengairan dan Saliran Malaysia
26-28 Jun / June 26-28	Bengkel KPI RoL	Hotel Impiana, Ipoh Perak
30 Jun / June 30	Mesyuarat Pasukan Petugas RoL Bil 4/2015	Jabatan Pengairan dan Saliran Malaysia
16 Julai / July 16	Mesyuarat Pasukan Petugas RoL Bil 5/2016	Jabatan Pengairan dan Saliran Malaysia
11 Ogos / August 11	Mesyuarat Pasukan Petugas RoL Bil 5/2017	Jabatan Pengairan dan Saliran Malaysia
14 Ogos / August 14	Mesyuarat Peruntukan RoL	Kementerian Wilayah
11 September / September 11	Bengkel Kearah Banjir Sifar	INTEKMA Resort, Shah Alam
20 Oktober / October 20	Seminar On National Lake Research Blue Print	NAHRIM
3-7 November / November 3-7	Bengkel Rasionalisasi RMK-10	Hotel Best Western Dua Sentral
17-19 November / November 17-19	Mesyuarat Penyelarasan Pengawasan Air Kebangsaan	Hotel Concorde, Shah Alam
21 November / November 21	Mesyuarat Peruntukan RoL 2015	Jabatan Pengairan dan Saliran Malaysia

PENGAWASAN KUALITI AIR TANAH

Program Pengawasan Kualiti Air Tanah Kebangsaan telah dimulakan pada tahun 1997 di Semenanjung Malaysia dan diperkembangkan ke Sabah dan Sarawak pada tahun 2003. Kedudukan stesen air tanah di Semenanjung Malaysia serta Sarawak dan Sabah adalah seperti dalam **Peta 4.4 (a) dan 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, koliform, sebatian berfenol, radioaktif, jumlah keliatan dan jumlah pepejal terlarut.

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

Pada tahun 2014, sebanyak 356 sampel daripada 105 buah telaga pengawasan kualiti air tanah di seluruh Malaysia telah di analisis. Telaga pengawasan ini telah dibina di kawasan-kawasan mengikut jenis guna tanah iaitu pertanian, perindustrian, padang golf, tapak pelupusan sampah, tapak pelupusan bangkai haiwan, kawasan bekalan air, bekas tapak perlombongan, perbandaran dan luar bandar di seluruh Malaysia (**Jadual 4.10**)

Sepanjang tahun 2014, kesemua 105 stesen telah dijalankan selenggaraan. Daripada jumlah itu, sebanyak 17 stesen dilakukan penyelenggaraan secara menyeluruh seperti kerja pencucian dan pembaikan luaran. Di antara aktiviti-aktiviti lain yang dijalankan berkaitan pengawasan air tanah pada tahun 2014 adalah seperti berikut:

GROUNDWATER QUALITY MONITORING

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

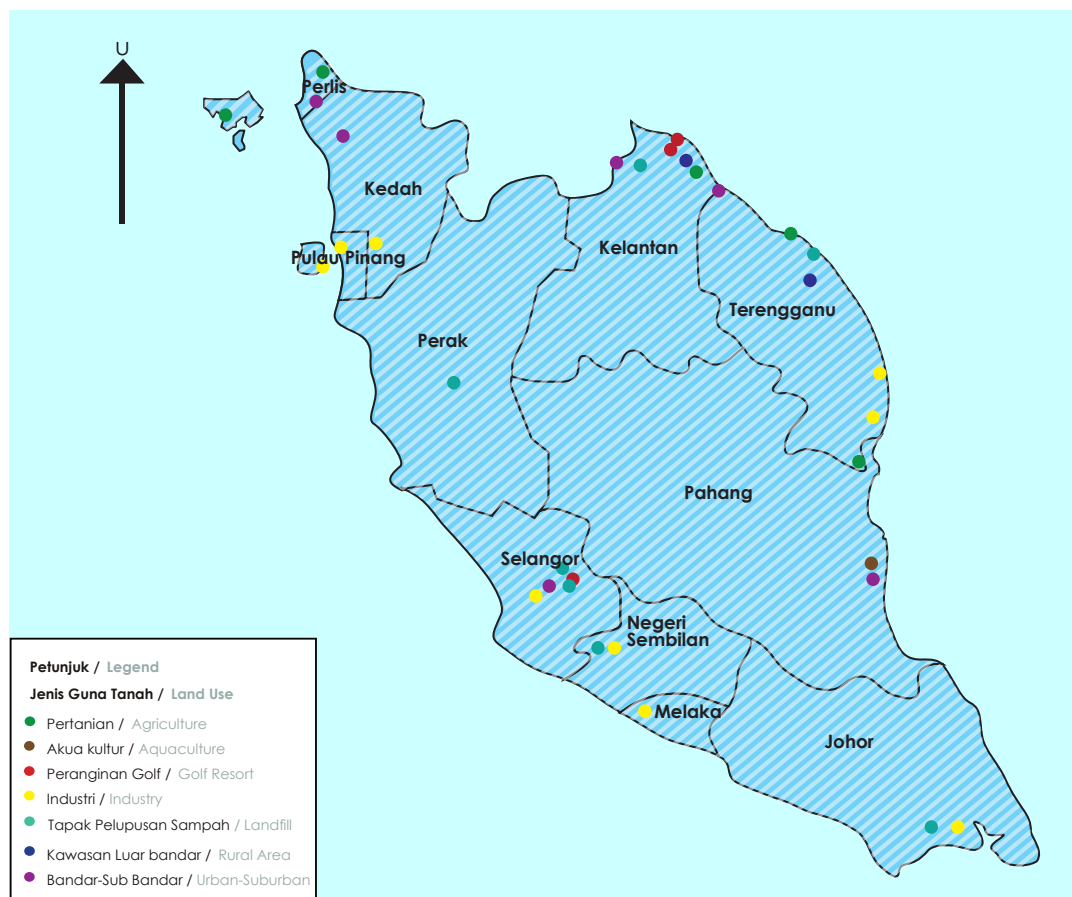
In-situ measurements were taken to determine the level of temperature, pH, conductivity, turbidity, salinity and dissolved oxygen. Laboratory analysis were carried out to determine the level of total volatile organic compounds (VOCs), hydrocarbons, pesticides, heavy metals, anions, total coliform, phenolic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

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

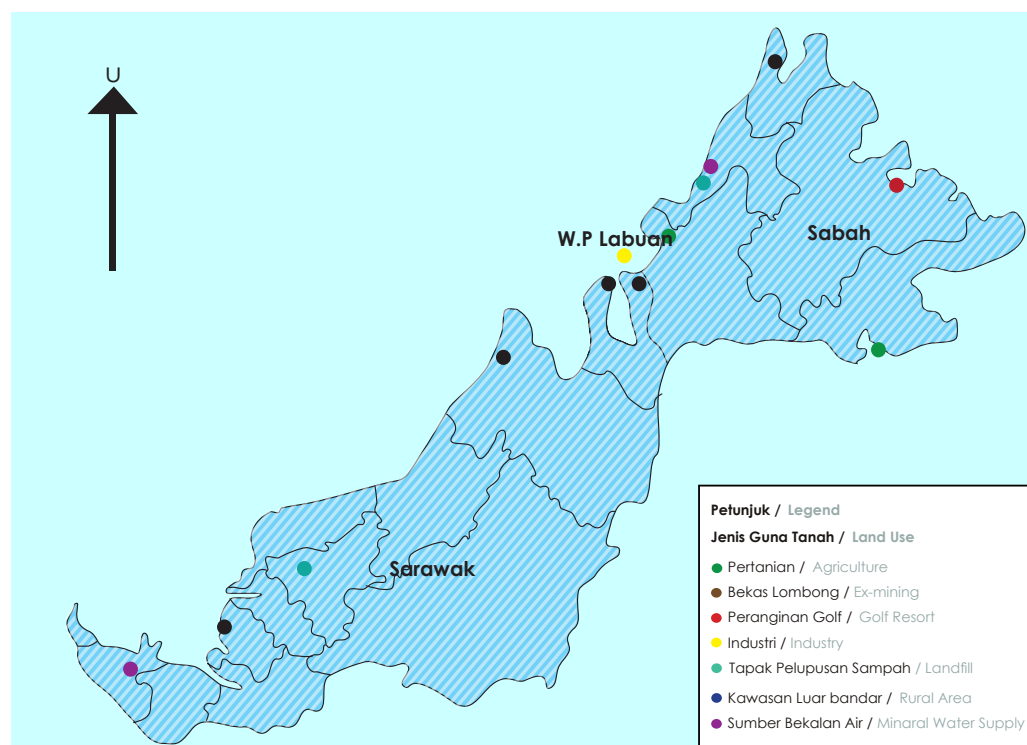
In 2014, a total of 356 groundwater samples were taken on a quarterly basis from 105 monitoring wells in Malaysia for analysis. The monitoring wells had been constructed in areas categorised according to land use type such as agriculture, industrial, golf course, solid waste landfill, animal burial, municipal water supply, ex- mining (gold mine) and urban/suburban. (**Table 4.10**)

In 2014, all 105 groundwater stations were maintained. Out of all, 17 stations required major maintenance such as flushing work and external upgradation. Among other activities related to groundwater monitoring in 2014 are as follows;

TARIKH DATE	Aktiviti ACTIVITY	KUMPULAN SASAR TARGET GROUP	BIL. PENYERTAAN NO. OF PARTICIPANT
11 Jun 2014	Mesyuarat semakan draf SOP Pengawasan Air Tanah(Peringkat akhir)/Meeting of the draft revised SOP Groundwater Monitoring (Final Stage).	Pegawai-pegawai JAS/ DOE officers	25
22 Julai 2014	Kolokium Interpretasi parameter persampelan Air Tanah/Interpretation colloquium on Groundwater Sampling parameter.	Pegawai-pegawai JAS/ DOE officers	12
17 Mac 2014	Lawatan semakan stesen air tanah yang bermasalah/Visit revision problematic groundwater stations.	Pegawai-pegawai JAS/ DOE officers	6
20 Mac 2014	1 stesen di Kuantan, Pahang.		
24 -25 Jun 2014	1 stesen di Kg. Batu 4, Kota Tinggi Johor.		
30 Sept - 2 Okt 2014	2 stesen di Kubang Kerian, Kelantan 1 stesen di Kg. Pusu 40, Pasir Mas, Kelantan 1 stesen di Kg Jembal Kota Bharu, Kelantan 2 stesen di Sibul, Sarawak 4 stesen di Miri, Sarawak		



Peta 4.4 (a) Semenanjung Malaysia: Taburan Stesen Pemantauan Air Tanah, 2014
Map 4.4 (a) Peninsular Malaysia: Distribution of Groundwater Monitoring Stations, 2014



Peta 4.4 (b) Semenanjung Malaysia: Taburan Stesen Pemantauan Air Tanah, 2014
Map 4.4 (b) Peninsular Malaysia: Distribution of Groundwater Monitoring Stations, 2014

Jadual 4.10 JAS: Taburan Telaga Pemantauan Air Tanah Mengikut Jenis Kategori Guna Tanah, 2014
Table 4.10 DOE : Distribution Of Groundwater Monitoring Wells By Land Use Category, 2014

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

PENGAWASAN BUNYI BISING AMBIEN

PUNCA PENCEMARAN BUNYI BISING DAN KESANNYA

Aktiviti pembangunan, perindustrian dan trafik menyebabkan bunyi bising yang berlebihan. Pencemaran bunyi boleh menjejaskan kesihatan, produktiviti dan menyebabkan gangguan psikologi. 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.

PROGRAM PENGAWASAN BUNYI BISING AMBIEN

Pada tahun 2014, Jabatan Alam Sekitar 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 (21 stesen), perindustrian (21 stesen) dan kawasan sensitif seperti hospital, lapangan terbang, sekolah dan tempat ibadat (27 stesen) (**Jadual 4.11**). Bagi kes aduan, pengawasan berkala telah dijalankan oleh Pejabat JAS Negeri.

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 garis panduan berkenaan.

AMBIENT NOISE MONITORING

SOURCES AND EFFECT OF NOISE POLLUTION

Activities such as industrial, development and transportation activities generate excessive noise. Noise pollution has an impact on health, psychology and reduces productivity. 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.

AMBIENT NOISE MONITORING PROGRAM

In 2014, 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 (21 stations), industrial areas (21 stations) and noise sensitive areas such as hospitals, schools and places of worship (27 stations) (**Table 4.11**). For complaint cases, periodic monitoring had also been carried out by the DOE States Officers.

Compliance to the noise level is 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 3 major landuse had exceeded the guideline limits.

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014
Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014

KATEGORI CATEGORIES		NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%) COMPLIANCE (%)	
					SIANG DAY TIME	MALAM NIGHT TIME
Trafik Traffic	Lebuhraya Highway	Johor	Horizon Hill Horizon Hill	1	0	0
		Kedah	Kawasan Rehat R&R Gurun, Lebuhraya Utara Selatan Gurun R&R Area, North South Highway	4	0	0
		Kelantan	Jalan Utama Kota Bharu – Kuala Krai/Gua Musang Kota Bharu – Kuala Krai/ Gua Musang Main Road	3	0	0
		Pahang	Kawasan Rehat R&R Gambang, Lebuhraya Pantai Timur Gambang R&R Area, East Coast Highway	4	0	0
		Perak	Lebuhraya Utara-Selatan (Taman Tambun) North South Highway (Ta- man Tambun)	4	0	0
		Perlis	Lebuhraya Kuala Perlis – Changloon Kuala Perlis – Changloon Highway	2	0	0
		Terengganu	Lebuhraya Pantai Timur (Bukit Payung) East Coast Highway (Bukit Payung)	4	0	0
	Jalan Persekutuan Federal Road	Johor	Jalan Skudai Skudai Road	1	0	0

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014 (Sambungan)

Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014 (Continueud)

KATEGORI CATEGORIES	NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%) COMPLIANCE (%)	
				SIANG DAY TIME	MALAM NIGHT TIME
		Kelantan Jalan Kota Bharu – Pengkalan Chepa Kota Bharu – Pengkalan Chepa Road	3	0	0
		Pahang Jalan Bukit Goh Bukit Goh Road Taman Bertam Jaya Taman Bertam Jaya	4	0	0
		Perak Jalan Kampung Tekah, Ipoh Kampung Tekah Road, Ipoh	4	0	0
		Perlis Jalan Alor Star – Kangar Alor Star – Kangar Road	2	0	0
		Terengganu Kompleks Seri Iman Seri Iman Complex	4	100	0
	Jalan Kampung Sub urban Road	Johor Jalan Kampung Danga Kampung Danga Road	1	0	-
		Kedah Jalan Charok Mogan Charok Mogan Road	4	25	0
		Kelantan Jalan Tok Bali – Pasir Puteh Tok Bali – Pasir Puteh Road	3	0	0
		Pahang Jalan Tanah Putih, Kuantan Tanah Putih Road, Kuantan	4	0	0

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014 (Sambungan)
Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014 (Continueud)

KATEGORI CATEGORIES		NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%) COMPLIANCE (%)	
					SIANG DAY TIME	MALAM NIGHT TIME
Industri Industries	Industri Berat Heavy Industry	Johor	Kawasan Perindustrian Pasir Gudang Pasir Gudang Industrial Area	1	100	100
		Kedah	Kawasan Perindustrian Gurun Gurun Industrial Area	4	100	100
		Kelantan	Kawasan Industri Pengka- lan Chepa Pengkalan Chepa Indus- trial Area	3	66.7	33.3
		Pahang	Kawasan Perindustrian Gebeng Gebeng Industrial Area	1	100	0
		Perak	Kawasan Perindustrian Kamunting Kamunting Industrial Area	2	100	50
		Perlis	Kilang Simen CIMA CIMA Cement Plant	1	100	0
		Terengganu	Kampung Bukit Jong Kampung Bukit Jong	3	100	100
	Industri Sederhana Medium Industry	Johor	Kawasan Perindustrian Senai Senai Industrial Area	1	0	100
		Kedah	Kawasan Perindustrian Jitra Jitra Industrial Area	4	75	75
		Kelantan	Kawasan Industri MIEL Lundang MIEL Industrial Area, Lun- dang	3	100	100
		Pahang	Kawasan Perindustrian Semambu Semambu Industrial Area	1	100	100

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014 (Sambungan)

Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014 (Continueud)

KATEGORI CATEGORIES		NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%) COMPLIANCE (%)	
					SIANG DAY TIME	MALAM NIGHT TIME
Industri Ringan Small Industry		Johor	Kawasan Perindustrian Taman Universiti Taman University Industrial Area	1	0	0
		Kedah	Kawasan Perindustrian Napoh Napoh Industrial Area	4	100	75
		Kelantan	Kawasan Industri MARA, Kota Bharu MARA Industrial Area, Kota Bharu	3	100	66
		Pahang	Kawasan Perindustrian Indera Mahkota Indera Mahkota Industrial Area	1	100	100
		Perak	Kawasan Perindustrian Ringan Kinta Jaya Kinta Jaya Industrial Area	2	50	0
		Perlis	Kawasan Perindustrian Kuala Perlis Kuala Perlis Industrial Park	2	100	100
		Terengganu	Kawasan Perindustrian Chendering Chendering Industrial Area	4	100	100
Sekolah School		Johor	Sekolah Kebangsaan Taman Perling Sekolah Kebangsaan Taman Perling	1	0	-
		Kedah	Sekolah Menengah Kebangsaan Sultanah Sekolah Menengah Kebangsaan Sultanah	3	0	0

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014 (Sambungan)
Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014 (Continueud)

KATEGORI CATEGORIES		NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%)	
					COMPLIANCE (%)	
					SIANG DAY TIME	MALAM NIGHT TIME
Sensitif Bunyi Noise Sensitive		Kedah	Hospital Sultanah Bahiyah Sultanah Bahiyah Hospital	4	0	0
		Kelantan	Hospital Universiti Sains Malaysia, Kubang Kerian Universiti Sains Malaysia Hospital, Kubang Kerian	3	0	0
		Pahang	Hospital Tengku Ampuan Afzan Tengku Ampuan Afzan Hospital	2	0	0
		Perak	Hospital Raja Permaisuri Bainun Raja Permaisuri Bainun Hospital	4	0	0
		Perlis	Hospital Tuanku Fauziah Tuanku Fauziah Hospital	1	0	0
		Terengganu	Hospital Besar Terengganu Terengganu General Hospital	4	0	0
	Tempat Ibadat Place of Worship	Johor	Masjid Taman Perling Masjid Taman Perling	1	0	0
		Kedah	Masjid Jitra Masjid Jitra	4	0	0
		Kelantan	Masjid Muhammadi, Kota Bharu Masjid Muhammadi, Kota Bharu	3	0	0
		Pahang	Masjid Negeri Sultan Ahmad Shah Masjid Negeri Sultan Ahmad Shah	1	0	0

Jadual 4.11 JAS : Program Pengawasan Bunyi Bising Ambien, 2014 (Sambungan)

Table 4.11 DOE : Ambient Noise Monitoring Programme, 2014 (Continueud)

KATEGORI CATEGORIES		NEGERI STATES	LOKASI LOCATION	BILANGAN PENGUKURAN NO. OF MEASUREMENT	PERATUS PEMATUHAN (%)	
					COMPLIANCE (%)	
					SIANG DAY TIME	MALAM NIGHT TIME
		Kedah	Lapangan Terbang Sultan Abdul Halim Sultan Abdul Halim Airport	4	0	0
		Kelantan	Lapangan Terbang Sultan Ismail Petra, Kota Bharu Sultan Ismail Petra Airport, Kota Bharu	3	0	0
		Pahang	Lapangan Terbang Sultan Ahmad Shah Sultan Ahmad Shah Airport	2	0	0
		Perak	Markas Udara TLDM Markas Udara TLDM	4	0	0
		Terengganu	Lapangan Terbang Sultan Mahmud, Kuala Terengganu Sultan Mahmud Airport, Kuala Terengganu	4	0	0

PROTOKOL MONTREAL DAN PERLINDUNGAN LAPISAN OZON

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 klorofluoro karbon (CFC), halon dan karbon tetraklorida (CTC) mulai 1 Januari 2010. Bahan pemusnah ozon seperti Metil Bromida pula akan dihapuskan penggunaannya kecuali untuk aktiviti praperkapalan dan kuarantin (QPS) mulai 2015 manakala penghapusan hidroklorofluoro karbon (HCFC) adalah menjelang tahun 2030.

