

Curtin University Sustainability Policy Institute

**Environmental Regulations of the Mining Industry:
Two Case Studies from Western Australia**

Sunil Kantha Govinnage

This thesis is presented for the Degree

of

Doctor of Philosophy Degree

of

Curtin University

November 2018

DECLARATION

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

A handwritten signature in black ink, appearing to read "Sumi Gorin". The signature is written in a cursive style with a large, sweeping flourish at the end.

Signature

Date 26 October 2018

ABSTRACT

This PhD project investigates the mining regulatory framework (MinReF) of Western Australia (WA), and the environmental protection it provides during the lifecycle of mining operations. The MinReF—a construct developed for this study is defined as the Federal and State mining laws consisting of numerous legislation, regulations, policies and other administrative tools implemented by government agencies. It covers century-old legislation as well as more recent Acts.

The study was conducted using qualitative research methods to analyse the effectiveness of the environmental regulations based on an investigation of the overall MinReF, two case studies and interviews with regulators, lawyers, academics, researchers and stakeholders. This research is grounded in sustainable development principles but also draws from other disciplines such as public policy, legal doctrines and environmental law, regulation theory, theories of bureaucracy, and discourse analysis to understand relevant theoretical approaches concerning the study. The two case studies include a uranium mine which received approval in January 2017 but is not yet operational, and coal mining operations in the Collie Region of Western Australia.

The government of Western Australia regulates over 1000 mine sites, covering more than fifty different minerals, including coal, copper, iron ore, lithium, mineral sands, and uranium. As a result of the legacies of the past, there are 17,000 abandoned mines spread across Western Australia, and the MinReF needs to address issues relating to their rehabilitation. The existing MinReF has evolved over 100 years with several government agencies responsible for its implementation. It is characterised by complexity concerning both, regulations and administrative structures which have evolved to facilitate and regulate mining operations in the State. A distinctive feature of the WA's MinReF is its dichotomy allowing some of the mining operations to be carried out under the *Mining Act 1978* while others are based on purposefully designed State Agreements. The two case studies are examples of the use of State Agreements but are also subject to other legislation related to the issuing of mining tenements, land access, and mine closures.

The study identified seven challenges with the MinReF of WA. They are (i) inherent weaknesses of key legislation; (ii) unclear demarcations and overlap of legislation; (iii) ambivalence and dichotomy of the mining regulatory framework; (iv) lack of coordination of

mining regulatory framework and multi-agency roles; (v) absence of an apex-level agency to coordinate mining regulations; (vi) delays in introducing environmentally-centric legislation; and, (vii) lack of adaptive capacity. Following the comprehensive analysis and informed by the range of theoretical insights, the thesis develops a concept of adaptive capacity for the improvement of the mining regulatory framework of Western Australia. The thesis also analyses the notion of best practices to explore innovative ways to restore the health of the land affected by mining. Having identified both the strengths and weaknesses of the MinReF, this study proposes the need to introduce a new theoretical framework: “Adaptive Capacity for the improvement of the Mining Regulatory Framework of Western Australia” (ADMINREF) to advance the performance of the legislative framework concerning environmental protection and sustainable mining practices. This thesis includes a series of recommendations and a future research agenda.

Abstract referred International Conference Presentations

Some of the work in this thesis is drawn from the following conference papers which are primarily compiled by me.

Govinnage, S. (2014) "Sustainability Framework for the Mining Sector"
The IPAA 2014 International Conference, Research Day, Perth, Western Australia, 31
October 2014.

Govinnage, S. (2015) "Mining Reforms in Western Australia, and the global agenda on
sustainable mining". Pathways to futures: Inaugural Curtin Post Graduate Conference,
Bentley, Western Australia.
2 September 2015.

Govinnage, S & Marinova, D.(2017). "Corporate Social Responsibility: Some observations
the need to shift the paradigm". The CSR International Conference, Perth, Western
Australia, 28 -29 July 2017.

ACKNOWLEDGEMENTS

The research and writing of this thesis would not have been accomplished without the attention, support and encouragement of many people whose names do not appear in this acknowledgement. I will continue to extend my gratitude to them in this life, and beyond if that becomes a reality with my current consciousness.

First, I want to acknowledge my principal supervisor Professor Dora Marinova, who has been my teacher, mentor and friend for over 25 years. Her love and care for teaching and research, complemented by her gentle, patient and professional manners, helped me to maintain motivation over the journey of this research project and finally writing this thesis. Her encouragement, reminders, insights provided and advice to explore new ideas are very much appreciated. Dora's suggestion to consider case study methods for my investigation helped me to find facts and evidence that I would never have found, had I followed my pre-conceived notions of research methods when I enrolled in the PhD program. Dora's guidance made all the difference in conducting the research and finally writing the thesis.

My co-supervisor, Mr Peter McCafferty always found time to discuss matters relating to the key issues of this thesis. Peter always emphasised the need to find empirical evidence and helped me to develop alternative insights, and sometimes challenged me about the parameters and limitations of qualitative methodologies. He allocated time generously to read my early drafts and provided feedback.

Dr Talia Raphaely was one of my co-supervisors until she left Curtin University, and the support and encouragement she provided during the early stages of this research are warmly appreciated.

My friend, mentor, and former teacher, Professor John Phillipmore, Director, John Curtin Institute of Public Policy, Curtin University supported me by providing references and books upon request. I am grateful for his support, and encouragement.

Russel Clemens, a former colleague, was always available to chat over the phone, and person-to-person meetings to debate on public policy issues and other matters pertaining to sustainability issues by sharing his knowledge, and practical work experience in the public sector.

I thank Dr Myo Nyunt, a former colleague, scholar, and dear friend for sharing his wisdom, and offering me the best home-made coffee every time I visited his home.

I acknowledge my dearest elder sister, Dr Pushpa Wickramasuriya, an eminent physician who has acquired the highest academic and professional qualifications in our family, with deep respect and affection for her constant support and encouragement.

I thank my youngest sister, Ms Manohari de Zoysa ((Chuti) who is an educator, and my dearest friend, and brother-in-law Wimal de Zoysa, for their support and in particular sending me key books on social research methods from the USA to enable me to refer the most recent references in the methodology chapter.

My son Upulmal helped me throughout this research by supporting, and keeping me motivated by asking the questions: “Dad how is it going? When are you going to complete your thesis ah!”. I thank him for his invitations to share meals and watch the episodes of House of Cards at his warm apartment.

My daughter, Sunili Uthpalawanna, a feminist, an eminent lawyer, and Human Rights advocate supported my research work by providing insights on some legal matters despite her busy schedule, and feminist activities.

My dear young friend, Melbourne-based Dr Tharanga Dandeniya, was always available for chats about attacking procrastination, and tips for writing regularly. His suggestions of finding a comfortable chair in the corner of the house, and how to write continuously based on his successful PhD journey at Monash University, were most beneficial.

I also learnt much about research skills during my PhD journey by continually watching the vlogs by Professor Tara Brabazon, Dean of the Graduate Research.

My life-long friend, Dr Sarath Gunathilake, Professor of Public Health at State University, Long Beach, California was a good role model for my academic journey. His kind invitation to join his research team to conduct field research for the WHO Bangladesh in late 2016 was useful to refine my qualitative research and interviewing skills.

I must acknowledge three of my beloved friends based in Sri Lanka, the eminent bi-lingual writer Daya Dissanayake, poet Udeni Sarathchandra who always encouraged me to finish this project, and Sachitra Mahendra for his support and encouragement.

My life-long mentor and friend, Professor Wimal Dissanayake's encouragement is much appreciated. When I last wrote to him, complaining about winter weather in Perth, and asking for forgiveness for not writing a promised review of his latest poetry collection, Wimal immediately replied and encouraged me to finish writing my thesis as a priority.

I must acknowledge Melissa Pilkington, of 'To the Letter Transcripts', for providing a professional transcription of interviews in the most professional manner. Melissa also proof-read the first draft of the abstract and first chapter, and I record my gratitude and appreciation for her services.

I must extend gratitude for many of my peers including several "CUSPIans" who shared their time, food and friendship throughout the journey of this research project. There are too many to acknowledge by name. However, I must share my gratitude to all of them, and for the support extended in particular to Aditya Nugraha who has always shared his librarian skills whenever I had a question about references, Laura Kittle, Lucas Marie, Daniel Jukes, and Achmad Room Fitrianto for friendship and support and words of encouragement throughout my PhD journey. Bohan Wang, dear young friend was an excellent inspiration for sharing her study skills and goal settings for academic excellence.

I must also acknowledge the time given by all the research participants, whose names I cannot divulge in this thesis due to Curtin University's Code of Ethics.

I must record my gratitude to Chintana and Max Gerreyn for converting my concept of representing 'Western Australian Mining Regulatory Symphony' (WAMRS) into a visual and their contribution and time is much appreciated.

The staff of Curtin University's Graduate Research School helped me throughout from the beginning to the final submission of this thesis. I must acknowledge the support received from Ms Zalila Abdul Rahman, Ms Doreen Phan and Ms Catherine Martin for their prompt and professional responses to my questions. Ms July Lunn's support and all the hard work she has done for all graduate students must be acknowledged. Ms Marilyn Coen, Humanities Librarian's, assistance and the support extended to graduate students is warmly.

I am grateful to my dear Sri Lankan friends in Perth, especially, Banudla and Vinitha Rodrigo for their support, humour and a frequent invitation to social events at their home. Chintana and Chandima Meegamarachchi not only extended their warm friendship but offered me a

place to sleep after late nights spent working at the Curtin University 'Hub', saving me the long drive home.

Finally, but not least, I am grateful to my long-time friend Marilyn Beech who proof-read the abstract, chapters three, five, six, a part of chapter eight, and ten of this thesis

I must acknowledge the stipend I received through the post-graduate scholarship provided by the Australian Government supplemented by Curtin University for three and half years to support my survival during this PhD journey. I have neither received nor sought any financial support from any mining company in Perth, or elsewhere for this research.

I must finally declare that I had no conflict of interest in doing this research. I did not use any privileged or confidential information from any of the government agencies I have worked prior to become a full-time post-doctoral student in March 2014. If there is any sensitive information appearing in this thesis, the sources are the anonymous research participants who were contacted, and interviewed according to the Guidelines of Ethics as stipulated by the Code of Ethics of the Curtin University.

Sunil K Govinnage,
Curtin University Sustainability Policy Institute

2 October 2018

DEDICATION

I dedicate this thesis to:

Present and past generations of Whadjuk - Noongar people who lived and preserved a precious land and environment for over 60,000 without destroying our unique eco-system;

Professor Dora Marinova, my principal supervisor and Mr Peter McCafferty my co-supervisor for mentoring, and support extended to complete this research project;

And to the following ladies and gentlemen whom I met during academic, seminars, meetings and through follow up with them on their insightful writing on various subjects on mining-related work in Australia and elsewhere:

Dr Gavin Mudd, who has written some of the best peer-reviewed journal articles on a variety of subjects on Australian mining industry;

Dr Sara Bice, for her effortless research and academic contributions to areas such as responsible mining, corporate social responsibility and licence to operate;

Piers Verstegen, for being the other voice on environmental protection in Western Australia;

Charlie Roche for his effortless work and research on mining rehabilitation work in Australia and elsewhere;

Ms Mia Pepper for her tireless work on environmental protection and mine rehabilitation work;

16 anonymous research participants who gave their time and shared their insiders' stories to add value to this research project,

My two beloved children; Sunili Utpalawanna and Upulmal Govinnage,

Sachitra Mahendra who will one day soon write a better thesis than this work, and,

All present and future researchers who will continue to investigate environmental issues relating to mining in Australia and elsewhere.

TABLE OF CONTENT

Declaration.....	i
Abstract.....	iii
Conference presentations	v
Acknowledgements.....	vi
Dedication.....	x
Table of Content.....	xi
List of Tables.....	xvii
List of Figures.....	xix
List of Maps.....	xix
List of Boxes.....	xix
List of Photographs	xx

CHAPTER ONE: Research puzzle

Introduction	1
1.1 Introduction.....	1
1.2 Scope of the research project	2
1.2.1 Limitation of the research.....	3
1.3 The focus of the research project.....	4
1.4 An overview of the mining Industry in Western Australia.....	5
1.5 The objectives.....	6
1.5.1 Research question and the objectives.....	8
1.5.1.1 Research question.....	8
1.6 The rationale and justification of the research project.....	9
1.7 The significance of the research.....	11
1.8 Thesis structure.....	12

CHAPTER TWO:

Review of literature on global policy drivers on mining	15
2.1 Introduction	15
2.2 Sustainable development	16
2.2.1 Genesis and emergence of sustainable development as a new paradigm.....	16
2.2.2 Emergence of mining sustainability concept	33
2.3 The origins of global drivers on sustainability.....	36
2.4 The impact on the global sustainability drivers in the Australian mining sector.....	44

2.5 Summary of the chapter.....	45
---------------------------------	----

CHAPTER THREE:

Literature Review: Theoretical approaches.....	46
3.1 Introduction	46
3.2 Corporate social responsibility and social licence for mining.....	46
3.3 Theory of bureaucracy.....	48
3.4 Legal doctrines.....	50
3.5 Rule of Law.....	51
3.6 Discourse analysis.....	52
3.7 Chapter Summary	56

CHAPTER FOUR:

Literature review: mining and environmental laws, public policy & regulatory principles	57
4.1 Introduction	57
4.2 Mining Law	57
4.3 Environmental Law	60
4.4 Public Policy.....	61
4.5 Politics and Resource Development	63
4.5.1 The impact of party politics on uranium mining.....	66
4.5.2 The State minister's authority on mining approval.....	66
4.6 Regulation theory.....	68
4.7 Chapter Summary.....	70

CHAPTER FIVE

The history of mining legislation in Western Australia and key issues.....	71
5.1 Introduction.....	71
5.2 The history and evolution of mining legislation in Western Australia.....	71
5.3 Environmental regulatory reform agendas in Western Australia.....	74
5.4 The Mining Regulatory Framework of Western Australia.....	78
5.5 State Agreements.....	91
5.6 Government agencies responsible for implementing the WA MinReF.....	99
5.6.1 The Department of Mines, Industry Regulation and Safety.....	99
5.6.1.1 Mining Act 1978.....	100
5.6.1.2 Mining Rehabilitation Fund Act 2012.....	101

5.6.1.3 Guidelines for Preparing Mine Closure Plans.....	101
5.6.1.4 Mining Rehabilitation Fund Regulations 2013.....	102
5.7 Department of Water and Environment Regulation.....	102
5.7.1 Rights in Water and Irrigation Act 1914.....	104
5.7.2. Environmental Protection Act 1986.....	104
5.7.3 Environmental Protection (Clearing of Native Vegetation) Regulations 2004.....	105
5.7.4 Environment Protection and Biodiversity Conservation Act 1999.....	106
5.8 Department of Planning, Lands and Heritage.....	107
5.8.1 Department of Biodiversity, Conservation and Attractions.....	107
5.9. Abandoned mines and mine rehabilitation legislation.....	109
5.10. Environmental Compliance: The findings of two audit reports on current gaps of the regulatory framework	112
5.10.1 Findings of the WA Auditor General's Report on State.....	112
5.10.2 Findings of the Auditor General's Report on Environment Compliance.....	112
5.11 Summary.....	114

CHAPTER SIX

Methodology and methods.....	115
6.1 Introduction.....	115
6.2 Research philosophy and strategy.....	118
6.3 Qualitative research.....	118
6.3.1 Limitation of qualitative research.....	120
6.3.2. Research design.....	122
6.4 Case study method.....	125
6.4.1 Design of the case study research.....	126
6.4.2 Strengths and limitations of case study methods.....	128
6.5 Interviews.....	129
6.5.1 Selection of the sample.....	130
6.5.2 Ethical Considerations.....	131
6.6 Data collection.....	131
6.6.1 Data coding.....	133
6.6.2 Limitation of computer software in analysing qualitative data.....	134
6.7 Content Analysis.....	135
6.8 Limitation of the research.....	138
6.9 Summary of the chapter.....	139

CHAPTER SEVEN

Two Case Studies	140
7.1 Introduction.....	140
7.2 The Yeelirrie case study.....	142
7.2.1 Yeelirrie uranium deposit.....	142
7.2.2 History, ownership changes, amendments to the legislation and past environmental approval 1978 – 2016.....	145
7.2.3 The Uranium (Yeelirrie) Agreement Act.....	148
7.2.4 Amendments to the Yeelirrie Act.....	152
7.2.5 Legal issues about the ownership of the Yeelirrie Project.....	154
7.2.6 Uranium regulatory frameworks Federal and State Government’s discourses	160
7.2.7 A Critique of uranium mining approval framework – Western Australia.....	163
7.2.8 Yeelirrie Project Environmental approval	164
7.2.9 Cameco’s proposal on the Yeelirrie project.....	167
7.2.10 Conclusions.....	174

CASE STUDY TWO:

Environmental regulations of coal mining in Western Australia	176
7.3.1 Introduction.....	176
7.3.2 Background.....	177
7.3.3 Approval of Coal mining regulation of Western Australia.....	180
7.3.4 A critique of the environmental regulations in State Agreements used for coal.....	182
7.3.5 Weaknesses of the Griffin Agreement Act 1979	184
7.3.6 Lack of regulatory provisions for environmental protection in State Agreements.....	184
7.3.7 Inherent weaknesses of State Agreements managing coal mining	185
7.3.8 Sustainability and environmental performance of the two coal mining companies.....	190
7.3.9 Environmental impact of coal mining in the Collie Region.....	191
7.3.10 Conclusions: Second case study.....	195
7.4 Conclusions of two case studies.....	195

CHAPTER EIGHT :

Strengths and weaknesses of WA Mining Regulatory Framework	197
8.1 Introduction.....	197
8.2 Data description.....	203
8.3 Description of the research participants.....	203
8.4 Strengths of the WA mining regulatory framework	207
8.5 Research findings	209
8.5.1 Inherent weaknesses of the key mining Acts	209
8.5.2 Rights in Water and Irrigation Act 1914.....	209
8.5.3 Mining Act 1978.....	209
8.5.4 Mining Rehabilitation Fund Act 2012.....	212
8.5.5 State Agreements	212
8.5.6 Environmental Protection Act 1986.....	215
8.5.7 Environmental Protection and Biodiversity Act 1999 (EPBC Act).....	216
8.6 Unclear demarcations and overlaps of legislation.....	218
8.7 Ambivalence and dichotomy of the mining regulatory framework	221
8.8 Lack of coordination of the mining regulatory framework and multi-agency roles.....	223
8.9 Absence of an apex level agency to coordinate mining regulations.....	232
8.10 Delays in introducing environmentally-centric legislation and regulations	234
8.11 Lack of adaptive capacity	236
8.12 New theoretical framework.....	241
8.13 Summary	244

CHAPTER NINE:

Best Practice models and environmental regulatory strategy of Western Australia ..	246
9.1 Introduction.....	246
9.2 Problematics of defining best practice.....	246
9.3 Regulating environmental protection by Western Australian agencies.....	250
9.3.1 Best practice model of the Department of Mining, Industry, Resources and Safety.....	251
9.4 Examples of innovative best practices.....	258
9.4.1. National Land Care Program.....	259
9.4.2. Mining rehabilitation and restoration of the ecosystem due to old mining legacies: Greenbushes, Western Australia.....	263
9.4.3 Royal Commission on South Australia's participation in the nuclear fuel cycle.....	266

9.4.4 Innovative approaches to re-use difficult to rehabilitate abandoned mines.....	268
9.4.5 Production and storage of cheese in an abandoned mine: Italy.....	272
9.4.6 Wieliczka Salt Mine – Re-use of abandoned mine as a cultural centre and a tourist destination.....	274
9.5 Summary.....	276
 CHAPTER TEN:	
Conclusions	278
10.1 Introduction.....	278
10.2 Addressing the research question and objectives	279
10.3 Research objective one	279
10.4 Research objective two	280
10.5 Research objective three.....	280
10.6 Research objective four.....	281
10.7 Summary	281
 CHAPTER ELEVEN:	
Recommendations and future research directions	283
11.1 Introduction.....	283
11.2 Recommendations.....	284
11.3 Future Research Agenda.....	286
 REFERENCES	 291
APPENDIX A Information sheet for participants.....	321
APPENDIX B Questionnaire	323
APPENDIX C Federal Government’s response to the National Audit Report on the EPBC Act.....	327

LIST OF TABLES

TABLE 2.1	The emergence and evolution of sustainable development concept.....	19
TABLE 2.2	Principles of mining sustainability	35
TABLE 2.3	A summary of the evolution of GRI as a global driver of sustainable reporting.....	37
TABLE 4.1	Key elements of regulatory design principles	69
TABLE 5.1	Mining regulatory framework according to the WA Auditor General	82
TABLE 5.2	The Mining regulatory framework of Western Australia - Key legislation, regulations and policies	83
TABLE 5.3	List of Western Australian State Agreements.....	93
TABLE 5.4	Arguments and assumptions supporting state agreements	96
TABLE 5.5	Shortcomings of State Agreements – Summary of key literature.....	97
TABLE 5.6	Best practice principles (Interim) of Department of Water Environment Regulation.....	103
TABLE 5.7	The objectives of the Environment Protection and Biodiversity Conservation Act 1999.....	106
TABLE 5.8	Timeline of Mining Rehabilitation Legislation.....	110
TABLE 6.1	Research question, Objectives and Methods.....	116
TABLE 6.2	Comparison of quantitative and qualitative research.....	121
TABLE 6.3	Data coding categories.....	133
TABLE 6.4	Merits and demerits of content analysis as a research method.....	136
TABLE 7.1	Timeline of the Yeelirrie uranium mine, 1972 – 2017.....	145
TABLE 7.2	A sample of special conditions under the Yeelirrie Act.....	149
TABLE 7.3	Amendments to the Yeelirrie State Agreement Act 1978.....	153
TABLE 7.4	Federal legislation of uranium approval, production and transportation.....	160
TABLE 7.5	Western Australian Government’s description on uranium.....	161
TABLE 7.6	Uranium regulatory Framework: Western Australia.....	162
TABLE 7.7	Yeelirrie project - Timeline of the environmental approval (1978 – 2017).....	165
TABLE 7.8	Summary of public submissions on the Yeelirrie project.....	168
TABLE 7.9	EPA’s Environmental Assessment of the Yeelirrie project.....	168
TABLE 7.10	Key environmental issues of the Yeelirrie project.....	170
TABLE 7.11	History of Collie coal mining, 1923 – 2017.....	179
TABLE 7.12	Environmental consequences of pit lakes in Collie	192

TABLE 8.1 Summary of key sustainability issues ascribed environment.....	199
TABLE 8.2 Summary of expertise of research participants.....	205
TABLE 8.3 Mining legislation enacted by the Western Australian Govt since 2011.....	233
TABLE 8.4 Key elements of adaptive governance and strengths and weaknesses of mining regulatory Framework compared.....	238
TABLE 9.1 Examples of best practice standards	249
TABLE 9.2 Two best practice models of Western Australian regulatory agencies.....	253
TABLE 9.3 National Landcare Program - Participation by States and Territories.....	260
TABLE 9.4 Western Australian Community groups participating in National Land Care Program.....	261
TABLE 9.5 Examples of re-use of abandoned mines	269
TABLE 11.1 Recommendations to address gaps and deficiencies of the mining regulatory framework	285
TABLE 11.2 Future research agenda	288

LIST OF FIGURES

FIGURE 1 The triple bottom line of sustainable development.....	6
FIGURE 5.1 A schematic diagram of the Mining Regulatory Framework in Western Australia.....	80
FIGURE 6.1 Research methodology.....	125
FIGURE 8.1 Data collection for the analysis of the mining regulatory framework.....	202
FIGURE 8.2 Participants' views on environmental protection	206
FIGURE 8.3 Mining regulatory symphony of Western Australia.....	229
FIGURE 8.4 Adaptive capacity for the improvement of the mining regulatory framework	242
FIGURE 9.1 National Landcare Program Participation by States and Territories.....	262

LIST OF MAPS

MAP 7.1 Location of the Yeelirrie uranium mine.....	143
MAP 7.2 Description of Yeelirrie uranium deposits.....	144
MAP 7.3 Map of Collie Region: Map of Collie Region and coal mine sites.....	178

LIST OF BOXES

BOX 5.1 Administrative functions of the Department of Mines, Industry Regulation and Safety.....	100
BOX 7.1 Ministerial decision of approving the Yeelirrie project.....	173
BOX 8.1 Federal government's response to the national audit report on the EPBC Act.....	218
BOX 8.2 Regulator's views on the fragmented nature of mining Framework.....	226

LIST OF PHOTOGRAPHS

PHOTOGRAPH 9.1 Fontina's valpelline cheese factory & warehouse.....	273
PHOTOGRAPH 9.2 Wieliczka salt mine: Poland - An abandoned salt mine as a cultural and tourist centre.....	275

ABBREVIATIONS

ABC – Australian Broadcasting Corporation

ABS – Australian Bureau of Statistics

ACF – Australian Conservation Foundation

ADMINREF – Adaptive Capacity for the improvement of the Mining Regulatory Framework of Western Australia

AFR – Australian Financial Review

AER – Annual Environmental Report

AFR – Australian Financial Review

ANAO – Australian National Audit Office

ALCP – Australian Government’s Landcare Program (“ALCP”)

AusIMM – Australian Institute of Mineral and Mining

BHP – The Broken Hill Proprietary Company Limited (BHP), an international mining first incorporated in 1885 and commencing mining silver and lead at Broken Hill, in New South Wales, Australia.

BHPB – BHP Billiton Limited and BHP Billiton, a multinational mining, metals and petroleum public company headquartered in Melbourne, Australia

CEEC – Coalition for Energy Efficient Communitation

CERES – Coalition for Environmentally Responsible Economies

CFCs – Chlorofluorocarbons

CSR – Corporate Social Responsibility

CSIRO – Commonwealth Scientific and Industrial Research Organisation

CSRP – Centre for Sustainable Resource Processing

DBCA – Department of Biodiversity, Conservation and Attractions

DDT – Dichlorodiphenyltrichloroethane

DBCA – Department of Biodiversity, Conservation and Attractions

DIA – Department of Indigenous Affairs (WA)

DPLH – Department of Land Administration

DME – Department of Mines and Energy

DMP – Department of Mines and Petroleum

DMIRS – Department of Mines, Industry, Resources, and Safety (See also DMP)

DSD – Department of State Development

DJTSI – Department of Jobs, Tourism, Science and Innovation (See also DSD)

DWER – Department of Water and Environmental Regulation

ENB – Earth Negotiations Bulletin

EPBC – Environment Protection and Biodiversity Conservation Act 1999

EIA – Environmental Impact Assessment
EIR – Extractive Industries Review
EDF – Environmental Defense Fund (USA)
EMS – environmental management system EMS.
FoE – Friends of the Earth
FoEA – Friends of the Earth Australia
GEF – Global Environment Facility
GSWA – Geological Survey of Western Australia
GDP – Gross Domestic Products
GMI – Global Mining Initiative
GRI – Global Reporting Initiative
GRO – Gold Regulation Ordinance 1854
GSP – Gross State Products (WA)
GSSB – Global Sustainability Standards Board
ICMM – International Council of Mining and Minerals
IEA – International environmental agreement
ISO – International Standard Organization
IISD – International Institute for Sustainable Development
IUCN – International Union for the conservation of nature and natural resources
IIED – International Institute for Environment and Development
LA Act – Land Administration Act 1997
LGA – Local Government Areas
NRDC - Natural Resources Defense Council (USA)
NTA – Native Title Act 1993
MCA – Minerals Council of Australia
MCP – Mine Closure Plan
MEA – Millennium Ecosystem Assessment
MRF – Mining Rehabilitation Funds
MMSD – Mining, Minerals and Sustainable Development
MMSDP – Mining, Minerals, and Sustainable Development (MMSD) Project
OECD – Organisation for Economic Co-operation and Development
SAs – State Agreements
SDD – Sustainability Disclosure Database
SDIMI – Sustainable Development Indicators for the Australian Minerals Industry
SMEs – Small and medium-sized enterprises
SMI – Sustainable Minerals Institute
SLO – Social Licence for Operation

SSE – Sustainable Stock Exchanges
TBL – Triple-Bottom Line of sustainable development
WA – Western Australia
WAPC – Western Australian Planning Commission
WBCSD – World Business Council for Sustainable Development
WCED – World Commission on Environmental and Development
WAAG – Western Australian Auditor General
WAG – Western Australian Government
WFF – World Wild Life Fund
WIA – Abstraction of Groundwater: Water and Irrigation Act 1914
WMC – Western Mining Corporation (WMC)
WRI – The World Resources Institute (USA)
UN – United Nations
UNGCG – United Nations’ Global Compact Group
UNCOD – United Nations Conference on Desertification
UNEP – United Nations Environment Program
UNCHE – United Nation Conference on Human Environment
UNESCO – United Nations Educational, Scientific and Cultural Organization
UNGCG – United Nations’ Global Compact Group

GLOSSARY OF TERMS

Abandoned mines - “*abandoned mine site* means land declared to be an abandoned mine site” (MRF Act, section 9(1)).

Act - An Act of Parliament. “A statute, what a parliament *enacts* when it makes laws. The term ‘statutes’ and ‘Acts’ are interchangeable (Mann, 2013, p.15)

Legislation

- (1) Making LEGAL something that was not legal...
- (2) Another usage treats legislation as roughly synonymous with JURISDICTION or JUDICIALISATION. (ibid. p.445).

Adaptive Capacity for the improvement of Mining Regulatory Framework of Western Australia—A concept developed in this thesis for the improvement of the Mining Regulatory Framework of Western Australia.

Discourse Analysis - “study of conversation or language in use” and consists of an “array of analytic approaches” (Stubbe, Lane, Hilder, Vine, Vine, Marra, Holmes & Weatherall, 2003, p.351).

Mining Regulatory Framework of Western Australia (MinReFWA) - A construct developed to define the Western Australian and Federal legislation on mining, consisting of numerous regulations, policies and other administrative tools managed by several State government agencies.

Regulation - “Broadly, mechanisms of social control, typically based in law and including the enforcement strategies of government agencies and public authorities.

- (1) In its narrow sense, a form of delegated legislation, referring to a single rule, (a regulation) or set of rules (regulations) made law by being authorised as DELEGATED LEGISLATION made under a PARENT ACT. (Mann, 2013, p.617).

State Agreements (SAs) – “State Agreements [are] contracts between the State and a company seeking to develop a project have traditionally been the vehicle used to conduct major resource projects in Western Australia. They are comprehensive documents, designed to establish ‘an integrated regime for approval, management and monitoring of all stages of the project’ under ministerial supervision” (Hillman, 2006, p.293).

Sustainable development - “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED. 1987. p.43).

Mining Regulatory Framework of Western Australia – a construct developed to define the State and Federal legislation consisting of numerous regulations, policies and other administrative tools developed to manage the mining operations in WA.

Volatilization - is a potential route by which hazardous waste constituents migrate out of a landfill, especially one having a high vapor pressure”. Source: Environmental Management, 2017

PROLOGUE

What follows are reflections on my journey that led me to undertake this research project, after having worked for over twenty years as a career civil servant in the public service in Western Australia. First, I want to write about the factors that influenced me to embark on an academic journey to undertake this research project and write this thesis. It all started not as an epiphany, but due to a calling which is linked to my new sense of place: Perth, Western Australia.

I arrived in Perth on 29 May 1988 as a skilled migrant, with my Sri Lankan heritage as a cultural identity and with the intention of adopting Australia. I wanted to adopt Perth as my new home with two children (two years and four years of age respectively), help them to be good citizens, and support my partner; a medical officer who wanted to continue her further studies to become a paediatric surgeon. Perth was very different from the country where I was born and grew up, Sri Lanka, and where I had worked in a university; the Asian Institute of Technology, Thailand where the Asian Disaster Preparedness Centre was then located.

Since arriving in Perth, despite the economic, social, cultural and geographical differences from my native country, Sri Lanka, I have fallen in love with Perth and come to understand the history, culture, social and economic background of Western Australia where we have a prosperous mining industry which has a history of over 160 years. As part of my reflections of life in Perth and also due to my interest in literature, I have published five poetry books in Sinhala, my native language, and two English poetry collections in which I have described my journey, the long struggle to settle down, and the adjustments made to our lifestyle to develop roots in Perth. Though some of my reflections are written in Sinhala, my second collection of English poetry titled "Perth: My Village Down Under (2011) includes more insights about my journey to Australia and the settlement process as a first-generation migrant.

The first six months of our life in Perth were consumed by uncertainty, amidst fear of racism against Asian migrants, which was at its peak during the time of our arrival, the dilemma of losing of my native language, and the uncertainty of not knowing ways to settle down in a new place that was both familiar and unfamiliar. I was concerned about how to develop new roots in a new place without even knowing the names of trees in our surroundings. During this period, much energy was spent on searching for jobs and trying to find out the Australian ways of presenting my skills to secure a job based on my qualifications. When I arrived in Australia, I had a bachelor's degree in humanities, a diploma in business management and professional

qualifications in public health and journalism, with significant work experience in community health, rural development, project management, and journalism in Sri Lanka. I later worked in the fields of disaster management and information technology in Thailand before my arrival in Australia. However, despite my background and experience, I was unsure how to apply for employment, let alone to secure a job to earn a regular income and settle down and raise our two small children in Perth.

The first five months were devoted to searching for jobs. At one point, I even thought of doing a second university degree specialising in social work at the University of Western Australia. To follow this idea, I met and consulted the then head of Social Work and Social Administration, Professor Laksiri Jayasuriya, whom I had heard of through my Sri Lankan network of contacts. After carefully perusing my resume, his first and firm reaction was that my desire to pursue a degree in social work to embark on a new career was futile. He said some words to the effect: "Sunil, you must try and secure a job in the civil service here. You are more than qualified to find a good job in the public sector in Perth. We need skilled migrants like you in this Lucky Country!" By that time, I had applied for several jobs in various fields with no results or even an opportunity for an interview. A few days after my conversation with Professor Jayasuriya, I secured my first successful Australian job interview for a position in disaster management and international relief work advertised by a non-governmental agency in Melbourne.

My job interview took me to Melbourne where I had my first unsuccessful job interview in Australia. I returned home by a Greyhound bus, crossing a vast stretch of land in my new country, travelling through two States and crossing the famous, 1,100 kilometres long Nullarbor Plain. My first journey back from the eastern seaboard to Perth, not only gave me some insights into the arid nature of my adopted country, but also motivated me to read further on the environmental issues that have impacted the ecosystem of Australia. While in Melbourne, I found a brochure that described the work of a voluntary group organising a unique conference titled "Pathways to the Future" in Perth. As soon as I arrived in Perth, I telephoned a contact person listed on the brochure and eventually joined the group as a volunteer. Professor David Blair, a physicist, was one of the distinguished persons amongst the diverse professionals who formed that group. I became friends with a retired civil servant in the group, one Mr Max Throbjensen, a son of an immigrant, who understood my struggle to adapt to a new way of life in a new country. My involvement with the group gave me profound insights into environmental, social and economic issues in my adopted "home" that many migrants might take decades to learn or perhaps never fully understand during their lifetime.

By early December 1988, I managed to secure a civil service job successfully as an Information Technology Planning Officer to support a new information system developed by the Health Department of Western Australia. After six months of employment, I had the privilege of securing a tenured position that gave me a regular income and enables to begin a comfortable life in Perth. Though I was professionally engaged in technocratic work, I never gave up my interest or the association with the Pathways to the Future Group as a volunteer. I also helped the group to organise a conference targeted at high school students, policymakers, and politicians (as keynote speakers) on topics relating to sustainable development.

By the mid-1990s, due to organisational changes in the government sector in Perth, my first job was made redundant. However, as I was a tenured civil servant by then, I managed to secure another position in the same agency relating to information system development projects. Though I was fond of technology planning work and computers, I had a strong desire to move into other areas of interest and focus on the environment. Further, I was interested in learning more about various environmentally friendly pathways to the future, particularly in a State where the so-called notion of “prosperity” was entrenched, based on the success of the mining industry. My interest and curiosity to learn further led me to undertake graduate studies in a new field that was emerging as an academic discipline described as sustainable development.

In early 1990, I enrolled in a master’s degree program at the Institute of Science and Technology Policy at Murdoch University in Perth, Western Australia, where I commenced my studies as a part-time student. By the end of the first semester, I completed two units that taught me various issues related to science and technology policy and a second unit, a semester-long workshop on sustainable development. Though I never had high academic grades during my undergraduate and overseas studies, I received high distinctions for my first two units. Perhaps it was due to my enthusiasm for learning new subjects relating to environment-centric topics. For a new migrant who wanted to study a post-graduate course in a new discipline with two primary school children and a partner trying to get back to her career in medicine was not an easy task. However, we all did what we were required to do, with our new sense of place, and I was able to complete my master’s degree with distinctions in 1995 and continue my civil service career.

While continuing my studies and working in the field of information technology, I managed to find employment through secondments to the Department of Transport and Perth Zoo. The latter agency was one of the fascinating workplaces I have ever worked. Perth Zoo was then

led by a very inspiring and future looking leader, Ms Ricky Burges. Although my primary tasks at Perth Zoo were to develop information technology infrastructure in support of the agency's business plans, I had the opportunity of meeting various experts and learning about conservation programs developed by Perth Zoo. I was fascinated by the dedicated team of employees and volunteers who worked so hard to preserve vanishing species native to Western Australia, such as numbats, chuditches and long-neck turtles. My experience at Perth Zoo confirmed that the colonisation process of Australia on top of over 60,000 years of civilisation had impacted the environment including the native ecosystem. These epiphanies and learning various complex subjects relating to sustainable development for my master's degree program led me to continue to read more about the Australian environment, its fragile ecosystem and the mining industry.

In February 1999, I received a promotion and found a new job as a Senior Consultant, System and Technology Architecture, in the Department of Mines and Energy (DME). Over the years, I found various public information resources about the Australian environment, and my engagement in various personal conversations with many experts had exposed me to hitherto unknown public information sources on the Western Australian environment. One such source was the knowledge of various public information repositories on the mining industry and legislation on mining. DME was one of the key government agencies, with over 100 years of history and responsibility for regulating the mining industry in Western Australia.

The history of the department was associated with the functions it had to perform, such as granting exploration and mining tenements for mining minerals, gas and petroleum, and collecting Royalties. The department was established during the colonial era, first to facilitate the development of the gold sector and collect Royalties (Spillman, 1993, Hunt, 2009). Over the years, the agency has developed an administrative structure and, among other functions, at present promotes and regulates the mining industry and is responsible for the development of resources in Western Australia. By the time I went to work at the DME, a former head of the Department had commissioned a book titled *A Rich Endowment: Government and Mining in Western Australia 1829 -1994* (Spillman,1993). The book provided me with knowledge and information on the history of the mining industry in Western Australia, and how not only the mining industry but the legislation and an administrative system that had evolved over a period of 100 years. A few years later, I had the opportunity to read an audit report titled *'Ensuring compliance with conditions on mining'* by the Western Australian Auditor General (WAAG, 2011) and tabled in the Western Australian Parliament in 2011. According to the Auditor General's report, the mining regulatory compliance in WA had not functioned effectively. The report further states that "legislation and powers are in place to enable agencies to monitor

and enforce compliance with mining conditions. However, the way agencies have implemented this framework means they do not provide assurance on the overall levels of compliance with conditions, or whether the conditions deliver the desired outcomes” (p.7). This passage in the Auditor General's report raised many questions in my mind, as I had an interest and some knowledge of the Australian environment by then, including a commitment to the principles of sustainable development. The information I was gathering outside of work helped me to develop a natural curiosity to find some answers as an independent researcher outside the government agency framework. Three years later, this curiosity influenced me to leave my tenured public service position to find answers to the questions in my mind about the issues impacting Western Australia, focusing on the environment and its protection. I wanted to explore the nature of mining laws and how they have been implemented to ensure environmental protection in my sense of place that I had begun to call home.

There is a variety of public information sources in the mining industry in Western Australia. Along with a few other agencies, the Department of Mines, Industry Regulation and Safety has a rich repository of public information that also includes the evolution of the agency structure for over a century. Its website provides the annual reports submitted to the Western Australian Parliament. I also learned that Hansard of the State Parliament has all the debates on legislation, including mining legislation, dating back to more than a century. In my civil service career, I held many positions and performed a variety of roles by supporting information systems, managing information technology projects, carrying out corporate risk management tasks, including occupational health and safety work, except environmental regulatory work on mining at my last place of work, then known as the Department of Mines and Petroleum (DMP). I retired early in March 2014 from my job as I wanted to follow up on my over two decades of interest in the environmental issues and policies informing the nature of Western Australia and my new sense of place. This led me to ask the question: what could an independent researcher do to identify environmental issues according to the principles of sustainable development? I thought it was a relevant question to answer in a State where the mining industry still plays a significant role in generating income and providing employment. What follows is my humble best attempt to answer the research question of my independent research in an academic environment under an excellent team of mentors in one of the best universities in Australia: “How is the mining regulatory framework in Western Australia being implemented legislatively to ensure environmental protection during the lifecycle of mining?”

CHAPTER ONE – RESEARCH PUZZLE

1.1 Introduction

Mining operations are inherently intertwined with economic, social and environmental issues (Brueckner, Durey, Mayes & Pforr, 2014; Petrova, 2012; Mudd, 2007 & 2014). The current practices of mineral extraction could have significant impact on local communities (Brueckner et al. 2014; Brereton & Moran, 2010; Worrall, Neil, Brereton & Mulligan, 2009; Bice, 2014), and environment (Bruckner et al. 2014; Mudd, 2010a, Mudd, 2007; Azapagic, 2004). Further, the extent of such impacts is rising due to the need for production increases and therefore, will contribute to the deterioration and decline of ore grades (Giurco and Petrie, 2007; Mason, Prior, Mudd & Giurco, 2011). Declining ore grade means that more substantial amounts of minerals of lower metal content need to be extracted to deliver each tonne of processed metal, and contribute to lower the productivity (Topp, Soames, Parham & Bloch, 2008), causing higher waste and generation of greenhouse gas per tonne of product (Mudd, 2009), thus, contributing to negative environmental impacts (Mudd and Patterson, 2010).

Mining companies across the globe now use new technology and employ innovative systems for mine operations (McLellan, Corder, Giurco, & Green, 2009), and adopt concepts such as 'responsible mining' (Bice, 2014), and 'mining sustainability' (Mudd, 2013, 2010 & 2010a) to justify mining practices. The concept of mining sustainability has also influenced the global mining industry. The importance of adopting sustainable mining practices is highlighted in a report titled "*Mining, Minerals and Sustainable Development*" (MMSD) published by the International Institute for Environment and Development (IIED) in 2002. The IIED report also identifies the need for 'social licences' to operate mining. The MMSD report states that the mining industry had "failed to convince some of its constituents and stakeholders that it has the 'social licence to operate' in many parts of the world" (IIED, 2002, p. xiv). Further, Danielson (2002), who presented the key issues of the MMSD report to the Extractive Industries Review (EIR) of the World Bank highlighted the shortcomings of the initial findings:

"MMSD found that many broadly shared ideas about sustainable development in the minerals sector simply are not correct. The only way to avoid falling into this trap is to ensure that the EIR's findings are based on reliable and publicly checkable evidence" (Danielson, 2002, p. 3).

The concept of mining sustainability emerged in literature after the initiatives of the MMSD project and critiques against some of its findings and approaches. Several academics (Hilson & Murck, 2002; Mudd, 2013, 2010 & 2010a; Azapagic, 2004), and other organisation (GRI.

n.d.). World Resource Institute (n.d.) have contributed to sustainable mining practices, and reporting initiatives of the new approach (Chapter Two, Table 2.2).

Long before the identification of the need for global mining sustainability initiatives, Western societies have introduced mining legislation to manage various aspects of mining operations across the globe (General Mining Act 1872 (USA); State Coal Mines Act 1901 (New Zealand), Legal Information Institute “nzlii.org”(1901). Western Australia (WA) was no exception with the enactment of the State’s first mining law—the *Gold Regulation Ordinances 1854*— in the mid-nineteenth century (Hunt, 2009, p.7). Since 1854, subsequent governments progressively introduced mining legislation by enacting several mining laws (Mineral Lands Act 1892; Mining Act 1904; Abstraction of *Groundwater: Water and Irrigation Act 1914*; Mining Act, 1978; Environmental Protection Act, 1986; Mining Rehabilitation Fund Act, 2012). Further to the mining legislation, now regulatory agencies in WA frequently use discourses such as “responsible exploration” and “development of mineral and energy resources” (DMP, 2017). However, the references to concepts such as ‘mining sustainability’, ‘corporate social responsibility’ and ‘licence to operate’ discussed in Chapter Three are not mandatory regulatory requirements, hence, not embodied in key legislation and regulations that come under the mining regulatory framework (MinReF) in WA.

This chapter consists of eight sections including the preceding introduction. The second section outlines the scope of the research project. The third section outlines the focus of the study.¹ The fourth section provides an overview of the mining industry in WA. The fifth section states the research question and the objectives of this PhD study. Section six provides the justification and the rationale for the research. The seventh section outlines the significance of this research. The eighth section provides the chapter outline of the thesis.

1.2 Scope of the research project

This study investigates “how the mining regulatory framework in Western Australia being implemented legislatively to assure environmental protection during the mining life cycle?” The term mining regulatory framework (MinReF)—a construct developed for this study, is defined as State and Federal legislation consisting of numerous Acts, regulations, policies and other administrative tools implemented by government agencies. It covers century-old legislation (*Abstraction of Groundwater: Water and Irrigation Act 1914*), as well as more recent mining laws (*Biodiversity Conservation Act 2016*).

¹ Throughout this thesis, I used the terms ‘study’, ‘research project’, ‘PhD study’ and ‘PhD project’ are used interchangeably, and they convey the research undertaken to submit this thesis.

