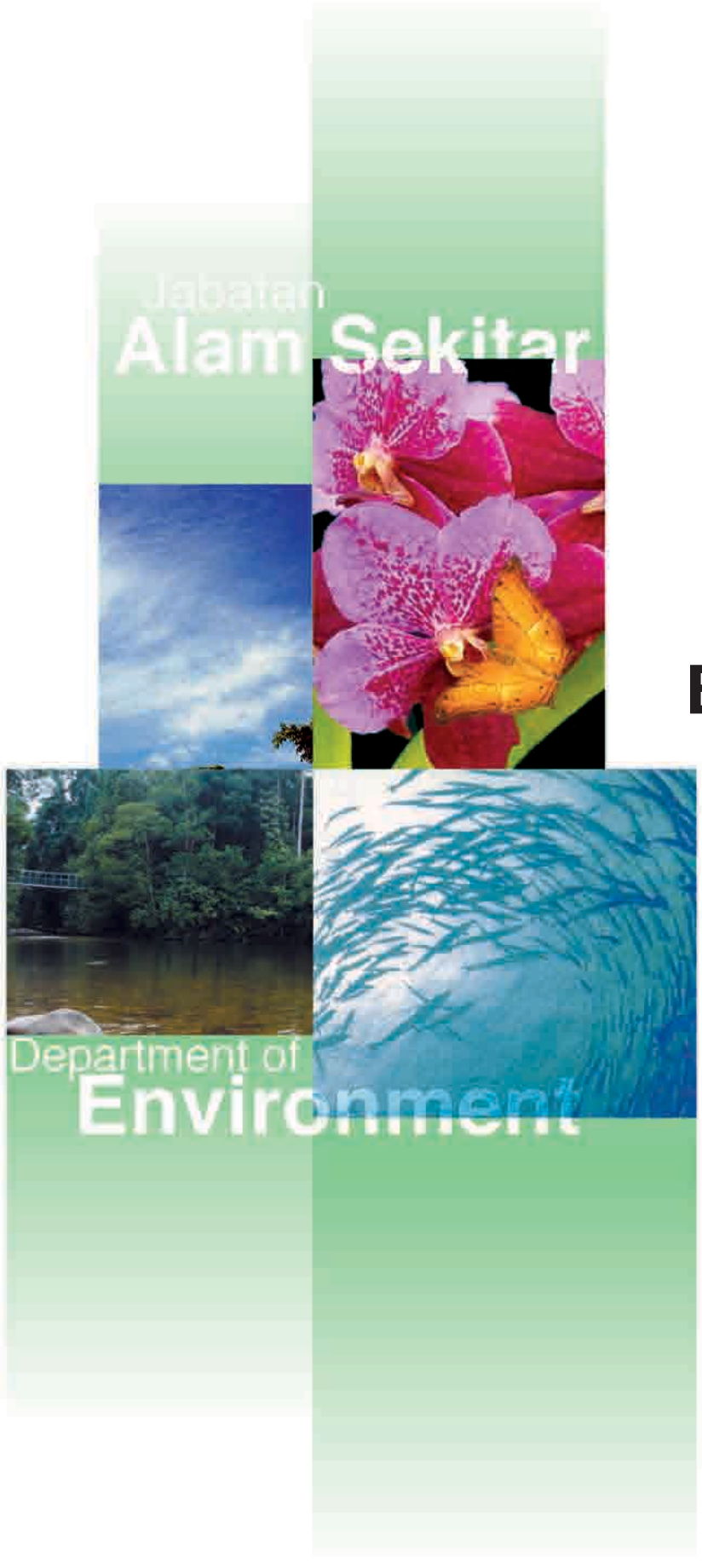


BAB / CHAPTER 5

PENGAWASAN KUALITI UDARA

Status Kualiti Udara

Pada tahun 2003, Jabatan Alam Sekitar (JAS) terus mengawasi status kualiti udara di dalam negara melalui rangkaian pengawasan kualiti udara kebangsaan yang terdiri dari 51 stesen automatik dan 25 stesen manual (Peta 5.1, Peta 5.2). Sulfur Dioksida (SO_2), Karbon Monoksida (CO), Nitrogen Dioksida (NO_2), Ozon (O_3) and Partikulat Terampai (PM_{10}) diawasi secara berterusan sementara logam berat termasuk plumbum (Pb) diukur sekali pada setiap enam hari. (Jadual 5.1).

Secara keseluruhan, kualiti udara di seluruh negara pada tahun 2003 meningkat sedikit berbanding tahun sebelumnya terutama bagi parameter Partikulat Terampai (PM_{10}) disebabkan oleh keadaan cuaca dalam tahun 2003.

AIR QUALITY MONITORING

Air Quality Status

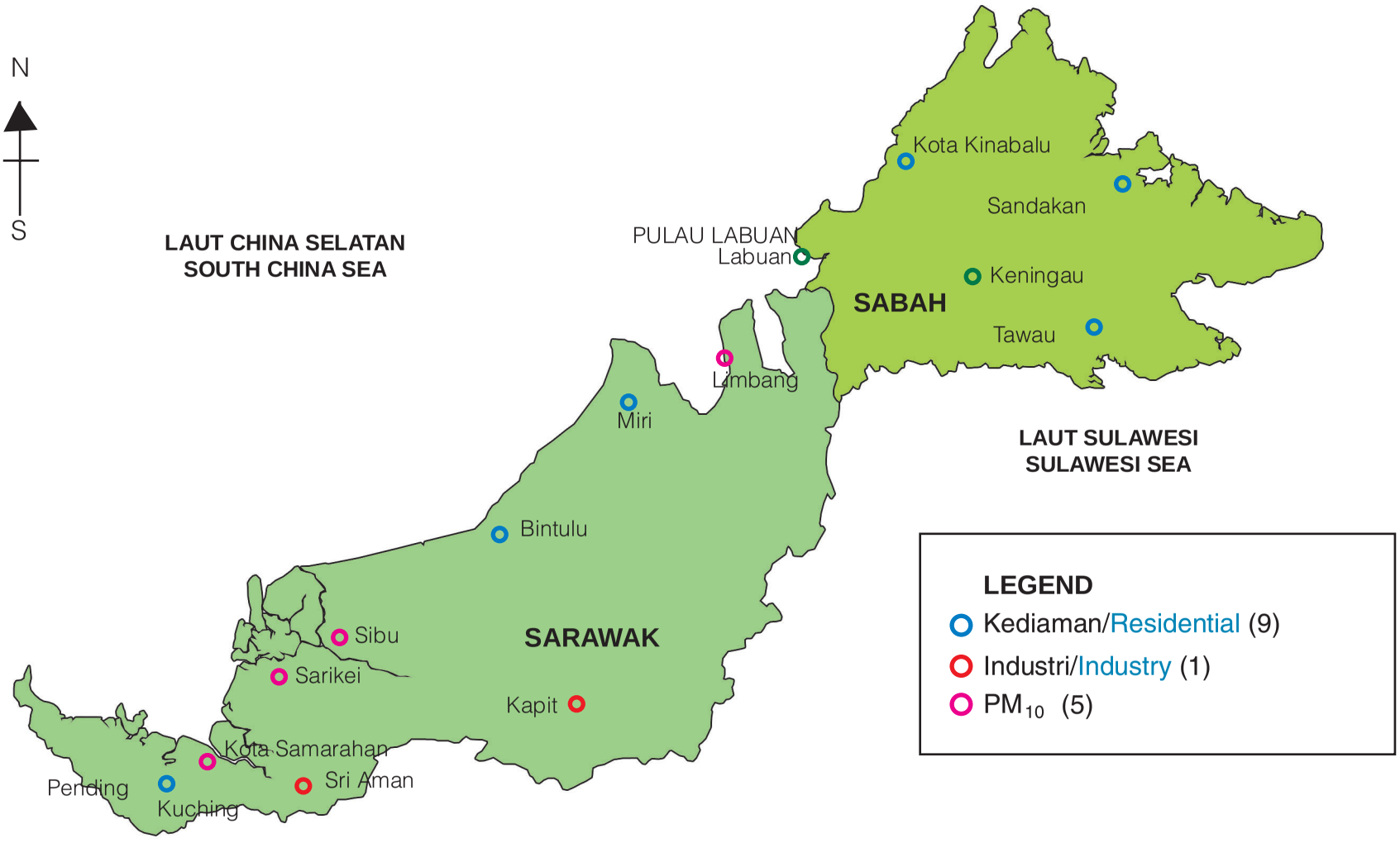
In 2003, the Department of Environment (DOE) monitored air quality under the national monitoring network consisting of 51 automatic and 25 manual stations (Map 5.1, Map 5.2). Sulphur Dioxide (SO_2), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (O_3) and Particulate Matter (PM_{10}) were continuously monitored, while several heavy metals including lead (Pb) were measured once in every six days (Table 5.1).

The overall air quality for Malaysia throughout the 2003 improved slightly compared to 2002, such as for PM_{10}, mainly due to more wet weather conditions in 2003.

Jadual 5.1 Jabatan Alam Sekitar: Bilangan Stesen Pengawasan dan Parameter Yang Diawasi, 1997-2003
Table 5.1 Department of Enviroment: Number of Stations and Parameters Monitored, 1997-2003

Pencemar | Pollutant	1997	1998	1999	2000	2001	2002	2003
Karbon Monoksida | Carbon Monoxide, (CO)	21	27	34	39	39	39	40
Nitrogen Dioksida | Nitrogen Dioxide, (NO_2)	27	33	40	45	45	45	46
Partikulat Terampai | Particulate Matter, (PM_{10})	27	37	44	40	50	50	51
Sulfur Dioksida | Sulphur Dioxide, (SO_2)	27	33	40	45	50	50	51
Ozon | Ozone, (O_3)	21	27	34	39	39	39	40
Plumbum | Lead	11	16	19	23	3	3	3

Peta 5.1 Malaysia: Lokasi Stesen Pengawasan Udara Automatik, 2003
Map 5.1 Malaysia: Location of Continuous Air Quality Monitoring Stations, 2003



Peta 5.2 Sabah dan Sarawak: Lokasi Stesen Pengawasan Udara Automatik, 2003
Map 5.2 Sabah and Sarawak: Location of Continuous Air Quality Monitoring Stations, 2003

PUNCA-PUNCA PENCEMARAN UDARA (PUNCA TETAP DAN PUNCA TIDAK TETAP)

Kajian Pembentukan Faktor-faktor Pelepasan Untuk Bahan Pencemar Industri

Terdapat empat objektif utama kajian ini iaitu:-

- Untuk mengkaji dan mengenalpasti proses-proses yang dijalankan di industri-industri berkenaan, sumber pencemaran dan jenis peralatan kawalan yang digunakan bagi setiap industri yang terbabit;
- Untuk mengukur pelepasan pencemar yang dilepaskan ke udara dari setiap punca;
- Untuk membentuk faktor pelepasan bagi pengiraan beban pencemaran yang dilepaskan hasil dari aktiviti perindustrian tersebut;
- Untuk membangunkan pangkalan data dalam bentuk perisian yang mesra pengguna bagi tujuan pengiraan beban pencemaran udara.

Kajian ini telah selesai dijalankan pada bulan Oktober 2003 dan pihak perunding kajian telah mencadangkan nilai-nilai faktor pelepasan bagi setiap industri yang terbabit untuk digunapakai dalam mengganggarkan beban pencemaran udara bagi sektor-sektor tersebut seperti kilang minyak kelapa sawit mentah, getah, simen, kuari, stesen jana kuasa, insinerator, industri logam, petrokimia dan kenderaan bermotor.

Kajian Pengukuran dan Penentuan Standard Bau

Di bawah rancangan Malaysia Ke Lapan, JAS dengan kerjasama Lembaga Getah Malaysia (LGM) telah menjalankan “Kajian Pengukuran dan Penentuan Standard Bau” bertujuan untuk menentupasti nilai atau tahap bau yang tertentu untuk dijadikan sebagai standard pelepasan bau yang boleh diterima bagi

AIR POLLUTION SOURCES (STATIONARY AND AREA SOURCES)

Study on Formulation of Emission Factors for Industrial Pollutants

The primary objectives of the study were:

- To study and identify the processes in selected industries, as well as to identify sources of pollution and various control equipment employed for each industries;
- To measure the actual pollutant emissions from each source;
- To formulate the emission factor for emission load calculations based on pollutants emitted from selected industrial activities;
- To develop a user friendly computer database for pollution load calculation.

This study was completed in October 2003 and recommended values of emission factors for selected pollution sources to provide better estimate of emission load calculations such as for crude palm oil mills, rubber factories, cement plants, quarries, power generation stations, incinerator, metal industries, petrochemical plants and mobile sources.

Study on Odour Measurements and Standards

Under the Eighth Malaysian Plan, DOE with cooperation from the Malaysian Rubber Board (LGM) conducted a Study on Odour Measurement and Standards with the objective of determining odour thresholds and odorant concentrations of the gas samples collected for air pollution (odour) control. The

tujuan mengawal masalah pencemaran bau. Kajian ini telah dimulakan pada tahun 2002 dan dijangka akan diselesaikan pada penghujung tahun 2004.

Hasil dan cadangan-cadangan dari kajian ini akan digunakan oleh JAS sebagai asas dalam menggubal peraturan dan standard bau di Malaysia.

PROGRAM PEMANTAUAN KUALITI AIR SUNGAI

Jabatan Alam Sekitar telah menjalankan Program Pengawasan Kualiti Air di seluruh negara sejak tahun 1978. Program tersebut kini dilaksanakan oleh Alam Sekitar Malaysia Sdn. Bhd. (ASMA) mulai tahun 1995 melalui program penswastaan. Pada 2003, terdapat stesen pengawasan yang melibatkan 120 buah lembangan sungai di Malaysia (Jadual 5.2).

Sampel air yang diambil dari 926 buah stesen dianalisa bagi enam (6) parameter berikut untuk mengira Indeks Kualiti Air (IKA):

- Keperluan Oksigen Biokimia (BOD)
- Keperluan Oksigen Kimia (COD)
- Ammoniakal Nitrogen (NH_3N)
- pH
- Oksigen Terlarut (DO)
- Pepejal Terampai (SS)

Berdasarkan keperluan di tapak, parameter lain seperti logam berat dan pencemaran bakteria juga turut dianalisis. Sepuluh (10) buah stesen pemantauan kualiti air sungai secara automatik untuk mengesan perubahan secara terus menerus kepada kualiti air Sungai Perai (Pulau Pinang), Sungai Perak (Perak), Sungai Selangor (Selangor), Sungai Kelang (WPKL), Sungai Linggi (Negeri Sembilan), Sungai Melaka (Melaka), Sungai Skudai (Johor), Sungai Keratong (Pahang), Sungai Terengganu (Terengganu) dan Sungai Sarawak (Sarawak) juga telah ditubuhkan (Jadual 5.3). Di bawah Program Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai, lima (5) stesen automatik tambahan telah ditubuhkan di

study started in 2002 and would be completed by the end of 2004.

The findings and recommendations from this study will be used by DOE as a basis to formulate regulations on odour emission standards.

RIVER WATER QUALITY MONITORING

The Department of Environment (DOE) National River Water Monitoring Programme started in 1978 but since 1995, it was contracted out to Alam Sekitar Malaysia Sdn Bhd (ASMA) under a privatisation arrangement. In 2003, 926 stations located within 120 river basins in Malaysia were monitored (Table 5.2).

Water samples taken from the 926 stations were analysed to compute the Water Quality Index (WQI) based on the following parameters :

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Ammoniacal Nitrogen (NH_3N)
- pH
- Dissolved Oxygen (DO)
- Suspended Solids (SS)

Depending on site requirement, other parameters such as heavy metals and bacterial contamination were measured. In addition, ten (10) automatic water quality monitoring stations monitored river quality changes on a continuous basis at Sungai Perai (Pulau Pinang), Sungai Perak (Perak), Sungai Selangor (Selangor), Sungai Kelang (WPKL), Sungai Linggi (Negeri Sembilan), Sungai Melaka (Melaka), Sungai Skudai (Johor), Sungai Keratong (Pahang), Sungai Terengganu (Terengganu) and Sungai Sarawak (Sarawak) [Table 5.3]. Under the Pollution Prevention and Water Quality Improvement Programme, five (5) additional automatic stations were installed at Sungai Langat (Selangor), Sungai Batang Benar (Negeri

Sungai Langat (Selangor), Sungai Labu (N. Sembilan), Sungai Batang Benar (N. Sembilan), Sungai Putat (Melaka) dan Sungai Rajang (Sarawak).

Program Kerjasama Dalam Penambahbaikan Kualiti Air Sungai

Bengkel bagi program ini telah diadakan pada 12-15 Ogos 2003 di Tanjung Bidara Resort, Melaka. Program PREP ini adalah lanjutan dari Program Jaminan Mutu (QA/QC) yang diadakan pada tahun-tahun sebelumnya. Bengkel tersebut diuruskan dan ditaja oleh Alam Sekitar Malaysia Sdn. Bhd. (ASMA) dengan kerjasama Jabatan Alam Sekitar, Universiti Teknologi Malaysia (UTM) dan EiMAS. Peserta-peserta yang terlibat adalah dari setiap Pejabat JAS Negeri dan pihak ASMA. Objektif utama program ini adalah untuk menyediakan Pelan Tindakan bagi meningkatkan dan sekurang-kurangnya mengekalkan tahap kualiti air sungai-sungai yang telah dipilih di setiap negeri dengan mengambilkira beban pencemaran dan konsep Pengurusan Bersepadu Lembangan Sungai. Di bawah program ini, 14 sungai telah dipilih iaitu: Sungai Ngulang (Perlis); Sungai Padang Terap (Kedah); Sungai Kilang Ubi (Pulau Pinang); Sungai Kinta (Perak); Sungai Sembah (Selangor); Sungai Keroh (WPKL); Sungai Simin (Negeri Sembilan); Sungai Merlimau (Melaka); Sungai Perembi (Johor); Sungai Bentong (Pahang); Sungai Landas (Terengganu); Sungai Galas (Kelantan); Sungai Kuap (Sarawak) dan Sungai Sembulan (Sabah). Program ini juga bertujuan untuk mendapatkan kerjasama dari pelbagai pihak dalam meningkatkan kualiti air sungai.

Sembilan) Sungai Labu (Negeri Sembilan), Sungai Putat (Melaka) and Sungai Rajang (Sarawak).

Partnership in River Enhancement Programme (PREP)

A PREP Workshop was organized from 12-15 August 2003 at Tanjung Bidara Resort, Melaka. The PREP programme was an extension of the Quality Assurance Programme which was conducted the previous year. The Workshop was managed by Alam Sekitar Malaysia Sdn. Bhd. (ASMA) in collaboration with the Department of Environment, Universiti Teknologi Malaysia (UTM) and EiMAS. Participants were from DOE State Offices and ASMA. The primary objective was to prepare an Action Plan for the enhancement and maintainance of the water quality of selected rivers in each State taking into account pollution load and the integrated river basin management concept. The 14 selected rivers under the programme were: Sungai Ngulang (Perlis); Sungai Padang Terap (Kedah); Sungai Kilang Ubi(Pulau Pinang); Sungai Kinta(Perak); Sungai Sembah (Selangor); Sungai Keroh (WPKL); Sungai Simin (N.Sembilan); Sungai Merlimau (Melaka); Sungai Perembi (Johor); Sungai Bentong (Pahang); Sungai Landas (Terengganu), Sungai Galas (Kelantan); Sungai Kuap(Sarawak) and Sungai Sembulan (Sabah). This programme was also aimed at seeking the cooperation of other stakeholders for river quality enhancement.

Pemantauan Kualiti Air Sungai di Kawasan Wabak *Japanese Encephalitis* (JE)

Aktiviti khusus ini yang mula dilaksanakan pada bulan April 1999, diteruskan dalam tahun 2003 bagi mengesan perubahan kepada kualiti air sungai dari pelupusan bangkai babi di kawasan wabak JE di Negeri Sembilan (4 stesen), Melaka (4 stesen) dan Perak (2 stesen).

River Monitoring in the Vicinity of Areas Previously Affected by the Japanese Encephalitis (J.E) Outbreak

This specific activity which started in April 1999 was continued in 2003, to detect, if any, river water quality changes in JE affected areas in Negeri Sembilan (4 stations), Melaka (4 stations) and Perak (2 stations).

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
PERLIS	01	PERLIS	10	ARAU	1
				JARUM	1
				JERNIH	2
				KOK MAK	1
				NGULANG	1
				PERALIT	1
				PERLIS	1
				SERAI	1
				TASOH	1
KEDAH	01PL	MELAKA	3	KISAP	1
				MELAKA	1
				PETANG	1
	03	KEDAH	6	KEDAH	1
				PADANG TERAP	3
				PEDU	1
				TEKAI	1
	4	MERBOK	10	BAKAR ARANG	1
				BATU	1
				BONGKOK	1
				BUKIT MERAH	1
				KOROK	1
				MERBOK	1
				PETANI	1
				TOK PAWANG	2
				TUPAH	1
KEDAH / PULAU PINANG	05	MUDA	9	JERUNG	2
				KETIL	1
				MUDA	3
				MUDA (P.PINANG)	1
				TAWAR	2
PULAU PINANG	06J	JURU	8	ARA	1
				JURU	1
				KILANG UBI	2
				PASIR	1

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
PULAU PINANG / KEDAH	06P	PERAI	22	RAMBAI	3
				AIR MELINTAS	1
				JARAK (KEDAH)	2
				JARAK	4
				KELADI	1
				KEREH	4
				KUBANG SEMANG	2
				KULIM	3
				PERAI	2
				SELUANG (KEDAH)	1
				SELUANG BAWAH (KEDAH)	2
PULAU PINANG	06PP	PINANG/KLUANG	12	AIR ITAM	5
				AIR TERJUN	1
				DONDANG	3
				JELUTONG	1
				KLUANG	1
				PINANG	1
	07	JEJAWI	5	CEMPEDAK	1
				JAWI	3
				JUNJONG	1
PULAU PINANG / PERAK	08	KERIAN	10	KECHIL	3
				KERIAN	4
				SELAMA (PERAK)	2
				SERDANG	1
PERAK	09	KURAU	5	ARA	1
				KURAU	4
	10	SEPETANG	10	BATU TEGUH	2
				JANA	1
				LARUT	1
				LIDIN	1
	10	SEPETANG		MALAI	1
				SEPETANG	3
				TUPAI	1
	10T	TEMERLOH	2	TEMERLOH	2
	11	BERUAS	4	BRUAS	2
				ROTAN	2
	12	RAJA HITAM/ MANJONG	6	DERHAKA	2
				MANJONG	2
				RAJA HITAM	2
	12W	WANGI/DERALIK	4	DERALIK	2
				WANGI	2
				BATANG PADANG	3
				BIDOR	3
				CHENDERIANG	2
				CUAR	2
				KAMPAR	2
				KANGSAR	2
				KEPAYANG	2

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
PERAK	13	PERAK	53	KERDAH	2
				KINTA	6
				KLAH	2
				KLIAN BARU	2
				KUANG	1
				PARI	2
				PELUS	2
				PERAK	8
				PINJI	2
				RAIA	2
				SELUANG	1
				SEROKAI	2
				SUNGKAI	2
				SUNGKAI MATI	2
				TUMBOH	1
PERAK / SELANGOR	14	BERNAM	10	BERNAM	4
				BERNAM (SELANGOR)	2
				SLIM	2
				TEROLAK	2
SELANGOR	15	TENGI	2	TENGI	2
	16	SELANGOR	9	BATANG KALI	1
				KANCING	1
				KERLING	1
				SELANGOR	4
				SEMBAH	1
				SERENDAH	1
	17	BULOH	5	BULOH	5
SELANGOR/ WPKL	18	KLANG	24	AMPANG	1
				BATU	1
				BATU (WPKL)	1
				DAMANSARA	3
				GOMBAK	2
				GOMBAK (WPKL)	1
				JINJANG (WPKL)	1
				KERAYONG (WPKL)	1
				KEROH (WPKL)	1
				KLANG	6
				KLANG (WPKL)	4
				KUYOH (WPKL)	1
				PENCALA	1
SELANGOR/ N. SEMBILAN	19	LANGAT	28	ANAK CHUAU	1
				BALAK	1
				BATANG BENAR (N.S)	2
				BATANG LABU	1
				BATANG LABU (N.S)	1
				BATANG NILAI (N.S)	2
				BERANANG	1
				BUAN	1
				CHUAU	2

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
SELANGOR/ N. SEMBILAN	19	LANGAT		JIJAN	1
				LANGAT	8
				LIMAU MANIS	1
				LUI	1
				PAJAM	1
				RINCHING	1
				SEMENYIH	3
SELANGOR	20	SEPANG	3	SEPANG	3
NEGERI SEMBILAN	20J	LUKUT	1	LUKUT	1
	21	LINGGI	15	BATANG BENAR	1
				CHEMBONG	1
				KEPAYONG	1
				KUNDUR BESAR	1
				LINGGI	6
				PEDAS	1
				REMBAU	2
				SIMIN	1
				TEMIANG	1
MELAKA	22	MELAKA	17	BTG.MELAKA	2
				DURIAN TUNGGAL	1
				MELAKA	9
				PUTAT	2
				REMBIA	2
				TAMPIN	1
	23	DUYONG	3	DUYONG	3
	24	KESANG/MERLIMAU	8	CHOHONG	2
				KESANG	3
				MERLIMAU	3
	25	MUAR	43	GEMENCHEH (N.S)	3
				JUASSEH	2
				KELAMAH (N.S)	2
JOHOR/NEGERI SEMBILAN				LABIS	4
				MERBUDU	1
				MERLIMAU	1
				MUAR	11
				MUAR (N.S)	5
				P. MENGKUANG	1
				PALONG	2
				PALONG (N.S)	2
				SEGAMAT	1
				SENARUT	2
				SEROM	1
				SPG. LOI	2
				TEMARONG (N.S)	1
				TENANG	2
JOHOR	26	BATU PAHAT	23	AMRAN	2
				BATU PAHAT	1
				BEKOK	4
				BERLIAN	2

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
JOHOR				CHAAH	2
				LENIK	1
				MEREK	2
				MERPO	2
				SEMBERONG	2
				SIMPANG KANAN	2
				SIMPANG KIRI	3
	27A	AIR BALOI	3	AIR BALOI	3
	27B	BENUT	7	BENUT	4
				PT. HAJI YASSIN	2
				ULU BENUT	1
	28	SEGGET	5	SEGGET	5
	28A	PONTIAN BESAR	5	AIR HITAM	1
				AYER MERAH	1
				PONTIAN BESAR	3
	28B	PONTIAN KECIL	2	PONTIAN KECIL	2
	28C	SKUDAI	11	MELANA	2
				SKUDAI	9
	28D	TEBRAU	5	PLENTONG	1
				TEBRAU	4
	28E	KEMPAS	2	KEMPAS	2
	28F	DANGA	2	DANGA	2
	28G	RAMBAH	2	RAMBAH	2
	29	JOHOR	44	ANAK SG. SAYONG	3
				BERANGAN	2
				BKT. BESAR	2
				CHEMANGAR	1
				JOHOR	4
				LAYANG	1
				LAYAU KIRI	2
				LEBAM	2
				LINGGIU	1
				PENGGELI	2
				REMIS	2
				SANTI	1
				SAYONG	4
				SEBOL	2
				SEMANGER	1
				SEMENCHU	2
				SENING	2
				SERAI	2
				TELOR	2
				TEMON	2
				TIRAM	4
	29B	KAW. PASIR GUDANG	5	TUKANG BATU	1
				BULUH	1
				LATOH	1
				MASAI	1
				PEREMBI	1

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
	30A	SEDILI BESAR	13	AMBAT	2
				DOHOL	1
				MUPUR	1
				SEDILI BESAR	5
				SEMANGGOT KANAN	1
				SEMANGGOT KIRI	1
				TEMUBOR KANAN	2
	30B	SEDILI KECIL	5	ANAK SEDILI KECIL	1
				BAHAN	2
				SEDILI KECIL	2
	30C	PALOI	2	PALOI	2
	31A	MERSING	1	MERSING	1
	31B	JEMALUANG	2	JEMALUANG	2
	32	ENDAU	29	A.S. SEMBERONG	2
				DENGAR	2
				ENDAU	1
				JEBONG	1
				LENGA	2
				LENGGOR	2
				MAMAI	2
				MELANTAI	2
				MENGKIBOL	3
				PALOH	2
				PAMOL	1
				SEMBERONG	5
				SINGOL	2
				TAMOK	2
	32/33	PONTIAN	3	PONTIAN	2
				SEPAYANG	1
	32AE	ANAK ENDAU	2	ANAK ENDAU	2
	33	ROMPIN	18	AUR	1
				BAKAR	1
				JEKATIH	2
				JERAM	1
				KEPASING	1
				KERATONG	4
				PUKIN	3
				REKOH	1
				ROMPIN	4
	34	BEBAR/MERCHONG	8	BEBAR	1
				KELAYAT	1
				MERBA	1
				MERCHONG	1
				SERAI	2
				TEMIANG	2
	35	SERTING	5	MOKEK	2
				SERTING	3
	35B	BERA	5	BERA	3

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
PAHANG				TRIANG	1
				TASIK BERA	1
	35CH	BERTAM	10	BERTAM	2
				BURUNG	1
				HABU	1
				LENGGOK	1
				RINGLET	1
				TELOM	2
				TERLA	1
				TRINGKAP	1
	35L	LEPAR	10	ANAK SG. LEPAR	1
				BELAYAR	1
				BERKAPOR	2
				CHINI	1
				LEPAR	3
				T. PAYA BUNGOR	1
				TASIK CHINI	1
	35M	MENTIGA	2	MENTIGA	2
	35P	PAHANG	53	BATU	1
				BENTONG	4
				BENUS	2
				BILUT	1
				JELAI	2
				JEMPOL	2
				JENGKA	2
				KELAU	2
				KERTAM	1
				KOYAN	1
				KUNDANG	1
				LIPIS	3
				LUIT	1
				MARAN	2
				PAHANG	9
				PENJURING	1
				PERTANG (N.S)	2
				PERTING	1
				SEMANTAN	3
				SERTING	2
				SIAM	1
				TANGLIR	1
				TEKAL	1
				TEKAM	2
				TELANG	1
	35P	PAHANG		TELEMONG	2
				TERANUM	1
				TERAS	1
	36	KUANTAN	11	BELAT	1
				CHARU	1
				GALING BESAR	1

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
				GALING KECIL	1
				KENAU	1
				KUANTAN	4
				PINANG	1
				RIAU	1
	37	BALOK/TONGGOK	5	BALOK	2
				TONGGOK	3
	37A	CERATING	1	CERATING	1
TERENGGANU	38	KEMAMAN	10	CHERUL	2
				KEMAMAN	2
				NERAM	2
				PERASING	2
				RANSAN	2
	39C	CHUKAI	5	CHUKAI	1
				IBOK	2
				RUANG	2
	39K	KERTIH	2	KERTIH	2
	40	PAKA	10	BESUL	2
				PAKA	4
				RASAU	2
				RENGAT	2
	41	DUNGUN	4	DUNGUN	2
				TELEMBOH	2
	42I	IBAI	3	IBAI	3
	42L	LANDAS	2	LANDAS	2
	42M	MARANG	5	KERAK	2
				MARANG	1
				TEMALA	2
	43	TERENGGANU	9	BERANG	2
				NERUS	3
				PUEH	2
				TERENGGANU	2
KELANTAN	44	SETIU	3	SETIU	1
				TAROM	2
				BESUT	2
	46	BESUT	4	JERTIH	2
	47K	KEMASIN	1	KEMASIN	1
	47S	SEMERAK	2	SEMERAK	2
	48	KELANTAN	38	ARING	2
				BELATOP	2
				BER	1
				BEROK	2
				BETIS	1
				CHIKU	2
				GALAS	1
				KELANTAN	4
				KELESA	2
				KERAK	2
				KERILLA	2