PEMATUHAN TERHADAP PROTOKOL MONTREAL

Malaysia wajib menghapuskan penggunaan HCFC secara berperingkat sehingga dihapuskan sepenuhnya menjelang 2030 seperti yang telah ditetapkan di bawah Protokol Montreal. Bagi mencapai sasaran ini, Pelan Pengurusan Penghapusan HCFC (HPMP) telah digubal yang menggariskan polisi dan strategi jangka panjang untuk menghapuskan penggunaan HCFC mulai tahun 2012 hingga 2040. **Jadual 4.12** menunjukkan jadual strategi dan polisi dalam pelaksanaan HPMP. **Rajah 4.2** menunjukkan jadual penghapusan HCFC dalam mematuhi Protokol Montreal di mana HCFC akan dikurangkan sebanyak 10% menjelang 2015, 35% pada 2020, 67.5 % pada 2025, 97.5 % pada tahun 2030 (dengan 2.5 % dihadkan kepada penggunaan untuk penyenggaraan sahaja) dan HCFC menjadi larangan mutlak pada tahun 2040. **Rajah 4.3** menunjukkan pengimportan HCFC pada tahun 2014 yang berjumlah 7,299.11 metrik tan.

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

MONTREAL PROTOCOL AND PROTECTION OF THE OZONE LAYER

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 1 January 2010. Other ozone depleting substances such as the use of methylbromide will be restricted for quarantine and pre-shipment (QPS) activities only by 2015 and hydrochlorofluorocarbon (HCFC) will be phased out by 2030.

COMPLIANCE TO MONTREAL PROTOCOL

Malaysia is obligated to phase out HCFC in stages by 2030 under the Montreal Protocol. To meet the phase out target, the HCFC Phase-out Management Plan (HPMP) was formulated that outlined the policies and long term strategies for the phase-out of HCFC starting from 2012 until 2040. **Table 4.12** shows the policies and strategies of HPMP. **Figure 4.2** 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 4.3** shows the importation of HCFC in 2014 amounted to 7,299.1 metric tonnes.

On 1st January 2013, Malaysia implemented the quota system for the importation of HCFC. Application for Approval Permit (AP) was processed by DOE through an online 'e-Permit' system within the quota given with the total amount of HCFC allocated according to baseline level or freeze limit of 515.8 ODPT (ozone depleting potential tonnes) or 7,900 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 diantara pengimport/pengesport 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 2014, sebanyak 583 permohonan untuk mengimport HCFC telah diterima dari 22 pengimport berdaftar dan sebanyak 12 permohonan untuk mengeksport HCFC telah diterima melalui e-Permit.

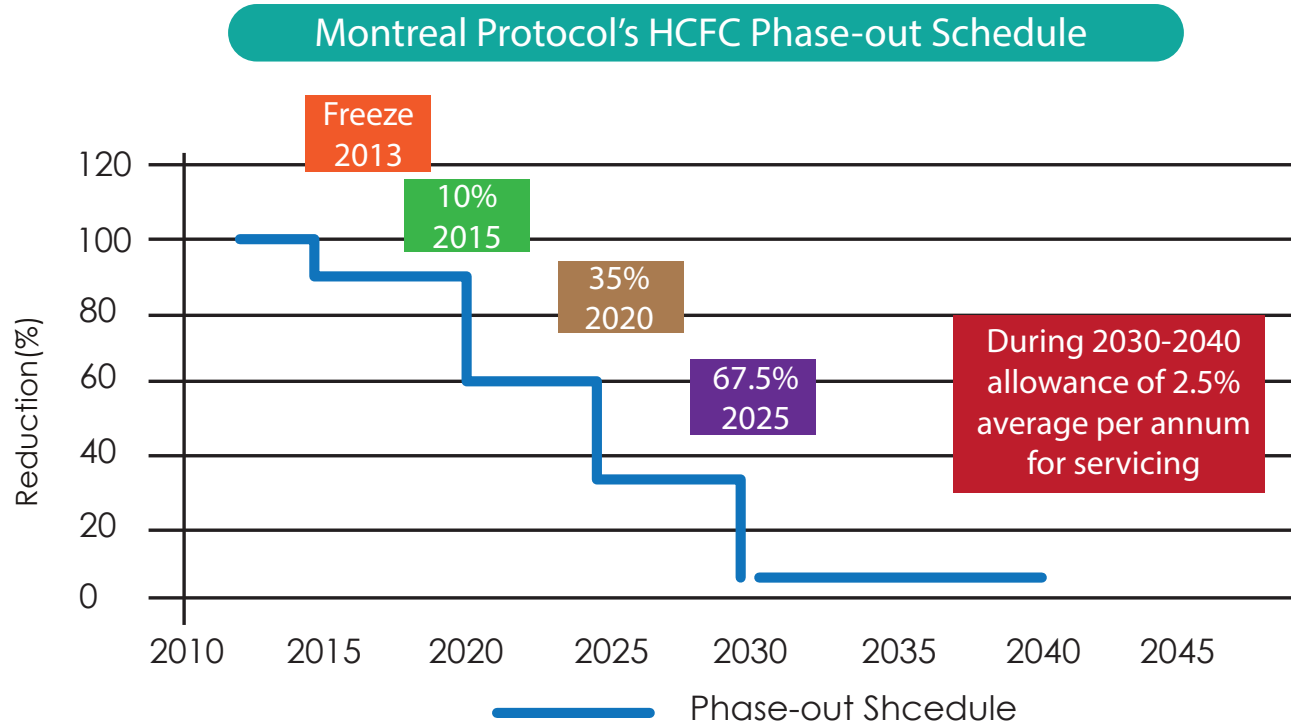
The on-line system, "e-Permit", was developed to process and approve import and export of HCFC from registered importers and exporters. The on-line system is a linkage network between the HCFC importers/exporters, Department of Environment Malaysia and the Customs Information System of the Royal Customs 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 2014, a total of 583 applications to import HCFC received via e-Permit from 22 registered importers and 12 applications to export HCFC were received via the same system.

Jadual 4.12 JAS : Polisi dan strategi perundangan Pelan Penghapusan HCFC (HPMP) (2012-2040)
Table 4.12 DOE : Policies and strategies of HCFC Phase Out Management Plan (HPMP) (2012-2040)

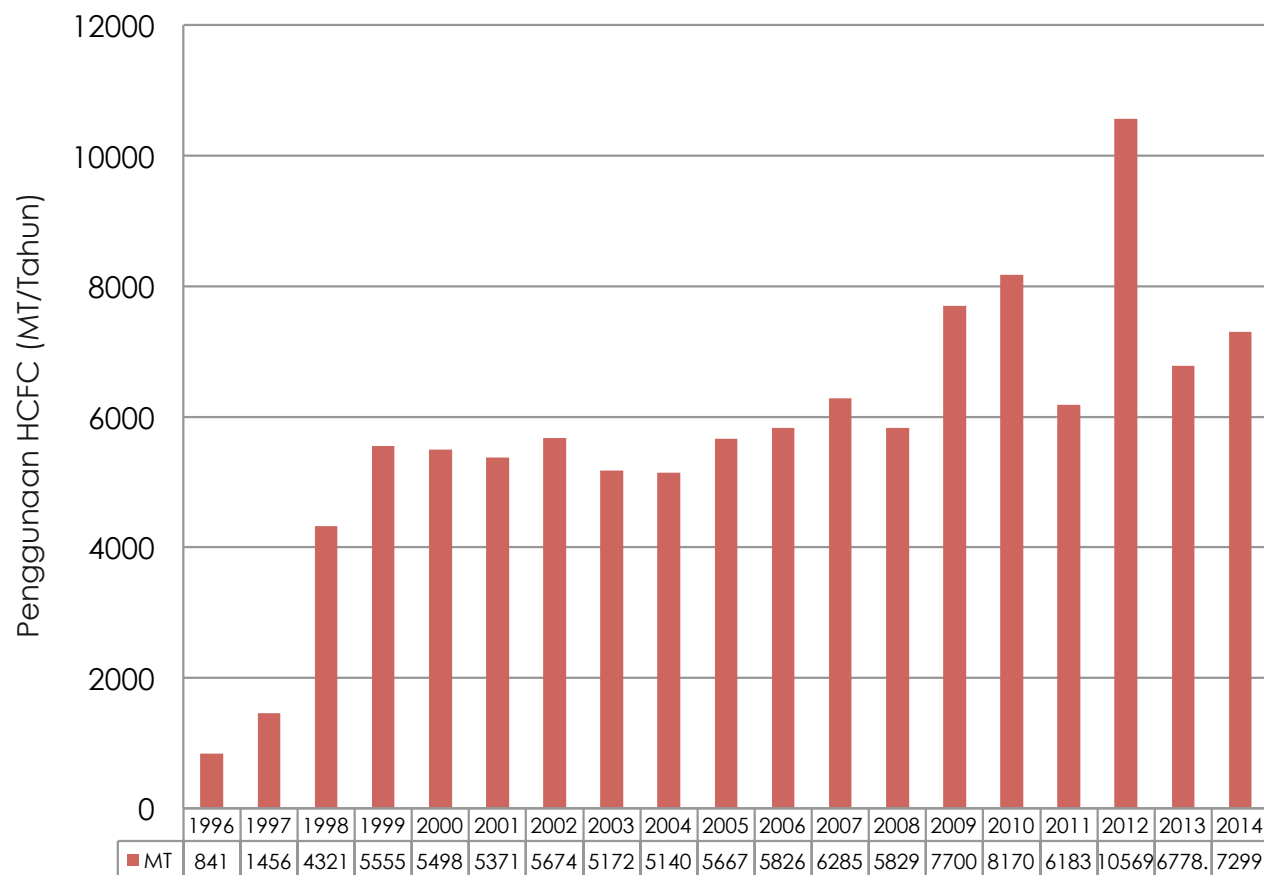
TAHUN YEARS	POLISI DAN TINDAKAN PERUNDANGAN POLICIES/ REGULATORY ACTIONS
2012	Mewujudkan sistem AP bagi pengagihan kuota import HCFC berdasarkan baseline atau purata import 2009/2010 Establishment of AP for HCFC import quota based on National average consumption for 2009/2010
	Meminda perundangan sediaada untuk mengawal penggunaan, import, pembuatan, pemasangan produk dan peralatan yang menggunakan HCFC Amend existing legislation for control on the use, import, manufacture, assembly or installation of products and equipment using HCFCs.
2013	Mewujudkan sistem perlesenan untuk mengeksport semula gas HCFC Licence re-export of HCFC chemicals
	Pelaksanaan sistem AP pada 1 Januari 2013 mengikut Jadual Pembekuan Protokol Montreal Implement Approved Permit (AP) system for HCFC import (by Jan 2013)
	Larangan menambah (expansion) atau membina fasiliti pembuatan baru menggunakan HCFC Prohibit expansion of new manufacturing facilities using HCFCs
	Promosi menggunakan bahan alternatif melalui pemberian insentif Promote the use of alternatives through incentives
	Latihan dan Pensijilan bagi pekerja yang mengendalikan HCFC Undertake certification of skilled workers trained to handle HCFCs
2015	Larangan bagi membuat, memasang dan mengimport peralatan penyaman udara menggunakan HCFC yang berkuasa 2.5 hp dan ke bawah (untuk penggunaan dalam Malaysia) Prohibit the manufacture, assembly and import of HCFC-based air-con equipment of 2.5hp and below (for use in Malaysia)
	Mewartakan HCFC sebagai bahan terkawal Include HCFCs as restricted gas
	Larangan ke atas pengimportan polyol yang mengandungi HCFC Prohibit import of pre-blended polyols with HCFCs

Jadual 4.12 JAS : Polisi dan strategi perundangan Pelan Penghapusan HCFC (HPMP) (2012-2040) (Sambungan)
Table 4.12 DOE : Policies and strategies of HCFC Phase Out Management Plan (HPMP) (2012-2040) (Continueud)

TAHUN YEARS	POLISI DAN TINDAKAN PERUNDANGAN POLICIES/ REGULATORY ACTIONS
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 4.2 JAS : Jadual Penghapusan HCFC Di Malaysia
Figure 4.2 DOE : HCFC Phase Out Schedule Consumption in Malaysia



Rajah 4.3 JAS : Tren Penggunaan HCFC Di Malaysia, 1996-2014
Figure 4.3 DOE : HCFC Consumption Trend in Malaysia, 1996-2014

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, dan projek-projek bantuan teknikal dalam sektor penyejukbekuan dan penyamanan udara. Sehingga 31 Disember 2014 sejumlah USD 6,823,815.10 telah dibelanjakan ke atas 17 projek penukaran teknologi bebas HCFC dalam pembuatan busa di 13 buah syarikat pembuatan busa dan 4 syarikat pembuatan *polyol*. Sejumlah 11 daripada 17 projek tersebut telah siap sepenuhnya di mana 7 syarikat pembuatan busa telah berjaya bertukar kepada sistem menggunakan *pentane* sebagai agen pengembang dan 4 syarikat pembuat *polyol* telah menghasilkan fomulasi *polyol* bebas HCFC. Projek busa yang lain dalam fasa akhir penukaran teknologi dan dijangka siap sepenuhnya pada bulan Mei 2015.

Untuk sektor penyejukbekuan dan penyamanan udara pula, Jabatan Alam Sekitar telah menerbitkan Training Manual For Technician in Refrigeration and Air-conditioning Service Sector untuk digunapakai oleh 41 Pusat Latihan Bertauliah (ATC) yang menjalankan kursus Pensijilan Juruteknik. Disampingitu sejumlah 30 unit Mesin Kitar Semula Refrigeran telah diagihkan kepada 30 ATC Kerajaan. Latihan bagi 85 orang tenaga pengajar di pusat-pusat tersebut telah dijalankan pada 23-26 September 2014 di Hotel Aston, Nilai dan Universiti Kuala Lumpur, Bangi.

Selain itu, satu projek demonstrasi penukaran sistem hawa dingin domestik daripada refrigeran R22 kepada R32 (bebas HCFC) telah dimulakan di dua tapak projek yang dipilih iaitu Universiti Kuala Lumpur dan Institut Latihan Alam Sekitar (EiMAS). Projek ini bertujuan untuk mengalakkan orang ramai menukar sistem hawa dingin mereka kepada sistem yang bebas HCFC. Projek ini telah mendapat kerjasama daripada syarikat O.Y.L Malaysia sebagai pembuat sistem hawa dingin jenis R32.

THE HCFC PHASE-OUT MANAGEMENT PLAN (HPMP)

Malaysia received funding assistance from the Multilateral Fund of the Montreal Protocol (MLF) amounting to USD 9,587,470 to implement the policy and strategy outlined in the HPMP- Stage 1 including investment project to phase out HCFC in 17 industries in foam sector and technical assistance for refrigeration and air-conditioning sector. As of 31st December 2014, a total amount of USD 6,823,815.10 had been disbursed to the 17 conversion projects at 13 foam manufacturers and 4 polyol system houses. Eleven (11) out of 17 recipients have completed their project successfully of which 7 foam manufacturers have completed the conversion to pentane foaming system and 4 system houses have formulated the HCFC-free polyol system. The other 6 foam industries are in the final stage of the project and expected to commission their technology conversion in May 2015.

As for the refrigeration & air-conditioning sector, the Department of Environment has published a Training Manual for Technician in Refrigeration and Air-conditioning Service Sector to be used by 41 Authorised Training Centres (ATCs) to carry out training for Certification of Technicians. In addition, 30 Reclaim and Recycle machines have been distributed to 30 Government ATCs. A program for Master Trainers for Technician in Refrigeration and Air-conditioning Servicing Sector was conducted for 85 trainers from 41 ATCs on 23-26 September 2014 at Aston Hotel, Nilai and University Kuala Lumpur, Bangi.

A demonstration project on replacement of domestic air-conditioning system using R22 with air-conditioning units using R32 is being carried out at two selected sites that is at University Kuala Lumpur, 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 O.Y.L Malaysia as the R32 air-conditioning system manufacturer.

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 dan JAS telah diadakan pada 16-20 Jun 2014 di Putra Palace Hotel, Perlis dan 17-19 Disember 2014 di Selesa Hotel, Johor Bahru. 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 Identifier).

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 Department of Environment on 16-20 June at Putra Palace, Kangar and 17-19 December at Selesa Hotel, Johor Bahru. The training course was organized to give better understanding on import and export of ODS especially on illegal trade together with hands-on training in using Refrigerant Identifiers.

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.

The implementation of project under HPMP Stage 1 runs according to 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.



Lawatan verifikasi dan pemantauan projek HPMP ke kilang pembuatan busa yang menerima dana bantuan Tabung Pelbagai Hala Protokol Montreal oleh pegawai Seksyen Pelindungan Ozon, pegawai UNDP dan perunding projek.

Verification and HPMP project monitoring visit by the officers from National Ozone Unit of the Department of Environment, personnels from UNDP and project consultants to the foam manufacturer as the recipient of Multilateral Fund.