This research is grounded in sustainable development principles, but it draws from other disciplines such as public policy, mining law, theories on legal doctrine and environmental law, regulation theory, theories of bureaucracy, and discourse analysis to understand various theoretical approaches relevant to this study. Firstly, this thesis identifies the environmental legislation, regulations and policies that come under the MinReF to map the scope of the study. Secondly, the study traces the origin of mining legislation in WA which commenced in 1854, and how the regulatory framework has evolved over the years to understand the drivers that shaped and formed the current mining laws in WA. However, the timeline of this study is limited to an analysis of the environmental regulations of the MinReF since the enactment of a key mining legislation; namely, the *Mining Act 1978*, and three State Agreements ratified in the State Parliament in 1979. Thirdly, this study analyses the strengths and weaknesses of the MinReF using data from a group of research participants who represent regulators, lawyers, academics, researchers and stakeholders supported by a literature review. Fourthly, the study reviews the problematics of defining the term of 'best practice' and examines how two regulatory agencies in WA has used the terminology and provides five examples that could be described as best practice methods examining emerging innovative practices of re-using difficult to rehabilitate mine sites for productive human use. Finally, having identified both the strengths and weaknesses of the MinReF, this study proposes the need to introduce a new theoretical framework—"Adaptive Capacity for the improvement of the Mining Regulatory Framework of Western Australia" (ADMINREF). This thesis also includes a future research agenda, and identify, a few key areas that are important, but fall outside the scope of this study.

This study is a phenomenological investigation exploring the evolution, the scope, and the strengths and weaknesses of the mining regulatory framework of WA. The study, using qualitative research methods, investigates how environmental regulations have been implemented legislatively by examining two case studies.

1.2.1 Limitation of the research

The impact of mining operations could be examined by analysing economic, social and environmental aspects under the principles of sustainable development as outlined in the Brundtland Report (1987). However, this study focuses only on the environmental sphere of sustainable development and examines only the environmental compliance of two types of minerals, i.e. uranium and coal. The study does not examine either economic or social issues

of “the triple bottom line”² concerning mining operations in WA. Through the research lenses of case study methodology, this study investigates only a slice of the MinReF focusing on the environmental compliance of two types of minerals, i.e. coal and uranium mining in WA. Thus, the research does not examine legislation and regulations on other minerals such as iron ore, mineral sands, nickel, lithium, and gas and oil (petroleum).

The MinReF that operates in its current form has evolved over a century. It has complex regulations and not being implemented through a well-coordinated regulatory framework (Western Australia’s Auditor General, “WAAG,” 2011). One research project cannot study multi-faceted and complex regulatory framework examining its economic, social and environmental impacts. Therefore, this research project investigates explicitly the environmental regulations and compliance focusing on two case studies and the strengths and weaknesses of the MinReF. However, it is assumed that insights gain from the findings of the analysis of the MinReF by investigating issues such as the implementation of legislation, mine rehabilitation and mine closure plans would help identify broader policy issues on regulations of other minerals, and gas and oil.

1.3 The focus of the research project

Further to the analysis of MinReF, this research project focuses on the compliance of environmental regulations of two case studies during the ‘life cycle of mining’ (Hartman, and Mutmansk, 2002). The first case study examines the regulatory framework employed to approve one of the four uranium mines in WA as the operation phase is yet to commence (Cameco Australia, 2015). The Yeelirrie uranium mine is located “660km north-east of Perth in the Goldfields region (mining-technology.com. n. d). The primary reason for selecting the Yeelirrie uranium project is to investigate the reasons for approving this particular mine in January 2017 under a State Agreement ratified in 1978. The other three uranium mines, namely Kintyre, Wiluna, Mulga Rock were approved under the *Mining Act 1978* (DMP, 2017) during the Barnett Liberal government (2009 – 2017). However, the fourth uranium mine, Yeelirrie, examined in the second case study was approved under a State Agreement (“SA”), (Cameco Australia, 2015, p.66). The SAs are “contracts between the State and a company seeking to develop a project, have traditionally been the vehicle used to conduct major resource projects in Western Australia” (Hillman, 2006). Using two sets of legislation to approve uranium mines reflects a dichotomy of mining legislation in the uranium mine approval process of WA. Hence, it was chosen to investigate the rationale of adopting two sets of

² The phrase “the triple bottom line” was first coined in 1994 by John Elkington, the founder of a British consultancy called SustainAbility (Economist.com (2009).

mining regulations to approve the same mineral. The second case study examines the environmental compliance and consequences of coal mining in the Collie Region in South-West Australia and managed through a State Agreement. The rationale for selecting coal mining for one case study is due to the availability of extensive literature suggesting various environmental impacts due to coal mining in the Collie Region (McCafferty, 2017; McCullough & Lund, 2016; Doupé & Lymbery, 2005, Johnson & Wright, 2003). In both case studies, I also examine other legislation relating to the issuing of mining tenements, land access, and mine closure plans examining the environmental regulations that come under the MinReF.

The timeline of this study is limited to an analysis of the legislation, regulations and policies since the enactment of a key mining legislation; namely the *Mining Act 1978* up to 2018. The end date of this study, February 2018, represents a judgment of the WA Supreme Court that upheld an appeal against the approval of the uranium mine chosen for the study. The timeline of this research project also covers two mining regulatory reform programs, first in 2009, and the second carried out from 2012 - 2015, with the objective of improving the environmental regulations by amending the *Mining Act 1978*. These two mining reform agendas helped to gain insights into how changes to existing legislation are made, and why new ones are added to the framework. The recent legislation added to the MinReF the *Mining Rehabilitation Fund Act 2012*, was also examined to find out its jurisdiction and the effectiveness as the very first mining rehabilitation regulation introduced after over 100 years of mining operations in WA.

1.4 An overview of the mining Industry in Western Australia

"The resource sector (mining and petroleum) is the key economic driver for the Western Australian and Australian economy" (Government of Western Australia, 2017, p.4). There are over 2000 approved mining tenements issued under the *Mining Act 1978*, and more than 1000 operating mine sites, and these have generated around A\$93 billion worth of commodities during 2016 (ibid).

Western Australia's mining industry directly employed an average of 108,769 people during 2016–17, up from 104,553 the previous year (ibid). This figure included people employed in mineral exploration, mine site infrastructure construction, mineral processing, mine site surveying, transport and catering. During 2016 –17, an area of 42.5 million hectares of land was released for mining tenements, representing "an increase of 13 per cent from 37.6 million hectares in 2015–16" (ibid). Exploration licences accounted for about 80 per cent of the area covered by mining tenements (ibid).

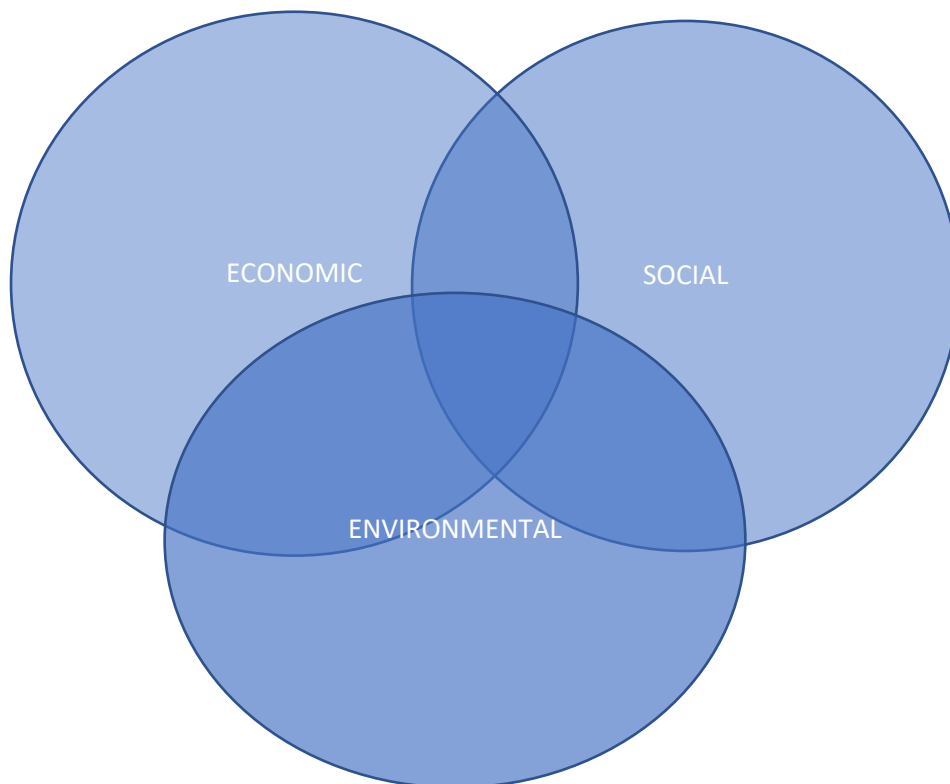
WA is considered one of the prime investment destinations for investment in mining projects, and has been listed among the top three jurisdictions at a global level (Fraser Institute, org. 2017). The Fraser Institute also assesses how mineral endowments and public policy factors, including taxation and regulatory uncertainty affect mining investments. According to the Frazer Institute's survey, WA is the third most attractive jurisdiction for mining investments behind Canada's Manitoba and Saskatchewan provinces (ibid).

The economic benefits of WA's mining boom have been widely publicised and are often emphasised (Barnett, 2014; Department of Mines and Petroleum, 2017). The vital role of the resource sector contributes to the prosperity of the State WA is considered "one of the world's most diverse resource jurisdictions, producing more than 50 different commodities, making it a leading contributor to the State economy" (Smith, 2017, p. 4).

1.5 The objectives

The research question and the objectives of this PhD study examine the legislation, regulations, and other administrative tool come under the MinReF and two case studies focusing on the environmental sphere of the sustainable development principles as outlined in the concept of 'triple bottom line' of sustainable development (Figure 1).

FIGURE 1 - THE TRIPLE BOTTOM LINE OF SUSTAINABLE DEVELOPMENT



Source: Elkington (1994)

This study examines only the environmental issues relating to sustainable development principles. It does not focus on the economic or social aspects of sustainable development principles. The theoretical framework of mining sustainability in this thesis is supported by the works by Bruntland (1987), Azapagic (2004); Mudd, (2010); who have examined and identified various elements of “mining sustainability” and “sustainability practices”. These practices include strategies to preserve biodiversity and reduce carbon footprints, prevention of air, water, noise pollution, and mine rehabilitation (Azapagic, 2004). However, all of these parameters are yet to appear as mandatory conditions in mining legislation. Although this research project is grounded in sustainable development principles, it also draws from other disciplines such as public policy, mining laws examining legal doctrines of environmental law, regulation theory, and discourse analysis, and the theory of bureaucracy in sociology to understand various theoretical discourses relevant to this study.

The research undertaken for this project was carried out exploring multiple facets of the mining regulatory framework of WA, enabling various issues to emerge through an epistemological investigation focusing on the genesis, the evolution, its scope, and the strengths and weaknesses of the MinReF. During the early phase of the literature review and before the data gathering phase of the project, the complexities associated with the project became clear. The main reasons for the complexity of this study could be attributed to four issues. First over the existence of over one hundred mining legislation and regulations (see Chapter Five, Table 5.2 & 5.3). Second, the evolutionary nature of the State and Federal legislation, regulations and policies that have evolved over 100 years. Thirdly, the evolutionary nature of the framework also reveals that it is not static, and has been subjected to various changes due to the needs of the society (Hunt, 2009, p.9). Hunt explains:

“That so many amendments have been made to the mining laws over... the years is not an indication of massive and continuing errors in the legislation but is simply a reflection of the willingness of the Department [DMP] and successive governments to listen to the mining industry and make amendments of the mining laws” (ibid).

The fourth issue is, the genesis of mining laws in WA which has a direct link to the State’s Colonial history when it was determined that the Crown own all the minerals. According to Hunt (2009), the mining laws in Australia differed substantially from the mining laws in other common law countries; with the most important differences arising from the policy decision that the Crown should own all minerals (ibid, p.1). The current legislation and the formation of agencies such as Department of Mines have also linked to the Colonial administration (Spillman, 1993, State Records Office, n. d).

WA's first mining legislation, namely, the *Gold Regulation Ordinance 1854* was enacted to fill a gap in the colonial administration enabling the Colonial Governor "to make regulations concerning gold fields and [issuing] licences for working for gold" (Hunt, 2009, p.2). When the gold was discovered, there were no laws for "governing the disposal of mineral lands" (ibid). This need was addressed by enacting the *Mineral Lands Act 1892* (ibid), and the legislation was then owned by the then Crown Lands and Surveys Department (State Records Office, n.d. para two).

The mining regulatory framework that exists in its present form (see Chapter Five, Table 5.2) has evolved progressively by removing redundant legislation (*Mining Act 1904*, *Wildlife Conservation Act 1950*), and adding new legislation on mining operations, (*Mining Act 1978*); environmental protection (*Environmental Protection Act 1986*); land administration (*Land Administration Act 1997*); and, water (*Water Agencies (Powers) Act 1984*). The current legislation and regulations are assigned to different agencies carrying out various tasks relating to mining operations. These include issuing of exploration licences, mining tenements under the Department of Mines, Petroleum, Industry, Regulation and Safety, granting access to land through the Department of Land, and providing licences for water and ensuring environmental protection through the Department of Water and Environmental Regulation. The administrative structures responsible for implementing the MinReF and the agency-centric roles are described in Chapter Five (sections 5.6 to 5.8.1). Therefore, it is essential to examine whether the mining regulatory framework is working in a coordinated manner, as a number of different agencies managing various aspects of legislation and regulations come under the MinReF. These issues will be examined by addressing the research question and the objectives of this research projects.

1.5.1 Research question and the objectives:

1.5.1.1 The research question:

'How is the mining regulatory framework in Western Australia being implemented legislatively to assure environmental protection during the mining life cycle?'

The main objectives of the research are as follows:

1.5.2 Analyse the strengths and weaknesses of the current mining regulatory framework in relation to environmental protection in Western Australia.

1.5.3 Analyse how the mining regulatory framework is being implemented in two case study locations.

1.5.4 Identify Australian and global best practices of environmental protection relating to mining operations and rehabilitation work.

1.5.5 Propose ways and means of improving the Western Australian mining regulatory framework to assure environmental protection.

In this research project, the term 'environmental protection' is used to denote "the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected" (Government of Western Australia, 1986, p.1).

1.6 The rationale and justification of the research project

This section provides an overview of several previous works that have examined various aspects of mining and sustainability-related research. There have been numerous studies and research work on WA mining operations and sustainability related subjects (Pope, 2007; Hillman, 2006; Govindarajalu, 2000). Further, there have been two State audit reports and one Federal audit report (Western Australian Auditor General Western 2004 & 2011; Australian National Audit Office, 2014) that have identified gaps and deficiencies of the mining regulatory framework of WA. However, these reports have not examined either the research questions or objectives of this study. The audit findings are discussed in Chapter Five (section 5.10.1).

Govindarajalu's (2000) research is based on a survey of a sample of mining companies, and evaluates whether they have followed the environmental guidelines of the Department of Minerals and Energy (DME) from the pre-mining to post-mining stages. However, Govindarajalu's study does not examine the functionality or the effectiveness of the overall mining regulatory framework or the environmental regulations external to the DME such as *Environmental Protection Act 1986*, *Environment Protection and Biodiversity Conservation Act 1999*. Further, Govindarajalu's research does not include in-depth case studies investigating the effectiveness of the environmental compliance of mining regulations.

Pope's research (2007) focuses on the sustainability assessment and policy lessons of the Gorgon project which deals with the extraction of natural gas from the off-shore North-West Shelf project in Western Australia. Pope's work, therefore, is out of the scope of this research. Petrova's research (2012) investigates the social sustainability aspects of a mining town in the South-West region of Western Australia. Petrova's research is limited to an analysis of the social sustainability of a mining town in WA. Flugge's (2012) doctoral research examines the effects of the senior manager's performance on sustainable development. There are a few other works on the environmental regulations of Western Australia (Chandler, 2014. Roche & Mudd, 2014). These works appear as chapters in a monograph (Brueckner et al., 2014) on

WA's mining operation, but it has not explicitly focused on the research question or the objectives of this research project (Chandler, 2014. Roche, & Mudd, 2014).

This PhD study also investigates a unique set of regulations called 'State Agreements' (SAs) specially designed to support large mining projects (Barnett, 1996, 2014), by granting special benefits to companies. There are sixty four SAs, (Table 5.3), and three of them are analysed in the two case studies in Chapter Seven. Chapter Five includes information on the merits and demerits of SAs (Tables 5.4 & 5.5). A few previous research studies have examined the roles and functions of the State Agreements (Hillman, 2006; Margetts, 2001; Fitzgerald, 2005 & 2002). Of the previous research, Hillman (2006) has examined the roles and future of the SAs from a legal perspective, but did not address issues on environmental compliance through case study methods. Fitzgerald (2005 & 2002), has researched on the use and application of SAs in Australian States and Territories. Fitzgerald's research work includes her doctoral research (2002), but it does not investigate the environmental regulations of State Agreements of WA, or their environmental compliance. Margetts' thesis (2001) examines SAs in the context of competition policy and public interest and does not cover legislative compliance of environmental compliance. In summary, the previous research on SAs have neither covered any aspects of the research objectives of this study nor have examined environmental regulations of SAs used to support large resource projects in Western Australia.

This PhD research proposes policy recommendations and includes a sample of Australian and overseas best practices examining what lessons could be learned on environmental protection including the re-use of difficult-to-rehabilitate abandoned mines for human use. Although this study focuses only on Western Australian legislation and regulations, addressing environmental compliance, the findings have national, as well as global applications. This study contributes to policy development on environmental regulations by providing new insights into local, national and global applications of mining practices based on the lessons learned from WA.

In summary, previous research findings on mining sustainability-related issues have not addressed the main research question or the objectives of this research project. This study investigates how the MinReF being implemented as a regulatory mechanism to assure the conditions of environmental protection during the life cycle of mining through two in-depth case studies which have not been the focus of previous research on WA's mining and sustainability-related research. Therefore, undertaking an analysis of the strengths and weaknesses of the MinReF in WA is of vital importance.

1.7 The significance of the research

Southalan (2012) identifies three vital aspects of environmental regulations and policy issues. They include, (a) "the inability or unwillingness of government agencies to monitor requirements under the mining law; (b) "concerns about regulatory burdens; and (c) "complexities (that) arise from other restrictions or controls placed ... by other agencies" (p.205). This research, while considering the above three critical issues on "environmental regulation and policy matters" as a running thread, investigates other issues. First, this study explores issues unique to WA mining operation and regulatory practices covering the administration of environmental regulations through a multi-agency system. Secondly, this study examines the effectiveness of State Agreements that are unique to Western Australia through two case studies analysing how the uranium mines are approved, and how coal mining operations are regulated and whether the legislation and regulations assure environmental protection by analysing the strengths and weaknesses of the MinReF. Further, this research study explores the effectiveness of the recently introduced mine rehabilitation legislation (Mining Rehabilitation Fund Act 2012).

Of the issues identified in this study, I have examined them in the context of gaps in environmental compliance of mining regulations as identified by the Western Australian Auditor General (WAAG, 2011). The Auditor General's report entitled *Ensuring compliance with conditions on mining* (2011) notes that the "legislation and powers are in place to enable agencies to monitor and enforce compliance with mining conditions. However, the way agencies have implemented this framework means they do not assure the overall levels of compliance with conditions" (p.7). This PhD project investigates the reasons for the absence of the overall level of compliance with environmental regulations through two case studies (Chapter Seven), supplemented by an analysis of the strengths and weaknesses of the MinReF (Chapter Eight), as research objectives. The analysis of the MinReF examines how the environmental regulations have been implemented through multiple agencies, and whether the current implementation system presents complexities and restrictions, or whether controls are placed by other agencies as highlighted by Southalan (2012, p.205). Further, such an analysis also provides an opportunity to propose specific policy recommendations by examining the current gaps and deficiencies of existing regulations in a policy context and why the regulatory framework does not provide evidence to assure the overall levels of compliance as noted by the Auditor General (WAAG, 2011, p.7).

This thesis not only examines the reasons for the lack of overall assurance of compliance but also proposes ways and means of improving the gaps and deficiencies of the existing regulations. Thus, this research project is relevant and significant in a State which is highly

dominated by mining for its income from the Royalties from mining companies. For example, WA's gross state product (GSP) of \$247.7 billion during 2016 – 17 contributed to 14% of Australia's gross domestic product (GDP), (Government of Western Australia: Department of Jobs, Tourism, Science and Innovation, 2018, para two). The revenue from mining Royalties collected accounted for 29% of GSP in 2016 - 17 (ibid).

The mining industry in WA has entered into new mining ventures such as 'fracking'. Studies have been commissioned, examining scientific approaches to measure the effectiveness of emerging mining activities (EPA, 2014). Although this study only focusses on the regulatory framework regarding coal and uranium, the findings provide new and independent insights would be valuable to supplement existing knowledge on the effectiveness of the overall mining regulations in WA and elsewhere.

The thesis also analyses the notion of best practices to explore innovative ways to restore the health of the land affected by mining as WA has 17,000 abandoned mines (Government of Western Australia: Media Statement, 2014) due to the legacies of the past mining activities. Concerning theory development, this research contributes in two ways. First, it examines relevant theories such as public interest policy (Ogus, 2004 & 2004a); legal doctrines (Hoecke, 2013), discourse analysis (Stubbe, Lane, Hilder, Vine, Vine, Marra, Holmes & Weatherall, 2003), and regulatory design principles (Gunnigham and Sinclair, 1999) to examine various facets of the environmental legislation and regulations come under the MinReF. Second, this study contributes to a new theoretical framework—Adaptive Capacity for the Mining Regulatory Framework of Western Australia (ADMINREF) to address the current gaps and deficiencies of the MinReF and is discussed in detail in Chapter Eight (Section 8.11 and Figure 8.4). This thesis includes a series of recommendations and a future research agenda. Insights gained from this study would be useful to examine other mineral and petroleum (gas and oil) regulations that are not addressed in this study. However, the findings and insights gained from this PhD study would be useful to investigate other projects operated under State Agreements and legislation not analysed in this research.

1.8 Thesis structure

Chapter One: Introduction summarises the background and the context, the theoretical framework, scope and the research objectives, limitation of the research, the justification and significance of the study.

Chapter Two: Review of the global policy drivers on mining focuses on the first two transdisciplinary areas outlines the literature on sustainable development that shapes the overall environmental policy drivers at a global, and Australian levels.

Chapter Three: Theoretical background discusses some key theoretical approaches and introduces concepts such as corporate social responsibility, and licence to operate the theory of bureaucracy, legal doctrine, the rule of law and discourse analysis.

Chapter Four: A literary review addresses several theoretical approaches covering mining law, environmental law, public policy, politics of resource development and regulation theory that helped to examine various facets related to this study to gain insights into the mining regulatory framework in Western Australia.

Chapter Five: History of mining legislation in Western Australia and key issues describes the genesis, evolution of the mining regulatory framework including a description of legislation and regulations concerning environmental compliance.

Chapter Six: Methodology and methods, describes the methodology of this study with details on qualitative research and case study method, the techniques used for data collection, coding, and analysis.

Chapter Seven: Two case studies investigate issues relating to the approval of a uranium mine, and coal mining in Western Australia focusing on how the environmental regulations have been implemented to approve, operate and development of mine closure plans.

Chapter Eight: Strengths and weaknesses of the mining regulatory framework analyse the mining regulatory framework. The chapter also includes the findings of the research project, and a theoretical model proposed to address the gaps and weaknesses of the framework.

Chapter Nine: Best practice models and environmental regulatory strategy of Western Australia discusses the problematics of defining the terminology and examines WA environmental strategies against the regulatory design principles. The second part of the chapter provides five examples of Australian and European 'best practice' cases that could successfully function outside government regulatory systems.

Chapter Ten: provides the conclusion of this research study and explains how the research question and the objectives have been addressed.

Chapter Eleven: Recommendations and future research directions include a series of policy recommendations in response to the findings of the study. The chapter also includes a future research agenda by identifying topics to facilitate further research.

CHAPTER TWO REVIEW OF LITERATURE ON GLOBAL POLICY DRIVERS ON MINING

2.1 Introduction

In this study, a systematic literature review was carried out to identify previous research, relevant peer-reviewed academic journals and other literature including legislation, regulations and policies that form the Mining Regulatory Framework (MinReF) of Western Australia (WA). This literature review identifies various State and Federal legislation (See Tables 5.2 and 5.3), and other vital theoretical discourses relevant to this study. The literature review in this chapter also includes sections providing several theoretical discourses to understand the WA bureaucracy³ responsible for implementing legislation and regulations that fall within the MinReF. The literature review also provides insights into the complexities of mining legislation which cannot be examined using a single discipline. Thus, this literature review includes multidisciplinary subjects covering theories on sustainable development, public policy, regulation theory, mining laws encompassing legal doctrines and environmental law. It also provides insights into the discourses represented by agencies responsible for the implementation of the MinReF. The agency narratives are examined using theoretical frames and disciplines drawing from literature on critical discourse analysis (Stubbe et al., 2003 & Fairclough, 1995) and theories of bureaucracy (Weber, 2015). Using multidisciplinary approach is in alignment with Pezzoli (1997), and Todorov & Marinova (2010) who emphasise the requirement “to break the silos of disciplinary research”, highlighting the need to adopt “methodologies and techniques that allow transdisciplinarity” (ibid, p.3) to examine issues relating to sustainable development.

The literature and theories relevant to this research project cover five transdisciplinary areas: (i) sustainable development (ii) public policy; (iii) regulation theory; (iv) mining law encompassing legal doctrines and environmental law, and (v) sociology focusing on the theories of critical discourse analysis and bureaucracy. This chapter deals with the first two disciplines that shape the overall environment policy drivers at a global, Australian and Western Australian level. The following two chapters discuss the theoretical background and legal frameworks for understanding the link between mining and environmental protection in WA.

³ I am using the term “bureaucratic/bureaucracy” in this study in the context of the work of German sociologist Max Weber (2015) Weber, M. (2015) "Bureaucracy" in *Weber's Rationalism and Modern Society*, translated and edited by Tony Waters and Dagmar Waters, Palgrave-Macmillan. p. 114.

2.2 Sustainable development

This section first identifies key literature on the genesis of sustainable development as a development paradigm and the emergence of concepts such as mining sustainability. It then identifies the origins of global drivers on sustainability agreements and frameworks that led to the incorporation of sustainable development principles into the mining industry examining global drivers. The terms ‘sustainable development’ (SD), and ‘sustainability’ are used interchangeably throughout the text with both concepts conveying the principles of SD. The literature on corporate social responsibility and social licence to operate is reviewed to position mining within the changing conceptual environment. Finally, global drivers of sustainable development which have influenced the Australian mining activities are examined.

2.2.1 Genesis and emergence of sustainable development as a new paradigm

The genesis and the emergence of the term “sustainable development” could be traced back to the United Nations Conference on Human Environment (UNCHE), held in Stockholm in 1972 (Dresner, 2012). The UNCHE led to the formation of the World Commission on Environment and Development (WCED). The report published by the WCED commonly known as ‘*Our Common Future*’ (1987) defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations General Assembly, 1987, p. 43). Since then, hundreds of alternative definitions of sustainable development have emerged (Zeijl-Rozema, Cörvers, Kemp & Martens, 2008; Dempsey, Bramley, Power, & Brown, 2011; Kommadath, Sarkar, & Rath, 2012). They aim to apply SD principles to a variety of established and emerging disciplines as a new paradigm (Pearce and Walrath, 2001). Following the scope of this research, SD “requires a nation to consider and protect the environment and natural resources on which its current and future development depend. The connections between the environment and development thus provide a powerful rationale for environmental protection: enlightened self-interest” (Dernbach, 1998, p.20).

The original definition of SD is not sufficient for the mining industry which is dependent on non-renewable resources. However, WCED highlights that “fossil fuels and minerals, their use reduces the stock available for future generations. However, this does not mean that such resources should not be used” (United Nations General Assembly, 1987, pp.45-46). It is important to recognise that even before the publication of the WECD (1987), there had been significant initiatives on environmental and ecological preservation. This trend could be traced back to Rachel Carson’s classic ‘*Silent Spring*’ (1962) first published as three serialised essays in the *New Yorker Magazine* (Carson, 1962). Table 2.1 lists the emergence and evolution of the sustainable development concept at the global level. It provides evidence to

work that has gone into identifying and contributing to numerous initiatives on SD goals and strategies since Rachel Carson's 'Silent Spring' was published. After the publication of Carson's work, many global initiatives commenced. In 1971, the International Institute for Environment and Development (IIED) was established in the United Kingdom which developed IIED strategies promoting programs for countries to make economic development without destroying the natural environment. (www.iied.org). In 1972, the United Nations (UN) held a conference on the Human Environment where the term "sustainable development" was adopted (Dresner, 2002). The following year, the UN established the United Nations Environment Program (UNEP), and it remains as the UN's primary policy coordinating agency on the environment (www.unenvironment.org). Amidst UN endeavours, the non-governmental agencies also emerged in the West, initiating various programs focusing on the environment. For example, the Greenpeace movement was established in Canada in 1971, and the Worldwatch Institute was established in the United States in 1975.

In 1987, the UN published its pathfinding report, commonly known as *Our Common Future*, on sustainable development. In 1988, the UN initiated the Intergovernmental Panel on Climate Change (IPCC). Another two landmark events initiated by the UN were the Earth Summit held in Rio de Janeiro and development of the Kyoto Protocol both of which took place in 1992 (United Nations Framework Convention on Climate Change "unfccc", 1998). The importance of the Earth Summit was the development of a treaty committing member nations to reduce individual nations' greenhouse gas emissions through national level action plans and strategies which came to know as Agenda 21. Agenda 21 highlighted the threat of greenhouse gas emissions and its contribution to climate change due to anthropocentric activities. (sustainabledevelopment.un.org, June 1992). Further development of such global action led to the initiatives of the development of the UN Sustainable Development Goals and the Paris Agreement (United Nations Framework Convention on Climate Change, n.d).

These global initiatives marked a global consensus about the importance of sustainability as a pragmatic philosophy for development. Reporting on sustainability performance also emerged through establishing systems of indicators and targets. Decarbonising the economy became a primary concern as well as an opportunity for new business initiatives within the framework of the green economy. This led to the World Economic Forum's 2018 report on the importance of the environment in the creation of global value chains (weforum.org, n.d.). These global milestones are listed in Table 2.1.

Within the new paradigm of sustainable development as the integration of economic, social and environmental issues, there are numerous arguments for and against its applicability to

the mining industry (IIED, 2002). The 2004 framework for sustainable development indicators for the mining and minerals industry (Azapagic, 2004) was followed by specific reporting guidelines (GRI, 2010). Although the SD principles and frameworks have been applied to a variety of other fields, including planning and forecasting, public transportation, measuring urban sustainability, automobile dependency in global cities, planning urban landscapes, fostering sustainable behaviour in social marketing and environmental protection (McKenzie-Mohr, 2000), the challenges for the mining industry remain. By its nature, these activities rely on extracting unrenovable resources. Many argue that the original definition of SD as articulated in the WCED (1987) report has been distorted (Holden, Linnerud & Banister, 2014) and question its applicability to mining.

Irrespective as to how sustainability is being reconciled with the mining of natural resources, what this thesis analyses is specifically the environmental provisions associated with the operation of mines. This particular perspective within the broad spectrum of sustainability issues related to mining is of high importance, particularly given the fact that all mines operate within a life cycle (Hartman, and Mutmansk, 2002). The legal frameworks that ensure environmental protection during and after the mining operations are the particular focus of this study and they are rooted within broader conceptual principles of sustainable development. Before tackling environmental protection in the case of mining in Western Australia, it is helpful to shed light on the emergence and evolution of the sustainable development concept. (Table 2.1).

TABLE 2.1 THE EMERGENCE AND EVOLUTION OF SUSTAINABLE DEVELOPMENT CONCEPT⁴

Year	Source/ Agency/ Author	Indicator/Significance
1961	World Wildlife Fund	<p>The concept of the World Wildlife Fund (WWF) was conceived in April 1961, and established in September 1961. It was then located at the International Union for Conservation of Nature headquarters in Morges, Switzerland. Prince Bernhard of the Netherlands became the first president of WWF (www.worldwildlife.org). It has evolved beyond its focus on wildlife and at present promote sustainable mining practices initiated by global mining companies. They are now supporting a web-portal on success stories of the mining companies towards the environment and sustainability practices.</p> <p>Source: https://www.worldwildlife.org/about/history</p> <p>The WWF works have already resulted in various reports, and a web portal is available at the following website: https://www.wwf.org.uk/what-we-do/area-of-work/responsible-oil-gas-and-mining</p>
1962	Rachael Carson	Publication of Silent Spring (1962).

⁴ This is a long Table and continues up to page 32.

1967	The Environmental Defence Fund (EDF) was established to pursue legal solutions to environmental damage.	An earlier action of the EDF was lodging a case against the Suffolk County Mosquito Control Commission to stop spraying DDT on Long Island's marshes. (Source: https://www.edf.org/about)
1968	Paul Ehrlich,	Publication of the 'Population Bomb' discussing the connection between human population, resource exploitation and the environment.
1968	UNESCO held Inter-govt. Conference for Rational Use and Conservation of the Biosphere.	This conference is the earliest forum where discussions were held on the concept of ecologically sustainable development. (source: www.unesco.org)
1969	Friends of the Earth (FoE)	The FoE was established as an independent advocacy organisation dedicated to: - prevention of environmental degradation, - preservation of biodiversity - promotion of the role of citizens in decision-making on environmental matters. Source: https://foe.org/about-us/

1970	Natural Resources Defence Council (NRDC) was established in the USA.	The NRDC employed a team of staff with lawyers and scientists to initiate action for a U.S. environmental policy. (Source: Natural Resource Defense Council "nrdc.org". n.d.).
1970	The First Earth Day was held in the USA.	An estimated 20 million people participated in peaceful demonstrations across the USA. (Source: https://www.earthday.org/about/)
1971	Greenpeace was commenced in Canada.	Greenpeace has developed and implemented programs to stop environmental damage through civil protests and non-violent activities around the globe. (Source: www.greenpeace.org)
1971	International Institute for Environment and Development (IIED) was established in the UK.	IIED commenced strategies and programs supporting countries to make economic development without destroying the natural environment. (Source: www.iied.org)

1972	United Nations held a conference on the Human Environment: Stockholm, June 1972.	<p>UN published a report following the Conference.</p> <p>The term “sustainable development” was adopted during the conference on man and the environment, the UN Conference on Human Environment (UNCHE) (Source: Dresner, 2012).</p> <p>The conference led to the establishment of the WCED.</p>
1973	The commencement of the United Nations Environment Program (UNEP).	<p>UNEP remains as the UN’s primary policy coordinating agency on environment. (Source: www.unenvironment.org)</p>
1974	Rowland and Molina (1974) published their work on chlorofluorocarbons (CFCs) in the scientific journal ‘Nature’.	<p>Rowland and Molina presented their findings by calculating that continued use of CFCs at current rates would critically deplete the ozone layer. (Source: https://www.nature.com/articles/249810a0)</p>
1975	Worldwatch Institute was established in the United States.	<p>The Worldwatch Institute launched public awareness programs on global environmental threats and initiated policy responses and commenced publishing annual State of the World. (Source: www.worldwatch.org)</p>

1975	The Convention on International Trade.	The conference highlighted the need to preserve endangered species of flora and fauna and through regulations. (Source: www.cites.org)
1976	The UN Conference on Human Settlements (Habitat).	This was the first global meeting to discuss the link between the environment and human settlement. (Source: http://mirror.unhabitat.org/downloads/docs/The_Vancouver_Declaration.pdf)
1977	The United Nations Conference on Desertification(UNCOD) was held in Nairobi, Kenya.	The UNCOD) adopted a Plan of Action to Combat Desertification. (Source: http://www.ciesin.org/docs/002-478/002-478.html)

1978	The OECD Directorate of the Environment relaunched a research program on environmental and economic linkages.	The OECD work established the groundwork for the 1987 report, ' <i>Our Common Future</i> '. (Source: Strange & Bayley, 2008)
1979	IIED published a report titled; 'Banking on the Biosphere'.	The IIED report included the practices of nine multilateral development agencies including the World Bank (Source: www.iied.org)
1980	World Conservation Strategy (WCS) was published.	The WCS was published by the International Union for the conservation of nature and natural resources (IUCN) in conjunction with UNEP and the World Wild Life Fund (WWF). (Source: https://portals.iucn.org/library/sites/library/files/documents/WCS-004.pdf)
1982	The World Resources Institute (WRI) was established in the United States.	WRI commenced publishing biennial resource assessments reports since 1986. (Source: www.wri.org)
1983	The United Nations established the WCED as an independent body to report on key global issues on economic and development.	Mme Gro Harlem Brundtland was appointed as the chairperson of the WCED. (Source: un.org)

1987	The UN published the WCED Report commonly known as 'Our Common Future.	"development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly, 1987).
1987	The International Court of Justice based in the Hague made a landmark judgement relating to sustainability.	A milestone legal judgment by the then head of the International Court of Justice based in the Netherlands. The ruling was made on the relationship between the 'right to development' and the concept of sustainability (Source: Singh, 1988)
1988	The Intergovernmental Panel on Climate Change (IPCC) was established.	The IPCC began to evaluate up-to-date scientific, technical and socio-economic research data on global climate change effects. (Source: www.ipcc.ch).
1990	International Institute for Sustainable Development (IISD) was established in Canada.	The IISD commenced publishing the "Earth Negotiations Bulletin" (ENB); the first report was published in 1992. (Source: International Institute for Sustainable Development, n.d.)
1991	Global Environment Facility (GEF), a functional unit of the World Bank, was established.	The Global GEF began its operations in 1991 as a three-year pilot project sponsored by the United Nations Development Programme, the United Nations Environment Programme, and the World Bank. (Source: www.gefweb.org; www.worldbank.org)
1992	United Nations Conference, Earth Summit was held in Rio de Janeiro from 3 to 14 June 1992.	The UN Framework Convention on Climate Change (UNFCCC) is an international environmental treaty, and it was adopted on May 9, 1992. The treaty was available for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992 and enforced on 21 March 1994. The treaty commits member nations to

		<p>reduce individual nations greenhouse gas emissions through national level action plans and strategies. Agenda 21 was adopted.</p> <p>(Source: www.un.org)</p>
1993	The first meeting of the UN Commission on Sustainable Development (SD) was established.	<p>A key follow-up of the conference was to ensure international cooperation through intergovernmental decisions to promote national SD work.</p> <p>(www.un.org/esa/sustdev)</p>
1994	The Global Environment Facility (GEFWEB) was established.	<p>The objective of the GEFWEB was to enable effective decision-making power to developing countries by granting billions of aid dollars to initiate projects on biodiversity, water, climate change, land degradation.</p> <p>(Source: www.gefweb.org)</p>
1994	China published a white paper titled, Agenda 21 on the country's challenges on SD.	<p>The white paper identified the country's development, population, environment. China's example was considered as a global example for developing national strategies for SD.</p> <p>(Source: www.iisd.org)</p>
1995	The World Trade Organization (WTO) was established.	<p>The agenda for the WTO included environmental linkages to global trade on environment and development.</p> <p>(Source: worldtrade.org)</p>
1996	The International Standard Organisation (ISO) 14001 was formally adopted.	<p>The ISO 14001 is a voluntary international standard to facilitate corporate environmental management (Source: www.iso.org)</p>

1998	Publication of <i>Cannibals with Forks: The Triple Bottom Line of 21st Century Business</i> by John Elkington.	John Elkington introduced the concept of 'triple bottom line' approach sustainable development adding a new dimension to the concept of sustainable development. (Source: Elkington, 1994)
1998	The approval of the international treaty, the Kyoto Protocol.	The Kyoto Protocol extends the 1992 United Nations Framework Convention on Climate Change. (Source: United Nations Framework Convention on Climate Change)
1999	The Dow Jones Sustainability (DJSI) Index was launched.	The DJSI guides investors searching for profitable companies that follow SD principles. (Source: www.sustainability-index.com)
2000	Global Reporting Initiative (GRI) commenced.	GRI initiated a series of initiatives on reporting on the development of a framework for corporate sustainability. (Source: www.gri.com)
2001	Fourth Ministerial Conference of the WTO was held.	The conference recognised the environmental and development concerns in its final report. (Source: http://www.wto.org)
2002	GRI developed G2 guidelines. Sustainable Minerals Roundtable (SMR) was held.	The second generation of the Guidelines, described as G2, was launched. (Source: www.gri.com)

2002	A report entitled Sustainability Indicators and Sustainability Performance Management was published. Professor Alyson Warhurst of the University of UK authored the report.	(Source: pubs.iied.org/pdfs/G00919.pdf).
2002	The World Summit on Sustainable Development was held in Johannesburg.	The conference was held during “a climate of frustration” due to the lack of governments’ progress on national SD strategies: (Source: www.worldsummit2002.org)
2004	Dr Adisa Azapagic, University of Surrey published a journal article titled “Developing a framework for sustainable development indicators for the mining and minerals industry”.	Azapagic highlighted the need to measure the “environmental and economic integrated indicators” and need to have a social licence and environmental factors of mining. (Source: Azapagic, 2004)
2004	Gray and Milne of the University of Canterbury published a book chapter critiquing the methods and myths of Triple Bottom line	(Source: Gray, & Milne, 2004)

	concept first introduced by John Elkington.	
2005	The International Mineral Processing Council (IMPC) meeting held in Antalya, Turkey, (October 13-14, 2005). Chaired by Professor Dr Güven Önal of the Istanbul Technical University.	The presentations of the conference are published as a book titled A review of indicators of sustainability for the minerals extraction industries (Source: Bôas, Shields, Šolar, Anciaux, & Önal, 2005)
2005	The initial Millennium Ecosystem Assessment (MEA) was published.	The MEA report with input from 95 countries provided scientific information on the consequences of ecosystem changes and the impact on human well-being. (Source: www.millenniumassessment.org)
2008	The Green economy concept entered the mainstream.	National governments commenced investing a portion of their national income as a stimulus for environmental and low-carbon initiatives. (Source: www.oecd.org)
2009	Copenhagen climate negotiations conference was held.	The conference participants were unable to reach an agreement on the emissions reductions of new GHG levels beyond 2012. (Source: www.iisd.ca)
2010	Global Reporting Initiative (GRI)	The Mining and Metals Sector Supplement was released including reporting tools for the mining industry. (Source: www.globalreporting.org)

	GRI mining and metals sector supplement was released.	
2010	A report titled 'Economics of Ecosystems and Biodiversity' was published (www.teebweb.org)	The report called for wider recognition of nature's contribution to human livelihoods, security and health. (www.teebweb.org)
2011	China published a 12-year plan towards a "green economy."	China's 12th Five Year Plan for economic development is based on sustainable development goals. It also included substantial reductions in air pollution through green carbon energy initiatives. Under the plan, nearly half a trillion USD has been allocated for environmental protection. (Source: www.china-briefing.com/news/2011/04/05/)
2012	Rio +20 conference was held.	The conference became a forum for reflecting the global environmental strategies fifty years after the publication of Silent Spring, and 40 years after Stockholm and 20 years after the Earth Summit by focusing efforts to secure agreement on "greening" the world economies (Source: https://sustainabledevelopment.un.org/rio20)
2013	A report titled 'Implementing Sustainable Public Procurement in South Africa: Where to start.'	The report published by the International Institute for Sustainable Development investigates the extent of policy space for the practical strategies of sustainable public procurement in South Africa. (Source: www.iisd.org)

	by Laura Turley and Oshani Perera.	
2014	The State of Sustainability Initiatives Review 2014 Standards and the Green Economy.	The report is a joint initiative of Initiative of ENTWINED, IDH, IIED, FAST, IISD. (Source: Potts, Lynch, Wilkings, Huppé, Cunningham, & Voor, 2014).)
2015	The United Nations' Conference on climate change known as the 21st Conference of the Parties of the within the United Nations Framework Convention on Climate Change (UNFCCC) was held in Le Bourget, near Paris	An agreement was reached with the participation of 196 representatives of the member nations on the need for adopting mitigating strategies on climate change by reducing the carbon levels by 1.5 C as it would significantly reduce the impacts and risks due to greenhouse gas emission. (Source: United Nations Framework Convention on Climate Change
2015	The 2030 Agenda for Sustainable Development strategies was adopted by the UN General Assembly in September 2015.	This is the UN's newest treaty on climate challenge and will come into effect in 2020 (Source: https://sustainabledevelopment.un.org/post2015/transformingourworld)
2015	The United Nations published a report titled 'Transforming our world:	The Report lists 17 SDG and 169 targets.

	The 2030 Agenda for Sustainable Development introducing 17 new Sustainable Development Goals.	(Source: http://www.refworld.org/docid/57b6e3e44.html)
2016	The Paris Agreement was ratified on 4 November 2016 at the UN General Assembly.	The Paris Agreement is a binding legal document within the United Nations Framework Convention on Climate Change (UNFCCC) and deals with mitigation strategies greenhouse gas emissions mitigation and to be effective from 2020. (Source: United Nations Framework Convention on Climate Change)
2018	The World Economic Forum published a report titled 'Global Value Chain Policy Series: Environment'.	This paper is one of the Global Value Chain Policy Series. The paper examines the questions that interact at the cross boundaries of environmental sustainability and global value chains. (Source: www.iisd.org)

Sources: (As cited above. See references)

2.2.2 The emergence of the mining sustainability concept

The sustainable development principles and framework outlined in the WCED (1987), and endorsed by the United Nations have influenced governments, global corporations and non-governmental agencies to respond to the challenges and adopt new strategies on protecting the environment. After the 1992 Rio Earth Summit, several global bodies responded jointly to the “pressure to improve” strategies on sustainable development and the mining industry (Mining, Minerals and Sustainable Development program. n.d., para five). The Mining, Minerals and Sustainable Development program was one of them (ibid). As a result, nine of the largest global mining companies embarked on a new initiative in late 1998 aimed at achieving a series of changes to the way the industry operates including global reporting on corporate sustainability reporting.