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
				KETIL	2
				NAL	3
				PEHI	2
				PENGKALAN CHEPA	1
				PENGKALAN DATU	3
				PERGAU	2
				PERTOK	2
				RELAI	2
	49	GOLOK	4	GOLOK	2
				TASIK GARU	2
SARAWAK	50	KAYAN	4	KAYAN	3
				SEMATAN	1
	51	SARAWAK	15	KUAP	2
				MAONG KIRI	1
				SANTUBONG	1
				SARAWAK	6
				SARAWAK KANAN	1
				SARAWAK KIRI	1
				SEMENGGOH	2
				TABUAN	1
	51BS	SAMARAHAN	2	SAMARAHAN	2
	52	SADONG	6	KARANGAN	1
				SADONG	3
				TARAT	2
	53	LUPAR	7	AI	1
				LUPAR	3
				SEKERANG	1
				SETERAP	1
				UNDUP	1
	54	SARIBAS	2	RIMBAS	1
				SARIBAS	1
	55	KERIAN	3	KERIAN	2
				SEBLAK	1
	56	RAJANG	18	BINATANG	1
				JULAU	1
				MERADONG	1
				RAJANG	14
				SARIKEI	1
	57	OYA	3	OYA	3
	58	MUKAH	4	MUKAH	4
	59	BALINGIAN	2	BALINGIAN	2
	60	TATAU	1	TATAU	1
	61	KEMENA	3	KEMENA	2
				SIBIU	1
	62	SIMILAJAU	1	SIMILAJAU	1
	63	SUAI	1	SUAI	1
	64	NIAH	5	NIAH	2
				SEKALOH	3

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
	65	KABULOH	6	KABULOH	2
				KEJAPIL	1
				SATAP	1
				SIBUTI	2
	66	MIRI/LUTONG	7	LUTONG	2
				MIRI	2
				ADONG	1
				PADANG LIKU	1
			4	DALAM	1
	67	BARAM	5	BARAM	4
	68	LIMBANG	1	LIMBANG	5
	69	TRUSAN	2	TRUSAN	1
	70	LAWAS		LAWAS	2
SABAH	71	MENGGALONG	3	LAKUTAN	1
				LINGKUNGAN	1
				MENGGALONG	1
	72	PADAS	7	BUNSIT	1
				LIAWAN	1
				PADAS	3
				PANGATAN	1
			1	TANDULU	1
	73	MEMBAKUT	2	MEMBAKUT	1
	75	PAPAR		PAPAR	2
	76	MOYOG	11	MENGGATAL	2
				MOYOG	3
				LIKAS	1
				INANAM	3
				TELIPOK	2
	77	DAMIT/TUARAN	6	DAMIT	2
				SONG SAI	1
			3	TUARAN	3
	78	KEDAMAIAN		TEMPASUK	2
				TENGHILAN	1
	79	BINGKONGAN	3	BANDAU	1
				TANDEK	1
			1	MENGGARIS	1
	80	BENGKOKA		BENGKOKA	1
	83	SUGUT	6	BONGKUD	1
				LOHAN	2
				MERALI	1
				SUGUT	2
	84	LABOK	8	KINIPIR	2
				LIWAGU	2
				MALIAU	1
				SAPI	2
			1	SUALONG	1
	85	KAYA		MOUNAD	1

Jadual 5.2 Jabatan Alam Sekitar: Senarai Lembangan Sungai dan Sungai-Sungai Yang Dipantau, 2003
Table 5.2 Department of Environment: List of River Basins and Rivers Monitored, 2003 (continued)

NEGERI STATE	KOD WKA CODE WQR	LEMBANGAN SUNGAI RIVER BASIN	BIL. STESEN NO. OF STATIONS	SUNGAI DIAWASI RIVERS MONITORED	BIL. STESEN NO. OF STATIONS
SABAH	86	KINABATANGAN	4	KINABATANGAN	2
				KOYAH	1
			1	TENEGANG BESAR	1
	87	SEGAMA	2	SEGAMA	1
	88	SILABUKAN	1	SILABUKAN	2
	89	TINGKAYU		TINGKAYU	1
	90	KALUMPANG	5	INTAN	1
				KALUMPANG	2
				PANG BURONG 1	1
				PANG BURONG 2	1
	91	TAWAU	5	APAS	1
				BALUNG	1
			1	TAWAU	3
	93	UMAS-UMAS	1	UMAS-UMAS	1
	94	BRANTIAN	2	BRANTIAN	1
	95	KALABAKAN		KALABAKAN	

Jadual 5.3 Jabatan Alam Sekitar: Stesen Pemantauan Kualiti Air Sungai, 1995-2003
Table 5.3 Department of Environment: River Quality Monitoring Stations, 1995-2003

Pemantauan | Monitoring	Tahun | Year								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Pemantauan Manual | Manual Monitoring									
Lembangan Sungai | River Basin	115	116	117	120	120	120	120	120	120
Bilangan Stesen Pemantauan | Number of Monitoring Stations	821	909	909	900	902	901	931	827	926
Pemantauan Berterusan Automatik | Automatic Continuous Monitoring									
Lembangan Sungai | River Basin	2	4	6	8	10	10	10	12	12
Bilangan Stesen Pemantauan | Number of Monitoring Stations	2	4	6	8	10	10	10	12	15

Gambarfoto 5.1 : Sg. Melaka-Program Pencegahan dan Peningkatan Kualiti Air Sungai
Photo 5.1 : Sg. Melaka-River Pollution Prevention and Water Quality Improvement Programme

Gambarfoto 5.2 : Pengawasan Kualiti Udara Melalui Udara
Photo 5.2 : Air Quality Aerial Surveillance

PROGRAM PENCEGAHAN PENCEMARAN DAN PENINGKATAN KUALITI AIR SUNGAI

Bahagian Sungai yang telah ditubuhkan secara rasmi pada 1 April 2003 bagi menguruskan Program Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai.

Lembangan Sungai Melaka di Negeri Melaka, Lembangan Batang Rajang di Negeri Sarawak, Lembangan Sungai Telom, Bertam dan Lemoi di Cameron Highlands telah dikenalpasti pada tahun 2003 untuk dijalankan Kajian Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai di bawah Program Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai. Pemilihan dibuat berdasarkan kepada penggunaan berfaedah dan ancaman pencemaran yang sedang dihadapi. Tujuan utama kajian adalah:

- Mengenalpasti semua punca pencemaran di lembangan sungai yang dipilih dan menentukan beban pencemaran dari punca-punca tersebut;
- Menentukan impak beban pencemaran ke atas kualiti air sungai; dan
- Membentuk pelan-pelan tindakan untuk memperbaiki kualiti air sungai.

RIVER POLLUTION PREVENTION AND WATER QUALITY IMPROVEMENT PROGRAMME

The River Division was established on 1 April 2003 to manage the River Pollution Prevention and Water Quality Improvement Programme.

The Melaka River Basin in the State of Melaka, the Batang Rajang Basin in Sarawak, the Telom, Bertam and Lemoi River Basins in Cameron Highlands, Pahang were identified for the 2003 River Pollution Prevention and Water Quality Improvement Programme. The selection was done based on their beneficial uses and the pollution threat. The main objectives of the study were:

- To identify all pollution sources in the selected river basins and to determine the pollution loading from each source;
- To determine the impact of pollution on the water quality; and
- To formulate action plans for water quality improvement.

Pemilihan dan perlantikan perunding untuk menjalankan kajian bagi ketiga-tiga sungai yang dipilih telah siap pada akhir tahun 2003. Hanya kajian bagi Lembangan Sungai Melaka sahaja dapat dilaksanakan dalam tahun 2003. Kajian untuk dua lembangan sungai lagi akan dimulakan pada tahun 2004.

The selection and appointment of consultants for the three studies were completed in late 2003. The actual study for the Melaka River basin started in 2003. The other two studies were rescheduled for 2004.

Gambarfoto 5.3 : Latihan di Lapangan Program Kawalan Kualiti dan Jaminan Kualiti
Photo 5.3 : Hands-on Training: River Monitoring Quality Assurance and Quality Control

Gambarfoto 5.4 : Mencantikkan Tebing Sungai-Sungai Sebagai Tempat Rekreasi
Photo 5.4 : Riverbank Beautification - River As Your Front Yard

Perlaksanaan Pelan Tindakan

Pelaksanaan bagi pelan-pelan tindakan ini Sungai Langat, Sungai Segget dan Sungai Tebrau tidak dapat dimulakan dalam tahun 2003 kerana tiada peruntukan yang sedia ada sama ada dari Kerajaan Persekutuan ataupun Kerajaan Negeri. Demi kesinambungan program ini, pelan-pelan tindakan ini akan dibentangkan oleh agensi-agensi pelaksana untuk mendapatkan peruntukan di bawah Rancangan Malaysia Kesembilan.

Implementation of Action Plans

Implementation of action plans for Sungai Langat, Sungai Segget and Sungai Tebrau did not take off in 2003 due to shortage of funding. In order to sustain the continuity of the Programme, these Action Plans would be tabled by the respective implementing agencies for funding approval under the Ninth Malaysian Plan.

Penguatkuasaan

Untuk mempertingkatkan lagi keberkesanan Program Pencegahan dan Peningkatan Kualiti Air Sungai di 26 lembangan sungai yang telah dipilih (Rajah 5.1), sebanyak 1,672 lawatan penguatkuasaan telah dilaksanakan dalam tahun 2003 untuk memastikan punca-punca yang sedia ada di dalam lembangan sungai berkenaan mematuhi standard pelepasan

Enforcement

To further enhance the effectiveness of the River Pollution Prevention and Water Quality Improvement Programme in the 26 selected river basins (Figure 5.1), 1,672 enforcement visits were conducted in 2003 to ensure compliance of discharge standards. 289 premises were given written notices to improve their effluent treatment systems, 23 premises were

yang telah ditetapkan. Sebanyak 289 premis telah diberi Notis Arahan untuk memperbaiki sistem pengolahan effluen, 23 premis telah dikemukakan untuk tindakan mahkamah dan perintah larangan telah dikeluarkan kepada tiga premis untuk diberhentikan operasi (Rajah 5.2).

recommended for court action and 3 premises were given prohibition order to cease operation(Figure 5.2).

Program Kesedaran Awam

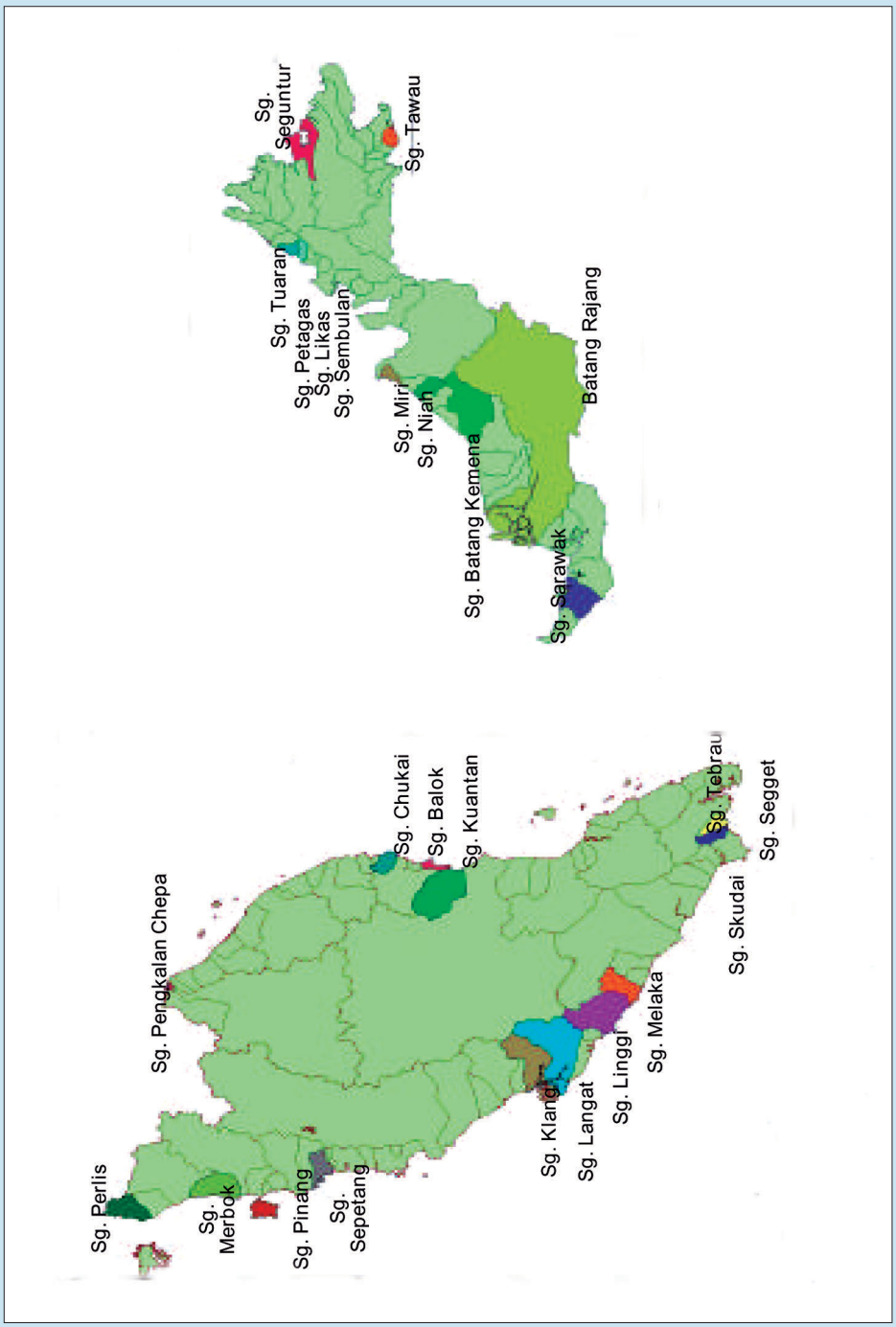
Program Kesedaran Awam mengenai pencegahan pencemaran seperti seminar, ceramah, dialog, bengkel, pameran dan gotong–royong telah diadakan pada tahun 2003 untuk kumpulan sasaran seperti sektor industri, pelaksana-pelaksana projek, komuniti setempat, murid-murid sekolah dan guru-guru di lembangan sungai berkenaan (Rajah 5.3).

Public Awareness Programmes

Public awareness programmes on pollution prevention like seminars, talks, dialogues, workshops, exhibitions and 'gotong-royong' were conducted in 2003 for targeted groups such as industries, development project proponents, local communities, school children and teachers within the selected river basins (Figure 5.3).

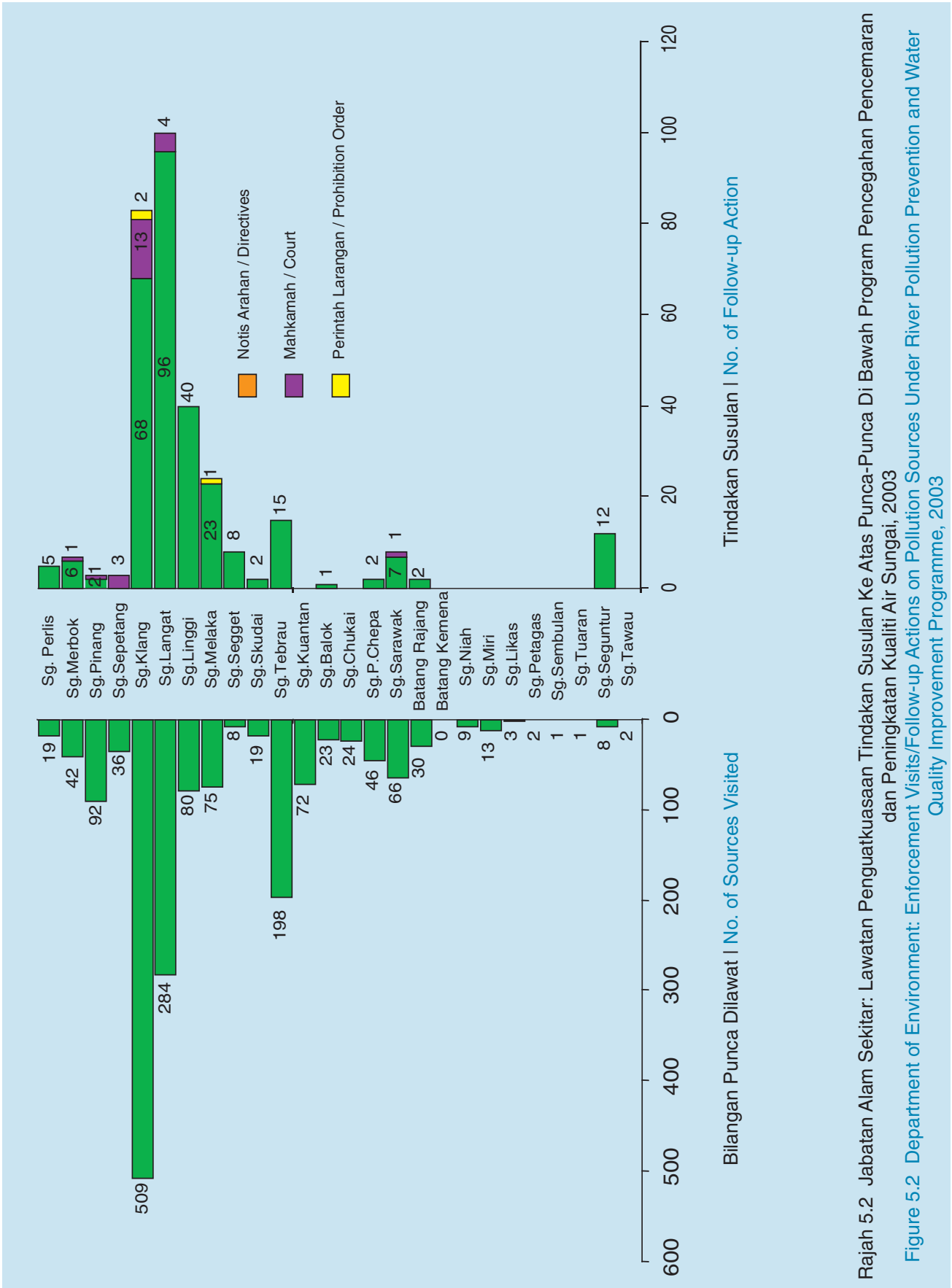
Gambarfoto 5.5 : Kempen Kesedaran Awam: Larangan Pembakaran Terbuka
Photo 5.5 : Public Awareness Campaign: Prohibition of Open Burning

Gambarfoto 5.6 : Kempen Kesedaran Awam: Pencegahan Pencemaran Sungai
Photo 5.6 : Public Awareness Campaign: Prevention of River Pollution



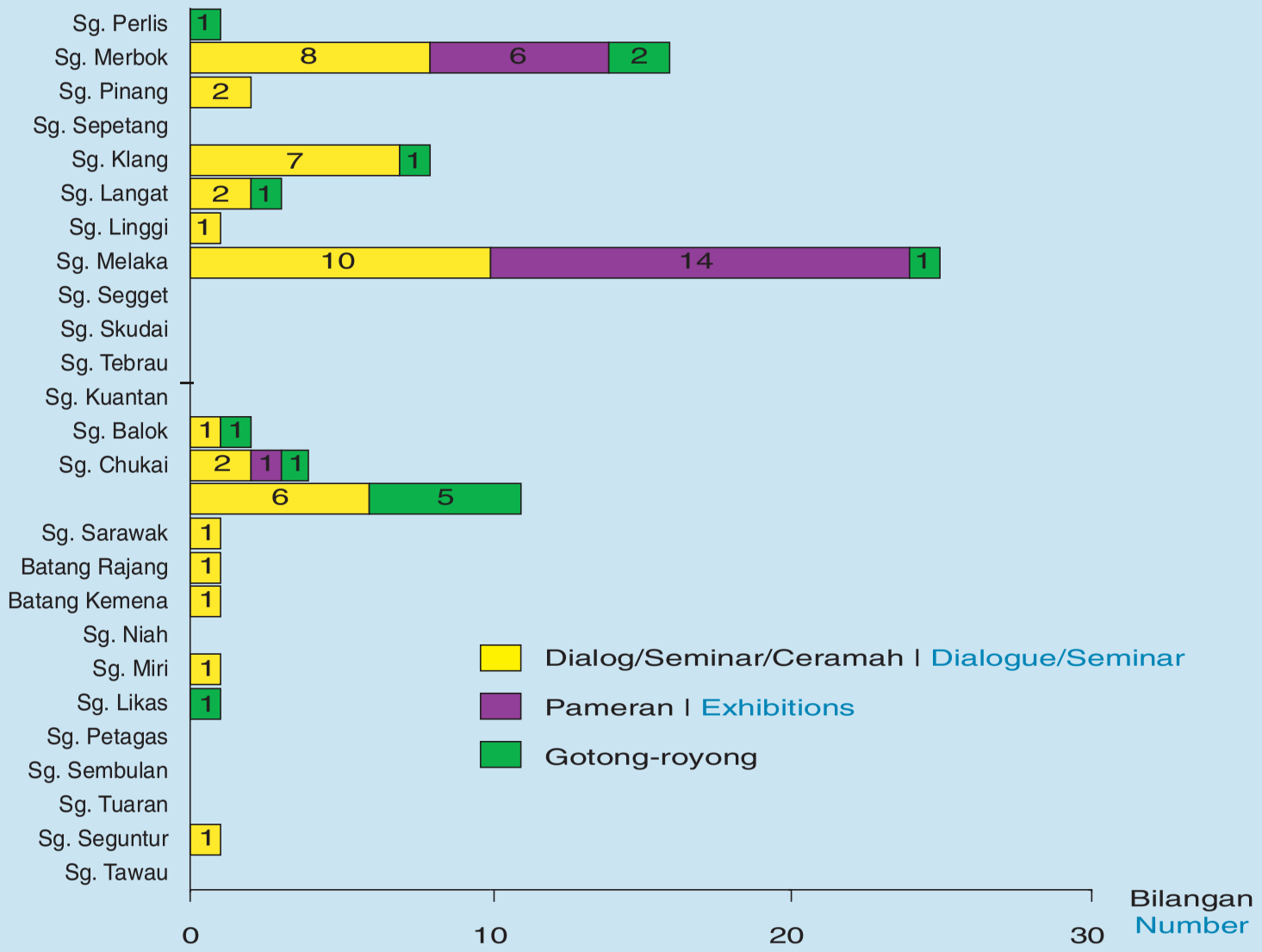
Rajah 5.1 Jabatan Alam Sekitar: Lembangan Sungai Di Bawah Program Pencegahan Pencemaran Sungai dan Peningkatan Kualiti Air (Rancangan Malaysia Kelapan)

Figure 5.1 Department of Environment: River Basins under the River Pollution Prevention and Water Quality Improvement Programme (Eighth Malaysian Plan)



Rajah 5.2 Jabatan Alam Sekitar: Lawatan Penguatkuasaan Tindakan Susulan Ke Atas Punca-Punca Di Bawah Program Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai, 2003

Figure 5.2 Department of Environment: Enforcement Visits/Follow-up Actions on Pollution Sources Under River Pollution Prevention and Water Quality Improvement Programme, 2003



Rajah 5.3 Jabatan Alam Sekitar: Aktiviti-Aktiviti Kesedaran di Bawah Program Pencegahan Pencemaran dan Peningkatan Kualiti Air Sungai, 2003

Figure 5.3 Department of Environment: Awareness Activities under River Pollution Prevention and Water Quality Improvement Programme, 2003

PENGAWASAN KUALITI AIR MARIN KEBANGSAAN

Status kualiti air marin memainkan peranan yang penting dalam menjaga sumber-sumber semulajadi marin seperti terumbu karang, perikanan dan paya bakau yang menyumbang kepada keseimbangan ekosistem marin. Punca-punca pencemaran dari daratan dan juga lautan mengancam sumber-sumber ini.

Program Pengawasan Kualiti Air Marin Kebangsaan telah dimulakan pada tahun 1978 di Semenanjung Malaysia dan pada tahun 1985 di Sabah dan Sarawak untuk memberikan maklumat amaran awal, mengenalpasti tren pencemaran sesuatu lokasi termasuk asal, pergerakan dan destinasi pencemaran tersebut. Ianya juga menghasilkan pangkalan data untuk kegunaan pihak-pihak yang berkaitan dan juga penting untuk audit alam sekitar.

Pada tahun 2003, terdapat 219 stesen pengawasan yang telah diwujudkan di seluruh Malaysia; Perlis (2); Kedah (3); Pulau Langkawi (7); Pulau Pinang (23 stesen); Perak (13); Selangor (14); Negeri Sembilan (13); Melaka (9); Johor (45); Pahang (11); Terengganu (19); Kelantan (10); Sabah (26); Wilayah Persekutuan Labuan (5) dan Sarawak (19) (Peta 5.3, Peta 5.4 dan Jadual 5.4). Terdapat beberapa stesen yang telah ditutup atas sebab-sebab tertentu (Jadual 5.5).

Sebagai tambahan di bawah Program Pengawasan *'Malaysia-Singapore Joint Commitee on the Environment'* (MSJCE),14 stesen telah dipantau sebanyak tiga (3) kali pada tahun 2003 (Jadual 5.6).

Pengawasan kualiti air laut akibat Projek Penambakan Singapura juga dijalankan pada tahun 2003 dimana data marin dikumpul setiap bulan daripada 20 buah stesen di Selat Johor (Jadual 5.7).

MARINE WATER QUALITY MONITORING

The quality of marine waters is important for the conservation of marine resources such as coral reefs, fisheries and mangroves, which contribute to the stability of the marine ecosystem. Sources of pollution from land as well as from the sea are threats to these resources.

The National Marine Water Quality Monitoring Programme which started in 1978 for Peninsular Malaysia and in 1985 for Sabah and Sarawak aims to provide early warning of water quality change and to identify the origin, pathway and fate of pollutants. It also provides useful database for relevant stakeholders. Monitoring is also essential for environmental auditing.

In 2003, 219 monitoring stations were set up all over Malaysia; Perlis (2); Kedah (3); Pulau Langkawi (7); Pulau Pinang (23); Perak (13); Selangor (14 stations); Negeri Sembilan (13); Melaka (9); Johor (45); Pahang (11 stations); Terengganu (19); Kelantan (10); Sabah (26); Wilayah Persekutuan Labuan (5) and Sarawak (19 stations) (Map 5.3, 5.4 and Table 5.4). Due to technical reasons (Table 5.5) a number of stations had to be closed down.

In addition under the Malaysia-Singapore Joint Commitee on the Environment (MSJCE) Monitoring Programme, 14 stations were monitored thrice in 2003 (Table 5.6).

Monitoring of marine waters due to the Singapore Reclamation Project was also carried out in 2003. Monthly marine data were collected from 20 stations situated along Straits of Johor (Table 5.7).