PENGURUSAN HALON

Halon tidak lagi digunakan bagi pemasangan baru sistem mengawal kebakaran dan alat-alat pemadam api di Malaysia. Sebaliknya, air, karbon dioksida atau serbuk kimia kini digunakan sebagai alternatif. Walaubagaimanapun, kegunaan halon masih dibenarkan untuk tujuan terhad kepada sistem keselamatan kawalan kebakaran tentera dan penerbangan awam sepertimana dipersetujui di bawah Protokol Montreal. Pada tahun 2014, Pusat Bank Halon Kebangsaan yang dikelolakan oleh Jabatan Bomba dan Penyelamat telah berpindah dari Kuala Kubu Baru ke Bandar Baru Enstek, Negeri Sembilan. Sehingga tahun 2013, Pusat Bank Halon Kebangsaan telah melaporkan sebanyak 267,280 kg jenis Halon 1211 dan 7,114 kg Halon 1301 disimpan di Pusat Bank Halon Kebangsaan. 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.

HALON MANAGEMENT

Halon is no longer used in Malaysia for new installation of fire protection systems and fire extinguishers. Instead, water, carbon dioxide or chemical powders are now 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 2014 the Halon Bank managed by the Fire and Rescue Department in Kuala Kubu Baru had been moved to Bandar Baru Enstek, Negeri Sembilan. Up to 2014, Halon Bank reported 267,280 kg Halon 1211 and 7,114 kg Halon 1301 were stored at the National Halon 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.



Mesin Kitar Semula Refrigeran diagihkan kepada ATC Kerajaan bagi Program Pensijilan Juruteknik.
Refrigerants Reclaim and Recycle Machine distributed to Government ATCs for Technicians Certification Programmes

PROGRAM 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 Montreal Protocol. Penekanan terhadap tatacara dan kodetika yang betul di dalam pengendalian refrigeran juga diberikan semasa sesi latihan sebagai usaha untuk mengelakkan pelepasan refrigeran ke persekitaran secara sengaja mahupun tidak sengaja.

Sepanjang tahun 2014, sebanyak 31 siri latihan telah dijalankan oleh ATC dengan kerjasama JAS untuk melatih juruteknik-juruteknik atau pengendali refrigeran ini. Selaras dengan pemakaian buku manual terbaru "Training Manual for Technician in Refrigeration & Air Conditioning Service Sector (RACs)". Latihan Tenaga Pengajar bagi Program Persijilan Juruteknik Bertauliah dalam Sektor Penyejuk bekuan dan Penyamanan Udara yang merupakan latihan semula kepada tenaga pengajar sedia ada dan sebagai latihan kepada tenaga pengajar baru telah diadakan pada 22-26 September 2014 di Hotel Aston, Nilai dan Universiti Kuala Lumpur, Bangi. Seramai lapan puluh lima orang (85) tenaga pengajar dari institut latihan awam dan swasta telah menghadiri latihan ini.

Objektif latihan ini diadakan adalah untuk melatih tenaga pengajar mengenai "Good Practices and Proper Handling and Servicing of Refrigerants". Selain itu, bengkel ini juga memberi pendedahan kepada peserta mengenai refrigeran alternatif Hidro karbon (HC) termasuk ciri-ciri keselamatan dan kesesuaian penggunaannya di Malaysia.

CERTIFICATION ON REFRIGERATION SERVICE SECTOR (RSS)

Certification to technicians or to the person handling in 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 have organized series of certification training for technicians in this field. Emphasis on the methodologies and code of ethics in handling refrigerants are given in the training to avoid accidental release of refrigerant to the atmosphere.

In 2014, 31 series of courses have been organized by ATC with the collaboration of Department of Environment to train technicians and refrigerant handler of HCFC refrigerants. In line with the new manual "Training Manual for Technician in Refrigeration & Air Conditioning Service Sector (RACs)", Training for Master Trainers for Programme on Certified Technicians in Refrigeration and Air Conditioning (RACs) Servicing Sector was held on 22-26 September 2014 in Aston Hotel, Nilai and University Kuala Lumpur, Bangi as a refresher course for the existing master trainers and as a training for new master trainers. A total of 85 master trainers from the government and private training institutes had attended the training.

Objectives of the training were to train the master trainers on "Good Practices and Proper Handling and Servicing of Refrigerants". In addition, the workshop introduced alternative refrigerant such as hydrocarbon (HC) on its safety and applicability in Malaysia.



Latihan Tenaga Pengajar bagi Program Persijilan Juruteknik Bertauliah dalam Sektor Penyejukbekuan dan Penyejukan Udara pada 22-26 September 2014 di Aston Hotel, Nilai /UniKL, Bangi.

Training for Master Trainerfor Programme on Certified Technicians in Refrigeration and Air Conditioning (RACs) Servicing Sector was held from 22-26 September 2014 at Aston Hotel, Nilai/UniKL, Bangi



Sesi peperiksaan praktikal semasa Latihan Tenaga Pengajar bagi Program Persijilan Juruteknik Bertauliah dalam Sektor Penyejukbekuan dan Penyejukan Udara.

Practical examination during the Training for Master Trainers for Programme on Certified Technicians in Refrigeration and Air Conditioning (RACs) Servicing Sector

PROGRAM DAN KEMPEN KESEDARAN

Hari Ozon Antarabangsa iaitu pada 16 September 2014 telah disambut dengan tema "Ozone Layer Protection: The Mission Goes On" atau "Perlindungan lapisan ozon: Misi diteruskan". Majlis sambutan telah diadakan di Dewan Universiti Kuala Lumpur- Malaysia France Institute (UniKL-MFI), Bangi pada 23 September 2014. Majlis ini telah dirasmikan oleh YB Menteri Sumber Asli dan Alam Sekitar, Datuk Seri G. Palanivel. Dalam majlis yang sama, buku panduan "Training Manual for Technician in Refrigeration & Air-conditioning Service Sectors (RACS)" terbitan Jabatan Alam Sekitar juga turut dilancarkan oleh YB Menteri.

Selain itu, 41 pusat latihan dari seluruh negara telah ditauliahkan sebagai pusat untuk mengendalikan kursus latihan refrigeran kepada juruteknik sektor penyejuk bekuan dan penyamanan udara. Beberapa syarikat pembekal peralatan sistem penyejuk bekuan dan penyamanan udara turut dijemput untuk mengadakan pameran dalam majlis tersebut. Poster tema Hari Ozon Negara-negara ASEAN yang diterbitkan oleh UNEP diserahkan kepada YB 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 2014, latihan dan mesyuarat antarabangsa serta serantau yang dihadiri JAS seperti di **Jadual 4.13** dan **Jadual 4.14**.

AWARENESS PROGRAMME AND CAMPAIGN

The International Ozone Day Celebration on 16 September 2014 was celebrated with the theme 'Ozone Layer Protection: Mission Goes ON'. The Ozone Day Celebration was held at University Kuala Lumpur- Malaysia France Institute (UniKL-MFI), Bangi on 23 September 2014 graced by the Minister of Natural Resources and Environment, Datuk Seri G. Palanivel. The "Training Manual for Technician in Refrigeration & Air-conditioning Sectors (RACS)" published by the Department of Environment had been officially launched by the Minister at the event.

Besides that, 41 selected training centres had also been rewarded as "Authorised Training Centre (ATC)" to conduct training courses for technicians in the refrigeration and air-conditioning sector. A few companies in RAC sector participate in the exhibition at the event. An ASEAN Theme Poster on International Ozone Day was hand over to the minister during the official ceremony. Pamphlets on ozone layer protection and HCFC phase-out, HPMP and e- Permit as well as the Ozone Bulletin were published and distributed. Details of awareness programmes carried out in 2014 are listed in **Table 4.13**. Meetings and trainings at regional and international levels attended by the DOE officers are listed in **Table 4.14**.



Majlis Sambutan Hari Ozon pada 23 September 2014 di UniKL-MFI, Bangi
Ozone Day Celebration on 23 September 2014 at UniKL-MFI, Bangi

Jadual 4.13 JAS : Aktiviti-Aktiviti Latihan dan Kesedaran 2014
Table 4.13 DOE : Training and Awareness Activities 2014

TARIKH DATE	AKTIVITI& PROGRAM ACTIVITIES & PROGRAMME	TEMPAT VENUE
29 Apr	Seminar on Alternative for Foam Sector (System House)	IOI Palm Garden, Putrajaya
10 June	Methyl Bromide Phase-out Seminar	IOI Plam Garden, Putrajaya
12 June	Methyl Bromide Phase-out Seminar	Riverside Majestic, Kuching Sarawak
16-20 June	Latihan Kastam mengenai HCFC Customs Training on HCFC	Putra Palace Hotel, Perlis
22-26 Sept	Latihan Tenaga Pengajar bagi Program Persijilan Juruteknik Bertauliah dalam Sektor Penyejukbekuan dan Penyamanan Udara Training for Master Trainer for Programme on Certified Technicians in Refrigeration and Air Conditioning (RACs) Servicing Sector	The Aston Hotel, Nilai; Unikl-MFI, Bangi
23 Sept	Hari Ozon Antarabangsa International Ozone Day Celebration	UniKL-MFI, Bangi
8 & 30 Oct	Seminar Alternatif BPO (Hidrokarbon) ODS Alternative Seminar (Hydrocarbon)	ILP Kepala Batas, Penang
30-4 Nov	Latihan Kastam mengenai HCFC Customs Training on HCFC	Selesa Hotel, Johor Bahru
17-19 Dec	Bengkel Modul Latihan RACS Workshop on RACS training module	Klana Hotel, Port Dickson

Jadual 4.14 JAS : Mesyuarat-Mesyuarat dan Latihan Peringkat Serantau dan Antarabangsa 2014
Table 4.14 DOE : Regional and International Meetings and Trainings 2014

TARIKH DATE	AKTIVITI& PROGRAM ACTIVITIES & PROGRAMMES	TEMPAT VENUE
5 Feb	Mesyuarat Jawatankuasa Akaun Amanah Protokol Montreal Meeting on Montreal Protocol Trust Account	DOE
10 - 14 Feb	Latihan Sambil Belajar NOU Brunei Study Tour for NOU Brunei	DOE
11 Feb	Dialog Bersama Ahli MACRA Dialogue with MACRA Members	DOE
25 Feb	Mesyuarat Jawatankuasa Pemandu Kebangsaan Perlindungan Lapisan Ozon Ke 43 The 43rd National Steering Committee Meeting (NSC)	NRE, Putrajaya
3 – 7 Mac	Bengkel Modul Latihan Juruteknik Sektor Penyejuk bekuan dan Penyamanan Udara Workshop on the Training Module for Technician in Refrigeration & Air-Conditioning Sector (RACS)	Thistle Hotel, Port Dickson
1 – 4 April	Joint South Asia/ South East Asia Pacific ODS Network Meeting	Luang Prabang, Lao PDR
8 May	Mesyuarat Jawatan kuasa Pemandu Projek HPMP Ke 2 The 2nd HPMP Project Steering Committee (PSC) Meeting	DOE
12 – 16 May	The 72 nd Executive Committee of Multilateral Fund Meeting (ExCom)	Montreal, Canada
9 July	Compliance Assistance Program (CAP) Advisory Group Meeting	Paris
11 – 12 July	HFC Management Workshop	Paris
11 - 18 July	The 34th Open Ended Working Group Meeting (OEWG 34)	Paris

Jadual 4.14 JAS : Mesyuarat-Mesyuarat dan Latihan Peringkat Serantau dan Antarabangsa 2014 (Sambungan)
Table 4.14 DOE : Regional and International Meetings and Trainings 2014 (Continueud)

TARIKH DATE	AKTIVITI& PROGRAM ACTIVITIES & PROGRAMMES	TEMPAT VENUE
20 Aug	Mesyuarat Jawatankuasa Kuota Quota Committee Meeting	DOE
9 Oct	Joint South Asia/ South East Asia and Pacific Ozone Officer Network Meeting	Siem Reap, Cambodia
17 – 21 Nov	10th COP on Vienna Convention and 26th MOP of Montreal Protocol	Paris
4 Dec	Mesyuarat Jawatankuasa Akaun Amanah Protokol Montreal Meeting on Montreal Protocol Trust Account	DOE
17 Dec	Mesyuarat Jawatankuasa Kuota Quota Committee Meeting	DOE



Delegasi Malaysia di Mesyuarat Konvensyen Parti kepada Vienna Konvensyen dan Mesyuarat Parti kepada Protokol Montreal ke -26

Malaysian Delegates at the 10th Convention of Parties to the Vienna Convention and the 26th Meeting of Parties to the Montreal Protocol, UNESCO Building, Paris.

PENGUATKUASAAN TERHADAP AKTIVITI PEMBAKARAN TERBUKA

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). Pada tahun 2014 sebanyak 4,354 kes titik panas di seluruh negara telah dilaporkan melalui satelit NOAA18 (**Jadual 4.15**).

Sebanyak 6,083 kes pembakaran terbuka telah dikesan di lapangan pada tahun 2014 (**Jadual 4.16 & Jadual 4.17**) dan dilaporkan oleh setiap JAS Negeri melalui Sistem e-KAS (Modul Pembakaran Terbuka dan Modul Aduan). Kejadian pembakaran terbuka yang sering berlaku adalah bagi aktiviti pembakaran sampah sarap di kawasan perumahan, pembakaran sampah sarap di bahu jalan dan pembakaran untuk upacara keagamaan atau penyembahan (dikategorikan sebagai lain-lain aktiviti) (1,253), belukar (1,240), hutan (1,220) dan pertanian (997) terutamanya semasa cuaca panas dan kering iaitu pada bulan Februari (182), Mac (252) dan Julai (120). Daripada 6,083 kes pembakaran terbuka tersebut, 478 kes telah dikompaun dengan jumlah kompaun yang dikutip ialah sebanyak RM707,102.00 dan kes mahkamah yang melibatkan kes pembakaran terbuka bagi tahun 2014 adalah sebanyak 5 kes.

ENFORCEMENT AGAINST OPEN BURNING ACTIVITIES

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). Throughout the year 2014, a total of 4,354 hotspots were detected via satellites NOAA18 (**Table 4.15**).

A total 6,083 open burning cases detected on the ground in 2014 and these cases were reported in e-KAS reporting system (Open Burning Module and Complaint Module) by the DOE state offices (**Table 4.16 & Table 4.17**). Cases of open burning recorded are mainly from activities such as burning of garbage in residential area, garbage burning by the roadside and burning of articles as part of religious rites or worshipping activities (categorized as other activities) (1,253), bushes (1,240), forests (1,220) and agriculture areas (858), that normally occurred during the hot and dry period in the months of February (182), Mac (252) and July (120). Out of 6,083 open burning cases detected, 481 cases were issued compounds amounting to RM707,102.00 and court cases involving open burning cases for the year of 2014 is 5 cases.

PENGAWASAN MELALUI UDARA

Pada tahun 2014, Program Pengawasan Alam Sekitar Melalui Udara telah dilaksanakan di beberapa buah negeri di Semenanjung Malaysia, Sabah dan Sarawak. Program ini dilaksanakan untuk mengawasi dan mengesan dari udara kejadian pencemaran alam sekitar seperti pembakaran terbuka, penerokaan hutan secara haram, pelepasan dari industri, aktiviti pembukaan tanah serta pembangunan di kawasan tanah tinggi dan pembangunan di 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 telah diperuntukkan pada tahun 2014 untuk pelaksanaan program ini. Sepanjang program ini, 256 penerbangan telah dilaksanakan

AERIAL SURVEILLANCE

In 2014, the programme of surveillance has been done in Peninsular Malaysia, Sabah and Sarawak. Environmental pollution due to open burning activities, emission from industries, coastal and marine pollution, land clearing activities on highland and island development were monitored continuously. 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.

A development budget of RM2,302,729.57 was allocated for aerial surveillance and a total of 256 flights were conducted.

Jadual 4.15 JAS : Bilangan Kes Titik Panas Mengikut Negeri, 2014

Table 4.15 DOE: Number of Hotspots by States, 2014

NEGERI / STATE	BULAN / TOTAL												
	JAN	FEB	MARCH	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JUMLAH TOTAL
Johor	9	69	140	10	6	11	3	8	22	5	7	6	296
Kedah	3	49	95	1	8	2	6	0	4	0	0	0	168
Kelantan	3	45	142	33	24	16	17	3	6	1	0	2	292
Melaka	0	1	6	0	3	4	2	0	0	1	1	0	18
Negeri Sembilan	0	8	24	6	6	9	9	6	9	2	3	1	83
Pahang	9	132	422	106	51	116	54	45	52	16	20	12	1,035
Perak	8	45	119	2	2	14	15	0	3	1	0	2	211
Perlis	3	16	4	0	0	0	0	1	0	0	0	0	24
Pulau Pinang	0	1	6	1	2	1	0	0	0	0	0	0	11
Sabah	9	33	95	59	45	43	75	38	49	39	11	6	502
Sarawak	76	143	228	92	76	102	315	60	79	32	21	19	1,243
Selangor	0	46	81	2	0	19	28	16	1	0	1	0	194
Terengganu	2	19	77	61	54	12	5	16	22	4	1	2	275
W.P.K.L. / Putrajaya	0	0	1	0	0	0	0	0	0	0	1	0	2
W.P. Labuan	0	0	0	0	0	0	0	0	0	0	0	0	0
JUMLAH / TOTAL	122	607	1,440	373	277	349	529	193	247	101	66	50	4,354
JUMLAH KESELURUHAN / TOTAL = 4,354													

Jadual 4.16 JAS: Bilangan Kes Pembakaran Terbuka Mengikut Negeri, 2014

Table 4.16 DOE: Number Of Open Burning Cases By States, 2014

NEGERI / STATE	BULAN / TOTAL							
	LADANG PLANTATION	PERTANIAN AGRICULTURE	BELUKAR BUSHES	HUTAN FOREST	TAPAK PEMBINAAN CONSTRUCTION SITES	TAPAK PELUPUSAN DISPOSAL SITES	INDUSTRI INDUSTRY	LAIN - LAIN OTHERS
Johor	95	65	111	108	33	18	12	106
Kedah	41	64	29	53	5	1	2	43
Kelantan	125	62	39	84	11	8	6	34
Melaka	19	17	48	0	11	1	1	60
Negeri Sembilan	44	8	35	25	8	8	1	110
Pahang	311	89	334	327	27	10	8	46
Perak	44	43	48	130	14	2	4	93
Perlis	3	18	6	1	1	1	0	11
Pulau Pinang	5	12	16	6	15	6	0	91
Sabah	28	285	24	19	5	0	4	43
Sarawak	230	265	168	368	5	1	6	40
Selangor	53	35	163	56	2	30	1	427
Terengganu	58	27	216	42	24	7	8	53
W.P. K. Lumpur	0	7	3	0	5	1	0	96
W.P. Labuan	0	0	0	1	6	0	0	0
JUMLAH / TOTAL	1,056	997	1,240	1,220	170	94	53	1,253
JUMLAH KESELURUHAN / TOTAL = 4,354								

Jadual 4.17 JAS: Bilangan Kes Pembakaran Terbuka Bulanan, 2014

Table 4.17 DOE: Number of Open Burning Cases by Month, 2014

NEGERI / STATE	BULAN / TOTAL							
	LADAN PLANTATION	PERTANIAN AGRICULTURE	BELUKAR BUSHES	HUTAN FOREST	TAPAK PEMBINAAN CONSTRUCTION SITES	TAPAK PELUPUSAN DISPOSAL SITES	INDUSTRI INDUSTRY	LAIN - LAIN OTHERS
January	25	42	43	25	19	4	6	107
February	164	180	240	185	31	22	8	182
March	359	256	420	438	28	26	13	252
April	77	110	130	105	15	10	0	77
May	66	62	75	63	10	4	4	59
June	93	80	92	77	7	3	4	88
July	130	169	92	165	13	13	4	120
August	45	40	56	39	16	9	2	94
September	53	35	51	60	10	3	3	69
October	17	9	13	24	6	0	5	91
November	11	10	16	23	11	0	1	54
Dicember	16	4	12	16	4	0	3	60
JUMLAH / TOTAL	122	997	1,240	1,220	170	94	53	1,253
JUMLAH KESELURUHAN / TOTAL = 6,083								

RANCANGAN KONTINGENSI KEBANGSAAN KAWALAN TUMPAHAN MINYAK

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 4.5**. Jabatan Alam Sekitar (JAS) juga memberi penekanan terhadap latihan-latihan berstruktur dan berkala bagi semua kakitangan yang terlibat dalam tindakbalas Kontingensi Tumpahan Minyak (KTM). 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 International Convention on Oil Spill Preparedness and Response (OPRC) 1990 telah menggariskan obligasi Negara dalam komitmen di peringkat Antarabangsa dalam hal-ehwal berhubung dengan latihan. Keperluan latihan ini telah dimasukkan ke dalam mekanisme tindakbalas RKKKTM.