The academic world also responded to this global trend. For example, Professor Warhurst (2002) of the University of Warwick produced a pathfinding report on Sustainability Indicators, and Sustainability Performance Management. Further, Azapagic (2004) highlighted the need to measure the “environmental and economic integrated indicators” under the umbrella of sustainability. Specifically, he argued for the need for reporting on “per unit mass of mineral various/products sold and per unit value-added, respectively” (Azapagic 2004, p 661). Private sector business enterprises and governments also considered the need for incorporating sustainability principles into their strategies and work plans (globalreporting.org, n.d). These considerations were supported by a milestone legal judgment made by the then head of the International Court of Justice based in the Netherlands in 1987. The ruling was made on the relationship between the ‘right to development’ and the concept of sustainability:

“The imperative of sustainability has to be recognised in relation to any right to development. Given these considerations, there would seem to be three broad elements of sustainability which qualify the right to development, and which can be listed as follows:

- (i) sustainability in relation—to resources available for present and future generations;
- (ii) Sustainability in relation to an adequate and healthy environment;
- (iii) Sustainability in relation to the community – the concept of ‘international commons’ and safeguarding the “common heritage of mankind” (Singh, 1988, p. 5).

Judge Singh's ruling is considered a landmark decision as it provides a legal basis for sustainability and the "common heritage of mankind". The concept of 'mining sustainability' is relatively a new and diverse interpretation with different opinions, views and controversies (Fonseca et al.; 2013; Azapagic, 2004; Mudd, 2007). Fonseca et al. (2013) highlight the presence of "20 records of frameworks" to measure mining sustainability citing the Global Compendium of Sustainability Indicators Initiatives (p. 180). Azapagic (2004) further highlights the need to measure sustainability activities embracing concepts such as a 'licence to operate'. On the other hand, Mudd (2007) raises the question: "How on earth do we really assess the sustainability of mining and move beyond rhetoric and policy to really understand this debate?" (Mudd, 2007, p. 27). It is evident that there are unanswered issues and further questions to examine the concept of mining sustainability. Mudd (2007) notes:

"At first 'Sustainable Mining' is often perceived as a paradox - minerals are widely held to be truly finite resources with rising consumption causing pressure on known resources. The true sustainability of mineral resources, however, is a much more complex picture and involves exploration, technology, economics, social and environmental issues, scientific knowledge and so on – predicting future sustainability is therefore not a simple task." (Mudd, 2007, p.1).

Kirsch (2010) provides critical views on the concept of sustainable mining stating that the term is used too often as a corporate oxymoron and one of the key strategies corporations use to justify their activities:

"The mining industry moves more earth than any other human endeavour. Yet mining companies regularly claim to practice Sustainable Mining. Progressive redefinition of the term sustainability has emptied out the concept of its original reference to the environment. Mining companies now use the term to refer to corporate profits and economic development that will outlast the life of a mining project. The deployment of corporate oxymorons like Sustainable Mining is one of the key strategies corporations use to conceal harm and neutralize critique" (Kirsch, 2010. p. 88).

Nevertheless, the International Council on Mining and Metals (ICMM) disagrees on academic debates on mining sustainability. The ICMM argues that the global mining sector has a vital role in promoting sustainable development. According to the Council, mining, similar to many other anthropocentric activities should be "undertaken in such a way that the activity itself and the products provide a net positive long-term contribution to human and ecosystem well-being" (International Council on Mining and Metals, 2012, p. 5). The ICMM's ethos on sustainable

development is stemming from a framework that explains ten principles of sustainable development declared in 2003 (see Table 2.2). Two of these principles, namely the principles six and seven relate directly to environmental protection and should guide mining activities as well as the legislative frameworks that support them.

TABLE 2.2 PRINCIPLES OF MINING SUSTAINABILITY

Principle	GOAL
Principle 1	Apply ethical business practices and sound systems of corporate governance and transparency to support sustainable development
Principle 2	Integrate sustainable development in corporate strategy and decision-making processes
Principle 3	Respect human rights and the interests, cultures, customs and values of employees and communities affected by our activities
Principle 4	Implement effective risk-management strategies and systems based on sound science and which account for stakeholder perceptions of risks
Principle 5	Pursue continual improvement in health and safety performance with the ultimate goal of zero harm
Principle 6	Pursue continual improvement in environmental performance issues, such as water stewardship, energy use and climate change
Principle 7	Contribute to the conservation of biodiversity and integrated approaches to land-use planning
Principle 8	Facilitate and support the knowledge-base and systems for responsible design, use, re-use, recycling and disposal of products containing metals and minerals
Principle 9	Pursue continual improvement in social performance and contribute to the social, economic and institutional development of host countries and communities
Principle 10	Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance

(Source: International Council on Mining and Metals, 2003)

Although this research project focuses on Western Australia, it is of paramount importance to review the global drivers that have influenced SD principles in the mining industry globally and how they have impacted the Australian mining industry. In this context, various plans of work undertaken by the Global Reporting Initiatives (GRI) by promulgating mining sustainability reporting are reviewed in the following section.

2.3 The origins of global drivers on sustainability

The GRI has been a pathfinder in promoting sustainability reporting initiatives that go back to the late 1990s. By the end of 2016, the GRI published its fourth-generation guidelines known as 4G reporting standard (globalreporting.org, n.d.) which should also cover mining companies. Table 2.4 provides a summarised list of the landmarks and evolution of GRI as a global driver promoting the concepts of SD principles across the globe. It is evident that there is no clear legislative guidance on sustainability reporting in Australia..

TABLE 2.3 A SUMMARY OF THE EVOLUTION OF GRI AS A GLOBAL DRIVERS OF SUSTAINABLE REPORTING

YEAR	INITIATIVES	COMMENTS
1997	GRI was founded in Boston, the USA in 1997.	The genesis of the GRI goes back the US NGO; the Coalition for Environmentally Responsible Economies (CERES) and the Tellus Institute.
1998	GRI established a multi-stakeholder Steering Committee to develop the organization's guidance.	Steering Committee agreed to focus on activities to do more than on environment.
2000	GRI launched the first version of the GRI Guidelines.	This Guideline incorporated the first global framework for comprehensive sustainability reporting.
2001	GRI became an independent organization.	
2002	Ernst Ligteringen was appointed as the Chief Executive, and the GRI Board of Directors was appointed. The second generation of the Guidelines, G2, was launched. The G2 Guidelines also included the public feedback received from the first version of the GRI's technical guidelines.	The GRI was relocated to Amsterdam, the Netherlands.
2003	GRI's Organizational Stakeholders Program was launched, enabling core supporters to champion GRI's mission and contribute their expertise to GRI's work.	The GRI Stakeholder Council was formed – the formal stakeholder policy forum to advise the Board of Directors.

2005	GRI formed an advisory committee to provide high-level technical advice and expertise to maintain the overall quality of the Framework.	
2006	GRI G3 Guidelines were launched with an emphasis on the materiality principle. GRI's first Global Conference on Sustainability and Transparency took place: 'Reporting: A measure of Sustainability'.	This year marked developing formal partnerships with the UNGC and the OECD.
2007	A Regional Hub in Brazil was established.	GRI activities were expanded to South America.
2008	GRI held its second Global Conference titled 'Sustainability Reporting Today: The Readers' verdict'. GRI Governmental Advisory Group was established.	A regional hub in Australia was established.
2009	GRI expanded its services by providing certified software and tools, i.e. GRI certified software and tools program.	A GRI Regional Hub in China was established, the first of its kind in Asia.
2010	GRI published: (a) GRI and ISO 26000: How to Use the GRI Guidelines in Combination with ISO 26000; (b) Carrots and Sticks – Promoting Transparency and Sustainability.	One of the outcomes of the third GRI conference was the signing a memorandum of understanding between GRI and the UN Global Compact that was signed during the conference.

	<p>GRI's third Global Conference on Sustainability and Transparency: "Rethink – Rebuild – Report." was held in Amsterdam, 1200 attendees participated from 77 different countries.</p>	
2011	<p>GRI published the following:</p> <p>G3.1 Guidelines – an update and completion of G3, with expanded guidance on reporting gender, community and human rights-related performance indicators.</p> <p>How Do the Global Reporting Initiative Reporting Guidelines Match with the Carbon Disclosure Project?</p> <p>Three new Sector Guidelines on Mining and Metals, Airport Operators, Construction and Real Estate.</p> <p>A Sustainability Disclosure Database (SDD) was launched.</p>	<p>This year GRI also launched a "Report or Explain" Campaign. The campaign offered an opportunity for all stakeholders wishing to provide sustainability disclosure as mainstream management and accountability tool.</p> <p>The SDD helped to catalogue all GRI-based and non-GRI-based sustainability reports.</p>

2012	<p>GRI hosted its first Australian Conference in Melbourne. 250 delegates from 11 countries attended.</p> <p>Further to the Australian conference, GRI held two other conferences in North America: GRI US Focal Point in St Louis, Missouri and Toronto, Canada.</p>	<p>First ever GRI global conference since the Australian hub was launched in 2008.</p>
2013	<p>The fourth global GRI conference was held in Amsterdam, Netherlands titled “Information – Integration – Innovation,” with 1,600 delegates from 69 countries attended.</p> <p>Released the fourth generation Guidelines, (G4) addressing Reporting Principles, Standard Disclosures and an Implementation Manual for the preparation of sustainability reports by organizations online.</p> <p>A free web-based tool representing all the content of the G4 (Guidelines) with interactive features was developed.</p>	<p>In parallel to the Guideline 4G improvements, the following collaborative global activities were initiated:</p> <p>Joined forces with the United Nations’ Global Compact Group (UNGCG).</p> <p>World Business Council for Sustainable Development (WBCSD) planned to develop private sector guidance.</p>

2014	<p>Launched GRI's content index services to facilitate validation of accuracy and alignment of G4-based reports.</p> <p>A publication titled Ready to Report? aimed at SMEs to consider the relevance for sustainability reporting in the SMEs</p> <p>Independent public funding solely for standards-setting activities was established.</p> <p>Continued the expansion of global activities by setting up the GRI's seventh focal point in Colombia.</p> <p>A new Chief Executive (Michael Meehan) was appointed.</p>	<p>The following (GRI) organizational changes took place:</p> <p>The creation of a new organizational entity was established by separating GRI standard-setting work and all other organizational activities.</p> <p>The new organisational entity led to the creation of a new Global Sustainability Standards Board and, an oversight committee, and also an independent appointments committee.</p>
2015	<p>GRI developed improved certification of reporting procedures.</p> <p>Launched an exam for G4 formulated 60 multiple choice questions enabling individuals to gain accreditation and evaluate the ability to use GRI's G4 Guidelines.</p>	<p>The GRI certification exam is offered in more than 70 countries.</p> <p>The report explores materiality from the SD reporter's perspective, using data from fields covering technology hardware & equipment, and banking issues.</p>

	<p>Published, Defining Materiality: What Matters to Reporters and Investors (Part I). The report explores materiality from the SD reporter's perspective, using data from fields covering technology hardware & equipment, and banking issues.</p>	
2016	<p>GRI launched its first global standards for sustainability reporting developed under the GRI's Global Sustainability Standards Board (GSSB).</p> <p>Held its 5th Global Conference in Amsterdam attended by nearly 1200 sustainability leaders and practitioners from 73 different countries.</p> <p>The first African regional conference in South Africa was held and attended by hundreds of experts who provided a platform for improving the value of sustainability reporting and accountability on the African continent.</p>	<p>The African regional conference is the expansion of GRI and expansion of activities in Africa.</p>

2017	GRI considered reporting on climate change as an integral part of sustainable reporting. Organised a workshop at the Sustainable Stock Exchanges (SSE) in Bonn, Germany.	The emphasis on the climate change was considered as a result of the Hurricane Maria that impacted the people, economy and infrastructure of Puerto Rico. The SSE workshop was held from 6 to 17 November.
2018	The work on the transition from GRI's G4 guidelines to the Sustainability Reporting Standards was completed.	Work on the effects on climate change is continuing.

Source: GRI yearly reporting on milestones extracted from www.globalreporting.org

2.4 The impact on the global sustainability drivers in the Australian mining sector

The development of global reporting initiatives had an impact on mining sustainability work in Australia. For example, several organisations associated with the mining industry have developed dialogues through regular conferences to discuss further exploring how Australian mineral sector could contribute to global initiatives on sustainable development through the work of The Australasian Institute of Mining and Metallurgy (AusIMM), the Sustainable Minerals Institute (SMI), and the Centre for Sustainable Resource Processing (CSRP).

Founded in 1893 and with a current membership of 13,000 members drawn from all sections of the industry and supported by a network of branches and societies in Australasia and internationally (AusIMM, n.d., para one), the Australasian Institute of Mining and Metallurgy provides services to professionals engaged in all areas of the global resources sector. It is the national peak body working towards a culture of promoting and increasing the knowledge of sustainability among the practitioners. Rather than viewing sustainability from purely a company perspective, the AusIMM sees it as a requirement for all professionals within the industry (Keogh, 2009, p.90) in response to the changing times and new opportunities.

The Coalition for Energy Efficient Comminution (CEEC) is another independent body established by a group of leaders of the mining industry. The CEEC provides a forum for effective communication about the latest technical findings to its members (Coalition for Energy Efficient Comminution, n.d.). These new technological findings raise awareness and provide programs on improved engineering designs covering a range of subjects such “improved blasting, crushing and grinding techniques” that helps to “lower project costs, and improve energy efficiency.” (Ibid, n.d., para two & three).

These organisations have developed and contributed to sustainable development practices and training for the Australian minerals industry (AMI, 2009, CCEE, n.d). Regular industry events, such as conferences, awareness and training programs emphasise improving “the capacity of the [Australian] minerals sector to contribute to the global goal of sustainable development.” (AusIMM, n.d, second para) are held for the benefits for the members regularly.

Another agency that represents the Australian mineral sector is the Minerals Council of Australia (MCA), and it was established in 1995. The MCA represents the “minerals industry with a common purpose in advocating responsible policies to promote growth, prosperity and sustainability.” (MCA, n.d., para two). MCA could be cited as an example of the trickle-down effect of the global mining sustainability initiatives discussed earlier in this chapter.

Further to these private sector initiatives to promote mining sustainability across the country, the Australian government also has initiated actions supporting environmental protection legislatively. Among these is the enactment of Australia’s peak national legislation, namely the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. This Act “is the Australian Government’s central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places” (Australian Government: Department of Environment and Energy (n.d)). A closer examination of the functionality and implementation of this Act is discussed in Chapter Five (section 5.7.4). Despite the enactments of the *EPBC Act*, specific mining sustainability legislation has not yet appeared in Western Australia (*Mining Act 1978; Mining Rehabilitation Fund Act 2012*) though the latter has introduced regulation to rehabilitate abandoned mines sites. A detailed discussion covering issues on the WA mining regulatory framework, evolution of the mining legislation and other background information is included in Chapters Five and Eight respectively.

2.5 Summary of the chapter

This chapter outlined how the global extractive industry has actively responded to exploitation and conservation of natural resources (world resources institute, n.d). The industry bodies have tried not only to reform their approaches but displayed initiatives by introducing new reporting methods on sustainability practices (globalreporting.org, n.d). What has emerged from these policy drivers is that establishing mining can no longer remain as an extractive industry without integrating social and environmental considerations into its economic performance. The next chapter provides an overview of emerging theoretical concepts which allow the mining industry to link their work with social responsibility and licence to operate.

CHAPTER THREE LITERATURE REVIEW - THEORETICAL APPROACHES

3.1 Introduction

This chapter reviews key literature covering concepts such as corporate social responsibility, social licence to operate, the theory of bureaucracy, legal doctrine, the rule of law and discourse analysis.

As a result of the global trends towards sustainability initiatives, a need emerged to accept concepts such as Corporate Social Responsibility (CSR), and Social Licence to Operate (LSO), as practical philosophies guiding the performance of corporate responsibilities concerning its role within society. Global corporations now embrace concepts such as CSR and LSO by incorporating elements of sustainable development and global reporting initiatives (MMSD. n.d. para five); globalreporting.org, n.d.).

Discussing the future directions of business ethics, Friedman (1970) developed the conceptual ideas of CSR. Furthermore, the need for environmental protection has been conceptualised through regulation theories and implemented through legislation as mining can cause damage to the Earth's ecosystems beyond repair (MMSD. n.d. para five, Martonas, 2017 & Azapagic, 2004). These issues and increased community concerns have influenced the mining companies to initiate actions as a part of their social responsibility and adopting responsible practices (Bice, 2014, Azapagic, 2004).

3.2 Corporate social responsibility and social licence for mining

Concepts such as CSR and SLO now appear as integral parts of frameworks describing mining sustainability (Bice, 2014; Bice & Moffat. 2014; Frazer Institute, n.d.; & Azapagic, 2004). The Frazer institute which compiles an annual global index for best places for investments in mining and resource development projects defines CSR and SLO as follows:

“The social license to operate (SLO) refers to the level of acceptance or approval by local communities and stakeholders of mining companies and their operations. The concept has evolved fairly recently from the broader and more established notion of “Corporate Social Responsibility” and is based on the idea that mining companies need not only government permission [or permits] but also “social permission” to conduct their business. Increasingly, having an SLO

is an essential part of operating within democratic jurisdictions, as without sufficient popular support it is unlikely that agencies from elected governments will willingly grant operational permits or license” (Fraser Institute - MiningFacts.org. n.d., para one).

Despite having a long history of the usage of the term, there is no consensus among the industry, academics and interested parties about a universal definition of CSR (Sheehy, 2015). The CSR concept emerged emphasising a vital element of business profits and ethics as far back as in 1970 (Friedman, 1970). The mining companies embraced it when large global corporations initiated actions to incorporate elements of sustainable development and global reporting initiatives (MMSD. n.d. para 5); globalreporting.org, n.d.). According to Donaldson and Dunfee (1999), the reason why many companies embrace the concept of CSR is due to the need to have a social licence to operate because it protects their interests. However, CSR and SLO are voluntary commitments. Unless there are proper definitions and incorporated them into legislation, these concepts would end up as rhetoric:

“Without definition and boundaries, social licence is no more than abstract rhetoric that has little meaning or, worse still, may frustrate genuine efforts to align interests because of the differing expectations it creates” (Business Council of British Columbia, 2015, p.1).

Thus, the implementation of these concepts involves negotiating and receiving the consent of the community and stakeholders where mining operates. These two concepts have not been incorporated into any mining legislation in Australia. At present, there are no universal definitions or mandatory guidelines enforcing a company to incorporate either CSR or SLO as an essential operational ethos. On the other hand, CSR has become an integral part of sustainability reporting. Asmus (2009) identifies three issues that need to be addressed and resolved due to the voluntary nature of these concepts. They are: (a) how is a “community” defined? Is there a specific geographical limitation? Should the elected officials represent a “community” and be given equal or higher status compared to local citizens who may actually represent a community; (b) If there are differences of opinions among the members of the community, then what processes should validate any decision-making; whether it is to be achieved through a majority vote or by other means, e.g. referendum or participatory democracy; (c) in the absence of a political processes, how to define and determine an adequate level of consent (ibid). According to

Donaldson and Dunfee (1999) engaging with stakeholders to obtain SLO can start by identifying “micro-social contracts” through discussions at the commencement of a project.

Australian legislation and regulations have no provisions for either CSR or SLO conditions. On the other hand, environmental protection is covered by legislation which could be explained by regulation theory.

3.3 Theory of bureaucracy

This section reviews the literature regarding the theory of bureaucracy and focuses primarily on German sociologist Max Weber’s work (1952, 2015) to gain insights into the formation and the functions of the agencies that are entrusted to implement the legislation and regulations come under the MinReF. The theory of bureaucracy explains specific features of public administration (Udy, 1959) emphasising the critical need for communication that runs as a thread of bureaucracy (Weber, 2015). Weber (2015) introduces bureaucracy as prerequisite conditions for establishing a bureaucratic administration which functions according to several of its characteristics. Weber defines characteristics of a bureaucratic administration by identifying a series of features. The first feature of bureaucracy is the presence of a hierarchical nature of authority and structures. Another feature of bureaucracy according to Weber (2015) is that staff members of the organisation or bureaucrats perform their duties in an impersonal manner. This feature can be applied to all public service organisation where employees have to follow specific codes and ethics. Furthermore, these features could be observed in the Western Australian public sector. (Government of Western Australia: Public Sector Commission, n.d., para one). Another feature of bureaucracy is the presence of specialised administrative staff to carry out specific functions within an organisation. Weber notes:

“Bureaucratic administration means fundamentally the exercise of control is on the basis of knowledge. This is one feature which makes it specifically rational” (Weber, 1952, p.26).

Furthermore, according to Weber, Gerth & Mills. (1977), employees in “rational organizations” should be rewarded to compensate for their time (salaries)”. When perusing the functions of agencies that implement MinReF such as DMIRS and EPA,

the relevance of Weber's features of bureaucracy such as specialised administrative staff could be observed. This feature also applies to all public service employees of all levels in WA as they work on public service awards (Government of Western Australia: Public Sector Commission, n.d).

Weber also introduced the term, "Rational-Legal authority" which is still considered a feature of modern liberal states (Anter, 2014; Meyer and Brown, 1977). The notion of "Rational-Legal authority" maintains that an individual within the bureaucracy or an institution has powers (authority) that stem from the legal offices that they hold. Weber's ideas are useful to understand the authority granted under vital legislation within the MinReF. For example, the *Mining Act*, defined two critical positions of the agency entrusted to implement the *Act* as follows:

"Director General of Mines means the person for the time being holding or acting in the office of a chief executive officer of the Department.; Director, Geological Survey means the person for the time being holding or acting in the office of Director, Geological Survey in the Department". (Mining Act 1978, p.7)

Similarly, Section 11 of the *Act* legitimises establishing departments and officers (bureaucrats) to perform specialised functions such as mining registrars, geologists, surveyors, inspectors and such other officers:

"There shall be a department of the Public Service of the State to assist the Minister in the administration of this Act, to which department there shall be appointed, under Part 3 of the Public Sector Management Act 1994, a chief executive officer and such number of persons to be mining registrars, geologists, surveyors, inspectors and such other officers as may be necessary for the due administration of this Act" (Mining Act 1978, p. 17).

Similar role delineation and the bureaucratic functions are defined in other key Acts that come under the MinReF. For example, Section 22 of the *Environmental Protection Act 1986* stipulates the appointment and engagement of staff to perform the functions of the EPA:

s. 22 (1) There shall be appointed under and subject to Part 3 of the Public Sector Management Act 1994 a chief executive officer and such other officers as are necessary to assist the Minister, the Authority and the CEO in the

performance of their respective functions (Environmental Protection Act, p. 34).

The staffing requirements and the role clarifications under the *Mining Act* and the *EP Act* reflect Weber's theories on bureaucracy describing the characteristic of bureaucratic administration. When reviewing Weber's work in the context of the MinReF and the bureaucracy that exists to support and implement legislation two unique features emerge. First, what Weber highlights as the need for communication, stating that it needs to run as a thread of the bureaucracy within an organisation. However, this feature is not entirely transparent in the MinReF bureaucracy due to lack of coordination of agency activities (WAAG, 2011). Secondly, the justification of Weber's features of bureaucracy such as the hierarchical nature of authority is noticeable among the MinReF agency structures as appearing in the *Mining Act* (s 11) and cited above.

While Weber's work provides the characteristics and "Rational-Legal authority" of the Bureaucracy, his work does not explain political decisions that impact the mining approval process and environmental compliance. Hoecke's work (2013) on legal doctrines are useful to gain some insights into political decisions that influence the mining approval process and environmental compliance.

3.4 Legal doctrines

The concept of 'legal doctrines' provide a framework to examine various issues and political decisions that impact the mining approval process and environmental compliance. According to Hoecke (2013), there are seven features of legal doctrines. They are: (i) hermeneutic; (ii) argumentative; (iii) empirical; (iv) explanatory; (v) axiomatic; (vi) logical; and (vii) normative.

The hermeneutic doctrine involves "interpreting texts and arguing about a choice among diverging interpretations" (Hoecke, 2013, p. 4). By contrast, the argumentative doctrine "is the argumentation to support some legal interpretation or solution that is emphasised, rather than interpretation as such" (ibid), while the empirical discipline involves "verification by checking statements in legal doctrines against the judicial practice, and action of the courts" (Hoecke, 2013, p.5). The explanatory doctrine "explains why the rule is a valid legal rule in a given society. This explanation may be historical, sociological, psychological, economical" (Hoecke, 2103, p.8). According to Weber et al. (1952), however, the bureaucratic or political

decisions should be based on rational and neutral grounds which is one manifestation of the explanatory doctrine. The axiomatic doctrine considers “law as an algebra of legal concepts” (Hoecke, 2013. p.9). In a theoretical context, the term axiomatic could be explained as “a theory, i.e. systematically organized knowledge applicable in a relatively wide variety of circumstances, especially a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature or behaviour of a specified set of phenomena” (American Heritage Dictionary, 1992). A more modern version of the axiomatic is the logical doctrine which supports having a rational (logical) and neutral approaches in administrative systems. By comparison, the normative doctrine “is not only describing and systematising norms, but also to a larger extent, [could be considered as] a discipline which takes normative positions and makes choices among values and interests” (p.10). In summary, Hoecke’s work (2013) helps explain the role of the legal framework as a guide to understanding acceptable behaviour and expectations of the “Bureaucracy’ managing the mining industry.

3.5 Rule of Law

The rule of Law is a “principle that all people and institutions are subject to and accountable to law that is fairly applied and enforced; the principle of government by law” (dictionary.com). Most of the content of the rule of law may be summarised in two ways (a) that the law should rule the people with authority including the government officials and obey it and (b) the bureaucracy will be able to be guided by it (ibid). Legislation that operates within regulatory systems is not stable, as the mining laws need to change in response to changing needs of society (Hunt, 2009, p.9). No legal expert can predict that any law would change in response to the needs and demands of society. For example, until a few decades ago, no one could predict that sustainability would be considered international law (Singh, 1988, p.5). A fundamental principle of the ‘rule of law’ is the commitment to transparency and accountability inherent in good governance:

“The commitment to transparency and accountability inherent in good governance promotes the rule of law over corruption, allowing the many benefits of other sustainable development initiatives and economic inputs to reach those in society who most need to benefit from them” (United State Council for International Business, 2015, para one).

One of the issues, I explore in this study is the WA Government's commitment to transparency and accountability principles concerning the environmental regulations of the mining industry. This is of paramount importance, as there is evidence about various narratives and discourses that emerge outside regulatory framework and projected by agencies responsible for implementing the MinReF. Discourse analysis provides useful insights and helps understand various narratives and discourses emerge outside the mining regulatory framework in Western Australia.

3.6 Discourse analysis

In order to understand various discourses and narratives that emerge outside the regulatory framework on environmental regulations, it is essential to analyse the language used in key documents published by regulatory agencies. This section provides key references from the literature on discourse analysis (DA) which is a generic term that assists in the “study of conversation or language in use” and, consists of an “array of analytic approaches” (Stubbe et al., 2003, p.351). Fairclough (1995) considers DA “as a constructive part of its local and global, social and cultural contexts” (p.29). As a methodology, DA is now considered a useful research method for investigating socially constructive phenomena as it is grounded in an explicitly constructive epistemology (Stubbe et al., 2003; Fairclough, 1995). In all approaches of DA, as a methodology, it uses language as a constructive phenomenon instead of examining empirically representative occurrences. Discourse analysis is also considered as a methodology for studying social constructions which have attracted both academics and researchers (Fairclough, 1995; Alvesson & Kärreman, 2000). Holmes (2007) discusses the importance of monitoring organisational boundaries to understand various discourses used within organisations that act as gatekeepers (p. 1993). The literature on DA views discourses as constitutive of the social world—not a route to it and assumes the world cannot be known separately from various discourses either representing individuals or corporate entities. Such interpretations help to identify rhetorical CSR statements of government agencies responsible for mining legislation in WA (Govinnage, 2018).

The challenges and opportunities highlighted by Fisher (2010) about the Australian environmental legal system need to be understood through the lenses of agencies responsible for implementing the MinReF in WA. As some of these agencies have evolved over a century (State Records Office, n.d) as in the case of the DMIRS (the former DMP), these agencies over the years have developed various discourses, and they can be understood and explained by carrying out discourse analysis. In the

remaining part of this section, I examine a sample of discourses of one government agency responsible for implementing legislation and regulations that come under the MinReF. Using a sample of a selected content analysis of annual reports from 2014 to 2017, I analysed various discourses presented by the DMP/DMIRS to identify the nature of discourses which are not related to the agency-owned legislation and regulations on mining and/or environment. My review of DMP/DMIRS discourses is based on a content analysis of various narratives and discourses extracted from a sample (n=4) of annual reports published by the DMP since 2014 (Govinnage, 2018).

Similar to marketing tags of products that promote favourite fizzy drinks, DMP/DMIRS, have been projecting various discourses in the agency annual reports. One of the discourses identified from an annual report states:

“Contributing to making Western Australia the destination of choice for responsible resource exploration and development” (DMIRS, Annual Report 2016- 2017, p.1)

In the same report, under the Director General’s (DGs) message, DMP projects another discourse:

“The department’s strong regulatory framework, along with its innovative and adaptive management approach, contributed to the State is recognised as one of the world’s most attractive mining investment jurisdictions” (sic) (ibid, p.7).

The DG’s message about Western Australia as one of the “world’s most attractive mining jurisdictions” stems from the Frazer Institute’s Global index of best mining investments (Frazer Institute. org, n.d.). However, the term, “innovative and adaptive management approach” has neither been defined in the Annual Report (2016 - 2017) nor appeared in legislation. A unique feature of these narratives and discourses is that they change from one year to another as they are not consistent. For example, the agency (then known as DMP) has projected different narratives in the 2014 – 2015 Annual Report stating that the agency supports a “Responsible Resource Future” (DMP, 2016, p.1). The tag on the cover page of the 2015 - 2016 Annual Report has been expanded to represent another discourse:

“The Department of Mines and Petroleum is responsible for ensuring the State’s resources sector is developed and managed responsibly for the benefit of all Western Australians” (ibid, p. iv).

The statements that the DMP is “responsible for ensuring the State’s resources sector is developed and managed responsibly for the benefit of all Western Australians” (ibid) had not been defined either in the legislation or agency annual reports. Legislatively, this particular discourse could be disputed for three reasons. First, the term has not been defined (e.g. who are the “Western Australians”: electoral voters, all people living in WA?, the Aborigines who have lost their lands to colonisers? Secondly, the discourse suggests that it is a phenomenon happening at present. If it is happening at present, then the agency needs to explain how the resources sector is being developed and managed “responsibly for the benefit of all Western Australians”. However, it raises further questions such as what is the meaning of “responsible” etc. Does it mean the Royalties collected and redistributed through other portfolios such as education and health? Does the agency support or facilitate establishing outreach programs to support needy people in WA? If so, have such programs been legitimised through legislation? What are these programs, and have they been developed responsibly for the benefit of all Western Australians? The fundamental question is how the DMIRS could justify the claim within a legal framework, or is it a public relations campaign of the Department to indicate that the agency has embraced corporate values following the concepts of CSR in alignment with global sustainability trends? Thirdly, such discourses do not appear in legislation under which the agency regulates the mining operations in WA (Govinnage, 2018).

The DMIRS-focused content analysis helped to identify a similar discourse appearing as a web-based document titled “Our Plan for Success 2019”. The document has no linkages to any legislation under which the agency operates (ibid). Thus, to gain insights and provide explanations of agency-specific discourses, the literature on discourse analysis is useful as a research tool to identify and explain how agencies represent dynamic discourses as explicitly constructive epistemology.

These discourses have no specific references to key legislation and regulations that come under the MinReF such as the *Mining Act* or the *MRF Act*. Further, DMP discourses reveal how “constructed phenomena” operate outside legislation. One of the insights gained from the discourse analysis projected by the DMP/DMIRS indicates a need for further research. Moreover, the need for further investigations of

the changing discourses of the DMP/DMIRS merits further analysis and has been included in the future research agenda (Chapter Eleven, Table 11.2).

The theoretical insights of discourse analysis are useful to understand and analyse various discourses and narratives put forward by agencies that are responsible for implementing the MinReF. Each agency that operates under a set of legislative jurisdictions and is operating in Westminster type parliamentary systems need to operate within a regulatory framework following the rules of law (Australian Politics.com, n.d.). In countries like Australia, the UK and New Zealand which are governed by Westminster parliamentary system operated under a series of procedures supported by legislation and applied equitably for all citizens similar to legislation ratified in the parliament (Australianpolitics.com, n.d. para one). However, the agency discourses I analysed are not supported by legislation similar to the concepts such as CSR or SLOs as discussed in this chapter. For example, the DMIRS has authority to collect Royalties from the mining company because there are Regulations such as the 'Administrative Schedules' under the *Mining Act* and ratified in the Parliament regularly empowering the agency to collect Royalties. The only exception is the legislative agreements where different Royalty rates are agreed upon and ratified under a State Agreement. Panegyres and Panckhurst, (2015) who have examined the legislative framework of the DMP's Royalty systems have written about the variations of the Royalties collected under *Mining Act* and different rates offered to certain companies operating under State Agreements (ibid). The relevant point is that any government agency operating under the MinReF cannot just initiate or implement programs or policies based on discourses as there is an acceptance that the large resource projects operated under the State Agreements benefit the economy (Barnett, 1996, 2016). The DMP discourses such as "the State's resources sector is developed and managed responsibly" need to be ratified in the Parliament to achieve set objectives, so they could be and evaluated to ascertain whether stated outcomes have been met or not and to legitimatise the agency narratives that operate outside the legislative framework.

3.7 Chapter Summary

This chapter provided several theoretical insights into concepts such as corporate social responsibility, licence to operate, theory of bureaucracy, legal doctrines, rule of law and discourse analysis as they are relevant to identify and analyse multiple issues related to various discourses put forward by an agency that is responsible for implementing the MinReF. This chapter commenced with a review of literature covering the two concepts: 'corporate social responsibility' and 'licence to operate' that have emerged as theoretical perspectives as well as practical philosophies for corporations including the mining industry to justify their work. Max Weber's theory of Bureaucracy was reviewed to understand and explain the multiple administrative structures that have evolved to implement the legislation and regulations come under the mining regulatory framework and various positions established under legislation such as *Mining Act 1978*, and *Environmental Protection Act 1986*. The seven features of legal doctrine by Hoecke (2013) were identified and summarised to examine various features of the MinReF and provide interpretations of how some regulatory clauses could be interpreted. The concept of the 'rule of law' was reviewed as it helps to analyse the government commitment to transparency and accountability aspects of the legislation and regulations of the MinReF as a basis for analysing its strengths and weaknesses outlined in Chapter Eight. Finally, the literature and relevance of discourse analysis were reviewed as it allows how language constructs phenomena. Written words embodied in a sample of the DMIRS' annual reports were analysed to explain how the agency use language outside the regulatory framework to project various discourses overtly.

CHAPTER FOUR LITERATURE REVIEW: MINING AND ENVIRONMENTAL LAWS, PUBLIC POLICY & REGULATORY DESIGN PRINCIPLES

4.1 Introduction

This chapter identifies and reviews the literature on several theoretical approaches covering mining law, environmental law, public policy, politics of resource development and regulatory theory and examines various facets related to this study to gain insights into the mining regulatory framework in Western Australia (WA). In this chapter, I examine public policy issues identifying politics and resource development to understand and explain how party politics, State minister's influence and authority play a significant role when approving mining proposals in WA. This chapter also reflects on the importance of the application of mining and environmental laws and introduces the political environment influencing decisions related to the mining industry including the approval of new mining proposals. The chapter concludes the need for identifying key elements of regulatory design principles to analyse some aspects of the MinReF in WA.

4.2 Mining Law

Fisher, (2010), outlines three traditional functionalities of the Australian legal system that emerged at the beginning of the twentieth century. They are (i) the facilitation of the use and development of the environment as a natural resource; (ii) the protection of the environment from environmentally damaging activities; and (iii) the conservation of the natural environment and ongoing management practices (p.10). The Australian legal system that Fisher (2010) describes helps to contextualised broader categories of mining laws.

According to Southalan (2012), "the law of mining at a level wider than just one country brings complexities. Unlike, geology, economics, accounting and many other disciplines that travel internationally with mining, the law does not have common terminology or rules" (p.20). Cruse, (1993, p.35) states that in mining law, the complexity gets intensifies where the same words used "may mean different things and involve different legal rights" confirming Southalan's view on mining law. Southalan (2012) identifies three categories of mining laws that would impact mining activities globally. These categories are: (a) international laws; (b) comparative law, and, (c) constitutional laws (p.17). In this section, the focus would be limited to international laws and constitution categories as this study does not deal with comparative (mining) laws.

The international laws are “treaties’ that are ratified by international agencies such as the United Nations (UN). For example, the Kyoto Agreement is one of the treaties that member countries of the UN have agreed to abide, by becoming the signatories to the treaty. An international law could be an international environmental agreement (IEA) or an environmental protocol, such as the Kyoto protocol bounded by international laws by nature. Mitchell (2003) defines an IEA as “an intergovernmental document intended as legally binding with a primary stated purpose of preventing or managing human impacts on natural resources” (p.432). Summarising the overall effects on international agreements Mitchell (2003) notes:

“Despite extensive public, legal, and social science interest in international environmental agreements, the empirical basis for claims regarding the number of such agreements and their characteristics remains weak” (p.431).

The literature concerning the mining law in WA did not reveal that any international treaties play a role or come under the MinReF. The constitutional law as described by Southalan (2012) “is the law within a country, about its government duties and responsibilities bearing in mind that ‘government usually involved three’: parliament, the executive and the judiciary branches” (p.19). Constitutional law is intertwined with the sovereign power of a nation enabling a (national) government to give lawmaking powers:

“The Constitution confers the power to make laws on the Commonwealth Parliament. However, the power of the Commonwealth Parliament to make laws is limited to particular subjects. Most of these subjects are listed in sections 51 and 52. They include defence; external affairs; interstate and international trade; taxation; foreign, trading and financial corporations; marriage and divorce; immigration; bankruptcy; and interstate industrial conciliation and arbitration” (Commonwealth of Australia, 2010. Parliamentary Education Office and Australian Government Solicitor. P.vi).

The above list of law-making does not include the authority of enacting environmental laws, and it raises the question of the sovereign power of Australia. The British Monarchy is the head of the Australian Government. Hence, the Sovereign power of Australia has been questioned by legal professionals (Manetta, 1999). Michael Manetta (1999) in his submission on the need to change the Australian constitution and to form a Republic proposed a way to change the current position:

“The sovereignty of the Crown, on the other hand, over the whole structure of the federation, Federal and State, remains distinct and separate from the provisions of the Federal Constitution and beyond the scope of s.128.

Accordingly, whilst s.128 can be used to amend the Constitution, that is to say, to amplify, modify or restrict the exercise of the sovereign powers of the Crown, it cannot be used to remove those powers from the Crown and place them elsewhere, because the Commonwealth is just as firmly under the Crown as it is under the Constitution. The Crown is not a creature of the Constitution and does not owe its continued sovereignty to the Constitution”.

(Manetta, 1999, p. 2)

Therefore, when considering mining laws of Western Australia, and authority under the Constitutional Law, it is important to recognise the power lineage of the British Monarch about the ownership of minerals in Australia. The situation did not change when Australia became a Federation in 1901. Though Australia is no longer a colony of the British Monarch, the ownership of mineral in Australian States and territories remain under the Crown (Banks, 2003). According to Banks (2003, p.1) the “history of the mining industry is intimately connected with government regulation”. He further highlights that “it has also made a strong advocate for reform — not only of the maze of regulation that applies specifically to mining (such as land access, development and environmental regulations), but recognising broader policy environment, including protection reform (p.1-2).

The Australian Constitution “confers the power to make laws on the Commonwealth Parliament. However, the power of the Commonwealth Parliament to make laws is limited to particular subjects” (Commonwealth of Australia: Parliamentary Education Office and Australian Government Solicitor. 2010, p.vi). The role of Constitution is relevant to mining law in Australia because the Constitution has no powers;

“to a number of important subjects including education, the environment, criminal law, and roads – but this does not mean that those subjects are wholly outside the Parliament’s powers. For example, even though the Commonwealth Parliament has no specific power in relation to the environment” (ibid, p.vi).

The reason why each State and Territories have developed separate legislation on mining is due to lack of provision in the Australian Constitution. However, the “Constitution expressly guarantees the continuing existence of the States and preserves each of their constitutions” (ibid). Despite the delegations of granting power to make laws at the State level, the section 106 and 107 states that the State must do so “subject to the Australian Constitution (sections 106 and 107):

Under the constitutions of each of the States, a State Parliament can make laws on any subject of relevance to that particular State” (ibid).

This particular clause in the Australian Constitution explains the authority under which the WA Government has developed mining laws since the formation of the Federation in 1901. The flaws and powers of the Australian Constitution provide useful insights into the genesis and formation of mining laws in WA. However, both international laws and constitutional laws are not sufficient to explain the mining laws in WA where international treaties have not played any role in influencing the mining regulatory framework. Next section provides an overview of the environmental law.

4.3 Environmental Law

In this thesis, the legislation and regulations that come under the MinReF are analysed using disciplines such as regulation theory and legal doctrines in the context of the environmental legal system (ELS) in Australia. Fisher (1993) notes that the ELS is “much more complex than international environmental law”. According to him, this complexity arises due to several reasons. First; is due to the “division of responsibility between the Commonwealth and States (Fisher, 1993, p.38). Second, the “consequence of a wide range of sources of legal rights and obligations” (ibid). Fisher further notes the “wide range of instruments and mechanisms provided by the legal system and obligations” exist to ensure the efficacy of these rights and obligations (ibid). In this regard, Fisher (1993) makes a key observation of the fundamental of the environmental management in Australia:

“Environmental management by virtue of the position of the Crown as the holder of the radical title to land and land-related resources is the model that has evolved as the basis for the present environmental legal system.” (Ibid, p.39).”

Fisher’s opinion supports the evolutionary nature of the MinReF, as since 1854, Western Australia has developed legislation to regulate “land and land-related resources” supporting the mining industry by enacting early legislation on lands such as the *Minerals Land Act 1892* and the *Land Act 1933* (Hunt, 2009). Fisher (2010) notes the opportunities and challenges of the environmental law within a matrix of power, liabilities, rights and duties that I have considered in compiling the two case studies presented in Chapter Seven of this thesis. In this regard, Fisher provides insights into the challenges of enforcing sustainability in the context of Australian environmental legal system:

“If the environmental law is founded upon a utilitarian approach and if environmental management is driven by sustainability, then this poses considerable challenges for the traditional matrix of power, liabilities, rights and duties. If the management of the environment is to be sustainable, then legal terms do not comprise a power, a liability, a right or duty. This not to suggest that sustainability may not be incorporated within the legal system in the form of one or other of these mechanisms. It can indeed sustainability in one or the other of a series of different forms, an element of the Australian environmental legal system. The law has been uncomfortable with the idea of sustainability as an outcome- or any other outcome for that matter—that is enforceable. But this may be changing” (Fisher, 2010, p.8).

The environmental laws need to be considered as a public policy discourse as the legislation and regulations come under the MinReF are implemented through several public service agencies. (Chapter Five, section 5.6).

4.4 Public Policy

This section outlines key issues relating to public policy in the context of this research drawing from the literature on public policy from several sources. Policy-making is a complex process, and it involves “both a technical and political process of articulating and matching actors’ goals and means” (Howlett & Cashore, 2014, p.17). The Australian Government defines policies as a government instrument that would;

“deliver services and programmes successfully, risks and implementation issues must be considered during policy design. Effective implementation requires a structured approach to thinking about how the policy will be

delivered” (Australian Government: Australian Government- Department of the Prime Minister and Cabinet. n.d. para one).

In my view, the best and the short definition of public policy has been offered by Thomas Dye, who defines public policy as ‘anything a government chooses to do or not to do’ (Dye, 1972, p.2).

Exploration and advancement of theories relating to the web of complex public policy issues are critical to understand how various legislation and regulations that come under the MinReF are implemented through a multi-agency system. In the context of WA, the MinReF implementing agencies have their jurisdictions and focus on agency-specific activities (DMP, 2016; WAAG, 2011). Thus, it is imperative to analyse complex issues examining the scope, and the strengths and the weaknesses of the of the MinReF (see Chapter Eight), how they address policy discourses, and whether specific “cultures” exist among the responsible agencies to understand issues about coordination or lack thereof.

First, I examine the works of John, (2003 & 2012); Rein (2009), Rein and Schön (1996) to understand complex issues on public policy theories to gain insights into resource development projects. Secondly, I examine the views of Phillimore (2014) and Layman (1982) to understand the role of politics in resources development in Western Australia.

About complex public policy issues, John (2003) states that “theory is a body or system of propositions about the causal relations that link together elements of the social, economic, and political worlds. These relations are regularized, having applicability over a range of cases, both in space and time” (p.482). John further states that “decision making varies vastly from sector to sector, a claim that is the core contribution of public policy studies ... which complicates the task at hand. The problem is compounded by the absence of a clear chain of causation from public opinion to parties and bureaucracies.” (p.483). These policy-centric issues are useful to understand the links that bind “social, economic and political worlds” that operate behind the MinReF. Johns argues that no single framework could offer a meaningful and comprehensive explanation of public policy. He suggests the need for and exploring a synthesis of frameworks based on different aspects of the approaches adopted, and the need for utilising concepts and approaches of advocacy coalitions,

interposed steadiness and evolution as more effective ways to understand public policy (ibid).

Another area of public policy, I have utilised in this research project is the work Anthony Ogus (2004; 2004a) who explains theoretical discourses that help to understand a feature, dichotomy of the mining legislation in WA. The dichotomy of the WA mining legislation is present due to having two systems of mining laws one depended on the *Mining Act 1978* and the other using State Agreements (SAs). The latter is used to promote and support large resource projects including uranium mining (Barnett, 1996; Cameco Australia.com, 2015). Ogus's (2004, pp 31-41) provides useful insights into the regulation and public interest theory. He examines the fundamental changes in the relationship between the state and the industrial sector. Utilising economic theories, Ogus critically observes how the public law has been employed to regulate the industrial sector similar to the case in WA where the SAs have been introduced as mining regulatory tool mainly to support the large resource projects (Barnett, 1996 & 2014). Further, Ogus provides a systematic and comparative overview of the underlying arrangements of theories that drive and promote social and economic regulations. He provides a case for the parallel existence of two sets of frameworks. Ogus's work is useful to examine the ambivalence and dichotomy of WA mining regulations (See Chapter Eight; section 8.7).