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
1	PERLIS	KUALA	KUALA SG. BARU	6302903	N 06° 19' 54"	E 100° 09' 16.68"
2	PERLIS	KUALA	KUALA SG. PERLIS	6401901	N 06° 23' 59"	E 100° 07' 34.8"
1	P.LANGKAWI	PANTAI	LANGKAWI IS. RESORT	6399914	N 06° 17' 55.2"	E 099° 51' 37.8"
2	P.LANGKAWI	PANTAI	PANTAI KOK	6397922	N 06° 21' 58.2"	E 099° 40' 54"
3	P.LANGKAWI	PANTAI	PANTAI KUAH	6398913	N 06° 17' 50.4"	E 099° 51' 39"
4	P.LANGKAWI	PANTAI	PANTAI PASIR TENGKORAK	6497901	N 06° 25' 49.2"	E 099° 43' 37.2"
5	P.LANGKAWI	PANTAI	PANTAI TELUK BURAU	6396923	N 06° 21' 45.6"	E 099° 40' 21"
6	P.LANGKAWI	PANTAI	PANTAI TELUK NIBUNG	6497915	N 06° 21' 37.2"	E 099° 42' 37.8"
7	P.LANGKAWI	PANTAI	PANTAI TENGAH	6297903	N 06° 13' 19.8"	E 099° 43' 54"
1	KEDAH	KUALA	KUALA SG. KEDAH	6102908	N 6° 06' 13"	E 100° 16' 32"
2	KEDAH	KUALA	KUALA JERLUN	6302925	N 6° 12' 36"	E 100° 14' 20.88"
3	KEDAH	PANTAI	PANTAI MERDEKA	5603905	N 5° 40' 10"	E 100° 40"
1	PULAU PINANG	KUALA	KUALA SG. JAWI	5204901	N 05° 16' 50"	E 100° 25' 00"
2	PULAU PINANG	KUALA	KUALA SG. JURU	5304904	N 05° 20' 20"	E 100° 24' 20"
3	PULAU PINANG	KUALA	KUALA SG. KERIAN	5104901	N 05° 10' 00"	E 100° 25' 00"
4	PULAU PINANG	KUALA	KUALA SG. PINANG	5403934	N 05° 24' 00"	E 100° 25' 05"
5	PULAU PINANG	KUALA	KUALA SG.PERAI	5303908	N 05° 23' 00"	E 100° 22' 00"
6	PULAU PINANG	PANTAI	BATU FERINGGI (CASUARINA)	5402904	N 05° 28' 10"	E 100° 14' 30"
7	PULAU PINANG	PANTAI	BATU MAUNG	5202901	N 05° 17' 10"	E 100° 17' 25"
8	PULAU PINANG	PANTAI	GERTAK SANGGUL	5201919	N 05° 16' 50"	E 100° 12' 40"
9	PULAU PINANG	PANTAI	KAW.PER.BAYAN LEPAS I	5303932	N 05° 20' 00"	E 100° 18' 45"
10	PULAU PINANG	PANTAI	KAW.PER.BAYAN LEPAS II	5303933	N 05° 19' 00"	E 100° 18' 30"
11	PULAU PINANG	PANTAI	KAW.PER.BAYAN LEPAS III	5302939	N 05° 18' 20"	E 100° 17' 45"
12	PULAU PINANG	PANTAI	LUAR PANTAI TELUK BAHANG	5402930	N 05° 27' 45"	E 100° 12' 45"
13	PULAU PINANG	PANTAI	PANTAI BERSIH	5403906	N 05° 26' 30"	E 100° 22' 40"
14	PULAU PINANG	PANTAI	PANTAI MIAMI	5502901	N 05° 28' 30"	E 100° 16' 00"
15	PULAU PINANG	PANTAI	PANTAI PASIR PANJANG	5201938	N 05° 17' 50"	E 100° 11' 00"
16	PULAU PINANG	PANTAI	PERSIARAN GURNEY	5403902	N 05° 25' 30"	E 100° 19' 30"
17	PULAU PINANG	PANTAI	PULAU AMAN	5203910	N 05° 15' 50"	E 100° 23' 35"
18	PULAU PINANG	PANTAI	RUMAH PAM BARU PERAI	5304927	N 05° 21' 15"	E 100° 23' 15"
19	PULAU PINANG	PANTAI	RUMAH PAM LAMA PERAI	5303926	N 05° 20' 00"	E 100° 18' 45"
20	PULAU PINANG	PANTAI	SELAT PP SELATAN (JELUTONG)	5303911	N 05° 23' 30"	E 100° 19' 50"
21	PULAU PINANG	PANTAI	TANJUNG BUNGAH	5402937	N 05° 28' 00"	E 100° 16' 50"
22	PULAU PINANG	PANTAI	TELUK BAHANG (P. MUTIARA)	5402912	N 05° 28' 46"	E 100° 15' 41"
23	PULAU PINANG	PANTAI	TELUK TEMPOYAK	5202923	N 05° 28' 30"	E 100° 17' 30"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
1	PERAK	KUALA	KUALA SG. MANJUNG	4205930	N 4⁰ 14' 9"	E 100⁰ 39' 57"
2	PERAK	KUALA	KUALA SG. TG. PIANDANG	5003921	N 5⁰ 04' 27"	E 100⁰ 22' 34"
3	PERAK	KUALA	KUALA SG.GULA	4906926	N 4⁰ 55' 7"	E 100⁰ 28' 57"
4	PERAK	KUALA	KUALA SG.KURAU	4994919	N 4⁰ 59' 13"	E 100⁰ 25' 46"
5	PERAK	KUALA	KUALA SG.PERAK	4007901	N 3⁰ 59' 03"	E 100⁰ 48' 58"
6	PERAK	KUALA	KUALA SG.SEPETANG	4806925	N 4⁰ 50' 7"	E 100⁰ 37' 57"
7	PERAK	PANTAI	PANTAI PASIR BOGAK	4205908	N 4⁰ 12' 58"	E 100⁰ 37' 55"
8	PERAK	PANTAI	PANTAI PASIR PANJANG	4205924	N 4⁰ 25' 7"	E 100⁰ 35' 35"
9	PERAK	PANTAI	PANTAI PUTERI DEWI	4205907	N 4⁰ 15' 17"	E 100⁰ 32' 47"
10	PERAK	PANTAI	PANTAI TANJUNG BATU	4406927	N 4⁰ 25' 7"	E 100⁰ 35' 35"
11	PERAK	PANTAI	PANTAI TELUK BATIK	4205923	N 4⁰ 11' 14"	E 100⁰ 36' 33"
12	PERAK	PANTAI	PANTAI TELUK DALAM	4205928	N 4⁰ 14' 53"	E 100⁰ 33' 25"
13	PERAK	PANTAI	PANTAI TELUK GEDUNG	4205929	N 4⁰ 15' 39"	E 100⁰ 34' 49"
1	SELANGOR	PANTAI	PANTAI BAGAN LALANG	2616927	N 02° 36' 20"	E 101° 41'30"
2	SELANGOR	PANTAI	PANTAI MORIB	2712902	N 02° 45' 00"	E 101° 26' 20"
3	SELANGOR	PANTAI	SELAT PULAU BABI	3012929	N 03° 01' 10"	E 101° 15' 55"
4	SELANGOR	PANTAI	SELAT KLANG UTARA	3013908	N 03° 04' 00"	E 101° 21' 00"
5	SELANGOR	KUALA	KUALA SG. SEPANG	2517922	N 02° 35' 35"	E 101° 42' 56"
6	SELANGOR	KUALA	KUALA SG. SEPANG (KECIL)	2612928	N 02° 36' 40"	E 101° 42' 15"
7	SELANGOR	KUALA	KUALA SG. SEPANG (KAWALAN)	2616926	N 02° 36' 20"	E 101° 41' 30"
8	SELANGOR	KUALA	KUALA SG. KLANG	3013909	N 03° 00' 06"	E 101° 23' 24"
9	SELANGOR	KUALA	KUALA SG LANGAT (JUGRA)	2814925	N 02° 48' 25"	E 101° 24' 15"
10	SELANGOR	KUALA	KUALA SG LANGAT (LUMUT)	2913903	N 02° 55' 50"	E 101° 21' 15"
11	SELANGOR	KUALA	KUALA SG. BULOH	3212930	N 03° 15' 10"	E 101° 15' 50"
12	SELANGOR	KUALA	KUALA SG. SELANGOR	3312915	N 03° 20' 00"	E 101° 13' 30"
13	SELANGOR	KUALA	KUALA SG. TENGI	3311931	N 03° 23' 00"	E 101° 10' 20"
14	SELANGOR	KUALA	KUALA SG. BERNAM	3808924	N 03° 51' 00"	E 100° 49' 00"
1	N. SEMBILAN	KUALA	KUALA SUNGAI LINGGI	2319901	N 02° 23' 20"	E 101° 58' 19"
2	N. SEMBILAN	KUALA	KUALA SUNGAI LUKUT	2517910	N 02° 34' 45"	E 101° 47' 16"
3	N. SEMBILAN	PANTAI	BAGAN PINANG	2418915	N 02° 30' 31"	E 101° 49' 44"
4	N. SEMBILAN	PANTAI	KG.TELUK SINTING	2419908	N 02° 24' 57"	E 101° 56' 31"
5	N. SEMBILAN	PANTAI	P.D. BANDAR	2517907	N 02° 31' 16"	E 101° 47' 51"
6	N. SEMBILAN	PANTAI	P.D. BATU 10	2418914	N 02° 24' 58"	E 101° 51' 23"
7	N. SEMBILAN	PANTAI	P.D. BATU 5	2418906	N 02° 29' 48"	E 101° 50' 15"
8	N. SEMBILAN	PANTAI	P.D. BATU 6	2418916	N 02° 29' 05"	E 101° 50' 46"
9	N. SEMBILAN	PANTAI	P.D. BATU 7	2418905	N 02° 27' 43"	E 101° 51' 04"
10	N. SEMBILAN	PANTAI	P.D. BATU 8	2418912	N 02° 27' 16"	E 101° 51' 20"
11	N. SEMBILAN	PANTAI	P.D. BATU 8 (STESEN KAWALAN)	2418913	N 02° 27' 16"	E 101° 51' 10"
12	N. SEMBILAN	PANTAI	P.D. JANAKUASA TNB	2517909	N 02° 32' 08"	E 101° 47' 42"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
13	N. SEMBILAN	PANTAI	TELOK PELANDUK	2419917	N 02° 25' 03"	E 101° 53' 34"
1	MELAKA	KUALA	KUALA SG. KESANG	2186905	N 2° 05' 43"	E 102° 29' 12"
2	MELAKA	KUALA	KUALA SG. MELAKA	2122903	N 2° 11' 06"	E 102° 14' 52"
3	MELAKA	KUALA	KUALA SG. MERLIMAU	2124912	N 2° 09' 25"	E 102° 25' 28"
4	MELAKA	KUALA	KUALA SG. SEBATU	2186904	N 2° 06' 06"	E 102° 27' 35"
5	MELAKA	PANTAI	PANTAI KUNDOR	2221908	N 2° 14' 37"	E 102° 08' 29"
6	MELAKA	PANTAI	PANTAI ROMBANG	2221906	N 2° 13' 35"	E 102° 08' 57"
7	MELAKA	PANTAI	PANTAI TG. BIDARA	2320909	N 2° 17' 30"	E 102° 05' 18"
8	MELAKA	PANTAI	PULAU BESAR	2123911	N 2° 07' 57"	E 102° 20' 09"
9	MELAKA	PANTAI	TELUK GONG PENGKALAN BALAK	2320902	N 2° 20' 23"	E 102° 03' 30"
1	JOHOR	PANTAI	KG.TANJUNG KOPOK	SJ1	N 1° 25' 31"	E 104° 00' 03"
2	JOHOR	PANTAI	KG. PASIR PUTIH	SJ2	N 1° 25' 48"	E 103° 55' 40"
3	JOHOR	PANTAI	J/K SULTAN ISKANDAR	SJ3	N 1° 26' 49"	E 103° 46' 09"
4	JOHOR	PANTAI	KG.SENIBUNG	SJ4	N 1° 29' 01"	E 103° 48' 47"
5	JOHOR	KUALA	KUALA SG.TEBRAU	SJ4A	N 1° 28' 56"	E 103° 47' 48"
6	JOHOR	PANTAI	TANJUNG PUTRI	SJ5	N 1° 27' 20"	E 103° 46' 09"
7	JOHOR	PANTAI	HADAPAN MPJB (W.F.CT)	SJ6	N 1° 27' 08"	E 103° 45' 43"
8	JOHOR	PANTAI	TANJUNG DANGA	SJ7	N 1° 27' 24"	E 103° 42' 52"
9	JOHOR	KUALA	KUALA SG.SKUDAI	SJ7A	N 1° 27' 46"	E 103° 43' 22"
10	JOHOR	PANTAI	DEPAN PUSAT ISLAM	SJ7B	N 1° 27' 19"	E 103° 44' 51"
11	JOHOR	PANTAI	TEBING RUNTUH	SJ8	N 1° 25' 10"	E 103° 40' 06"
12	JOHOR	KUALA	KUALA SG.MELAYU	SJ8A	N 1° 26' 53"	E 103° 41' 53"
13	JOHOR	PANTAI	TANJUNG BUNGA	SJ9	N 1° 23' 07"	E 103° 39' 02"
14	JOHOR	PANTAI	TANJUNG KUPANG	SJ10	N 1° 23' 36"	E 103° 39' 11"
15	JOHOR	KUALA	KUALA SUNGAI BATU PAHAT	1729930	N 1° 47' 44"	E 102° 53' 22"
16	JOHOR	KUALA	KUALA SUNGAI JOHOR	1440916	N 1° 29' 04"	E 104° 01' 22"
17	JOHOR	KUALA	KUALA SUNGAI MELAYU	1437946	N 1° 27' 15"	E 103° 41' 56"
18	JOHOR	KUALA	KUALA SUNGAI MERSING	2438905	N 2° 26' 10"	E 103° 50' 35"
19	JOHOR	KUALA	KUALA SUNGAI MUAR	2024932	N 2° 02' 54"	E 102° 33' 11"
20	JOHOR	KUALA	KUALA SUNGAI SEGGET	1437919	N 1° 27' 21"	E 103° 45' 58"
21	JOHOR	KUALA	KUALA SUNGAI SKUDAI	1437922	N 1° 28' 28"	E 103° 43' 12"
22	JOHOR	KUALA	KUALA SUNGAI TEBRAU	1438943	N 1° 28' 56"	E 103° 47' 48"
23	JOHOR	PANTAI	JETI TANJONG BELUNGKOR	1440963	N 1° 27' 14"	E 104° 04' 03"
24	JOHOR	PANTAI	JETI TELUK JAWA	1438913	N 1° 28' 22"	E 103° 50' 23"
25	JOHOR	PANTAI	PANTAI AIR PAPAN	2538959	N 2° 31' 05"	E 103° 50' 00"
26	JOHOR	PANTAI	PANTAI DESARU	1542914	N 1° 32' 48"	E 104° 15' 41"
27	JOHOR	PANTAI	PANTAI KUKUP	1334925	N 1° 19' 30"	E 103° 26' 29"
28	JOHOR	PANTAI	PANTAI LIDO	1437921	N 1° 27' 56"	E 103° 43' 29"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
29	JOHOR	PANTAI	PANTAI SRI PANTAI	2339960	N 2° 22' 45"	E 103° 53' 19"
30	JOHOR	PANTAI	PANTAI STULANG LAUT	1437951	N 1° 28' 02"	E 103° 46' 46"
31	JOHOR	PANTAI	PANTAI SUNGAI LURUS	1730962	N 1° 43' 14"	E 103° 01' 43"
32	JOHOR	PANTAI	PANTAI TANJONG SETAPA	1341961	N 1° 20' 33"	E 104° 08' 09"
33	JOHOR	PANTAI	PANTAI TELUK GOREK	2538958	N 2° 34' 57"	E 103° 48' 18"
34	JOHOR	PANTAI	PANTAI TELUK MAHKOTA	1841911	N 1° 53' 52"	E 104° 06' 15"
35	JOHOR	PANTAI	PANTAI TG.LEMAN	2140694	N 2° 08' 43"	E 104° 00' 24"
36	JOHOR	PANTAI	PASIR GOGOK	1441966	N 1° 25' 2.82"	E 104° 05' 59.7"
37	JOHOR	PANTAI	PEL. PASIR GUDANG	1428939	N 1° 25' 44"	E 103° 54' 03"
38	JOHOR	PANTAI	PULAU MERAMBONG	1336972	N 1° 18' 25.9"	E 103° 36' 42.2"
39	JOHOR	PANTAI	TANJUNG BUAI	1340973	N 1° 29' 48.1"	E 104° 2' 43.4"
40	JOHOR	PANTAI	TANJUNG MERAK	1441968	N 1° 21.765'	E 104° 06 59.2'
41	JOHOR	PANTAI	TANJUNG PENGELIH	1441967	N 1° 22. 245'	E 104° 05 32.5'
42	JOHOR	PANTAI	TANJUNG PENYUSUP	1444920	N 1° 22' 12.9"	E 104° 16' 48.3"
43	JOHOR	PANTAI	TANJUNG SEPANG	1443969	N 1° 23' 1.2"	E 104° 06' 44.8"
44	JOHOR	PANTAI	TELUK RAMUNIA	1432971	N 1° 22' 4.6"	E 104°14' 30.8"
45.	JOHOR	PANTAI	HADAPAN HSAJB	1437920	N 1° 27' 18.9"	E 103° 44' 44.1"
1	PAHANG	PANTAI	PANTAI SEPAT	3633940 (A)	N 3° 42' 02"	E 103° 20' 16"
				3633940 (B)	N 3° 41' 54"	E 103° 20' 19"
2	PAHANG	PANTAI	PANTAI BATU HITAM	3833915 (A)	N 3° 53' 06"	E 103° 21' 58"
				3833915 (B)	N 3° 53' 09"	E 103° 21' 59"
3	PAHANG	PANTAI	PANTAI CHERATING (Club Med)	4133903 (A)	N 4° 08' 41.0"	E 103° 24' 31"
				4133903 (B)	N 4° 07' 51.0"	E 103° 24' 23"
4	PAHANG	PANTAI	PANTAI CHERATING (Legend)	4133942 (A)	N 4° 06' 16.0"	E 103° 23' 06"
				4133942 (B)	N 4° 06' 12.0"	E 103° 23' 07"
5	PAHANG	PANTAI	PANTAI KUALA API-API	3235917 (A)	N 3° 31' 20.0"	E 103° 23' 45"
6	PAHANG	PANTAI	PANTAI MUHIBBAH BALOK	3933901 (A)	N 3° 55' 28.0"	E 103° 22' 21"
				3933901 (B)	N 3° 55' 30.0"	E 103° 22' 23"
7	PAHANG	PANTAI	PANTAI BESERAH	3933941 (A)	N 3° 54' 41.0"	E 103° 22' 02"
				3933941 (B)	N 3° 54' 39.0"	E 103° 22' 01"
8	PAHANG	PANTAI	PANTAI TANJUNG BATU	3334915 (A)	N 3° 31' 10.0"	E 103° 23' 45"
9	PAHANG	PANTAI	PANTAI TELUK CEMPEDAK	3833910 (A)	N 3° 48' 51"	E 103° 22' 19"
				3833910 (B)	N 3° 48' 49"	E 103° 22' 21"
10	PAHANG	PANTAI	PANTAI TELUK GELORA	3833909 (A)	N 3° 48' 16"	E 103° 20' 43"
				3833909 (B)	N 3° 48' 20"	E 103° 20' 53"
11	PAHANG	PANTAI	PANTAI LEGENDA	3534943 (A)	N 3° 12' 16.7"	E 103° 26' 53.7"
				3534943 (B)	N 3° 12' 16.7"	E 103° 26' 53.7"
1	TERENGGANU	KUALA	KUALA SG. BESUT	5825902	N 05° 50' 45"	E 102° 34' 15"
2	TERENGGANU	KUALA	KUALA SG. DUNGUN	4734918	N 04° 46' 40"	E 103° 26' 10"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
3	TERENGGANU	KUALA	KUALA SG. IBAI	5231949	N 05° 16' 30"	E 103° 10' 34"
4	TERENGGANU	KUALA	KUALA SG. KERTEH	4534922	N 04° 30' 45"	E 102° 27' 15"
5	TERENGGANU	KUALA	KUALA SG. KERTEH TIOXIDE UTARA	4234950	N 04° 16' 05"	E 103° 28' 35"
6	TERENGGANU	KUALA	KUALA SG. KERTEH TIOXIDE DISCHARGE	4234951	N 04° 16' 03"	E 103° 28' 45"
7	TERENGGANU	KUALA	KUALA SG. KERTEH TIOXIDE SELATAN	4234952	N 04° 16' 00"	E 103° 28' 45"
8	TERENGGANU	KUALA	KUALA SG. MARANG	5232911	N 05° 12' 15"	E 103° 12' 00"
9	TERENGGANU	KUALA	KUALA SG. PAKA	4634920	N 04° 39' 20"	E 103° 26' 30"
10	TERENGGANU	KUALA	KUALA SG. SETIU	5627953	N 05° 39' 05"	E 102° 45' 45"
11	TERENGGANU	KUALA	KUALA SG. TERENGGANU	5331907	N 05° 20' 30"	E 103° 08' 34"
12	TERENGGANU	KUALA	KUALA SUNGAI CHUKAI	4234929	N 04° 14' 20"	E 102° 27' 00"
13	TERENGGANU	PANTAI	PANTAI BATU BURUK	5331935	N 05° 19' 00"	E 103° 09' 00"
14	TERENGGANU	PANTAI	PANTAI BUKIT KELUANG	5825903	N 05° 48' 10"	E 102° 34' 30"
15	TERENGGANU	PANTAI	PANTAI CHENDERING	5231934	N 05° 16' 25"	E 103° 11' 10"
16	TERENGGANU	PANTAI	PANTAI RANTAU ABANG	4833917	N 04° 52' 00"	E 103° 23' 40"
17	TERENGGANU	PANTAI	KIPC UTARA	4634954	N 04° 36' 35"	E 103° 26' 55.9"
18	TERENGGANU	PANTAI	KIPC TENGAH	4534955	N 04° 34' 51.4"	E 103° 27' 35.8"
19	TERENGGANU	PANTAI	KIPC SELATAN	4534956	N 04° 33' 10.8"	E 103° 28' 08.9"
1	KELANTAN	KUALA	KUALA SG. KEMASIN	5824914	N 5° 53' 50"	E 102° 29' 05"
2	KELANTAN	KUALA	KUALA SG. GOLOK	6220911	N 6° 14' 05"	E 102° 05' 35"
3	KELANTAN	KUALA	KUALA SG. KELANTAN	6222901	N 6° 13' 12"	E 102° 13' 50"
4	KELANTAN	KUALA	KUALA SG. PENG. DATU	6123913	N 6° 10' 20"	E 102° 20' 40"
5	KELANTAN	KUALA	KUALA SG. PENG. CHEPA	6223912	N 6° 12' 20"	E 102° 18' 10"
6	KELANTAN	PANTAI	PANTAI BISIKAN BAYU	5825905	N 5° 52' 00"	E 102° 31' 00"
7	KELANTAN	PANTAI	PANTAI CAHAYA BULAN	6122903	N 6° 10' 45"	E 102° 16' 50"
8	KELANTAN	PANTAI	PANTAI IRAMA BACHOK	6024908	N 6° 03' 00"	E 102° 25' 15"
9	KELANTAN	PANTAI	PANTAI SABAK	6123909	N 6° 10' 25"	E 102° 02' 10"
10	KELANTAN	PANTAI	PANTAI SERI TUJUH	6221910	N 6° 13' 00"	E 102° 08' 00"
1	W.P. LABUAN	PANTAI	LAYANG-LAYANGAN	5251902	N 05° 19' 59"	E 115° 11' 36"
2	W.P. LABUAN	PANTAI	TANJUNG ARU	5251903	N 05° 23' 14"	E 115° 14' 18"
3	W.P. LABUAN	PANTAI	PULAU PAPAN	5151905	N 05° 15' 22"	E 115° 16' 03"
4	W.P. LABUAN	PANTAI	KIAMSAM	5151906	N 05° 15' 22"	E 115° 10' 28"
5	W.P. LABUAN	PANTAI	SUNGAI PAGAR	5151907	N 05° 16' 20"	E 115° 10' 19"
1	SABAH	KUALA	KUALA SUNGAI MENGGATAL/INANAM	5050905	N 05° 01' 05"	E 115° 07' 07"
2	SABAH	KUALA	KUALA SUNGAI PENYU	5453901	N 05° 34' 13"	E 115° 35' 55"
3	SABAH	PANTAI	BORNEO GOLF SEAWATER	5355901	N 05° 33' 00"	E 115° 47' 01"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
4	SABAH	PANTAI	PANTAI BAK-BAK	6665901	N 06° 56' 44"	E 116° 50' 23"
5	SABAH	PANTAI	PANTAI ULU TUNGKU	5085901	N 05° 01' 09"	E 118° 53' 22"
6	SABAH	PANTAI	PANTAI BATU SAPI	5580903	N 05° 47' 42"	E 118° 02' 22"
7	SABAH	PANTAI	PANTAI DALIT	6161901	N 06° 11' 25"	E 116° 09' 45"
8	SABAH	PANTAI	PANTAI LOK KAWI	5560904	N 05° 55' 00"	E 116° 02' 00"
9	SABAH	PANTAI	PANTAI MANGROVE PARADISE	6161902	N 06° 15' 02"	E 116° 13' 50"
10	SABAH	PANTAI	PANTAI MANIS	5555901	N 05° 45' 15"	E 115° 52' 04"
11	SABAH	PANTAI	PANTAI MELINSUNG	5565902	N 05° 50' 18"	E 115° 50' 45"
12	SABAH	PANTAI	PANTAI PASIR PUTIH SANDAKAN	5580901	N 05° 49' 26"	E 118° 04' 58"
13	SABAH	PANTAI	PANTAI SABANDAR	6161903	N 06° 15' 02"	E 116° 13' 50"
14	SABAH	PANTAI	PANTAI SARINA KUNAK	4481901	N 04° 39' 41"	E 118° 17' 01"
15	SABAH	PANTAI	PANTAI SILAM LAHAD DATU	4681902	N 04° 58' 08"	E 118° 14' 46"
16	SABAH	PANTAI	PANTAI TELUK BRUNEI 1	5053901	N 05° 09' 55"	E 115° 32' 53"
17	SABAH	PANTAI	PANTAI TELUK BRUNEI 2	5053902	N 05° 09' 55"	E 115° 32' 53"
18	SABAH	PANTAI	PANTAI TELUK BRUNEI 3	5053903	N 05° 09' 55"	E 115° 32' 53"
19	SABAH	PANTAI	PANTAI TELUK BRUNEI 4	5053904	N 05° 09' 55"	E 115° 32' 53"
20	SABAH	PANTAI	PANTAI TELUK BRUNEI 5	5053905	N 05° 09' 55"	E 115° 32' 53"
21	SABAH	PANTAI	PANTAI TELUK BRUNEI 6	5053906	N 05° 09' 55"	E 115° 32' 53"
22	SABAH	PANTAI	PANTAI TG. ARU (REST LIDO)	5656901	N 05° 55' 01"	E 115° 59' 03"
23	SABAH	PANTAI	PANTAI TG. ARU (REST SKATING)	5656902	N 05° 55' 01"	E 115° 59' 03"
24	SABAH	PANTAI	PANTAI TG.ARU (No. 3)	5656903	N 05° 55' 01"	E 115° 59' 03"
25	SABAH	PANTAI	PANTAI TINAGAT TAWAU	4473901	N 04° 13' 22"	E 118° 59' 04"
26	SABAH	PANTAI	PANTAI TLDM	5580902	N 05° 50' 00"	E 118° 08' 01"
1	SARAWAK	KUALA	KUALA BAKO	1704905	N 01° 40' 00"	E 110° 52' 08"
2	SARAWAK	KUALA	KUALA BATANG KEMENA	3130911	N 03° 10' 59"	E 113° 01' 53"
3	SARAWAK	KUALA	KUALA BATANG RAJANG	2111909	N 02° 07' 22"	E 111° 11' 21"
4	SARAWAK	KUALA	KUALA SG MIRI	4349915	N 04° 23' 55"	E 113° 58' 23"
5	SARAWAK	KUALA	KUALA SG. SANTUBONG	1702903	N 01° 46' 38"	E 110° 16' 46"
6	SARAWAK	KUALA	KUALA SG. SEMANTAN	1898901	N 01° 48' 49"	E 109° 46' 29"
7	SARAWAK	KUALA	KUALA SG. SARAWAK	1604907	N 01° 36' 44"	E 110° 29' 44"
8	SARAWAK	KUALA	KUALA BATANG MUKAH	2927920	N 02° 55' 30"	E 112° 45' 25"
9	SARAWAK	PANTAI	PANTAI BAKO	1704906	N 01° 42' 49"	E 110° 25' 40"
10	SARAWAK	PANTAI	PANTAI BELAWAI	2212913	N 02° 14' 27"	E 111° 12' 51"
11	SARAWAK	PANTAI	PANTAI BRIGHTON	4449917	N 04° 23' 00"	E 113° 58' 23"
12	SARAWAK	PANTAI	PANTAI DAMAI	1702904	N 01° 47' 55"	E 110° 17' 58"
13	SARAWAK	PANTAI	PANTAI LIKAU	3230915	N 03° 20' 42.6"	E 113° 09' 2.9"
14	SARAWAK	PANTAI	PANTAI PANDAN	1824918	N 01° 50' 16"	E 109° 40' 11"

Jadual 5.4 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin Kebangsaan, 2003
Table 5.4 Department of Environment: National Marine Water Quality Monitoring Stations, 2003

BIL. NO	NEGERI STATE	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
15	SARAWAK	PANTAI	PANTAI PASIR PUTIH	1604910	N 01° 30' 14"	E 110° 30' 00"
16	SARAWAK	PANTAI	PANTAI PIASAU	4539918	N 04° 27' 34"	E 113° 59' 28"
17	SARAWAK	PANTAI	PANTAI SEMANTAN	1898902	N 01° 49' 38"	E 109° 46' 29"
18	SARAWAK	PANTAI	PANTAI TANJUNG BATU	3132602	N 03° 12' 35.3"	E 113° 02' 38.9"
19	SARAWAK	PANTAI	PANTAI HARMONI	1626921	N 01° 38' 35"	E 112° 40' 35"
		Kuala | Estuarine	68			
		Pantai | Coastal	149			
		Jumlah | Total	217			

Jadual 5.5 Jabatan Alam Sekitar: Senarai Stesen Yang Telah Ditutup, 2003
Table 5.5 Department of Environment: List of Closed-Down Stations, 2003

NEGERI STATE	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
P.LANGKAWI	PANTAI TELUK EWA	6498901	N 06° 25' 18.6"	E 099° 46' 28.2"
P.LANGKAWI	PANTAI TANJUNG RHU	6498916	N 06° 27' 9.6"	E 099° 49' 8.4"
P.LANGKAWI	PANTAI CENANG	6397902	N 06° 17' 13.8"	E 099° 43' 38.4"
P.LANGKAWI	JETI KUAH	6398924	N 06° 18' 55.2"	E 099° 51' 39"
MELAKA	PANTAI KUNDOR (Stesen Kawalan)	2221910	N0 2° 15' 00"	E 102° 08' 15"
MELAKA	TANAH MERAH (Petronas Penapisan Melaka S/B)	2221901	N 02° 07' 57"	E 102° 20' 09"
JOHOR	HADAPAN TITAN HIMONT	SJ2B	N 1° 26' 10"	E 103° 53' 10"
JOHOR	SUNGAI KIM-KIM	1439965	-	-
JOHOR	KUALA SUNGAI PULAI	1335923	N 1° 21' 26"	E 103° 32' 48"
SABAH	PANTAI CHE WAH, SANDAKAN	5680904	N 05° 57' 06"	E 118° 06' 50"
SARAWAK	PANTAI TG. KIDURONG	3230914	N 03° 13' 35"	E 113° 02' 00"

Jadual 5.6 Jabatan Alam Sekitar: Stesen Pengawasan *'Malaysia-Singapore Joint Committee on the Environment' - (MSJCE)*, 2003
Table 5.6 Department of Environment: Monitoring Stations under the Malaysia-Singapore Joint Committee on the Environment (MSJCE), 2003

BIL. NO.	KAWASAN AREA	NAMA STESEN STATION NAME	NO. STESEN STATION NO.	LATITUD LATITUDE	LONGITUD LONGITUDE
1.	PANTAI	KG.TANJUNG KOPOK	SJ1	N 1° 25' 31"	E 104° 00' 03"
2.	PANTAI	KG. PASIR PUTIH	SJ2	N 1° 25' 48"	E 103° 55' 40"
3.	PANTAI	J/K SULTAN ISKANDAR	SJ3	N 1° 26' 49"	E 103° 46' 09"
4.	PANTAI	KG.SENIBUNG	SJ4	N 1° 29' 01"	E 103° 48' 47"
5.	KUALA	KUALA SG.TEBRAU	SJ4A	N 1° 28' 56"	E 103° 47' 48"
6.	PANTAI	TANJUNG PUTRI	SJ5	N 1° 27' 20"	E 103° 46' 09"
7.	PANTAI	HADAPAN MPJB (W.F.CT)	SJ6	N 1° 27' 08"	E 103° 45' 43"
8.	PANTAI	TANJUNG DANGA	SJ7	N 1° 27' 24"	E 103° 42' 52"
9.	KUALA	KUALA SG.SKUDAI	SJ7A	N 1° 27' 46"	E 103° 43' 22"
10.	PANTAI	DEPAN PUSAT ISLAM	SJ7B	N 1° 27' 19"	E 103° 44' 51"
11.	PANTAI	TEBING RUNTUH	SJ8	N 1° 25' 10"	E 103° 40' 06"
12.	KUALA	KUALA SG.MELAYU	SJ8A	N 1° 26' 53"	E 103° 41' 53"
13.	PANTAI	TANJUNG BUNGA	SJ9	N 1° 23' 07"	E 103° 39' 02"
14.	PANTAI	TANJUNG KUPANG	SJ10	N 1° 23' 36"	E 103° 39' 11"

Jadual 5.7 Jabatan Alam Sekitar: Stesen Pengawasan Kualiti Air Marin (Projek Penambakan Singapura), 2003
Table 5.7 Department of Environment: Marine Water Quality Monitoring Stations (Singapore's Reclamation Project), 2003

BIL. NO.	NAMA STESEN STATION NAME	LATITUD LATITUDE	LONGITUD LONGITUDE
1.	LS1	N 1° 19' 54.70"	E 104° 05' 45.22"
2.	LS3	N 1° 21' 27.35"	E 104° 05' 47.44"
3.	LS5	N 1° 23' 01.78"	E 104° 05' 21.02"
4.	LS10	N 1° 26' 20.14"	E 104° 01' 21.38"
5.	LS12	N 1° 25' 39.48"	E 104° 00' 37.28"
6.	SG1	N 1° 20' 56.47"	E 104° 05' 03.01"
7.	SG2	N 1° 21' 06.56"	E 104° 05' 25.60"
8.	SG3	N 1° 21' 15.14"	E 104° 05' 46.69"
9.	SG4	N 1° 21' 25.66"	E 104° 06' 05.24"
10.	SG5	N 1° 21' 37.03"	E 104° 06' 23.14"
11.	NG1	N 1° 23' 22.96"	E 104° 05' 28.14"
12.	NG2	N 1° 23' 23.65"	E 104° 05' 48.16"
13.	NG3	N 1° 23' 25.36"	E 104° 06' 09.88"
14.	NG4	N 1° 23' 27.41"	E 104° 06' 28.88"
15.	NG5	N 1° 23' 29.47"	E 104° 06' 46.53"
16.	TK1	N 1° 25' 54.57"	E 104° 00' 52.86"
17.	TK2	N 1° 26' 11.59"	E 104° 00' 51.86"
18.	TK3	N 1° 26' 31.06"	E 104° 00' 50.50"
19.	TK4	N 1° 26' 47.79"	E 104° 00' 48.79"
20.	TK5	N 1° 27' 06.57"	E 104° 00' 47.43"

PROGRAM PENGAWASAN KUALITI AIR MARIN PULAU-PULAU

Program Pengawasan Kualiti Air Marin Pulau-Pulau telah diwujudkan pada Julai 1998 dan melibatkan 71 buah pulau terpilih dengan 85 buah stesen pengawasan untuk memperolehi tahap data aras latar (baseline) kualiti air marin di persekitaran pulau-pulau di Malaysia. Data ini adalah berfaedah untuk memberi input bagi pengurusan persisiran pantai secara bersepadu untuk tujuan spesifik seperti pelancongan dan rekreasi. Rangkaian pelaporan dikategorikan kepada empat (4) iaitu pulau-pulau pembangunan (3 buah), pulau-pulau peranginan (25 buah), pulau-pulau taman laut (38 buah) dan pulau-pulau yang dilindungi (5 buah) (Jadual 5.8).

