APPENDIX

APPENDIX I

DOE Interim National Water Quality Standards for Malaysia

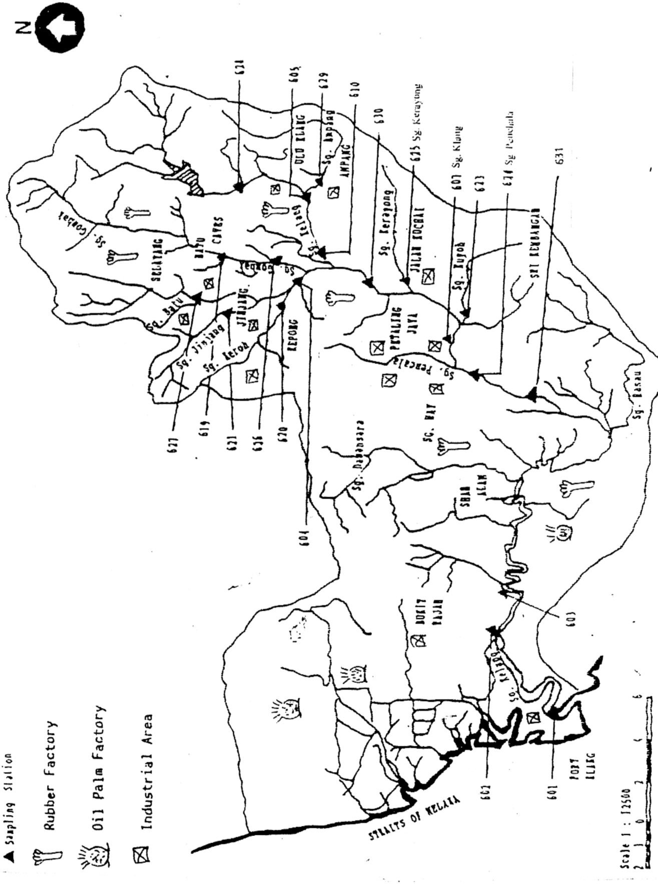
Parameters	(Units)	Classes					
		I	IIA/IIB	III#		IV	V
Al	mg/l		-	-	(0.06)	0.5	
As	mg/l		0.05	0.4	(0.05)	0.1	
Ba	mg/l		1	-		-	
Cd	mg/l		0.01	0.01*	(0.001)	0.01	
Cr (VI)	mg/l		0.05	1.4	(0.05)	0.1	
Cr (III)	mg/l		-	2.5		-	
Cu	mg/l		0.02	-		0.2	
Hardness	mg/l		250	-		-	
Ca	mg/l		-	-		-	
Mg	mg/l		-	-		-	
Na	mg/l		-	-		3 SAR	
K	mg/l		-	-		-	
Fe	mg/l		1	1		1 (leaf)	
		N					L
Pb	mg/l	A	0.05	0.02*	(0.01)	5 (other)	E
Mn	mg/l	T	0.1	0.1		5	V
Hg	mg/l	U	0.001	0.004	(0.0001)	0.002	E
Ni	mg/l	R	0.05	0.9*		0.2	L
Se	mg/l	A	0.01	0.25	(0.04)	0.02	S
Ag	mg/l	L	0.05	0.0002		-	
Sn	mg/l		-	0.004		-	
U	mg/l	L	-	-		-	A
Zn	mg/l	E	5	0.4*		2	B
		V					O
B	mg/l	E	1	-	(3.4)	0.8	V
Cl	mg/l	L	200	-		80	E
Cl_2	mg/l	S	-	-	(0.02)	-	
CN	mg/l		0.02	0.06	(0.02)	-	IV
F	mg/l		1.5	10		1	
NO_2	mg/l		0.4	0.4	(0.03)	-	
NO_3	mg/l		7	-		5	
P	mg/l		0.2	0.1		-	
Si	mg/l		50	-		-	
SO_4	mg/l		250	-		-	
S	mg/l		0.05	-	(0.001)	-	
CO_2	mg/l		-	-		-	
Gross-α	mg/l		0.1	-		-	
Gross-β	mg/l		1	-		-	
Ra-226	mg/l		< 0.1	-		-	
Sr-90	mg/l		< 1	-		-	

* = At hardness 50 mg/l $CaCO_3$

\# = Maximum (unbracketed) and 24-hour average (bracketed) concentrations

APPENDIX II

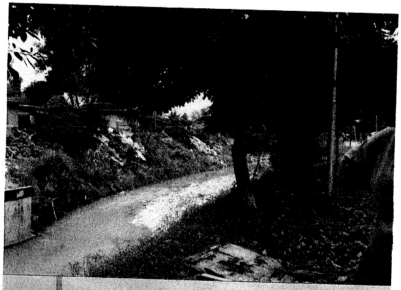
The map for the Sungai Penchala.