4.5 Politics and Resource Development

This section provides an overview of how the State and Federal political drivers including government policies have influenced the directions of resource development projects in WA. This overview outlines public policy discourses on uranium mining by respective Australian governments since 1952. This overview also identifies specific actions of the State ministers who are responsible for mining and environment and how their decisions have impacted the implementation of environmental regulations and new mining approval in WA.

The definition of 'politics' has been the subject of many philosophers, political scientists, sociologist and academics who have provided a variety of definitions of the term 'politics' (Locke, 1690; Marx, 1867 & 1911; Wolff 1970; Leftwich, 1983). My primary focus here is to examine definitions by those who have provided interpretations on how political decisions on power and authority have been defined as this issue is relevant to the way mining legislation provides access to minerals and

grant approval for mining under the regulatory framework. In this section, I also examine how such interpretations and definitions could assist in understanding the issues relating to the ownership of minerals within a jurisdiction and how approval has been granted focusing on a uranium mine approval chosen as a case study in this research project (Chapter Seven). Further, I also examine how various political parties have either supported or opposed to uranium mining by defining and redefining environmental regulations and changing policies in Australia and WA. To provide a theoretical context on these issues, I first, review the literature on some key political philosophies and theories to gain insights into concepts such as political power and authority and how they impact mining legislation and regulations.

John Locke (1690) in his classic: *The Two Treatises of Government*, argues that people have rights, such as the right for liberty and life, property ownership as the foundation of laws of any particular society (Locke, 1690). Karl Marx, a German philosopher and political theorist in his pathfinding work *Das Capita* (1867) explains the nature of power structures of societies. Marx argues that a group could hold power at a given time in history (Marx, 1867). Marx highlights that the ruling class would hold all the power and use their authority to exploit the working class. According to Marxism, the struggle to control the factors of production in a given society is the dynamic power that governs human development (ibid). Marx argues that an economic system determines other features of a given society including its political system. For Karl Marx, the “economic structure of society [is] the real foundation on which depend moral, legal and political superstructures and to which definite forms of social consciousness” (Marx, 1911, p.11). Marx’s views on the importance of the ‘economic structures’ and their importance in a given society could be useful to explain the genesis of the State Agreements (SAs) in WA. Barnett, (1996), a former Premier of WA explains how and why the SAs are important to support resource projects as an important aspect of economic development:

“Development of regional centres, population expansion, legislative changes and economic factors that have occurred in the interval since State Agreements were first used to facilitate project development have impacted on some of the considerations originally used for determining whether projects could be facilitated by the completion of State Agreements” (Barnett, 1986, p.318).

Barnet’s definition explains how specific legislative tools such as State Agreements (SAs) could be used to facilitate legislation to support projects for economic

development and the role of government policies (ibid). According to Wolff (1970), politics is the vehicle of the power of the state. Carter (2007) provides an account of the human-nature interaction in the context of political process highlighting that human societies are an inextricable part of the environment (ibid). As this study examines the drivers that establish authority on natural resources and environmental protection, a definition presented by Leftwich (1983) is useful. Leftwich focusses on issues such as “obtaining, using, producing and distributing” resources and notes:

“Politics consists of all the activities of cooperation and conflict, within and between societies, whereby the human species goes about obtaining, using, producing and distributing resources in the course of the production and reproduction of its social and biological life” (Leftwich, 1983, p.11).

Leftwich’s definition along with the views of Locke (1690) and Marx (1867) helps to understand the genesis, evolution of mining legislation in WA, and various decisions that have led to specific mining projects with the introduction of SAs in 1952, and various resource development projects developed under the SAs up to now. When gold was discovered in the Kalgoorlie-Norseman region in the 19th century (Spillman, 1993), the colonial administrators who represented the British Monarch introduced the earliest mining laws in WA to facilitate the development of gold mining and to collect Royalties (Hunt 2009). Further, after the discovery of gold, a proclamation was issued declaring that precious mineral is owned by the Crown (ibid). The ownership of minerals by the Crown also enforce the miners to pay back due Royalties to the owners (crown) for mining various minerals defined in legislation (Mining Act 1904. Mining Act 1978). The early mining legislation in WA supports Marx’s view that an authority driven economic system determines the rules in a given society. Even today, all minerals are owned by the Crown (Mining Act 1978; Hunt, 2009), and an agent of the Crown (a nominated government agency) stipulates the amounts Royalties to be paid as per the regulations associated with the *Mining Act 1978* (ibid). The agents of the crown can determine from time to time how much Royalties should be paid by those who receive access rights to extract mineral (Hunt, 2009).

4.5.1 The impact of party politics on uranium mining

The Federal Liberal Coalition governments and the Australian Labor Party (ALP) and their resource extraction policies have had a direct impact on uranium extraction and new mine approvals across Australia (Needham, 2016). When Bob Hawke (ALP) was elected as the Prime Minister of Australia in 1983, in the following year, he announced that Australia should have only ‘three-mine [uranium] policy’. This announcement was approved as the national policy on uranium mining (ibid). “This policy determined that uranium mining in Australia should be limited only to three existing mines; Ranger, Nabarlek and Olympic Dam (ibid). However, subsequently, both the Coalition (1996 – 2007) and the Labor Governments (2007- 2013) adopted a flexible approach on uranium mine approval. (ibid). While the decisions of the Federal Government had a significant impact on uranium mine approval process across Australia, the Western Australian Liberal governments followed a pro-resource development approach subject to the Federal policies (ibid). Layman (1982, p. 149) notes that the “resource development has been an objective of all Western Australian Governments”, and this observation is important to understand the genesis of the State Agreements that support major resource projects in WA. Phillimore (2014) highlights the “important influence in WA party and electoral policy” about the ‘Politics of Resource Development’ in WA (p.33). He notes how the “Barnett [Liberal] government lifted the ban on uranium mining and commenced approval processes for the first [uranium] mines in WA with minimum disruption” (p.35). When the Labor Government was elected in March 2017, they adopted a position changing the Barnett government policy and restitched the approval of uranium mines in WA. The “Labor’s position on uranium mining has been that it will allow projects with final State approvals, but it would not approve any new proposals” (Mercer, 2017, para five). In other words, the new ALP Government will not approve any more uranium mines while in power as they have rescinded the previous Liberal Government policy on uranium mining in WA confirming the power of political parties and its authority directing what minerals owned by the crown could be extracted.

4.5.2 State minister’s authority on mining approval

In Western Australia, some ministers who had responsibilities for portfolios such as the Environment, Mining and Resource Development have adopted a pro-uranium mining approach (Barnett, 1996; Australian Broadcasting Corporation, 2017, para one). For example, the former Environment Minister, Albert Jacob approved the Yeelirrie uranium mine in January 2017 disregarding the advice received from the

Environmental Protection Agency that recommended the mine should not be approved on environmental grounds:

“The West Australian Government has granted environmental approval for a uranium mine, which was knocked back by the state’s environmental watchdog last year” (Australian Broadcasting Corporation, 2017, para one).

After the Minister’s decision on his own accord, he made a public announcement about the rationale for overruling the advice from the Environmental Protection Authority. The reason cited was that the Government “had considered broader economic and social matters, as well as environmental factors” when approving the Yeelirrie uranium mine (Australian Broadcasting Corporation, 14 January 2017). This issue is discussed further in Chapter Seven of this thesis.

The former Minister for Mining and State Development, Bill Marmion is also known to express pro-mining opinions disregarding issues associated with sensitive and important biodiversity resources in WA (guardian.com, 1 July 2015, para two). Minister Marmion made a public declaration that he would always support mining even if the approval would damage the environment including precious biodiversity resource in Western Australia:

“Environmental recognition of the Great Western Woodlands, the largest remaining temperate woodlands in the world, will not be supported if it impinges on mining, the Western Australia mining minister, Bill Marmion, has said” (ibid).

The former Minister’s statement about the “the largest remaining temperate woodlands in the world” suggests that those with political power and the authority under the legislation would not always respect or abide by regulations that exist to support environmental assurance. These ministerial behaviours provide unique insights into the politics of resource development in WA and reveal that the legislation and environmental regulations come under MinReF are not the key drivers assuring environmental compliance. This assertion is in aligned with observations on the effectiveness of mining regulations in WA that highlight the importance of “political will” and the compliance with legislation on environmental protection (Chandler, 2014). According to Chandler, (2014) “WA legislation provides a strong and comprehensive basis for regulating the environmental impacts of mining” (p.174). Chandler, who is a Perth-based environmental consultant, further states that an

“effective system to regulate the resource sector...requires appropriate administrative tools, a supportive political environment and a balanced understanding of environmental management” (pp.174 - 175). The State Ministerial power and how they have used their authority in approving uranium mining proposals in WA confirm Chandler’s (2014) views, on the need for “supportive political environment” for effective mining legislation ensuring environmental protection.

In summary, politics, especially party politics and minister’s authority have functioned as key drivers on enforcing policies that confirm what type of mineral extraction would be authorised and how on some occasions ministers have disregarded the conditions of environmental compliance and taken decisions disregarding the scientific evidence on adverse environmental effects of approving some mining proposals.

In the preceding section, I investigated key public policy theories and reviewed the politics of resource development and their impact on mining approval in WA. The legislation and associated policies that I have analysed in this thesis are inextricably linked with regulation theory.

4.6 Regulation theory

In a legal context, the act or function of regulation is about “a rule or order prescribed for management or government (Black’s Law Dictionary, n.d., para one). “Under the Australia’s federal system of government, responsibility for environmental regulation is carried by the Commonwealth Government and state/territory governments concurrently” (Australian Parliament House, n.d., p.6).

This thesis draws from the regulatory design principles as proposed by Gunnigham and Sinclair (1999) to analyse complexities involved in the MinReF and use of best practice model in Western Australia (Chapter Nine).

TABLE 4.1 KEY ELEMENTS OF REGULATORY DESIGN PRINCIPLES

Principles	Key augments against the principles Gunningham & Sinclair (1999)
Principle 1 Policy mixes incorporate instruments and institutional combination.	<ul style="list-style-type: none"> • Economic instruments tend to be efficient but in most cases not dependable • Being non-coercive, but also have low reliability when used in isolation.
Principle 2 Less interventionist measures	<p>This principle has two components: <i>prescription and coercion</i>)</p> <ul style="list-style-type: none"> • Prescription refers to the extent to which external parties determine the level, type and method of environmental improvements Coercion refers to the extent to which parties or instruments place negative pressure • Coercion is exercised through a price signal, which firms, by and large, cannot avoid
Principle 3 Escalate up an instrument pyramid to the extent necessary to achieve policy goals	<ul style="list-style-type: none"> • Given instruments may be effective in influencing the behaviour on some, but not on others • Highly prescriptive instruments lack flexibility
Principle 4 Empower participant	This principle supports the empowerment of the participants (Under the <i>Mining Act</i> (Participants would be exploratory and tenement licence holders)
Principle 5 Maximise opportunities for win-win outcomes	This principle encourages the regulators to look for opportunities to seek win-win solutions instead of penalties or prosecution. A situation applicable to WA may be to give grace periods to contribute to the MRF for win-win outcomes.

(Source: Extracted from Gunningham & Sinclair, 1999)

While any theory whether it is regulation principles or public policy, they need to be considered and implemented within a dynamic environment that is dominated by political authorities as discussed in section 4.5.2 of this chapter.

4.7 Chapter Summary

In this chapter, I reviewed the literature on several theoretical approaches covering mining law, environmental law, public policy, politics of resource development and regulation theory to examine various facets concerning this study to gain insights into the mining regulatory framework of Western Australia. In this chapter, I examined public policy issues identifying politics and resource development to understand and explain how party politics and the State minister's authority have functioned as key drivers on enforcing policies that confirm what type of mineral extraction would be authorised. Further, this chapter examined how on some occasions ministers have approved conditions affecting environmental compliance and taken decisions disregarding scientific evidence about adverse environmental effects of some mining proposals. The chapter concludes by identifying key elements of regulatory design principles to be discussed further in Chapter Nine (section 9.3.1)

CHAPTER FIVE - HISTORY OF MINING LEGISLATION IN WESTERN AUSTRALIA AND KEY ISSUES

5.1 Introduction

This chapter provides background information covering the history and other critical issues relating to the mining legislation in Western Australia (WA)—the geographical focus of the study area. The issues covered in this chapter include the evolution of mining legislation in WA, the composition and the elements of Mining Regulatory Framework (MinReF), and two mining regulatory reform agendas that fall within the timeline (1978 – 2018) of this research project. This background information helps to give an understanding of the complexity surrounding environmental regulations of mining operations in a State where the mining industry is a dominant economic activity (Barnett, 1996 & 2014).

5.2 The history and evolution of mining legislation in Western Australia

The WA mining legislation has a history of over 160 years going back to Colonial times associated with the discovery of gold in the State in the 19th century (Spillman, 1993; Hunt, 2009). In 1842, when gold deposits were first discovered, there were no “special laws or regulations for “governing the disposal of mineral lands” (Hunt, 2009, p.2). The first mining law —the *Gold Regulation Ordinance 1854* (GRO) gave authority to the Colonial Governor “to make regulations concerning gold fields and [issuing] licences for working for gold” (ibid, p.2), and empowered him to collect Royalties.

After the enactment of the *GRO*, there was a requirement to grant access to land other than for gold exploration. This need was regulated by introducing the *Minerals Lands Act 1892* (Hunt, 2009, p. 2). Three years later, a comprehensive code for gold mining was introduced under the *Goldfields Act 1895* which confirmed the “miner’s right” for a specific (short-term) period “to occupy Crown land to mine gold” (Hunt, 2009, p.3) and this continues to be the case at present.

The enactment of the first formal mine legislation in WA titled the *Mining Act 1904* (ibid) allowed for specific arrangements about particular lands and operations. Consequently, the *Mining Act 1904* was utilised to approve mining tenements under State Agreements (SAs) including the three key SAs analysed in the two case studies of this thesis (Chapter Seven). According to Hunt (2009) both the *Mining Act 1904* and the *Minerals Land Act 1892* have been repealed; however, the SAs approved under the Act 1904 continue to remain in place. For its time, the *Mining Act 1904* was

considered excellent and world-leading mining legislation (Veatch, 1911). For example, the then President of the USA, Theodor Roosevelt sent an American geologist on a mission to learn from Australia's mining legislation (ibid). One of the objectives of the *Mining Act 1904* was the definition of mining activities by limiting the term to all "modes of prospecting and mining for and obtaining gold or minerals" (Mining Act, 1904, p. vii). The term "mining lease" therein refers only to "gold-mining leases or other mineral leases granted under [the] Act" (ibid). These definitions reflect the purpose of mining operations prevailed in the early 20th century in WA. The absence of environmental compliance clauses in the *Mining Act 1904* is not surprising given the early days of the industry and lack of general awareness about its significant consequences.⁵ Since then, various legislation, regulations, and policies relating to operations of mining in WA, including with environmental objectives, have evolved and gone through a process of "legislative metamorphosis".⁶

The *Minerals Lands Act 1892* was the first legislation in WA that was used to grant access to land for mining. 41 years after the enactment of the 1892 Act, the *Land Act 1933*⁷ was enacted. This new land access legislation became the basis for allocating land for mining and was later used in conjunction with the *Mining Act 1978* (Barnett, 1996). The review of the *Mining Act 1904* by a committee of inquiry in 1970 considered it outdated (Government Printer, 1971, p.146). In response to this review, eight years later the *Mining Act 1904* was replaced by enacting the *Mining Act 1978* which is still functioning as a key piece of legislation governing the mining industry in WA (Hunt, 2009). It took eight years between the review of the old Act and the enactment of the *1978 Act* which indicates the speed of progress of mining reforms in WA.

The *Mining Act 1978* (referred to as the *Mining Act* hereafter) has a broader scope compared to the first *Mining Act 1904*. The *Mining Act* covers issues, such as mining

⁵ The *Mining Act 1904* was enacted three years after Australia became a Federation and the approval of the Australian Constitution (1901). Similar to the absence of references to Environment in the Constitution as stated in Chapter 4 (section 4,1), it is not a surprise that there were no regulations on environment in the first formal mining Act enacted in 1904.

⁶ The term 'legislative metamorphosis' has appeared in literature before. This term was borrowed from the title of a conference paper. Source: Marsh & Sherwood (1980) *Proceedings of 26th Annual Rocky Mountain Mineral Law Institute*. Retrieved from: <https://www.rmmf.org/publications/digital-library>

⁷ The *Land Act 1933* was superseded by the *Land Administration Act 1997*.

in Crown lands, marine reserves and private lands. Further, it includes a special section defining the rights of the miners (Mining Act, pp 22-53). Since its introduction, the *Mining Act* has undergone various revisions, including the associated Administration Schedules (Hunt, 2009. p.9). Hunt notes that these amendments are “not an indication of massive and continuing errors in the legislation but a reflection of the willingness of the Department and successive governments to listen to the mining industry and to make amendments to mining laws to make them more workable” (ibid). The need for frequent changes to the *Mining Act* also indicates that the mining legislation and associated regulations in WA are not static, but inherently dynamic due to the needs of the changing environment and community sentiments noted by Hunt (2009). Since the enactment of the *Mining Act*, various legislation, regulations, and policies relating to the operations of mining have evolved (see Table 5.2). The WA mining legislative metamorphosis commenced by establishing protocols for gold exploration as a single piece of legislation (Gold Regulation Ordinance 1854) followed by various legislation under the jurisdiction of several individual agencies regulating various aspects of mining operations in the State (Western Australia’s Auditor General “WAAG”, 2011). A list of legislation come under the mining regulatory framework is presented in Table 5.2.

Environmental regulatory reforms have played a role in proposing changes to existing regulations and introducing new legislation (Government Printer 1971; DMP, 2014). The timeline of this study covers two mining reform agendas in WA. The mining reform agendas could be defined as enquiries and directed by a Minister (usually under the mining portfolio) to propose changes to existing legislation. The first mining reform agenda that falls under the timeline of this study (1978 - 2018) focused on the WA mining approval process and conducted in 2009. The second reform agenda program took place from 2012 to 2015. These reform agendas are explained in the following section. The second mining reform agenda also includes the introduction of legislation related to abandon mine sites in WA by introducing new legislation. All these issues are presented in the remaining sections of this chapter.

5.3 Environmental regulatory reform agendas in Western Australia

The 2009 review of the mining approvals in WA resulted in a report presented to the then Minister for Mines and Petroleum with a series of recommendations highlighting the need to make changes for an improved (mining) approval process. The report titled *Review of Approval Processes in Western Australia* (which came to be known as the Keating Review). The Keating Review highlighted the then situation of the WA mining regulatory system as follows:

“We can no longer boast of our approval system being the best in Australia. It has deteriorated to where it is criticised for taking too long, being too costly, too bureaucratic, “process driven” rather than being focused on outcomes, and not always representing the objectives of the elected government. This present situation has developed over the past 25 years. Successive Governments have enacted more legislation, created additional departments and agencies, while additional requirements for licensing, regulatory approvals and compliance, have been approved by Parliament without sufficient review of their effect upon the existing regulatory and licensing arrangements.”
(Government of Western Australia. 2009, p. i).

The Keating Review Report proposed fifteen (15) recommendations to be implemented under two categories:

“(a) policy and administrative arrangements that did not require legislative changes – the recommendations under the first category included: (i) putting in place a resource development policy for WA; (ii) establishment of a standalone role for the Environmental Protection Authority (EPA).

(b) recommendations requiring legislative changes, namely: (iii) establishment of an approvals reform office; (iv) reforming the native title – a process which recognises Aboriginal ownership of land in Western Australia, and Aboriginal Heritage processes, and (v) the need for reforming the environmental appeals processes” (Government of Western Australia; Smith, 2009).

Smith (2009) provided a legal opinion about the recommendations of the Keating Review:

“Implementation of recommendation[s] would require a significant body of work by government over a period of 18–24 months with substantial legislative reform required. The single DMA model could also be applied to other major projects in Western Australia outside of the mining sphere” (Smith, 2009, para ten).

The literature review of this study which included archival records did not find any of significant changes to the overall mining regulatory framework such as proposing new mining laws or the follow up on the 15 recommendations proposed by the Keating Review (2009).

The second inquiry and a suite of reforms commenced in 2012 (Government of Western Australia: Ministerial Advisory Panel, 2012) led to a legislative reform initiative implemented by the Environmental Division of the then Department of Mines and Petroleum (DMP). The reforms aimed to:

- Implement a risk-based framework to ensure DMP’s regulatory activity is targeted and proportional to risk to achieve its environmental outcomes.
- Establish legal obligations for environmental management under mining [one] legislation to provide clear, enforceable obligations which align with environmental outcomes” (Government of Western Australia: Ministerial Advisory Panel. (2012). December 2012, p.3).

The Government reform program was developed in a broader context and included the development and the enactment of the *Mining Rehabilitation Fund Act 2012*. The reform program also considered issues on emerging industries such as unconventional gas and uranium mining in WA (ibid. p. 7). A fundamental assumption of the reform program was that it would “provide DMP with a clearer scope of responsibility to enable it to establish an effective, efficient and accountable environmental regulatory regime” (ibid. p.10).

In 2014, two years after the second reform agenda program commenced a government document provided further details about its expectations how “environmental risks” in the mining proposals could be identified. The document stated the proposals would require the proponent (tenement holder) to present “environmental risks” identification process in a flexible manner:

“The proposed ...reforms will require the tenement holder to identify the environmental risks arising from the proposal and demonstrate how they will manage to avoid, reduce or mitigate environmental harm. The proponent must detail their risk assessment within this section. DMP intends to allow industry flexibility in how their risk assessments are conducted. This is to enable proponents to utilise an existing internal standard, develop their own standards, or follow international standards” (Government of Western Australia: Department of Mines and Petroleum, September 2014. p.8).

Further, the Government report stated that:

“[I]n its current form the Mining Act 1978 is functional. However, the environmental regulatory framework established by the Act has resulted in a prescriptive approval process. This requires an amendment to enable the development of an outcome-based and risk-based regulatory system” (ibid, p.6).

The above assertion highlights the philosophy of the agency (DMP) stating the rationale for amending the functional *Mining Act 1978*. In other words, the Western Australian Government intended to adopt a minimalist governance approach which does not align well with its public responsibilities. In this regard, the public policy literature on Governance suggests that regulatory processes such as the WA Mining Reform Agenda of 2012 – 2015 are not in alignment both with the principle of regulations (Gunningham & Sinclair 1999)⁸ and also with the principles of Governance. (Fukuyama, 2013). The proposed mining reform agenda by DMP lacked justifications based on transparency and the regulatory principles outlined in Chapter Four. It failed to show why the agency wanted the tenement holders to identify environmental risks on their standards. (Government of Western Australia Department of Mines and Petroleum, September 2014). Further, the Government proposal did not indicate how the environmental risks and outcome-based approaches could increase transparency and the certainty in the mining industry to address the existing “prescriptive approval process” (ibid).

⁸ The ‘principles of regulatory designs’ as discussed by Gunningham & Sinclair (1999) and the comparison of the DMP’s ‘best practice’ model is discussed in detail in Chapter Nine (section 9.3.1 of this thesis).

These environmental reform initiatives were later supported by a ministerial committee recommending a series of new amendments which were yet to be ratified (Government of Western Australia – Department of Mines and Petroleum, 2014). The culmination of the reform process of 2012 – 2015 was the introduction of new legislation titled *Mining Amendment Bill 2015* to amend the *Mining Act 1978*. According to DMP/ DMIRS the need for the *Mining Amendment Bill 2015* (Bill) was as follows:

“The *Mining Legislation Amendment Bill 2015* consolidates all the environmental management provisions of the *Mining Act 1978* into one new Part. It modernises and simplifies environmental regulation of the mining industry by reducing the administrative burden on industry – allowing for better service delivery and enhanced effectiveness of government. The amendments aim to achieve better outcomes for industry, government and the environment” (Department of Mines, Industry, Resources and Safety, para one & two).

When the *Bill* was tabled in the WA Parliament, its intention was criticised by the opposition politicians (Parliament Western Australia. Hansard. Debate on the Mining Amendment *Bill* 2015, 22 September 2015). It was also criticised by many stakeholders, and in particular small prospectors who demanded a Royal Commission to inquire into the difficulties, the new changes would introduce (Shine, 18 April 2016, para one).

The position of the latest 2017 State Government on the mining reform process as articulated by the Minister for Mining is as follows:

“Changes to the State’s Mining Act will likely not be put to Parliament before 2018 at the earliest... τ

Fulfilling a pre-election commitment to visit prospecting groups in the region, including Goldfields. First, [the Minister] said there was no chance the Bill would be introduced in its present form, which died on the Legislative Council floor last year and prompted a parliamentary inquiry” (Chiat, 2017, para one).

The proposed *Mining Amendment Bill 2015* was not enacted. One of the legislative outcomes of the mining reform process was the enactment of the *Mining Rehabilitation Fund Act 2012* (MRF Act) which became mandatory from 1 July 2014

(Department of Mines and Petroleum, 2014). However, the *MRF Act* only applies to mines operations under the *Mining Act 1978*. It has no jurisdiction over State Agreements Acts, (Morrison-Saunders, Gorey, Doepel, Mtegha, & McHenry, 2014) which cover larger resource projects and represent around 80% of the volume of Royalties and mining activities in WA (Barnett, 2016).⁹

This study found that the Government reform program of 2012 – 2015 had been developed based on two principles. First, it introduced the *MRF Act* establishing mining rehabilitation legislation, but the new legislation did not have authority across the entire spectrum of mining operations covering large-scale resource projects operated under State Agreements (see Table 5.3). Second, the government proposed a regulatory strategy “to align with the principles of ‘best practice’”. The DMIR’s ‘best practice’ model is discussed in Chapter Nine (section 9.3.1) of this thesis.

2012 - 2015 mining reform agenda had broad objectives. Perhaps it would have been influenced by emerging concepts such as ‘corporate social responsibility’ and ‘license to operate’ (Bice, 2014; Bice & Moffat. 2014; Frazer Institute, n.d.; Azapagic, 2004) with an aim of introducing new legislation to demonstrate the need to promote responsible mining in WA. 2012 – 2016 mining reform agenda also indicates the complexities of proposing new legislation on environmental compliance with the objective of improving the overall mining regulatory framework in WA. The following section provides an overview of the MinReF..

5.4 The Mining Regulatory Framework of Western Australia

In this research, the MinReF is defined as State and Federal laws consisting of numerous Acts, regulations, policies, and administrative tools that exist to manage mining operations in WA, through a multi-agency system. This term is a construct to conceptualise the content, to explore interconnectedness and implementation processes of various legislation, regulations, and policies that need to be considered under the MinReF. These issues are discussed by addressing the first research objective of this PhD study in Chapter Eight while examining the strengths and weaknesses of the MinReF. This chapter covers only the background information on

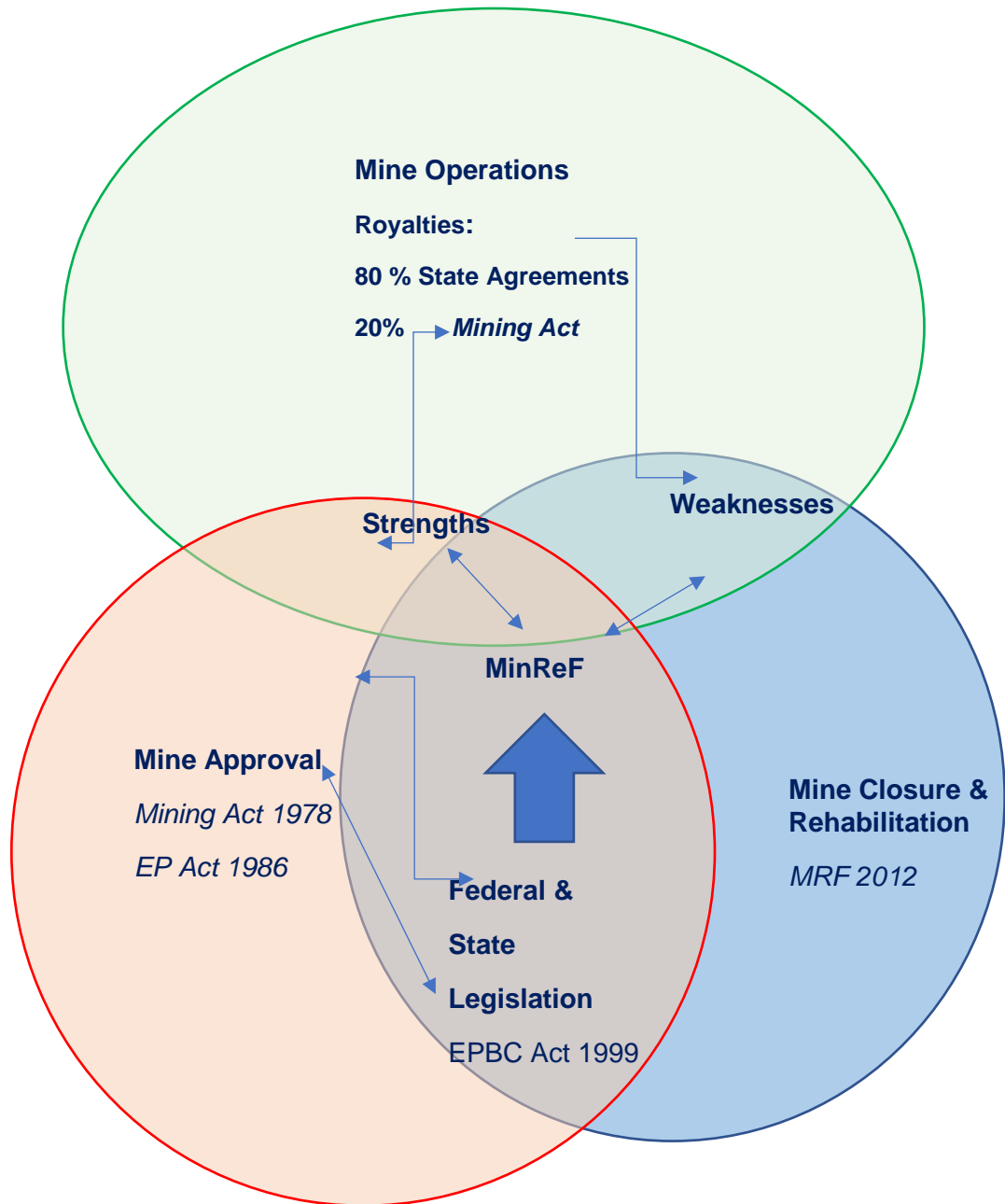
⁹ This figure of 80 percent has been cited as 70 percent by the Auditor General’s Report (WAAG, 2011) and the Keating Report (2009).

the formation and evolution of the WA mining legislation to map the context of this study, hence, this section provides only an overview of the MinReF.

An investigation into the current framework of mining legislation and compliance was first carried out through an audit conducted by the Western Australia's Auditor General (WAAG) in 2011 (see also section 5.10 of this chapter). The scope of the audit, however, did not cover relevant Federal legislation and notably, the following three key regulations: The *Environmental Protection and Biodiversity Act 1999 (EPBC Act)*; the *Australian Radiation Protection and Nuclear Safety Act 1998*, and *Radiation Safety (Transport of Radioactive Substances) Regulations 2002*. These three Federal Acts also need to be considered under the WA MinReF as they are essential legislation in the approval, operation and transportation of uranium. One of the principal Federal Acts (EPBC Act) is investigated to discuss its features, and jurisdictional power and how it functions within other legislation and regulations come under the MinReF in Chapter Eight (Section 8.5.7).

Figure 5.1 provides a schematic diagram of the mining regulatory framework (MinReF) in Western Australia representing its elements, linkages, and critical legislation.

FIGURE 5.1 A SCHEMATIC DIAGRAM OF THE MINING REGULATORY FRAMEWORK IN WESTERN AUSTRALIA



(Govinnage, Marinova, 2016)

Legend:
 EPBC 1999 – Environmental Protection and Biodiversity Act 1999
 EP Act – Environmental and Protection Act 1986
 MRF ACT 2012 – Mining Rehabilitation Fund Act 2012

Further, the *Native Title Act 1993 (NTA 1993)* also supports a national framework for the recognition and protection of land rights of Aboriginal peoples and functions within the national land management system. The NTA 1993 has heritage and environmental implications based on the Aboriginal interpretation of land. Although very important, in this thesis, when defining the MinReF, I have excluded the NTA 1993 as its primary objectives do not deal with environmental assurance or protection of mining operations which is the focus of this study.

The legislation, regulations and policies which come under the WA MinReF covering State and Federal legislation are analysed in respect to their alignment with assuring environmental protection during the life cycle of mine operations. The mining regulatory framework has evolved over a period of over 160 years. Some of the legislation within the MinReF such as the *Mining Act 1978* has its beginning to the *Mining Act 1904*. The first *Land Act* was enacted in 1933, and the access to lands under the early State Agreements have been granted under the same legislation. The *Land Act 1933* was replaced by the *Land Administration Act 1997*. Some of the old Acts such as the *Abstraction of Groundwater: Water and Irrigation Act 1914 (WAI Act)* are relevant legislation to the scope of this study. The legislation within the MinReF still evolves adding new legislation under individual agencies. The most recent addition to the MinReF is the *Biodiversity, Conservation Act 2016 (WA)*. It is also important to recognise that the legislation come under the MinReF have been established over time, and implemented through stand-alone agencies. The WAAG (2011) notes:

“The regulatory framework around the mining industry has been established over time. It is a large and complex industry, and there are numerous agencies and pieces of legislation involved. Some of the legislation is specific to mining, while other Acts cover mining activities as part of a broader scope. There are also individual Acts of Parliament that enable and manage specific mining projects (State Agreement Acts)” (WAAG, 2011, p. 14).

Further, the WAAG (2011) identifies the agencies that come under the WA MinReF as follows:

“A number of agencies are responsible under numerous pieces of legislation, regulation and policy for monitoring compliance with the conditions placed on mines. The Department of Mines and Petroleum (DMP), the Department of

Environment and Conservation (DEC), the Department of State Development (DSD), the Department of Indigenous Affairs (DIA), and the Office of the Environmental Protection Authority (OEPA) all have key roles in regulating mining. The Department of Water (DoW), the Department of Planning, and local government authorities are also often involved” (WAAG, 2011, p. 6).

Table 5.1 provides a list of the agencies and legislation included in the regulatory framework of the mining operations according to the WAAG (2011). However, not all the legislation and associated regulations listed in Table 5.1 and Table 5.2 are relevant to the analysis as this research as focusses only on the environmental protection components of the legislation that comes under the MinReF and the mining laws analysed in the two case studies in Chapter Seven.

TABLE 5.1 MINING REGULATORY FRAMEWORK ACCORDING TO THE WA AUDITOR GENERAL

Responsible Agency¹⁰	Legislation
Department of Water	Rights in Water and Irrigation Act 1914
Department of Mines and Energy	Mining Act 1978
Department of Land	Conservation and Land Management Act 1984
Environmental Protection Agency	Environmental Protection Act 1986
Department of Mines and Energy	Mines Safety and Inspection Act 1994
Department of Aboriginal Affairs	Aboriginal Heritage Act 1972
Department of State	Various Individual State Agreements

Source: (WA Auditor General, 2011)

Table 5.2 includes all mining legislation, regulations and policies that need be included in the MinReF, but all of them do not have environmental components. It is essential to consider the Federal legislation including the *EPBC Act* due to its relevance to the approval of projects of major environmental significance across Australia. Such projects come under the jurisdictions of the *EPBC Act*. Other Federal

legislation relevant to uranium mining and transportation, namely, the *Australian Radiation Protection and Nuclear Safety Act 1998 (ARPNS Act 1998)* and associated regulations are represented in Table 5.2. It covers both the Federal and State legislation, regulations and policies from 1904 to 2017 and applicable to mineral extraction (including uranium), environmental protection, water regulation, land administration, mine rehabilitation and biodiversity. Such laws are also relevant to oil and gas, but they are excluded from the analysis of the MinReF Chapter Eight of this thesis, as some of the legislation falls outside the scope of the study. I have highlighted those relevant to this study in bold italics in Table 5.2.

TABLE 5.2 MINING REGULATORY FRAMEWORK OF WESTERN AUSTRALIA – KEY LEGISLATION, REGULATIONS, AND POLICIES¹¹

YEAR	LEGISLATION	SCOPE	AGENCY & OWNERSHIP
1904	Mining Act 1904 ¹²	Exploration, mining tenement and other mining related licences	DMIRS[DMP]
1914	Abstraction of Groundwater: Water and Irrigation Act 1914 (WIA).	Under section 5C of the WIA Act, the licence holders allowed to take water from a water source, well, and or, underground source.	DWER [DoW]
1950	Wildlife Conservation Act	This Act has now been replaced by the new Biodiversity Conservation Act 2016 (WA)	See Biodiversity Conservation Act 2016 (WA)

¹¹ This is a long Table representing all relevant mining laws of the MinReF enacted since 1904 up-to 2017. The Table runs up to page 88.

¹² The *Mining Act 1904* has been superseded by the *Mining Act 1978* (Hunt, 2009). However, it is important to recognise that the 1904 Act was the key piece of legislation that granted mining leases for three State Agreements that I have examined in two case studies in Chapter Seven.

1978	<i>Mining Act 1978</i> ¹³	Granting of exploratory licences and mining leases, Royalty collection, and receiving Mine Closure Plans.	Department of Mines, Industry, Resources and Safety and Petroleum (DMP]
1979	<i>Uranium (Yeelirrie) Agreement Act 1978</i>	This Act is an Agreement between the State of Western Australia and Western Mining Corporation Limited concerning the mining and treatment of certain uranium ore reserves.	Department of Jobs, Tourism, Science and Innovation (DJTSI) [DSD]
1979	<i>Collie Coal (Griffin) Agreement Act 1979</i>	This Act is a ratified agreement between the State of Western Australia and The Griffin Coal Mining Company Limited concerning the mining, development and rehabilitation of certain coal reserves and to matters related to it.	DJTSI [DSD]
1979	<i>Collie Coal (Western Collieries) Agreement Act 1979</i>	This Act is a ratified agreement between the State of Western Australia and Western Collieries Ltd. concerning the mining, development and	DJTSI [DSD]

¹³ The highlighted (in bold italics) legislation and regulations in Table 5.2 come under the scope of this study, and they are discussed in Chapter Five (section 5.6 1.1 to 5.9).

		rehabilitation of certain coal reserves and to matters related to it.	
1981	<i>Mining Regulations</i>	The 1986 Regulations under the Mining Act consist of eight (8) parts and schedules describing (a) Miner's Rights; (b) Mining on Private Land, (c) Issue on mining tenements and leases such as prospecting, exploration, retention, miscellaneous licences, surrenders and forfeitures, (d) general, I surveys and (f) inspectors etc	DMIRS [DMP]
1984	Water Agencies (Powers) Act 1984.	Of the many pieces of legislation managing water resources in WA, this Act is the lead legislation that coordinates the protection, assessment of water resources, promotion of the efficient use of water, and preparation of plans on floods.	DWER [DoW]
1986	<i>Environmental Protection Act 1986</i>	Regulates all aspect of environmental issues on mining and other projects in WA.	Department of Water and Environmental Regulations (DER) [EPA]
1987	<i>Environmental Protection Regulations 1987</i>	The 1987 regulations address on issues such as Administrative matters relating to the EPA Act	DER [EPA]

		1986, pollution control and seven (7) schedules describing audible alarms (noise pollution) tyre disposal matters and the infringements powers under the Act.	
1997	Land Administration Act 1997 (LAA 1997)	The Act deals with land access and rights. Regarding mining, the Act section 205 states "Mine, compensation for damage to etc. through damage to mine on the land, or the works connected with a mine" (LAA 1997, pp. 174-175)	Department of Planning, Lands and Heritage
1998	Australian Radiation Protection and Nuclear Safety Act 1998	Regulates Radiation Protection and Nuclear Safety across Australia.	Commonwealth Government
1999	Environmental Protection and Biodiversity Act 1999 (EPBC Act)	Any project with significant environmental component needs to be approved under the EPBC Act 1999.	Commonwealth Government
1999	Australian Radiation Protection and Nuclear Safety Regulations 1999	This regulation protects the health and safety of people and to protect the environment from the harmful effects of radiation.	Commonwealth Government

2002	Radiation Safety (Transport of Radioactive Substances) Regulations 2002	This regulation provides guidelines on the transport of Radioactive Substances.	Commonwealth Government
2004	<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	The regulations on the clearing of native vegetation required for mining exploration and operations	This Regulation has been amended 13 times since it was enacted in 2004. The last amendments to the regulations took place in 2013
2009	The WA Liberal Government policy: Liberalisation of uranium mining in WA.	Liberalisation of restricting uranium mines in WA	DMP
2011	WA Environmental Offsets Policy 2011	The DWER administers: <ul style="list-style-type: none"> • the clearing provisions under the EPA • issue permits to offset the loss of the cleared vegetation, make monetary contributions to a fund for establishing or maintaining vegetation”. 	DER [EPA]
2011	WA Environmental Offsets Policy 2011 guidelines	These guidelines expand on the Offsets Policy and provide guidelines to facilitate the understating of the policy.	DEWR [EPA]

2012	Water Services Act 2012	Department of Water and Environmental Regulation	DWER [DoW]
2012	Mining Rehabilitation Fund Act 2012 (MRF Act)	The MRF Act 2012 became mandatory legislation on 1 July 2014, and it has three objects: (a) Establishment of Mining Rehabilitation Fund (b) Declaration of abandoned mine sites and an annual levy payable in respect of mining authorisations, and for related purposes.” Authorization for collecting a levy. (<i>MRF Act</i> , 2012, p.1).	DMIRS [DMP] It is important to note here that this Act is only applicable to those mines operated under the <i>Mining Act 1978</i> . The MRF Act has no jurisdiction over State Agreement (GoWA, 2014).
2012	Environmental offsets policy (October 2012) (Also known as the EPBC Offset Policy’)	This policy provides guidelines on the Australian Government’s approach. The use of advanced offsets and should be read in conjunction with the EPBC Act 2009.	Commonwealth Government
2013	Rehabilitation Fund Regulations 2013	Various regulations relating to the MRF Act 2012 are provided.	DMIRS [DMP]

2014	Agreement (MoU) between the Commonwealth of Australia and Western Australia Government, delegating environmental assessment 2014 under the EPBC Act. ¹⁴	The effective date of the agreement: 1 January 2015. Through this Agreement, the Commonwealth of Australia delegated the authority under The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) ('EPBC Act') to the Environmental Protection Agency of WA by accrediting the WA authorisation processes, under the EPBC Act.	DER [EPA]
2015	The Mining Legislation Amendment Bill	The bill proposed to consolidate all environmental management provisions into one new Section of the <i>Mining Act 1978</i> . <i>This Bill was never approved.</i>	DMIRS [DMP]
2015	Guidelines for Preparing Mine Closure Plans	Provides guidelines on Preparing Mine Closure Plans.	DMIRS/DER [DMP/EPA]
2016	Abandoned Mines Policy, 2016	This policy outlines the objectives and process of the WA mining rehabilitation program. This policy is still in draft format.	DMIRS [DMP]

¹⁴ The Federal Government confirms this MoU "signed with Western Australia (WA), setting out governments' commitment to the process, timing for implementation of the policy, and key principles." Source: <http://www.environment.gov.au/protection/environment-assessments/bilateral-agreements/wa#current-assessment>

2016	Biodiversity Conservation Act 2016 (WA)	The object of the Act is twofold: (a) “to conserve and protect biodiversity in the State”; and (b) “to promote the ecologically sustainable use of biodiversity components in the State” (BCA 2016, p. 2)	Department of Biodiversity, Conservation and Attractions (DBCA)
2017	Advanced environmental offsets policy under the <i>EPBC Act 1999</i>	This policy statement provides guidance on the “ Australian Government’s approach to the use of advanced offsets and should be read in conjunction with the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Environmental Offsets Policy (October 2012) (the ‘EPBC Offset Policy’)”	Commonwealth Government
2017	Restriction of uranium mine approval in Western Australia.	McGowan’s Labor Government approve a policy in June 2017 confirming no new new uranium mining in WA.	DMIRS

(Sources: Various State and legislation, regulations and policies listed above)

The volume, scope and complexities of legislation, regulations and policies that come under the WA MinReF are significant. Table 5.2 represents legislation and regulations that regulate various areas covering exploration licences, mining tenements, mining proposals, biodiversity, environment, land, water land, mining

rehabilitation, radiation control and uranium transportation. Since 1952, State Agreements (SAs)—a unique regulatory tool of the MinReF begun to appear in the MinReF. The next section provides an overview of the SAs while a critique of three of the SAs focusing on environmental compliance are examined in the two case studies in Chapter Seven of this thesis.

5.5 State Agreements

State Agreements (SAs) have been a unique feature of the resource development approach adopted by Western Australia across a range of commodities (Barnett, 1996; 2014; Layman, 1982). The SAs have a relatively long history compared to important mining legislation such as the *Mining Act*, as the first SA was developed and ratified in the early 1950s (Barnett, 1996). Barnett (1996)¹⁵ defines SAs from a different perspective emphasising how they provide certainty for operations and management of larger resource projects:

“State Agreements allow the whole of State government requirements to be managed under a single Act for each project [and] State Agreements provide certainty for operation and management of projects, as their provisions can be changed only by agreement between the State and the project proponents” (Barnett, 1996; p.315)

According to Barnett (1996. p. 318), the SAs “[e]nsure the efficient and effective development of the State’s natural resources – particularly mineral resources – by the private sector for the ongoing benefit of the Western Australian community”. As of 2018, there are 64 SAs in operation in WA of which 26 are mining or mineral processing projects (Department of Jobs, Tourism, Science and Innovation, 2018,). The SAs “cover the largest mine sites in Western Australia and account for about 70 per cent¹⁶ of mining royalties paid to the State” (ibid). The WA Auditor General define SAs as;

¹⁵ Colin Barnett was the Premier of WA (2008-2017) and was also responsible for major resource development projects operating under the State Agreements.