Parameter kualiti air marin yang digunakan untuk pengawasan adalah seperti di Jadual 5.9. Program ini juga membolehkan pengemaskinian data Sistem Maklumat Geografi (GIS) yang antara lainnya memberikan maklumat mengenai sumber marin, aktiviti dan sumber pencemaran. Percontohan bebola tar pantai juga turut dilaksanakan.

ISLAND MARINE WATER QUALITY MONITORING PROGRAMME

The Island Marine Water Quality Monitoring Programme was established in July 1998 involving 71 selected islands and 85 stations to establish island water quality baseline levels in Malaysia. This would be beneficial to provide relevant input for inter grated coastal management such as for tourism and recreation . The islands were classified into four categorise; development islands (3), resort islands (25), marine park islands (38) and protected islands (5) (Table 5.8)

Parameters measured are as specified in Table 5.9. This programme also provided data for updating of the Geographical Information System (GIS) which started in 2002 such as marine resources, activities and pollution sources. Tar ball sampling on beaches were also conducted.

Jadual 5.8 Jabatan Alam Sekitar: Pengawasan Kualiti Air Marin Pulau, 2003
Table 5.8 Department of Environment: Island Marine Water Quality Monitoring, 2003

BIL. NO.	NEGERI STATE	PULAU ISLAND	KATEGORI CATEGORY	NO. STESEN STATION NO.
1	Kedah	Singa Besar	R	1
		Dayang Bunting	R	1
		Payar	M	1
		Kaca	M	1
		Lembu	M	1
		Segantang	M	1
		Langkawi	D	4
2	Perak	Pangkor	R	2
		Pangkor Laut	R	1
		Sembilan	R	1
3	Pulau Pinang	Aman	R	1
		Jerejak	R	1
		Gedong	R	1

Jadual 5.8 Jabatan Alam Sekitar: Pengawasan Kualiti Air Marin Pulau, 2003
Table 5.8 Department of Environment: Island Marine Water Quality Monitoring, 2003

BIL. NO.	NEGERI STATE	PULAU ISLAND	KATEGORI CATEGORY	NO. STESEN STATION NO.
	Pulau Pinang	Kendi	R	1
		Rimau	R	1
		P.Pinang	D	4
4	Selangor	Ketam	R	1
		Angsa	R	1
		Lumut	R	1
5	Melaka	Besar	R	1
		Upeh	R	1
6	Pahang	Tioman	M	2
		Tulai	M	1
		Chebeh	M	1
		Labas	M	1
		Sepui	M	1
		Seri Buat	M	1
		Sembilang	M	1
		Tokong Bahara	M	1
		But	M	1
7	Johor	Setindan	R	1
		Harimau	M	1
		Mensirip	M	1
		Gual	M	1
		Rawa	M	1
		Pemanggil	M	1
		Babi Hujung	M	1
		Babi Tengah	M	1
		Sibu Tengah	R	1
	Johor	Dayang	R	1
		Aur	M	1
		Besar	M	1
		Tinggi	M	1
		Nanga Besar	M	1
		Sibu Besar	M	1
		Sibu Hujung	M	1
8	Terengganu	Gumia	R	1

Jadual 5.8 Jabatan Alam Sekitar: Pengawasan Kualiti Air Marin Pulau, 2003
Table 5.8 Department of Environment: Island Marine Water Quality Monitoring, 2003

BIL. NO.	NEGERI STATE	PULAU ISLAND	KATEGORI CATEGORY	NO. STESEN STATION NO.
	Terengganu	Kapas	M	1
		Tenggol	P	1
		Nyireh	P	1
		Bidong	R	1
		Duyong	R	1
		Susu Dara	M	1
		Perhentian Besar	M	2
		Redang	M	2
		Perhentian Kecil	M	1
		Lang Tengah	M	1
		Pinang	M	1
		Ekor Tebu	M	1
		Lima	M	1
9	Sabah	Gaya	R	1
		Layang-layang	R	1
		Mabul	R	1
		Sipadan	R	2
	(Labuan)	Labuan	D	4
		Kuraman	M	1
		Rusukan Kecil	M	1
		Rusukan Besar	M	1
10	Sarawak	Satang	P	4
		Talang-Talang Kecil	P	4
		Talang-Talang Besar	P	4

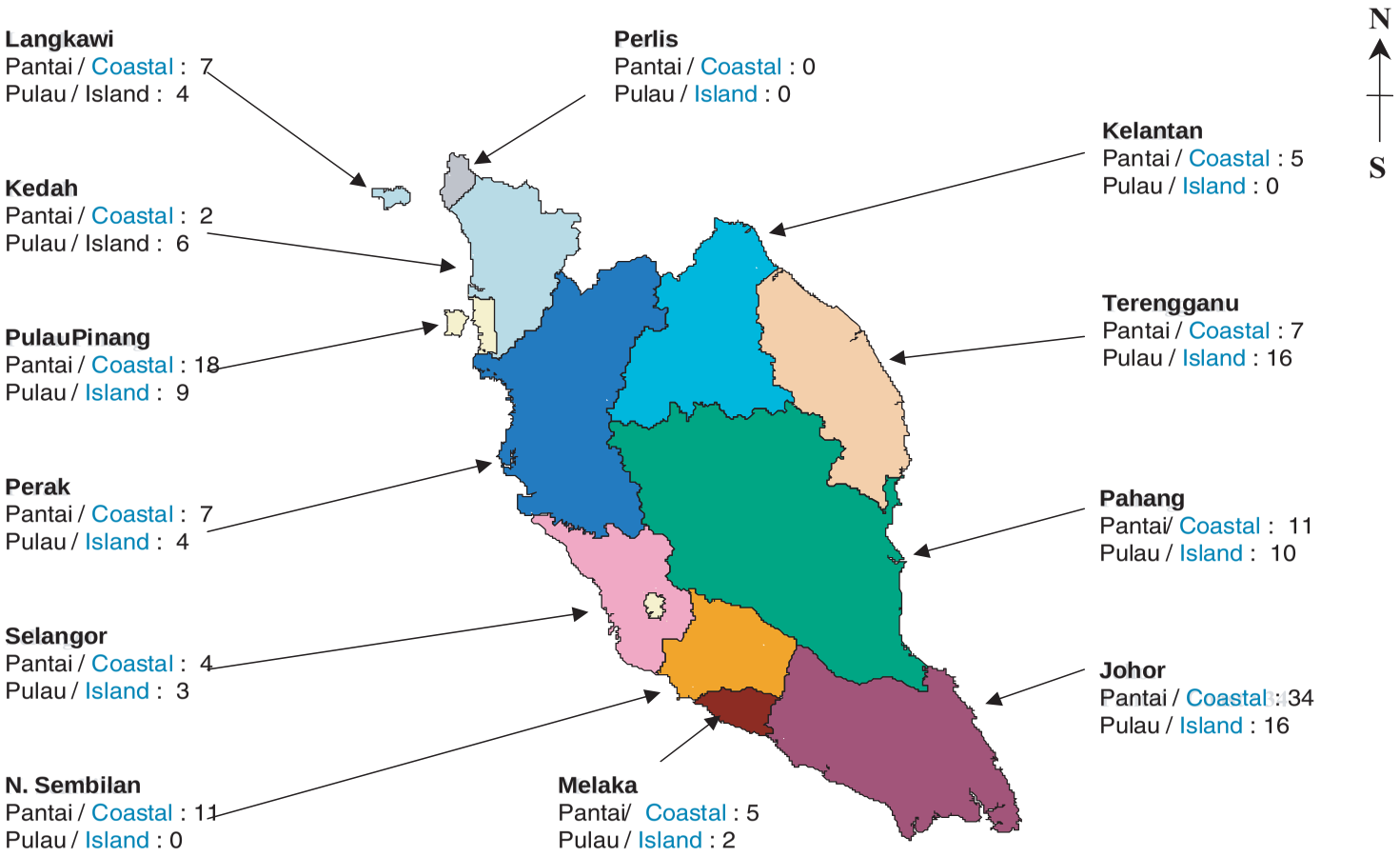
Resort Island (R)	25	27
Marine Park Island (M)	38	41
Protected Island (P)	5	5
Development Island (D)	3	12

Jadual 5.9 Jabatan Alam Sekitar: Parameter Kualiti Air Marin, 2003
Table 5.9 Department of Environment: Marine Water Quality Parameters, 2003

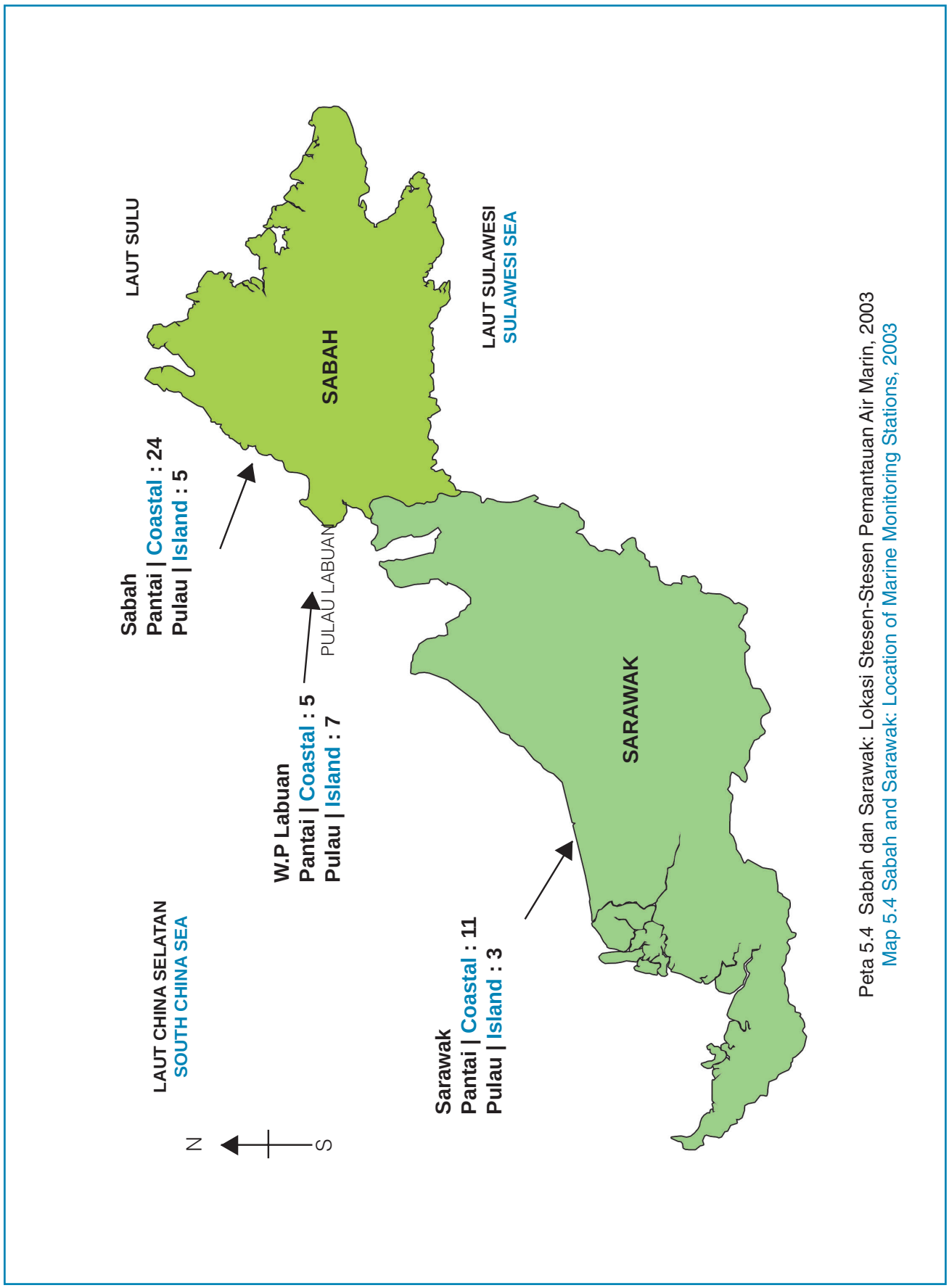
PARAMETER PARAMETERS	KOD CODE	UNIT UNIT
PENGUKURAN MAKMAL | **LABORATORY MEASUREMENT**		
Jumlah Pepejal Terampai | Total Suspended Solids	TSS	mg/l
Escherichia coli	E.coli	MPN/100ml
Minyak & Gris | Oil & Grease	O&G	mg/l
Kuprum | Copper	Cu	mg/l
Kadmium | Cadmium	Cd	mg/l
Plumbum | Lead	Pb	mg/l
Arsenik | Arsenic	As	mg/l
Raksa | Mercury	Hg	mg/l
Kromium | Chromium	Cr	mg/l
Bebola Tar | Tarball	Tar	mg/l
Jumlah Karbon Organik | Total Organic Carbon	TOC	mg/l
Nitrat | Nitrate	NO_3-	mg/l
PENGUKURAN IN-SITU | **IN-SITU MEASUREMENTS**		
Oksigen Terlarut| Dissolved Oxygen	DO	mg/l
Saliniti | Salinity	Sal	%
Suhu | Temperature	Temp	^{0}C
Konduktiviti | Conductivity	Cond	Ïmhos/cm
Turbiditi | Turbidity	Turb	NTU/FTU
pH	pH	mg/l

Gambarfoto 5.7 : Pengambilan Sampel Air Laut Dari Bot Menggunakan *'Van Dorn Sampler'*
Photo 5.7 : Marine Water Sampling Using Van Dorn Sampler

Gambarfoto 5.8 : Stesen Pengawasan Kualiti Marin Pulau
Photo 5.8 : Island Marine Water Quality Station



Peta 5.3 Semenanjung: Lokasi Stesen-Stesen Pemantauan Air Marin, 2003
Map 5.3 Peninsular: Location of Marine Monitoring Stations, 2003



Peta 5.4 Sabah dan Sarawak: Lokasi Stesen-Stesen Pemantauan Air Marin, 2003
Map 5.4 Sabah and Sarawak: Location of Marine Monitoring Stations, 2003

PENCEMARAN MARIN

Sebanyak 11 kes tumpahan minyak di perairan Malaysia telah dilaporkan kepada Jabatan Alam Sekitar pada tahun 2003 (Jadual 5.10). Daripada 11 kes yang dilaporkan, empat (4) berlaku di sekitar perairan Johor, dua (2) di Terengganu dan masing-masing satu (1) di Labuan, Negeri Sembilan, Sarawak, Kelantan dan Selangor. Satu (1) kes yang dilaporkan di Johor telah didakwa di bawah Seksyen 27, Akta Kualiti Alam Sekeliling, 1974.

Rancangan Kontigensi

Bagi tujuan penyediaan Pelan Tindakan Pembersihan Pantai Akibat Tumpahan Minyak Peringkat Negeri, sebanyak tujuh (7) buah negeri iaitu Johor, Kedah, Pulau Pinang, Perak, Selangor, Perak dan Wilayah Persekutuan Labuan telah mengadakan bengkel bagi merangka dan merumus Pelan Tindakan Pembersihan Pantai bagi negeri masing-masing. Bengkel tersebut telah dihadiri oleh wakil-wakil dari pelbagai agensi Kerajaan Persekutuan dan Tempatan serta pihak swasta. Bagi Negeri Johor dan Wilayah Persekutuan Labuan, ianya telah siap diterbitkan dan telah dipersetujui oleh pihak Kerajaan Negeri untuk digunapakai.

Dua (2) sesi Latihan Peralatan Melawan Tumpahan Minyak telah diadakan pada 10 September 2003, bertempat di Jabatan Laut, Kota Kinabalu. Sesi latihan ini telah disertai oleh wakil-wakil dari Jabatan Laut Sabah, Jabatan Alam Sekitar, Pelabuhan Kota Kinabalu, PIMMAG *(Petroleum Industry Malaysia Mutual Aid Groups)* dan pihak kontraktor yang mengendalikan penyelenggaraan peralatan melawan tumpahan minyak. Latihan yang sama juga telah diadakan bersama Jabatan Laut Sarawak di Bintulu pada 4 dan 5 Ogos 2003.

MARINE POLLUTION

Eleven (11) oil spills in Malaysian waters were reported to the Department of Environment in 2003. Out of these eleven cases, four (4) were in the State of Johor, two (2) in Terengganu and one (1) each in Labuan, Negeri Sembilan, Sarawak, Kelantan and Selangor respectively (Table 5.10). One of the four Johor cases had been prosecuted under Section 27, Environmental Quality Act,1974, while the rest are still under investigation.

Contingency Planning

For the purpose of preparation of Oil Spill Control and Beach Clean-up Action Plans at the State level, seven (7) States, namely Johor, Kedah, Penang, Selangor, Perak and Labuan had organised workshops to formulate action plans for each respective State. The workshops were attended by participants from various agencies at the Federal and Local Government level as well as the private sector. To date the Action Plans for Johor and the Labuan Federal Territory had already been approved by the respective State Government and had been published for use.

Two Oil Spill Combat exercises were conducted in 2003, at the Sabah Marine Department, Kota Kinabalu. The exercises were attended by representatives from the Marine Department of Sabah, the Department of Environment, the Kota Kinabalu Port Authority, PIMMAG (Petroleum Industry Malaysia Mutual Aid Group) and the contractor responsible for service and maintenance of oil spill control equipment. The same exercise was also carried out by the Marine Department of Sarawak on 4-5 August 2003 in Bintulu.

Pada tahun 2003 juga, Jabatan Alam Sekitar telah memperolehi peralatan melawan tumpahan minyak yang berkeupayaan mengawal sehingga 13 kilobarel tumpahan minyak. Alat ini ditempatkan di Pejabat Pelabuhan Jabatan Laut di Tanjung Lembung, Langkawi.

Jawatankuasa Tabung Pusingan Bagi Selat Melaka Dan Selat Singapura (RFC)

Malaysia adalah bertanggungjawab bagi mengurus Tabung Pusingan Selat Melaka dan Selat Singapura *(Revolving Fund Committee-RFC)* bagi tempoh 2001-2006. Pada tahun 2003, mesyuarat Jawatankuasa Teknikal RFC telah diadakan pada 17-19 Mac 2003. Mesyuarat Jawatankuasa Pengurusan Tabung Pusingan Selat Melaka dan Selat Singapura pula telah diadakan pada 2-3 September 2003 (kali ke-24), yang mana telah dihadiri oleh delegasi dari Indonesia, Malaysia dan Singapura. Turut hadir ialah wakil daripada *Melaka Strait Council* (MSC). Mesyuarat Jawatankuasa Teknikal RFC, telah dipengerusikan oleh Pengarah Bahagian Kawalan JAS, manakala mesyuarat kali ke-24 Jawatankuasa Pengurusan RFC telah dipengerusikan oleh Ketua Pengarah Alam Sekitar Malaysia.

In 2003, a set of oil spill control equipment with the capacity for 13 kilobarrel of oil spill was delivered to the Department of Environment located at the Marine Department in Tanjung Lembung, Langkawi.

The Straits Of Malacca And Singapore Oil Spill Revolving Fund Committee (RFC)

Malaysia was given the responsibility to manage the Straits of Malacca and Singapore Oil Spill Revolving Fund Committee (RFC) for the year 2001-2006. A RFC Technical Meeting was held on 17-19 March 2003 and the 24th RFC Management Committee Meeting was held on 2-3 September 2003 which were attended by delegates from Indonesia, Malaysia and Singapore as well as representatives from the Melaka Straits Council (MSC). The RFC Technical Committee Meeting was chaired by the Department of Environment's Control Division Directors, while the RFC Management Meeting was chaired by the Director-General of Environment, Malaysia.

Jadual 5.10 Jabatan Alam Sekitar: Laporan Tumpahan Minyak, 2003
Table 5.10 Department of Environment: Oil Spill Reports, 2003

PUNCA TUMPAHAN SOURCE	SEBAB CAUSES	LOKASI | LOCATION		JUMLAH KES TOTAL CASES
		PERAIRAN NEGARA TERRITORIAL WATERS	ZEE EEZ	
Pelantar Minyak | Oil Platform	Masalah Mekanikal | Mechanical Failure	1	-	1
	Kelalaian Manusia | Human Error	-	-	
Saluran Paip | Pipeline	Pecah | Rupture	-	-	-
Kapal | Vessel	Perlanggaran | Collision	2	-	2
	Tersadai | Grounding	1	-	2
	Letupan & Kebakaran | Explosion & Fire	-	-	-
	Pelepasan Haram | Illegal Discharging	2	-	2
Terminal dan Depoh | Terminal and Depot	Lebihan Muatan | Overfilling	-	-	-
	Hos Pecah | Burst Hose	-	-	-
	Letupan & Kebakaran | Explosion & Fire	-	-	-
	Injap bocor Leaking valves and phlanges	-	-	-
	Cuci Tangki & "deballasting" Tank washing deballasting	-	-	-
Lain-Lain | Others	Tiada maklumat lengkap Incomplete information	5	-	5
JUMLAH KES | TOTAL		**11**	**-**	**11**

PROGRAM PEMANTAUAN KUALITI AIR TANAH

Program Pemantauan Kualiti Air Tanah Kebangsaan dimulakan oleh Jabatan Alam Sekitar pada tahun 1997. Sehingga tahun 2003, sebanyak 94 stesen pemantauan kualiti air tanah (telaga air tanah) telah ditubuhkan di Semenanjung Malaysia, 19 di Sarawak dan 15 di Sabah (Jadual 5.11). Frekuensi persampelan ialah empat (4) kali setahun setiap stesen. Kawasan stesen-stesen tersebut dipilih dan dikategorikan mengikut kegunaan tanah seperti kawasan pertanian, bandar, luar bandar, industri, tapak pelupusan sampah, padang golf, tapak penyimpanan bahan radioaktif, tapak pelupusan bangkai haiwan, bekalan air tempatan, bekas lombong emas dan kolam akuakultur.

GROUNDWATER QUALITY MONITORING PROGRAMME

The National Groundwater Quality Monitoring Programme was initiated by DOE in 1997. By 2003, 94 monitoring wells had been established at Peninsular Malaysia, 19 in Sarawak and 15 in Sabah (Table 5.11). The frequency of sampling was four (4) times per year for each station. The sites were selected and categorized according to the surrounding landuse such as agricultural, urban/suburban, rural, industrial, solid waste landfills, golf courses, radioactive storage site, animal burial areas, municipal water supply, leachate (gold mine) and aquaculture farm.

Jadual 5.11 Jabatan Alam Sekitar: Telaga-Telaga Pemantauan Kualiti Air Tanah, 2003
Table 5.11 Department of Environment: Groundwater Quality Monitoring Wells, 2003

NEGERI STATE	BIL. NO.	LOKASI LOCATION	KATEGORI CATEGORY
PERLIS	1	Rimba Mas	Agriculture
	2	Arau, Perlis	Urban/Suburban
	3	Arau, Perlis	Urban/Suburban
KEDAH	4	S.K. Darul Uloom, K. Batas	Agriculture/Urban
	5	Kulim, Hi-Tech	Industrial
P.LANGKAWI	6	Padang Mat Sirat. P. Langkawi	Agriculture/Urban
	7	Padang Mat Sirat. P. Langkawi	Agriculture/Urban
P.PINANG	8	Mak Mandin (Kastam)	Industrial
	9	Mak Mandin (P.Penjaja)	Industrial
	10	Bayan Lepas	Industrial
	11	Ladang Valdor	Animal Burial
	12	Ladang Valdor	Animal Burial
	13	Ladang Valdor	Animal Burial
PERAK	14	Pusing (Landfill)	Solid Waste Landfill
	15	Lahat (Radioactive Storage)	Radioactive Landfill
	16	Ldg. Bak Hua, Sg. Siput	Animal Burial
	17	Ldg. Bak Hua, Sg. Siput	Animal Burial
	18	Bazaar PKNP, Ipoh	Animal Burial
KUALA LUMPUR	19	Sg. Besi Landfill	Solid Waste Landfill
	20	Sg. Besi Landfill	Solid Waste Landfill
	21	Sg. Besi Landfill	Solid Waste Landfill
	22	Tmn. Beringin, Kepong	Solid Waste Landfill
	23	Tmn. Beringin, Kepong	Solid Waste Landfill
	24	Royal Selangor Golf Club	Golf Course
SELANGOR	25	CIAST, Shah Alam	Industrial
	26	CIAST, Shah Alam	Industrial
	27	S.K. SS 20, Shah Alam	Industrial
	28	Saujana Golf, Subang	Urban/Suburban
	29	Saujana Golf, Subang	Urban/Suburban
	30	Sepang	Animal Burial
	31	Sepang	Animal Burial
	32	Sepang	Animal Burial
	33	Templer Park, Rawang	Saltwater
	34	Templer Park, Rawang	Saltwater
	35	Kolam Memancing, Jln. Reko	Saltwater
	36	Kolam Memancing Tanjung, Kuala Langat	Saltwater
NEGERI SEMBILAN	37	Senawang Edible Oil	Industrial
	38	Kualiti Alam	Solid Waste Landfill
	39	Kualiti Alam	Solid Waste Landfill

Jadual 5.11 Jabatan Alam Sekitar: Telaga-Telaga Pemantauan Kualiti Air Tanah, 2003
Table 5.11 Department of Environment: Groundwater Quality Monitoring Wells, 2003

NEGERI STATE	BIL. NO.	LOKASI LOCATION	KATEGORI CATEGORY
	40	Bkt. Pelanduk	Animal Burial
	41	Bkt. Pelanduk	Animal Burial
MELAKA	42	Petronas	Industrial
	43	Kota Tinggi	Landfill
	44	Bkt. Bakeri, Muar	Landfill
	45	Bkt. Bakeri, Muar	Landfill
	46	Tg. Puteri , Pasir Gudang	Industrial
	47	Tg. Puteri , Pasir Gudang	Industrial
	48	Ulu Choh, Pekan Nanas	Animal Burial
	49	Ulu Choh, Pekan Nanas	Animal Burial
	50	Ulu Choh, Pekan Nanas	Animal Burial
PAHANG	51	Kuantan Landfill	Landfill
	52	Sek. Keb. Lepar	Agriculture
	53	Nenasi	Suburban
	54	Kg. Tekek , Pulau Tioman	Salt.Int/Rural
	55	Kg. Tekek , Pulau Tioman	Salt.Int/Rural
	56	Nenasi	Aquaculture Farm
	57	Nenasi	Aquaculture Farm
	58	Nenasi	Aquaculture Farm
	59	Nenasi	Aquaculture Farm
	60	Nenasi	Aquaculture Farm
	61	Nenasi	Aquaculture Farm
	62	Nenasi	Aquaculture Farm
	63	Nenasi	Aquaculture Farm
	64	Nenasi	Aquaculture Farm
	65	Nenasi	Aquaculture Farm
	66	Nenasi	Aquaculture Farm
TERENGGANU	67	Kg. Kubang Badak	Landfill
	68	Kg. Kubang Badak	Landfill
	69	Teluk Kalong	Industrial
	70	Teluk Kalong	Industrial
	71	Padang Pak Wan	Rural
	72	Kg. Raja	Urban
	73	Kg. Raja	Urban
	74	Kertih	Industrial
	75	Kertih	Industrial
	76	Kg. Merang	Urban
KELANTAN	77	Pengkalan Chepa	Golf Course
	78	Pengkalan Chepa	Golf Course

Jadual 5.11 Jabatan Alam Sekitar: Telaga-Telaga Pemantauan Kualiti Air Tanah, 2003
Table 5.11 Department of Environment: Groundwater Quality Monitoring Wells, 2003

NEGERI STATE	BIL. NO.	LOKASI LOCATION	KATEGORI CATEGORY
KELANTAN	79	Kg. Jembal	Agriculture
	80	Eastern Garment, PC	Industrial
	81	Eastern Garment, PC	Industrial
	82	Panji	Landfill
	83	Panji	Landfill
	84	Kubang Kerian	Golf Course
	85	Kubang Kerian	Golf Course
	86	Rantau Panjang	Urban/Suburban
	87	Rantau Panjang	Urban/Suburban
	88	Pasir Mas	Urban/Suburban
	89	Sek. Keb.Jelawat	Rural
	90	Kg. Gelong Badak	Rural
	91	Kg. Beris Lalang	Agriculture
	92	Kg. Gajah Mati	Agriculture
	93	Kg. Gajah Mati	Agriculture
	94	Kg. Gajah Mati	Agriculture
SARAWAK	95	Matang	Landfill
	96	Matang	Landfill
	97	Bau	Leachate (gold mine)
	98	Bau	Leachate (gold mine)
	99	Bau	Leachate (gold mine)
	100	Kabong	Municipal water supply
	101	Kabong	Municipal water supply
	102	Kabong	Municipal water supply
	103	Kabong	Municipal water supply
	104	Kabong	Municipal water supply
	105	Oya, Sibu	Animal Burial
	106	Oya, Sibu	Animal Burial
	107	Kemuyang, Sibu	Landfill
	108	Kemuyang, Sibu	Landfill
	109	Lambir, Miri	Municipal water supply
	110	Lambir, Miri	Municipal water supply
	111	Lambir, Miri	Municipal water supply
	112	Kuala Lawas, Lawas	Municipal water supply
	113	Kuala Lawas, Lawas	Municipal water supply
SABAH	114	Stesen Pertanian Limbawang	Agriculture
	115	Sandakan Golf Club	Golf Course
	116	Sandakan Golf Club	Golf Course
	117	Inanam	Urban/Suburban

Jadual 5.11 Jabatan Alam Sekitar: Telaga-Telaga Pemantauan Kualiti Air Tanah, 2003
Table 5.11 Department of Environment: Groundwater Quality Monitoring Wells, 2003

NEGERI STATE	BIL. NO.	LOKASI LOCATION	KATEGORI CATEGORY
SABAH	118	Yong's Farm, Tawau	Agriculture
	119	Kg. Tajau Laut, Kudat	Municipal water supply
	120	IATC, Kg. Duvanson	Landfill
	121	IATC, Kg. Duvanson	Landfill
	122	IATC, Kg. Duvanson	Landfill
	123	Penampang	Landfill
	124	Penampang	Landfill
	125	Penampang	Landfill
	126	Penampang	Landfill
	127	Pulau Manukan	Resort
	128	Asian Supply Base Sdn. Bhd Labuan	Heavy Industry

PREMIS YANG DITETAPKAN

Kilang Getah Asli Mentah dan Kilang Kelapa Sawit Mentah dikategorikan sebagai premis yang ditetapkan 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 tuanpunya premis-premis ini perlu mempunyai lesen daripada Jabatan Alam Sekitar bagi menduduki dan menggunakan premis.

Kilang Getah Asli Mentah

Pada tahun 2003, sejumlah 96 buah kilang getah asli mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Getah Asli Mentah), 1978. Sebanyak 81 buah kilang telah dilesenkan untuk melepaskan effluen terolah ke alur air, 5 buah kilang dilesenkan untuk melepaskan effluen ke atas tanah manakala baki 10 buah kilang dibenarkan untuk mengitar semula effluen. Tempoh lesen yang diberikan bagi setiap

PRESCRIBED PREMISES

Raw Natural Rubber Factories and Crude Palm Oil Processing Mills are prescribed premises under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order, 1978 and the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order, 1977. The operation of these premises is subjected to the requirement of Section 18 of the Environmental Quality Act, 1974, whereby the owners of such premises are required to obtain a license from the Department of Environment for occupation and use.