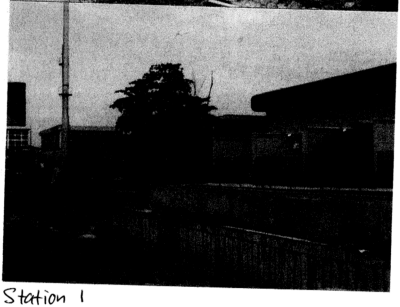


APPENDIX III

STATION 1 & 2

Station 2

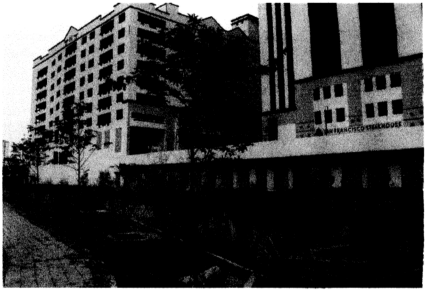




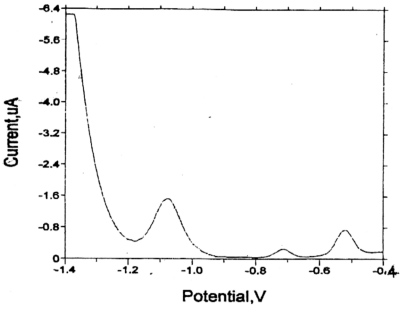
Station 1

APPENDIX III

STATION 3



APPENDIX IV

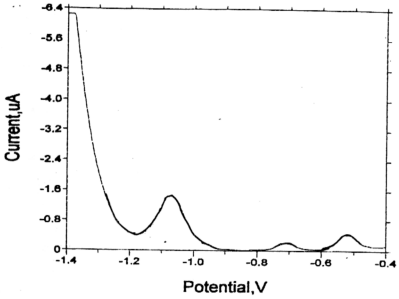


Mode: DPSV
Supporting electrolyte: KCl (0.1 M)
Drop size: 13

General Parameters:	i) Initial E:	-1400 mV
	ii) Final E:	-400 mV
	iii) Rotation rate:	100 rpm
	iv) Sensitivity:	10 µA/V
	v) Deposition time:	300 s
Specific Parameters:	i) Scan rate:	5 mV/s
	ii) Pulse amplitude:	50 mV
	iii) Sample width:	17 ms
	iv) Pulse width:	50 ms
	v) Pulse period:	200 ms
	vi) Quiet time:	30 s

Figure 5.25: The voltammogram for Station 1 by DPSV mode.

APPENDIX V

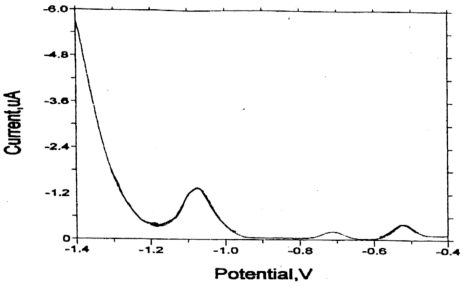


Mode: DPSV
Supporting electrolyte: KCl (0.1 M)
Drop size: 13

General Parameters:	i) Initial E:	-1400 mV
	ii) Final E:	-400 mV
	iii) Rotation rate:	100 rpm
	iv) Sensitivity:	10 µA/V
	v) Deposition time:	300 s
Specific Parameters:	i) Scan rate:	5 mV/s
	ii) Pulse amplitude:	50 mV
	iii) Sample width:	17 ms
	iv) Pulse width:	50 ms
	v) Pulse period:	200 ms
	vi) Quiet time:	30 s

Figure 5.26: The voltammogram for Station 2 by DPSV mode.

