

TABLE OF CONTENTS

	Page
Acknowledgment	iii
Abstract (in Thai)	iv
Abstract (in English)	v
List of Tables	ix
List of Figures	x
Chapter 1 Introduction	
1.1 Overview	1
1.2 Study areas	4
1.3 Objective of this study	4
1.4 Method of investigation	7
Chapter 2 Theoretical Consideration	
2.1 Introduction	9
2.2 Resistivity method	
2.2.1 Theory	9
2.2.2 Resistivity of earth materials	11
2.2.3 Array configurations	13
2.3 Induced polarization method	
2.3.1 Theory	17
2.3.2 Measurement of induced polarization effect	24
Chapter 3 Geologic Information and Data Acquisition	
3.1 Introduction	27
3.2 Mae Chong area	28
3.3 Khao Khi Nok area	31

3.4 Pong Nok Gaew area	38
Chapter 4 Data Processing and Results	
4.1 Introduction	43
4.2 Data processing	45
4.3 Data analysis	45
4.4 Result of Mae Chong sulphide deposit	47
4.5 Result of Khao Khi Nok graphite deposit	62
4.6 Result of Pong Nok Gaew clay deposit	78
4.7 Decay curve characteristics	96
4.8 Relationship of resistivity and chargeability parameters	113
4.9 Conclusion of results	127
Chapter 5 Discussion and Recommendation	
5.1 Discussion	131
5.2 Recommendation	133
References	135
Cirriculum Vitae	140

LIST OF TABLES

Table	Page
3.1 Specification of data acquisition of each study area.....	27
4.1 Summary of various data processed from data reduction.....	46
4.2 Summary of data files used in data analysis.....	46
4.3 Summary of sulphide mineralization.....	97
4.4 Summary of graphite mineralization.....	97
4.5 Summary of clay mineralization.....	97
4.6 Calculated parameters, a and b, of Mae Chong area.....	124
4.7 Calculated parameters, a and b, of Khao Khi Nok area.....	124
4.8 Calculated parameters, a and b, of Pong Nok Gaew area.....	125

LIST OF FIGURES

Figure		Page
1.1 Location map of three study areas.....		5
2.1 Four point electrode and set up parameter.....		12
2.2 Range of resistivity variation in some rock.....		12
2.3 Array set up and their resistivity formula.....		14
2.4 Pseudosection plot of sounding and profiling.....		14
2.5 Decay characteristic of (a) R-C circuit and (b) induced polarization.....		18
2.6 Illustration represents (a) rock pore passage with and without metallic mineral and (b) its R-C electrical circuit.....		18
2.7 Electrode polarization effect.....		20
2.8 Relationship of polarization effect with mineral content.....		20
2.9 Relationship of polarization effect with mineral grain size.....		21
2.10 Relationship of polarization effect with current density.....		21
2.11 Relationship of polarization effect with frequency applied.....		22
2.12 Relationship of polarization effect with fluid-filled in pore.....		22
2.13 Membrane polarization effect; (a) without external force, (b) under external force.....		23
2.14 Effect of charging time duration on polarization effect.....		23
2.15 Typical current signal used in; (a) time domain, (b) frequency domain.....		25
2.16 Measurement technique in time domain induced polarization (a) conventional technique and (b) time slice technique.....		25

Figure	Page
3.1 Topographic map of Mae Chong area.....	29
3.2 Geologic map of Mae Chong area.....	30
3.3 Lithologic log of Mae Chong sulphide deposit.....	32
3.4 Airborne electromagnetic (AEM) survey areas in Thailand.....	33
3.5 Topographic map of Khao Khi Nok area.....	35
3.6 Geologic map of Khao Khi Nok area.....	36
3.7 Lithologic log of Khao Khi Nok graphite deposit.....	37
3.8 Topographic map of Pong Nok Gaew area.....	39
3.9 Geologic map of Pong Nok Gaew area.....	40
3.10 Lithologic log of Pong Nok Gaew clay deposit.....	41
4.1 Flow chart of data preparation, processing, and presentation.....	44
4.2 Profile plot of apparent resistivity of Mae Chong sulphide deposit.....	49
4.3 Stacked profile plot of apparent resistivity of Mae Chong sulphide deposit.....	50
4.4 Conventional and complex resistivity pseudosections plot of Mae Chong sulphide deposit.....	51
4.5 Profile plot of apparent chargeability of Mae Chong sulphide deposit.....	52
4.6 Stacked profile plot of apparent chargeability of Mae Chong sulphide deposit.....	54
4.7 Profile plot of metal factor of Mae Chong sulphide deposit.....	55
4.8 Stacked profile plot of metal factor of Mae Chong sulphide deposit.....	56
4.9 Profile plot of chargeability of Mae Chong sulphide deposit.....	58