Di sepanjang tahun 2014, sebanyak 12 aktiviti berkaitan dengan tumpahan minyak telah dianjurkan/ dihadiri/ dilaksanakan oleh pegawai-pegawai JAS bagi tujuan peningkatan kemahiran dan perkongsian kepakaran dalam usaha melawan tumpahan minyak di perairan Malaysia.

NATIONAL OIL SPILL CONTINGENCY PLAN

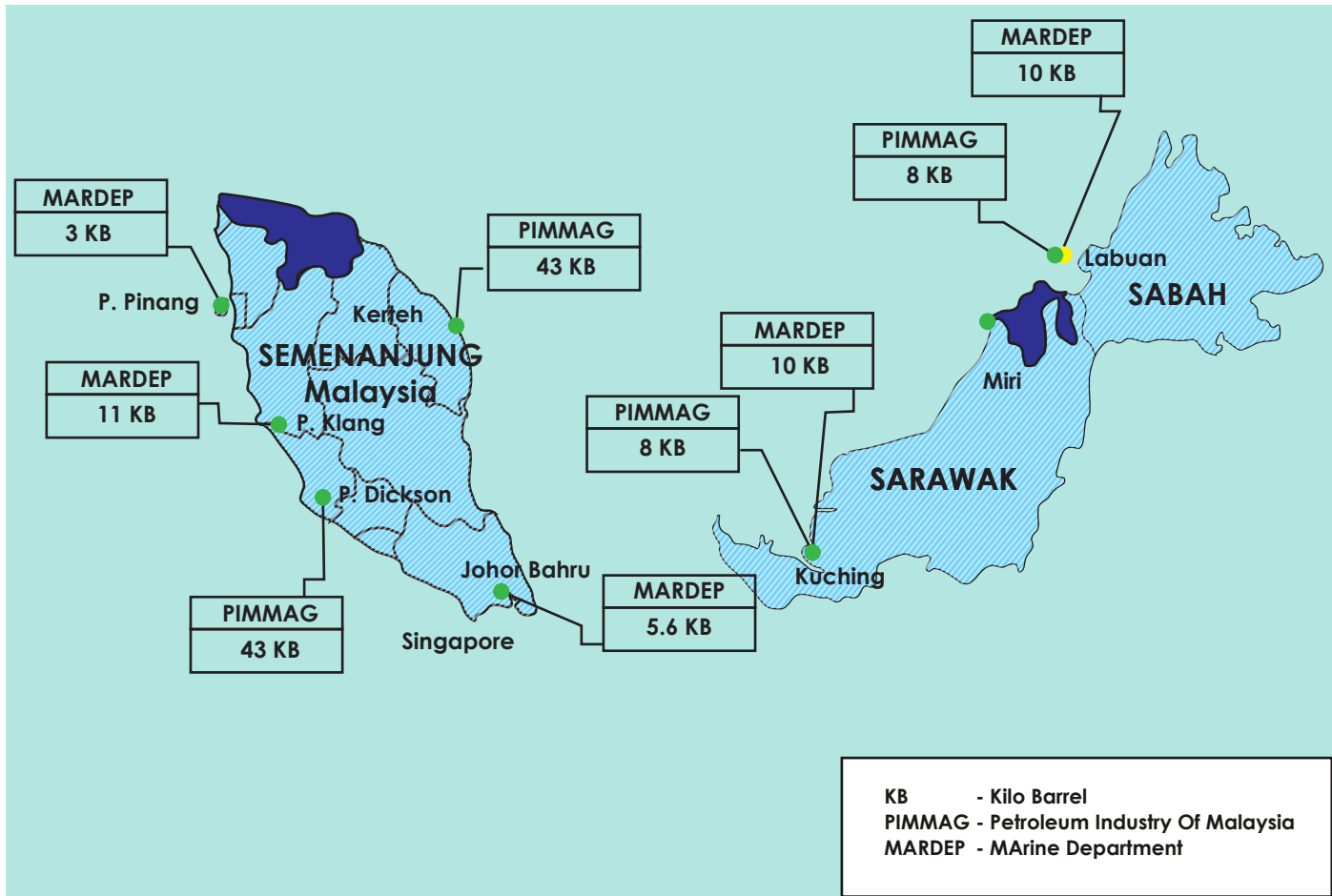
The National Oil Spill Contingency Plan (NOSCP) is a contingency plan which provides guidelines to address oil spill incident in Malaysian waters. The NOSCP is administered by the National Oil Spill Control Committee (NOSCC) consisting of seventeen (17) member departments and agencies, chaired by the 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 4.5**. DOE places equal emphasis on scheduled and periodical training activities for personnel involved in Oil Spill Response (OSR). Such training is aimed to ensure DOE officers involved in OSR 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 2014, a total of 12 activities related to oil spill were organized/ attended/ conducted by DOE officers for capacity building and sharing of expertise to combat oil spills in Malaysian waters.

Antara aktiviti tersebut ialah:

The activities are:

Bil No	Aktiviti ACTIVITIES	Tarikh DATES
i	Percetakan dan agihan dokumen Rancangan Kontingensi Kebangsaan Kawalan Tumpahan Minyak (RKKKTM) yang disemak semula kepada 17 agensi Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak. Printing and distribution of the National Contingency Plan Oil Spill (NOSCP) document to 17 agencies of the National Oil Spill Control Committee.	22 Dec 2014
ii	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.	22 Dec 2014
iii	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. Terengganu (Zon Timur) / Terengganu (East) b. Perak (Zon Barat) / Perak (West) c. Labuan (Zon Borneo) / Labuan (Borneo)	26-28 Aug 2014 10-12 Nov 2014 4-6 Nov 2014
iv	1 st Technical Meeting On The Standard Operating Procedure For Joint Oil Spill Combat In The South China Sea Including Brunei Bay For Brunei-Malaysia di Langkawi, Kedah. 1 st Technical Meeting On The Standard Operating Procedure For Joint Oil Spill Combat In The South China Sea Including Brunei Bay For Brunei-Malaysia in Langkawi, Kedah.	20-21 May 2014
v	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	5-7 June 2014
vi	Mesyuarat Kerjasama Jabatan Alam Sekitar dan Jabatan Laut Malaysia. Department of Environment and Marine Department Malaysia Partnership Cooperation Meeting	18 Feb 2014
	Mesyuarat Kerjasama Jabatan Alam Sekitar dan Agensi Penguatkuasaan Maritim Malaysia. Department of Environment and Malaysia Maritime Enforcement Agency Partnership Cooperation Meeting.	9 July 2014
	Verifikasi Pelan Tindakbalas Kawalan Tumpahan Minyak Tier 1 di: Verification of Oil Spill Response Plan Tier 1 at: a. Melaka b. Negeri Sembilan c. Johor	23 & 24 June 2014



Peta 4.5 Malaysia : Lokasi Peralatan Melawan Tumpahan Minyak Dan Keupayaan Di Malaysia, 2014.
Map 4.5 Malaysia : Location Of Oil Spill Equipment Stockpile And Capability In Malaysia, 2014.



Percetakan dan agihan dokumen Rancangan Kontingensi Kebangsaan Kawalan Tumpahan Minyak (RKKKTM) kepada 17 agensi Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak.
Printing and distribution of National Oil Spill Contingency Plan (NOSCP) to 17 agencies of National Oil Spill Control Committee.



Terengganu



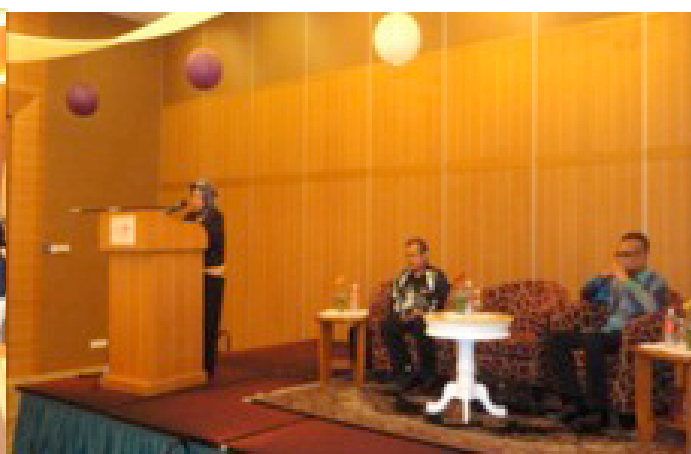
Perak



Labuan

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 Officer.



Latihan Table-Top Jawatankuasa Kebangsaan Kawalan Tumpahan Minyak (JKKTM) pada 5-7 Jun 2014 di Port Dickson, Negeri Sembilan.

Table-Top Exercise National Oil Spill Control Committee (NOSCC) on 5-7 June 2014 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 melawan kejadian tumpahan minyak dari kapal-kapal yang melalui Selat Melaka dan Selat Singapura.

Pengurusan Tabung ini adalah diurus secara bergilir-gilir dikalangan tiga (3) buah negara 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 2014 adalah seperti berikut:

- i. Mesyuarat Teknikal Jawatankuasa Tabung Pusingan telah berlangsung di Jakarta pada 6 Februari 2014.
- ii. Mesyuarat Pengurusan Jawatankuasa Tabung Pusingan telah diadakan di Bandung, Indonesia pada 2 hingga 3 Jun 2014.
- iii. Tiga (3) orang peserta masing-masing dari Malaysia, Singapura dan Indonesia telah dibiayai untuk menghadiri ke "RFC Cross Boundary Oil Pollution Combat Workshop" di Jakarta, Indonesia pada 5 Jun 2014.

STRAITS OF MALACCA AND SINGAPORE REVOLVING FUND COMMITTEE (RFC)

RFC Fund was established on February 11, 1981 for the purpose 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) 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 2014 are:

- i. RFC Technical Meeting convened in Jakarta on 6th February 2014.
- ii. Revolving Fund Committee Management Meeting was held in Bandung, Indonesia from 2nd to 3rd June 2014.
- iii. Three (3) participants from Malaysia, Singapore and Indonesia respectively were sponsored to attend the "RFC Cross Boundary Oil Pollution Combat Workshop" in Jakarta, Indonesia on 5th June 2014.



Mesyuarat Pengurusan Jawatankuasa Tabung Pusingan telah diadakan di Bandung, Indonesia pada 2 hingga 3 Jun 2014.

Revolving Fund Committee Management Meeting was held in Bandung, Indonesia from 2nd to 3rd June 2014.



Mesyuarat Teknikal Jawatankuasa Tabung Pusingan telah berlangsung di Jakarta pada 6 Februari 2014.

RFC Technical Meeting convened in Jakarta on 6th February 2014.

PENCEMARAN MARIN

Sepanjang tahun 2014, sejumlah 21 kes aduan pencemaran tumpahan minyak yang diterima iaitu sepuluh (10) kes berlaku di Laut China Selatan, lima (5) kes dikesan di Selat Melaka dan enam (6) kes di Selat Johor (**Jadual 4.18**).

Daripada dua puluh satu (21) jumlah kes tumpahan minyak yang berlaku pada tahun 2014, lapan (8) kes adalah berpunca dari kapal dan 13 kes tidak diketahui punca.

MARINE POLLUTION

Throughout 2014, there were 21 cases of marine pollution from oil spills were reported; ten (10) cases in the South China Sea, five (5) in the Straits of Malacca and six (6) in the Johor Straits (**Table 4.18**).

Out of 21 cases of oil spill in 2014, 8 were from ships meanwhile others are unknown.

Jadual 4.18 JAS: Kejadian Pencemaran Minyak, 2014
Table 4.18 DOE: Oil Pollution Incidents, 2014

LOKASI LOCATION	KAWASAN AREA		BIL. KES NO. OF CASES	NEGERI STATE
Laut China Selatan South China Sea	Perairan Malaysia Malaysia Territory	Semenanjung Peninsular	7	Pahang (3), Terengganu(1) Johor (3)
		Malaysia Timur East Malaysia	3	Labuan (2), Sabah
	Zon Ekonomi Eksklusif (EEZ) Exclusive Economic Zone (EEZ)		0	
Laut Sulu Sulu Sea	Perairan Malaysia Malaysia Territory	Sabah	0	Sabah
Selat Melaka Straits of Malacca	Perairan Malaysia Malaysia Territory		5	Kedah, Perak(2), Pulau Pinang, Selangor
	Zon Ekonomi Eksklusif (EEZ) Exclusive Economic Zone		0	-
Selat Johor/ Straits of Johor	Perairan Malaysia	Bahagian Barat/West Part	5	Johor
	Malaysia Territory	Bahagian Timur/East Part	1	
JUMLAH/TOTAL			21	

PENGURUSAN BUANGAN TERJADUAL

KEBENARAN BERTULIS DAN LESEN PREMIS YANG DITETAPKAN

Sebanyak 41 Kebenaran Bertulis telah dikeluarkan oleh Ketua Pengarah untuk pembinaan kemudahan pemerolehan kembali, pengolahan dan pelupusan buangan terjadual pada tahun 2014. Kebenaran Bertulis berkenaan telah dikeluarkan kepada 2 penunu buangan terjadual, 11 kemudahan pemerolehan kembali (bukan e-waste), 4 kemudahan pemerolehan kembali penuh (e-waste), 10 kemudahan pemerolehan kembali separa (e-waste), 12 kemudahan penstoran luar tapak, 1 kemudahan loji rawatan air resapan dan 1 tapak pelupusan selamat (**Jadual 4.19**).

Di samping itu, sejumlah 407 lesen dikeluarkan kepada kemudahan baru dan sedia ada pada tahun 2014 yang terdiri daripada 172 kemudahan pemerolehan kembali luar tapak (bukan e-waste), 31 kemudahan pemerolehan kembali luar tapak (penuh e-waste), 118 kemudahan pemerolehan kembali luar tapak (separa e-waste), 35 kemudahan penunu buangan terjadual, 2 kemudahan pengolahan di tanah, 4 kemudahan pengolahan luar tapak, 7 kemudahan tapak pelupusan selamat, dan 40 kemudahan penstoran luar tapak. Sejumlah 393 lesen dikeluarkan kepada pembawa yang ditetapkan (**Jadual 4.20**).

SCHEDULED WASTE MANAGEMENT

WRITTEN PERMISSION AND LICENCES FOR PRESCRIBED PREMISES

Fourty one (41) Written Permissions were issued by the Director General in 2014 for the construction of recovery, treatment and disposal facility for scheduled wastes, two (2) scheduled waste incinerator, 11 off-site recovery plants (non e-waste), 4 off-site full recovery plants (e-waste), 10 off-site partial recovery plants (e-waste), 12 off-site storage facilities, 1 diffusion water treatment plant and 1 secured landfill (**Table 4.19**).

In addition, a total number of 407 licenses were issued for both existing and new facilities in 2014 which consists of 172 licenses for off-site recovery (non e-waste), 31 licenses for off-site full recovery plants (e-waste), 118 licenses for off-site partial recovery plants (e-waste), 35 licenses for scheduled wastes incinerators, 2 licenses for land treatment facilities, 4 licenses for off-site treatment, 7 licenses for secured landfills and 40 licenses for off-site storage facilities. A total of 393 licenses were issued for prescribed conveyance (**Table 4.20**).