¹⁶ According to the Keating Review (2009) and Auditor General (WAAG, 2011), the ratio of the mining Royalties earned from the mines managed under *the Mining Act 1978*, and large resource projects managed through the SAs have been estimated to be 30 to 70 respectively. Colin Barnett (2014) has estimated the Royalty ratios as 80 to 20 percent respectively. I have followed the original figures in each citation throughout the thesis in accordance with each source.

“contracts between the Government of Western Australia and proponents of major resources projects which are ratified by an Act of the State Parliament. There are 45 operating State Agreements, 26 of which are mining or mineral processing projects. These are governed by the Government Agreements Act 1979. These cover the largest mine sites in Western Australia and account for about 70 per cent of mining royalties paid to the State.” (WAAG, 2011, p.14).

The Department of Jobs, Tourism, Science and Innovation, (DMIRS) responsible for managing the SAs provides the following definition:

“A State Agreement is a legal contract between the Western Australian Government and a proponent of a major project within the boundaries of Western Australia”. (Government of Western Australia: Department of Jobs, Tourism, Science and Innovation. n.d.; para three).

According to Hillman, (2006) the SAs are;

“contracts between the State and a company seeking to develop a project, have traditionally been the vehicle used to conduct major resource projects in Western Australia. They are comprehensive documents, designed to establish ‘an integrated regime for approval, management and monitoring of all stages of the project’ under ministerial supervision. Each State Agreement is negotiated on an ad hoc basis and is then ratified under an Act of Parliament. The purpose of ratification is to enable the project to proceed outside most State laws, under the terms of the agreement.

In 2002 approximately 70 per cent of the total value of production in the Western Australian resources sector occurred under State Agreement projects...” (Hillman, p. 293).

Table 5.3 presents a list of all SAs in operation in WA as of August 2018. As per the above definitions, several issues about the nature of State Agreements and their functions emerge. First, SAs is applicable only to a single resource (mining) project (WAAG, 2011, p.14), and operates externally to current mining legislation such as the *Mining Act 1978* (Hillman, 2006). Second, the SAs assure the Government’s commitment to large resource projects (WAAG, 2011).

As of August 2018, there were 64 SA's (Table 5.3).

TABLE 5.3 LIST OF WESTERN AUSTRALIAN STATE AGREEMENTS

NO	CATEGORY	NAME OF THE AGREEMENT
1	Alumina	Alumina Refinery Agreement Act 1961
2		Alumina Refinery (Pinjarra) Agreement Act 1969
3		Alumina Refinery (Worsley) Agreement Act 1973
4		Alumina Refinery (Wagerup) Agreement and Acts Amendment 1978
5		Alumina Refinery (Worsley) Agreement Act 1973
6	Coal	<i>Collie Coal (Griffin) Agreement Act 1979</i>
7		<i>Collie Coal (Western Collieries) Agreement Act 1979</i>
8	Copper	Western Mining Corporation Limited (Throssell Range) Agreement Act 1985
9	Diamonds	Diamond (Argyle Diamond Mines Joint Venture) Agreement Act 1981
10	Energy	Goldfields Gas Pipeline Agreement Act 199
11		Ord River Hydro Energy Project Agreement Act 1994
12	Forest products	Dardanup Pine Log Sawmill Agreement Act 1992
13		Albany Hardwood Plantation Agreement Act 1993
14		Bunbury Treefarm Project Agreement Act 1995
15		Collie Hardwood Plantation Agreement Act 1995
16		Dardanup Pine Log Sawmill Agreement Act 1992
17		Wood Processing (WESFI) Agreement Act 2000
18		Wood Processing (Wesbeam) Agreement Act 2002
19	Gas	North West Gas Development (Woodside) Agreement Act 1979
20		Barrow Island Act 2003 (which incorporates the Gorgon Gas Processing and Infrastructure Project Agreement)
21		Natural Gas (Canning Basin Joint Venture) Agreement Act 2013
22	Iron ore and steel	Iron Ore (Hamersley Range) Agreement Act 1963

23		Iron Ore (Hamersley Range) Agreement Act 1963
24		Iron Ore (Mount Goldsworthy) Agreement Act 1964
25		Iron Ore (Mount Newman) Agreement Act 1964
26		Iron Ore (Robe River) Agreement Act 1964
27		Iron Ore (Hamersley Range) Agreement Act Amendment Act 1968
28		Iron Ore (Channar Joint Venture) Agreement Act 1987
29		Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972
30		Iron Ore (McCamey's Monster) Agreement Authorization Act 1972
31		Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972
32		Iron Ore (Wittenoom) Agreement Act 1972
33		Iron Ore (Mount Bruce) Agreement Act 1972
34		Iron Ore (Murchison) Agreement Authorization Act 1973
35		Iron Ore (Marillana Creek) Agreement Act 1991
36		Iron Ore (Hope Downs) Agreement Act 1992
37		Iron Ore (Yandicoogina) Agreement Act 1996
38		Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002
39		BHP Billiton (Termination of Agreements) Agreement Act 2006.
40		Iron Ore (FMG Chichester Pty Ltd) Agreement Act 2006
41		Iron Ore Agreements Legislation (Amendment, Termination and Repeals) Act 2011
42	Mineral Sands	Mineral Sands (Eneabba) Agreement Act 1975
43		Mineral Sands (Beenup) Agreement Act 1995
44		Mineral Sands (Cooljarloo) Mining and Processing Agreement Act 1988
45	Miscellaneous	Industrial Lands (Kwinana) Agreement Act 1964
46		Cement Works (Cockburn Cement Limited) Agreement Act 1971

47		Wundowie Charcoal Iron Industry Sale Agreement Act 1974
48		Pigment Factory (Australind) Agreement Act 1986
49		Silicon (Kemerton) Agreement Act 1987
50		Industrial Lands (CSBP & Farmers Limited) Agreement Act 1976
51		Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement Act 2004
52		Railway (Roy Hill Infrastructure Pty Ltd) Agreement Act 2010
53		Railway (BBI Rail Aus Pty Ltd) Agreement Act 2017
54	Nickel	Poseidon Nickel Agreement Act 1971
55		Nickel (Agnew) Agreement Act 1974
56		Nickel Refinery (BHP Billiton Nickel West Pty Ltd) (Termination of Agreements) Agreement Act 2008
57	Oil	Oil Refinery (Kwinana) Agreement Act 1952
58		Nickel Refinery (BHP Billiton Nickel West Pty Ltd) (Termination of Agreements) Agreement Act 2008
59	Salt	Leslie Solar Salt Industry Agreement Act 1966
60		Evaporites (Lake MacLeod) Agreement Act 1967
61		Dampier Solar Salt Industry Agreement Act 1967
62		Onslow Solar Salt Agreement Act 1992
63		Shark Bay Solar Salt Industry Agreement Act 1983
64	Uranium	<i>Uranium (Yeelirrie) Agreement Act 1978</i>

Source: Department of Jobs, Tourism, Science and Innovation, Annual Report 2017 -2018

Of the 64 State Agreement in operation, this study focusses only on three namely, the *Collie Coal (Griffin) Agreement Act 1979*, the *Collie Coal (Western Collieries) Agreement Act 1979* and the *Uranium (Yeelirrie) Agreement Act 1978* are discussed in detail in the two case studies (Chapter Seven) focusing on their legislative functions focusing on environmental compliance.

The SAs have been developed and still operating by various assumptions. Table 5.4 presents a detailed summary of the arguments and assumptions supporting the SAs as represented in the literature.

TABLE 5.4 ARGUMENTS AND ASSUMPTIONS SUPPORTING STATE AGREEMENTS

ARGUMENTS/ASSUMPTIONS	Source
“They are comprehensive documents, designed to establish ‘an integrated regime for approval, management and monitoring of all stages of the project’ under ministerial supervision.” (Crommelin, 1996)	(Crommelin, 1996; AMPLA Yearbook 328- 330)
“State Agreement Acts are powerful contractual and regulatory arrangements.” (p.9)	WA Auditor General (2004)
“Identification of the State with a project by means of a ratified agreement gives stature to the project and assists the miner in obtaining finance...” (p.17).	Hunt, 2009)
“Agreements have primarily been used as a policy tool of Australian governments to encourage and facilitate major natural resource projects.” (p.22)	WA Auditor General (2011)
“State Agreements allow the whole of State government requirements to be managed under a single Act for each project. These include [the] orderly development of towns, ports and other infrastructure and enable all land tenure requirements to be adequately addressed”.	Barnett, 1996, 315.
“Ensure the efficient and effective development of the State’s natural resources – particularly mineral resources – by the private sector for the ongoing benefit of the Western Australian community”	Barnett, 1996, p.318.

(Sources: As cited above.)

Table 5.5 outlines the literature that identifies deficiencies, weaknesses and problems with the SAs.

TABLE 5.5 SHORTCOMINGS OF STATE AGREEMENTS – SUMMARY OF KEY LITERATURE

Shortcoming	Source
“Governments face significant difficulties evaluating major developments where they must consider a large number of intangible factors.” (p.300)	Hillman (2006)
“Ultimately the greatest obstacle to the accurate evaluation of a State Agreement is the insulation of agreement provisions from demand and competitive pressures” (p. 300).	Hillman (2006)
The Government agency “evaluating the performance of the agreements it manages...”is in a position of conflict” (p.300).	Hillman (2006)
State Agreements lack requirements for assessing its Return on Investment to the State (p.8).	Govinnage (2018)
“The fundamental flaw with State Agreements, in imposing obligations as part of ad hoc negotiations, is that there is no clear standard by which to identify the cost of the obligations or their success” (p. 300).	Hillman (2006)
“develop the reporting of Agreement status and performance to Parliament” (p.20)	Auditor General WA (2004)
“The Department has not methodically monitored how well companies discharge Agreement obligations to maximise the use of local labour, services and materials. In consequence”.	Auditor General WA (2004)

<p>“The Department has not developed structured procedures and guidelines to assist its staff manage Agreements, once established”. (p. 8)</p>	<p>WA Auditor General (2004)</p>
<p>“The Department does not evaluate Agreements in a structured and comprehensive way. It is, therefore, difficult to objectively assess how well Agreements are achieving their objectives, where Agreements have succeeded and failed and what the main lessons learned are” (p.22).</p>	<p>WA Auditor General (2004)</p>

(Sources: As cited in the Table)

The legislative nature of the SAs provides several challenges to any researcher embarking on an analysis of the legislation and regulations in the context of sustainable development. According to Southalan (2016):

A parliamentary-approved agreement is a legislative endorsement of a contract between the executive government and a company to develop/operate a mine and associated facilities. **These agreements have been useful in mining regulation in providing a structure by which governments can regulate large mining projects. However, the establishment and use of parliamentary agreements should be improved to better enable this form of regulation to contribute to sustainable development.** Where a miner and government have agreed on proposed terms to regulate a long-term mining operation, parliamentary consideration of that proposal presents an opportunity for transparency and broader acceptance. However, if parliamentary approval is achieved simply through the government’s weight of numbers or manipulation of procedures, that will preclude the benefits that could otherwise be obtained. (Emphasis added.)

(Southalan, 2016, p.1)

The next section provides an overview of the functions of the five government agencies which have responsibility for managing the mining regulatory framework of WA.

5.6 Government agencies responsible for implementing the WA MinReF

As stated previously, the mining industry in Western Australia (WA) is regulated by State and Federal legislation consisting of various parliamentary Acts which are supported by regulations, policies, and administrative tools. To understand the roles and functions of the MinReF, and in particular the bureaucratic institutions responsible for implementing it, three issues need to be considered. Firstly, the role of each agency responsible for implementing the MinReF needs to be identified together with an understanding of agency structures and functions. Secondly, the jurisdictional powers of each legislation and regulation entrusted to each agency need to be examined. Thirdly, the key roles of the legislation under each agency need to be identified.

Five Western Australian agencies are responsible for implementing the MinReF are: (a) Department of Mines, Industry Regulation and Safety; (b) Department of Water and Environmental Regulation; (c) Department of Jobs, Tourism, Science and Innovation, (d) Department of Planning, Lands and Heritage, and (e) the Department of Biodiversity, Conservation and Attractions.

5.6.1 The Department of Mines, Industry Regulation and Safety

The Department of Mines, Industry Regulation and Safety (DMIRS) was established on 1 July 2017, following the “merging of the bulk of the Department of Commerce with the Department of Mining and Petroleum.” (DMIRS, 2017). The operational framework of DMIRS is “to support a safe, fair and responsible future for the Western Australian community, industry and resources sector.” (ibid). DMIRS has five functional areas, and the roles of these five functions are listed in Box 5.1.

BOX 5.1 ADMINISTRATIVE FUNCTIONS OF THE DEPARTMENT OF MINES, INDUSTRY REGULATION AND SAFETY

- Resource and Environmental Regulation
- Industry Regulation and Consumer Protection
- Safety Regulation
- Service Delivery
- Strategic Business Innovation
- Corporate Services

Source: Department of Mines, Industry Regulation and Safety

Concerning the scope of this study, DMIRS¹⁷ is responsible for administering the following legislation (a) *Mining Act 1978*; (b) *Mine Rehabilitation Fund Act 2012*; (c) *Rehabilitation Fund Regulations 2013*; and (d) *Guidelines for Preparing Mine Closure Plans, 2015*, which are reviewed below.

5.6.1.1 Mining Act 1978

DMIRS has the jurisdiction's authority of the *Mining Act 1978* which grants mining tenements and exploration licences (Mining Act 1978, Hunt, 2009). Subsequent amendments to the Act (*Amendments to the Mining Act 2010*) and other administrative schedules passed under the Act give authority to DMIRS to collect Royalties (Hunt, 2009). The jurisdiction of the *Mining Act* includes the State of Western Australia, but it also covers an extended territorial sea area under an arrangement with the Commonwealth:

The *Mining Act 1978* (the Mining Act) outlines the law as it relates to mining, and for incidental and other purposes.

Until recently the *Mining Act 1978* has applied to the land area of Western Australia and, by arrangement with the Commonwealth, the first three nautical

¹⁷ DMIRS is responsible for many other legislation covering Petroleum, Gas, Safety, and Consumer Protection and they are not relating to the scope of this study.

miles of the territorial sea from the baseline. (Department of Mines, Industry Regulation and Safety, n.d., para one).

However, the *Mining Act 1978* has limited legislative powers in relation to the *Environmental Protection Act 1986* as described under Section 6 (1) which stipulates:

“S. 6. Operation of this Act

- (1) This Act shall be read and construed subject to the *Environmental Protection Act 1986*, to the intent that if a provision of this Act is inconsistent with a provision of that Act, the first-mentioned provision shall, to the extent of the inconsistency, be deemed to be inoperative” (Mining Act, 1978, p.3).

As per the 2010 amendment to the *Mining Act 1978*, now, the Act requires “a Mine Closure Plan [MCP] ... for assessment and approval as part of Mining Proposal applications” (Department of Mines and Petroleum: Environmental Protection Agency. (2015, p. 5). The first *Guidelines for Preparing Mine Closure Plans* were published in May 2015 – five years after the amendment to the Act, in collaboration between DMP and the Environmental Protection Agency.

5.6.1.2 Mining Rehabilitation Fund Act 2012

The *Mining Rehabilitation Fund Act 2012* (MRF Act) was enacted in 2012. It has three objectives: (a) establishment of a Mining Rehabilitation Fund; (b) declaration of a payable non-refundable annual levy on abandoned mine sites to the state; (c) granting the authority for collecting the levy (DMIRS, n.d., MRF Act, 2012). The MRF Act became mandatory on 1 July 2014 (DMP, 2014; Morrison-Saunders et al. 2014).

5.6.1.3 Guidelines for Preparing Mine Closure Plans

In the *Guidelines for Preparing Mine Closure Plans* (Guidelines for Mine Closure, May 2015) one of the key issues is the importance of operating within the external framework under the Federal legislation:

“Where a Mine Closure Plan is a condition of approval under the EPBC [1999] Act, the same Mine Closure Plan required by the EPA may be submitted to the Commonwealth Government for approval provided it meets the requirements of the EPBC Act. The EPBC Act requirements should be

discussed with the Commonwealth Department of Environment and the EPA” (DMP, 2015, p.5).

Though it does not appear in any legislation or regulations that come under the jurisdictions of DMIRS, it has a narrative about the agency role:

“DMP (DMIRS) is the lead regulator and decision-making authority for mining projects in Western Australia (WA) under the *Mining Act 1978* (the Mining Act). DMP has the role of regulating the industry to ensure the closure conditions applied and commitments made are implemented during the life of the mining project” (ibid, p.4).

Despite its regulatory functions, DMIRS also performs a role as a sponsor of a mining exploration program titled ‘Exploration Incentive Scheme’ (ELC) funded by the Royalties for Regions programs. Now the program is in its ‘Round 15’. According to DMP/DMIRS, a total sum of “\$5.26 million will be offered to 43 drilling projects to be drilled in the 2017-18 financial year and applies to successful projects drilled since the beginning of July 2017”. DMP’s website reports state that in the “10 years the [ELS] scheme has been running, exploration teams have drilled more than 630,000 metres and made a number of major resource discoveries.” (DMP, August 2017, para one & two; DMP, 2017 May 2018, para six).

5.6.1.4 Mining Rehabilitation Fund Regulations 2013

DMP developed the *Mining Rehabilitation Fund Regulations Act 2013*, for providing administrative guidelines for the *MRF Act 2012*. The regulations explain how to calculate the MRF levy and define key terminology of the *MRF Act*. Further, the Guidelines provide details about appointing a MRF Advisory Panel by calling for nominations through the agency’s website.

5.7 Department of Water and Environment Regulation

The Department of Water Environment Regulation (DWER) was established as a new agency in 2017 with the mandate to be “responsible for environment and water regulation, serving as a ‘one stop shop’ for industry and developers, with the aim of streamlining and simplifying regulation” (Department of Water Environment Regulation, n.d, para one, (ibid). By amalgamating the former Department of Water, Department of Environment Regulation and the Office of the Environmental

Protection Authority, now the DER functions under six guiding regulatory principles. These are summarised in Table 5.6.

TABLE 5.6 BEST PRACTICE PRINCIPLES (INTERIM)¹⁸ OF DEPARTMENT OF WATER ENVIRONMENT REGULATION

BEST PRACTICE PRINCIPLES	APPLICATION
Risk-based	The “regulatory decisions proportionate to the level of risk posed to public health, the environment and water resources.”
Evidence-based	The approach will be “an evidence-based ... on the best available information including sound science to inform regulatory decision-making.”
Transparent	The provision of “clear publicly available reliable and relevant information on regulatory processes and requirements to ensure that regulatory decision-making is clear, consistent and well understood.”
Effective regulation across government	The principle of collaboration with “other regulators to share information and avoid unnecessary regulatory duplication.”
Consistent	initiating “regulatory actions... consistent with legislation and within statutory powers.”
Responsive	The principle to “respond in an effective and timely manner.”

(Source: Department of Water, Environment Regulation. July 2017)

¹⁸ The reason for the tag ‘interim’ under DWER’s best practice model is due to the ongoing nature of the Labor Government’s Reform Agenda where the Executives of key departments such as DWER, DMIRS, and DJTSI are appointed under short-term acting arrangements.

The DWER plays a vital role in environmental regulations across the State and is also responsible for implementing the Federal legislation, namely the *Environmental Protection and Biodiversity Act 1999 (EPBC Act)* along with a few other Federal Acts (DWER, n.d.). The *Rights in Water and Irrigation Act 1914*, the *EPA 1986* and the *EPBC Acts* fall within the scope of this study. However, the other three Federal Acts are relevant to uranium mining include the *Australian Radiation Protection and Nuclear Safety Act 1988*, the *EPBC Act 1999*, the *Australian Radiation Protection and Nuclear Safety Regulations 1999*. The relevant pieces of legislation that come under the DWER are reviewed below.

5.7.1. Rights in Water and Irrigation Act 1914

This century-old “Act defines the rights in water resources, to make provision for the regulation, management, use and protection of water resources, and for related purposes” (Rights in Water and Irrigation Act 1914, p.1). Among other things, this Act stipulates regulations concerning the control of water resources (Part 3) and licencing and related provisions (Schedule 1). These regulations apply to the issuing the licence for mining operations up-to-now. Under section 26GX (d), the Minister has the authority: (i) to “provide water at sustainable levels of use; and (ii) the environmental impact of developing those sources” (ibid, p.52). However, the Act does not stipulate how to achieve the provisions of “sustainable use” of water, and the environmental impact indicating weakness of this century-old legislation.

5.7.2 Environmental Protection Act 1986

The environmental protection of the mining industry in WA was addressed eight years after the enactment of the *Mining Act 1978* through the introduction of the *Environmental Protection Act 1986 (EP Act)* under which the Environmental protection Agency (EPA) was established. The *EP Act* has also gone through various amendments, including its additional associated regulations. Among them are the *Environmental Protection Regulations 1987* and the *Native Vegetation Regulations 2004*. Both these are important pieces of regulation concerning environmental protection.

The *EP Act (WA)* has a broad scope in protecting the environment across the State of Western Australia. It has the authority for “the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing” (Government of Western Australia: Environmental

Protection Act 1986. p.1). Other unique jurisdictions of the *EP Act* are its powers to prosecute those discharging waste causing pollution and the authority to prosecute for criminal negligence for breaches (*EP Act* 1986, Section 50, p.89), as well as declare environmentally sensitive areas (*Op. Cit.*, Section 51B, p.91). The Act also has authority to prosecute for “unreasonable noise” (*EPA Act*, subsection (3); vegetation conservation (*ibid*, section 70), and causing serious environmental harm” (p.90). Further, the Act has the power to prosecute for causing unreasonable emissions from premises (p.157) and vehicles or vessels (p.90) and dumping waste in WA (*ibid*, p. 89).

5.7.3 Environmental Protection (Clearing of Native Vegetation) Regulations 2004

Amendments to the *EP Act* were gazetted December 2013 and came into effect on Wednesday 4 December 2013 by formulating *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (DER, n.d.; para one). The document titled *Regulations 2004* provides definitions and conditions of clearing native vegetation in the State of WA. One of the key features of the *Regulations 2004* is the provision of the definition of the following key terms:

R. 5 (2) In this regulation —

biodiversity conservation includes conservation of species diversity, genetic diversity or ecosystem diversity;

land conservation includes management of salinity, erosion, soil acidity or waterlogging;

plant includes to sow and to propagate. (*Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. P.4). (Original emphasis).

Seven years after *Regulations 2004* was approved, the legislative power under the *EP Act* was delegated to the DMP through a memorandum of understanding (MoU). Under this MoU, the provisions for clearing “native vegetation under the Environmental Protection Act 1986 for mineral and petroleum activities [now] regulated under the Mining Act 1978” (DMP, 2011. para one).

5.7.4 Environment Protection and Biodiversity Conservation Act 1999 (EPBC)

The most important legislation that governs all Australian projects with significant environmental consequences is the *Environment Protection and Biodiversity Act 1999 (EPBC)*. This is Federal legislation which applies to all States and Territories for any project that has a significant environmental component (*EPBC*). The objectives of the *EPBC* are listed in Box 5.7.

TABLE 5.7 THE OBJECTIVES OF THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The objectives of the EPBC Act are to:

- (a) provide for the protection of the environment, especially matters of national environmental significance conserve Australian biodiversity
- (b) provide a streamlined national environmental assessment and approvals process
- (c) enhance the protection and management of important natural and cultural places
- (d) control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife
- (e) promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources
- (f) recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity

Source: Australian Government: Department of Environmental and Energy – *EPBC Act 1999*

Of the wide range of powers under the *EPBC Act*, the objectives (a), (b) and are relevant to the scope of this study. They are discussed in detail in Chapter Eight (Section 8.5.5).

5.8 Department of Planning, Lands and Heritage

The Department of Planning, Lands and Heritage (DPLH) has the jurisdiction over the *Land Administration Act 1997* (“*LA Act*”) under which the Minister has authority on granting land rights access to Crown and private lands, pastoral and mining lands. The *LA Act* provides clarifications on land ownership issues across WA. Concerning mining, section 205 of the *Act* assures those who hold mining tenements for compensation for damage to mines as follows:

“If an interest in land taken under Part 9 is held under any Act relating to the use of land for mining purposes, the holder of the interest is only entitled to claim compensation for “actual loss sustained by reason of the taking through damage to a mine on the land, or the works connected with a mine” (*Land Administration Act, 1997, p.175*).

Section 49 of the *Act* stipulates conditions relating to the “development, management and use of the Crown land” (*ibid, p.42*).

5.8.1 Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions (DBCA) was established in 2017 following amalgamating of the Botanical Gardens & Parks Authority, Parks and Wild Life Service, Perth Zoo and the Rottenest Island Authority (*ibid*). It has the jurisdiction over the *Biodiversity, Conservation Act 2016* (*BCA 2016*). (DBCA, n.d. para one) which is the “replacement for the *Wildlife Conservation Act 1950* and *Sandalwood Act 1929*” (Department of Biodiversity, Conservation and Attractions, n.d., para one)

The objective of the Act is twofold:

- (a) “to conserve and protect biodiversity in the State”; and
- (b) “to promote the ecologically sustainable use of biodiversity components in the State” (*BCA 2016, p. 2*).

5.9. Abandoned mines and mine rehabilitation legislation in Western Australia

This section provides an overview of the mining rehabilitation legislation and the environmental legacies of Western Australia. After more than over one hundred years of mining, there are 17,000 abandoned mine sites in WA (Government of Western Australia: Media Statement. (8 June 2014). para thirteen) which are no longer operational, but where the earlier presence of the industry has left long-lasting environmental legacies (ibid). In 2014, mining rehabilitation legislation became mandatory to address the environmental and safety issues due to abandoned mines in WA. For example, the abandoned Elverdton copper-gold mine located 12 kilometres south of Ravensthorpe in south-west Australia is an example of an environmental legacy mine. “It is a target for rehabilitation under the government mine rehabilitation program” (Ibid, para four).

“Under the new MRF, the focus will be on avoiding the sort of environmental legacies left by abandoned projects such as Elverdton.

The Elverdton mine was operating between 1956 -1972. A small potash operation for farm fertilizer continues, but beyond this mining ceased in 1972. The “massive uncontained tailings dump which is eroding into a local river catchment” (mindat.org. n.d.).

In order to consider the environmental harms of disused mine sites such as the abandoned Elverdton mine in WA, it is essential to define the term “abandoned mine’. It refers to sites where *mining* activities occurred, but acceptable *mine* closure and reclamation did not take place or was incomplete. *Abandoned mines* contribute to the legacy of environmental degradation left by historic *mining* activities which occurred before *mine* closure regulations were developed.” (*miningfacts.org. n.d*). The Government of Western Australia defines abandoned mines as “shafts, dumps and buildings that are commonly found at sites of historical *mine* production. “Affected land” in relation to an abandoned mine *site* means land outside the site that has been affected by mining operations carried out in, on or under the site” (Government of Western Australia: Department of Mines and Petroleum (2016, p.3).

The past mining activities in WA were functioning without any regulations for mine closures. The issue of addressing the rehabilitation of the 17,000 abandoned mines was enacted in 2012, and the legislation became mandatory in July 2014. It shows that the enactment of the *MRF Act* is a vital landmark within the MinReF. However,

the \$50, 000 annual rehabilitation liabilities under the *MRF* legislation are limited to mine tenement holders operating under the *Mining Act* and not applicable to any of the State Agreements:

“All tenement holders operating on *Mining Act 1978* (Mining Act) tenure (with the exception of tenements covered by State Agreements not listed in the regulations), are required to report disturbance data and contribute annually to the fund. Tenements with a rehabilitation liability estimate (RLE) below a threshold of \$50,000 must report disturbance data but are not required to pay into the fund” (DMP, n.d. para three)

According to the *MRF Act* the mine “*rehabilitation work*” means work to rehabilitate an abandoned mine site or affected land that is funded from money standing to the credit of the Fund” (*MRF Act*, p.7). As this definition has a limited scope implying that all abandoned would be restored, in this thesis, a practical definition is adopted to define mining rehabilitation: “recovery of a mine site to a healthy ecological state or for productive human use” (Marinova, 2018).

All tenement holders operating on *Mining Act 1978* (Mining Act) tenure (with the exception of tenements covered by State Agreements not listed in the regulations), are required to report disturbance data and contribute annually to the fund. Tenements with a rehabilitation liability estimate (RLE) below a threshold of \$50,000 must report disturbance data but are not required to pay into the fund (*MRF Act*, 2012).

Table 5.8 provides a timeline of mining rehabilitation legislation and initiatives.

TABLE 5.8 TIMELINE OF MINING REHABILITATION LEGISLATION

Year	Legislation/ and initiatives	Comments
1854	Gold Regulation Ordinance	The first mining law in WA.
1904	Mining Act	No environmental protection conditions included.
1978	Mining Act	No environmental protection conditions included.
2010	The Amendment to the Mining Act 1978	The amendments mandated the need to submit mine closure plans with mining applications.
2011	Guidelines for Preparing Mine Closure Plans (Version 1)	The preliminary version of the “Guidelines for Preparing Mine Closure Plans” developed in collaboration with the EPA.
2012	Mining Rehabilitation Fund Act (MRF Act)	The MRF Act 2012 became mandatory legislation was enacted.
2013	Mining Rehabilitation Fund Act (MRF Act) Regulations 2013	MRF Act provides guidelines on how to calculate the MRF Levy; definitions of terminology, the appointment of MRF Advisory Panel and other admin issues.
2013	DMP commenced the implementation of the ‘Abandoned Mines Program’ (AMP).	The funding for the AMP was sourced from the Mining Rehabilitation Fund (MRF).
2014	MRF Act became mandatory	MRF Act became mandatory on 1 July 2014. The mining operators to pay one per cent of self-estimated mine closure liabilities annually.
2015	Guidelines for Preparing Mine Closure Plans (version 2)	These guidelines were published in collaboration with the Environmental Protection Agency

2015	DMP commenced the rehabilitation of the 'Ellendale Diamond Mine' in the Kimberley as a pilot under the MRF,	This was an "unplanned project to address immediate concerns at the Ellendale Diamond Mine..." (DMP, n.d. Abandoned mine project)
------	---	---

Source: The sources cited above.

DMP has undertaken the responsibility for rehabilitating. Selected abandoned mines using the funds from MRF as a pilot program:

"Currently, there are five projects in the [Abandoned Mines Program]. The Ellendale Diamond Mine was abandoned in 2015 and was the first site where works were undertaken using the funds from the principal of the MRF. Ellendale continues to be managed in care and maintenance whilst DMIRS is undertaking an Expression of Interest (EOI) process to have mining recommence at the site. There are four historical abandoned mine sites identified as pilot sites for rehabilitation funded from the interest generated on the MRF: Black Diamond Pit Lake, Pro-Force Plant Site, Bulong Nickel Tailings Storage Facility and the Elverdton Dumps. Two of the pilot Sites, Black Diamond and Pro-Force, were successfully completed during the 2016–17 financial year". (GoWA: DMP, 2017. pp 6-7).

The effectiveness of the *MRF Act* and issues concerning mine closure plans and rehabilitation of mine sites are discussed in detail concerning the two case studies (Chapter Seven). How the mining sector complies with environmental legislation is also of interest and relates to the focus of this research. The Auditor General of Western Australia conducted two audit reports: First in 2004 examining the State Agreements and the second in 2011 reviewing the overall environmental compliance of the mining regulatory framework. The following section provides a review of the findings from these two reports.

5.10 Environmental Compliance: The findings of two audit reports on current gaps of the regulatory framework

The report by the Auditor General titled *Developing the State: Management of State Development Acts (2004)* examined the WA State Agreements as critical pieces of legislation which support large-scale resource projects while the 2011 audit report titled *Ensuring Compliance with Conditions on Mining* analysed the general environmental compliance of the industry. They are discussed below.

5.10.1 Findings of the WA Auditor General's Report on State Agreements

One of the key findings of the Auditor General's 2004 Report identifies the need to:

“develop a more systematic approach to Agreement risk management, consistent with their value and importance to the State improve reporting to Parliament on Agreement status and performance” (WAAG, 2004, p.20).

Further, the Audit Report highlights the absence of “a structured process to evaluate” the achievements of agreement and the absence of a “systematic approach to Agreement risk management” (ibid). However, the Audit Report neither provides details explaining what this “systematic approach” is nor explains how to manage risks and the environmental conditions incorporated in the SAs. This PhD study fills in a gap by analysing how environmental assurance regulations of three SAs are implemented in two specific case studies. It also includes a critical evaluation of the environmental compliance aspects of the SAs (Chapter Five).

5.10.2 Findings of the Auditor General's Report on the Environment Compliance

The second report titled *Ensuring Compliance with Conditions on Mining (2011)* published by the Auditor General (WAAG, 2011) notes several weaknesses in agency practices:

“Responsibility for monitoring and ensuring compliance with conditions rests with several agencies, and performance varies significantly across these agencies, and across key conditions...Weaknesses in agency practice mean that we cannot give assurance that environmental protection conditions are being met.” (WAAG, 2011 p.7).

Of the overall weaknesses, the WAAG report (2011) highlights the lack of inter-agency coordination and a principal agency for monitoring the Annual Environmental Reports (AER) submitted by mining companies. The Report notes the following deficiencies concerning one of the agencies; namely the Department of Mines and Petroleum (DMP):

“Only 55 per cent of sampled operators submitted their required Annual Environmental Reports (AERs) to DMP to provide regular information on whether they are minimising their impact on the environment.

When the AERs were not submitted, DMP rarely followed up with the operator or took action” (Western Australian Auditor General, 2011, p.8).

Further, the Audit Report notes that the DMP has not established the extent and the scope of inspections required to provide “reasonable assurance that mining conditions are being met” and only “[f]orty-three per cent of sampled mines were inspected over the five years to 2011” (ibid). One of the key insight of the Audit Report is DMP’s role in monitoring “whether mining operators have taken action to address identified noncompliance” and notes the agency practice “poor” (ibid). Another key finding of the audit is the poor “coordination between agencies”, (p.17) However, the audit findings do not discuss the strengths and weaknesses of the legislation that comes under the WA MinReF and the reasons for the lack of interagency coordination of relevant legislation. A reason for not monitoring the Annual Environmental Reports submitted by the mining companies is the initiation by DMP of a mining regulatory reform process between 2011 and 2015 by proposing “risks and outcome based” regulatory solutions through amendments to the *Mining Act 1978* (see also Section 5.4 of this Chapter). A key issue of the mining regulations in WA seems to arise from the lack of effective coordination as various legislation and regulations on mining confine to individual agencies. The Auditor General highlights:

“The legislation ...is clearly ‘owned’ by individual agencies. However, the way this framework is currently implemented does not provide overall assurance on compliance with conditions” (Western Australian Auditor General, 2011, p.17).

Nevertheless, this audit report does not explain the genesis and the evolution of the MinReF resulting in a piecemeal approach to environmental legislation. The findings from the audit justify researching to identify any theoretical grounds for the

shortcomings and deficiencies of specific agency-based legislation. Further, regulatory requirements for monitoring and enforcement of environmental conditions and how the responsible agencies could improve their practices have not been adequately addressed in the Auditor General's Report. Further, the 2011 Audit Report does not provide the functions of the *EPBC* and its role within the WA MinReF.¹⁹ This research project examines the objectives of the *EPBC Act* and its functionality within the WA MinReF in Chapter Eight (section 8.5.7). Neither of the audit reports examines the overall functionality and effectiveness of MinReF and in particular, nor provide policy solutions to address the existing gaps and deficiencies. Further, this thesis draws from multiple theoretical approaches to explain the gaps and deficiencies identified in the respective reports.

5.11 Summary

This chapter provided an overview of how the mining regulatory framework in WA has evolved over a period of 160 years since the enactment of the first mining law (GRO 1854) in WA. The large number of legislation, regulations and policies also demonstrate the scope and complexities of the various subjects the framework covers. Included in this chapter was an overview of the merits and demerits of the SAs as a prelude to the two case studies in Chapter Seven where a sample of these Agreements will be reviewed as regulatory tools examining their capacity to assure environmental compliance concerning a uranium mine approval and coal mining. The main conclusion from the identification of the WA's complex mining legislation is that there are two parallel systems—the *Mining Act* and the State Agreements which deal differently with mining approval, management including mine rehabilitation work. The chapter demonstrated that these responsibilities are distributed across different State ministries and government departments displaying a lack of a coordinated approach. These policy gaps require further analysis in order to produce workable solutions by strengthening the role of legislation concerning the environmental protection in WA and discuss in Chapter Eight.

¹⁹ 2011 audit report only focused on the WA compliance process and did not address the role of the *EPBC Act 1999*.

CHAPTER SIX METHODOLOGY AND METHODS

6.1 Introduction

This chapter describes the rationale for the chosen research methodology and methods utilised to collect and analyse data to obtain evidence to address the issues embodied in the research question and objectives of this study. This chapter includes the approach to the inquiry, data collection and analysis while Chapters Seven and Eight represent the insights obtained from the participants, literature review and the analysis and interpretation of various issues relevant to this research project. Further, this chapter establishes methods to ground the analysis of the two case studies (Chapter Seven) using qualitative research methods.

The study was conducted based on qualitative research using the principles of case study methods (Yin, 2011, 2018), and supported by an analysis using primary and secondary data sources. Table 6.1 provides the research question, objectives and methods utilised to conduct the study.

Chapters Two, Three, and Four identified key issues, and the literature addressing sustainable development, global drivers which influenced the corporate world and mining industry to adopt sustainable approaches in their business practices. Further, the previous chapters also identified the theoretical approaches relevant to this study which requires an approach based on intradisciplinary perspectives to investigate the research question and objectives. This PhD project, developed within a social sciences framework, is grounded in sustainable development principles. Nevertheless, it draws from other disciplines such as public policy, mining law, theories on legal doctrine and environmental law, regulation design principles, theories of bureaucracy, and discourse analysis to understand various theoretical approaches relevant to this study. A suite of methods has been used to answer the research question (see Table 6.1) which are explained in further detail below starting from the underlying philosophy and strategy. In essence, this is a qualitative investigation which builds on two case studies, interviews with experts and secondary sources. Content analysis was used to examine the collected data and inform the insights gained to support the findings of this study.

The research methods of social sciences are different from investigations in disciplines describing natural phenomena, such as chemistry, physics, biological studies and medicine. While the hard sciences depend on verifiable data, including

clinical trials, and quantitative approaches, the social sciences are very much interested in concepts and relationships between people and within society, to which qualitative thinking seems more appropriate. (Yin, 2011, 2018; Creswell & Poth, 2018). However, it is important to note that research in social as well as natural sciences these days needs to be cross-fertilised with interdisciplinary and transdisciplinary insights. For example, in medicine understanding people’s and patients’ behaviour, attitudes and priorities now depend on qualitative research (Creswell & Poth, 2018; Baker & Edwards, 2012; Adler & Adler, 1987). Similarly, in environmental science, preserving and restoring biological diversity, maintaining natural resources and functional ecological systems can be justified using insights from social sciences (Filho, Marans, & Callewaert 2018). The remainder of this chapter clarifies the methodological facets of the research design. It provides an overview of the applicability and limitations of the selected approaches adopted in conducting this research project.

TABLE 6.1 RESEARCH QUESTION, OBJECTIVES AND METHODS

RESEARCH QUESTION/OBJECTIVES		METHODS
Research Question	<ul style="list-style-type: none"> • How is the mining regulatory framework in Western Australia being implemented legislatively to assure environmental protection during the mining life cycle? 	<ul style="list-style-type: none"> • Identify State and Federal mining acts, regulations, policies and administrative tools under the Mining Regulatory Framework of Western Australia. (Table 5.2). • Case study analysis of the Yeelirrie uranium mine and Collie coal mining (Chapter Seven). • Analysis of data collected from a sample of well-informed participants representing government, academia, mining regulators and non-government organisations using semi-structured, in-depth interviews (Chapters Seven, & Eight).
Objective one	<ul style="list-style-type: none"> • Analyse the strengths and weaknesses of the current mining regulatory framework in relation to environmental protection in Western Australia. 	<ul style="list-style-type: none"> • Identification, and analysis of relevant government legislation, regulations, policies, audit reports and the outcomes of two mining reform

		<p>agendas of WA. (Chapters Five & Eight).</p> <ul style="list-style-type: none"> • Analysis of two case studies (Chapter Seven). • Analysis of data collected from a sample of key informants representing government, academia, non-government organisations and mining regulators using semi-structured, in-depth interviews (Chapters Seven, & Eight). • Review of two sets of primary data, namely interviews, legislative reviews, secondary data from relevant peer-reviewed literature and government websites. (Chapters Seven & Eight).
Objective two	<ul style="list-style-type: none"> • Analyse how the mining regulatory framework is being implemented in two case study locations. 	<ul style="list-style-type: none"> • Analysis of the case study of the Yeelirrie uranium mine based on primary data from legislation, interviews and secondary data from literature sources (Chapter Seven). • Analysis of the case study of the Collie coal mining based on primary data from legislation and interviews and secondary data from literature sources (Chapter Seven).
Objective three	<ul style="list-style-type: none"> • Identify Australian and global best practices of environmental protection relating to mining operations and rehabilitation work. 	<ul style="list-style-type: none"> • Review of literature related to, of Australian and global best practices of innovative approaches of ecosystem restoration and mine rehabilitation. (Chapter Nine).
Objective four	<ul style="list-style-type: none"> • Propose ways and means of improving the Western Australian mining regulatory framework to assure environmental protection. 	<ul style="list-style-type: none"> • Synthesis of research findings based on the analysis of the case studies and identifying the strengths and weaknesses of the MinReF) Chapter Eleven). • Propose policy recommendations to address the gaps and deficiencies identified in the Western Australian mining regulatory framework (Chapter Eleven).

6.2 Research philosophy and strategy

The research philosophy and strategies adopted in this study are based on qualitative research and case study methods (Creswell and Poth, 2018; Yin, 2018, 2011; Creswell, 2013). According to Creswell, (2013, p. 44):

“Qualitative research begins with assumptions and the use of interpretive/theoretical frameworks that inform the study of research problems addressing the meaning’s [of] individuals or groups ascribed to a social or human problem. To study this problem, qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is both inductive and deductive and establishes patterns or themes. The final written report or presentation includes the voices of participants, the reflexivity of the researcher, a complex description and interpretation of the problem, and its contribution to the literature or calls for change”.

6.3. Qualitative research

Qualitative research conveys different things and meanings when a researcher is engaged in an “activity that locates the observer in the [real] world” (Denzin & Lincoln, 2018, p.10). Hence, qualitative research “consists of a set of interpretive, material practices that make the world visible and generic definitions could be offered” (ibid). According to Denzin & Lincoln, 2018, p. 10):

“These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves, an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena regarding the meanings people bring to them”.

King et al. (1994, p. 4) highlight even though qualitative research “covers a wide range of approaches... by definition, none of these approaches relies on numerical measurements”. Denzin & Lincoln (2018, p. 10) explain the scope of qualitative research state that it:

“involves the studied use and collection of a variety of empirical materials— case study, personal experience, introspection, life story, interviews, artefacts,

and cultural texts and productions, along with observational, historical, interactional, and visual texts—that describe routine and problematic moments and meanings in individuals’ lives. Accordingly, qualitative researchers deploy a wide range of interconnected interpretive practices, hoping always to get a better understanding of the subject matter at hand. It is understood, however, that each practice makes the world visible in a different way. Hence, there is frequently, a commitment to using more than one interpretive practice in any study”.

In this study, the empirical materials gathered cover two case studies, interviews, historical data describing WA mining history and the evolution of the mining legislation (Table 5.2). Further, this study included reviews of old legislation such as the *Mining Act 1904*, agency annual reports (historical data), visual texts of abandoned mine sites in WA, pit lakes in the Collie Region and abandoned mine shafts. I have also examined cultural (media) texts, such as media coverage of issues relating to the scope of the study and also reflected on my professional experience as a former public official. My experience includes over two decades of employment as a civil servant holding positions in public service agencies in WA, including agencies such as health, transport, Perth Zoo, commerce, industry and resources. Between February 1999 and 31 March 2014, I was employed at the Department of Mines and Petroleum (DMP) with responsibilities related to management of information systems; corporate risk management; development, analysis and implementation of policies, and advised the Senior Executives as the chairperson of the Department’s staff consultative and communication committee.²⁰ As a result, I embarked on this research not as a novice, but as a practitioner with twenty years of knowledge on how public service agencies operate, the cultures of agencies, and diversity in several key departments in the State of Western Australia. Consequently, the overall experience makes me see the world from a particular point of view which includes the richness of experience and observations which would have missed, had I engaged in this study as a researcher with no public service experience.

This research includes a review of relevant social science literature and theories identified in Chapters Two, Three and Four. The theories relating to environmental law, regulatory theories, legal doctrines and mining practices outlined in Chapters

²⁰ During my 15 years of employment at DMP (until 31 March 2014), I did not hold any formal positions relating to environmental compliance or mining regulatory work.

Two, Three, Four and Five were adopted to understand issues in connection the implementation of regulations within the public sector and evaluating legislation, such as mining laws (legislation, regulations and policies) in WA. Further, the theories embodied in the works of Weber (1952, 2015) were used to analyse the government bureaucratic systems responsible for implementing the MinReF in WA.

It is essential at the outset to examine a definition of 'theory'. According to Ragin (1994, p. 25), a theory is "an attempt to specify as clearly as possible, a set of ideas that pertain to a particular phenomenon". In this study, the chosen "phenomenon" is the implementation of the mining regulatory framework of WA to assure environmental protection. Ragin notes (1994, p. 32):

"A primary goal of social research is to improve and expand the pool of ideas known as theories by testing their implications and to refine their power to explain. Testing is carried out by deriving hypotheses from theories and the implications of these theories and by... working through the implications of a theory and then testing this refinement, it is possible to progressively improve and elaborate a set of ideas" (ibid).