APPENDIX VI

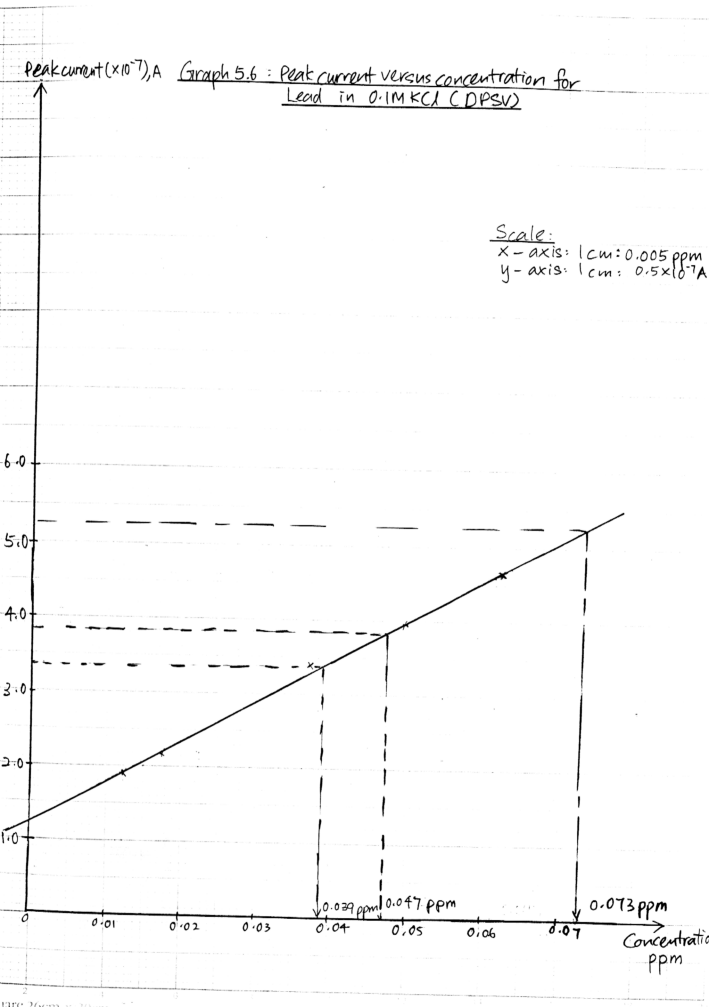


Mode: DPSV
Supporting electrolyte: KCl (0.1 M)
Drop size: 13

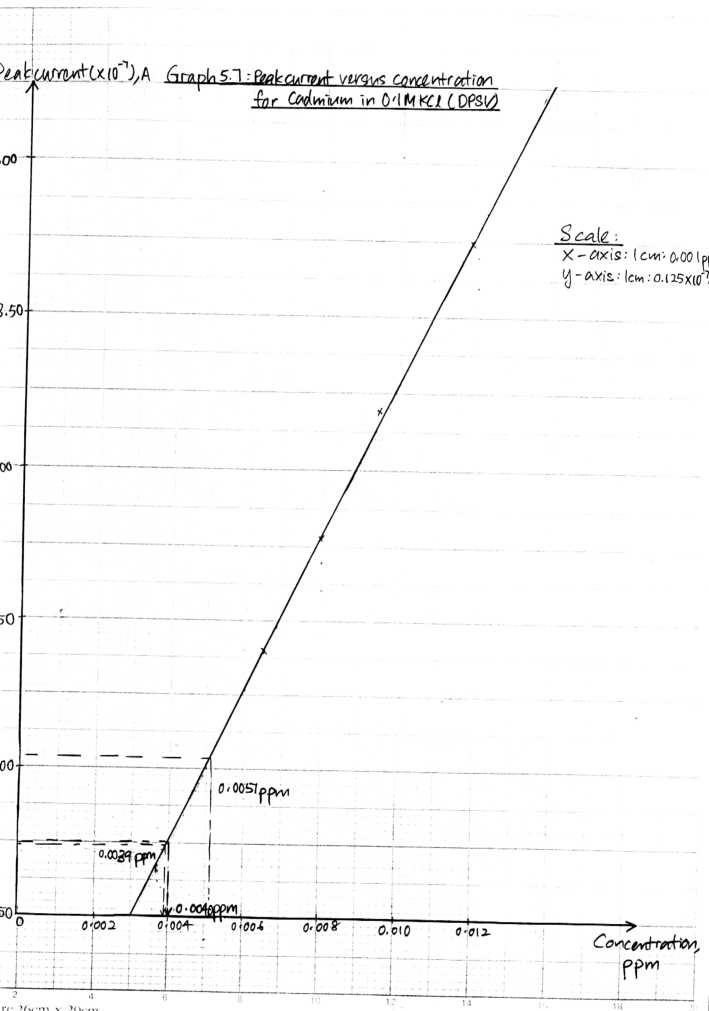
General Parameters:	i) Initial E:	-1400 mV
	ii) Final E:	-400 mV
	iii) Rotation rate:	100 rpm
	iv) Sensitivity:	10 µA/V
	v) Deposition time:	300 s
Specific Parameters:	i) Scan rate:	5 mV/s
	ii) Pulse amplitude:	50 mV
	iii) Sample width:	17 ms
	iv) Pulse width:	50 ms
	v) Pulse period:	200 ms
	vi) Quiet time:	30 s

Figure 5.27: The voltammogram for Station 3 by DPSV mode.