Jadual 4.19 JAS: Kebenaran Bertulis (KB) Yang Dikeluarkan oleh JAS Negeri Bagi Kemudahan Pemerolehan Kembali, Pengolahan & Pelupusan Buangan Terjadual, 2014

Table 4.19 DOE: Written Permission Status (KB) Produced by DOE for Recovery Facilities, Treatment & Disposal of Waste, 2014

BIL NO	KEMUDAHAN FACILITIES	JUMLAH KEBENARAN BERTULIS MENGIKUT NEGERI TOTAL NO. OF WRITTEN PERMISSION BY STATE															JUMLAH TOTAL
		JHR	KDH	KLN	MLK	N.S	PHG	PRK	PRS	PP	SBH	SRK	SLG	TRG	WP (KL)	WP (LAB)	
1	Penunu Buangan Terjadual / Scheduled Waste Incinerator	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	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	1	0	1	1	0	4	0	1	0	1	0	0	0	1	11
	b. Pemerolehan Kembali Luar Tapak (penuh e-Waste) / Off Site Recovery (full e-Waste)	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	4
	c. Pemerolehan Kembali Luar Tapak (Separa e-Waste) / Off Site Recovery (Partial e-Waste)	3	0	0	0	0	0	0	0	5	0	0	2	0	0	0	10
3	Kemudahan Penstoran Luar Tapak / Off Site Storage Facilities	0	0	0	0	0	0	0	0	0	3	3	2	0	0	4	12
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	1	1
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	0	0	0	0	0	0	0	1	0	0	0	1
	Bil. KB Yang Dikeluarkan / No. of Written Permission	4	1	0	1	1	0	4	0	7	3	5	8	0	0	7	41

Jadual 4.20 JAS: Lesen-Lesen Yang Dikeluarkan Bagi Kemudahan Pemerolehan Kembali, Pengolahan & Pelupusan Buangan Terjadual Yang Diluluskan Oleh Jabatan Alam Sekitar, 2014

Table 4.20 DOE: Licenses issued for Recovery Facilities, Processing Waste Disposal Approved by The Department Of Environment, 2014

BIL NO	KEMUDAHAN FACILITIES	JUMLAH LESEN DIKELUARKAN MENGIKUT NEGERI NO OF LICENCES ISSUE BY STATE															JUMLAH TOTAL
		JHR	KDH	KLN	MLK	N.S	PHG	PRK	PRS	PP	SBH	SRK	SLG	TRG	WP (KL)	WP (LAB)	
1	Pembawa Yang Ditetapkan / Prescribed Conveyance	49	24	1	25	15	13	28	1	68	11	47	90	10	6	4	393
	Penstoran Luar Tapak / Off Site Storage	2	1	0	0	2	1	2	0	0	1	22	4	1	0	4	40
2	Pemerolehan Kembali Luar Tapak / Off Site Recovery																
	a. Pemerolehan Kembali Luar Tapak (bukan e-Waste) / Off Site Recovery (none e-waste)	32	11	0	4	19	8	21	1	8	2	9	51	5	0	1	172
	b. Pemerolehan Kembali Luar Tapak (penuh e-Waste) / Off Site Recovery (full e-Waste)	0	1	0	5	3	0	1	0	18	0	0	3	0	0	0	31
	c. Pemerolehan Kembali Luar Tapak (separa e-Waste) / Off Site Recovery (partial e-Waste)	15	11	1	13	3	1	3	0	29	0	7	29	0	6	0	118
3	Penunu Buangan Terjadual / Schedule Waste Incinerator	5	1	0	1	3	1	2	0	3	4	7	5	2	0	1	35
4	Pengolahan Di Tanah / Land Treatment Facilities	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
	Pengolahan Luar Tapak / Off Site Treatment Facilities	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
5	Tapak Pelupusan Selamat / Secured Landfill	0	1	0	0	2	0	0	0	0	0	1	2	1	0	0	7
	Bil. Lesen / No. of License	104	50	2	48	47	24	57	2	126	18	95	184	20	12	11	800
	Bil. Premis / No. of Premises	54	26	1	23	32	11	29	1	58	7	48	94	10	6	7	407

NOTA:

JHR - JOHOR

KDH - KEDAH

KLN - KELANTAN

MLK - MELAKA

N.S - NEGERI SEMBILAN

PRK - PERAK

PRS - PERLIS

PP - PULAU PINANG

PHG - PAHANG

SBH - SABAH

SLG - SELANGOR

SRK - SARAWAK

TRG - TERENGGANU

WP (KL) - WILAYAH PERSEKUTUAN KUALA LUMPUR

WP (LAB) - WILAYAH PERSEKUTUAN LABUAN

PASUKAN PEMANTAU PENCEMARAN (3P)

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 membolehkan JAS mengambil tindakan cepat dan cekap ke atas kes aduan terutamanya aduan berulang.

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

Sepanjang tahun 2014, sejumlah 731 ahli 3P telah dilantik di seluruh negara yang melibatkan 66 kawasan parlimen. yang telah dikenalpasti. JAS telah menerima sejumlah 91 pelaporan daripada ahli 3P berhubung kes pencemaran seperti berikut;

POLLUTION MONITORING TEAM (PMT)

PMT

The 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 the PMT includes representatives from members of the JKKK, village leaders, Penghulus, Religious Communities, Resident Associations and also politicians.

Throughout 2014, a total of 731 members of 3P were appointed nation wide involving 66 parliamentary constituencies. DOE received 91 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	52
Pelepasan efluen / Effluent discharge	15
Pencemaran udara / Air pollution	12
Pembukaan tanah / Land clearing	10
Pelupusan sisa pepejal / Domestic waste disposal	2



Pasukan Pemantau Pencemaran (3P), Johan Setia, Selangor
Pollution Monitoring Team (Pmt), Johan Setia, Selangor



Siasatan Pembakaran Terbuka Berdasarkan Maklumat Ahli 3P, Di Johan Setia, Selangor
Investigation Of Open Burning At Johan Setia, Selangor Based On Information From Pmt Member



Pemantauan Pembakaran Terbuka Oleh Ahli 3P, Di Kg. Tok Kah, Terengganu
Monitoring Of Open Burning By Pmt Member, At Kg. Tok Kah, Terengganu



Pemantauan Aktiviti Pembukaan Tanah Tanpa Kawalan Oleh Ahli 3P, Di Tanah Tinggi Cameron
Monitoring Of Uncontrolled Land Clearing Activity At Cameron Highlands By Pmt Member



KAWALAN TERHADAP PREMIS YANG DITETAPKAN

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 2014, sejumlah 68 buah kilang getah asli mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Getah Asli Mentah), 1978. Daripada jumlah ini, 54 buah kilang telah dilesenkan bagi melepaskan effluen yang telah diolah ke alur air, sebuah kilang telah dilesenkan untuk melepaskan effluen ke atas tanah, manakala 13 buah kilang dibenarkan untuk mengitar semula effluen. 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 2014, pegawai-pegawai penguatkuasa JAS Negeri telah menjalankan sejumlah 227 pemeriksaan ke atas 68 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**.

Sejumlah 4 arahan lapangan dan 29 notis arahan telah dikeluarkan kepada premis-premis tersebut supaya mengambil tindakan pembaikan bagi mematuhi keperluan perundangan. Sebanyak tujuh (7) kompaun telah dikeluarkan bagi kesalahan-kesalahan yang telah dilakukan. Manakala empat (4) tindakan mahkamah telah diambil bagi kegagalan mematuhi syarat-syarat lesen dengan denda sebanyak RM40,000 telah dikenakan (**Rajah 4.4**).

CONTROL OF PRESCRIBED PREMISES

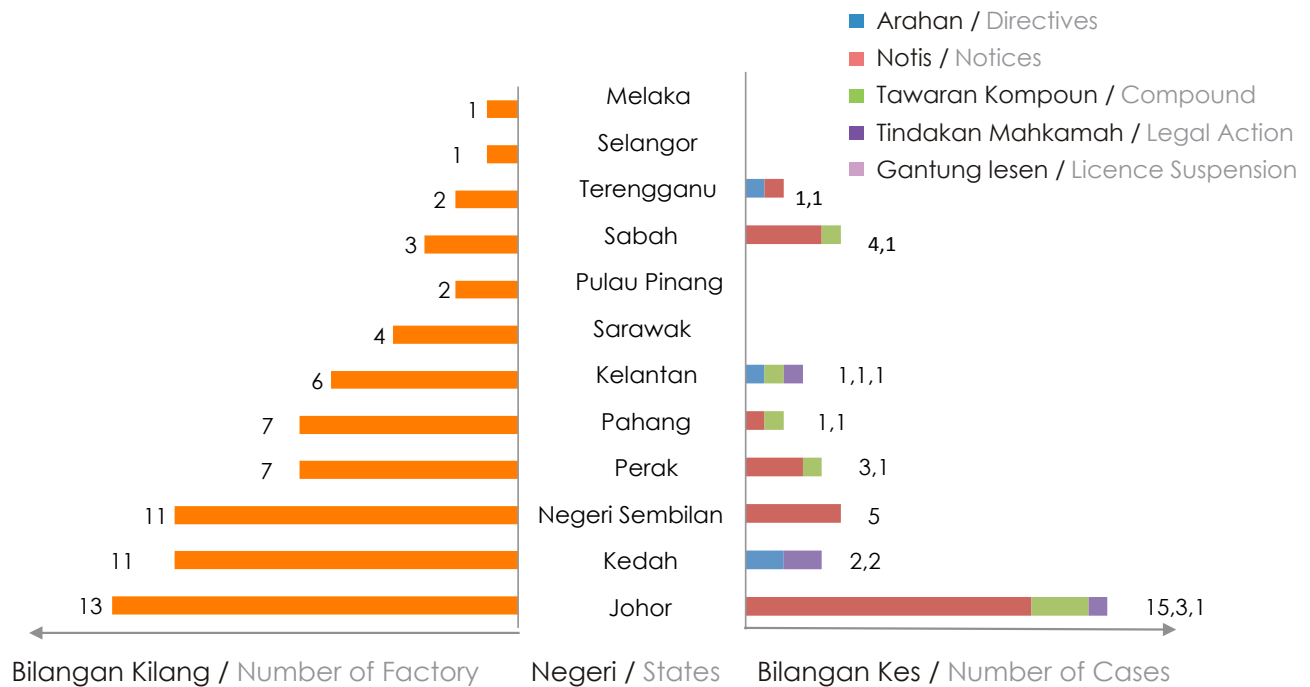
Raw natural rubber factories and crude palm oil mills are classified as prescribed premises under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order, 1978 and the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order, 1977 respectively. The operation of these premises 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 2014, there were 68 raw natural rubber factories licensed under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978. Out of these, 54 factories were licensed to discharge treated effluent into inland watercourse, one (1) was permitted to practise land disposal, while the remaining 13 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 2014, State DOE enforcement officers conducted 227 inspections on 68 licensed raw natural rubber factories. Those factories with low previous compliance record were given priority for inspections. Follow-up actions taken as a result of these inspections are as shown in **Figure 4.4**.

A total of 4 field citations and 29 notices were issued to the concerned premises to take corrective actions in order to comply with the legal requirements. Seven (7) compounds were issued for the offences committed. Meanwhile, legal action was taken against four (4) premises for failure to comply with conditions of their licences. The total amount of fines collected was RM40,000 (**Figure 4.4**).



Rajah 4.4 JAS : Tindakan Undang-Undang Terhadap Kilang Getah Asli Mentah, 2014
Figure 4.4 DOE : Legal Actions Against Raw Natural Rubber Factories, 2014

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

Pada tahun 2014, pencapaian pematuhan keseluruhan kilang getah asli mentah yang tertakluk di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan)(Getah Asli Mentah) 1978 adalah 100%.

STATUS OF COMPLIANCE WITH THE ENVIRONMENTAL QUALITY (PRESCRIBED PREMISES) (RAW NATURAL RUBBER) REGULATIONS, 1978

In 2014, 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 100%.

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 2014, 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 2014, overall compliance performance by the raw natural rubber factories was 100%.

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

Pada tahun 2014, pencapaian pematuhan keseluruhan oleh kilang getah asli mentah bagi Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 adalah 99%.

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

In 2014, overall compliance performance by the raw natural rubber factories for the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 99%.

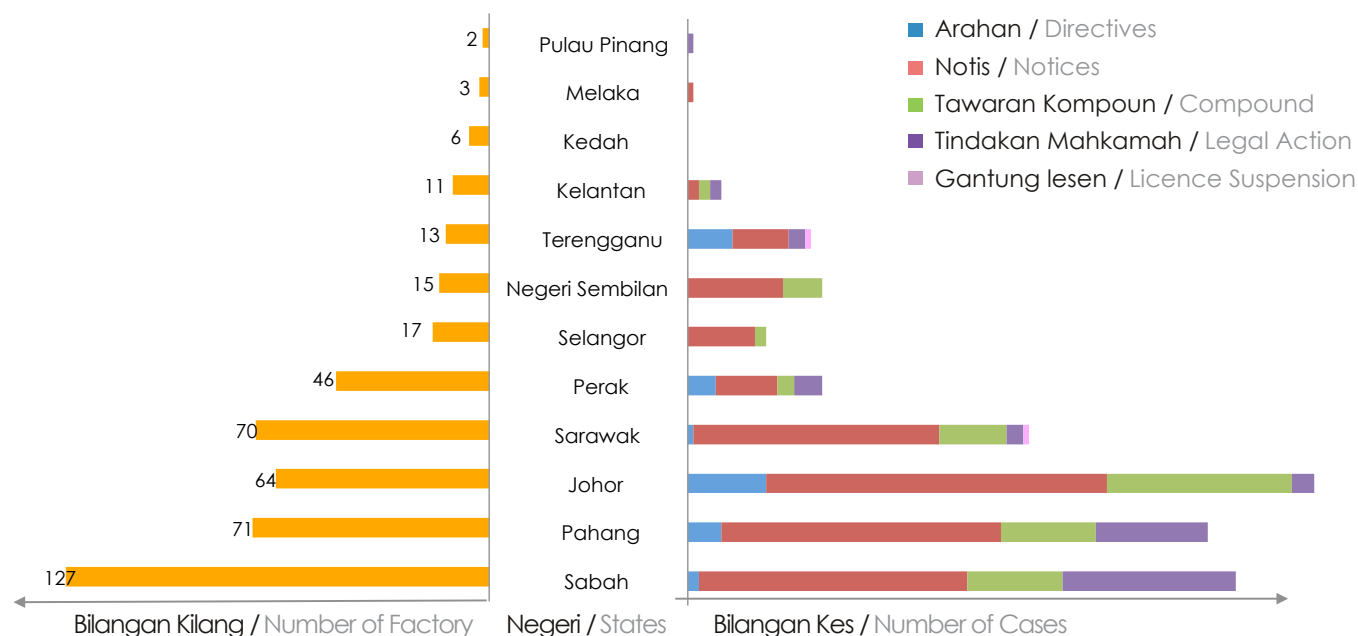
KILANG KELAPA SAWIT MENTAH

Sejumlah 445 buah kilang kelapa sawit mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Kelapa Sawit Mentah), 1977 pada tahun 2014, seperti ditunjukkan di jadual berikut:

JENIS LESEN TYPE OF LICENSE	BILANGAN KILANG DILESENKAN NO. OF PREMISES
Pelepasan effluent yang diolah ke alur air Discharge treated effluent into inland watercourse	363
Pelupusan effluent ke atas tanah Land disposal	50
Pelupusan effluent secara gabungan kaedah alur air dan atas tanah Discharge effluent by combination into inland watercourse and land disposal	27
Pelupusan effluent kaedah kompos Composting	3
Pelupusan secara gabungan kaedah alur air dan kompos Combination of inland watercourse and composting	2
JUMLAH TOTAL	445

CRUDE PALM OIL

There were 445 palm oil mills licensed under the Environmental Quality (Prescribed Premises) (Crude Palm Oil Mill) Regulations, 1977 in the year 2014 as shown in the table below:



Rajah 4.5 JAS : Tindakan Undang-Undang Terhadap Kilang Minyak Kelapa Sawit Mentah, 2014
Figure 4.5 DOE : Legal Action Against Crude Palm Oil Mills, 2014

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.

Sepanjang tahun 2014, sejumlah 1,269 pemeriksaan ke atas 445 kilang kelapa sawit yang dilesenkan telah dilaksanakan oleh pegawai-pegawai penguatkuasa JAS Negeri. Tindakan susulan hasil pemeriksaan tersebut seperti yang ditunjukkan dalam **Rajah 4.5** dan seperti di **Jadual 4.21**.

Throughout 2014, a total of 1,269 inspections on 445 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 JAS : Tindakan Susulan hasil Pemeriksaan
Table 4.21 DOE : Follow-up Actions taken

TINDAKAN SUSULAN HASIL PEMERIKSAAN FOLLOW UP ACTIONS TAKEN	JUMLAH TOTAL
Arahan lapangan Field Citation	36
Notis arahan Land disposal	256
Kompaun Compound	93
Mahkamah Legal action	69
Denda Fines	RM 1,057,500

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

Pada tahun 2014, 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 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 2014, pencapaian pematuhan keseluruhan oleh kilang minyak kelapa sawit mentah adalah 100%.

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

Pada tahun 2014 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 (PRESCRIBED PREMISES) (CRUDE PALM OIL) REGULATIONS, 1977

In 2014, the overall compliance performance by the crude palm oil mills that were subjected to the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977 was 98%.

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

Palm oil mills are also subjected to the Environmental Quality (Clean Air) Regulations, 1978. In 2014, the overall compliance performance by palm oil mills was 100%.

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

In 2014, the overall compliance performance by the palm oil mills under the Environmental Quality (Scheduled Wastes) Regulations, 2005 was 98%.

KAWALAN PREMIS YANG BUKAN DITETAPKAN

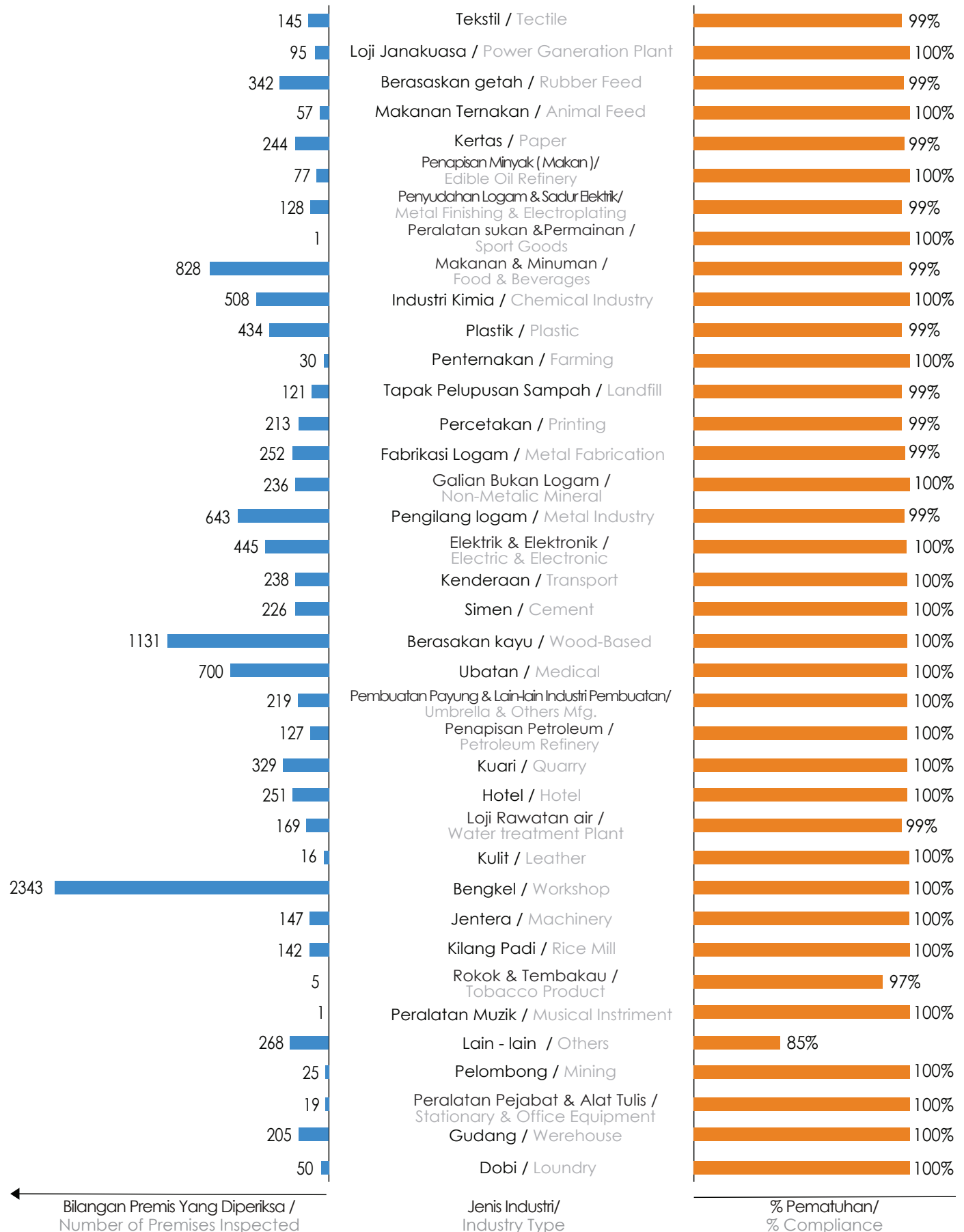
STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (EFLUEN PERINDUSTRIAN) 2009

Premis-premis yang bukan ditetapkan yang melepaskan efluen adalah tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009. Pada tahun 2014, JAS telah menjalankan 11,410 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%. Daripada 38 kategori, terdapat 24 kategori industri mencapai pematuhan 100%, pada tahun 2014 (**Rajah 4.6**).