I follow the views expressed by Ragin (1994) in Chapter Seven where I present two case studies. I followed the same approach in my analysis of the MinReF in Chapter Eights using the data collected through expert interviews.

Despite its ability to provide a rich description and different worldviews, qualitative research has some limitations. It requires good research design and works to convey the best understanding and theory development using the available information and the researcher's insights.

6.3.1 Limitation of qualitative research

There are resistances to the approaches adopted in qualitative research. According to Denzin and Lincoln (2018, p.9), the "academic and disciplinary resistance to qualitative research illustrates the politics embedded in this field of discourse". There are many criticisms against qualitative research. To better understand these criticisms, it is necessary to "distinguish the political (or external) role of [qualitative] methodology from the procedural (or internal) one" (Seale, Gobo, Gubrium, & Silverman, 2004, p.7).

A possible way to do so is to compare it with quantitative research which uses “precise and compact abstract data” (Neuman, 2014, p. 479). Neuman’s (2014) insights into quantitative versus qualitative research methods identify the inherent weakness and strengths of qualitative research. Table 6.2 outlines the essential resemblances and variances between these two groups of research methods.

TABLE 6.2 COMPARISON OF QUANTITATIVE AND QUALITATIVE RESEARCH

RESEMBLANCES	VARIANCES
Both approaches derive abstract concepts from empirical data.	Quantitative research uses a limited number of standardised methods. Qualitative research uses many non-standardised methods and techniques.
Both use objectively available sources and describe them in detail depending on the research.	Quantitative uses pre-existing or established theories or hypotheses which be tested for “verification or falsification of facts.” ²¹ Qualitative research can be used for conceptualisation and is capable of developing theories.
Both methods use comparisons with chosen variables.	Quantitative methods use precise “and verifiable data”. Qualitative methods use imprecise and “subjective data” .
Both methods could avoid errors and conclusions “using empirical data” .	Different researchers can reproduce the results following the prescribed quantitative methods to generate “scientifically verifiable facts”. Qualitative methods cannot validate a theory using “scientifically verifiable empirical data” ²² , and the conclusions depend on the analytical skills of the researcher.

Source: Neuman (2014, p.497) & Govinnage (2018)

²¹ All highlighted texts in italics bold in the table are my contribution to this table (Govinnage, 2018)

²² I have borrowed the highlighted words **“verification”** from scientific methodology (Andersen, Hanne and Hepburn, et al. (2016). as established by Gallio in and **falsification facts”** from Carl Popper’s work. James, F. and Hempel, C. (Fall 2017) who first proposed that facts could also be falsified when using the scientific method.

The most significant difference between quantitative and qualitative methods is the role that the researcher plays. While with quantitative techniques the results are reproducible by any well-trained researcher, qualitative analysis produces outcomes which depend on the analytical skills and previous knowledge as well as the value system of the researcher. In this sense, a limitation of the qualitative methods is their subjectivity. The same feature, however, could also act as the strength of the methodology, as researchers look for theory development and explanations of phenomena within the areas where they feel most knowledgeable and well-informed. They also engage with a particular phenomenon because of passion and other emotional explanations – reasons usually left entirely outside the hard formal logic of quantitative techniques.

Further to the empirical qualitative data collected from 16 research participants, the detailed information about the two case studies (presented in Chapter 7), I use several theoretical approaches from the disciplines mentioned earlier in this chapter. For example, I draw from the work of Seale et al. (2004) to examine both external – the role of politics, and internal – the rationale for using Yeelirrie (Uranium Agreement Act 1979), factors for the approval of the uranium project in January 2017. Additional theoretical insights are drawn from Hoecke (2013) related to legal doctrines, the theories about bureaucracy (Weber, 1952 & 2015) and discourse analysis as discussed in Chapter Three (section 3.6).

6.3.2. Research design

Based on the literature review of qualitative approaches and case study research (Denzin & Lincoln, 2018, Creswell & Poth, 2018, Maier & Allen, 2017; Yin, 2011, 2018), this PhD research was conducted using four design choices. I briefly discuss this below with my reflections on the four choices I considered in developing the design for this study:

Option A: To carry out an investigation reviewing both historical and contemporary data on environmental compliance, and conduct an agency-centric survey, aimed at finding out the administrative arrangements adopted to implement environmental compliance regulations. Further, I also considered interviewing those responsible for the implementation of the legislation under the Western Australian MinReF and base the thesis on these data and findings. Having done further desktop research and reading the works by Helms and Nixon (2010), I also considered carrying out Strengths, Weakness, Opportunities and Threats Analysis (SWOT). Although this

appeared as an attractive option given my familiarity with the WA public sector, on reflections, I realised that the institutional responses would be subjective and most likely defend existing agency practices. This concern was justified based on the analysis of various discourses and practices as represented in some agencies' official reports (DMP, 2017; WAAG, 2004; WAAG, 2011).

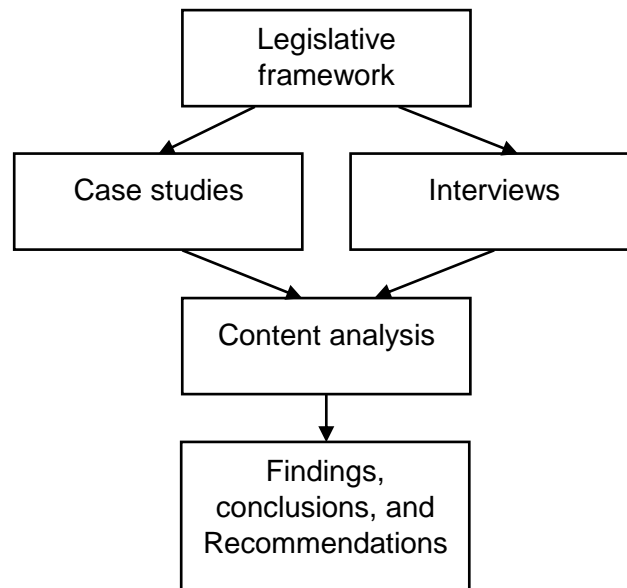
Option B: To conduct and analyse two sets of data to be collected from the bureaucratic agencies and external stakeholders. The intention was to compare the data sets against existing regulations. I intended to present my findings according to themes identified based on the interviews and literary reviews. Having explored the literature and through reflections, I realised that most likely I would have had to deal with two sets of data with two polarised opinions representing pro and against the current mining regulatory framework. Thus, such black and white representation would not have been helpful as the research question is not about investigation opinions pro and against mining, but about analysing environmentally responsible mining regulations. Hence, I did not follow the second option as study design.

Option C: To carry out the research analysing multiple case studies (hence based on case study research (Stake, 1995; Denzin & Lincoln, 2011; Creswell & Poth; Yin, 2011, 2018). I thought that it would help develop "stories": focusing on environmental compliance, thereby allowing issues to emerge using grounded theory. As introduced by Glaser and Strauss in 1967, the grounded theory rests on an analysis of actual data related to the behaviours of the participants being studied. It is not applicable in the case of stories as they are not direct observation and a particular interpretation would have already been imposed. As stated in Chapter Five, the mining regulatory framework is complex and has evolved over a century. Further, it is implemented through several individual agencies (WAAG, 2011). Moreover, environmental protection applies to all stages in the mine's life cycle which might require longitudinal observations beyond the time constraints of a PhD project. Multi-disciplinary approaches based in the respective conceptual frameworks may be a better solution to understand the many factors which have influenced and contributed to the current regulation and practices adopted such as the *Mining Act 1978*, 64 State Agreements and the newly developed the *MRF Act 2012*, which focusses only on rehabilitating abandoned mines.

Option D: To carry out an empirical evaluation of all pieces of legislation and regulations to examine the effectiveness of their implementation. I realised that this approach would not be productive for two reasons. First, an analysis of all legislation and regulations would end up with a legislative inventory and a description of their individual, features, strengths and weaknesses. Secondly, such an inventory-based study would not provide an opportunity to analyse the operational and implementation issues within particular settings, such as one or two case studies. Having collected a large number of legislation and regulations which come under the MinReF (Table 5.2), I realised the complexity of analysing a larger terrain of legal documents (nearly 200 pieces of legislation and regulations, including 64 State Agreements Acts, without being able to undertake an in-depth analysis.

Therefore, having reflected on the four options separately, I decided to draw elements from all of them and to focus on compiling two case studies, conduct interviews with key informants and stakeholders and analyse the legislative framework. Logistically, focusing on two types of minerals, namely uranium, coal and provides an opportunity to identify, collect and analyse empirically valid and achievable sets of data, and identify various factors influencing the implementation of the legislation. Hence, the research design comprised two case studies using the theoretical approaches outlined by Yin 2011, (2018), Creswell and Poth (2018) and Stake (1995). The case study approach gives flexibility. Further, it is a reliable methodology to collect data and to examine a sample of regulations applicable to these two types of minerals and conduct an in-depth analysis. Also, the interviews allow me to investigate some general themes, ask for different opinions and insights about better practices. The structure of the methodology is presented in Figure 6.1 while further details are provided in the sections to follow.

FIGURE 6.1 RESEARCH METHODOLOGY



6.4 Case study method

Yin (2011, 2018)—a widely recognised academic in the area of case study methodologies, explains the essence of the case study method as follows:

“There is no formula, but your choice depends in large part on your research question[s]. The more that your questions seek to explain some contemporary circumstance (e.g. ‘how’ or ‘why’ some social phenomenon works), the more that case study research will be relevant. Case studies also are relevant the more that your question requires an extensive and “in-depth” description of some social phenomenon” (Yin, 2018, p.4).

A running thread of this study is asking ‘how’ (as well as ‘why’) as my entry to the investigation of the mining regulatory framework in WA examining the background information identified in Chapter Five. I begin my investigation first by reviewing key mining legislation such as the *Mining Act 1978*, the jurisdictional powers under the State Agreements (SAs) which operate above and over the State’s laws (Southalan, 2016; Hillman, 2006). Further, my investigation focus on the functions of the SAs and why it is operating outside the current mining rehabilitation law (*MRF Act*). I also analyse the Federal legislation, primarily the *Environmental Protection and Biodiversity Act 1999*, and inquire its role concerning the environmental compliance of the two minerals (coal and uranium) as discussed in the two case studies in

Chapter Seven. In the case study analysis, I have carried out an in-depth review of the regulatory tools adopted to manage the coal mines in the Collie Region. Furthermore, I investigate 'how' and 'why' by following the phenomenon of the Yeelirrie uranium mine approval under a SA. This approach is essential as three other uranium mines have been approved under the *Mining Act 1978* which suggests a dichotomy in mining regulations and the resource development politics in decision making in mine approval in WA. A case study analysis allows for the details to be revealed in a thick description. According to Mills, Durepos, & Wiebe (2010) thick description is used to describe the process that pays attention to related details of observation, and interpretation of social meanings, that allows the researcher to present the context, and not just the facts and observations. Across all major disciplines of the social sciences, the case study methods are widely used to examine a chosen research focus. The emerging evidence suggests that this is a research strategy in its own right (Jacob, 1987; Hartley, 1994, Denzin & Lincoln, 1994). Stake (1995, p. 3) explains the dependability of case studies when a researcher has a "research question, a puzzlement; a need for general understanding and feel that we may get insights into the question by studying a particular case". This is the reasons behind the two case studies included in the thesis. Nevertheless, "[u]sing case studies for research purposes remains one of the most challenging" (Yin, 2009, p.1). It requires the investigators to discover their own way of presenting and explaining the context as well as the facts and observations about the studied phenomena. These challenges represent both the strengths and limitations of case study research. The following sections provide a brief introduction of the selected case studies and a review of the strengths and limitations of the method.

6.4.1 Design of the case study research

'Case study' is not a homogeneous term. According to Creswell and Poth (2018, p. 98) "case studies are distinguished by the focus of analysis for the bounded case such as whether the case involves studying one individual, several individuals, a group, an entire program, or an activity". In the two case studies of this PhD thesis, I follow the activities involved in the current mining approval process in WA. Creswell and Poth (2018) identify three types of case studies, based on the "intent of case analysis" (ibid). They identify the 'variations' of case studies "in terms of [the] intent: the single **Instrumental case study**, the collective or multiple case study, and the **intrinsic case** study (ibid; the original emphasis). The focus of the single instrumental case study is the researcher focusing on a single issue (the intent). The collective or multiple case study method selects multiple issues mainly to provide "different

perspectives on the issue (p. 99). Based on these classifications, this PhD thesis analyses the features of intrinsic case study elements—that is, environmental compliance of the mining regulatory framework to evaluate its effectiveness. The chosen focus provides opportunities to determine whether environmental protection has been assured during the life cycle of mine operations in the Collie region and the uranium approval process. Map 7.1 & 7.2 shows the location of the sites for the two case studies—one in the vicinity of the mining town of Collie and the other 70 km from the town of Wiluna in Western Australia. The two case studies are very different, as one relates to coal mining in several sites that have been in operation for an extended period, while in the other case, mining operations have not yet commenced. There are, however, some similarities in the contested political environment surrounding the two types of mining. The climate change priorities have cast doubts on the continued use of coal as an energy source (Paddenburg, 2014; EPA WA, 1991, while the radioactive qualities of uranium pose threats to human health (world-nuclear.org, n.d) and are also perceived as undesirable by many (Flannery & Stanley, 2014; Doctors for the environment, 2013).

As both case studies were focused on the effectiveness of the regulatory system, the applicable laws were indexed and reviewed. Further, desktop research was carried out to identify and review the applicability of the sustainability principles for the respective two mining companies. Field observations were carried out only for the coal mine, as the uranium mine is not yet operational. I visited the Collie Region twice and observed the environmental impact due to coal mining. The Yeelirrie site was not visited intentionally as it was not yet operational. The uranium mine approval was granted in January 2017, and operational activities have not yet commenced during this research. Further, it is located over 1200 km (one-way journey) away from Perth. The purpose of the uranium case study was to analyse the current environmental regulations of WA and was not to evaluate the environmental impact assessment (EIA) of the project. A field trip to Yeelirrie would not have generated additional data or insights.

The evaluation was carried out reviewing all important reports including two environmental impact assessments made available by the proponent and the environmental protection agency (Cameco Australia, 2015, EPA 2016).

6.4.2 Strengths and limitations of case study methods

Comparing case studies with other social science research approaches, Yin (2018, p. 5) notes that “each method has its own advantages and disadvantages”. It is difficult to argue which has better “exploratory, descriptive and explanatory” power (Yin, 2018, p.8). The principal characteristic of the case study method is the emphasis on the details which contextualise the observed facts and behaviours. Moreover, the three main research purposes of social science research—exploring, describing and explaining (Yin, 2018), can be achieved within the same settings.

For example, in this study, I explored certain regulatory phenomena such as the unique features of SAs, their merits and demerits and the empirical reasons for their powers as regulatory tools reviewing relevant literature and legislative framework (Table 5.3). Further, in Chapter Seven, I provide detailed evidence about the uranium approval process, including critical issues behind the government decision, the legal issues around the State Agreement drawing from the context of legal doctrines and gaining insights from the politics of resource development. In the second case study I describe and explore the environmental effects of coal mining in the Collie Region, including whether the existing regulation could manage adverse effects (e.g. formation of pit lakes in abandoned mines (McCafferty, 2017; McCullough & Lund (2016).

Nevertheless, case study research has inherent weaknesses. The main criticism relates to the fact that it is based on loosely framed non-generalised theories. These include: (a) biases involved in selecting the cases to be investigated; (b) informal nature and lack of rigour in research design; (c) non-replicability and (d) subjective conclusions (Achen and Snidal, 1989; Geddes, 2003, King, Keohene & Verba, 1994; Lieberman, 1987). Examining the criticisms against case study research, Gerring (2007, p.6) notes that it is “not necessarily against case studies per se”. The criticisms against case study research can apply to any qualitative investigation. The strength of case study research is that the ‘thick description’ (Mills, et al. 2010; Ponterotto, 2006) allowing users, including practitioners, policy makers or researchers to make informed judgements about how relevant previous findings are to a set of circumstances they face. Universal ethics and value system play a significant part in this, but most importantly the collected and presented evidence can inform other users about the applicability of the research findings.

6.5 Interviews

Semi-structured, open-ended method was used as the chosen interview approach to collect data from the research participants. The SAGE Encyclopedia of Qualitative Research Methods (2008), qualitative data collection strategy;

“qualitative data collection strategy in which the researcher asks informants a series of predetermined but open-ended questions. The researcher has more control over the topics of the interview than in unstructured interviews...”
(Given, 2008, p.17).

As a result, the interviewees had more freedom to bring aspects and insights which they find relevant than in structured interviews where usually pre-determined answers may be included in the questionnaire (ibid). They can accommodate cross conversations and digression into other areas, but the existence of a structure within the directional questionnaire allows the researcher to return to the main flow of investigation. A human research ethics approval was obtained from Curtin University before the commencement of the interviews. Appendix B includes a sample of the questionnaire used to gather the qualitative data from the interviewees.

The themes covered during the interviews included the legislative definition of environmental protection; legislative powers and the need to use State Agreements; jurisdictional powers of the *Mining Act 1978*; the *Environmental Protection and Biodiversity Act 1999* and policy formulation to support regulatory functions. During the interview, each participant and the researcher raised supplementary questions and queries. The interviews were conducted as a two-way process. Appendix A provides the Information Sheet sent to the participants.

The qualitative data collected produced a large pool of data which was transcribed and analysed. In this study, the total transcribed data consisted of over 100, 000 words collected from 16 research participants through semi-structured interviews. The interview data contained grammatical and syntactical errors as in any regular conversations. Therefore, all quotations extracted from the interviews required minor editing but ensured the participants' original ideas were kept intact. The following section explains the data collection strategy and approaches adopted in this study.

6.5.1 Selection of the sample

In selecting an appropriate sample size to conduct interviews, I had to overcome two problems. First, there was no defined population, such as an electoral roll or white pages, from which a sample could be selected. People knowledgeable and experienced in environmental compliance related to mining operations are located across different institutions and fields of activities. There is no publicly available list of mining regulators or researchers in Australia, let alone in Western Australia, as the questions required specific familiarity with this State. Second, determining the size of the sample, that is the number of professionals to be interviewed, is a subjective decision. According to Deming (1950), any sample which is not a probability sample is a “judgement sample”. Given that a probability sample was not possible (as the population size was unknown), a judgement sample inherently includes errors. Nevertheless, Deming (1959, p. 11) points out that;

“It is more important to learn something about the biases of a judgment-sample than about its sampling errors. The usefulness of data from judgment-samples is judged by expert knowledge of the subject matter” (Deming, 1959, p.11).

To collect data for this study, I selected a ‘judgement sample’ representing a group of research participants with expert knowledge on WA mining regulations. A summary of the research participants and their positions is presented in Table 8.2. In selecting a ‘judgement sample’, I used not only my knowledge of the literature on mining regulations, but also the networks of contacts that I have developed through my public service career in Perth, Western Australia. My primary goal was to find people who had a corporate memory as well as an understanding and knowledge of the current situation of the WA mining operations and associated issues. Concerning the number of participants to be selected, also considering the required effort in transcribing a large quantity of data, Adler and Adler (1997, p. 10) note:

“In sum, the number of people required to make an adequate sample for a qualitative research project can vary from one to a hundred or more. However, when considering the length of time this type of research often takes, the difficulty of gaining entrée to even the most mundane group or setting, the difficulty in transcribing thousands of hours of interviews, and the “publish or perish” world in which we live, our best bet is to advise in the broad range of between a dozen and 60” (ibid).

A study on social sustainability issues related to mining in Western Australia (Petrova, 2012), used 14 key informants to collect data for her research. Furthermore, Hennink, Kaiser & Marconi (2017) explain that data collection should occur until there is saturation represented as; (a) a stable number of themes (or codes) with new interviews—that is, no new themes are being generated, and (b) no new insights or ideas appear. Consequently, the sample size was determined at 16, which falls within the parameters of Adler and Adler (2007), and is compatible with previous studies conducted on social sustainability using case study methods in Western Australia (Petrova, 2012).

6.5.2 Ethical Considerations

This research was conducted following the policies and guidelines of the Curtin University's Human Research Ethics Committee. The National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research (2007) was followed as a standard in dealing with the human research participants throughout the journey of this research project.

All participants were given the right to withdraw from the interviews or from participating in this research. No such requests were expressed or registered. The data collected through the interviews and analysed for this study were anonymised to maintain the privacy and confidentiality of the participants who openly and freely expressed their views and opinions related to the questions. The data included in the thesis is tagged using only the participant's respective expertise and a number, for example, academic #11 represents the opinion provided by an anonymous academic research participant in this study (see Section 8.3).

The next section presents further details about the data collection throughout the research process (see Figure 6.1). It describes the three data sets were generated following the literature review, legal documentation and interviews.

6.6 Data collection

In any given research, the selection of a sample and data collection is a challenging exercise (Cochran, 2007). Defining and understanding how data relates to the different phases and methods employed in the investigation are important methodological puzzles. Three types of data sets support the analysis of this research project. First, an extensive literature review was carried out during this PhD study. The literature reviewed covered issues such as the genesis, evolution of legislation,

regulations and policies defining the WA MinReF, previous research, gaps and deficiencies identified in the literature which helped to define the scope of the research project. Peer-reviewed literature identifying the concepts of sustainable development, mining sustainability, corporate social responsibility and social licence to operate and related issues were also identified and reviewed. The literature review also covered past and contemporary factors which guided the changes to legislation and two mining reform agendas that fall within the timeline of this research. Vital documents, such as annual reports of government agencies, policy papers, public consultation papers and agency structures were also identified and reviewed. The identified literature was processed and updated using EndNote maintaining a reference list.

The second data set relates to the legislation and regulations analysed for two case studies, and the conceptual framework of the project. The conceptual framework includes all relevant State and Federal legislation, regulations, and policies come under the WA MinReF. (see Table 5.2). Although the relevant legislation and regulations represent published documents which sit outside of the mainstream literature, they are considered a source of primary data (Library, University of New South Wales, n.d., Coen, 2018). This is a standard approach in legal studies where primary sources are defined including court decisions under case law and Acts of Parliament for legislative inquiries (ibid). The identification and review of the legislative documents helped to define not only the scope of this study but also the legal framework examined in this PhD project including the two case studies.²³ The third set of primary data for this research project was gathered using semi-structured interviews from a selected group of informants. They represent regulators, administrators, lawyers, independent researchers, academics, and former bureaucrats who have worked in the agencies responsible for implementing environmental legislation under the WA MinReF. All interviews were conducted face to face. Each interview lasted approximately sixty minutes. The location was selected to be convenient for the interviewee, and thirteen of the sixteen interviews were conducted at the interviewee's workplace, and other three in secured public spaces. According to Nueman (2014, p. 347), "[f]ace-to-face interviews have the highest response rates and permit the longest and interactive" opportunities to collect

²³ There is a similarity between the case study and legal research concerning the applicability of the findings. As the legal profession builds its cases on precedents, the users of case study research decide the usefulness of its outcomes in comparison to the particular circumstances they face.

data. In order to achieve data saturation with the interview material, the collected information had to be coded as soon as I got the transcripts typed. The coding of data was done manually after unsatisfactory attempts to use the Nvivo software. Next section provides further clarification.

6.6.1 Data coding

The qualitative data collected for this research project were analysed following a structured approach to ensure quality and available richness to address the research question and objectives adequately. I started coding the data in three phases: preliminary—after the first four interviews were completed, mid-way, and after the tenth interview was completed, and final— and at the end of all interviews. The coding of data was based according to the framework proposed by Neuman (2014, see Table 6.3). It starts with open coding which assigns tentative labels to condense the information into preliminary categories followed by axial coding which links the open categories to create connections and analytical meaning. Finally, selective coding allows the core variables or themes to be identified to support concept development. Using a manual process, seven themes were produced as a result of the selective coding exercise.

TABLE 6.3 DATA CODING CATEGORIES

CODING CATEGORY	TASKS
Open	“The first coding of qualitative data that examines the data to condense them into preliminary analytic category or code” (Nueman, 2014, p.481)
Axial	“A second stage of coding during which the researcher organizes the codes links them, and discover key analytical categories” (ibid, p.482)
Selective	“The last stage in coding qualitative data that examines previous codes to identify and select data that will support the conceptual coding categories that were developed” (ibid, p.484).

(Source: Nueman, 2014, pp 481- 484)

6.6.2 Limitation of computer software in analysing qualitative data

There is ample literature highlighting the importance of using qualitative software for analysing qualitative data (e.g. Bazeley & Jackson, 2013; Miles et al. (1994). However, in analysing the large quantity of qualitative data gathered for this research, I found using computer software limiting and restrictive to extract some of the ‘value-laden’ information with a significant portion of subjective elements. For example, the software could not independently capture participants’ personal, professional, philosophical and linguistic expressions behind certain verbally articulated views and perceptions properly. My pilot experience in using Nvivo demonstrated the need to go back often to search texts and put different keywords. I realised that it was critical for me to go through every transcribed sentence and reflect on conversations also by simultaneously listening to the taped voices repeatedly – any computer software is unable to capture verbally expressed, and reflections as a human could do. In some instances, listening to some parts of the conversations with the research participants’ voices brought back memories of the interviewee’s body language and non-verbal gestures during the interviews. An example is an incident during my interview with a senior regulator. During my interview seeking clarifications about State Agreements and follow-up questions, I asked: “Why aren’t the SAs coming under the newly introduced mining regulatory legislation; the *MRF Act 2012*?” The interviewee jumped up from the chair and showed me the sign of victory using his hands. After the non-verbal gesture, the regulator replied that he too had asked the same question from a stakeholder in another agency highlighting the importance of asking questions on mining rehabilitation of projects come under the State Agreements. A software analysis cannot capture these kinds of interactions during data gathering through reflections and extract particular chunks of qualitative data as an output. As this study does not use quantitative methods, analysis and reflection of data extraction by manual coding appeared productive and useful. Further, coding of qualitative data by assigning numerical values would not have provided any meaningful insights.

Reflection during manual data coding also revealed a key feature of qualitative research. For example, in disciplines, such as physics or chemistry, a researcher’s findings could be validated in a laboratory anywhere in the world and could obtain the same results. However, qualitative research enquiries involve people’s opinions and attitudes which would vary in interpretation depending on the knowledge, values and the professional training of the researcher, hence, interpreting the data beyond its numeric representation is vital in qualitative research.

The collected and coded data were analysed using content analysis. This is a quantitative process which allows qualitative data to be used dependent on the intent of the research (Denzin & Lincoln, 2018; Maier & Allen (2017). The following section provides further explanation of content analysis.

6.7 Content Analysis

Concerning the content analysis, Maier and Allen (2017, p. 243) state:

“Scholars use content analysis to describe or explain communication; however, content analysis cannot be used to predict cause-and-effect relationships. While used as an approach to discover communication, content analysis can be used in conjunction with other methods and is useful as a starting point for understanding the effects of particular messages through other research methodologies” (ibid).

Maier and Allen (2017) further explain that content analysis can be applied “in a wide variety of contexts”. However, it is important to maintain objectivity, systematic approach and generality (ibid) when using content analysis. The merits and demerits of the content analysis are presented in Table 6.4.

In this study, while all precautions were taken to maintain objectivity in analysing the qualitative data from 16 transcribed interviews (representing over 100,000 words), it is important to emphasise that the data contains opinions, and the views of the research participants are subjective. However, the participants’ responses on most issues have been validated using the literature review undertaken for this study. One example is the object and the legislative limitations of the *Mining Act 1978* as a regulatory tool to assure environmental protection. The data were collated supporting the objectives of the research under a thematic framework. These findings are presented with supporting data in the two case studies, and also in Chapters Eight.

TABLE 6.4 MERITS AND DEMERITS OF CONTENT ANALYSIS AS A RESEARCH METHOD

Strengths	Limitations	Comments
A flexible method used by scholars and practitioners.	Subject to the design of questions, the research participants may not provide the required data as they might provide subjective responses..	Validation of questioners could address the limitation.
Can be used to examine the manifest or latent content of the communication, depending on the research question. <i>Manifest content</i> is the specific characteristics of meanings.	Subject to the content and the focus of research questions.	<i>Manifest content</i> is the specific characteristics of the message itself, or what the interviewees say.
Describes communication phenomenon	Content analysis is a complex, time-consuming, and meticulous process.	Data gathered from research participants (n= 16) was analysed under seven thematic frameworks.
Provides a systematic, quantitative examination of communicative messages.	“Content analysis also faces challenges of generalizability; that is, sampling can be difficult for a variety of reasons” (Maier & Allen, 2017).	It is not always easy to obtain precise quantitative data if unstructured interview techniques are used.
Content analysis can be broadly used in a variety of different contexts.	Non-availability of random sampling universe would provide biased data..	This feature can be applied to any discipline.

Strengths	Limitations	Comments
Provides a systematic approach to solicit data.	The absence of a systematic approach could lead to the generation of data that supports the research question or hypothesis.	Moreover, thereby influence the results, which may affect the objectivity.
Without a systematic approach, researchers could elect to include only the data that supports the research question or hypothesis, thereby influencing the results, which in turn affects the objectivity.	Sampling can be difficult for a variety of reasons, i.e. unavailability of public sampling universe.	As there was no sample universe such as phone book listings or electoral voters' lists for mining regulatory experts for this study, a selective judgement sample was chosen.

Adopted from: Maier, M. A.; Allen, M. (ed). (2017). *The sage encyclopedia of communication research methods* (Vols. 1-4).

6.8 Limitation of the research

The two case studies chosen for this research are not random samples. Western Australia has over 1000 active mine sites, but there is no publicly available list as in telephone white Pages or electoral voters' list of these locations. It is not feasible to take a representative sample of these sites randomly to evaluate how environmental compliance takes place at mine sites. Thus, the judgement sample method was applied to produce some meaningful insights and minimise errors. Their applicability, however, also depends on judgement based on similarity and appropriateness.

Under the principles of sustainable developments (SD), the impact of mining could be investigated using the three triple bottom lines of SD—environmental, economic and social. However, this research study focussed only on the environmental sphere of the SD principles. It was a deliberate decision given the complexity of the mining regulatory framework and the existing research gaps identified through the literature review. Although all three aspects of sustainability need to be integrated into any business operations, research can selectively aim at providing an in-depth analysis by addressing only a particular aspect of SD, which is an investigation into the environmental compliance as chosen for this research. In a previous study on the sustainability aspects of mining in Western Australia, Petrova (2012) has conducted research focusing on one aspect of sustainability principle, i.e. social sustainability.

This study focuses on the environmental regulatory compliance of two types of minerals, namely the uranium and coal, also considering other relevant legislation that governs the mining tenement, access to land and, and mining rehabilitation. Of the total of 64 State Agreements (SAs) operating in WA at present, this study examined only three SAs. The SAs also manage large iron ore projects in Western Australia's Pilbara region, diamond and other mineral extraction projects, and gas and petroleum across the State and offshores. The study does not cover mining laws which regulate petroleum and gas industry or other minerals. Therefore, the findings of this research cannot be universally applied to the overall effectiveness of the WA MinReF that consists of over 100 legislation including the 64 SAs. However, the methodology adopted and the findings of this research, and in particular, the issues identified about the gaps and deficiencies of the MinReF would be useful to examine other mining regulations in Australia and elsewhere.

6.9. Summary of the chapter

This chapter provided a detailed description of the research methodology adopted for this research project and methods employed for data analysis based on qualitative approaches including case study methods. The data collected for this study gathered from three sources. The first set of data included a literature review, and the second source was based on analysis of legislation and regulations that govern the mining operations in WA as a primary set of data. The third set of data was collected using semi-structured interviews from a group of well-informed research participants. Content analysis was used to gain insights from the coded information. The research methods used in this research project have limitations, but the findings would be useful to examine other mining regulations in Australia and elsewhere. The research was conducted following the Australian academic ethical standards and following the guidelines for involving human research participants as stipulated by Curtin University.

CHAPTER SEVEN TWO CASE STUDIES

7.1 Introduction

This chapter includes two case studies analysing the application of the relevant regulations listed under the Mining Regulatory Framework (MinReF) of Western Australia (WA): the first is the approval of the Yeelirrie uranium project, and the second, the operation of coal mines in the Collie Region of South-West Australia. The analysis of the first case study is limited to the approval of the Yeelirrie uranium mine by the then Environmental Minister, Albert Jacobs on 12th January 2017 (Shepherd & Tomlin, 2017) with the operational phase of the mine yet to commence (Cameco Australia, 2015). The second case study covers the life cycle operation of the coal mines in Collie excluding the exploratory phase which was carried out in the early 1880s. A standard operational definition of the life cycle of mining covers exploration, operation, and mine closure (Hartman, and Mutmansk, 2002) typically. However, under the influence of the sustainability principles, the mining industry has added a new dimension or stage to the original definition called “reclamation” which is linked to the mine closure work. Hartman and Mutmansk, (2002) define:

“The overall sequence of activities in modern mining is often compared with the five stages in the life of mine: prospecting, exploration, development, exploitation, and reclamation. Prospecting and exploration, precursors to actual mining, are linked and sometimes combined. Geologists and mining engineers often share responsibility for these two stages—geologists more involved with the former, mining engineers more with the latter. Likewise, development and exploitation are closely related stages; they are usually considered to constitute mining proper and are the main province of the mining engineer... Closure and reclamation of the mine site has become a necessary part of the mine life cycle because of the demands of society for a cleaner environment and stricter laws regulating the abandonment of a mine” (Hartman, and Mutmansk, 2002, p.6).

Both case studies can be accommodated within the description espoused by Yin (2014). According to him, a case study is “an empirical inquiry that investigates a contemporary phenomenon (the ‘case’) in depth and within its real-world context” (Yin, 2014, p. 16). The contemporary phenomenon on which I focus the first case study for this research is the approval process of the Yeelirrie uranium mine with particular attention to the environmental regulations under the MinReF (see Table 5.2). In this case study, I investigate how the environmental protection conditions were considered during the approval process and whether the current legislation on closure and reclamation plans applies to the Yeelirrie mine.

Further, to the theoretical approaches espoused by Yin (2014 & 2018), I also draw from the work of Creswell and Poth (2018) and Stake (1995 & 2006) to investigate and analyse this case study. Concerning the ‘intention’ of the case study, Schramm, (1971) provides a useful insight:

“The essence of a case study, the central tendency among all types of the case study, is that it tries to illuminate a *decision* or *set of decisions*: why they were taken, how they were implemented, and with what results” (Yin, 2018, p.14, emphasis added).

The analysis of the uranium mine approval is an explorative case study to gain insights into a set of circumstances. Three of the four uranium mines had already been approved under the Western Australian *Mining Act 1978* while the fourth approval for the Yeelirrie project was granted under a State Agreement ratified in 1978 for a different company (Western Mining Corporation). A second reason for selecting a uranium mine as a case study for this research project is the widely available literature on the potential harmful effects on the environment and people involved in the rehabilitation of the mining sites. For example, Mudd and Patterson (2010, p. 1) provide an analysis of “an internationally important case study on environmental pollution from and rehabilitation of ... the Rum Jungle mining project” which is a uranium mine located 100 kilometres south of Darwin. They review the Rum Jungle case “followed by a critical evaluation of monitoring data and pollution loads prior to and after rehabilitation – leading to the conclusion that rehabilitation has clearly failed the test of time after just two decades” (ibid). Based on the evidence and work of Mudd and Patterson (2010), it is important to consider whether during the approval process, the mine closure plans of the Yeelirrie project have been considered and how they are going to be implemented.

This uranium case study also reviews the legal ownership issues surrounding the Yeelirrie project, the environmental impact assessment (EIA) submitted by the current tenement holder – Cameco, and the previous EIAs submitted by the former owners – Western Mining Corporation (WMC) and Broken Hill Proprietary (BHPB). The time span of the approval process covers a period from 1978 to 2018.

The second case study is an examination of the legislation focusing on the environmental regulations of two State Agreements (SAs) that is used to manage the coal mining in Collie Region in South-West Australia.

7.2 The Yeelirrie case study

The objective of this case study is to gain insights into the implementation of regulations on the environmental compliance of the Yeelirrie project. Foremost, it is essential to identify the nature of the mineral uranium. According to the World Nuclear Association (n.d.), “[u]ranium is a naturally occurring element with an average concentration of 2.8 parts per million in the Earth's crust [and is] used almost entirely for [generating] electricity, a small proportion is used for the important task of producing medical isotopes”. Uranium has been mined in Australia since the middle of the 20th century (Lanzen, 2008). During the 1930s, uranium was mined at Radium Hill and Mount Painter in South Australia to extract radium, solely for medical purposes, and as a result “a few hundred kilograms of uranium were produced (World Nuclear Org. 2017). The “Yeelirrie deposit is the largest known uranium deposit in WA” (Cameco Australia, 2015, p. xxi). According to the World Nuclear Association, 29% of the known world uranium deposits are located in Australia (World Nuclear Association. 2016). Moreover, Australia is considered the third largest uranium ore producer in the world (Cameco Australia, 2015). In 2014 -15, the country exported 5,515 tonnes of uranium oxide concentrate (valued at \$532 million) with South Australia producing more than 70% of this commodity (DMP, n.d. para thirteen). In February 2014, it was estimated that 226,000 tonnes of uranium deposits are on the territory of Western Australia (DMP, n.d. para thirteen).

7.2.1 Yeelirrie uranium deposit

An Australian Parliament document (2009) describes the Yeelirrie uranium deposit as follows:

“The Yeelirrie uranium deposit is [located] between Wiluna and Leinster... about 500 kms north of Kalgoorlie and close to the Goldfields gas pipeline (See Map 7.1). Access by road to the proposed mine site is about 1040 kms from Perth. Land use in the region is rangeland pastoralism, with homesteads around 30 km apart” (Australian Parliament, 27 November 2009, para eight).

Yeelirrie's location is in a sparsely populated area with the nearest settlements being Sandstone (population 89) and Wiluna (population 720) (ABS, 2016). This is considered one of Australia's largest undeveloped uranium deposits (Cameco Australia, 2015). It “contains about 52,000 tonnes of uranium oxide (U_3O_8) and would sustain an annual production of 5000 tonnes U_3O_8 (yellow cake) for at least 10 years” (Needham, 2009. para three). The deposit extends over 9 km, is up to 1.5 km wide, up to 7 m thick and has an

average depth of about 7m of overburden (DMP).²⁴ Maps 7.1 and 7.2 provide the location of the Yeelirrie site and the uranium deposits respectively.

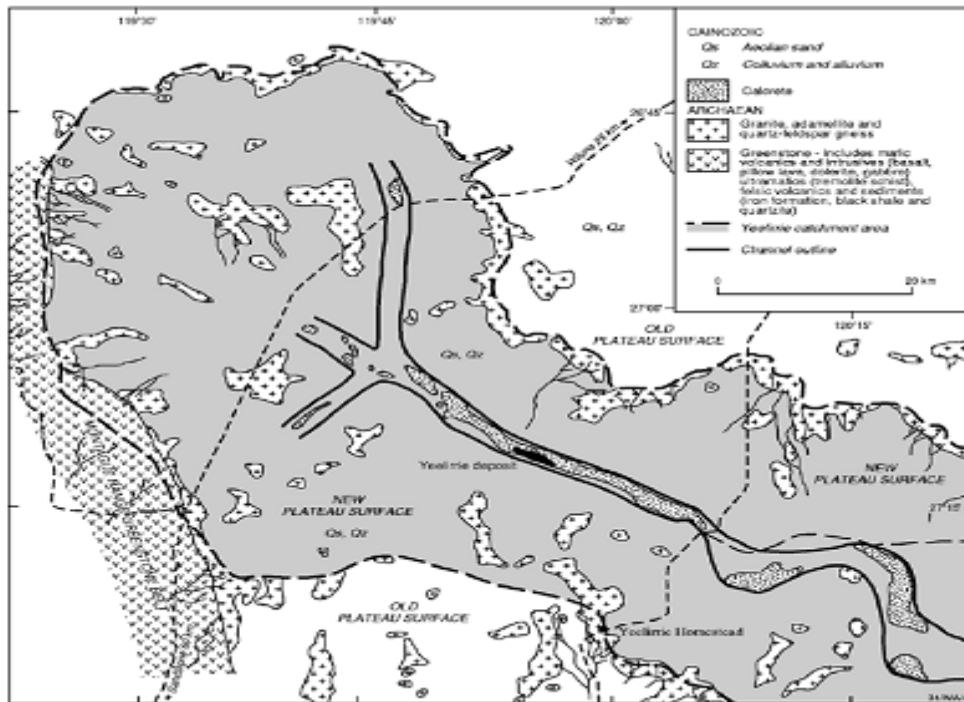
MAP 7.1 LOCATION OF THE YEELIRRIE URANIUM MINE



(Source: Google. 2018. Map data)

²⁴ The Department of Mines and Petroleum (DMP) has published a " *Guide to Uranium in Western Australia*" that explains the types of uranium deposits in WA, mining and production methods detail. Geoscience Australia and the Commonwealth Department of Industry and Science also have published useful information about uranium and radioactive waste management on their websites". Sources: <http://www.dmp.wa.gov.au/Uranium-1459.asp> & <https://industry.gov.au/resource/Mining/AustralianMineralCommodities/Uranium/Pages/default.aspx>

MAP 7.2 - DESCRIPTION OF YEELIRRIE URANIUM DEPOSITS



(Source: McKay & Miezitis: Geoscience Australia, 2001, Mineral Resource Report 1)

When the Cameco's Yeelirrie project commences, the plan is to "involve a 9 km open-pit mine, clearing 2421 ha of native vegetation and generating 36 million tonnes of potentially radioactive mine waste to be stored in open pits" (Cameco, 2015; Mckinnon, 8 February 2018, para seventeen). The then Environment Minister, Albert Jacob granted the environmental approval of the mine against the recommendation of the Environmental Protection Agency of WA. This approval was met with strong opposition by environmental groups, including the Conservation Council of Western Australia, which were concerned about radioactive contamination and the extinction risk of subterranean stygofauna species endemic to the area (McKinnon, 2018). Although the current Yeelirrie uranium project received approval in January 2017 as a new mine site, it has over 40-year history going back to 1972 when the deposit was discovered by the Western Mining Corporation (Needham, 2009), which secured a licence for exploration. The mining tenement for the Yeelirrie project was granted under the old *Mining Act 1904* (Hunt, Kavenagh & Hunt, 2015, p.10).

The following sections identify the history, ownership changes, amendments to the legislation and past environmental approval of the Yeelirrie mine, and analyse the legal issues

surrounding the project and the environmental regulations embodied in the mining regulatory framework.

7.2.2 History, ownership changes, amendments to the legislation and past environmental approval 1978 – 2016

Yeelirrie is a pastoral station on Western Australian crown land where deposits were discovered by Western Mining Corporation (WMC) in 1972 (Needham, 2009). The history of the Yeelirrie project and key events on its timelines between 1972 and 2016 are listed in Table 7.1.

TABLE 7 1 TIMELINE OF THE YEELIRRIE URANIUM MINE, 1972 – 2017

1972	Western Mining Corporation (WMC) discovered the Yeelirrie uranium deposits in Western Australia. Subsequently, WMC submitted a proposal for approval to mine with Environmental Impact Statement (EIS) and subsequently an Environmental Review and Management Programme (ERMP) (Needham, 2009).
1972-1980	WMC carried out several exploration activities and three trial uranium exploration programs at Yeelirrie (ibid)
1978 (Dec)	The WA Liberal government under the leadership of Charles Court ratified the <i>Uranium (Yeelirrie) Agreement Act 1978</i> “to facilitate the construction of a uranium and vanadium treatment plant at Yeelirrie with a capacity of 1.21 million tonnes a year to produce uranium oxide.” (WA Parliament, Hansard, 1978, para 2).
1978	Urangesellschaft Australia Pty Ltd made a \$3 million offer to WMC and bought 10 per cent of the project.
1978	Esso was granted 15 per cent equity of the deposit for a commitment to 80 per cent of funds (at \$21 million) for the proposed a feasibility study (Stage I), and a pilot plant (Needham, 2009).
1978	WMC and its partners (including Esso) invested a total of \$35 million for preparatory work including building and operating a pilot metallurgical plant to produce uranium ore as yellow cake ²⁵ (ibid).

²⁵ “Yellowcake is milled uranium oxide, known to chemists as U₃O₈. When uranium ore comes out of the mine, it actually contains fairly little of the precious radioactive element” (Koerner, 2003, para two).

1979	Both the Federal and Western Australian governments received the EIS and ERMP and approved the Yeelirrie project under the ownership of WMC (ibid).
1980 - 1982	WMC carried out “trial mining and operated a pilot processing plant in Kalgoorlie” (Cameco Australia, 2015. p.xix).
1982	The WA Parliament introduced legislation to amend the Uranium (Yeelirrie) Agreement Act 1978. It was proclaimed as law on 27 May 1982.
1982	The <i>Uranium (Yeelirrie) Agreement 1978</i> was amended as the <i>(Yeelirrie) Agreement Amendment Act 1982</i> . Three major amendments were included: (a) adding ESSO exploration and production Australia Inc. and; (b) Urangesellschaft Australia Pty. Limited as partners of the Yeelirrie Development Company Pty. Ltd (c) Substituting the <i>Mining Act 1904</i> with <i>Mining Act 1978</i> , as per the Sections 5 and Clause 21 (a ii)
1982 (May)	Esso withdrew from the partnership due to commercial reasons, and its share of ownership reverted to WMC.
1983	Further development of the project was denied by the Australian Labor Party's (ALP) ‘three mines policy’, and the WA Labor government from 1983 to 1993 and 2001 to 2008 (www.aph.gov.au, Australian Academy of Science, 2009) ²⁶
1984	Due to the “implementation of the Australian Government’s ‘three mines policy’ in 1983, the Yeelirrie project was placed on ‘monitored care and maintenance’ in 1984” (Cameco Australia, 2015, p. xix)
1993	WMC reacquired Urangesellschaft Australia Pty Ltd 10% shareholding.
1993	WMC ceased its exploration work.
2004 (March)	The Gallop Labor Government issued a media release stating that the Government and WMC Resources Ltd had reached an agreement to terminate the <i>Uranium (Yeelirrie) Agreement Act 1978</i> (Source: Government of Western Australia: Media Release, March 2004).