Figure	Page
4.10 Stacked profile plot of chargeability of Mae Chong sulphide deposit.....	59
4.11 Profile plot of frequency dependent of Mae Chong sulphide deposit.....	60
4.12 Stacked profile plot of frequency dependent of Mae Chong sulphide deposit.....	61
4.13 Profile plot of time constant of Mae Chong sulphide deposit.....	63
4.14 Stacked profile plot of time constant of Mae Chong sulphide deposit.....	64
4.15 Profile plot of apparent resistivity of Khao Khi Nok graphite deposit.....	66
4.16 Stacked profile plot of apparent resistivity of Khao Khi Nok graphite deposit.....	67
4.17 Conventional and complex resistivity pseudosections plot of Khao Khi Nok graphite deposit.....	68
4.18 Profile plot of Apparent chargeability of Khao Khi Nok graphite deposit.....	69
4.19 Stacked profile plot of apparent chargeability of Khao Khi Nok graphite deposit.....	70
4.20 Profile plot of Metal factor of Khao Khi Nok graphite deposit....	72
4.21 Stacked profile plot of metal factor of Khao Khi Nok graphite deposit.....	73
4.22 Profile plot of chargeability of Khao Khi Nok graphite deposit.....	74

Figure	Page
4.23 Stacked profile plot of chargeability of Khao Khi Nok graphite deposit.....	75
4.24 Profile plot of frequency dependent of Khao Khi Nok graphite deposit.....	76
4.25 Stacked profile plot of frequency dependent of Khao Khi Nok graphite deposit.....	77
4.26 Profile plot of time constant of Khao Khi Nok graphite deposit.....	79
4.27 Stacked profile plot of time constant of Khao Khi Nok graphite deposit.....	80
4.28 Profile plot of apparent resistivity of Pong Nok Gaew clay deposit.....	81
4.29 Stacked profile plot of apparent resistivity of Pong Nok Gaew clay deposit.....	83
4.30 Conventional and complex resistivity pseudosections plot of Pong Nok Gaew clay deposit.....	84
4.31 Profile plot of apparent chargeability of Pong Nok Gaew clay deposit.....	85
4.32 Stacked profile plot of apparent chargeability of Pong Nok Gaew clay deposit.....	86
4.33 Profile plot of metal factor of Pong Nok Gaew clay deposit.....	87
4.34 Stacked profile plot of metal factor of Pong Nok Gaew clay deposit.....	88
4.35 Profile plot of chargeability of Pong Nok Gaew clay deposit.....	90

Figure	Page
4.36 Stacked profile plot of chargeability of Pong Nok Gaew clay deposit.....	91
4.37 Profile plot of frequency dependent of Pong Nok Gaew clay deposit.....	92
4.38 Stacked profile plot of frequency dependent of Pong Nok Gaew clay deposit.....	93
4.39 Profile plot of time constant of Pong Nok Gaew clay deposit.....	94
4.40 Stacked profile plot of time constant of Pong Nok Gaew clay deposit.....	95
4.41 Top is decay curves of an anomalous zone and bottom is decay curves of non-anomalous zone Mae Chong sulphide deposit.....	98
4.42 Combined plot of anomalous and non-anomalous zones of Mae Chong sulphide deposit.....	100
4.43 Top is decay curves of an anomalous zone and bottom is decay curves of non-anomalous zone Khaokhi Nok graphite deposit.....	101
4.44 Combined plot of anomalous and non-anomalous zones of Khaokhi Nok graphite deposit.....	103
4.45 Top is decay curves of an anomalous zone and bottom is decay curves of non-anomalous zone Pong Nok Gaew clay deposit.....	104
4.46 Combined plot of anomalous and non-anomalous zones of Pong Nok Gaew clay deposit.....	105
4.47 Combined plot of sulphide, graphite, and clay deposits.....	106
4.48 Comparison of array configuration.....	109
4.49 Comparison of dipole separation.....	110
4.50 Comparison of transmitting time duration.....	112

Figure	Page
4.51 Graphs of apparent resistivity and apparent chargeability for n=1 of Mae Chong sulphide deposit.....	115
4.52 Graphs of apparent resistivity and apparent chargeability for n=1 of Khao Khi Nok graphite deposit.....	117
4.53 Graphs of apparent resistivity and apparent chargeability for n=1 of Pong Nok Gaew clay deposit.....	119
4.54 Plots of fitted parameter of Mae Chong sulphide deposit.....	121
4.55 Plots of fitted parameter of Khao Khi Nok graphite deposit.....	122
4.56 Plots of fitted parameter of Pong Nok Gaew clay deposit.....	123