Raw Natural Rubber

In 2003, 96 raw natural rubber factories were licensed under the Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978. Out of these, 81 factories were licensed to discharge treated effluent into inland watercourses, five (5) factories were permitted to practise land disposal, while the remaining 10 factories were allowed to recycle their effluent. The licensing varied from one (1) to three (3) years depending on the record of

premis adalah berbeza dari satu (1) hingga tiga (3) tahun bergantung kepada paras pematuhan yang diyakini bagi kilang-kilang tersebut terhadap syarat-syarat lesen (Rajah 5.4).

compliance of the stated conditions of the licenses (Figure 5.4).

Sepanjang tahun 2003, pegawai-pegawai penguatkuasa Jabatan Alam Sekitar negeri telah menjalankan sebanyak 156 pemeriksaan ke atas 82 buah kilang getah asli mentah. Kilang-kilang yang mempunyai rekod pematuhan yang rendah telah diberi keutamaan dalam tindakan pemeriksaan (Rajah 5.4).

Throughout the year 2003, the State DOE enforcement officers conducted 156 inspections on 82 raw natural rubber factories, priority given to those with low compliance record (Figure 5.4).

Kilang Kelapa Sawit Mentah

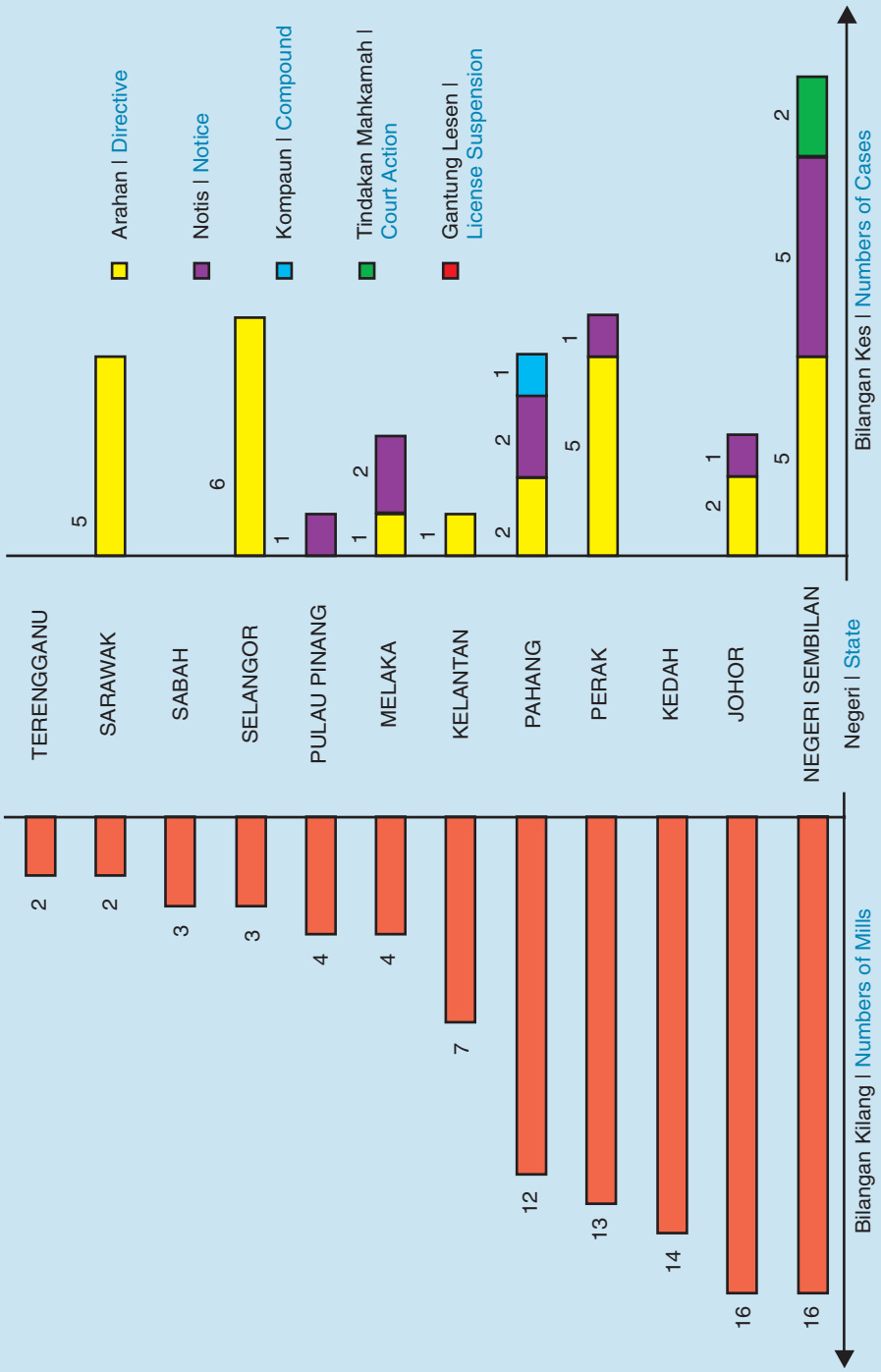
Crude Palm Oil

Sejumlah 369 buah kilang kelapa sawit mentah telah dilesenkan di bawah Peraturan-Peraturan Kualiti Alam Sekeliling (Premis Yang Ditetapkan) (Kelapa Sawit Mentah), 1977 pada tahun 2003, pertambahan sebanyak lima (5) buah kilang berbanding dengan tahun 2002. Dari 369 buah kilang yang dilesenkan, sebanyak 218 buah kilang telah dilesenkan untuk melepaskan effluen yang diolah ke dalam alur air, 124 buah kilang untuk melupuskan effluen ke atas tanah, 26 buah kilang melupuskan effluen dengan menggunakan kedua-dua kaedah dan sebuah kilang secara kitar semula (Rajah 5.5).

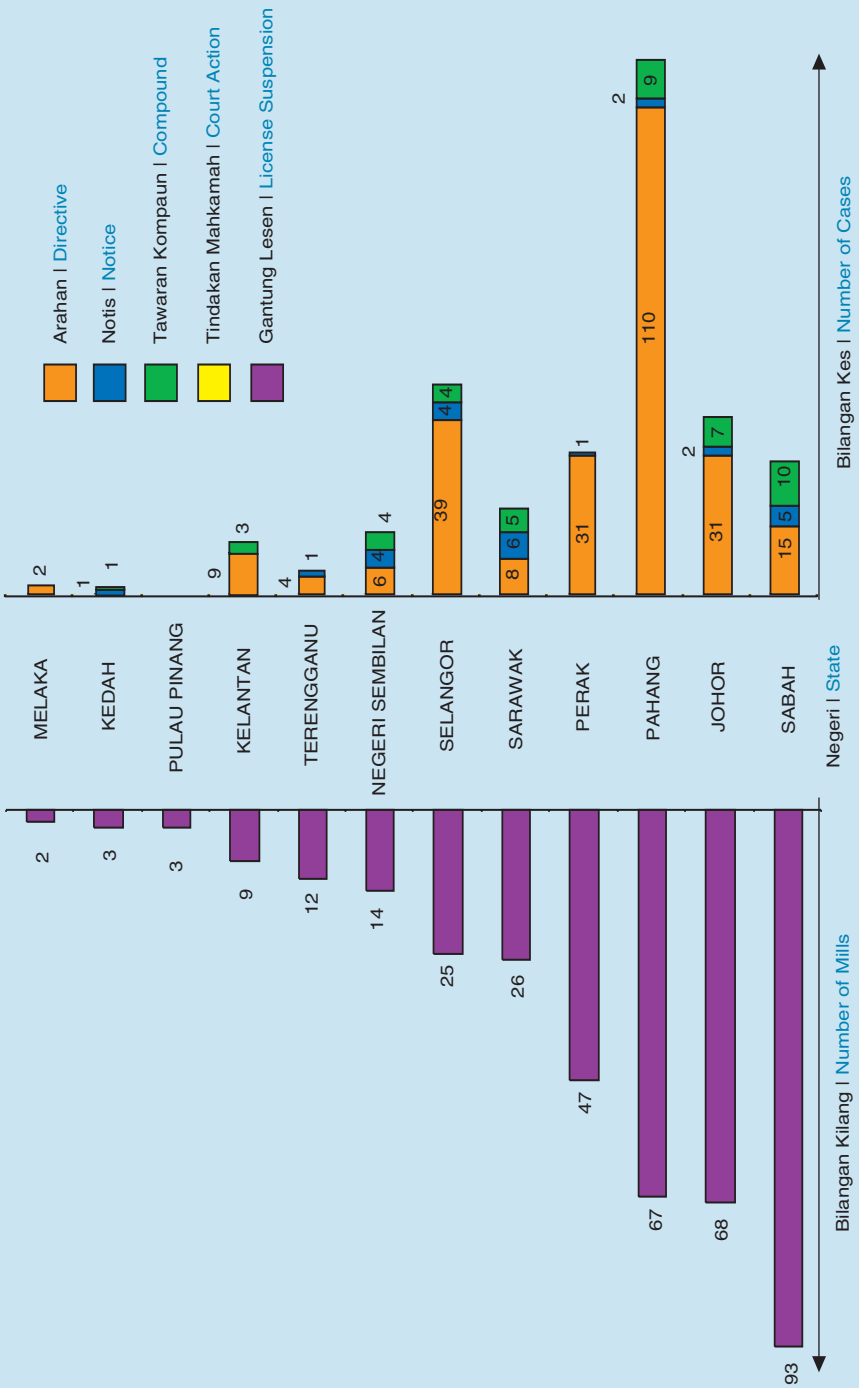
There were 369 palm oil processing mills licensed under the Environmental Quality (Prescribed Premises) (Crude Palm Oil Mill) Regulations, 1977 in 2003, an increase of five (5) mills compared to 2002. Of these 369 licensed prescribed premises, 218 premises were granted permission to discharge treated effluent into inland watercourses, 124 premises were approved for land disposal, 26 were licensed to implement both methods of effluent disposal and one mill for effluent recycling (Figure 5.5).

Sepanjang tahun 2003, 699 pemeriksaan ke atas kilang kelapa sawit di seluruh negara telah dilaksanakan oleh pegawai-pegawai penguatkuasa Jabatan Alam Sekitar negeri (Rajah 5.5).

Throughout the year, 699 inspections on the palm oil processing mills were conducted by the DOE State Officers (Figure 5.5).



Rajah 5.4 Jabatan Alam Sekitar: Bilangan Kes Tindakan Undang-Undang Terhadap Kilang Getah Asli Mentah, 2003
Figure 5.4 Department of Environment: Legal Action Taken Against Raw Natural Rubber Factories, 2003



Rajah 5.5 Jabatan Alam Sekitar: Bilangan Kes Tindakan Undang-Undang Terhadap Kelapa Sawit Mentah, 2003
Figure 5.5 Department of Environment: Legal Action Taken Against Crude Palm Oil Mills, 2003

PREMIS YANG BUKAN DITETAPKAN

Status Pematuhan: Peraturan-peraturan Kualiti Alam Sekeliling (Kumbahan dan Effluen-effluen Perindustrian) 1979.

Pada tahun 2003, Jabatan Alam Sekitar telah menjalankan 2,565 pemeriksaan penguatkuasaan terhadap sejumlah 1,957 industri pembuatan yang tertakluk kepada Peraturan-Peraturan Kualiti Alam Sekeliling (Kumbahan dan Effluen-effluen Perindustrian) 1979. 83% daripada premis yang dilawat mematuhi Peraturan ini. Sebanyak 17% premis pula didapati menghadapi pelbagai kesukaran pematuhan seperti tidak mematuhi standard pelepasan effluen (Peraturan 8), tidak mempunyai Kelulusan Bertulis bagi pembinaan loji pengolahan effluen serta pembesaran kilang (Peraturan 4), tidak melepaskan effluen di takat pelepasan yang diluluskan (Peraturan 16) dan tidak memaklumkan Jabatan Alam Sekitar mengenai kejadian tumpahan atau pelepasan secara tidak sengaja (Peraturan 18).

Sebanyak 59 kes dari premis-premis yang tidak patuh ini telah didakwa di mahkamah. Sejumlah RM1,423,000.00 denda telah dikenakan. Tindakan-tindakan lain yang diambil adalah pengeluaran 945 surat arahan dan 304 notis arahan kepada industri supaya mereka mengambil tindakan yang sepatutnya bagi mematuhi Akta Kualiti Alam Sekeliling, 1974 dan Peraturan-Peraturan Kualiti Alam Sekeliling (Kumbahan dan Effluen-effluen Perindustrian) 1979.

NON-PRESCRIBED PREMISES

Compliance Status: Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979

In 2003, the Department of Environment conducted 2,565 inspections of 1,957 industrial premises subjected to the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979. 83% of the premises inspected were in compliance with the Regulations. The other 17% non-compliance were offences such as exceeding effluent discharge standards (Regulation 8); no written approval for installing effluent treatment plant and factory expansion (Regulation 4); not discharging effluent at approved discharge points (Regulation 16); and not informing the Department of Environment of the occurrence of spill and accidental discharges (Regulation 18).

Of the non-complying premises, 59 cases were prosecuted in court. A total fine of RM1,423,000.00 were collected. Other actions taken were the issuance of 945 written field directives and 304 written notices to take appropriate action in order to comply with the Environmental Quality Act, 1974 and the Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979.

Industri kulit dan jentera mencapai pematuhan 100%, sementara industri-industri kertas, fabrikasi logam, elektrik dan elektronik, sadur-elektrik dan penyudahan logam, simen, kenderaan, kuari, penapisan petroleum, penapisan minyak makan, plastik dan makanan haiwan mencapai 86% hingga 95% pematuhan. Walaupun demikian industri-industri berasaskan kayu, asas kimia, asas getah, pengilangan logam, makanan dan minuman, tekstil dan mineral bukan logam masih menghadapi masalah mematuhi kehendak-kehendak Peraturan dengan peratus pematuhan kurang 85% (Rajah 5.6). Beberapa industri ini didapati beroperasi tanpa loji pengolahan atau loji pengolahan effluen yang ada tidak berupaya untuk mengolah effluen yang mematuhi standard pelepasan yang ditetapkan. Faktor lain yang menyebabkan ketidakpatuhan ini adalah penyelenggaraan yang lemah dan kurangnya pengetahuan/pengalaman dalam pengendalian loji pengolahan effluen.

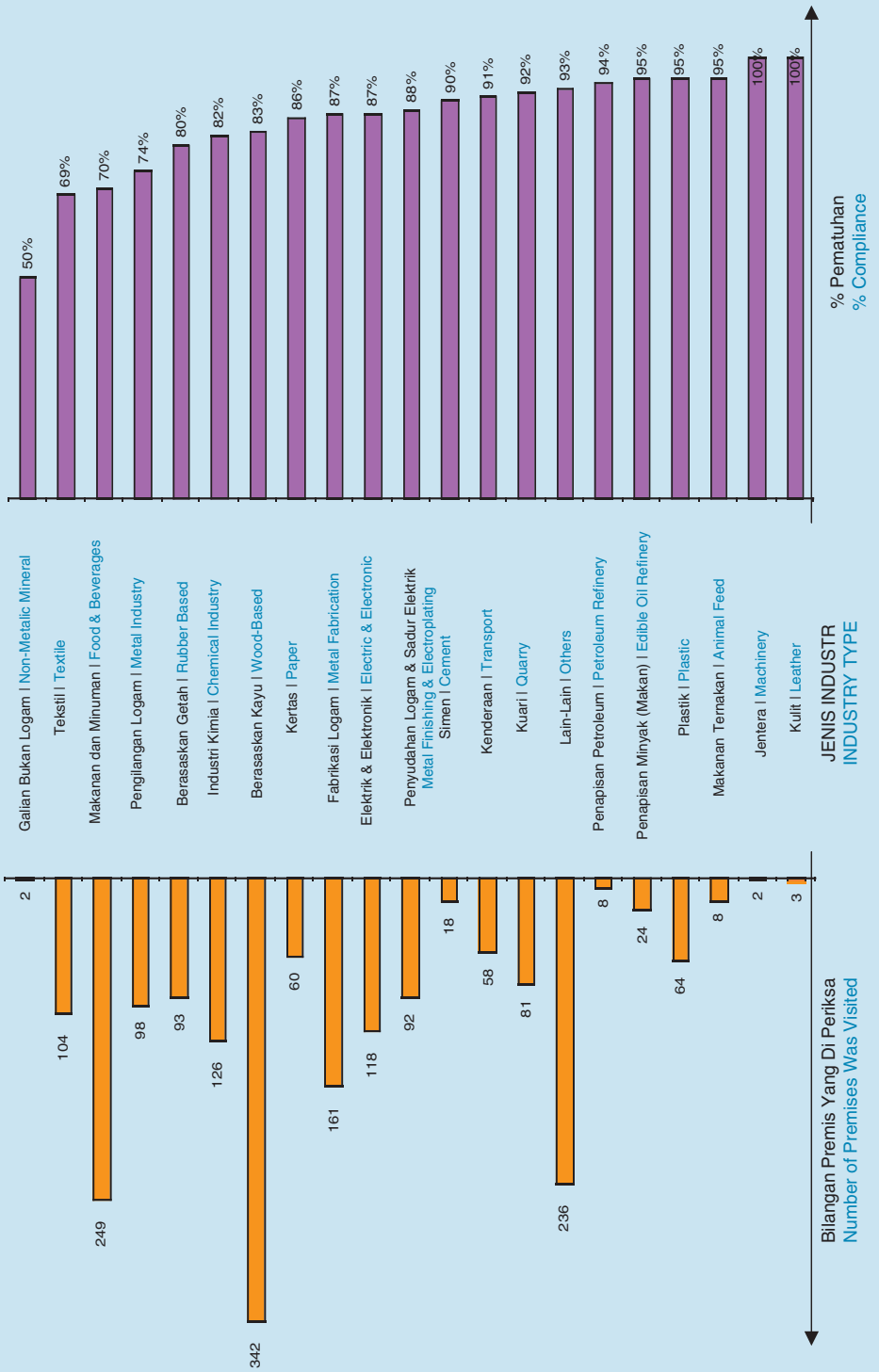
Industries such as leather and machinery achieved 100% compliance, while paper, metal fabrication, electric and electronic, metal finishing and electroplating, cement, transport, quarry, petroleum refinery, edible oil refinery, plastic and animal feed industries had between 86% to 95% compliance respectively. However industries like wood-based, chemical-based, rubber-based, basic metal, food and beverages, textile and non-metallic mineral had difficulties complying with the requirements of the Regulations and could only achieved below 85% (Figure 5.6). Some of these industries were found to be operating without effluent treatment plants or with inefficient effluent treatment plants. Other factors that contributed to non-compliance were poor maintenance and lack of knowledge or experience in operating the effluent treatment plants.

Pada umumnya, parameter-parameter yang sukar dipatuhi oleh industri-industri yang tidak patuh ialah keperluan oksigen biokimia (BOD), keperluan oksigen kimia (COD), pepejal terampai (SS), minyak dan gris (O&G) dan logam-logam berat seperti tembaga, nikel, plumbum, kromium dan mangganam. Secara spesifiknya, industri berasaskan kayu didapati sukar untuk mematuhi standard bagi parameter-parameter COD, BOD, SS fenol dan besi; industri asas kimia gagal mematuhi standard bagi parameter COD, BOD, O&G, SS, besi, plumbum dan zink; industri asas getah gagal mematuhi standard parameter COD, BOD, SS, O&G, zink, mengganam, kromium dan sulfid; industri pengilangan logam tidak mematuhi parameter COD, BOD, SS, O&G, besi zink, tembaga, nikel dan kromium; industri makanan dan minuman sukar mematuhi parameter COD, BOD, SS, O&G, besi dan pH; industri tekstil sukar mematuhi parameter COD, BOD, SS, O&G, besi dan mangganam; dan industri mineral bukan logam sukar mematuhi parameter COD, BOD dan Kadmium.

Generally, the parameters that most industries could not comply with were biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), oil and grease (O&G) and heavy metals such as copper, nickel, lead, chromium and manganese. Specifically, the wood-based industries were found to have difficulty in complying with the parameters such as COD, BOD, SS, phenol and iron; chemical-based industries with COD, BOD, O&G, SS, iron, lead and zinc; rubber-based industries with COD, BOD, SS, O&G, iron, zinc, manganese, chromium and sulphide; basic metal industries with COD, BOD, SS O&G, iron, zinc copper, nickel and chromium; food and beverages industries with COD, BOD, SS, O&G, iron and manganese; and non-metalic mineral industries with COD, BOD and cadcium.

Bagi meningkatkan pematuhan, Jabatan Alam Sekitar telah mengeluarkan arahan-arahan kepada pihak industri supaya memasang alat kawalan pencemaran yang lebih sesuai dan efisien serta meningkatkan keupayaan kemudahan kawalan pencemaran yang sedia ada. Di samping itu, berbagai aktiviti kesedaran dilaksanakan sepanjang tahun untuk kumpulan sasaran yang spesifik. Aktiviti-aktiviti tersebut termasuklah dialog, seminar dan bengkel untuk industri. Pihak industri juga dinasihatkan untuk mewujudkan sistem pengurusan alam sekitar yang baik dan digalakkan untuk mendapatkan pensijilan ISO 14000. Jabatan Alam Sekitar juga dalam usaha memastikan pematuhan sepenuhnya telah berusaha mempromosi penggunaan teknologi kawalan yang efisien, amalan pengeluaran bersih serta *'self-regulation'*.

In order to achieve more satisfactory compliance, the Department of Environment had issued directives to install more appropriate and efficient control equipment and upgrade existing pollution control facilities. In addition to the above measures, various awareness activities were implemented throughout the year for specific target groups which included dialogues, seminars and workshops for industries. The industries were also advised to set up a good environmental management system and encouraged to go for ISO 14000 certification . The Department of Environment in its effort to ensure full compliance is also promoting the adoption of more efficient control technologies, cleaner production practices as well as self-regulatory measures.



Rajah 5.6 Jabatan Alam Sekitar: Peraturan-peraturan Kualiti Alam Sekeliling (Kumbahan dan Effluen-Efluen Perindustrian) 1979, Status Pematuhan Industri, 2003

Figure 5.6 Department of Environment: Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979, Compliance Status, 2003

PENGURUSAN BUANGAN TERJADUAL

Kebenaran Bertulis dan Lesen Premis Yang Ditetapkan

Sejumlah lapan (8) Kebenaran Bertulis telah diluluskan oleh Ketua Pengarah untuk pembinaan premis yang ditetapkan bagi mengolah dan melupus buangan terjadual. Kebenaran Bertulis berkenaan telah diberi kepada lima (5) kemudahan pemerolehan kembali dan tiga (3) kemudahan penunu buangan terjadual.

Sejumlah 233 lesen diluluskan kepada kemudahan baru dan sedia ada untuk pemerolehan kembali, penstoran luar tapak, penunu, pengolahan atas tanah, tapak pelupusan selamat dan pelupusan buangan ke atas tanah.

Import dan Eksport Buangan Terjadual

Pada tahun 2003, sebanyak 12 permohonan telah diberi Kebenaran Bertulis untuk mengimport 305,398 tan metrik buangan untuk tujuan penggunaan sebagai bahan mentah Industri (Jadual 5.12). Di samping itu, sejumlah 2,361 tan metrik buangan terjadual telah dieksport (Jadual 5.13 dan Jadual 5.14). Buangan yang dieksport kebanyakannya terdiri daripada mangkin terpakai industri dan enapcemar logam berat daripada 42 pengeluar buangan untuk pemerolehan kembali logam di luar negara.

SCHEDULED WASTE MANAGEMENT

Written Permission and Licences for Prescribed Premises

A total of eight (8) Written Permissions were granted by the Director General for the construction of prescribed premises for the treatment and disposal of scheduled wastes; five (5) off-site recovery plants and three (3) scheduled waste incinerators.

In 2003, a total of 233 licences were issued for both existing and new facilities for off-site recovery, off-site storage, incinerators, land treatment, off-site treatment, secured landfills and land disposal of wastes.

Import and Export of Scheduled Wastes

In 2003, 12 Written Approvals were issued for the import of 305,398 tonnes of wastes for use as raw materials in industrial processes (Table 5.12) and 2,361 tonnes of scheduled wastes were exported (Table 5.13 and Table 5.14). The exported wastes were derived from 42 waste generators and comprised mainly of spent industrial catalysts and metal hydroxide sludges destined for metal recovery in foreign countries.

Gambarfoto 5.9 : Persampelan Rasmi Bahan Yang Disyaki Buangan Terjadual
Photo 5.9 : Formal Sampling of Suspected Scheduled Wastes

Gambarfoto 5.10 : Pelupusan Haram Buangan Yang Disyaki Bahan Buangan Terjadual
Photo 5.10 : Indiscriminate Dumping of Suspected Scheduled Wastes

Jadual 5.12 Jabatan Alam Sekitar: Kuantiti Terjadual yang Diimport , 1999-2003
Table 5.12 Department of Environment: Quantity of Scheduled Wastes Imported, 1999-2003

JENIS BUANGAN / TYPE OF WASTES	NEGARA / COUNTRY — TAHUN / YEAR	1999	2000	2001	2002	2003
Sangga Kuprum / Copper Slag	Singapura / Singapore	45,382	27,254	36,611	33,945	52,283
	Jepun / Japan	12,391	-	-	-	-
	China / China	-	-	-	-	-
	Korea / Korea	-	-	-	-	-
Sangga Peleburan / G.B. Furnace Slag	Singapura / Singapore	-	-	90	170	-
	Jepun / Japan	-	-	16,054	15,000	234,644
	China / China	104,917	93,673	15,622	14,770	17,363
	Korea / Korea	-	-	-	-	-
Mangkin Terpakai / Spent Catalyst	Singapura / Singapore	4,040	4,948	1,565	6,878	1,108
	Jepun / Japan	-	-	-	-	-
	China / China	-	-	-	-	-
	Korea / Korea	-	-	-	-	-
JUMLAH (TAN) / TOTAL (TONNES)		**166,730**	**125,875**	**69,942**	**70,763**	**305,398**

Jadual 5.13 Jabatan Alam Sekitar: Kuantiti Buangan Terjadual Yang Dieksport ,1999-2003
Table 5.13 Department of Environment: Quantity of Wastes Exported, 1999-2003

JENIS BUANGAN / TYPE OF WASTES — TAHUN / YEAR	1999	2000	2001	2002	2003
Enapcemar Hidroksida Logam / Metal Hydroxide Sludge	2,597	1,678	1,795	1,537	212
Mangkin Terpakai / Spent Catalyst	1,846	2,905	816	1,365	693
Kuprum Oksida / Copper Oxide	635	-	-	142	1,209
Bahan Letupan Terpakai / Used Blasting Material	5	36	19	-	-
Kadmium dan Nikel Oksida / Cadmium Nickel Oxide	103	108	-	67	30
Sanga Aluminium / Aluminium Dross	-	10	-	-	-
Nikel-Kadmium Bateri / Nickel Cadmium Battery	-	-	-	-	217
Kutlet Kaca / Glass Cutlet	-	141	45	-	-
JUMLAH (TAN) / TOTAL (TONNES)	**5,186**	**4,878**	**2,675**	**3,110**	**2,361**

Jadual 5.14 Jabatan Alam Sekitar: Kuantiti Buangan Terjadual Yang Dieksport dan Destinasi,1999-2003
Table 5.14 Department of Environment: Quantity of Wastes Exported and Destinations, 1999-2003

NEGARA I COUNTRY / TAHUN I YEAR	1999	2000	2001	2002	2003
Afrika Selatan I South Africa	45	-	-	-	-
Amerika I America	1,107	753	1,295	533	60
Australia I Australia	280	69	-	315	209
Filipina I Philippines	1,073	-	532	-	-
Finland I Finland	-	-	-	100	23
Belgium I Belgium	-	-	-	-	140
Holland I Holland	1,266	1,235	487	570	323
Itali I Italy	-	-	107	44	28
Jepun I Japan	1,103	1,530	68	1,035	1,006
Jerman I Germany	80	470	159	128	349
Korea Selatan I South Korea	23	-	-	-	118
Perancis I France	80	108	-	67	98
Singapura I Singapore	27	500	-	169	-
Sweden I Sweden	102	203	27	149	7
Switzerland I Switzerland	-	10	-		-
Jumlah (Tan) I Total (Tonnes)	**5,186**	**4,878**	**2,675**	**3,110**	**2,361**

PENGUATKUASAAN TERHADAP AKTIVITI PEMBAKARAN TERBUKA

Bagi mengelakkan berlaku kejadian jerebu yang diakibatkan oleh sumber tempatan, maka pada tahun 2003, semua pejabat JAS negeri telah meneruskan operasi rondaan mencegah pembakaran terbuka di kawasan-kawasan yang telah dikenalpasti sebagai kawasan yang cenderung berlaku kebakaran. Sepanjang tahun 2003, sejumlah 1,148 kes pembakaran terbuka dikesan dan disiasat termasuk *hotspot* yang dikesan melalui satelit (Rajah 5.7 dan Rajah 5.8).

Kejadian pembakaran terbuka yang sering berlaku adalah di kawasan ladang (253), tapak pembinaan (210) dan belukar (202), terutamanya semasa cuaca panas dan kering iaitu pada bulan-bulan Februari (144), Jun (212), Julai (144), dan Ogos (137). Daripada 1148 kes pembakaran terbuka tersebut, 267 kes telah dikompaun sebanyak RM440,300.00 dan dua kes telah dikenakan tindakan mahkamah dan didenda sebanyak RM100,000.00.

ENFORCEMENT AGAINST OPEN BURNING ACTIVITIES

In order to prevent open burning and the occurrence of haze due to local sources, all Department of Environment State Offices conducted daily ground surveillance of fire prone areas in 2003. Throughout the year, a total of 1,148 open burning cases were detected and investigated, including hotspots detected via satellites (Figure 5.7 and Figure 5.8).

Frequent open burning incidents were found to occur in plantations (253); constructions areas (210) and bushes (202), especially during the dry period in February (144); June (212); July (144); and August (137). Out of the 1,148 open burning cases detected, 267 cases were issued compounds amounting to RM440,300.00. Two cases were prosecuted in court and fined a total of RM100,000.00.

Untuk memperkemaskan lagi instrumen Perundangan bagi mengawal aktiviti pembakaran terbuka, Perintah Kualiti Alam Sekeliling (Aktiviti Yang Diisytiharkan) 2003, telah diwartakan pada 18 Disember 2003 dan telah mula berkuatkuasa pada 1 Januari 2004. Lima belas aktiviti pembakaran telah diisytiharkan sebagai bukan pembakaran terbuka sepertimana yang ditakrifkan dalam Seksyen 29A Akta Kualiti Alam Sekeliling, 1974 selagi aktiviti-aktiviti berkenaan dijalankan mengikut syarat-syarat yang dinyatakan dalam Perintah tersebut. Di bawah Perintah yang sama juga, kawasan dalam lingkungan 30 km jejari di sekitar Lapangan Terbang Antarabangsa Kuala Lumpur (KLIA) telah diwartakan sebagai kawasan larangan sebarang aktiviti pembakaran terbuka (selaras dengan peruntukan di bawah Seksyen 29AA, Akta Kualiti Alam Sekeliling, 1974) kecuali bagi lima (5) aktiviti iaitu pembakaran tumbuhan berpenyakit, pembakaran benda/bahan sebagai upacara keagamaan, pembakaran mayat, aktiviti gril/barbeku di luar rumah dan pembakaran gas mudah terbakar bagi tujuan *flaring* (Rajah 5.26).