²⁶ In 1984 the Federal Labor Government introduced ‘three mines policy’ where uranium production was limited to the three sites already being mined: Ranger, Nabarlek and Olympic Dam. This policy was abandoned during the Coalition Government (1996 to 2007). The subsequent Labor Government has softened its approach. See Australian Academy of Science, *Academy of science, Comment -- Uranium Mining, Processing and Nuclear Energy Review draft report* Retrieved from: <https://www.science.org>

2004 (March)	Minister Brown announced in the Parliament “the intention of the State and WMC Resources Ltd to end the only State Agreement in Western Australia for the mining of uranium.” ²⁷ (Parliament of Western Australia: Hansard, 2004),
2005	WMC ownership was passed onto BHP Billiton Ltd due to company takeover (Cameco, 2015).
2009	WA Liberal-National coalition government lifted the embargo on uranium mining in Western Australia
2009 (May)	BHP Billiton submitted to the then Federal Minister for the Environment for a determination of Yeelirrie mining under the <i>Environment Protection Biodiversity and Conservation Act (EPBC Act)</i> on 22 May 2009 (Needham, 2009, p.1).
2009 (June)	The (Federal) Department of Environment determined the Yeelirrie mine proposal be considered as a project of ‘national environmental significance’ on 19 June 2009 under the <i>EPBC Act</i> (ibid).
2012 (Dec)	Cameco, a company based in Saskatoon, Canada acquired the Yeelirrie mine from BHP Billiton for US\$ 430 million (Cameco, 2012).
2016 (Jan)	The Yeelirrie uranium mine was approved by Albert Jacobs (former) Minister of Environment (Shepherd & Tomlin, 2017).
2017 (June)	The McGowan Labor Government announced its policy on uranium mining cancelling the approval of new mines (Government of WA: Media Statements, 2017).

(Sources: Government of Australia: Media Statements, 2004 & 2017; Australian Academy of Science, 2009; Needham, 2009; WA Parliament: Hansard, 1978, 2004; Cameco Australia, 2015; Shepherd & Tomlin, 2017, www.aph.gov.au).

Having carried out extensive uranium exploration with the assistance of two foreign companies, namely Urangesellschaft Australia Pty Ltd and Esso Ltd, WMC sold the ownership of all its Australian projects, including that of Yeelirrie, to BHP Billiton (BHPB) in 2005. In December 2012, the Canadian company Cameco acquired 100% ownership of the Yeelirrie project from BHPB (Cameco Australia, 2015, p. xix).

²⁷ Despite the Government Media Release (31 March 2004) and the Minister Brown’s statement in the Parliament, the *Uranium (Yeelirrie) Agreement Act 1978* was never revoked. It is still listed as an active agreement as reported to the Parliament as stated in the annual report in 2017-2018 published by the Department of Jobs, Tourism, Science and Innovation.

Before Cameco's takeover of the Yeelirrie ownership, several important milestones about the project had taken place under its previous owners, including testing the quality of the uranium ore in a laboratory in Kalgoorlie (Needham, 2009). The most important milestone, however, is the project receiving approval under its first owner – WMC, under a State Agreement titled *Uranium (Yeelirrie) Agreement Act 1978* (hereafter referred to as the *Yeelirrie Act*). The genesis and issues relating to SAs were listed and discussed in Chapter Five (Section 5.5). However, it is essential to examine the regulatory clauses embodied in the *Yeelirrie Act* including its environmental management and protection conditions.

7.2.3 The Uranium (Yeelirrie) Agreement Act

This section provides a review of the *Uranium (Yeelirrie) Agreement Act* (hereafter *Yeelirrie Act*), its objectives, special conditions granted to the proponent and environmental regulations embodied in it.

The *Yeelirrie Act* is a State Agreement (SA) and was ratified in the Parliament in 1979:

“to facilitate the construction of a uranium and vanadium treatment plant at Yeelirrie with a capacity of 1.21 million tonnes a year to produce uranium oxide” (WA Parliament, Hansard, 1978, para 2).

The most noteworthy issue about the approval of the *Yeelirrie Act* is that it received both the exploration licence and the mining tenement under the *Mining Act 1904* which is now obsolete (Hunt et al. 2015, p. 10). Moreover, in the last amendment to the *Yeelirrie Act* in 1982, the current *Mining Act 1978* was substituted, but still it poses questions about the validity of the Agreement (ibid).

It is important to identify some of the special conditions granted to the WMC under the *Yeelirrie Act*. A summary of these issues is listed in Table 7.2. It highlights special conditions granted under the *Yeelirrie Act* and offered to the proponent. These clauses confirm a special feature of State Agreements (SAs) as during the contract negotiation process any conditions agreed by two parties could include in the contract. (Hillman, 2006; Southalan, 2016). Similar features can be observed in the other 64 SAs which are currently valid in WA (see Table 5.3).

TABLE 7.2 A SAMPLE OF SPECIAL CONDITIONS UNDER THE YEELIRRIE ACT

SPECIAL CONDITIONS GRANTED & RATIFIED UNDER THE ACT	REFERENCES
<p>“The Corporation [WMC] intends to establish a metallurgical research plant at Kalgoorlie at a cost in excess of \$7 million and under a programme estimated to cost approximately \$6 million to test such ore.”</p>	<p>Schedule (b) of the Agreement.</p>
<p>“The Corporation is currently investigating the economic feasibility of constructing a uranium and vanadium treatment plant at Yeelirrie with a capacity to treat 1.21 million tonnes of ore per year to produce uranium oxide (yellow-cake) and vanadium oxide (red-cake) for export through a port or ports in Western Australia.”</p>	<p>Schedule (c)</p>
<p>“The Corporation has in respect of both the proposed metallurgical research plant and the uranium-vanadium treatment plant submitted environmental review and management programmes to the State for consideration.”</p>	<p>Schedule (e)</p>
<p>“The provisions of the Mining Act shall be deemed to be modified to permit the creation of the temporary reserve under subclause (1) of this Clause.”</p>	<p>Section 5 (3)</p>
<p>“The Corporation may with the prior approval of the research State (sic) construct a metallurgical research plant at Kalgoorlie plant to test ore and to have such plant in operation by 30th June 1982.”</p>	<p>Section 7(1)</p>
<p>“For the purposes of the construction and operation of the metallurgical research plant referred ... (a) special lease under the Land Act [1933] of land at a site to be agreed for the said plant; (b) a pipeline easement for water over a route to be agreed from Addis Street Kalgoorlie to the said plant; (c) “a powerline easement over a route to be agreed to connect with the Corporation's existing Great Boulder-Scotia powerline and the said plant.”</p>	<p>Section 7 (2)</p>
<p>“a special lease under the Land Act of land at a site to be agreed for the said plant...”</p>	<p>Section 2 (a)</p>

(Source: *Uranium (Yeelirrie Act)*, emphasis added).

Under section 8 (n) of the *Yeelirrie Act*, the proponent is also required to submit “an environmental management programme” as a measure in respect of its commitment under the Agreement (Act). However, the Agreement does not specify the scope or any conditions of this environment management plan. The *Yeelirrie Act* also addresses matters about the provisions of water supply and the proponent’s obligations for securing water resources (Yeelirrie Act, Section 5 -16). Supplying water, including marketing of the water back to the State, is subject to the proponent’s finding adequate underground or nearby water resources (Yeelirrie Act: Section 5 – 16).

The SAs do not come under the jurisdiction of the *Mining Act* (except for granting the mining tenements) or any other legislation unless they are explicitly included in the Agreement (Southland, 2016; Hillman, 2006). There are two critical aspects of the ratification of the *Yeelirrie Act* (as well as any other State Agreement). First, once a SA is ratified, the compliance is only limited to the conditions included in the Agreement (similar to any other commercial contract). Table 7.2 lists the conditions and exemptions granted under the *Yeelirrie Act* for the proponent (WMC), under the *Mining Act 1904* and the *Land Act 1936*. Secondly, unless there are specific clauses in a SA and once they are ratified in the Parliament, a proponent is not legally bound to carry out any other tasks, including environmental protection plans, unless they are included as conditions in the SA.

As the focus of this research project is about environmental regulations in WA, it is essential to examine the mine closure and other environmental (protection) clauses in the *Yeelirrie Act*. Concerning the natural environment, an important clause is included in Section eight of the *Yeelirrie Act* as follows:

“Corporation [WMC] to submit Proposals

8. (1) On or before the 31st December, 1982 (or thereafter within such extended time as the Minister may allow as hereinafter provided) and subject to the provisions of this Agreement the Corporation shall submit to the Minister (having due regard where applicable to the environmental review and management programmes previously submitted by the Corporation and the State’s responses thereto) to the fullest extent reasonably practicable its detailed proposals (which proposals shall include plans where practicable and specifications where reasonably required by the Minister) for a mining and treatment project with a capacity to treat 1.21 million tonnes of ore per year or such other tonnage as the Minister may approve and the transport and shipment through a port or ports within the said State...” (*Yeelirrie Act 1978*, pp 11-12).

Concerning environmental protection, the company's obligation under the *Yeelirrie Act* is limited to submitting a proposal "to the fullest extent reasonably practicable...". This clause does not bind the proponent to implement an environmental management plan nor submit a financial bond or penalty for failure to fulfil their environmental management plan. Further, defaulting the above clauses does not impose any penalties as any such penalty clauses are not incorporated in the *Yeelirrie Act*. It is important to recognise that the original leaseholder of the Yeelirrie project, WMC did follow the above clauses of the *Yeelirrie Act*, and submitted an EIA which was approved by both the WA and Federal governments (See Table 7.2).

The conditions relating to environmental management are stipulated in the First Schedule of the *Yeelirrie Act* and stated in section (d) and (e) as follows:

- (d) The Corporation intends to provide facilities and services necessary for the accommodation, health, safety and welfare of its workforce and to take adequate measures to safeguard the public and the environment in its operation under this Agreement.
- (e) The Corporation has in respect of both the proposed metallurgical research plant and the uranium-vanadium treatment plant submitted environmental review and management programmes to the State for consideration (*Yeelirrie Act 1978*: Schedule (D) & (E)).

There are a few other references to environmental conditions in Section 41 of the *Yeelirrie Act*, but they do not provide any assurance of environmental protection, such as preserving biodiversity or prevention of polluting underground water resources with the radioactive waste material (tailings). It is important to note that issues such as biodiversity and protection of the underground water have been identified in the 2015 Environmental Impact Study (EIS) proposal submitted by the current proponent Cameco for public environmental review (PER) (Cameco, Australia, 2015). However, as these new environmental conditions included in the EIS have not been incorporated and ratified in the *Yeelirrie Act*, hence, the new proponent is not legally bound to address any of the issues that are not in the Act.

Section 41 of the *Yeelirrie Act* includes an environmental clause which is the only reference concerning the protection of the environment:

"Nothing in this Agreement shall be construed to exempt the Corporation from compliance with any requirement in connection with the protection of the environment arising out of or

incidental to the operations of the Corporation hereunder that may be made by the State or any State agency or instrumentality or any local or other authority or statutory body of the State pursuant to any Act for the time being in force" (*Yeelirrie Act 1978*, p.56).

However, whether the new proponent Cameco is bound to carry out these environmental management tasks is questionable as the new ownership of the project has not been added and ratified in the Parliament yet. Thus, a question arises whether the new proponent, Cameco is legally liable and bound to carry out the tasks enlisted in Section 41 of the *Yeelirrie Act*. In a legal context, as the *Yeelirrie Act* still carrying the name of the first proponent (WMC), raises the validity of the approval process (*Yeelirrie Act*, 1978, p.1). To further review the validity of the Yeelirrie mine approval under the new proponent (Cameco), the next section identifies the amendments made to the *Yeelirrie Act* since its enactment in 1978.

7.2.4 Amendments to the Yeelirrie Act

The only amendments appear in the original Agreement are the changes made in 1982 to include adding the names of two foreign companies that became partners of the WMC. These amendments made to the changes were incorporated into the *Yeelirrie Act* in 1982 which appear to be the only changes ratified and incorporated into the *Act* since 1978 (see Table 7.3).

TABLE 7.3 AMENDMENTS TO THE YEELIRRIE STATE AGREEMENT ACT 1978*Uranium (Yeelirrie) Agreement Act 1978*

Portfolio: Minister for State Development, Jobs and Trade

The Legislation (Act)	The Year and the Act no	Date of Ratification	Date receiving the approval of the Governor
<i>Uranium (Yeelirrie) Agreement Act 1978</i>	1978/110	12 Dec 1978	12 Dec 1978
<i>Uranium (Yeelirrie) Agreement Amendment Act 1982</i> (This is the amendment that relates to the WMC's partnership with two other companies).	1982/040	27 May 1982	27 May 1982

(Source: www.legislation.wa.gov.au)

The information in Table 7.3 shows only three amendments to the *Yeelirrie Act* with no references to any amendments made after 1982. Under the WMC ownership, there was trial mining at Yeelirrie until 1983 when the Australian Labor Government implemented its three mines policy. As a result, the WMC had to stop the mining and place the project under maintenance and care:

“Trial mining commenced, and ore was extracted from three excavation pits. Between 1980 and 1982, ore was sent to the Kalgoorlie Research Plant (pilot metallurgical plant) for processing test work. The Project was placed on monitored care and maintenance in 1984 after the newly elected Australian Labor Government implemented its three mines policy in 1983 and the Western Australian Government assumed an anti-uranium position in the same year. Monitored care and maintenance allowed for WMC to undertake, inspect and maintain rehabilitation of already disturbed areas” (Cameco, 2015, p.7).

Before the ownership of the Yeelirrie project being transferred from WMC to BHPB, there were legal issues, including a government decision to revoke the *Yeelirrie Act* due to WMC terminating the mining project. The next section outlines and provides a discussion of these legal issues.

7.2.5 Legal issues about the ownership of the Yeelirrie Project

When WMC ceased exploratory activities at Yeelirrie, the company consented to terminate the *Yeelirrie Act* (Government of Western Australia: Media Statement. 31 March 2004. Para 1- 4). The then Minister for Mines of the State Labor Government issued a media statement on 24 March 2004 that the *Yeelirrie Act* would be revoked:

“The Gallop Government and WMC Resources have reached an agreement to terminate the Uranium (Yeelirrie) Agreement Act 1978, which is the only State Agreement in Western Australia related to the mining of uranium.

The termination of the agreement will also see the rehabilitation of the Yeelirrie uranium project, located south of Wiluna, completed this year.

The rehabilitation will go ahead following the approval of WMC Resources’ rehabilitation program by the State Mining Engineer.

State Development Minister Clive Brown said he had been advised by WMC Resources, the holder of the Yeelirrie tenements, that tender documents for the rehabilitation work were currently being finalised.”

(Source: Government of Western Australia: Medial Statement, 31 March 2004).

On the same day – 31 March 2004, the termination of the *Yeelirrie Act* was announced in the Parliament. A member of the then opposition party asked a question from the then Minister of Mines about the termination of the *Yeelirrie Act*. The Hansard records of the Minister’s response as follows:

“Mr C.M. BROWN replied: I was pleased to issue a media release indicating that it is the intention of the State and WMC Resources Ltd to end the only state agreement in Western Australia for the mining of uranium. This state agreement was legislated by the former Liberal Government of Sir Charles Court in 1978 to facilitate the construction of a uranium and vanadium treatment plant at Yeelirrie with a capacity of 1.21 million tonnes a year to produce uranium oxide or yellowcake as it is known. The Government’s

policy is one of opposing uranium mining. That has been the Government's policy throughout. We are very pleased that we have been able to work with WMC Resources Ltd in implementing our policy through this measure. WMC Resources has a company view about uranium, but that does not coincide with the Government's view. The company has been working cooperatively in implementing government policy, and for that, we are very grateful indeed. It indicates firmly that the Western Australian Government is able to implement its policy through rational discussion with industry, by talking straight and directly with the company and by talking about outcomes that I believe will have a benefit for the State as a whole. The final nature of the agreement between WMC Resources and the State will be ratified later this year, but I am very pleased to be able to flag at this time that this agreement will end later this year" (Parliament of Western Australia- Hansard. 31 March 2004. p.1380).

However, the Gallop Labor Government's decision to revoke the *Yeelirrie Act* was never followed up, and there are no public records available to the reason for this inaction. The Annual Report 2016 - 2017 of the Department of Jobs, Tourism, Science and Innovation (formerly Department of State Development), the agency responsible for managing all projects under SAs, lists the *Yeelirrie Act* as an active Agreement (a list of all valid 64 SAs including the *Yeelirrie Act* is in Table 5.3). There are no records available either in the Hansard or any other documents why *Yeelirrie Act* was never revoked despite the March 2004 Labor Government's policy decision to revoke the *Act*.

Some plausible explanations for this inaction are: (a) flaw in overall project monitoring process of State Agreements; (b) inefficient bureaucratic structure in managing State Agreements;²⁸ (c) lack of governance about the overall resource project management including SAs due to the absence of a whole-of-government resource management policy; and (d) a combination of (a), (b) and (c).²⁹ A research participant provided a legal perspective attributing this inaction to lack of transparency due to ignoring the rule of law:

²⁸ The WA Auditor General states that the project management of the SAs is weak. (WAAG, 2004). See section 5.7 in Chapter Five. The current practice of reporting the State Agreement is limited to provide a list of active SAs in the DJTSl's Annual Reports.

²⁹ It is important to note here that the responsibility of the State Agreements come under an important portfolio of State Development Department (DJTSl) that usually come under the Head of the State (Premier) of Western Australia.

“I was amazed by it, but I am not. Because it goes to – if I draw it back to the rule of law issue; the Rule of Law is not just simply about the fact that everyone is subject to the same law. That is what it is about in very simple terms, but it is also about the institutions of government actually going forward and doing things. And, if there are decisions that are made in Parliament or if there are State Agreements made in Parliament, obviously it is then left to government departments to operationalise”.

(Research Participant # 4: Academic/Lawyer).

Although the reasons are unclear, the *Yeelirrie Act* has never been revoked. In 2005, the WMC ownership of the Yeelirrie project was passed onto BHP Billiton Ltd (BHPB) due to company takeovers (Long, 2005). No mining operations were commenced by BHPB. Seven years later, in 2012, Cameco—a world-renowned company specialised in uranium based in Saskatoon, Canada, acquired the Yeelirrie project from BHP Billiton for US\$ 430 million (Cameco Australia, 2015; DMP, 2017, para 8).

The current Yeelirrie deposit owners, Cameco states that the operation of the project would be continued under the *Yeelirrie Act*. However, they do not refer to the *Yeelirrie Act* as the key legal framework, and their interpretation of the Agreement is different to the regulatory clauses identified in section 7.2.3 of this chapter Referring to the *Yeelirrie Act*, Cameco states:

“State Agreements specify the rights, obligations, terms and conditions for the development of a project and establish a framework for ongoing relations and cooperation between the State and the Project proponent” (Cameco Australia, 2015, p. 25).

Cameco’s project description concerning the *Yeelirrie Act* is different from the conditions and the object of the *Yeelirrie Act* identified in section 7.2.3. Cameco’s website provides an overview of their project goals as follows:

“At our Yeelirrie project, in 2016:

- we continued to assess the technical, environmental and financial aspects of the project
- the Western Australian government granted state environmental approval, subject to a range of conditions that are considered implementable. We continue to advance the project through the federal environmental assessment process.

- the term of the Yeelirrie State Agreement was extended for a period of 10 years. We now have until 2028 to submit the required mine development and infrastructure proposal to the Western Australian government” (Camaco.com. n.d).

However, in accordance with the Project Proposal (PER, 2015) submitted by Cameco for public review, the company provides a different narrative about the intended mine which is about the next phase of project life cycle:

“Cameco is proposing to develop the Project, which comprises a uranium mine and associated treatment facilities... Ore would be mined from shallow pits using open cut techniques. The ore would be processed using alkaline leaching, including the following steps: comminution via SAG milling, atmospheric alkaline leaching, counter-current decantation (CCD), followed by direct precipitation of uranium oxide concentrate (UOC), product drying and packaging.

The current reported resource estimate ... is 127.3 million pounds (Mlbs) (57,742 tonnes) (measured and indicated) with an average grade of U₃O₈ of 0.16% or 1,600 ppm. Over the anticipated 19-year life of the Project, it will produce an estimated 106 Mlbs (48,081 tonnes) of U₃O₈-based UOC for export.

The UOC would be transported by road from the mine site to the Port of Adelaide, South Australia, via the Goldfields Highway, and the Eyre Highway. This environmental assessment covers all transport within Western Australia. Transport within South Australia will be the subject of a separate assessment and approvals processes” (Cameco Australia, 2015, p. xx).

The claim by the current proponent Cameco that the project has been approved under the *Yeelirrie Act* is questionable as there is no reference of such in the amendments to the original 1978 Act at the time of writing (August 2018). The reason being the *Yeelirrie Act* has not been duly amended, hence the approval of the Yeelirrie mine may not be valid. The Cameco’s claim that the 1978 Agreement has been “extended for a period of 10 years” enabling the company to “submit the required mine development and infrastructure proposal to the Western Australian government until 2028”. Cameco's public statement cannot be validated as neither legislation nor agency documents available in public space. Further, there are no references to the tenure of the project appear in the PER submitted by the proponent (Cameco. Australia, 2015), which is now available in the website of the Department of Water and Environmental

Regulations. The Yeelirrie Act was ratified in the WA Parliament on 1 November 1978 stating its lifetime as 21 years “with the right to renew the same from time to time for further periods each of twenty-one (21) years” (Yeelirrie Act, p.27). The sections 3 and 3A of the Act (p.1) explicitly state that any variations of the Agreement must be ratified to be an authorised amendment. Had there been any variation either to the tenure or any other conditions of the original Agreement, the changes should have been ratified and recorded as was the case in the Uranium (Yeelirrie) Agreement Amendment Act 1982. According to the WA government’s open access database which maintains all WA legislation (Acts and all amendments to legislation). According to current legislation, the last amendments to the Yeelirrie Act was made and duly reflected in the Uranium (Yeelirrie) Agreement Amendment Act 1982 (see Table 7.3).

Any State Agreements and the amendments, similar to any other WA legislation should be ratified in the Parliament. The new contractual conditions therein become law, the mutually agreed contract should be ratified in the Parliament as a special Act. (Hillton, 2006; Southalan, 2016). Further, any amendments to a SA should be recorded in the Hansard after the ratification, and then the changes to the original Agreement would be recorded in the WA open access legal repository as a standard procedure.

If this alleged extension of the Agreement as claimed by Cameco, until 2028, then it should appear as an amendment to the *Yeelirrie Act*. However, no such changes to the *Yeelirrie Act* do not exist in the WA legal repository records after the 1982 amendment to the original Act. Thus, Cameco’s public declaration about the validity of the *Yeelirrie Act*, and its extension until 2018 is contestable as these alleged changes to the Act have not been duly ratified. There is no documentary evidence that the Yeelirrie Act has been extended until 2028, nor have any changes to the ownership as the original proponent been made. The name WMC is still appearing as the proponent in the *Yeelirrie Act*. In other words, the status of the *Yeelirrie Act* as it is appearing today is still recorded under the first owner of the project, namely WMC. The statement about the change of the project owner, and the transfer is in the public space (Cameco Australia, 2015). However, any such statements are not legally valid until the new ownership changes are ratified through a new amendment of the *Act* representing the ownership changes.

No empirical evidence is available for any such amendments in the official legislative repositories of WA and Federal open access databases, namely the WA State Law Publishers and Federal AusLit legal database (Department of Premier and Cabinet: Online publications & classic.austlii.edu.au/au/wa). The referred data repositories maintain all legislation including

all State legislation and amendments, including the history of amendments to current and repealed legislation. Table 7.3 provides a history of the amendments to the *Yeelirrie Act* based on the information gathered and verified from the open access legal databases.

The mine's ownership and the legal status of the *Yeelirrie Act* is relevant to this study. If there is no valid legal status of the *Act*, any company or corporation that owns the Yeelirrie project at present or in future is not bound to carry out any work or comply with mine closure or rehabilitation work. The importance of having a mandatory legal framework for environmental compliance is of vital importance as the core value of any mining company is to make profits. A research participant articulated this point as follows:

“Mining companies are designed to make a profit. That’s what they’re there for. So, production at a profitable price is what they want to do – cost and price. So, that’s what mining companies are there to do, and regulators are there to make sure they do it within certain bounds and certain boundaries – so it’s not surprising that they’re two different cultures, because one is there as a business, one is there as a regulator. That’s why we have regulation. That’s why we regulate capitalism. That’s why we regulate companies. It’s no surprise to say that the miners – and it’s no crime if the miners are there trying to make a profit. Obviously, they’ve got to do it within the law.” (Participant no. 9, Academic).

In this context, it is important to review the uranium regulatory frameworks of the Federal and State governments and whether both Federal and State regulations ensure environmental protection while authorising mining companies to make profits within the law.

7.2.6 Uranium regulatory frameworks - Federal and State Government's discourses

Before discussing the uranium regulatory framework in WA, it is important to examine the Federal government's framework, together with the discourses focusing the philosophy and approaches to uranium mining. According to the Federal Government:

"Australia has a leadership role in **ensuring the sustainable development and responsible use** of this globally important energy resource. Consequently, the Australian Government's policy is that uranium exploration and mining will only be approved subject to stringent environmental and safety requirements **in line with world's best practice.**" (Australian Government: Department of Industry, Innovation and Science, n.d.) para 3). (emphasis added)

Hunt (2009) enumerates the legislative framework which needs to be considered in approving uranium mining and transporting the uranium ore (yellow cake) across Australia. Table 7.4 lists various State, and Federal legislation that need to be considered in uranium approval, production and transportation across Australia, hence applicable to WA uranium mining and transportation as well. As uranium production and transportation work in WA has not yet commenced, the only relevant Federal legislation for this case study is the *EPBC Act*.

TABLE 7.4 FEDERAL LEGISLATION OF URANIUM APPROVAL, PRODUCTION AND TRANSPORTATION

Legislation	Object
Environmental Protection and Biodiversity Act 1999 (EPBC Act)	The <i>EPBC Act</i> applies to manage any project with a significant environmental component.
Atomic Energy Act 1953 (Cth) s35	Under section 35 of the <i>Atomic Energy Act 1953</i> prescribed that mineral substances (uranium) in the Northern Territory be declared to be the property of the Commonwealth.
Environmental Protection (Nuclear Codes Act 1978 (Cth) s12(10)	This Act was enacted to regulate the industry
Environmental Protection (Impact of Proposal Act 1974 (Cth)	This Act led to the Commonwealth Ranger Uranium Enquiry.

(Sources: Hunt 2009 & the Federal Acts listed above)

The WA legislative framework on uranium mine approval is of particular interest. As described by the Western Australian Government (WAG) and listed on the agency’s website under the header “Uranium” is described under seven categories (Table 7.5). They range from uranium mining in WA to information on radiation.

TABLE 7.5 WESTERN AUSTRALIAN GOVERNMENT’S DESCRIPTION ON URANIUM

Uranium mining in Western Australia
Current projects
Uranium mining and production
Safety and uranium mining
Transporting uranium
Environmental impacts
Information on radiation

(Source: DMP, 2017)

There is no specific reference to a legislative framework on uranium in WA. However, the literature review revealed the reference to legislation and regulations listed in a DMP publication titled *Guide to Uranium in Western Australia*. Based on the content of publication, it appears to be a document prepared for potential investors.³⁰ In my analysis, there are several legislation and regulations need to be considered for uranium mining regulatory framework in WA, and they are listed in Table 7.6. However, it is important to note that except one legislation, all other legislation therein have been enacted after the *Yeelirrie Act* was ratified in 1978.

³⁰ It is important to note the title of the document as listed in the DMP website with the words “Investors-Uranium_WesternAustralia_Guide.pdf” suggest the document is meant for investment and not the Uranium Regulatory Framework of WA. Source: http://www.dmp.wa.gov.au/Documents/Investors/Investors-Uranium_WesternAustralia_Guide.pdf

TABLE 7.6 .URANIUM REGULATORY FRAMEWORK: WESTERN AUSTRALIA

ACTIVITY/LEGISLATION	DESCRIPTION
<i>Yeelirrie (uranium) Agreement Act 1978</i>	The key legislation under which conditions and operation were approved in 1978. The mining tenements for the Yeelirrie project was approved under the <i>Mining Act 1904</i> . (Hunt et al. 2015, p.10).
Exploration - <i>Mining Act 1978</i>	According to DMP, any company must first “obtain an exploration licence under the <i>Mining Act 1978</i> . They must also have agreements with relevant Native Title holders and landowner/occupiers before an exploration licence can be granted.”
Operation - <i>Mining Act 1978</i>	DMP outlines that “approvals to operate a uranium mine in Western Australia begins with obtaining a Mining Lease from DMP under the <i>Mining Act 1978</i> .”
<i>Native Title Rights- Native Title Act 1993</i>	The DMP Guidelines on uranium approval state that after obtaining the application for a mining lease to mine uranium, the Lease, “companies may be required to demonstrate they have a formal agreement under the <i>Native Title Act 1993</i> with relevant Native Title holders...”
<i>Environmental Protection Act 1986 (WA)</i>	After obtaining the mine exploration and obtaining a mining lease for operation, the proposed uranium project needs to be referred to the WA Environmental Protection Authority (EPA) for assessment.
Environmental (Federal) <i>Environmental Protection and Biodiversity Act 1999 (EPBC Act)</i>	As uranium mining has significant environmental significance, the uranium Project needs the Federal Environmental Minister’s Approval under the <i>EPBC Act</i> which is at peak level legislation as it operates above all State legislation.
Mining proposals back to the DMP after the environmental approval	The native vegetation clearing permit under the <i>Environmental Protection Act (1986)</i> ” required for approval and/or have a licence to construct and operate a plant, tailings storage facility or other ‘prescribed premises’ under Part V of the

	Environmental Protection Act (1986) (a) Groundwater Abstraction Licence under the Rights in Water and Irrigation Act 1914 required before removing water from a pit or bore; any activities on reserved land requiring approval from the vested authority of that reserve approval under the <i>Wildlife Conservation Act 1950</i> for disturbance to declared rare flora
Abstraction of Groundwater: <i>Water and Irrigation Act 1914</i> (WI Act 1914)	A licence for abstracting water from a pit or bore for all mining activities should be obtained under the WI Act 1914.
The <i>Wildlife Conservation Act 1950</i> ³¹ (WC Act 1950) Alternate Citations: Fauna Conservation, Fauna Conservation Act 1950.	All mining approval in WA need to declare and receive approval under the <i>WC Act 1950</i> if there is any disturbance to declared rare fauna and flora. (It is important to note here that the DMP guidelines under WC Act refer to only to flora and NOT fauna).

(Sources: The legislation listed above)

7.2.7 A Critique of uranium mining approval framework – Western Australia

The Western Australian Government's (WAG) discourses and the philosophy on uranium mining are different to that of the Commonwealth. Three narratives are listed on the DMP's website. The first appears under the header "Safety and Uranium Mining" as follows:

"WA regulators and the mining industry have been managing the safe mining, transportation and export of uranium". (DMIRS, 25 July 2017, para 15).

Described under the header "Uranium Regulation", the second narrative states:

"Mining radiation safety in Western Australia is regulated by the Department of Mines, Industry radioactive material for 40 years." (DMP, 25 July 2017, para 16).

The same section of the DMP website includes a hyperlink to a document titled "Memorandum of Understanding [MoU] Radiation Safety for Mining Operations Working Arrangement." This

³¹ This Act has been replaced by the *Biodiversity Conservation Act 2016* (WA).

MoU was signed by the Radiological Council on 22 January 2013. The third discourse on uranium is represented under the header “Transporting Uranium” is as follows:

“Once in production in Western Australia, uranium oxide will most likely be transported by road from the producing mine to existing container port facilities in South Australia or the Northern Territory for shipment to international customers.

The transport and export of uranium oxide is regulated by State and Federal Government agencies. In the case of uranium, there are also international standards that must be followed.” (DMP. 25 July 2017, para 19).

It is important to note that the Western Australian Government’s narratives on uranium, though somewhat descriptive, are not similar to the two Federal discourses, namely: (a) “ensuring the sustainable development and responsible use,” and (b) “world’s best practice” (Australian Government: Department of Industry, Innovation and Science, n.d., para 3). References to the sustainable development and best practice are absent in the WAG narrative indicating two different set of philosophies or ideologies between the Federal and State Governments on uranium mining.

7.2.8 Yeelirrie Project Environmental approval

Since the *Yeelirrie Act* was ratified in 1978, there had been three environmental approvals submitted by all three proponents who owned the Yeelirrie project since 1978 (Table 7.1 and Table 7.7). The first environmental approval took place after the Western Mining Corporation Ltd (WMC) discovered the Yeelirrie uranium deposits and submitted a proposal with an Environmental Impact Statement (EIS) to the Environmental Protection Authority WA (Needham, 2009). BHP Billiton submitted the second EIS statement concerning the Yeelirrie project in 2009 to the Federal Minister for the Environment under the *EPBC Act* (ibid). Cameco submitted the third EIS along with their proposal to the EPA (WA) in 2015. (EPA, 2016). The details of Cameco’s proposal and the EIS is discussed in section 7.2.9. The long awaited uranium operation at Yeelirrie was finally approved by the former Minister for Environment in January 2017. The policy on uranium mining changed when the McGowan Labor Government decided not to approve any new uranium mines in WA in June 2017:

“The Government will not prevent the four uranium projects that have received State Ministerial approvals from progressing, as it has clear legal advice it cannot legally deny secondary approvals for the purpose of frustrating approvals already granted.

This includes Toro Energy's Wiluna project, Cameco's Kintyre and Yeelirrie projects, and Vimy Resources' Mulga Rock project" (Government of Western Australia: Media Statement, 20 June 2017 para 5 & 6).

TABLE 7.7 YEELIRRIE PROJECT - TIMELINE OF THE ENVIRONMENTAL APPROVAL (1978 – 2017)

YEAR	EVENT
1978	Western Mining Corporation Ltd (WMC) discovered the Yeelirrie uranium deposits and submitted a proposal with an Environmental Impact Study (EIS) to the Environmental Protection Authority WA (EPA WA). (Needham, 2009).
1979 (Jan)	A supplement to the original EIS was submitted addressing issues raised in the WMC proposal. Although WMC received the State and Federal approval of the proposal and the EIS, the Australian Labor Party (ALP) denied development of uranium at Yeelirrie based as outlined in the ALP's Three Mines Policy.
1979 – 1983	Approximately 220 000 m ³ of uranium-rich ore was mined from three pilot exploratory pits, and some ore was transported to a plant in Kalgoorlie for processing. Some of the tailings were used to provide an operating surface on two routes and mine access tracks. A bulk of mine tailings were placed in five stockpiles (Ibid).
1983	The Australia Labor Party (ALP) won the 1983 Federal election and implemented the ALP three uranium mines policy. As a result, the WMC's permission to develop and contract to sell uranium was withdrawn in March 1983. The approved plans for Yeelirrie uranium were abandoned, the project was placed under care and maintenance.
1999	The Environmental Protection and Biodiversity Act 1999 (Cwth) was proclaimed. Of the nine matters of "national environmental significance" thus the <i>EPBC Act</i> plays a critical role in the approval of the Yeelirrie project (<i>EPBC Act</i>).
2005	The ownership of the project was transferred to BHP Billiton Ltd due to company takeover.
2007	Under the leadership of then Prime Minister (Kevin Rudd) in April 2007, the Labor party voted at their national conference to abandon the "three mine policy".

2008	The relaxation of ALP's Federal uranium policy and the election of a WA Liberal-National government in September 2008 provided the opportunity for BHP Billiton to lodge a new application for the development of uranium.
2008 - 2011	"Extensive environmental and mine planning studies were undertaken" (Cameco Australia, 2016, p.xix).
2009	BHP Billiton made a fresh application to the Federal Minister for the Environment for a determination under the <i>Environment Protection Biodiversity and Conservation Act</i> (EPBC) 22 May 2009.
2009	"Federal Environment Minister ... determined that the proposed [Yeelirrie mine] development was a Controlled Action under the EPBC Act" (Cameco Australia, 2016, p. xix).
2012 (Dec)	Cameco acquired the Yeelirrie mine from BHP Billiton for US\$ 430 million.
2014 (Nov)	Cameco requested the Environmental Protection Agency (WA) to cancel previous environmental approval and submitted a new environmental proposal for production of 7500 tonnes of Uranium Oxide annually (Cameco Australia, 2015).
2015	Cameco submitted a new proposal with an EIS to the approval of the Yeelirrie project to EPA (WA).
2015 (Nov)	EPA arranged a multi-agency field visit was to the mine site as a part of its evaluation of Cameco's submission (PER).
2016 (Aug)	EPA announced a Public Environmental Review (PER) assessment with recommendations in response to the Cameco's Yeelirrie proposal.
2016 (Aug 3)	The head of WA's Environmental Protection Authority Dr Tom Hatton, the chairperson of the EPA (WA), announced the uranium project did not meet one of the nine environmental criteria and did not recommend it's approval
16 Jan 2017	The former Minister Environment, Albert Jacobs approved the Yeelirrie project against the EPA advice.
20 June 2017	McGowan Government that defeated the former Liberal Government in March State Election announced a new uranium policy banning "uranium mining on all future granted mining leases".

(Sources: Needham, 2009, Australian Government, 1999); Government of WA, 2017, (Cameco Australia, 2015; EPBC Act)

7.2.9 Cameco's proposal on the Yeelirrie project

It is important to understand the background information by examining the details of Cameco's project and how the Environmental protection agency (EPA) provided its recommendations to the then Minister who approved the project. Cameco's request for approval of the Yeelirrie project contained a Public Environmental Review (PER) including an environmental impact statement (EIS) in a 422-pages long report outlining details of the Yeelirrie project and issues to be managed. However, Cameco's PER does not refer to any of the environmental management conditions of the *Yeelirrie Act* discussed in this Section 7.2.3 of this chapter. Cameco's EIS identified the environmental conditions that should be considered under the State and the Federal legislation. Table 7.9 provides a summary of ,significant environmental conditions in the PER and the response of the State Government agencies responsible for implementing the relevant regulations. According to the Cameco's proposal (Cameco Australia, 2015, pp. 23 -30), the legislative framework and impacts assessment process:

“requires environmental approval from:

- the Western Australian (WA) Minister for Environment under the provisions of the Environmental Protection Act 1986 (EP Act); and
- the Australian Minister for the Environment under the provisions of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Cameco Australia, (Ibid, p. 23).

Cameco's Public Environmental Review further identified that the:

“EP Act and its associated regulations *are the principal statute in WA that provides for environmental protection in the State.* Part IV – (Environmental Impact Assessment) of the EP Act allows for referral, environmental assessment and implementation of proposals. Part V – (Environmental Regulation) of the EP Act outlines mechanisms for control of pollution through the licensing system. The EP Act is administered by the State Office of the Environmental Protection Authority (OEPA) and the Department of Environment Regulation (DER). An overview of the Part IV environmental assessment process as it applies to this PER ... *The EPBC Act provides a legal framework to manage environmental issues of national significance including nuclear actions (such as uranium mines)* and the protection of nationally and internationally important flora, fauna, ecological communities and heritage places (Cameco Australia, 2015, p.23, emphasis added).

In response to Cameco’s Public Environmental Review, the EPA called for public submission and made the entire report available through the agency’s website. The EPA received more than 3,000 submissions from various stakeholders. A summary of the stakeholder categories that responded, and the number of submissions are shown in Table 7.8.

TABLE 7.8 SUMMARY OF PUBLIC SUBMISSIONS ON THE YEELIRRIE PROJECT

WA Govt Depts	Federal Govt Depts	Federal Politicians	State Politicians	Stakeholders External	Private Citizens	Online Submissions
9	1	1	1	12	151	2,964

(Source: EPA, August 2016)

In response to Cameco’s proposal on the Yeelirrie project, and the environmental impact statement, the WA Environmental Protection Agency provided a detail report (EPA, 2016), and identified nine critical factors based on scientific evidence outlining the agency concerns about approving the Yeelirrie project.

TABLE 7.9 EPA’s ENVIRONMENTAL ASSESSMENT OF THE YEELIRRIE PROJECT

	KEY FACTORS	DESCRIPTION OF EFFECTS
1	Subterranean Fauna (Environment)	<ul style="list-style-type: none"> • Potential impacts from loss of habitat due to dewatering and mine excavation work
2	Flora and Vegetation (Environment)	<ul style="list-style-type: none"> • Direct impacts on flora and vegetation due to clearing • Indirect impacts on vegetation from groundwater usage and reinjection, and potential changes to surface water flows
3	Terrestrial Fauna (Environment)	<ul style="list-style-type: none"> • Potential impacts due to the loss of habitat of significant species as a consequence of clearing of local (native) vegetation

4	Human Health (Environment)	<ul style="list-style-type: none"> • Potential impacts from the increased exposure to radiation on mine workers, residents of nearby sensitive receptors and along the transport route (from Yeelirrie to Port of Adelaide)
5	Hydrological Processes (Environment)	<ul style="list-style-type: none"> • Potential impacts due to extraction and reinjection of groundwater. • Potential changes to surface flow patterns.
6	Environmental quality on inland water sources (Environment)	<ul style="list-style-type: none"> • Potential changes to the quality of water due to surface water flow and seepage from proposed Tailing Storage Facility (TSF)
8	Rehabilitation and Decommissioning (Environment)	<ul style="list-style-type: none"> • Potential long-term impacts if rehabilitation and closure of the TSF are unsuccessful. • Potential long-term impacts to aquifer water quality from seepage from the TSF.
9	Offsets (Environment)	<ul style="list-style-type: none"> • Counterbalance strategies of the significant lasting impacts on endangered flora.

Source: Extracted from the the Environmental Protection Authority (2016)

Based on the nine factors assessed, (Table 7.9), the EPA concluded that the company (Cameco), would be unable to develop strategies to preserve subterranean fauna under the EPA's environmental objectives (EPA, 2016). The EPA, in its report, notes that eight other factors including potential impacts on the destruction of biodiversity, removal of vegetation, and the effect on human health and rehabilitation and decommissioning issues in future. The EPA submitted its recommendations against the approval of the project as a requirement under the *EP Act* and submitted its report to the then Minister of Environment for his consideration (Table 7.9).

The EPA report (2016) raised significant concerns about the Yeelirrie project, and its impact on biodiversity due to uranium mining, and the potential destruction of subterranean terrestrial environment unique to WA. Further, the EPA report also included the responses of the government agencies responsible for environmental compliance under the MinReF. This report also shows two different approaches of the proponent (Cameco), and the Environmental Protection Agency concerning how the environmental issues would be managed. Table 7.10 provides key environmental factors and likelihood of impact identified by the EPA in response to the EIS as proposed under the Cameco's proposal of the Yeelirrie project.

In summary, EPA examined the environmental impact of “clearing of up to 2,422 ha of native vegetation, removal of one of two populations of the threatened species and potential threats to flora and vegetation from radiation, lowering of the water table, fragmentation, weeds and fire” and the mining of “up to 726 ha of subterranean fauna habitat (EPA, 2016, Appendix 3).

TABLE 7.10 KEY ENVIRONMENTAL ISSUES OF THE YEELIRRIE PROJECT

KEY ENVIRONMENTAL FACTOR	LIKELIHOOD OF IMPACTS (As proposed under the Cameco’s Proposal)	GOVT AGENCY/PUBLIC COMMENTS	EPA EVALUATION
Subterranean fauna	Mining of “up to 726 ha of subterranean fauna habitat; potential changes in groundwater quality due to process spills and lowering of the water table by 0.5 m or more.” (EPA, 2016, Appendix 3)	Parks and Wildlife department notes that Cameco has “not provided any detail about the percentage of the habitat that supports the species that could be lost. Department of the Environment noted the need to demonstrate the “proposed mitigation measures for subterranean fauna” preservation “including how groundwater contamination will be addressed” (EPA, 2016, Appendix 3).	“EPA identified Subterranean Fauna as a key environmental factor”. (EPA 2016, Appendix 3)
Flora and vegetation	“clearing of up to 2,422 ha of native vegetation, removal of one of two populations of the threatened species ...and potential threats to flora and vegetation from radiation, lowering of the water table, fragmentation, weeds and fire” (ibid).	Dept of Parks and Wildlife noted, “unacceptably high level of risk to the conservation of the western genotype in the wild... The extent and quality of habitat [loss], could lead the taxon meeting the IUCN criteria for listing as critically endangered [flora] (ibid),	“EPA identified Flora and Vegetation as a key environmental factor” (ibid).

Terrestrial environmental quality	“potential to impact on Terrestrial Environmental Quality as a result erosion and sedimentation; flooding of water storage facilities; spills; seepage from the ... Waste storage and Dust deposition” (ibid)	Department of Parks and Wildlife noted the need for further investigations “to determine whether a resident population of the threatened black-flanked rock-wallaby is likely to occur at Yeelirrie” [site] (ibid).	“EPA identified Terrestrial Fauna as a key environmental factor” (ibid).
Terrestrial environmental quality	“potential to impact on Terrestrial Environmental Quality as a result erosion and sedimentation; flooding of water storage facilities” (ibid).	Department of the Environment requested for clarification “on the additional waste management facility to provide separation of disposal for non-radioactive material separate from radioactive waste (ibid).	“EPA did not identify terrestrial environmental quality as a key environmental factor at the conclusion of its assessment” (ibid).
Hydrological processes	“Hydrological processes may be impacted by the diversion of surface water flows from mine construction, groundwater dewatering and abstraction, and groundwater reinjection” (ibid).	Department of Water (DoW) noted “a discernible change in groundwater flow is expected at the catchment scale. The DoW has not comprehensively assessed the dewatering model and the modelled drawdowns” (ibid).	“EPA identified Hydrological Processes as a key environmental factor” (ibid).