CONTROL OF NON-PRESCRIBED PREMISES

STATUS OF COMPLIANCE WITH THE ENVIRONMENTAL QUALITY (INDUSTRIAL EFFLUENTS) REGULATIONS, 2009

The non-prescribed premises that discharge effluents are subjected to Environmental Quality (Industrial Effluents) Regulations, 2009. In 2014, DOE conducted 11,410 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%. Out of 38 categories, 24 categories of the industries achieved 100% compliance in 2014 (**Figure 4.6**).



Rajah 4.6 JAS : Status Pemuatan Industri Terhadap Peraturan- Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009, 2014
Figure 4.6 DOE :DOE: Status of Compliance to the Environmental Quality (Industrial Effluent) Regulations 2009, 2014

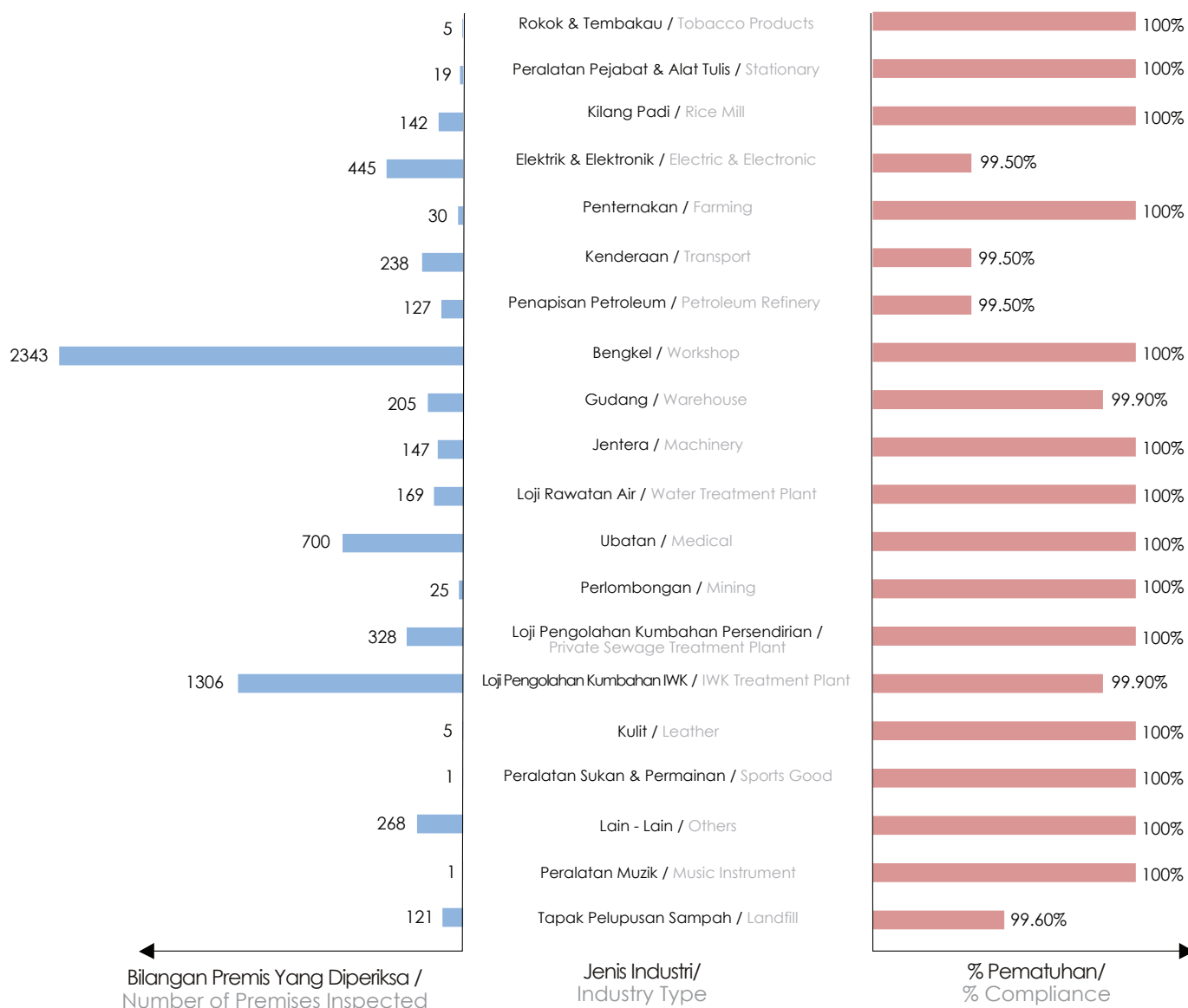
STATUS PEMATUHAN TERHADAP PERATURAN-PERATURAN KUALITI ALAM SEKELILING (UDARA BERSIH) 1978

Premis-premis yang bukan ditetapkan adalah juga tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978. Pada tahun 2014, JAS telah menjalankan 13,096 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%. Daripada 40 kategori, terdapat 20 kategori industri mencapai pematuhan 100% peraturan tersebut pada tahun 2014. (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 2014, DOE conducted 13,096 inspections on 40 categories of industrial premises and other non-prescribed premises that are subjected to the Environmental Quality (Clean Air) Regulations 1978. The overall compliance by the non-prescribed premises was 99%. Out of 40 categories, 20 categories of the industries achieved 100% compliance to the regulation in 2014. (Figure 4.7).

STATUS OF COMPLIANCE WITH THE



Rajah 4.7 JAS : Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978, 2014
Figure 4.7 DOE Status of Compliance to the Environmental Quality (Clean Air) Regulations 1978, 2014

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

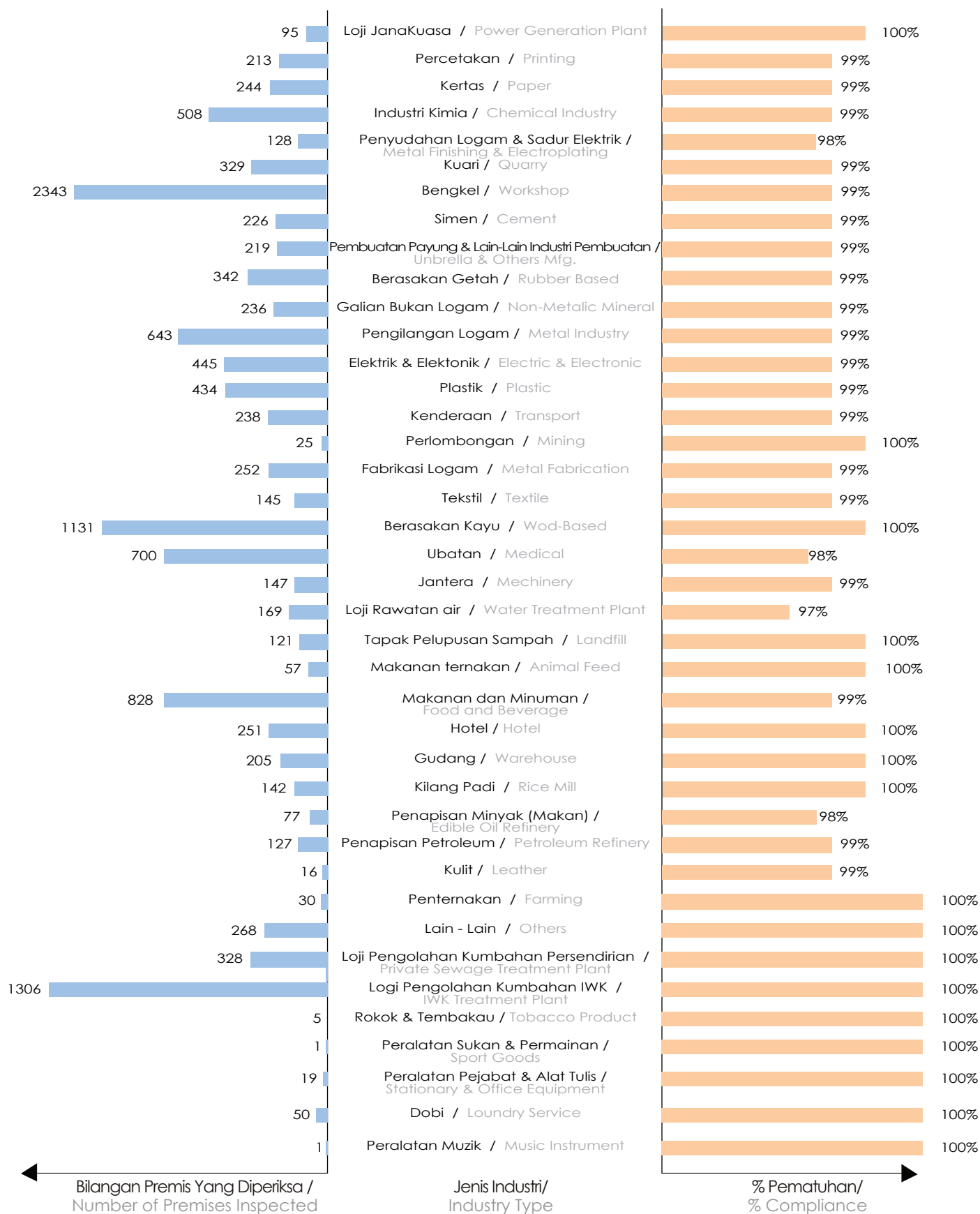
Premis-premis yang bukan ditetapkan adalah juga tertakluk kepada kawalan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005. Pada tahun 2014, JAS telah menjalankan 13,044 pemeriksaan ke atas 40 kategori industri pembuatan dan lain-lain premis yang bukan ditetapkan. Pencapaian pematuhan keseluruhan oleh premis yang bukan ditetapkan adalah 99%. Antara kegagalan pematuhan yang direkodkan adalah (i) gagal mengemukakan pemberitahuan mengenai pengeluaran buangan terjadual, (ii) buangan terjadual tidak distor dan tidak dilabel dengan sempurna dan (iii) gagal menyimpan rekod inventori buangan terjadual dengan tepat dan terkini (Peraturan-Peraturan 3, 8, 9, 10 dan 11).

Pada tahun 2014, terdapat 17 kategori industri mencapai pematuhan 100% terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005 (**Rajah 4.9**).

ENVIRONMENTAL QUALITY (SCHEDULED WASTES) REGULATIONS, 2005

The non-prescribed premises are also subjected to the Environmental Quality (Scheduled Wastes) Regulations, 2005. In 2014, the DOE conducted 13,044 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 2014, 17 categories of industries that are subjected to the Environmental Quality (Scheduled Wastes) Regulations, 2005 achieved 100% compliance (**Figure 4.9**).



Rajah 4.8 JAS : Status Pematuhan Industri Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005, 2014,

Figure 4.8 DOE : Status of Compliance to the Environmental Quality (Scheduled Wastes) Regulations 2005, 2014

TINDAKAN PENGUATKUASAAN

Sejumlah 248 kes premis yang tidak patuh telah dituduh di mahkamah dengan RM 7,343,150 denda telah dipungut. Tindakan-tindakan penguatkuasaan lain yang diambil adalah pengeluaran 662 arahan lapangan, 1,968 notis arahan dan 2,364 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 yang efisien, amalan pengeluaran bersih serta pematuhan sendiri. Pihak industri juga dinasihatkan untuk mewujudkan sistem pengurusan alam sekitar yang baik dan digalakkan untuk mendapatkan pensijilan ISO 14000.

ENFORCEMENT ACTIONS

A total of 248 cases of non-compliance premises were charged in court and they were fined. The amount of fines collected was RM 7,343,150. Other enforcement actions taken against the non-complying industries included issuance of 662 field citations, 1,968 notices and 2,364 compound charges to industries to compel them to take appropriate actions 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.

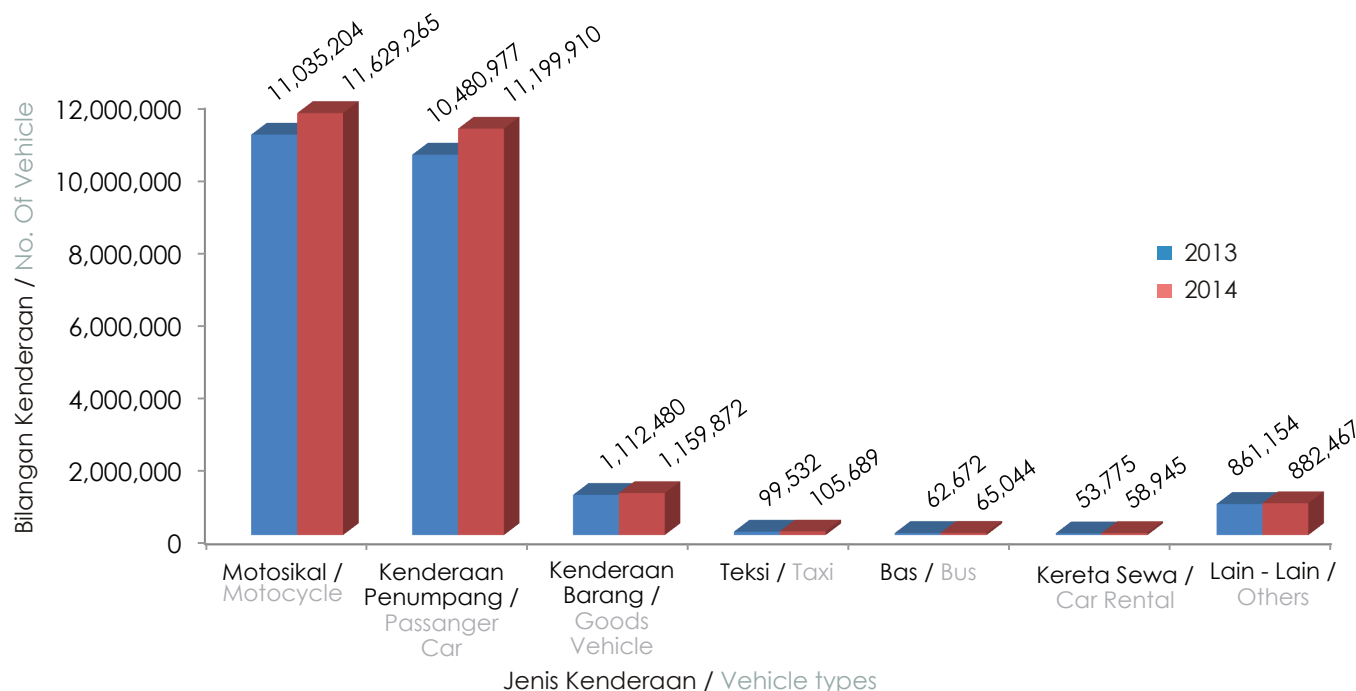
To further improve compliance to regulations, DOE issued directives to the industries to :

- (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 to improve the level of regulatory compliance. The DOE, in its effort to ensure full compliance, also promoted the adoption of more efficient 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

Sehingga akhir tahun 2014, sebanyak 24,694,195 buah kenderaan bermotor telah berdaftar di Malaysia, iaitu pertambahan sebanyak 1,395,398 buah kenderaan (5.9%) berbanding tahun 2013. Pecahan keseluruhan kenderaan bermotor yang berdaftar mengikut jenis kenderaan adalah seperti di **Rajah 4.9**.



Rajah 4.9 JAS : Bilangan Kenderaan Bermotor Ikut Jenis, 2014

(Sumber : Jabatan Pengangkutan Jalan, 2014)

Figure 4.9 DOE : Number of Motor Vehicles According to Type of Vehicles, 2014
(Source : Road Transport Department, 2014)

Dari sejumlah 1,281,937 buah kenderaan baru yang didaftarkan dalam tahun 2014, kategori kereta merupakan yang tertinggi iaitu sebanyak 664,335 unit (51.82%) diikuti motosikal sebanyak 541,387 unit (42.23%), manakala sebanyak 76,215 unit (5.95%) adalah dari lain-lain jenis kenderaan termasuk lori, bas, van dan sebagainya.