To further strengthen the legal instrument to control open burning activities, the Environmental Quality (Declared Activities) (Open Burning) Order 2003 was gazetted on 18 December 2003 and came into force on 1 January 2004. Fifteen (15) activities were not classified as open burning as defined in Section 29A of Environmental Quality Act, 1974 so long as such activities are carried out in accordance with the conditions specified in the Order. Under the Order, the area within 30 kilometre radius of the Kuala Lumpur International Airport (KLIA) was gazetted as a prohibited zone (in accordance with section 29AA EQA, 1974) where open burning activities are totally banned except for five activities which include burning of diseased plant; burning of any articles as part of religious rites; cremation, outdoor grill or barbecue activities and the burning of flammable gases for flaring purposes (Figure 5.26).

Lesen Pelanggaran

Di bawah Akta Kualiti Alam Sekeliling (AKAS), 1974 Lesen Pelanggaran boleh dikeluarkan untuk tempoh masa yang spesifik bagi membenarkan industri yang menghadapi kesukaran untuk mematuhi standard pelepasan melanggar syarat-syarat yang dibenarkan untuk pelepasan effluen ke dalam pengairan daratan atau pelepasan bendasing udara ke atmosfera sebagaimana yang diperuntukkan di bawah Seksyen 25(1) dan Seksyen 22(1), AKAS, 1974. Lesen Pelanggaran ini merupakan satu langkah atau mekanisme untuk membantu, memudah dan membolehkan industri yang bermasalah memasang atau meningkatkan peralatan kawalan pencemaran dalam tempoh masa yang mencukupi.

Contravention Licenses

Under the Environmental Quality Act, 1974 contravention licenses may be granted for a specific time frame to allow industries with genuine difficulties complying with discharge or emission standards to contravene the acceptable conditions of effluent discharges into watercourses or air emissions into atmosphere as provided for under Section 25(1) and Section 22(1) of the Act. These contravention licenses are meant to assist, facilitate and allow problematic industries adequate time to install or upgrade their pollution control equipment.

Pada tahun 2003, jumlah permohonan Lesen Pelanggaran di bawah Seksyen 25, Akta adalah menurun kepada 66 berbanding 87 permohonan dalam tahun 2002 (Rajah 5.9). Dari 66 permohonan, 51 telah diluluskan dan 15 ditolak (Rajah 5.10). Dari 51 Lesen Pelanggaran yang diluluskan, 20 (39%) lesen adalah untuk industri makanan dan minuman;

In 2003, the total number of applications for Contravention Licenses under Section 25 of the Act decreased to 66 as compared to 87 applications in 2002 (Figure 5.9). Out of the 66 applications, 51 were approved and 15 rejected (Figure 5.10). Of the 51 approved contravention licenses, 20 (39%) licenses were for food and beverages industries; eight (8)

lapan (8) (16%) untuk industri berasaskan kertas dan enam (6) (12%) untuk industri penyudahan logam dan sadur elektrik. Antara parameter yang sukar dipatuhi oleh industri dan diluluskan dalam Lesen Pelanggaran adalah keperluan oksigen biokimia, keperluan oksigen kimia, pepejal terampai, kadmium, kromium, sianid, plumbum, nikel, zink, boron, besi, fenol, sulfid, minyak dan gris. Penguatkuasaan telah dijalankan terhadap premis-premis yang dilesenkan bagi menentukan paras pematuhan. Pematuhan keseluruhan terhadap syarat-syarat Lesen Pelanggaran yang dikenakan pada tahun 2003 adalah 88%.

PENGAWASAN MELALUI UDARA

Program Pengawasan Melalui Udara diteruskan pelaksanaannya pada tahun 2003 untuk mengawasi dan mengesan dari udara kejadian pencemaran alam sekitar seperti aktiviti pembakaran terbuka, pelepasan dari industri, pencemaran pantai dan laut dan aktiviti pembukaan tanah dan pembangunan di kawasan tanah tinggi dan pulau-pulau. Maklumat mengenai kejadian pencemaran alam sekitar yang dikesan melalui pengawasan dari udara ini akan disalurkan ke Bilik Operasi JAS untuk diambil tindakan penguatkuasaan susulan oleh pegawai penguatkuasa di lapangan.

Pada tahun 2003, sebanyak RM3 juta telah diperuntukkan bagi pelaksanaan program tersebut di mana JAS telah memperolehi perkhidmatan pesawat udara dari Unit Udara Polis Diraja Malaysia, dan dua (2) syarikat swasta di Sabah dan Sarawak.

Sebanyak 464 bilangan penerbangan yang melibatkan 1,392 jumlah jam penerbangan telah dibuat sepanjang tahun 2003. Sebanyak 280 kes pembakaran terbuka telah dikesan melalui program ini di mana 35 kes telah dikenakan kompaun dan dua (2) kes dikenakan tindakan mahkamah.

(16%) for paper-based industries; and six (6) (12%) for metal finishing and electroplating industries. Among the parameters applied for contravention were biochemical oxygen demand, chemical oxygen demand, suspended solids, cadmium, chromium, cyanide, lead, nickel, zinc, boron, iron, phenol, sulphide, oil and grease. Regular enforcement visits were conducted on these contravention cases to monitor the progress of compliance . The overall compliance with the conditions of contravention licenses in 2003 was 88%.

AIRBORNE SURVEILLANCE

The National Airborne Surveillance Programme continued to be implemented in 2003 to monitor and detect environmental pollution such as open burning activities, emission from industries, coastal and marine pollution and land clearing activities for development on highlands and islands. Information obtained would be transmitted to the Department of Environment Operation Room for follow up enforcement action by ground surveillance teams.

For 2003, an allocation of RM3 million was allocated for aircraft services from the Royal Malaysian Police Air Wing and two other private aviation companies in Sabah and Sarawak.

In 2003, 464 flights were carried out with a total of 1,392 flight hours. 280 cases of open burning activities were detected during the surveillance. Out of the 280 cases detected, 35 cases were compounded and two (2) cases were prosecuted in court.

Pematuhan Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih), 1978

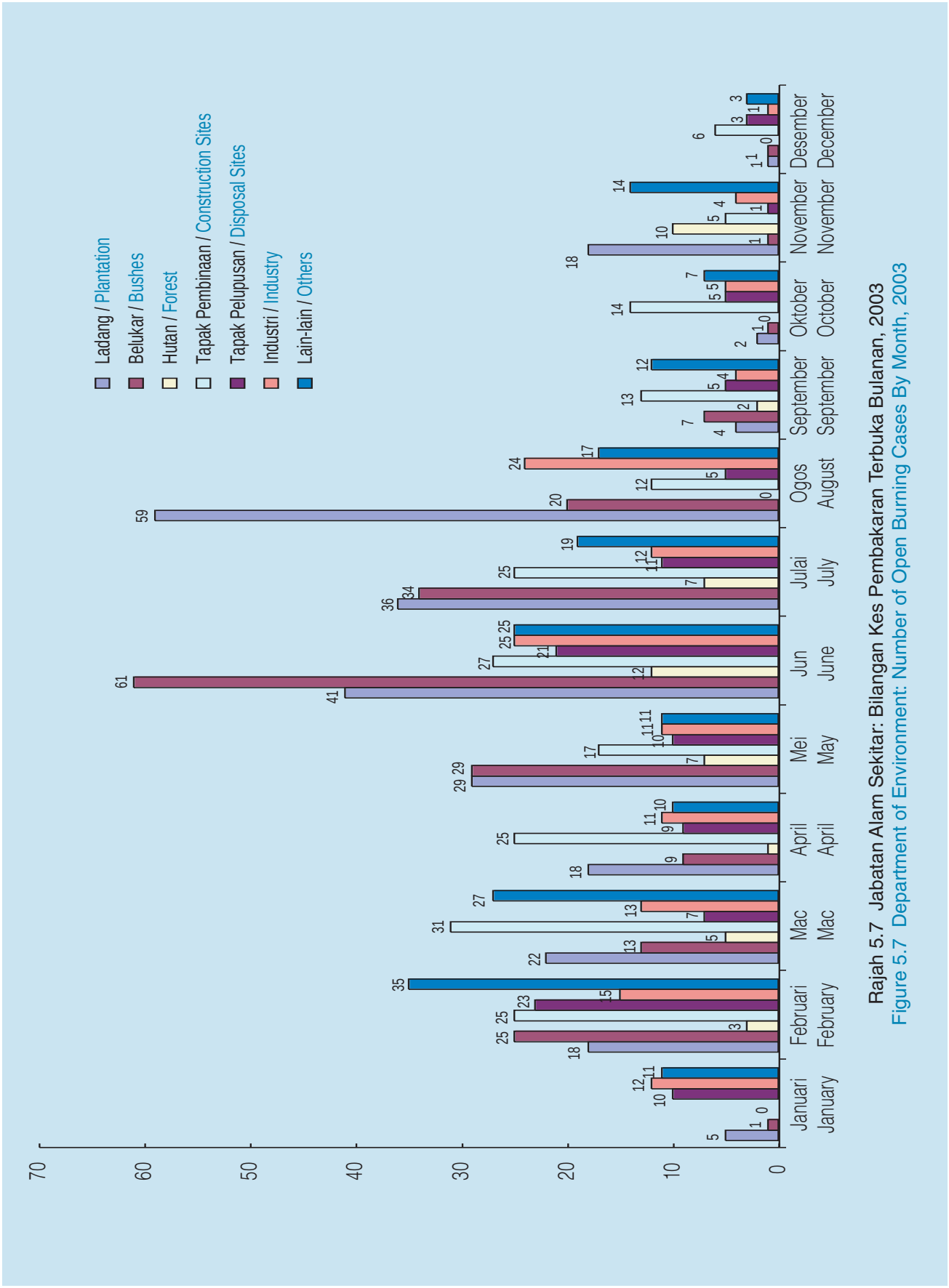
Sepanjang tahun 2003, sebanyak 2,768 lawatan penguatkuasaan telah dijalankan ke atas 1,925 premis-premis perindustrian (industri pembuatan dan premis yang ditetapkan) yang tertakluk di bawah Peraturan-peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978 dan didapati jumlah keseluruhan tahap pematuhan adalah sebanyak 85%. Daripada jumlah ini, didapati industri penyudahan logam/sadur elektrik dan penapisan minyak masak mencapai pematuhan sebanyak 100%, diikuti dengan industri berasaskan kimia dan industri elektronik (99%). Kilang minyak kelapa sawit mentah, kilang padi dan kilang simen merekodkan tahap pematuhan yang rendah (73%; 72%; 64%) (Rajah 5.11). Antara sebab utama yang menyumbang kepada tahap pematuhan yang rendah bagi ketiga-tiga sektor tersebut adalah akibat penggunaan alat kawalan pencemaran yang kurang efisien.

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

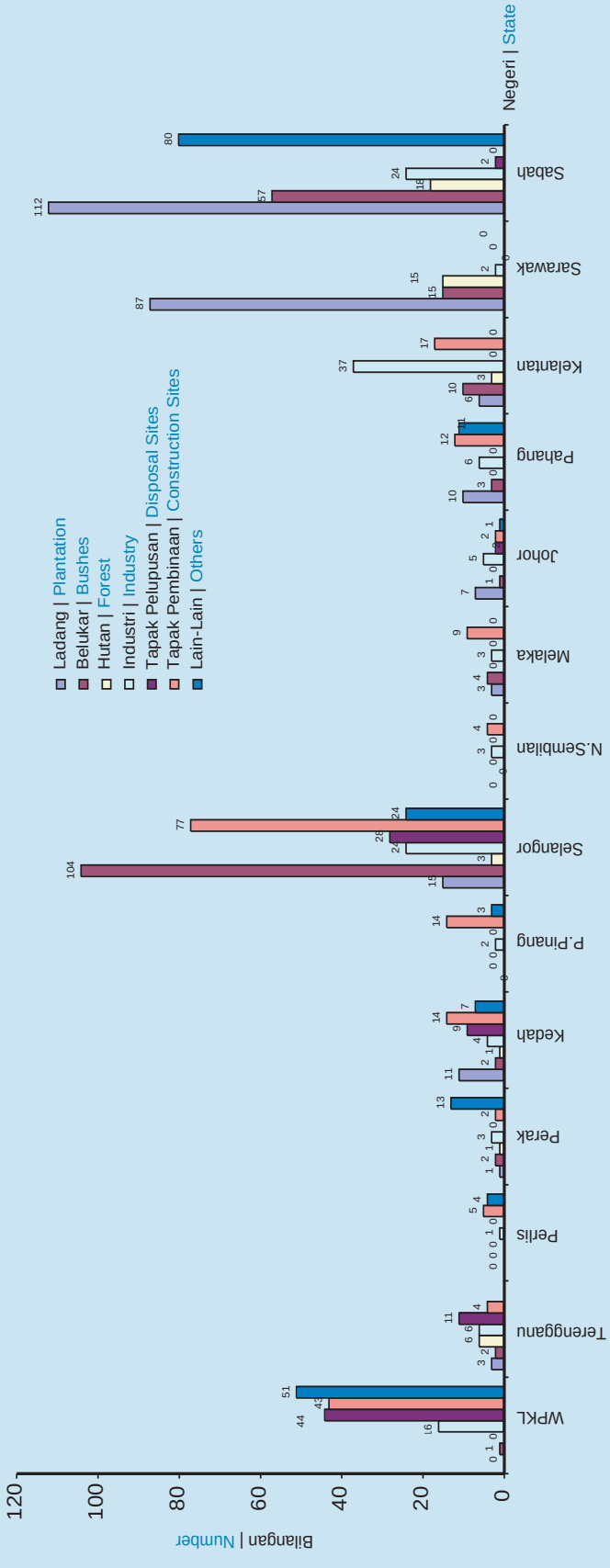
Throughout 2003, 2,768 enforcement visits to 1,925 premises (both manufacturing industries and prescribed premises) were conducted. Overall compliance to the Environmental Quality (Clean Air) Regulations 1978 was 85%. Metal finishing/ electroplating and edible oil refinery sectors achieved 100% compliance, followed by chemical based and electronics industry (99%). Palm oil mill, rice mill and cement industries recorded a low compliance of 73%, 72% and 64% respectively (Figure 5.11). The main reason for the low compliance level of these three sectors was inefficient pollution control equipment.

Gambarfoto 5.11 : Pengukuran Pencemaran Asap Hitam dari Cerombong Industri
Photo 5.11 : Measurement of Dark Smoke Emission from Industrial Stack

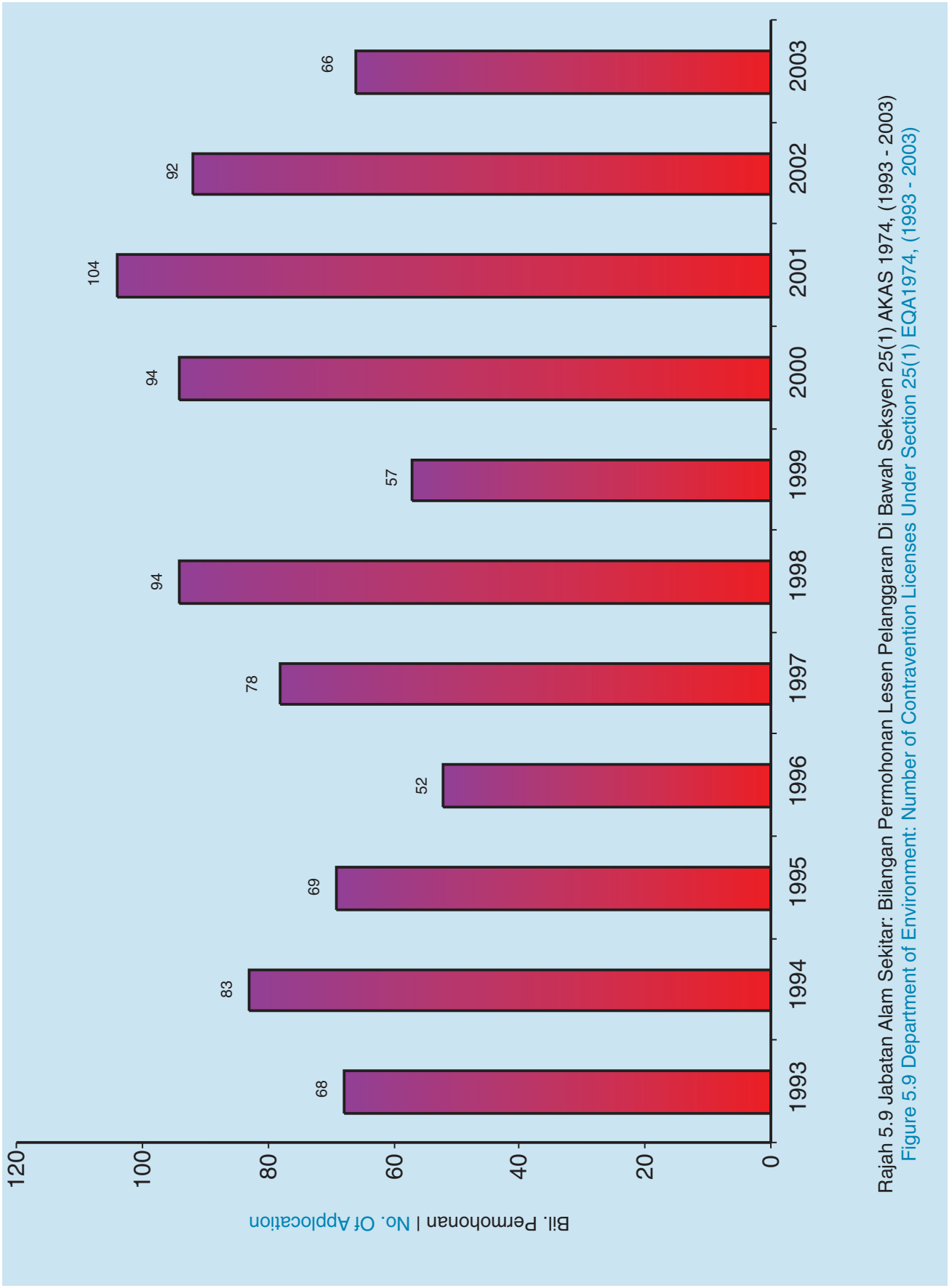
Gambarfoto 5.12 : Ops Asap Bersama Polis Diraja Malaysia
Photo 5.12 : 'Ops Asap' with the co-operation of Royal Malaysian Police



Rajah 5.7 Jabatan Alam Sekitar: Bilangan Kes Pembakaran Terbuka Bulanan, 2003
Figure 5.7 Department of Environment: Number of Open Burning Cases By Month, 2003



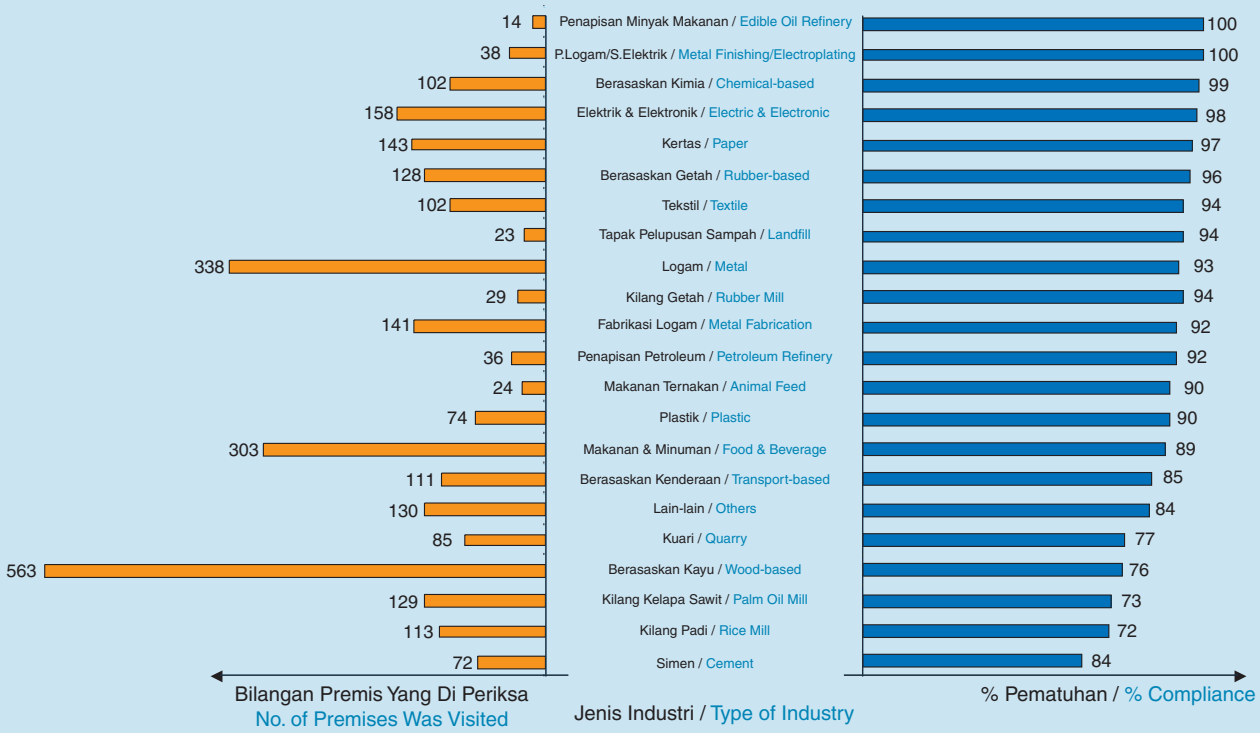
Rajah 5.8 Jabatan Alam Sekitar: Bilangan Kes Pembakaran Terbuka Mengikut Negeri, 2003
Map 5.8 Department of Environment: Number of Open Burning Cases By State, 2003



Rajah 5.9 Jabatan Alam Sekitar: Bilangan Permohonan Lesen Pelanggaran Di Bawah Seksyen 25(1) AKAS 1974, (1993 - 2003)
Figure 5.9 Department of Environment: Number of Contravention Licenses Under Section 25(1) EQA1974, (1993 - 2003)

Rajah 5.10 Jabatan Alam Sekitar: Lesen Pelanggaran Di Bawah Seksyen 25(1) AKAS 1974 Mengikut Jenis Industri, 2003

Figure 5.10 Department of Environment : Contravention Licenses Under Section 25(1) By Industry Type, 2003



Rajah 5.11 Jabatan Alam Sekitar: Status Pematuhan Industri-Industri Pembuatan Terhadap Peraturan-Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978, 2003

Figure 5.11 Department of Environment : Environmental Quality (Clean Air) Regulations, 1978; Compliance Status, 2003

PUNCA-PUNCA BERGERAK (KENDERAAN BERMOTOR)

Bilangan kenderaan bermotor yang berdaftar di Malaysia sehingga akhir tahun 2003 adalah sebanyak 12,819,248 buah, penambahan sebanyak 797,309 buah kenderaan iaitu (atau 6.22 %) berbanding tahun 2002 (Rajah 5.12).

Dari sejumlah 797,309 buah kenderaan baru yang didaftarkan dalam tahun 2003, kategori motorsikal dan motokar membentuk bilangan yang paling tinggi iaitu masing-masing sebanyak 322,341 unit (atau 40.43%) dan 427,501 unit (atau 53.62%), manakala baki selebihnya sebanyak 47,467 buah (atau 5.95%) adalah dari jenis kenderaan lain termasuk lori, bas, van dan sebagainya.

Taburan bilangan kenderaan bermotor di Malaysia mengikut negeri adalah seperti dalam Rajah 5.13. Wilayah Persekutuan Kuala Lumpur masih mendahului negeri-negeri lain dengan bilangan kenderaan sebanyak 2.7 juta (atau 21.28%) daripada keseluruhan bilangan kenderaan yang berdaftar di negara ini, diikuti oleh Johor, Selangor, Pulau Pinang dan Perak.

Kawalan Pelepasan Asap dan Gas dari Kenderaan Bermotor

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

MOBILE SOURCES (MOTOR VEHICLES)

By the end of 2003, there were about 12,819,248 registered motor vehicles in Malaysia, an increase of 797,309 (6.22%) compared to 2002 (Figure 5.12).

Out of these 797,309 new vehicles registered, motorcycles and motorcars made up the highest number 322,341 (40.43%) and 427,501 (53.62%) respectively, while the remaining 47,467 (5.95%) were other vehicle types such as lorries, buses and vans.

The distribution of registered vehicles throughout the States is given in Figure 5.13. The Federal Territory of Kuala Lumpur topped the other States with a vehicle population of 2.7 million (21.28 %), followed by Johor, Selangor, Pulau Pinang and Perak.

Control of Smoke and Gaseous Emissions from Motor Vehicles

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

Kawalan Pelepasan Asap Hitam Dari Kenderaan Diesel

Kawalan pelepasan asap hitam berlebihan dari ekzos kenderaan diesel dilaksanakan melalui Program AWASI (*Area Watch And Sanction Inspection*). Melalui Program AWASI ini, skuad peronda JAS akan menjalankan rondaan dan pemerhatian pelepasan asap hitam dari ekzos kenderaan. Tindakan kompaun akan diambil secara serta merta kepada pemandu dan tuan punya kenderaan yang didapati gagal mematuhi had pelepasan asap 50 Unit Asap Hartridge (HSU); kompaun serta perintah larangan menggunakan kenderaan di jalan raya akan dikeluarkan sekiranya kenderaan didapati melepaskan asap hitam melebihi 70 HSU.

Sepanjang tahun 2003, sebanyak 1,267 operasi penguatkuasaan AWASI telah dilaksanakan di bandar-bandar di seluruh negara. Dalam operasi tersebut, sebanyak 108,574 buah kenderaan diesel telah diperiksa. Dari jumlah tersebut, sebanyak 4,373 buah kenderaan telah disaman kerana gagal mematuhi had 50 HSU, manakala 1,554 daripadanya telah dikenakan perintah larangan. Pematuhan keseluruhan pelepasan asap hitam dari kenderaan diesel adalah sebanyak 96% (Rajah 5.14, Rajah 5.15). Tindakan mahkamah telah juga diambil ke atas 78 pemilik kenderaan kerana gagal menjelaskan kompaun yang telah dikenakan.

Sebagai tambahan pula, satu program penguatkuasaan baru, iaitu program penguatkuasaan keatas kenderaan diesel di sepanjang lebuhraya dan jalan utama di seluruh negara telah dilaksanakan oleh JAS. Di bawah program ini, pemeriksaan ke atas kenderaan telah dilaksanakan oleh penguatkuasa JAS selama tiga hari sepanjang lebuhraya. Upacara perasmian program Kempen Kawalan Pelepasan Asap Hitam Kenderaan Diesel Sepanjang Lebuh raya dan Jalan Utama Seluruh Negara peringkat Kebangsaan telah disempurnakan oleh Y.B. Timbalan Menteri Sains, Teknologi dan Alam Sekitar Malaysia pada 25 Ogos 2003 di Plaza Tol Sungai Besi, Kuala Lumpur.

Control of Black Smoke Emission from Diesel Vehicles

The control of excessive black smoke emission from diesel vehicle exhausts was implemented through the AWASI (Area Watch And Sanction Inspection) Programme. Through this programme, the Department of Environment mobile squads would be on patrol, observing and testing diesel vehicles belching excessive smoke. On-the-spot compounds were issued to drivers and owners of vehicles which failed the stipulated smoke limit of 50 HSU, and when the smoke limit exceeded 70 HSU, Prohibition Orders (prohibiting vehicle usage) were issued.

In 2003, a total of 1,267 AWASI enforcement programmes were conducted within cities throughout the country in 2003. Some 108,574 diesel vehicles were visually inspected, of which 4,373 vehicles were summoned for failing to comply with the 50 HSU smoke limits. Out of this, 1,554 vehicles were issued with Prohibition Orders and were only allowed back on the road after rectification and retesting by the Department of Environment. The overall percentage of compliance for diesel vehicles was 96% (Figure 5.14 , 5.15). Court action was also taken against 78 vehicle owners for failing to settle the compounds issued.

In addition, a new enforcement programme conducted along highways and main roads was also introduced by the Department of Environment. Under this programme road side vehicle inspections were carried out simultaneously by all Department of Environment State Offices for three consecutive days. The National Campaign on Control of Black Smoke Emission from Diesel Vehicles along Highways and Main Roads was launched by the Honourable Deputy Minister of Science, Technology and the Environment at the Sungai Besi Toll Plaza, Kuala Lumpur on 25 August 2003.

Dua kempen telah dilaksanakan secara serentak oleh semua pejabat-pejabat JAS negeri pada tahun 2003. Melalui kempen tersebut sebanyak 20,274 kenderaan diesel telah diperiksa, di mana 1,317 telah disaman dan 289 telah dikenakan perintah larangan menggunakan kenderaan (Rajah 5.16).

Two such simultaneous campaigns were carried out in 2003. From the above campaigns, a total of 20,274 diesel vehicles were inspected, 1,317 vehicles were summoned and 289 were issued with Prohibition Orders (Figure 5.16).

Kawalan Pelepasan Gas CO dan HC Dari Kenderaan Petrol

Pada tahun 2003, JAS meneruskan kempen kawalan pelepasan gas dari kenderaan petrol. Sejumlah 5,401 buah kenderaan petrol telah diuji pelepasan CO dan HC dengan menggunakan metergas *CO-HC Analyzer* (kaedah 'ujian idling') di jalan raya. Daripada jumlah ini, 4,035 kenderaan telah mematuhi had CO dan HC; sementara 1,366 kenderaan pula gagal untuk mematuhi had tersebut. Peratus pematuhan secara keseluruhannya adalah 74.71%. Notis amaran telah dikeluarkan kepada pemandu-pemandu kenderaan supaya segera membaiki kenderaan mereka untuk memastikan had pelepasan yang ditetapkan oleh undang-undang dipatuhi.

Control of CO and HC Gas Emissions from Petrol Vehicles

Throughout 2003, the campaign on control of gas emissions from petrol vehicles was continued. A total of 5,401 petrol-powered vehicles were tested for CO and HC gas emissions using the CO-HC gas analyzer (idling test method) at the roadside. From the above total, 4,035 vehicles were able to comply to the stipulated CO and HC limits, while the remaining 1,366 vehicles failed the test. The overall percentage of compliance was 74.71%. Written notices were issued to drivers to take immediate action to ensure compliance.

Ujian Kelulusan Jenis (Kenderaan Petrol)

Pada tahun 2003, Jabatan Alam Sekitar telah mengeluarkan sebanyak 36 Sijil Ujian Kelulusan Jenis bagi model-model baru kenderaan yang akan dipasarkan di pasaran Malaysia seperti dikehendaki dibawah Peraturan-peraturan Kualiti Alam Sekililing (Kawalan Pelepasa Daripada Enjin Pertol) 1996. Peraturan-peraturan ini menetapkan jisim Karbon Monoksida yang dibenarkan hendaklah tidak melebihi 2.2 g/km, manakala kombinasi Hidrokarbon dan Nitrogen Oksida pula hendaklah tidak melebihi 0.5g/km.

Type Approval Testing for New Petrol Vehicles

In 2003, the Department Of Environment issued 36 Type Approval Test Certificates for new models to be marketed in Malaysia as required under the Environmental Quality (Control of Emmision From Petrol Engine) Regulations 1996. The Regulations required that Carbon Monoxide shall not exceed 2.2 g/km, while the combination of Hydrocarbon and Nitrogen Oxides shall not exceed 0.5 g/km.

Kemudahan Yang DiLuluskan

Bagi membolehkan orang ramai menghantar kenderaan mereka untuk menjalani ujian pelepasan asap dan gas, Jabatan Alam Sekitar meneruskan program pengiktirafan "Kemudahan Yang Di Luluskan (KYDL)" kepada bengkel-bengkel yang memenuhi kriteria-kriteria yang ditetapkan sebagai pusat untuk membaiki kenderaan yang gagal mematuhi undang-undang pelepasan asap.

Sehingga akhir 2003, sebanyak 63 bengkel dan pusat pemeriksaan kenderaan di seluruh negara telah diiktiraf sebagai "Kemudahan Yang Diluluskan" oleh JAS, 33 pusat atau bengkel untuk menguji pelepasan CO dan HC, 15 untuk ujian pelepasan asap hitam kenderaan diesel manakala 15 pula untuk menguji pelepasan asap dan gas dari kenderaan diesel dan petrol.