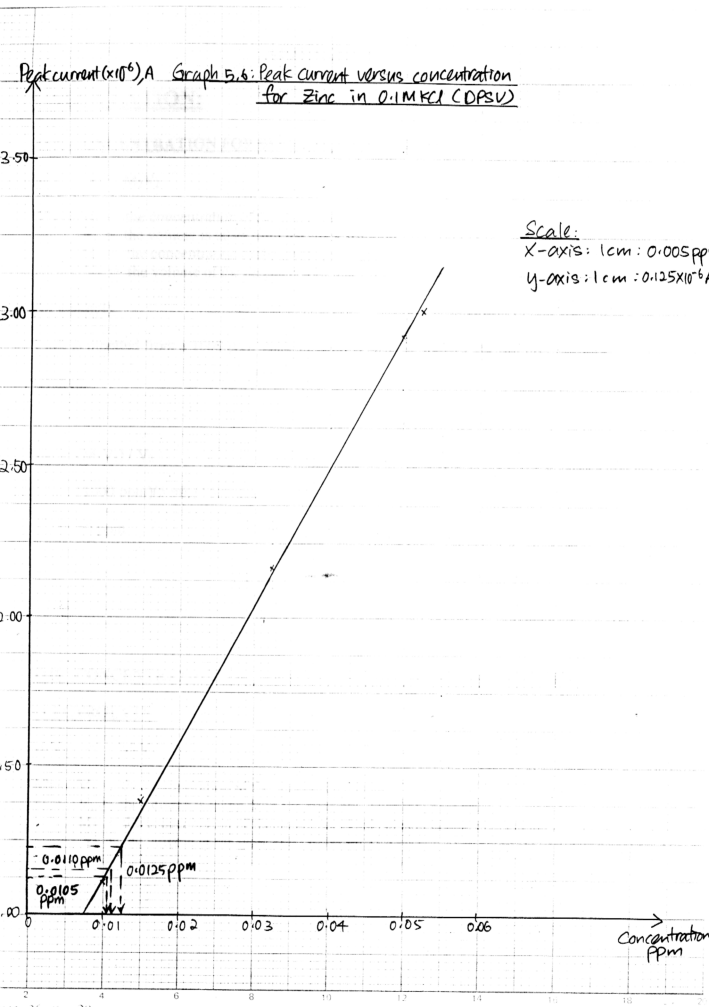
APPENDIX VII



APPENDIX VIII



APPENDIX IX


Peak current ($\times 10^{-6}$), A
Graph 5.6: Peak current versus concentration for Zinc in 0.1M KCl (DPSV)
Scale:
x-axis: 1cm : 0.005pp
y-axis: 1cm : 0.125x10^-6
3.50
3.00
2.50
2.00
1.50
1.00
0.0110ppm
0.0125ppm
0.0105 ppm
0
0.01
0.02
0.03
0.04
0.05
0.06
Concentration ppm

APPENDIX X

CALCULATION:

THE CONCENTRATION FOR STANDARD SOLUTIONS.

$M_1V_1 = M_2V_2$

Where M_1 = the concentration of the stock solution;
V_1 = the volume is taken from the stock solution;
M_2 = the concentration of the prepared solution;
V_2 = the volume of the prepared solution.

For example:

5 mL is pipetted from a 1000 ppm stock solution is used to prepare the 100 mL standard solution.

$M_2 = (M_1V_1) / V_2$

$= (1000 \text{ ppm})(5 \text{ mL}) / 100 \text{ mL}$

$= 50 \text{ ppm}$

THE CONCENTRATION OF METALS IN THE 10 mL OF SUPPORTING ELECTROLYTE.

$M_1V_1 = M_2V_2$

Where M_1 = the concentration of the standard solution;
V_1 = the volume is taken from the standard solution (0.05 mL);
M_2 = the concentration of the metals in 10 mL of supporting electrolyte;
V_2 = the volume in the glass cell (10.05 mL).

For example:

50 µL of the 50 ppm standard solution is pipetted into the 10 mL of supporting electrolyte.

$M_2 = (M_1V_1) / V_2$

$= (50 \text{ ppm})(0.05 \text{ mL}) / 10.05 \text{ mL}$

$= 0.25 \text{ ppm}$

THE CONCENTRATION OF THE METALS IN EACH STATION 1, 2, 3.

$M_1V_1 = M_2V_2$

Where M_1 = the concentration of the metal in river water;
V_1 = the volume is taken from the river water into the glass cell (6.0 mL);
M_2 = the concentration of the metal obtain from the calibration graph;
V_2 = the volume in the glass cell (10 mL).

For example:

The concentration of the lead from the calibration graph is 0.039 ppm.

$M_2 = (M_1V_1) / V_2$

$= (0.039 \text{ ppm})(10 \text{ mL}) / 6.0 \text{ mL}$

$= 0.065 \text{ ppm}$