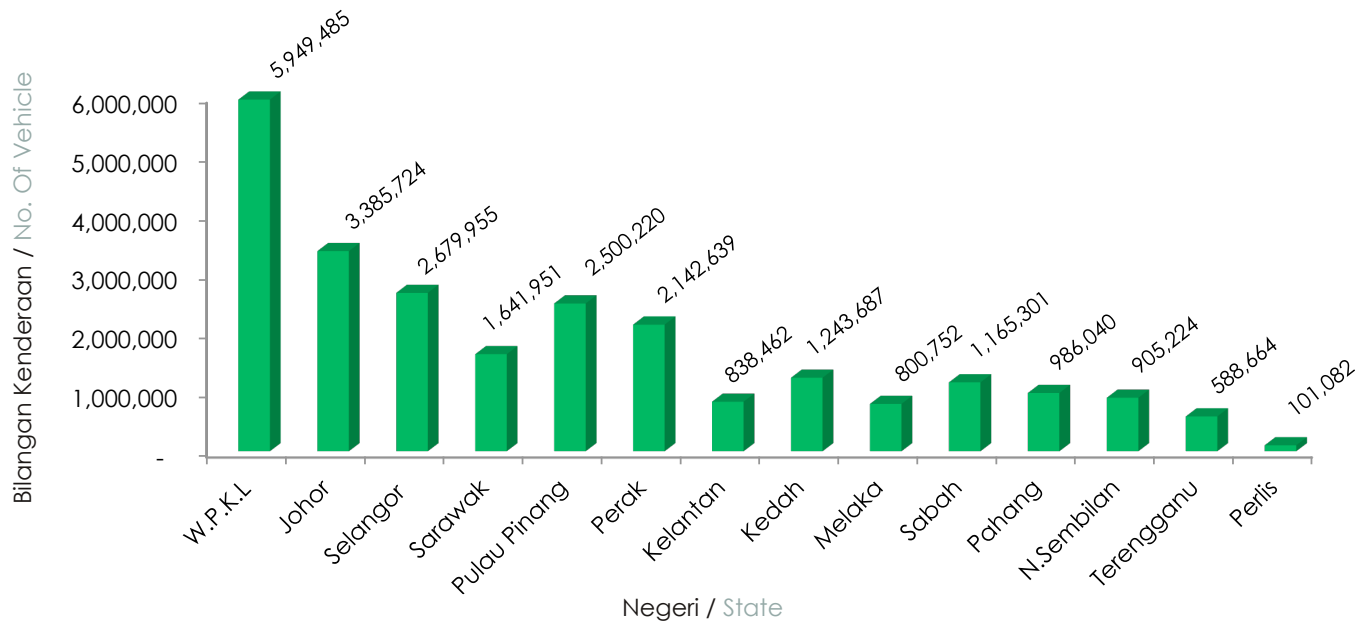
Taburan bilangan kenderaan bermotor di Malaysia mengikut negeri adalah seperti di **Rajah 4.10**. Wilayah Persekutuan Kuala Lumpur mendahului negeri-negeri lain dengan mempunyai bilangan kenderaan yang tertinggi iaitu sebanyak 5,949,485 unit (atau 23.87%) daripada keseluruhan bilangan kenderaan yang berdaftar di negara ini, diikuti oleh negeri Johor, Selangor, P. Pinang dan Perak.

MOTOR VEHICLES

As of end 2014, a total of 24,694,195 motor vehicles were registered in Malaysia, an increase of 1,395,398 units (5.9%) compared to 2013. The breakdown of the total registered vehicles according to vehicle type is given in **Figure 4.9**.

Out of 1,281,937 new vehicles registered in 2014, motorcars comprise the highest number with 664,335 units (51.82%), followed by motorcycles at 541,387 units (42.23%). Meanwhile, the remaining 76,215 units (5.95%) were from other vehicle types such as lorries, buses, vans and others.

The distribution of registered vehicles throughout the States is given in **Figure 4.10**. The Federal Territory of Kuala Lumpur recorded the highest number of vehicles registered, with 5,949,485 units (atau 23.87%) followed by Johor, Selangor, P. Pinang and Perak.



Rajah 4.10 JAS : Bilangan Kenderaan Bermotor Mengikut Negeri, 2014
Figure 4.10 DOE : Number of Motor Vehicles by State, 2014

KAWALAN PELEPASAN ASAP DAN GAS DARI KENDERAAN BERMOTOR

Pelepasan asap serta gas-gas pencemar seperti karbon monoksida (CO), hidrokarbon (HC), oksida-oksida nitrogen (NO_x) 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.

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 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.

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 to observe, stop and test 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 menggunakan kenderaan) akan dikeluarkan sekiranya kenderaan didapati melepaskan asap melebihi 70 HSU.

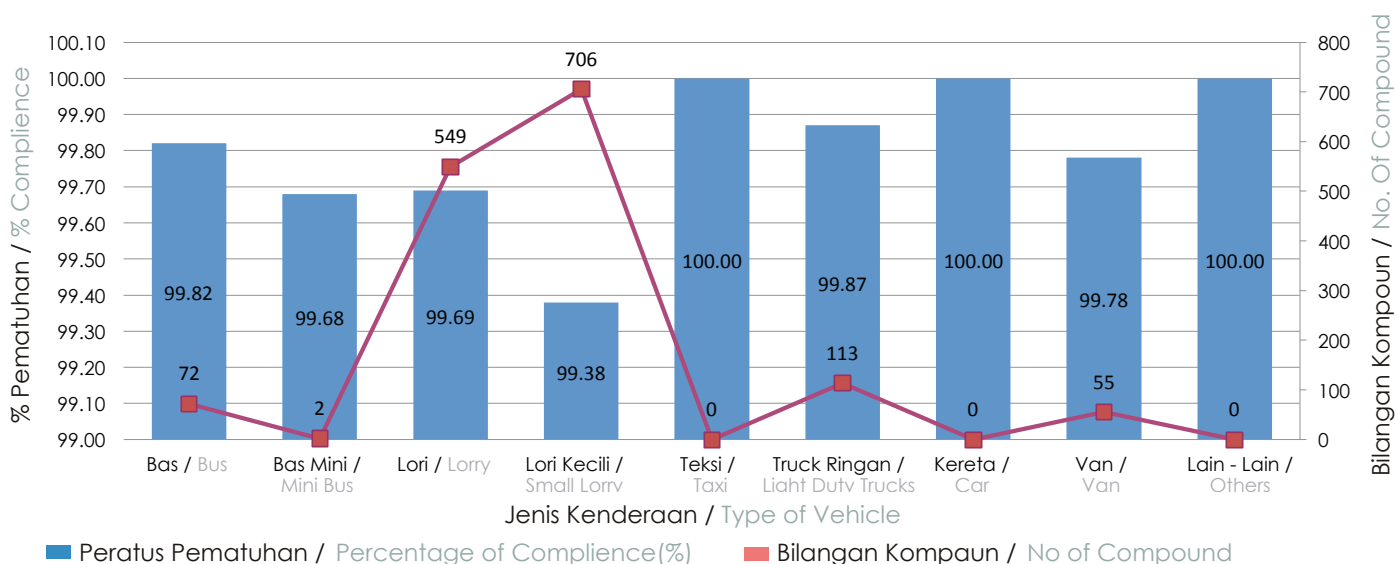
Pada tahun 2014, sebanyak 4,198 program penguatkuasaan telah dilaksanakan di bandar-bandar di seluruh negara. Sejumlah 540,567 buah kenderaan diesel telah diperiksa secara visual. Dari jumlah tersebut, sebanyak 1,496 buah kenderaan telah dikompaun kerana gagal mematuhi had pelepasan asap hitam sebanyak 50 HSU. Manakala 79 kenderaan telah dikenakan perintah larangan beroperasi sehingga lulus ujian asap semula oleh JAS. Pada keseluruhannya, peratus pematuan oleh kenderaan diesel adalah 99.71%. Ini adalah peningkatan sebanyak 0.30% berbanding dengan tahun 2013.

Bilangan kenderaan diesel yang dikompaun dan peratus pematuhannya mengikut jenis kenderaan adalah seperti di **Rajah 4.11**. **Rajah 4.12** pula menunjukkan bilangan kenderaan dikompaun, pengeluaran perintah larangan serta peratus pematuan mengikut negeri. Tindakan mahkamah telah juga diambil ke atas 98 pemandu serta pemilik kenderaan kerana gagal menjelaskan kompaun yang telah dikenakan. Sejumlah 5,383 kenderaan diesel juga telah diarahkan untuk menjalankan ujian semula di PUSPAKOM.

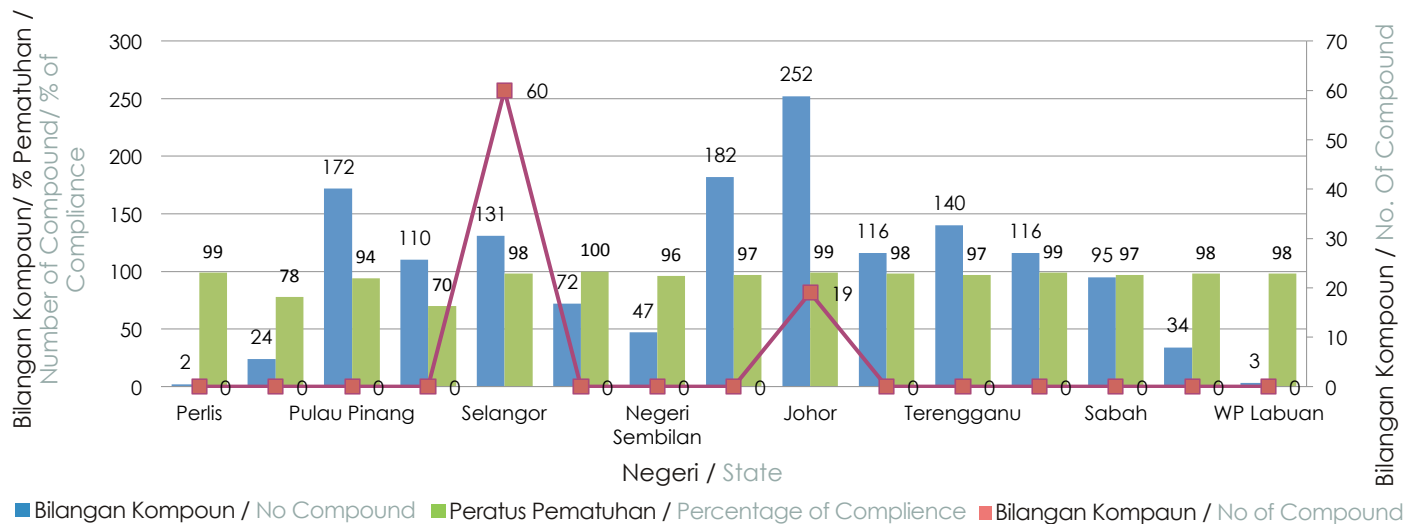
Compounds were issued on-the-spot to drivers and owners of vehicles which fail to comply with the stipulated smoke limit of 50 HSU. A prohibition order (prohibiting vehicle use) will be issued if the smoke limit exceeds 70 HSU.

In 2014, a total of 4,198 enforcement programmes were conducted in the cities throughout the country. A total of 540,567 diesel vehicles were visually inspected. Out of these, 1,496 vehicles were compounded for failing to comply with the 50 HSU smoke limit while 79 vehicles were issued with the prohibition order until they pass the qualifying test or undergo smoke re-test by the DOE. Generally, the percentage of compliance of diesel vehicles was 99.71%. This represents an increase of 0.30% compared to 2013.

The number of diesel vehicles summoned and their percentage of compliance according to vehicle types is given in **Figure 4.11**. **Figure 4.12** shows the number of vehicles compounded, number of prohibition orders issued and the percentage of compliance according to States. Legal action were also taken against 98 drivers and vehicle owners for failing to settle compound notices issued. A total of 5,383 diesel vehicles were instructed to undergo smoke re-test at PUSPAKOM.



Rajah 4.11 JAS : Peratus Pematuan Mengikut Jenis Kenderaan Dan Bilangan Kompaun, 2014
Table 4.11 DOE : Percentage of Compliance, According to Type Vehicles And Number of Compound 2014



Rajah 4.12 Bilangan Kenderaan Dikompaun, Pengeluaran Perintah Larangan & Peratus Pematuhan, 2014
Figure 4.12 Number of Vehicles Compounded, Number of Prohibition Orders Issued & Percentage of Compliance, 2014

KAWALAN PELEPASAN GAS CO DAN HC DARI KENDERAAN PETROL

Sepanjang tahun 2014, sejumlah 4,100 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 174 buah kenderaan telah dikompaun kerana gagal mematuhi had pelepasan yang ditetapkan. Peratus pematuhan keseluruhannya adalah 97.15% iaitu peningkatan sebanyak 0.07% berbanding dengan tahun 2013. 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.

UJIAN KELULUSAN JENIS (KENDERAAN PETROL)

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

Mana-mana model baru kenderaan bermotor pada atau selepas 1 Januari 2000 adalah dikehendaki mematuhi standard pelepasan pencemar yang ditetapkan dalam Jadual Ketiga, Peraturan-Peraturan Kualiti Alam

CONTROL OF CO AND HC GAS EMISSIONS FROM PETROL VEHICLES

Throughout 2014, a total of 4,100 petrol engine vehicles were inspected using the CO-HC gas analyzer via the idling test method conducted at road-sides. From the above total, 174 vehicles were compounded for failing to comply with the stipulated CO and HC limits. The overall percentage of compliance is 97.15% an increase of 0.07% as compared to 2013. Warning letters were also issued to drivers for immediate servicing of their vehicles to ensure compliance with the emission limits stipulated by the law.

TYPE APPROVAL TEST (PETROL VEHICLE)

Malaysia had established exhaust emission standards 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

Sekeliling (Kawalan Pelepasan Daripada Enjin Petrol), 1996 yang berdasarkan Arahan Majlis 94/12/EEC dan 93/59/EEC. Pada tahun 2014, Jabatan Alam Sekitar telah mengeluarkan 108 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan petrol yang akan dipasarkan di Malaysia.

UJIAN KELULUSAN JENIS (KENDERAAN DIESEL)

Bagi mengawal pelepasan dari kenderaan berenjin diesel di Malaysia. Setiap model baru kenderaan bermotor pada atau selepas 1 Januari 1997 adalah dikehendaki mematuhi standard pelepasan pencemar yang ditetapkan dalam Jadual Kedua, Peraturan-Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan Daripada Enjin Diesel), 1996 yang berdasarkan Peraturan No. 49.02 ECE dan Arahan Majlis 93/59/EEC. Pada tahun 2014, Jabatan Alam Sekitar telah mengeluarkan 104 Sijil Ujian Kelulusan Jenis bagi model baru kenderaan diesel yang akan dipasarkan di 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 pengujian segera dan kenderaan yang tidak mematuhi diperbaiki di pusat-pusat ini supaya memastikan kenderaan sentiasa mematuhi had pelepasan asap.

Sehingga akhir tahun 2014, sejumlah 123 sijil pengiktirafan telah dikeluarkan kepada bengkel serta pusat-pusat pemeriksaan kenderaan di seluruh negara sebagai "Kemudahan Yang Diluluskan" oleh JAS.

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 :-

Petrol Engines) Regulations, 1996 which is based on Council Directive 94/12/EEC and 93/59/EEC. In 2014, the Department of Environment issued 108 Type Approval Test Certificates for new models of petrol vehicles to be marketed in Malaysia.

Type Approval Test (Diesel Vehicle)

To control emissions from diesel vehicles in Malaysia, each new model of motor vehicles as on or after January 1, 1997 was 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 2014, the Department of Environment issued 104 Certificates of Type Approval Test for new model diesel vehicles to be marketed in Malaysia.

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 2014, a total of 123 certificates of accreditation were issued to the workshops and vehicle testing centres throughout the country as "Approved Testing Facilities" by the DOE.

CONTROL OF EMISSION FROM MOTORCYCLES

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

- Standard Kelulusan Jenis bagi motosikal baru : 97/24/EC
- 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 2014, sebanyak 85 Sijil Kelulusan Jenis telah dikeluarkan kepada pembuat, pemasang dan pengimport motorsikal untuk pasaran tempatan.

BUNYI BISING KENDERAAN BERMOTOR

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

Operasi penguatkuasaan bagi mengawal pelepasan bunyi bising dari motorsikal telah dilaksanakan oleh Pejabat-pejabat JAS negeri dengan kerjasama Polis DiRaja Malaysia (Cawangan Trafik). Pada 2014, sejumlah 10,846 buah motosikal telah ditahan bagi menjalani ujian pelepasan bunyi bising. Dari jumlah ini, 96 penunggang motosikal telah dikompaun oleh pihak polis kerana melanggar had bunyi bising yang dibenarkan. Peratus pematuan secara keseluruhannya ialah 99.1 % (**Rajah 4.13**) yang mana meningkat 0.40% berbanding pada 2013.

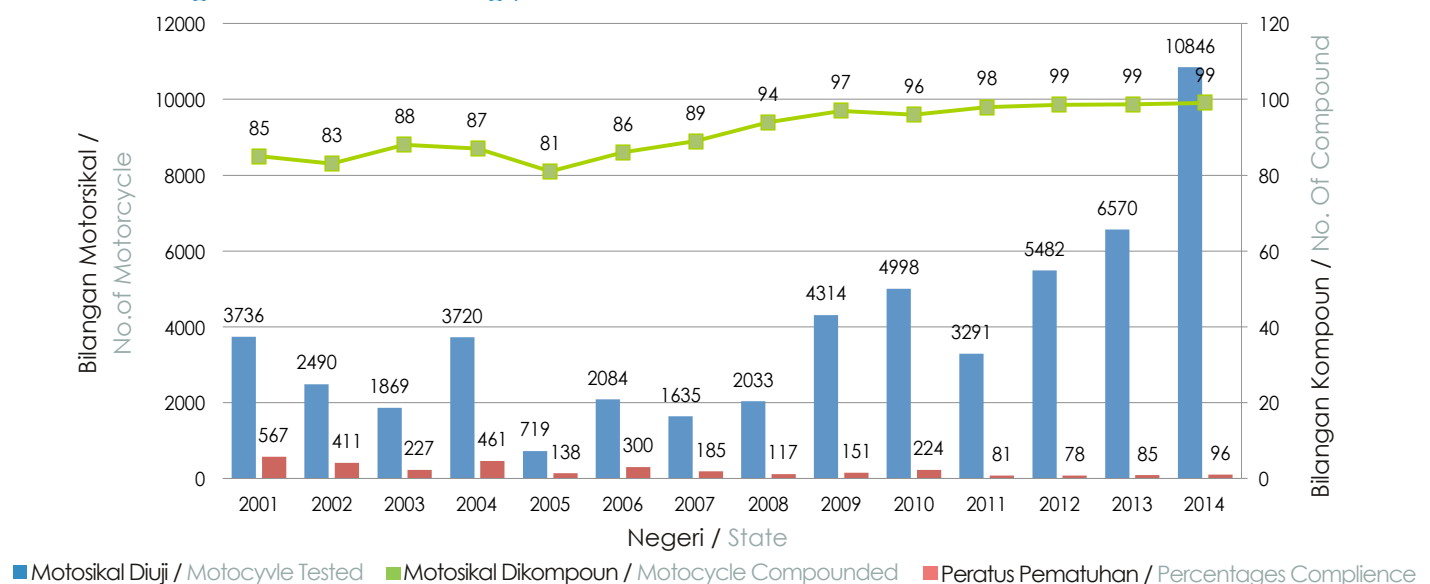
- Type Approval Emission Standard for new motorcycles : 97/24/EC
- Idling Emission Standard for in-use motorcycles : 4.5 % CO (Carbon Monoxide)

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. Meanwhile, local manufacturers had to comply with the new emission standards effective from 1 July 2005 for new models and 1 July 2006 for current models. In 2014, a total of 86 Type Approval Test Certificates were issued to the manufacturers, assemblers and importers of motorcycles for the domestic market.