Kawalan Pelepasan Asap Daripada Motosikal

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

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

Di bawah peraturan ini, pengimport motosikal adalah dikehendaki mematuhi standard pelepasan berkuatkuasa 1 Januari 2005 bagi model baru dan 1 Julai 2005 bagi model sedia ada, manakala pembuat tempatan dikehendaki mematuhi standard pelepasan berkuatkuasa 1 Julai 2005 bagi model baru dan 1 Julai 2006 bagi model sedia ada.

Establishment of Approved Testing Facilities

To facilitate convenient public access to workshops for smoke and gaseous emission testing, the Department of Environment gave accreditation to a number of workshops that had fulfilled the prescribed criteria as "Approved Testing Facilities" and as repair centres for non-complying vehicles.

By end of 2003, a total of 63 workshops and vehicle testing centers throughout the country were registered as "Approved Testing Facilities" by the Department of Environment; 33 for testing CO and HC emissions from petrol vehicles, 15 for testing of black smoke emissions from diesel vehicles and 15 for testing of smoke and gaseous emission from both petrol and diesel vehicles.

Control of Emission from Motorcycles

In 2003, the Environmental Quality (Control of Emission from Motorcycles) Regulations 2003 were gazetted and came into force on 1 January 2004. The emissions standards adopted are as follows:

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

Motorcycle importers would be required to comply with the new emission standards effective from 1 January 2005 for new models and 1 July 2005 for current models, while local manufacturers would have to comply with the new emission standards effective from 1 July 2005 for new models and 1 July 2006 for current models.

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 kenderaan bermotor telah dilaksanakan secara bersama oleh pejabat-pejabat JAS Negeri dengan kerjasama Polis DiRaja Malaysia(Cawangan Trafik). Sepanjang tahun 2003, sejumlah 1,869 kenderaan motosikal telah ditahan untuk menjalani ujian pelepasan bunyi bising. Dari jumlah ini, 227 telah disaman kerana melanggar had bunyi bising yang dibenarkan. Peratus pematuhan secara keseluruhannya ialah 87.85% (Rajah 5.17).

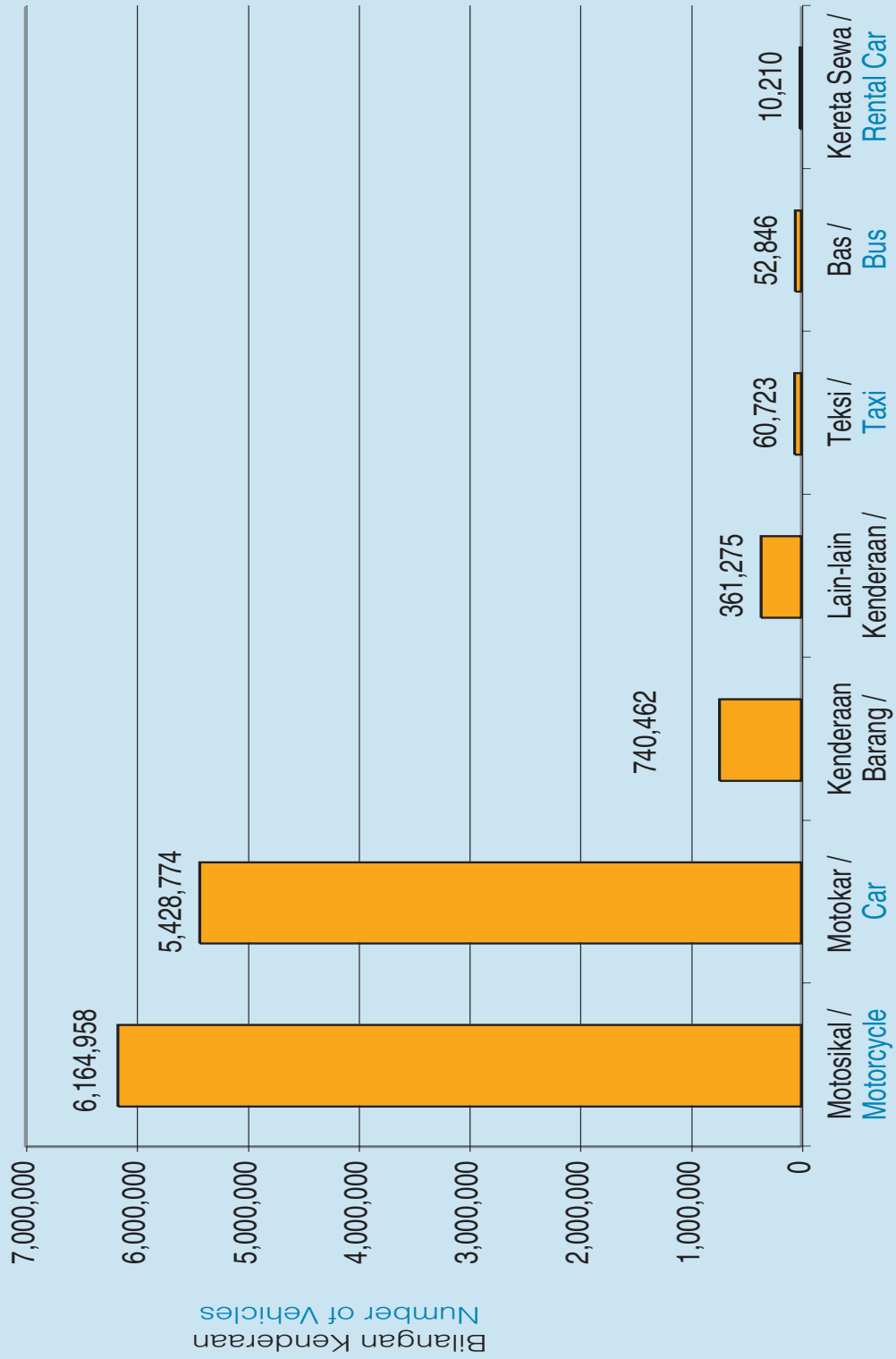
Ujian paras bunyi ke atas motosikal baru yang dipasang telah juga dilaksanakan oleh kesemua lima syarikat pemasang motosikal di negara ini (Rajah 5.18). Pada tahun 2003, sejumlah 2,409 buah motosikal baru yang meliputi 30 model yang berlainan telah diuji di kilang pemasang. Semua motosikal berkenaan didapati mematuhi had pelepasan bunyi bising yang telah ditetapkan.

Noise from Motor Vehicles

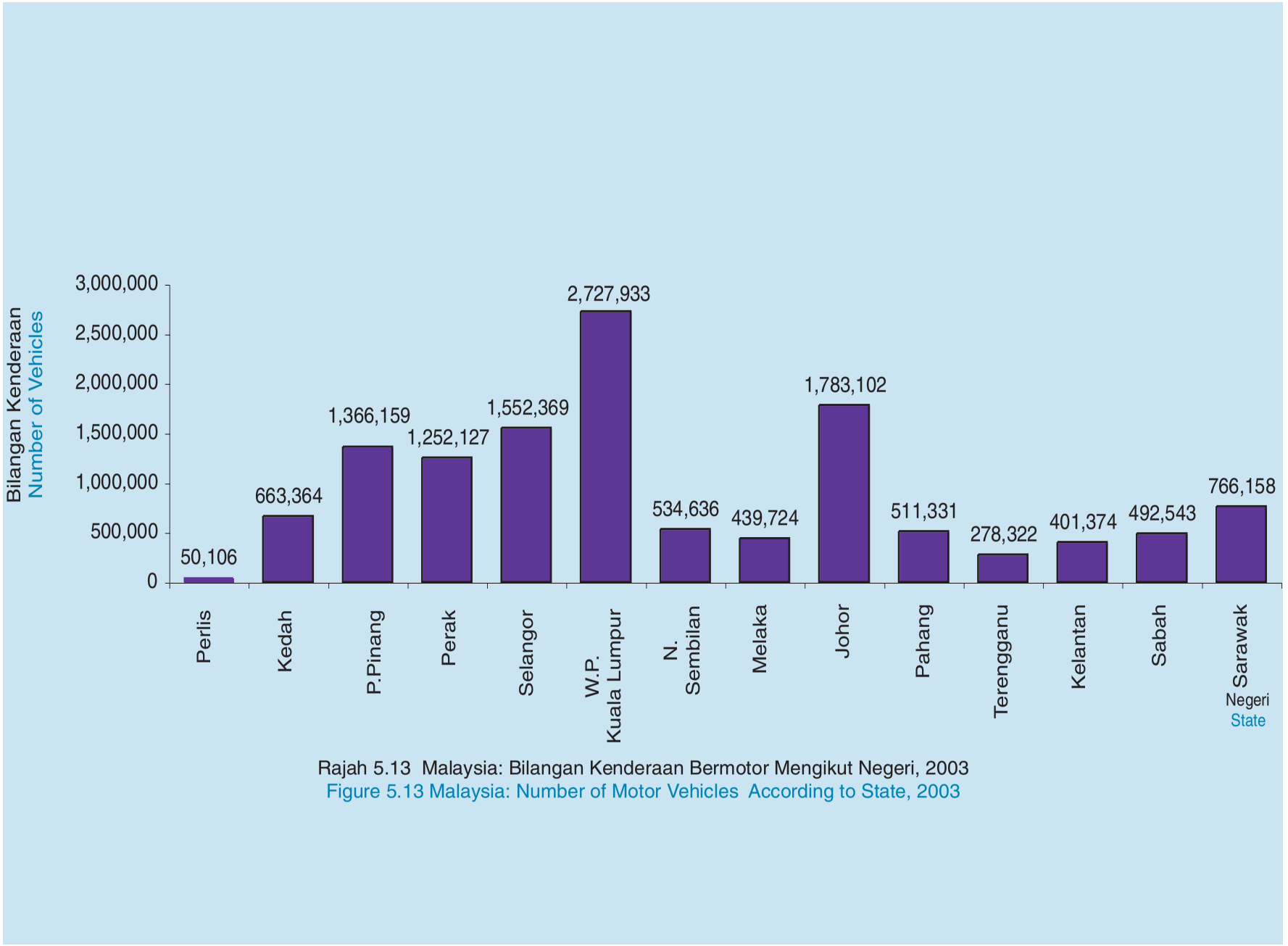
The control of noise from motor vehicles is enforced under the Environmental Quality (Motor Vehicle Noise) Regulations 1987.

Enforcements campaigns to control excessive noise from motor vehicles were jointly conducted by the DOE and the Traffic Police. In 2003, a total of 1,869 motorcycles were checked for noise pollution. From the above total, 227 motorcyclists were summoned for violating the stipulated noise limits. The overall percentage of compliance was 87.85% (Figure 5.17).

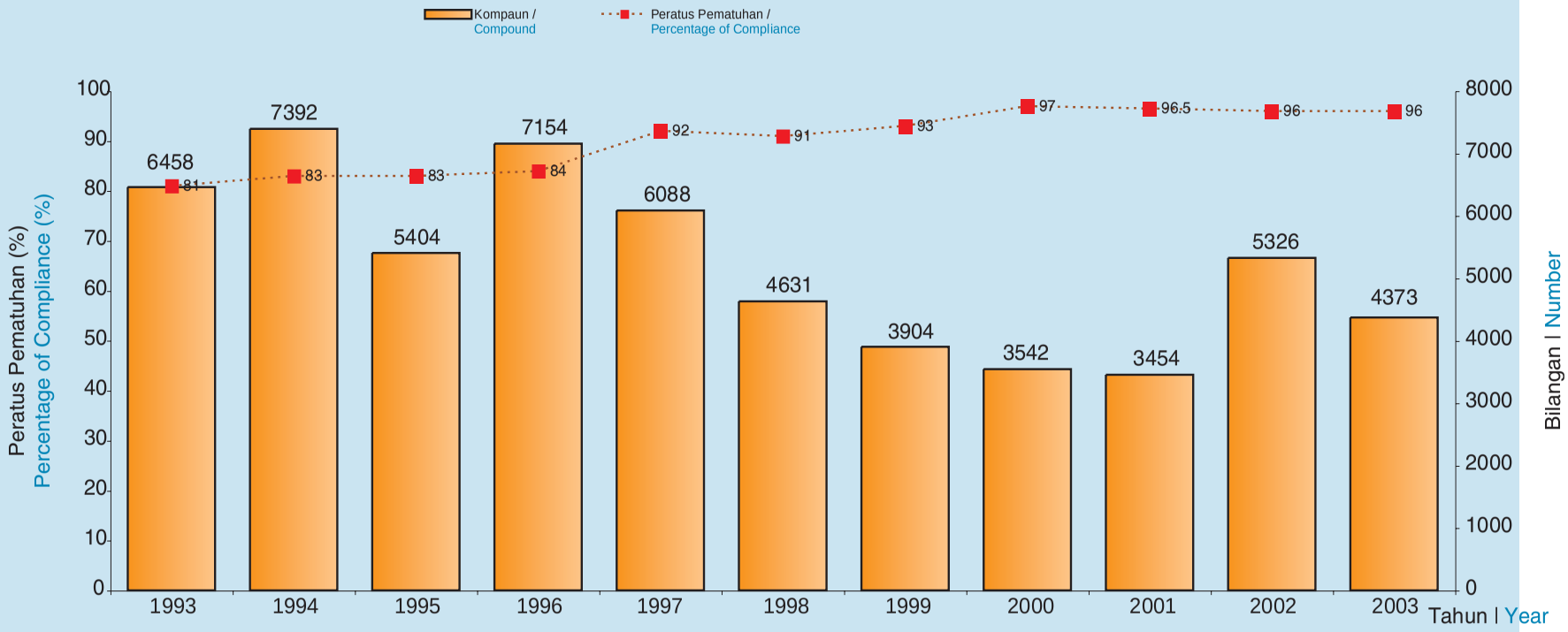
Noise level testing on new motorcycles was also conducted by all the five motorcycle assembly plants in the country (Figure 5.18). In 2003, a total of 2,409 newly assembled motorcycles from 30 different models were tested in their respective assembly plants. All the new motorcycles tested were found to be in compliance with the stipulated noise limit.



Rajah 5.12 Malaysia: Bilangan Kenderaan Bermotor Mengikut Jenis, 2003
Figure 5.12 Malaysia: Number of Motor Vehicles According to Type, 2003

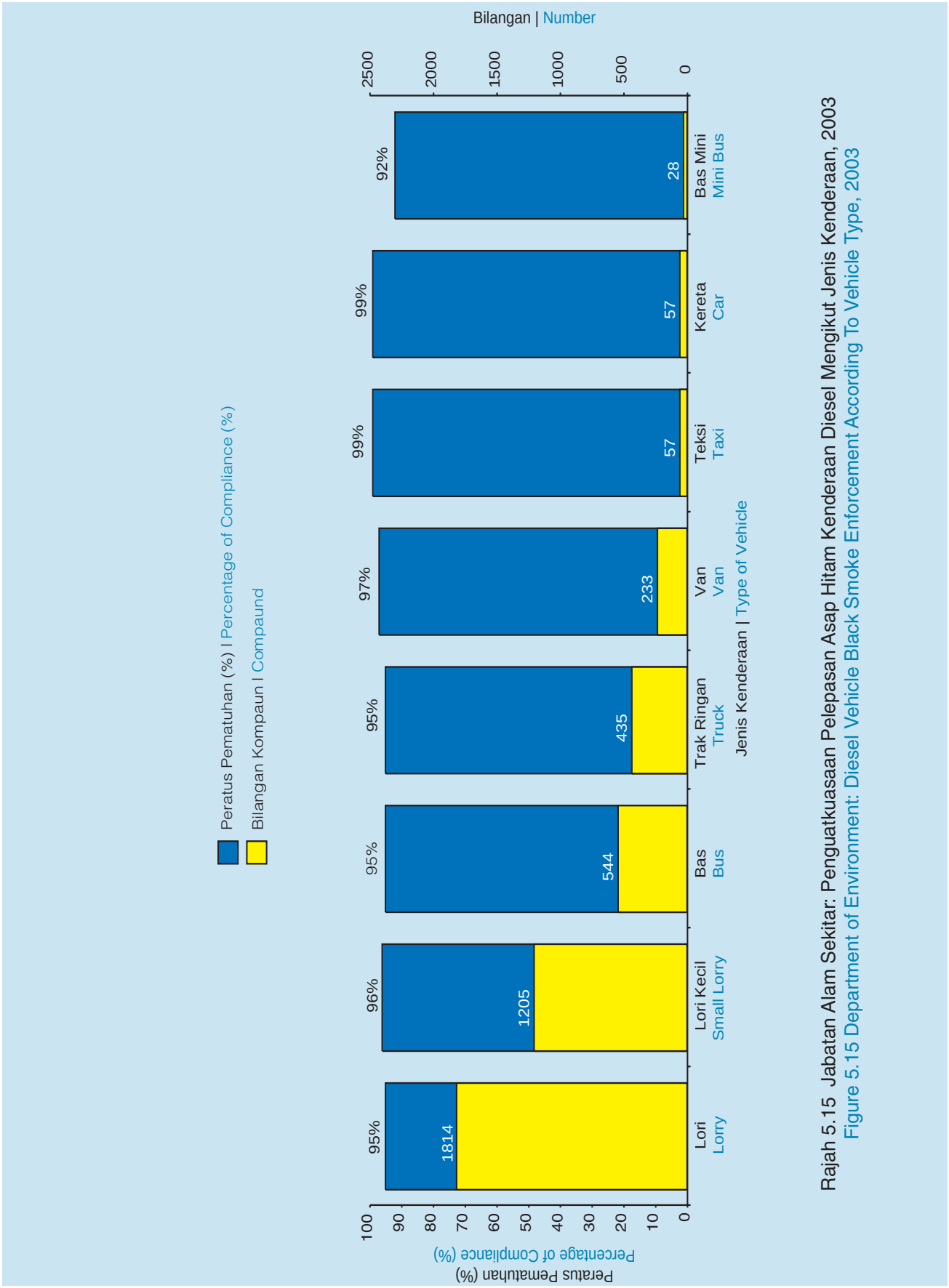


Rajah 5.13 Malaysia: Bilangan Kenderaan Bermotor Mengikut Negeri, 2003
Figure 5.13 Malaysia: Number of Motor Vehicles According to State, 2003



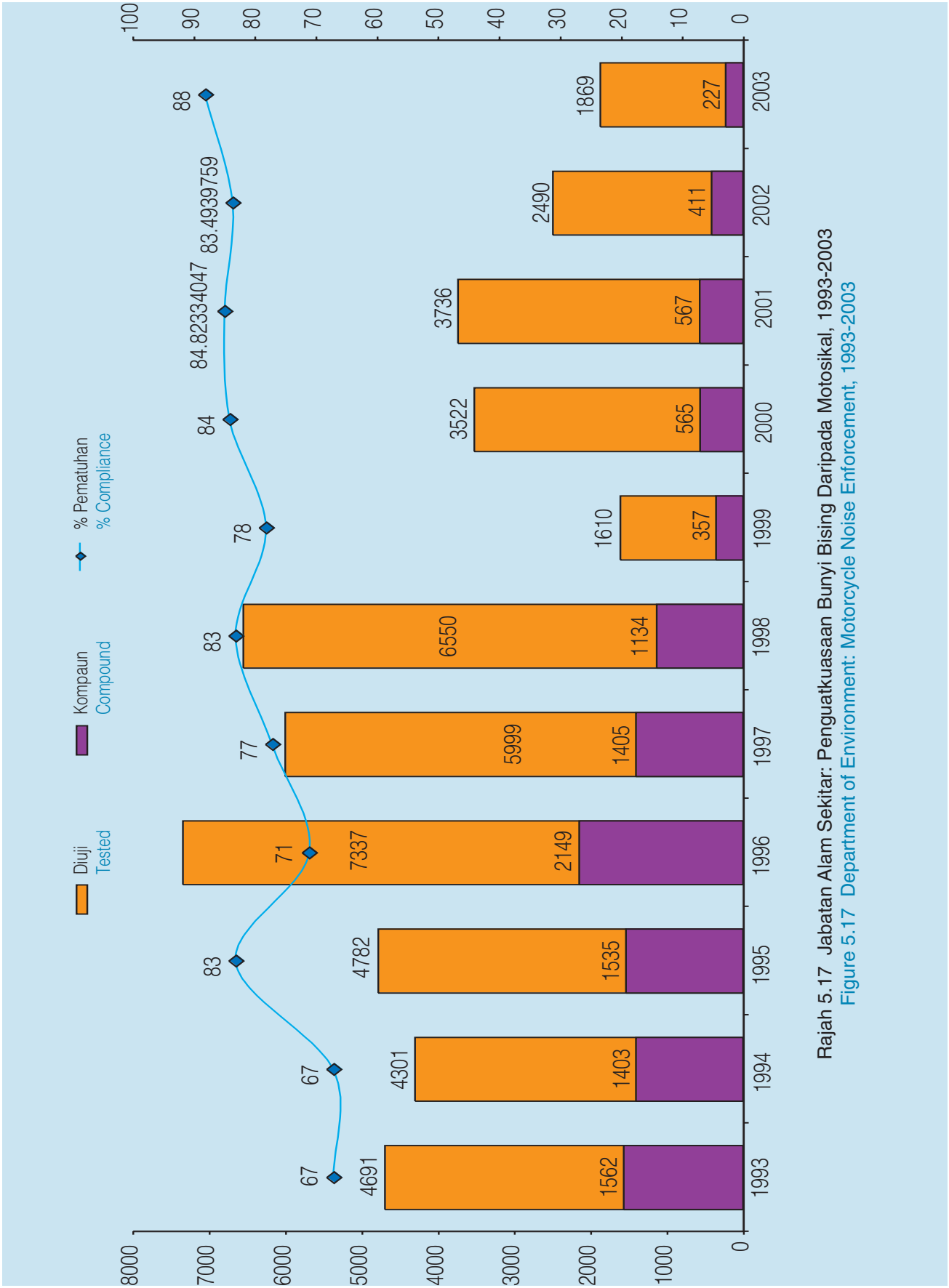
Rajah 5.14 Jabatan Alam Sekitar: Penguatkuasaan Pelepasan Asap Hitam Kenderaan, Diesel (Kompaun dan Peratus Pematuhan), 1993-2003

Figure 5.14 Department of Environment: Diesel Vehicle Black Smoke Enforcement, (Compound and Percentage of Compliance), 1993-2003

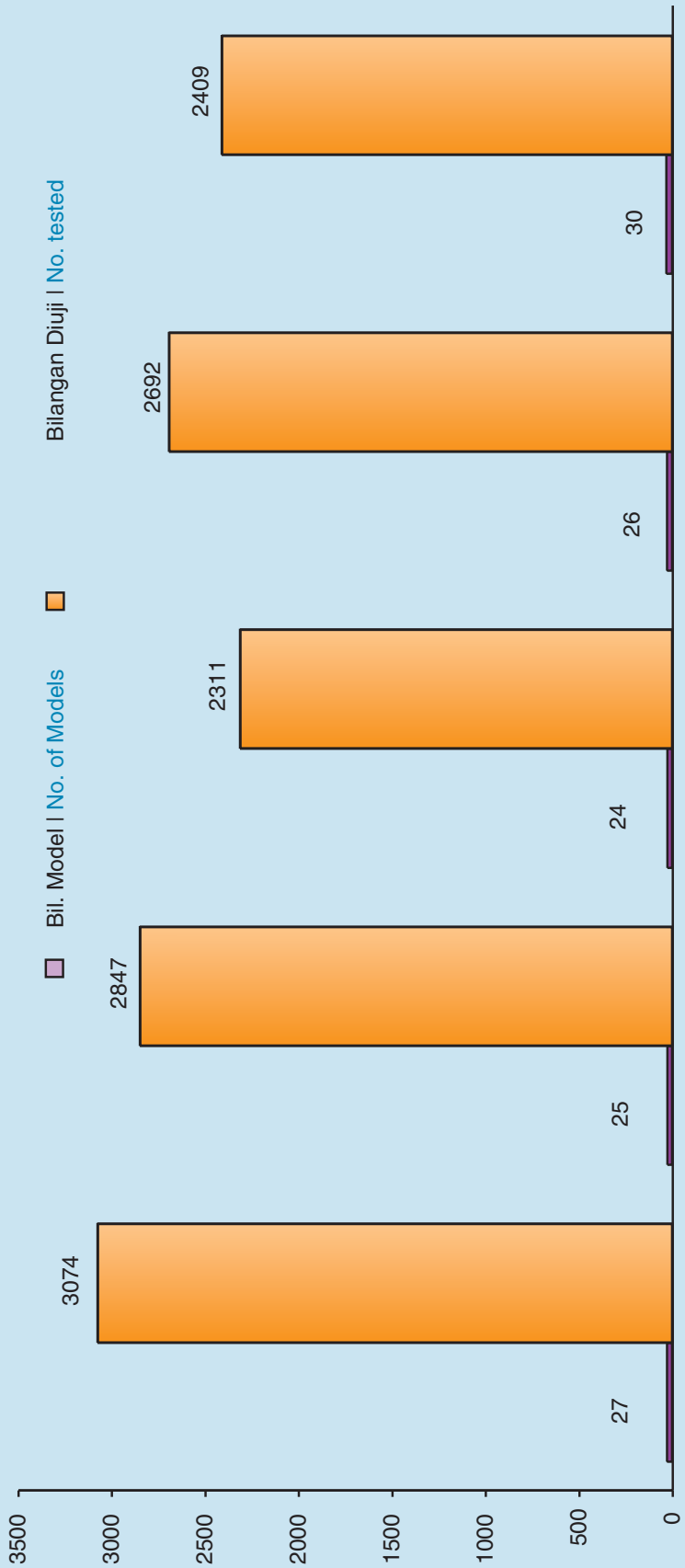


Rajah 5.15 Jabatan Alam Sekitar: Penguatkuasaan Pelepasan Asap Hitam Kenderaan Diesel Mengikut Jenis Kenderaan, 2003
Figure 5.15 Department of Environment: Diesel Vehicle Black Smoke Enforcement According To Vehicle Type, 2003

Rajah 5.16 Jabatan Alam Sekitar: Penguatkuasaan Pelepasan Asap Hitam Kenderaan Diesel Mengikut Negeri, 2003
Figure 5.16 Department of Environment: Diesel Vehicle Black Smoke Enforcement, Summons According to State, 2003



Rajah 5.17 Jabatan Alam Sekitar: Penguatkuasaan Bunyi Bising Daripada Motosikal, 1993-2003
Figure 5.17 Department of Environment: Motorcycle Noise Enforcement, 1993-2003



Rajah 5.18 Jabatan Alam Sekitar: Ujian Pelepasan Bunyi Bising Motosikal Daripada Syarikat Pemasang Motosikal, 1999-2003
Figure 5.18 Department of Environment: Noise Testing by Motocycle Assemblers, 1999-2003

TINDAKAN UNDANG-UNDANG

Pendakwaan

Pada tahun 2003, sejumlah 129 premis/syarikat telah didakwa dan disabitkan kesalahan oleh mahkamah dengan melibatkan denda berjumlah RM1,901,300.00 untuk kesalahan-kesalahan di bawah Akta Kualiti Alam Sekeliling 1974 (Rajah 5.19 dan Rajah 5.20). Daripada jumlah tersebut, sebanyak 55 (43%) kes mahkamah merupakan kesalahan mencemar perairan daratan melalui pengeluaran effluen melebihi had yang ditetapkan dibawah Seksyen 25(1) Akta Kualiti Alam Sekitar (AKAS) 1974. Terdapat 5 (29%) kes mahkamah yang melibatkan kesalahan pembakaran terbuka dengan jumlah denda sebanyak RM100,000.00.

Kompaun

Sejumlah 3502 kompaun telah dikeluarkan pada tahun 2003 kepada premis dan syarikat untuk pelbagai kesalahan di bawah Akta Kualiti Alam Sekeliling 1974. Daripada jumlah keseluruhan tersebut, sebanyak 2,320 (66%) kompaun adalah kesalahan di bawah Peraturan Kualiti Alam Sekeliling (Kawalan Pelepasan dari Enjin Diesel) 1996; 450 (13%) kompaun adalah kesalahan di bawah Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 1989; 384 (11%) kompaun adalah kesalahan di bawah Seksyen 29A, Akta Kualiti Alam Sekeliling 1974 dan sebanyak 348 (10%) kompaun adalah kesalahan di bawah Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978 (Rajah 5.21 dan Rajah 5.22).

Perintah Larangan

Perintah Larangan yang dikenakan ke atas sesuatu premis atau kilang merupakan langkah terakhir dalam tindakan penguatkuasaan setelah tindakan-tindakan lain seperti arahan, notis, kompaun dan tindakan mahkamah diambil kepada pihak premis atau pekilang. Bagi tahun 2003, tiada premis atau kilang yang dikenakan perintah larangan.

LEGAL ACTIONS

Prosecution

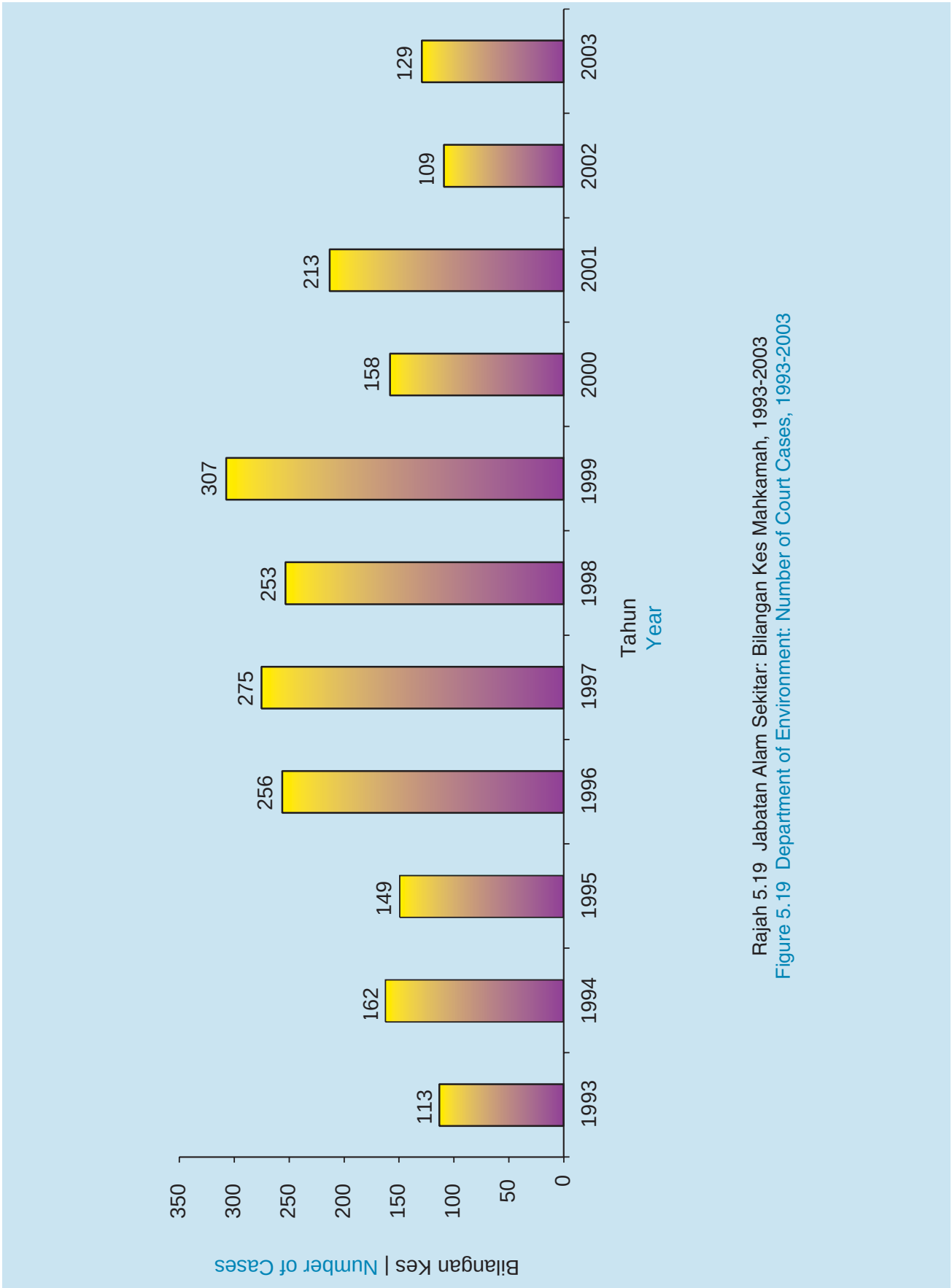
In 2003, a total of 129 premises or companies were taken to court and fined a total of RM1,901,300.00 for offences under the Environmental Quality Act, 1974 (Figure 5.19 and 5.20). Out of the total number of cases, 55 (43%) cases involved offences for polluting inland waters through discharges of effluent above the stipulated standard under Section 25(1) of the Environmental Quality Act (EQA) 1974. For open burning offences, 5 (29%) cases were prosecuted and fined a total of RM100,000.00.

Compounds

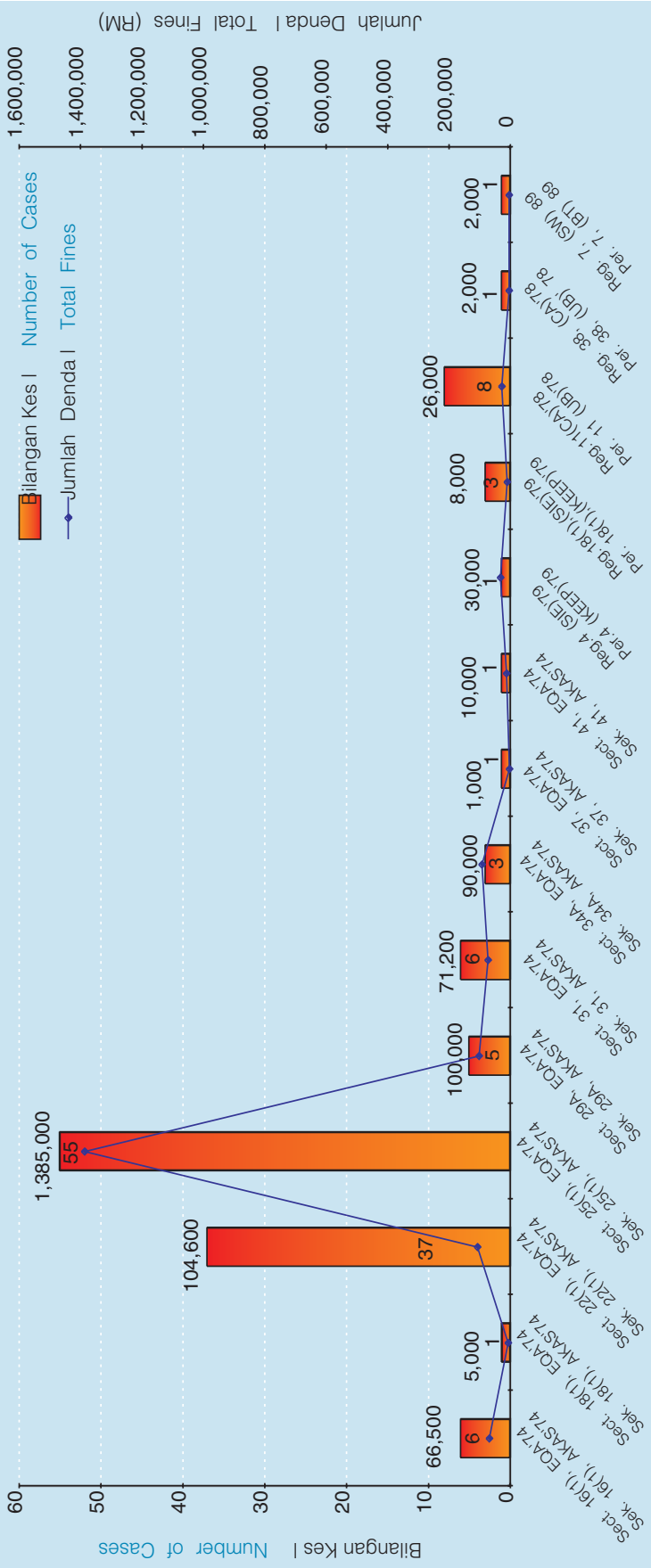
A total of 3,502 compounds were issued in 2003 to premises and companies for various offences under the Environmental Quality Act (EQA), 1974. Out of this total, 2,320 (66%) were offences under the Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996; 450 (13%) were offences under Environmental Quality (Schedules Wastes) Regulations 1989; 384 (11%) for offences under Section 29A of the Environmental Quality Act (EQA) 1974; and the remaining 348 (10%) were offences under the Environmental Quality (Clean Air) Regulations 1978 (Figure 5.21 and 5.22).

Prohibition Order

A Prohibition Order would be issued only as a last resort after other means of enforcement action such as directives, notices, compounds and court prosecution had been taken on the premises or companies. In 2003, no prohibition order was issued againts any premises.

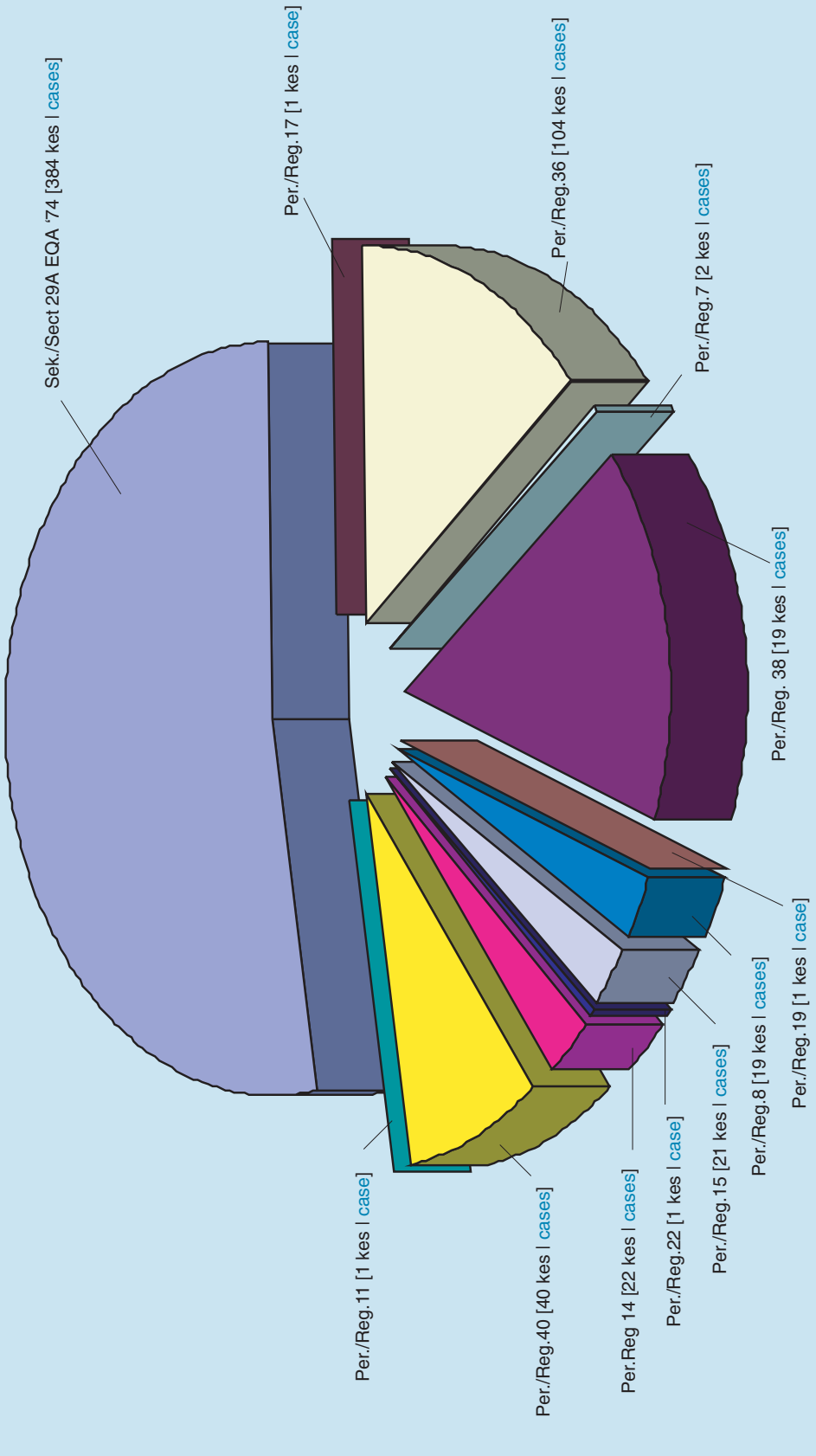


Rajah 5.19 Jabatan Alam Sekitar: Bilangan Kes Mahkamah, 1993-2003
Figure 5.19 Department of Environment: Number of Court Cases, 1993-2003

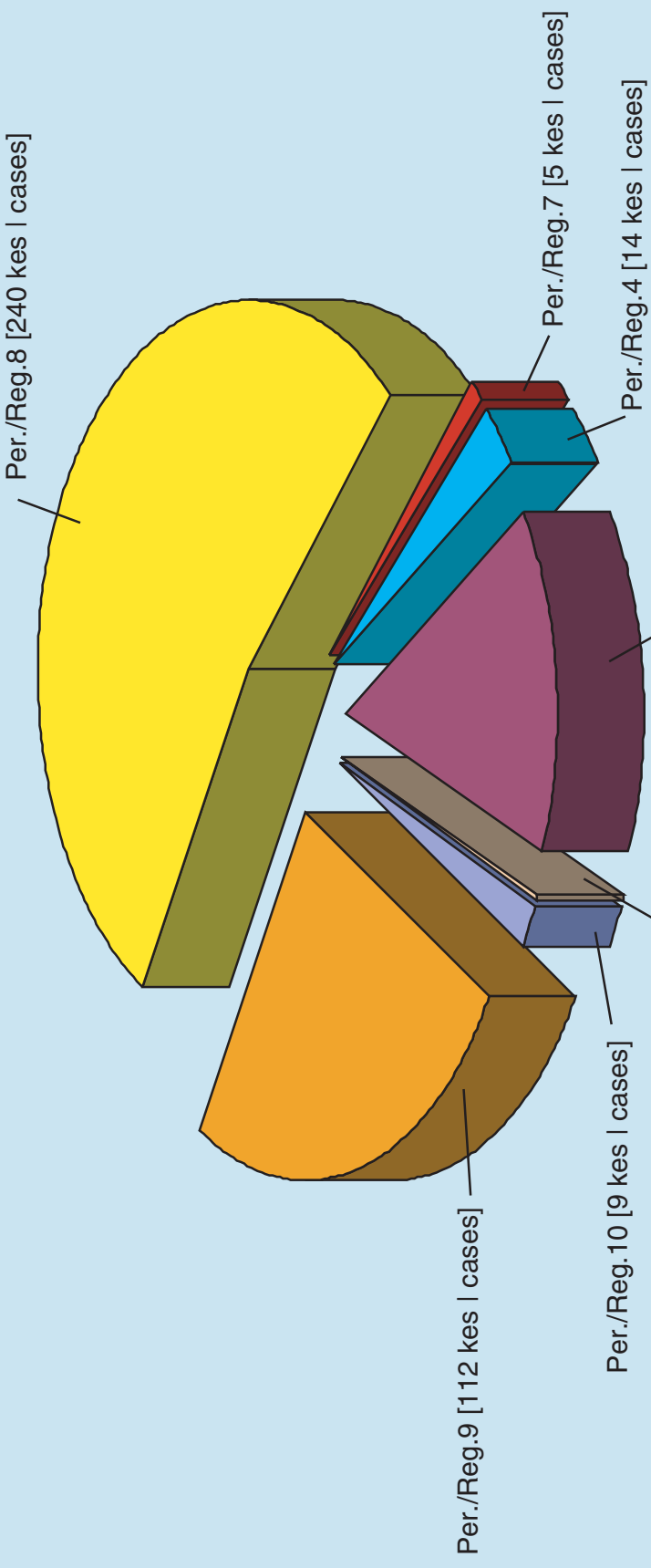


Rajah 5.20 Jabatan Alam Sekitar: Bilangan Kes Mahkamah dan Jumlah Denda, 2003

Figure 5.20 Department of Environment: Number of Court Cases and Fines Collected, 2003



Rajah 5.21 Jabatan Alam Sekitar 2003: Kompaun dibawah Peraturan Kualiti Alam Sekeliling (Udara Bersih) 1978 dan Seksyen 29A AKAS 1974,
Figure 5.21 Department of Environment 2003: Compounds under Environmental Quality (Clean Air) Regulations 1978 and Section 29A EQA 1974,



Rajah 5.22 Jabatan Alam Sekitar, 2003: Kompaun di bawah Peraturan Kualtiti Alam Sekeliling (Buangan Terjadual) 1989
Figure 5.22 Department of Environment, 2003: Compounds under Environmental Quality (Scheduled Wastes) Regulations 1989

PENGADUAN AWAM

Pada tahun 2003, sejumlah 2,324 aduan pencemaran alam sekitar telah diterima oleh Jabatan Alam Sekitar, iaitu peningkatan sebanyak 120 (52%) aduan berbanding dengan tahun 2002 (Rajah 5.23). Daripada jumlah keseluruhan aduan, sebanyak 1,784 kes aduan telah disiasat dan tindakan telah diambil di bawah peruntukan Akta Kualiti Alam Sekitar (AKAS) 1974 dan peraturan-peraturan yang berkaitan oleh Pejabat Jabatan Alam Sekitar Negeri. Sementara itu, 540 kes aduan telah dirujuk untuk tindakan agensi lain yang berkaitan.

Pada tahun 2003, Wilayah Persekutuan Kuala Lumpur terus menerima aduan yang tertinggi iaitu sebanyak 374 (16%) kes; diikuti oleh Selangor sebanyak 314 (14%) kes; dan Pulau Pinang sebanyak 262 (11%) kes. Wilayah Persekutuan Labuan menerima aduan yang paling sedikit iaitu sebanyak 21 (1%) kes (Rajah 5.24).

Seperti tahun-tahun yang sebelumnya, bilangan aduan pencemaran yang tertinggi adalah berkaitan pencemaran udara sebanyak 1,641 (71%) kes; 281 (12%) kes berkaitan pencemaran air; 123 (5%) kes berkaitan pencemaran bunyi; dan 80 (3%) kes berkaitan pelupusan haram buangan terjadual (Rajah 5.25).

PUBLIC COMPLAINTS

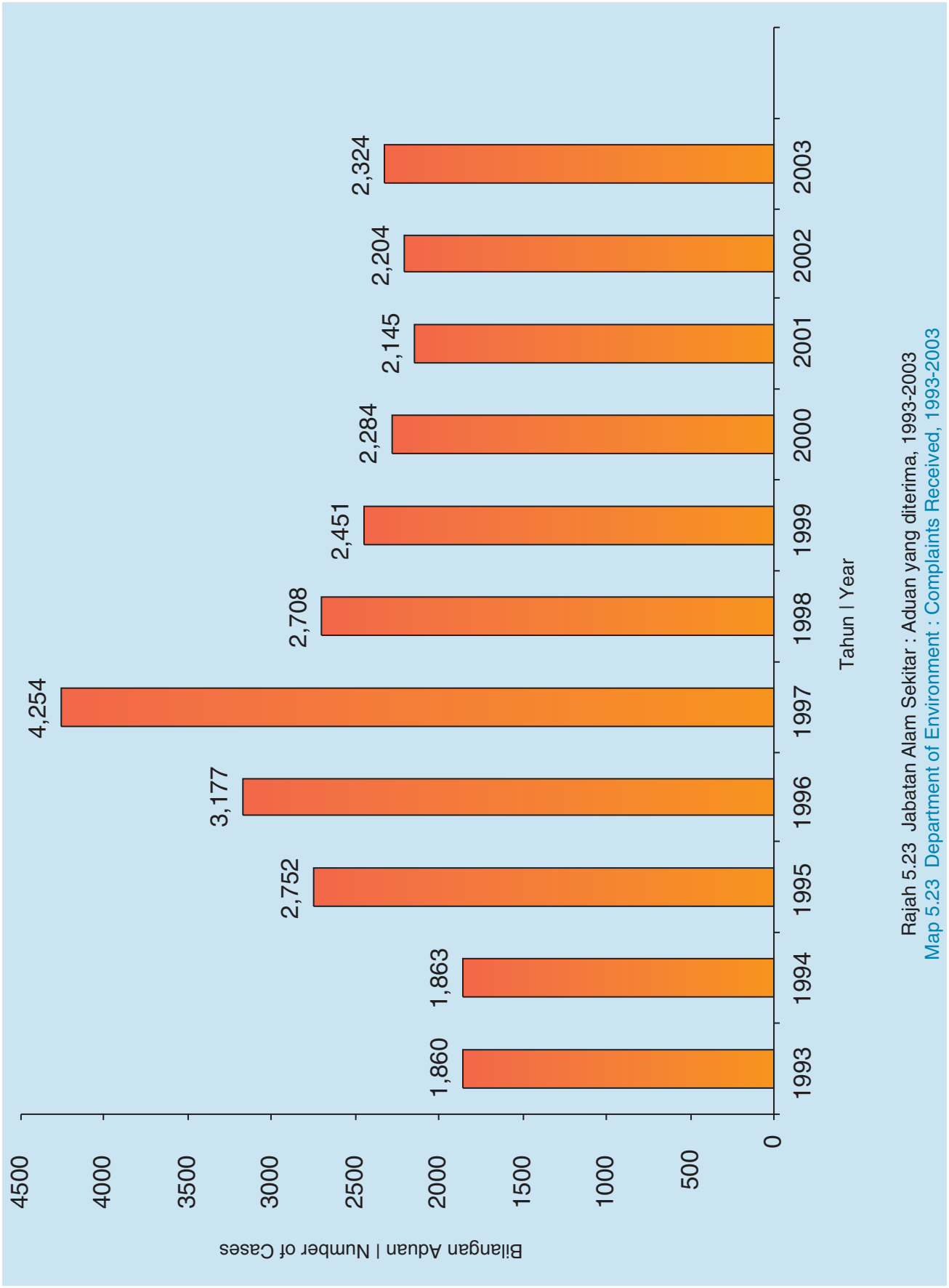
The Department of Environment received 2,324 environmental pollution complaints in 2003, an increase of 120 complaints (52%) compared to 2002 (Figure 5.23). Out of the total number of complaints received, 1,784 cases were handled by the Department of Environment State Offices, while the other 540 cases were referred to other relevant agencies.

In 2003, the Federal Territory of Kuala Lumpur recorded the highest number of complaints 374 (16%); followed by Selangor 314 (14%); and Penang 262 (11%) cases. The Federal Territory of Labuan recorded the least number of complaints with 21(1%) cases (Figure 5.24).

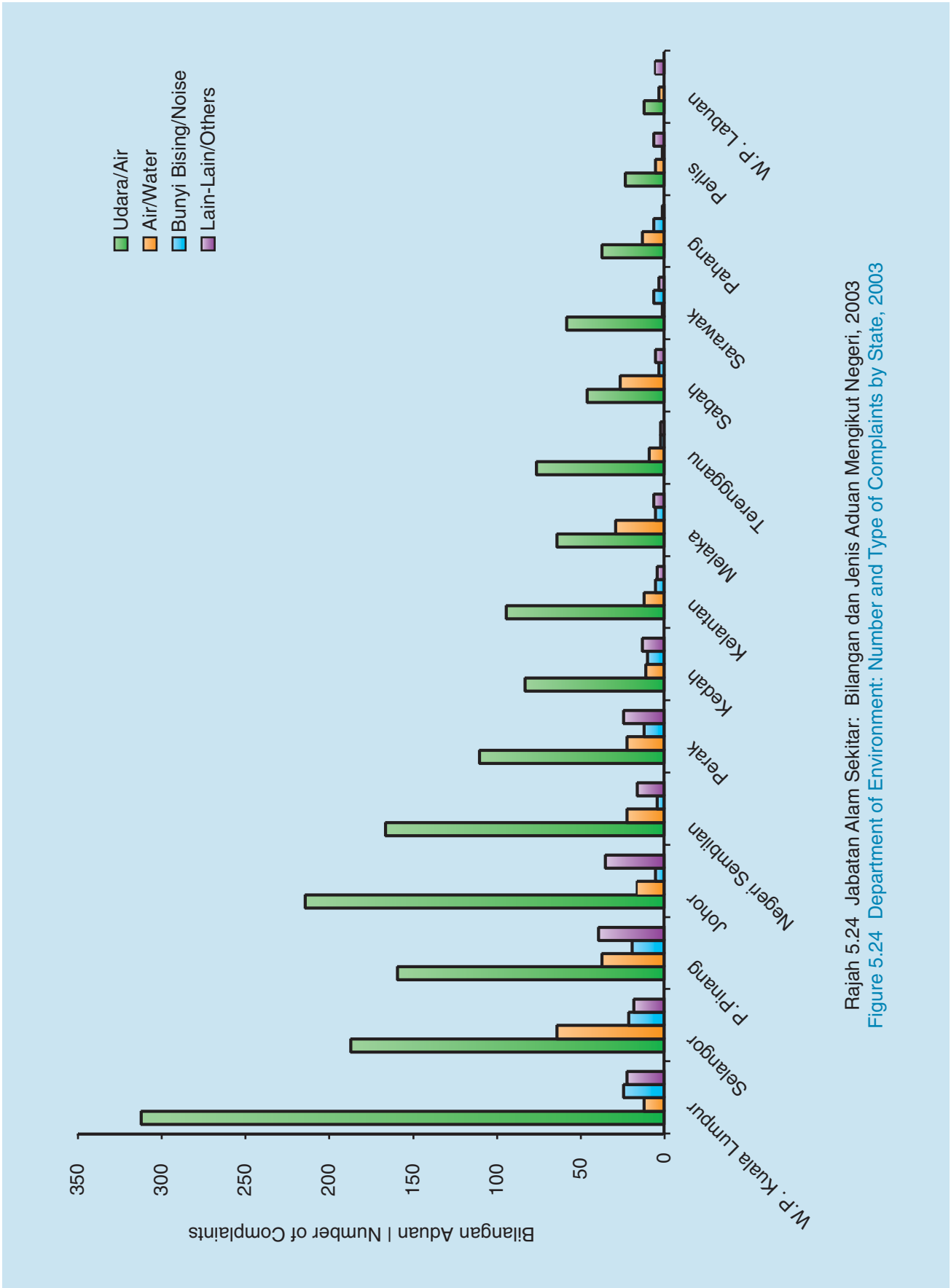
As in previous years, the number of air pollution complaints far exceeded other types of pollution complaints with 1,641 (71%) cases; 281 (12%) water pollution; 123 (5%) noise pollution; and 80 (3%) illegal dumping of scheduled or toxic wastes (Figure 5.25).

Gambarfoto 5.13 : Siasatan Aduan Pencemaran bersama Y.B Menteri Sains, Teknologi dan Alam Sekitar
Photo 5.13 : Investigation of Public Complaint together with the Minister of Science, Technology and the Environment

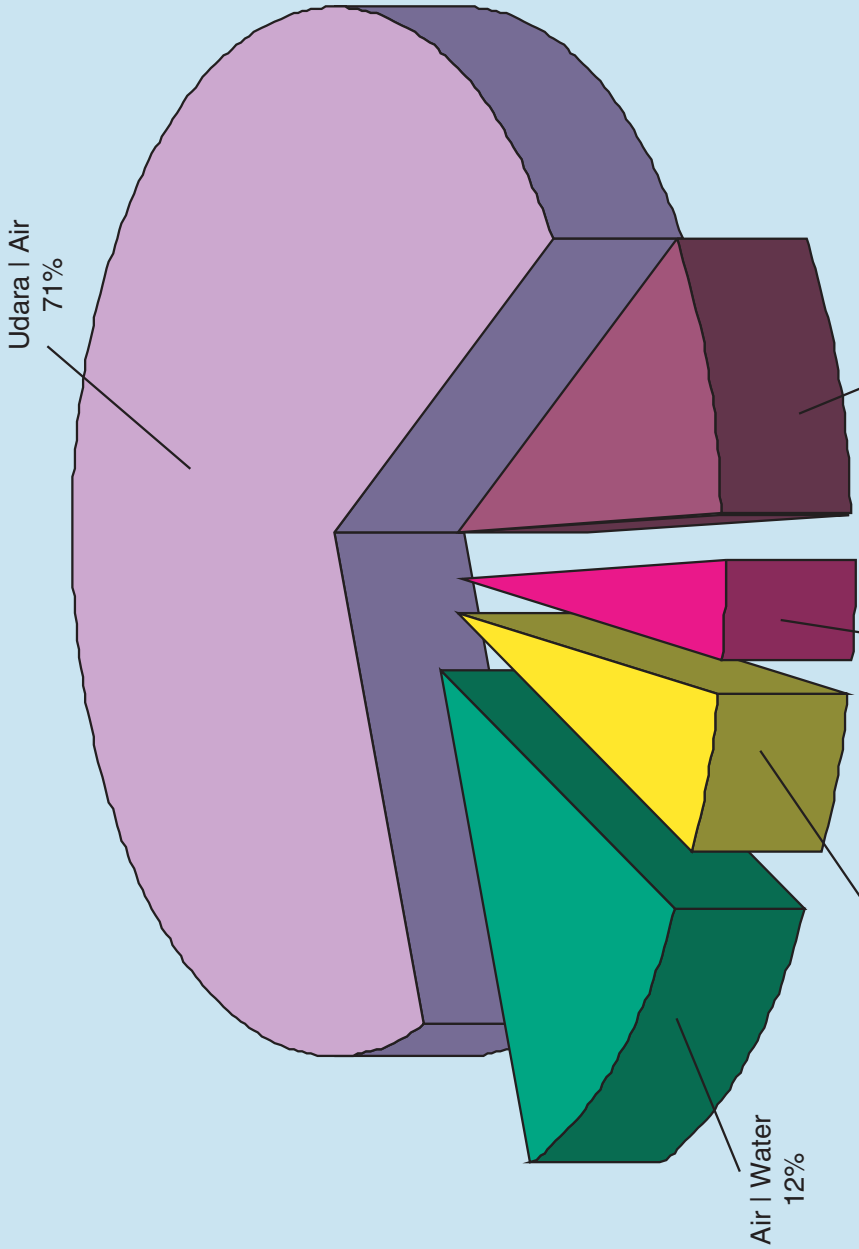
Gambarfoto 5.14 : Persampelan Rasmi Pelepasan Effluen Kilang
Photo 5.14 : Formal Sampling of Factory Effluent Discharges



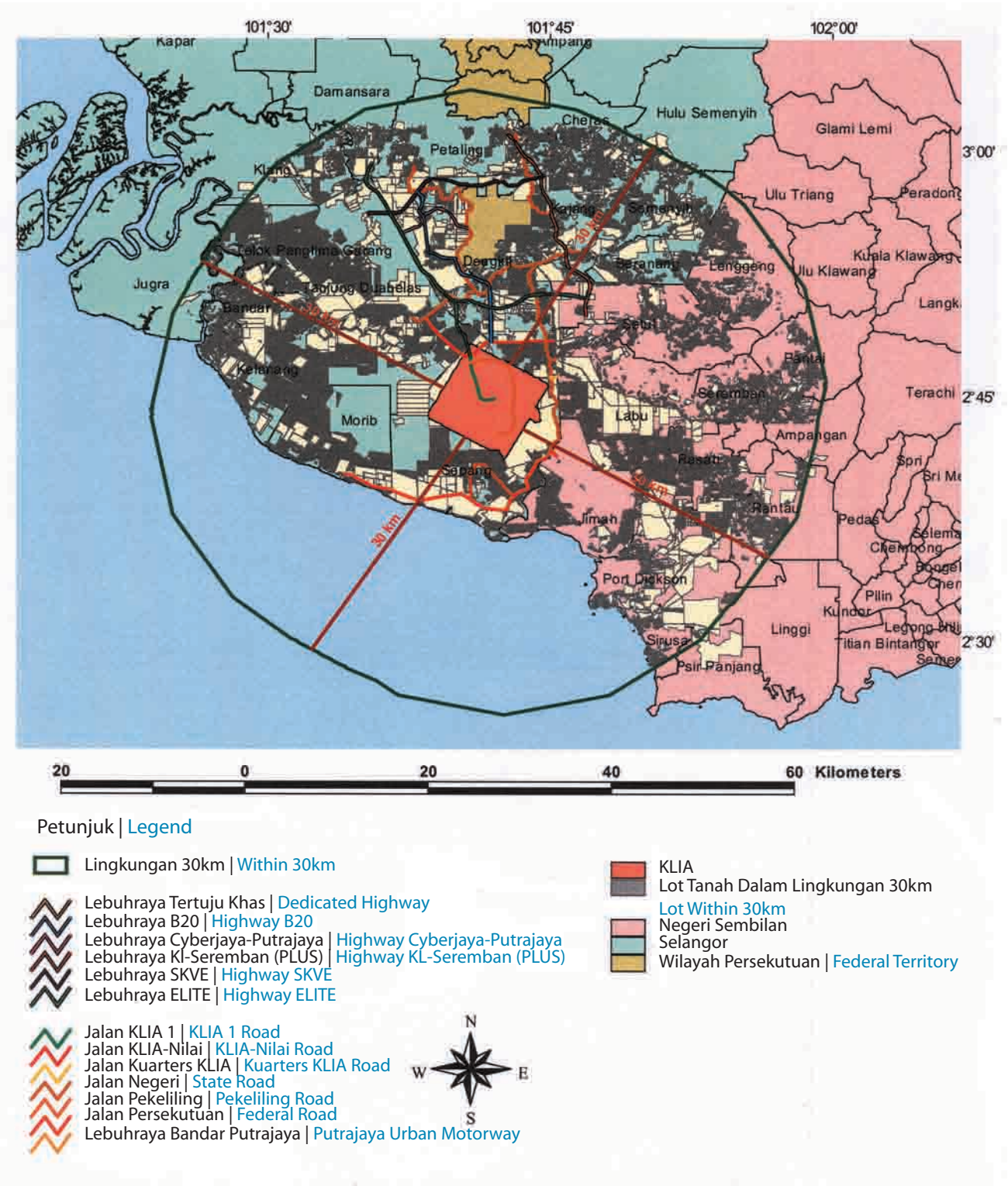
Rajah 5.23 Jabatan Alam Sekitar : Aduan yang diterima, 1993-2003
Map 5.23 Department of Environment : Complaints Received, 1993-2003



Rajah 5.24 Jabatan Alam Sekitar: Bilangan dan Jenis Aduan Mengikut Negeri, 2003
Figure 5.24 Department of Environment: Number and Type of Complaints by State, 2003



Rajah 5.25 Jabatan Alam Sekitar: Jenis Aduan Pencemaran, 2003
Figure 5.25 Department of Environment: Type of Pollution Complaints, 2003



Rajah 5.26: Kawasan Larangan Pembakaran Terbuka (30km jejari) di Sekitar Lapangan Terbang Antarabangsa Kuala Lumpur (KLIA) di bawah Seksyen 29A, AKAS, 1974

Figure 5.26: Prohibited Open Burning Zone (30km radius) Surrounding Kuala Lumpur International Airport, under Section 29A, EQA, 1974