NOISE FROM MOTOR VEHICLES

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

Enforcement operations to control excessive noise from motorcycles were jointly conducted by the DOE and the Traffic Police. In 2014, a total of 4,123 motorcycles were detained for noise inspection. Out of this, 96 motorcyclists were summoned for violating the stipulated noise limits. The overall percentage of compliance is 99.1 % (**Figure 4.13**) which represents an increase of 0.40% compared to 2013.



Rajah 4.13 Peratus Pematuan Bilangan Motosikal Diuji dan Bilangan Kompaun (2001 - 2014)
Figure 4.13 Percentage of Compliance, Number Of Motorcycle Tested And Compound Issued (2001 - 2014)

TINDAKAN UNDANG-UNDANG

PENDAKWAAN

Pada tahun 2014, sejumlah 142 kes kesalahan di bawah Akta Kualiti Alam Sekeliling (AKAS) 1974 telah didakwa di mahkamah dengan denda yang dikenakan berjumlah RM 3,726,550. (Rajah 4.14).

Daripada jumlah keseluruhan kes tersebut, sebanyak 40 (28.17%) kes mahkamah adalah melibatkan kesalahan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009 dengan jumlah denda sebanyak RM 2,204,000. Sebanyak 26 (18.3%) 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 225,050.

Selain itu, sebanyak 43 (30.28%) kes adalah melibatkan kesalahan pelanggaran syarat lesen di bawah Seksyen 16, AKAS 1974 dengan jumlah denda sebanyak RM 650,000 sementara 33 (23.24%) kes yang selebihnya melibatkan kesalahan-kesalahan lain di bawah AKAS 1974.

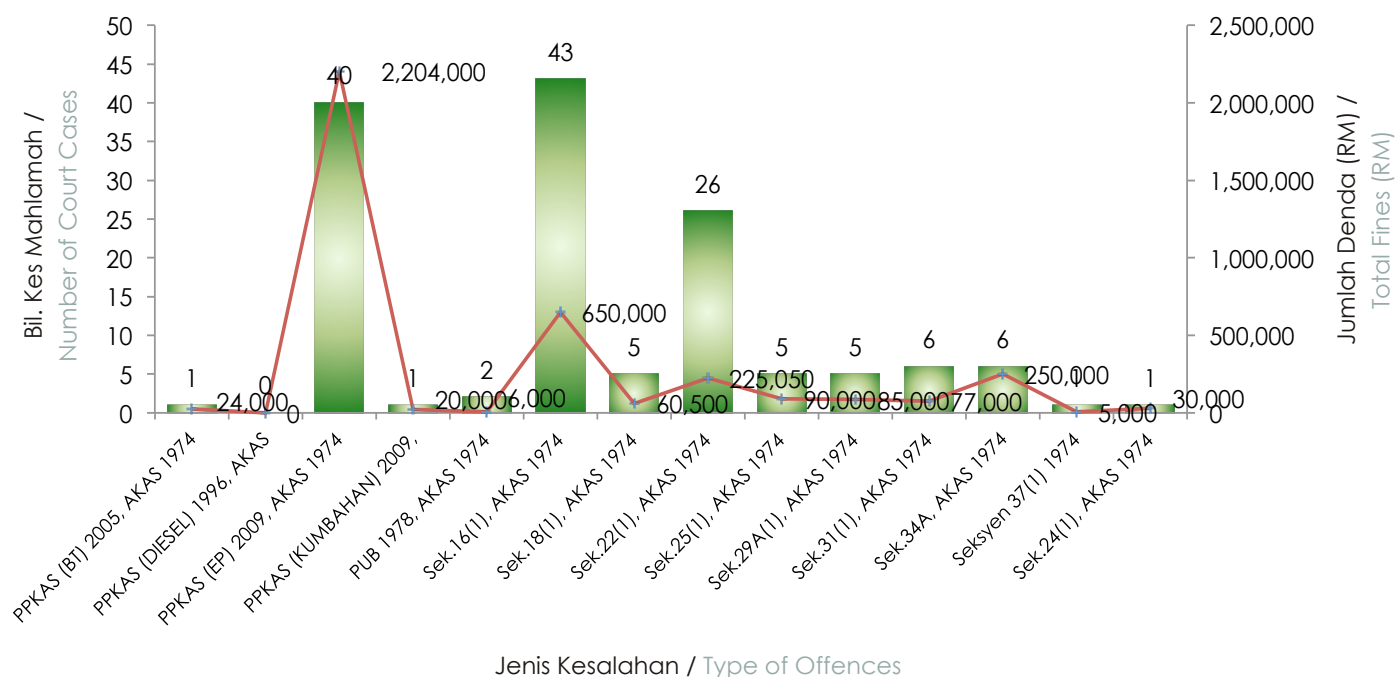
LEGAL ACTION

PROSECUTION

In 2014, a total of 142 offences were prosecuted under the Environmental Quality Act (EQA) 1974 with a total fine of RM 3,726,550. (Figure 4.14).

Out of this total, 40 (28.17%) court cases involved offences under Environmental Quality (Industrial Effluent) Regulations 2009 with a total fine of RM 2,204,000. There were 26 (18.3%) 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 225,050.

Apart from that, 43 (30.28%) cases were violating conditions of licences under Section 16 of the Act with a total fine of RM 650,000, while the remaining 33 (23.24%) cases were prosecuted for various other offences under the EQA 1974.



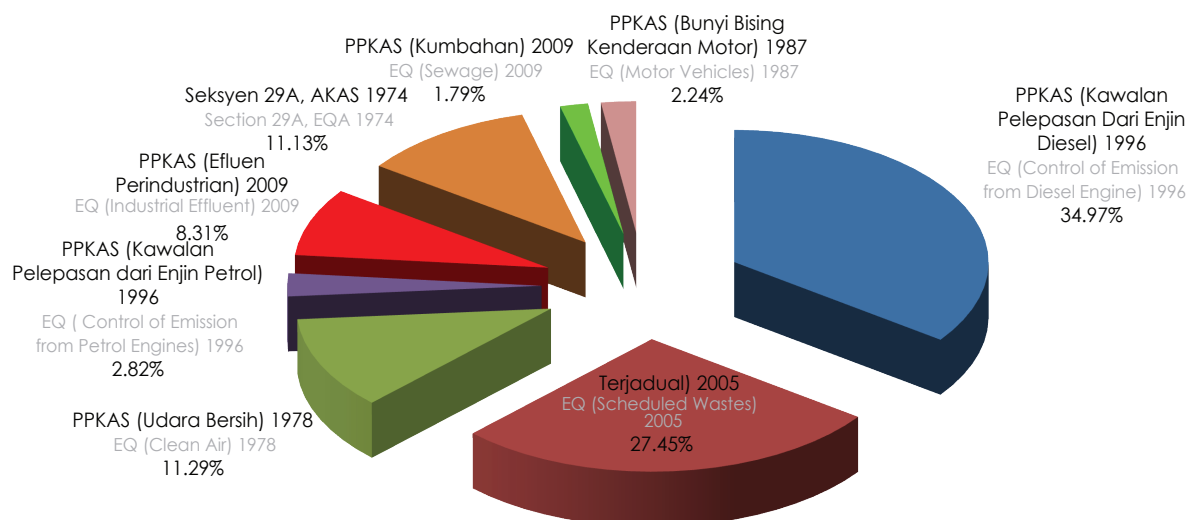
Rajah 4.14 JAS : Bilangan Kes Mahkamah dan Denda, 2014
Figure 4.14 DOE : Number of Court Cases and Fines, 2014

KOMPAUN

Sejumlah 4,295 kompaun telah dikeluarkan sepanjang tahun 2014 kepada premis dan syarikat untuk pelbagai kesalahan di bawah AKAS 1974. Pecahan mengikut kesalahan adalah seperti di **Rajah 4.15** dan **Jadual 4.22**.

COMPOUNDS

A total of 4,295 compounds were issued in 2014 against premises and companies for various offences under the EQA 1974. Breakdown by offences is shown in **Figure 4.15** and **Table 4.22**.



Rajah 4.15 JAS: Bilangan Kes Kompaun Mengikut Pecahan Peraturan Peraturan Kualiti Alam Sekeliling 2014
Figure 4.15 DOE: Number of Compound Cases According to Environmental Quality Regulations, 2014

Jadual 4.22 JAS : Bilangan Kes Kompaun Mengikut Pecahan Peraturan-Peraturan Kualiti Alam Sekeliling, 2014
Table 4.22 DOE : Number of Compound Cases According Environmental Quality Regulations, 2014

SEKSYEN/ PERATURAN SECTION/ REGULATION	JUMLAH KOMPAUN TOTAL COMPOUNDS	PERATUS PERCENTAGE
PPKAS (Kawalan Pelepasan Dari Enjin Diesel) 1996 EQ (Control of Emission From Diesel Engine) 1996	1,502	34.97%
PPKAS (Buangan Terjadual) 2005 EQ (Scheduled Wastes) 2005	1,179	27.45%
PPKAS (Udara Bersih) 1978 EQ (Clean Air) 1978	485	11.29%
PPKAS (Kawalan Pelepasan Dari Enjin Petrol) 1996 EQ (Control of Emission From Petrol Engine) 1996	121	2.82%
PPKAS (Efluen Perindustrian) 2009 EQ (Effluen Perindustrian) 2009	357	8.31%
Seksyen 29A, AKAS 1974 Section 29A, EQA 1974	478	11.13%
PPKAS (Kumbahan 2009 EQ (Sewage) 2009	77	1.79%
PPKAS (Bunyi Bising Kenderaan Motor) 1987 EQ (Motor Vehicle Noise) 1987	96	2.24%

MAKLUMBALAS TERHADAP PENGADUAN AWAM

Pada tahun 2014, sejumlah 6,594 aduan pencemaran alam sekitar telah diterima oleh Jabatan Alam Sekitar. 5,729 kes aduan telah diambil tindakan di bawah peruntukan Akta Kualiti Alam Sekeliling (AKAS) 1974 dan peraturan-peraturan di bawahnya oleh pejabat JAS Negeri. Manakala 865 kes aduan adalah di luar bidangkuasa JAS dan telah dirujuk kepada agensi lain yang berkaitan untuk diambil tindakan. **(Rajah 4.17)**

Pada tahun 2014, Selangor menerima aduan yang tertinggi iaitu sebanyak 2,159 kes (32.7%), diikuti oleh Johor sebanyak 806 kes (12.2%) dan Perak sebanyak 591 kes (9.0%). Wilayah Persekutuan Labuan menerima aduan yang paling sedikit iaitu sebanyak 25 kes (0.4%).

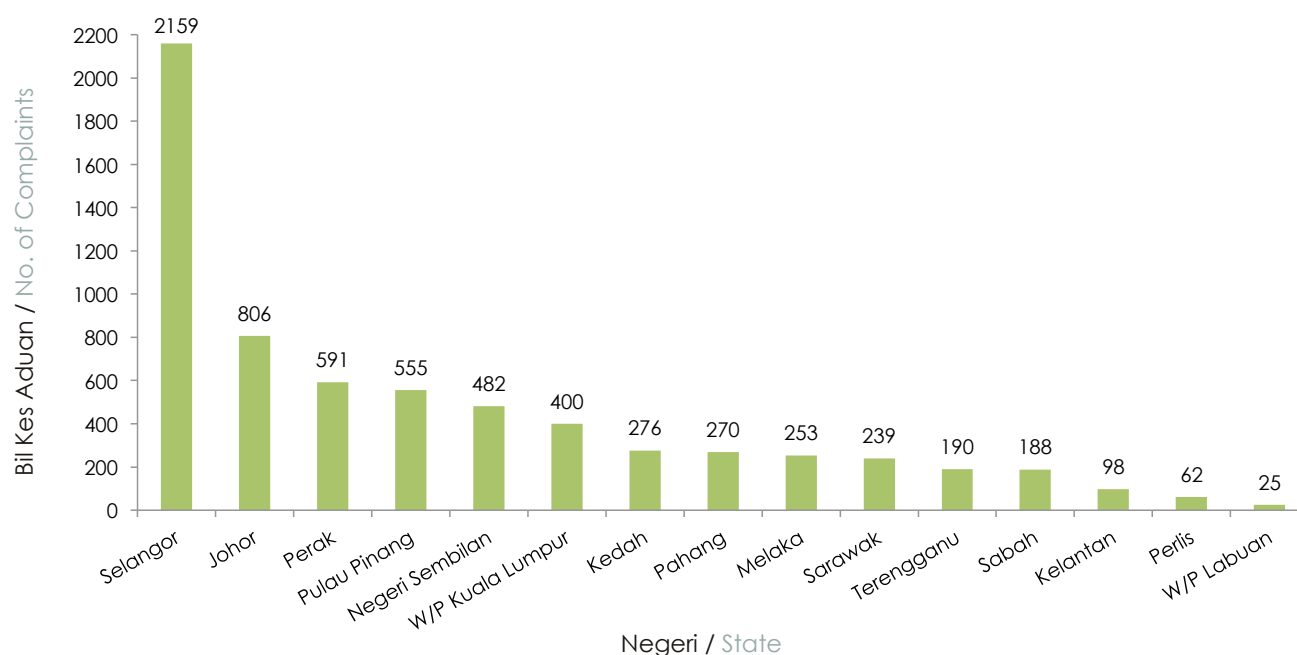
Seperti tahun-tahun yang sebelumnya, bilangan aduan pencemaran yang tertinggi adalah berkaitan dengan pencemaran udara iaitu sebanyak 5,336 kes (80.9%), 631 kes (9.6%) berkaitan pencemaran air, 160 kes (2.4%) berkaitan pencemaran bunyi, 106 kes (1.6%) berkaitan buangan terjadual, sebanyak 86 kes (1.3%) berkaitan tumpahan minyak, 42 kes (0.6%) berkaitan pencemaran tanah dan 233 kes (3.5%) lain-lain aduan **(Rajah 4.17)**.

RESPONSE TO PUBLIC COMPLAINTS

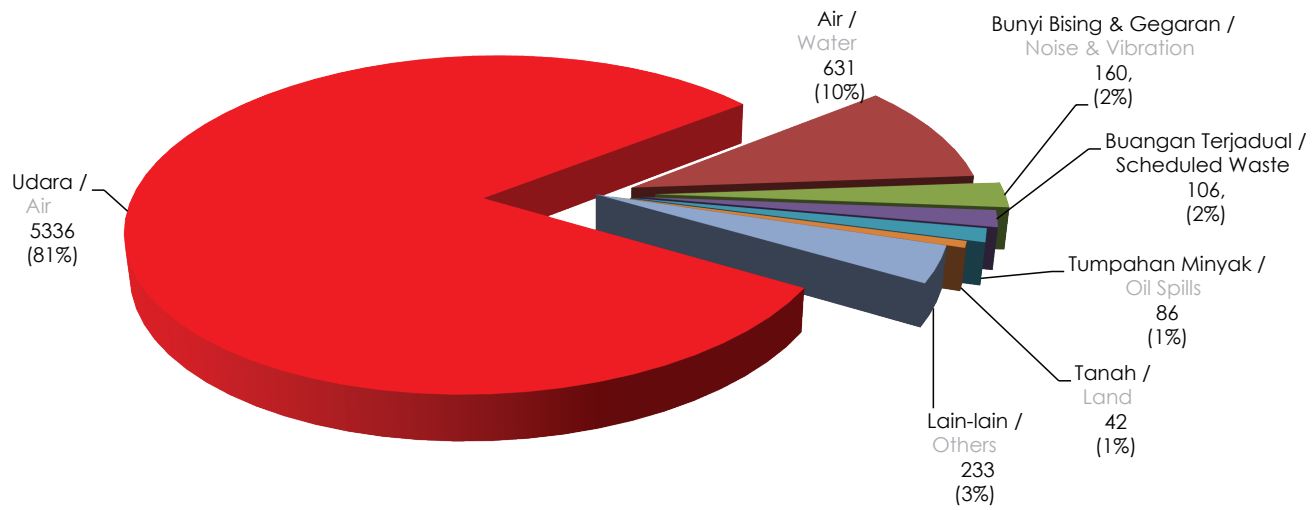
The Department of Environment received 6,594 environmental pollution complaints in 2014. Out of these, 5,729 were under the Environmental Quality Act, 1974 and investigated by the State DOE Offices. Meanwhile, the remaining 865 cases which were outside the jurisdiction of the DOE was referred to other relevant agencies. **(Figure 4.17)**

In the year 2014, Selangor recorded 2,159 (32.7%) complaints-the highest number received; followed by Johor with 806 complaints (12.2%) and Perak with 591 complaints (9.0%). The Federal Territory of Labuan recorded the least number of complaints at 25 (0.4%) complaints.

As in the previous years, most of the complaints received were related to air pollution at 5,336 (80.9%); followed by 631 (9.6%) for water pollution; 160 (2.4%) for noise pollution, 106 (1.6%) for illegal dumping of scheduled or toxic wastes; 86 (1.3%) for oil spillage; 42 (0.6%) land pollution and 233 (3.5%) being other complaints **(Figure 4.17)**.



Rajah 4.16 JAS : Bilangan Aduan Mengikut Negeri, 2014
Figure 4.16 DOE : Number of Complaints by State, 2014



Rajah 4.17 JAS : Bilangan Kes Aduan Mengikut Jenis, 2014
Figure 4.17 DOE : Number of Complaint Cases by Types, 2014



Pemeriksaan ke atas Industri Pembuatan latex
- Ipoh, Perak 19 Mac 2014
Site Inspection to the Latex Manufacturing Industry
- Ipoh, Perak 19 Mac 2014

Pemeriksaan ke punca bermasalah
(kes pembakaran terbuka)
- Klang, Selangor 14 April 2014
Site inspection to problematic sources
(open burning case)
- Klang, Selangor 14 April 2014



Lawatan untuk kajian teknologi di kilang batik
- Sentul, Kuala Lumpur 16 Julai 2014
Site visit for technology review at Batik Factory
- Sentul, Kuala Lumpur 16 July 2014