(Source: EPA, August 2016, *Appendix 3 Summary of Identification of Key Environmental Factors and Principles*)

The EPA Report (August 2016) is comprehensive. However, despite its recommendations against the approval of the project supported by scientific evidence, the then Minister of Environment approved the Yeelirrie project on 12th January 2017 (Shepherd & Tomlin, 2017). After overturning the EPA’s advice against approving the project, the Minister made a public announcement:

“Its actual responsibility of the Minister for the environment to consider economic and social consideration as well.

I believe 1,200 jobs and a \$5 billion investment in our state's economy is something that we need right now and something worth supporting" (Ibid, para 7 & 9).

The approval of the Yeelirrie uranium project took place two months before the WA State Election scheduled for 17 March 2017. At the election, the Liberal-Coalition Party lost the power of governing and was replaced by a Labor Government which announced a policy banning new uranium mining in June 2017 (Government of Western Australia: Media Statement, 20 June 2017).

One of the crucial issues about the Yeelirrie project is the supreme power of the elected officers' ability (in the case Yeelirrie approval, the former Minister for Environment, Albert Jacob) to overrule the scientific evidence and approve the project disregarding environmental protection. I discussed the issue about the elected minister's authority for approval concerning the Yeelirrie project with a regulator during the data gathering phase of this study. This well-informed research participant provided an insightful narrative about the ministerial decision explaining the environmental approval process of mining in WA (see Box 7.1). The regulator explained the power the Minister holds and also emphasised that ultimately all decisions are finally assessed by the public on an election day. In this case, the outcomes from the State Elections March 2017 among other issues, the public did not support the decision made by the former Minister of Environment on the Yeelirrie Project as he lost his Parliamentary seat. However, the elected Labor Government did not overrule the former, Minister's decision (ibid). According to the DMIRS' open access MINDEX database,³² the Yeelirrie is an approved mine under Cameco Australia (DMIRS: MINEDEX, n.d.).

³² MINEDEX is an open access database containing information on mines, mineral deposits and prospects, and maintained by Government of Western Australia (DMIRS, n.d).

BOX 7.1 MINISTERIAL DECISION OF APPROVING THE YEELIRRIE PROJECT

“Because he’s the minister. He’s a minister of the Crown. They reflect community – he can make a decision based on anything.

The power of the EPA is they can publish. They publish their views. They can produce reports and so on. But in the end the minister has the authority under the Environmental Protection Act. He is the one who makes a decision from the environmental perspective. It’s not the final decision, because the minister for mines still has to authorise that the mining takes place, but the [environment] minister can consider social and economic [issues] because that’s why he’s there.

The EPA provides the minister with its considered advice based on everything that it’s heard, what the companies have put in, whatever else it’s found. But the power – the strength of our system is that the minister then looks at it more broadly and he then has to defend it to the public. Because if the public aren’t happy with the decision he has made, he won’t be voted back in at the next election. That’s how it works”

(Research participant no #10: Regulator).

The decision of the then Minister of Environment by approving the Yeelirrie project against the scientific advice could be explained by relating to “historical evidence”; an approach espoused by case study research (Denzin & Lincoln (2018, p. 10). Layman (1982, p. 149) notes that mining and “resource development has been an objective of all Western Australian Governments”. Layman’s (1992) observation explains contemporary ministerial decisions which only focus on economic and social benefits over environmental values as in the case of the Yeelirrie project. However, according to Weber (2015), the bureaucratic and political decisions should be based on rational and neutral grounds. This also supports one manifestation of the “explanatory doctrine” by Hoecke, (2013). According to the explanatory doctrine (Hoecke, 2013), the former Minister for Environment provided an “explanation” that the uranium project could bring economic benefits by overruling the scientific advice provided by the Government Independent Advisory Body—the Environmental Protection Agency, against the approval of the project.

The Yeelirrie mine approval process documented in this case study highlights three issues. First, the centralisation of Ministerial power. Second, the limited authority of the EPA established under legislation to protect the environment, and suggest that in practice the advice it provides based on scientific evidence has no real value due to the ministerial power to overrule EPA's advice. Third, the continuous concerns raised by anti-nuclear campaigners about the environmental impact due to uranium mining in WA (Landgraft, 2016).

7.2.10 Conclusion

The objective of this case study was to gain insights into the implementation of the environmental regulations concerning the complex case of the Yeelirrie uranium project. I provided evidence and questioned the validity of the key legislation (*Yeelirrie Act 1978*) that is used to approve the project, and potential adverse impact on a variety of environmental issues it could pose as the compliance conditions therein are not mandatory (Table 7.10). In this case study, I also examined not only the issues relating to the multiple and complex ownership transfers of the Yeelirrie project, but also the environmental regulations embodied in the *Act*. Further, evidence was presented that the new ownership of the Yeelirrie project has not been ratified in the Parliament for it to be a valid approval process. There is no evidence about the alleged claim by proponent about the approval of the project until 2028 under the *Yeelirrie Act*. The case study also demonstrated the insufficient project management of State Agreements as the *Yeelirrie Act* should have been revoked in 2004 (Parliament of Western Australia, 2004).

The controversial and non-transparent nature of the approval of the Yeelirrie project raised the question of why this project was approved under a State Agreement. The rationale for approving the Yeelirrie project under the *Yeelirrie Act* is not only questionable but not transparent as three other uranium mines have been approved under the *Mining Act 1978*. Therefore, they are under the jurisdiction of the *MRF Act* concerning the mine rehabilitation work at the end of the life cycle of the mine; a condition not mandatory under the Yeelirrie project as the *MRF Act* has no authority over State Agreements.

One of the research puzzles of this study was the lack of evidence to understand the rationale for approving four of the three uranium mines, namely, Kintyre, Mulga Rock, Wiluna under the *Mining Act*, and the Yeelirrie project under a State Agreement ratified in 1978 whereas the project was approved in January 2017. There was no literature to find evidence to explain this legal phenomenon. The research participants could not provide any responses either. As the Yeelirrie project has been approved under a SA means that the current mining rehabilitation legislation (*MRF Act*) has no jurisdiction over the *Yeelirrie Act*.

In summation, the analysis of the *Yeelirrie Act* revealed that it does not contain any mandatory regulatory clauses addressing mine rehabilitation or mine closure plans. While it is due to an inherent weakness of the *Yeelirrie Act* similar to other State Agreements, it also reflects the contemporary attitudes on environmental protection prevailed during the late 1970s when the *Yeelirrie Agreement* was ratified. However, when there are no mandatory regulatory clauses for environmental protection in the *Agreement*, a proponent is not legally bound to carry out any mine rehabilitation work in the absence of such conditions in the legislation (*Yeelirrie Act*). There are only negative implications when approval is granted for the Yeelirrie uranium project in 2017 under an Act of 1978 which has no mandatory environmental protection regulatory conditions.

The uranium case study revealed three key issues. First, a weakness of the MinReF representing the dichotomy of two systems of approving and managing uranium mining in WA, under the *Mining Act 1978*, and a State Agreement respectively. Second, the case study confirmed the inefficiencies of managing State Agreements as the *Yeelirrie Act* should have been revoked in 2004 following the Gallop Government's decision to terminate the *Yeelirrie Act*. Finally, the case study demonstrated the absolute powers of the elected Ministers who can overrule and ignore scientific evidence against the approval of mining proposals.

The analysis of the Yeelirrie uranium project confirmed the case study definition by Schramm, (1971) who states that the “essence of a case study... is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what results” (cited from Yin, 2018, p.14). This case study demonstrated how sets of decisions were taken to approve a uranium mine using controversial and flawed legislation.

7.3 CASE STUDY TWO – ENVIRONMENTAL REGULATIONS OF COAL MINING IN WESTERN AUSTRALIA

7.3.1 INTRODUCTION

The second case study examines the implementation of environmental regulations embodied in two State Agreements (SAs), and how they have been utilised as legislation to assure environmental protection during the life cycle of coal mining in the Collie Region in South-West Western Australia (WA). The rationale for selecting coal mining operations in WA is due to the availability of scientific literature, and research suggesting various environmental impacts in the Collie region due to coal mining (McCullough & Lund, 2016; Doupé & Lymbery, 2005; Johnson & Wright, 2003; Thompson, 2000).

Coal has long been considered a reliable source of energy and is widely used in power generation in many countries (Munawer, 2018, p.87). However, it comes with costs because the process that enables coal to generate energy by breaking down carbon molecules in coal produces harmful environmental pollutants that impact human health (Union of Concerned Scientists Inc [US], n.d, para 1). These pollutants are accumulated in air and water and lead to severe environmental and health impacts as a result of leaching, volatilization,³³ melting, decomposition, oxidation, hydration and other chemical reactions” (Munawer, 2018, p.87). Air pollution due to coal combustion contributes to global warming (Union of Concerned Scientists Inc [US], n.d, para 1). At present, the supply of coal extracted under the two SAs are primarily used for power plants in Western Australia (Lund et al. 2012). The inherent environmental risks of using coal as an energy source for coal-fired power plants have been the focus of several studies (Munawer, 2018; Flannery & Stanley, 2014; Doctors for the Environment, 2013; Union of Concerned Scientists, 2012).

This case study examines the legislation and regulations that manage coal mining in the Collie Region with a special focus on environmental compliance, and evaluates whether they have been implemented to assure environmental protection. The structure of this case study is different from the previous case where I only focused on the uranium approval process of the Yeelirrie project as the operation phase of the uranium mine is yet to commence (Cameco Australia, 2015). However, this case study also falls within the definition espoused by Robert Yin (2014) who defines a case study as “an empirical inquiry that investigates a contemporary phenomenon (the ‘case’) in depth and within its real-world context” (p. 16). The “contemporary

³³ “Volatilization is a potential route by which hazardous waste constituents migrate out of a landfill, especially one having a high vapor pressure”. Source: Environmental Management, 2017

phenomenon” that I focus “within its real-world context” in this case study is the examination of the environmental regulations of two State Agreements namely the *Collie Coal (Griffin) Agreement Act 1979* (“*Griffin Act*”), and the *Collie Coal (Western Collieries) Agreement Act 1979* (“*Western Collieries Act*”). These two Agreements have been utilised as the regulatory framework to manage the life cycle of the coal operations in WA, but my analysis excludes early phases of coal operations before 1978.

Further to this introduction, this case study includes: (i) background; (ii) the history of coal mine operations in WA; (iii) coal mining approval regulatory system in WA; (iv) a critique of the environmental regulations embodied in the two State Agreements; (v) sustainability and environmental performance of the two coal mining companies; (vi) the environmental impact of coal mining in the Collie Region; followed by (vii) a conclusion.

In this case study, my analysis focuses on how the legislation and environmental regulations have been utilised to assure environment “with respect to the mining, development and rehabilitation of certain coal reserves” in WA (Griffin Act, 1979, p.1). The two State Agreements identified as relevant legislation for this thesis are considered under the Mining Regulatory Framework (MinReF) in WA. Both the *Griffin Act* and *Western Collieries Act* are “Agreements” between the State of Western Australia, and the two companies cited in the Agreements. These two “Agreements” were ratified in the State Parliament in 1979 as central legislation, and have been enacted to authorise among other things, the operation of coal reserves in the Collie Region of Western Australia.

As a consequence of coal mining in the Collie Region, many environmental issues have emerged over the years, (McCafferty, 2017; Etten at al., 2014; McCullough & Lund, 2009 & 2006; Lund, n.d.; Lund et al., 2012), and some of these works are discussed in this case study.

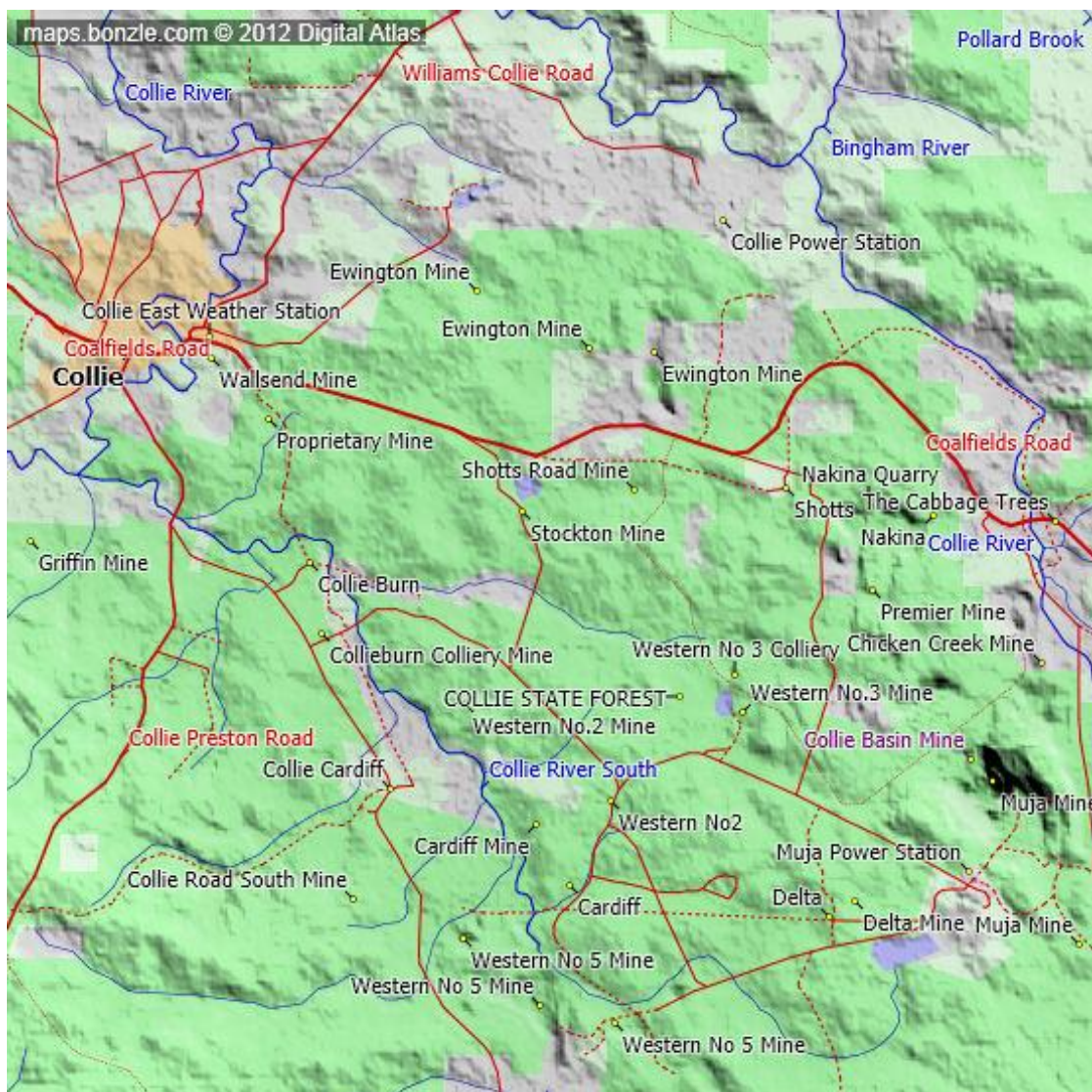
7.3.2 BACKGROUND

Coal is defined as “combustible rock of organic origin composed mainly of carbon along with variable quantities of other elements, chiefly hydrogen, sulphur, oxygen and nitrogen” (Geoscience Australia, 2013). Although coal was discovered in New South Wales in 1797 (Australian Government, 2013; Australian Bureau of Statistics, 1910), there was no interest in coal as a source of energy until the 1880s as an export commodity of WA. The search for coal in WA first began due to the arrival of steamships in WA ports and the expansion of the rail networks (ibid). A stockman named George Marsh led to the operation and development of the coal mining in Collie following the discovery of coal near the Collie River (ibid). Coal has been mined in Collie for over a century. However, the formal process of Collie coal mines

as a business venture can be traced back to 1923 when a company, Griffin Coal Ltd (GCL) was set up (ibid). Premier Coal Ltd (PCL) commenced its operations as Western Colliers Limited in 1950 (premiercoal.com.au, n.d., para 1).

Collie coal mines are located in a geological cluster named the Collie Sub-basin which is deposited in a pocket located within Permian sedimentary rocks covering an area of 225 km² and covered within the Yilgarn Craton (Wilde & Walker, 1982; Wilson, 1992), near the town of Collie which is located 213 km south-west of Perth. Map 7.3 provides the location of Collie Region.

MAP 7.3 -- COLLIE REGION AND COAL MINE SITES



(Source: Maps: Bonzie.com, 2012, digital Altus)

Coal mining in Australia has a long history. Table 7.11 provides a timeline of WA coal mining activities from 1923 to 2017.

TABLE 7.11 -- HISTORY OF COLLIE COAL MINING, 1923 - 2017

YEAR	ACTIVITY
1923	A private syndicate was established to negotiate and develop mining leases south of Collie to supply coal to Western Australian Government Railways (WAGR).
1925	The 'Western Australian Coal Mining Briquetting and By-Product Company Ltd' (WACMBBCL) was incorporated.
1927	WACMBBCL changed its name as Griffin Coal Mining Company Pty Ltd (Griffin Coal) and commenced supplying coal to ships, WAGR and the goldfields.
1949	The first Chief Coal Mining Engineer in WA was appointed.
1950	Western Collieries Limited (WCL) was established.
1952	WCL commenced an open cut mine called Collieburn, followed by operating two underground mines.
1953	Open cut mining operations commenced at Muja coal mine located 18 kilometres south-east of Collie.
1954	Deep underground mining work commenced at Muja.
1960	Griffin Coal won a contract to supply a major share of its coal to Muja Power Station, a new power station to be operated by Western Power, then WA's sole electricity provider.
1965	Deep mining operation ceased at Muja mine due to flooding.
1966 -69	Establishment of the Muja Power Station helps to stabilise the coal market due to the supply of coal produced by the two mining companies.
1970	Griffin's contract to supply coal to WAGR ended.
1979	<i>Collie Coal (Western Collieries) Agreement Act 1979</i> was ratified in the State Parliament.
1979	<i>Collie Coal (Griffin) Agreement Act 1979</i> was ratified.
1982	Open cut mining commenced at Chicken Creek Mine on the banks of Collie River.
1989	Wesfarmers Ltd purchased WCL and renamed the company as Premier Coal Ltd.
1994	The closure of the last underground mine operated by Griffin Coal Ltd

1994	Wesfarmers Ltd terminated the underground mining started by WCL
1996	Open cut mining commenced at Ewington II mine.
2009	Open cut mining commenced at Ewington I mine.
2010	Griffin Coal Ltd sold their business to an Indian company called Lanco Infratech (Smith, 2017).
2011	Wesfarmers Ltd sold the Premier Coal mine to a Chinese coal group Yancoal (Woods, 2011).
2011	Lanco Infratech acquired by a Chinese Company called Yangzhou and has been managed by Yancoal Australia.
2017	Indian-owned Lanco Resources appointed receivers and managers declaring heavy financial losses (Smith, 2017).

Sources: Griffincoal.com; Premiercoal.com; Spillman, (1993); Collie Coal (Griffin) Agreement Act 1979, Collie Coal (Western Collieries) Agreement Act 1979, Woods, 2011; (Smith, 2017).

Table 7.11 provides a brief history of WA coal mining as well as information on the formation of coal mining companies in the 1950s, and the transfer of ownership of two companies that were the signatories of the two State Agreements ratified in 1979. Since then, there had been several ownership transfers. For example, Wesfarmers Ltd (WL) purchased Western Colliers in 1989, and the WL sold the operation to a Chinese coal group called Yancoal in 2011 (Woods, 2011). Similarly, Griffin Coal sold its business to an Indian company called Lanco Infratech in 2011 (Smith, 2017). In the same year, Lanco Infratech was acquired by a Chinese Company called Yangzhou, and since the takeover, Griffin Coal has been managed by Yancoal Australia. However, none of these ownership changes has been duly ratified and reflected in the two State Agreements confirming their validity as legal documents. Later, in this case study, I will revisit the legal issues concerning the implementation of environmental regulations, embodied in two State Agreements in section 7.3.6 to review whether the ownership transfers would impact the environmental protection during the life cycle of coal mines in the Collie Region.

7.3.3 Approval of Coal mining regulation of Western Australia

Historical documents and archived legislation reveal the nature and regulations of coal mining operations that existed since the first decade of 20th Century (Spillman, 1993, Public Service Commissioner, 1908; Department of Premier and Cabinet, n.d). Early regulation of coal activities could be traced to the *Coal Mines Regulation Act 1902*. The 1902 Act stipulates

“General Rules” (Section 50. (1) such as “Penalty on non-compliance with rules” (Section 51) and “Special rules for every mine” (Section 53. (A)). Some of the special rules include the prohibition of employing “Boys” under 15 for mining operations reflecting early signs of health and safety regulations on mining in WA (Mines Safety and Inspection Act 1994). The machinery used for coal mines has also been managed under the *Mines and Machinery Act 1911 (MM Act 1911)*. The *MM Act 1911* was enacted over a century ago “relating to the administration of certain [mining] Acts for the Inspection of Mines and Machinery” (Mines and Machinery Act 1911, p.1). In December 1949, a year before Premier Coal started its mining operations in Collie, the first Chief Coal Mining Engineer was appointed (Spillman, 1993, p.329). The overarching legislation that applies to the regulation and granting of leases to the coal mines in Western Australia was provided by the *Mining Act 1904* and *Mining Act 1978*, the *Rights in Water and Irrigation Act 1914*. Coal mining activities were subsequently subjected to the *Environmental Protection Act 1986* (Johnson & Wright, 2003, p.22; Griffin Coal Mining Company Pty Ltd, 1994).

The *Western Collieries Act* was ratified in the Parliament as a contract between the then Premier of the State of Western Australia, and the Western Collieries Ltd, Perth-based Australian company on 17 January 1979 (*Western Colliers Act*, p.4). On 5 November 1979, the Griffin Coal State Agreement was signed between the then Premier of WA and Griffin Coal Mining Company Ltd (*Griffin Act*, p.2). However, as listed in Table 7.11, the ownership of both these companies has changed, but still, the central legislation that manages the coal mining remains with the two State Agreements that were ratified in 1979. It is important to recognise that both the *Western Colliers Act* and *Griffin Act* are considered as legislation among the 64 State Agreements that support large resource development projects in WA (Chapter Five, Table 5.3). It is also essential to note that both these SAs were legislated before the *EP Act 1986* or the *Federal EPBC Act 1999* were enacted and before formal environmental regulations being introduced to the Mining Regulatory Framework in WA. There are no references in the two State Agreements—the *Griffin Act* and *Western Colliers Act*, stipulating the companies submit to environmental impact assessments (EIA) or undergo formal environmental scrutiny including public consultation before receiving the approval for mining operations. Therefore, it is reasonable to assume that pre 1979 and post 1979 coal mining was not subjected to EIA until the *EP Act* came into effect in 1986. However, the literature revealed that when a company wanted to expand its operation, it had to go through an EIA after the *EP Act* was enacted in 1986. As a result, when the Griffin Coal’s proposed to expand the Ewington Coal Mine (II) in 1994, the company had to submit an EIA proposal under section 46 of the *EP Act* (Griffin Coal Mining Company Pty Ltd, 1994). An EIA was required to receive approval for the expansion under the current tenement to operate an additional open pit coal

mine covering 495 hectares. The EIA proposal, titled '*Expansion of Ewington Coal Mine Ewington II – Collie – Proposed Change to Environmental conditions*' contained references to mining rehabilitation information. However, Griffin's expansion did not have any references to mine closure plans therein (ibid) indicating the attention given to mine closure plans prevailing before the mining rehabilitation legislation (*MRF Act*) was enacted. The then Minister of Environment approved the expansion proposal without any specific conditions imposed on mine closure plans (Bob Pearce, Minister for Environment. 3 September 1992).

The following section provides a critique of the Griffin Coal State Agreement ratified as legislation to manage the coal mines in WA.

7.3.4 A critique of the environmental regulations in State Agreements used for coal mining operations in Western Australia

This section provides a critique of the environmental regulations embodied in the two State Agreements which are the central legislation enacted to manage the coal operations in WA. My analysis is limited to a review of the *Griffin Act* as the environmental regulations included in the *Western Collieries Act* are identical to the former.³⁴

Section 7 (l) of the *Griffin Act 1979* refers to "the protection and management of the environment including rehabilitation and restoration of the mined areas:

"measures to be taken in accordance with best modern practice for the protection and management of the environment including rehabilitation and/or restoration of the mined areas referred to in Clause 6 and the workings associated therewith, the prevention of the discharge of tailings, slimes, pollutants or overburden into the surrounding country, water courses, lakes or underground water supplies, the prevention of soil erosion and forest disease and, to the extent that the Company is responsible for implementing the matters referred to in paragraphs (a) to (k) of this subclause, consideration of the environmental effects relating thereto" (*Griffin Act 1979*, p.8).

The critical issue about section 7 of the *Griffin Act* is its introductory sentence which states, "measures to be taken in accordance with best modern practice for the protection and management of the environment". The analysis of the *Act* revealed the clause; "consideration of the environmental effects relating" is not a mandatory requirement. The way the clause has

³⁴ An identical clause appearing in section 7 (m) of the *Western Colliers Act*.

been written suggests that it does not bind the company to initiate action to address issues to assure environmental protection including mine rehabilitation. Further, section 7 of the *Griffin Act* does not stipulate any mining closure plans, and the consequences of defaulting mining rehabilitation work. The “consideration of the environmental effects” cannot be enforced. Further, under a subsection of the *Act* titled “Protection and management of the environment” states:

“The Company shall in respect of the matters referred to in paragraph (l) of subclause (1) of Clause 7 and which are the subject of approved proposals under this Agreement, carry out a continuous programme of investigation and research including monitoring and the study of sample areas to ascertain the effectiveness of the measures it is taking pursuant to its approved proposals for rehabilitation and the protection and management of the environment” (Griffin Act 1979, p11).

In 1979, the coal mining operations also required the approval for clearance of native forest (vegetation), however, there was no legislation to enforce it as the *EP Act* was enacted in 1986. This requirement has been stated in section 17 of the Agreement under the header ‘Implementation of approved proposals relating to the environment’ as follows:

“The Company may with the consent of the Conservator of Forests arrange for the Conservator of Forests to carry out on behalf of the Company any approved proposal relating to the environment at the cost in all respects of the Company” (Ibid).

The weakness of the above clause is that the implementation of approved proposals and completion schedules (specific dates). The clause 7 (i) of the Act where it states that “modern practice for the protection and management of the environment including rehabilitation and/or restoration of the mined areas” is not a mandatory condition as the Agreement states that company “may with the consent of the Conservator of Forests arrange for the Conservator of Forests to carry out on behalf of the Company any approved proposal relating to the environment”.

In the late 1970s, the reference to “modern practice for the protection and management of the environment including rehabilitation and/or restoration of the mined areas” is no different to what it means today as it implies the revegetation and restoration of the land back into the way it had been prior to the disturbances to the natural environment due to mining. However, when approval was granted to clear vegetation and topsoil for a large open cut mine covering

495 hectares as in the case of Ewington 11 coal mine extension, it becomes a difficult task to rehabilitate the land into its original conditions.

7.3.5 Weaknesses of the Griffin Agreement Act 1979

Section 11 (1) of the *Griffin Act* refers to the need to carry out “a continuous programme of investigation and research including monitoring and the study of sample areas to ascertain the effectiveness of the [rehabilitation] measures” and the conditions as follows:

“The Company shall in respect of the matters referred to in paragraph (l) of subclause (1) of Clause 7 and which are the subject of approved proposals under this Agreement, carry out a continuous programme of investigation and research including monitoring and the study of sample areas to ascertain the effectiveness of the measures it is taking pursuant to its approved proposals for rehabilitation and the protection and management of the environment” (Griffin Agreement Act, p.11).

The fundamental question of the above clause is the lack of transparency for two reasons. First, it does not specify which government agency is responsible for ensuring the company would carry out continuous investigation and research including the protection and management of the environment. Second, it does not state what penalties would be imposed for not adhering to the proposed environmental management conditions. Similar clauses appear in the *Western Colliers Act*; hence, they are not repeated.

7.3.6 Lack of regulatory provisions for environmental protection in State Agreements

As discussed in Chapter Five (section 5.5), a unique feature of the State Agreements is that during the negotiation phase, and before the agreement is ratified, both the proponent, and the government need to agree on all conditions to be included in the Agreement. Concerning the environmental regulatory conditions such as minimising excessive damage to the top and deep layers of soil, prevention of air, water and noise pollutions, preservation of biodiversity, mine rehabilitation and closure plans could be incorporated into an Agreement with specific details how such condition would be executed. Any conditions—environmental or other, if not included before the contract (Agreement) is ratified, they would not become mandatory requirements, thus, a company is not obliged to carry out any tasks that are not included in the ratified Agreement (contract). As all mining companies operate to maximise their profits, any additional expenditure on “non-core” activities, whether they are relating to environmental protection or not, would be interpreted as non-mandatory conditions, and any company would be reluctant to invest funds on such work. In other words, companies operating under a State Agreement are not legally obliged to implement environmental protection measures unless

they are specified and incorporated into an agreement before it is ratified in the WA Parliament as legislation. This unique characteristic of State Agreements is a significant factor impacting environmental protection through regulations.

7.3.7 Inherent weaknesses of State Agreements managing coal mining

To illustrate the inherent weaknesses of the two SAs utilised to manage the operation of coal mines in WA, I provide the following example as evidence by referring to a Parliamentary session which took place in 2014. During this Parliamentary session, both the role of the government agency responsible for managing State Agreements and environmental obligations such as the mine rehabilitation was raised as a Question on Notice (No 2013) directed to Mr Colin Barnett, the then Minister for State Development and also the then Premier of WA. The following questions were asked on 1 April 2014, by Mr M. P. Murray, an opposition Member of the Parliament:

- “(a) what role does the Department of State Development (DSD) have in the development of Lake Kepwari;
- (b) what development plans does the DSD have in place for Lake Kepwari;
- (c) what stage in the process is the DSD currently at of handing back Lake Kepwari from Yancoal to the Department of Parks and Wildlife;
- (d) what is the expected timeframe for this handover/transfer process; and
- (e) what total funding, past and present, has been expended for the development of Lake? (Parliament of Western Australia: Hansard, May 6 May 2014).

Mr Barnett as the then Minister responsible for the Department of State Development provided the following responses on 6 May 2014, at the 39 Session of the WA Parliament:

“The Department of State Development advises:

- (a) The Department administers the *Collie Coal (Western Collieries) Agreement Act 1979* (State Agreement) under which Yancoal Australia Group's Premier Coal Pty Ltd operates.
- (b) None.
- (c) The Department is advising the Minister for State Development on Premier Coal's progress in implementing its proposal, that has been approved under the State Agreement, for rehabilitating the area around Lake Kepwari. Completion of this proposal, as approved, is a precondition of the land being transferred from the Mining Lease.

- (d) There is no set timeframe for Premier Coal to complete its proposal.
- (e) The Department has not expended funds on this. Until the area is transferred from the Mining Lease, Premier Coal is responsible for the area” (Parliament of Western Australia: Hansard, 31 March 2004).

The critical issue emerging out of Mr Barnett’s response is the absence of a “set timeframe” for Premier Coal to complete its proposal” about the rehabilitation of a large pit lake (Lake Kepwari³⁵) which confirms an inherent weakness of the State Agreement under which the company operates. The reasons are twofold. First, there should be specific clauses embodied in the Agreement stipulating how the company should act to rehabilitate the disturbed land at the end of a mine’s life cycle. Second, the absence of specific conditions stipulating that old mine voids such as lake Kepwari need to be rehabilitated within a set period. The situation about the rehabilitation of Lake Kepwari gets further complicated as Yancol—the new owner of Premier Coal is not the proponent appearing in the State Agreement signed on 17 January 1979 (*Western Collier’s Act*, p.4). Due to the nature of State Agreements, any changes to the original, including the ownership transfers should be ratified, and reflected in the Agreement as an amendment it to be valid legislation. During the course of this study, I have verified whether any amendment to the *Western Collier’s Act* has been made concerning the ownership transfers, but no such changes appear in the latest version of the Agreement available in the government’s open access database (Department of Justice: Western Australian Legislation, n.d., para one) which has records of versions and the history of the Agreement should be duly recorded. The ownership of the companies operating under the *Western Collier’s Act* has changed several times (Table 7.11). However, any of these ownership transfers have not been ratified and incorporated into the Agreement. While there is a provision in the original Agreement to transfer the ownership of the Western Collieries Ltd, the key legal issue is how the term “Company” is defined in the *Act*:

“associated company” means —

- (a) any company or corporation providing for the purpose of this Agreement capital of not less than \$2 000 000 which is incorporated or formed within the United Kingdom the United States of America or

³⁵ Lake Kapawari is a mine void previously known as coal mine WO5B where mining had ceased operation in 1997. “The volume of Lake Kepwari is now 24 x 106 m3, with a maximum depth of 65 m and surface area of 1.03 km2” (Zhao, McCullough, & Lund, 2009, p.130). “The pit lake was renamed Lake Kepwari to facilitate its acceptance by the community” (ibid).

Australia or such other country as the Minister may approve ...”
(Western Collieries Act 1979, p.4).³⁶

Yanacol, the current owner of the Premier Coal is a Chinese owned company though it has a presence in Australia. However, Yanacol cannot be considered as a “company” by the above definition as embodied in the Agreement. Further, an Australian legal firm (Corrs Westgrath Chambers) had raised concerns about the company transfer issue:

“Yanzhou Coal became the first Chinese state-owned enterprise to acquire 100% of an Australian listed company through the A\$3.5 billion acquisition of Felix Resources. The deal featured an innovative undertaking whereby Yanzhou Coal would list Yancoal Australia on the Australian Securities Exchange by no later than the end of 2012, thereby guaranteeing public ownership.

Corrs advised Yanzhou Coal on what was the biggest ever Chinese deal in the Australian coal sector at the time.

The implementation of the transaction involved managing disclosures on three key stock exchanges - ASX, Shanghai and Hong Kong. A tight timeframe of only four months was met, even though all documents had to be translated and there were significant language and cultural differences that the team had to overcome” (Corrs Westgrath Chambers, n.d. para. 1- 4).

These legal issues are relevant to the scope of this study as it has a significant impact on the mining regulations analysed in this PhD research. The legal issues raise questions not only about the validity of the ownership of the company, but whether the current owner (Yanacol) as the owner of the Premier Coal Ltd is a valid corporate entity under the *Western Collier’s Act* as;

“Yancoal manages the Premier Coal operation on behalf of its majority shareholder Yanzhou Coal Mining Company Limited (Yanzhou)” (premiercoal.com, n.d., para one).

The implication is whether Yanacol—a foreign company, would carry out not only the rehabilitation of Lake Kepwari, but all other coal mines managed under the Premier Coal Ltd

³⁶ This quote is from the last amended version of the Act, (version 01-c0-05, as at 11 Sep 2010), extracted from www.slp.wa.gov.au, website.

in years to come. As the former Premier of WA has confirmed the company has no “timeframe” to rehabilitate Lake Kepwari reflects the non-mandatory nature of the legislative framework under which not only the coal mining in Collie Region operates but also all other resource projects under the current State Agreements implying the validity of regulations concerning environmental protection.

The issues I have identified about the validity of the Agreements, and other matters could be attributed to both legal and general project management issues concerning State Agreements. Among other things, the ‘project management’ issues of State Agreements have also been identified by the WA Auditor General who observed that “DSD’s responsibility for monitoring mines that operate under State Agreements is unclear (WAAG, 2011, p.24)”. However, examples such as the Kepwari lake issue raised in the Parliament of WA in 2004 suggest that after fourteen years of the audit report, no follow-up on managing the mines under the State Agreements has taken place. I attribute this weakness in the *Western Collier’s Act* to the lack of adaptive capacity—a concept developed and discussed as a core weakness of the MinReF in Chapter Eight (Sections 8.4 & 8.6). State Agreements not having legislative mechanisms for correction and project monitoring has a direct impact on effective mining rehabilitation. The Auditor General’s Audit Report (2011) also identified the need to ensure “the State is protected from the risk of long-term liability when a mine closes through effective rehabilitation and financial arrangements” (p.5), and it has not happened concerning the Lake Kepwari example.

These gaps of the MinReF could also be attributed to agency discourses that have developed over the years as a consequence of having a multi-agency system implementing the legislation under the MinReF. These discourses also might have influenced the way agency bureaucrats perceive and act upon State Agreements. One of the research participants, a senior officer, attached to a regulatory agency provided a perspective that reflects an inherent regulatory, cultural practice prevailing among the regulators responsible for State Agreements:

“Under the State Agreements, we don’t look at the environmental aspects. So, we brought in the *MRF*— mining rehabilitation fund...No; it doesn’t impact on State Agreements. So, there’s been informal discussions, why don’t you do it? We’ve also got – under the State Agreement there may also be some environmental aspects, but that’s covered by Department of State Development. We don’t do it (Participant #8; Regulator, emphasis added).

Regarding the validity of the current owner's entitlement to operate under the *Western Collieries Act* would have been addressed as an amendment to the *Act* ratified in 1979, but it has not happened yet. The consequence is the agency responsible for managing the State Agreements would not be able to enforce not only the environmental regulations embodied in the *Western Collieries Act*, but also to enforce any other condition therein. The former Premier's response about the rehabilitation of lake Kepwari, and the company having no set timeframe for mine rehabilitation is evidence about the government's inability to enforce environmental conditions or take any appropriate action to address environmental harm due to coal mining. Therefore, assuring environmental protection through existing legislation by implementing mine closure plans, and land rehabilitation works of Collie coal mines will remain as one of the legacies of mining in WA for many more years to come.

Several scientific studies which have been carried out since the mid-1980s (McCullough & Lund, 2009; Doupé & Lymbery, 2005; Johnson & Wright, 2003; Thompson, 2000), have identified the long-term adverse environmental effects due to abandoned coal mines in the Collie Region. The former Premier who oversaw the WA State Development Department responsible for managing State Agreements, and the government's inability to enforce a schedule for the rehabilitation of Lake Kepwari is just one example of a larger problem concerning the mining regulatory framework in WA.

The current issues emerging from this analysis not only confirm a regulatory flaw that prevents environmental protection due to coal mining in Western Australia, but suggest the inevitable event of passing the sovereign risk of rehabilitation of mines operated under State Agreements onto future generations. This is not a mere scenario, but a reality, and confirms that due to innate weaknesses of State Agreements that the WA Government has breached the core sustainability principle of 'inter-generation equity' (United Nations General Assembly, 1987, p. 43).

The environmental management conditions embodied in the *Griffin* and the *Western Collier Acts* have not become effective 39 years after the ratification of the two Agreements in 1979. When perusing the number of untreated abandoned mines in the Collie Region, it is evident that mine closure plans have not been implemented. Doupé and Lymbery (2005) observed that "there are currently about 1800 final mine voids, and 150 operational open cut mines in the Collie Basin" (p.314). The "open cut voids have been abandoned to form lakes, which are acidic because of the pyrite-rich Permian sediments of the Collie basin (p.135). Johnson and Wright (2003) predicted that those mine voids filled with rain water for decades would become more saline due to the high annual evaporation rate of water in the Collie Region (Johnson

and Wright, 2003). Doupé and Lymbery, (2005) identify the “urgent need for a regulatory framework to address mine lake options” (p.134) and environmental issues arising from abandoned mine pits in the Collie Region. This raises the sustainability and environmental performance of the two coal mining companies operating under two State Agreements.

7.3.8 Sustainability and environmental performance of the two coal mining companies

This section provides an overview of the discourse of the two coal mine operator’s environmental performance and sustainability practices. Griffin Coal states the company’s commitment to mining operation as follows:

“Griffin Coal is committed to ensuring management of its mining operations are undertaken in a sustainable manner.

Griffin Coal aims to minimise, mitigate and remediate any impacts from its business on the environment. Griffin Coal recognises that excellence in managing the Company’s environmental performance is critical to its business success.” (Griffincoal.com.au (n.d). para 1 & 2)

However, Griffin coal doesn’t provide additional information on how the company ensures their “mining operations are undertaken in a sustainable manner”. (ibid).

Premier Coal which formally commenced its operations in 1950 claims that the company “supports the principles of sustainability and places great emphasis on environmental management” (Premiercoal.com. n.d. para one). Concerning sustainability, Premier Coal states:

“Premier Coal fully supports the principles of sustainability and places great emphasis on environmental management. The Company is aligned with the ISO14001 management system designed to assist in managing and improving our workplace environment” (premiercoal.com, n.d., para one)

ISO 14001 is an international standard that defines guidelines and requirements for an effective environmental management system (EMS) (saiglobal.com. n.d., para 1). The standard provides a framework enabling an organisation to follow guidelines. However, it is not a mandatory standard for, establishing the requirement for environmental performance

(ibid). Nevertheless, decades-long coal mining operations have contributed to adverse environmental effects mainly due to the practice of open cut mining commenced in the 1970s:

“Open cut operations in Collie currently result in a final void at the end of mine life. Careful mine planning is done to minimise the size of the final voids through backfilling whenever possible. Inevitably, the style, scale and depth of operations require some out-of-pit dumping, leaving a final void” (premiercoal.com. n.d., para 2).

Coal is a non-renewable resource which once extracted and used, will provide no more stocks to be used by future generations. The major environmental issue is how the mine voids (pits) that have been created due to extracting coal contrary to the discourses of the two companies claiming their emphasis on “environmental management” and carrying out operations in a “sustainable manner”. The following section examines the sum effects of environmental issues due to coal mining in Collie.

7.3.9 Environmental impact of coal mining in the Collie Region

The major environmental impacts of the Collie coal mining could be described under two categories: (a) the formation of mine voids (pit lakes) and, (b) associated environmental degradations and risks (McCafferty, 2017; McCullough & Lund, 2006 & 2009) and the environmental risks due to end use of abandoned coal mines (Doupé & Lymbery, 2005). The operations of Griffin’s Collie coalfield have created 12 underground mines and 18 open cut mines (Griffin.com. n.d. para 7). When the open cut mines are abandoned at the end of the mine’s life cycle, they are described as “mine voids” (McCafferty, 2017; Lund et al., 2012; Lund, n.d; McCullough & Lund, 2006 & 2009). Lund et al. (2012) describe the history, the extent of nature of mine voids, and rehabilitation issues due to coal mining in the Collie Region:

“The pit lakes of Collie range from 4.5 ha to 98.5 ha in area and 8 to 81 m deep... One group of lakes consists of those abandoned in the 1960’s with no shaping or attempts at rehabilitation (Blue Waters, Stockton and Black Diamond), another includes relatively new lakes (<10 years old) that have been contoured and have had catchments revegetated (Lake Kepwari, WO5H, WO5F, WON9, WO5C, WO5D). The Chicken Creek lakes (4 and 5) are new lakes that have not been rehabilitated (due to possible remaining). WO3 and Centaur are historic and have not been rehabilitated” (Lund, McCullough & Kumar, 2012, pp.289-290).

The focus of this section is to identify a series of environmental impacts of the abandoned coal mines that have not been rehabilitated. An overview of these environmental issues is provided

below based on scientific studies concerning the abandoned coal mines in the Collie Region (McCullough & Lund, 2010; Doupé, and Lymbery; 2005; Lund et al., 2012). Doupé and Lymbery (2005) explain the legacy of hundreds of mine voids throughout WA and the difficulties of rehabilitation or stabilisation them throughout decades or possibly millennia:

“Mining is leaving a legacy of hundreds of mine voids throughout the State. There are numerous safety issues that must be addressed as part of mine closure and, until recently, there had been no assessment of the potential long-term environmental impacts of mining below the water table. The mine void issue is vitally important to both the Government and mining industry, as neither wishes to be liable for rehabilitation or stabilisation of a mine void over a period of decades or possibly millennia” (Ibid, p.8).

McCullough & Lund, (2010) identify 13 issues of consequences due to untreated abandoned coal mines in Collie district (Table 7.12).

TABLE 7.12 ENVIRONMENTAL CONSEQUENCES OF PIT LAKES IN COLLIE

NO	ISSUE	CONSEQUENCES
1	Presence of high-level metals in pit lakes.	1.1 limit in-lake diversity and abundance; 1.2 causes skin lesions in vertebrates living in the water; 1.3 drinking or feeding of poisonous biota in the water (livestock, pests and natives)
2	Physical hazards in the catchment area	2.1 Pit bank instability such as erosion and fluctuating water levels could impact wild and domestic animals by falling from high walls and become injured or drowning; 2.2 prevention of riparian vegetation; 2.3 smothering of aquatic plants due to pit bank erosion; 2.4 burying secondary minerals; 2.5 contribution to acid sulphate soils (that have previously been buried deep)
3	Salinisation	3.1 Limitation of beneficial end uses of pit lakes;

		<p>3.2. the potential for acidic pit water discharge contaminating ground and downstream groundwater communities;</p> <p>3.3 discharge of saline waters into surface waters degrading these environments.</p>
4	Stratification	<p>4.1 If pit lake water is permanently stratified, and does eventually change, highly contaminated waters may discharge hazardous gases (CO₂, H₂S, CH₄ and N₂O), releasing them into the atmosphere;</p> <p>4.2 production of algal blooms and release of metals to surface waters</p>
5	Occurrences of health hazards such as disease and biotic toxins	<p>5.1 Pit lake water could cause health hazards for people living nearby or coming into contact with the waters due to forming toxic algal blooms, the growth of disease-causing vectors (e.g. mosquitoes);</p> <p>5.2 causing diseases such as avian botulism and salmonella affecting humans and transmitted birds.</p>
6	Extremely low pH	<p>6.1 Buffering of acidity which makes remediation more difficult, as buffering has to be overcome prior changing pH to an optimum level;</p> <p>6.2 chemical neutralisation (e.g. with lime) if used may result in smothering of benthic organisms and create a barrier to normal sediment/water interactions;</p> <p>6.3 Low pH may negatively impact on survival of riparian zone flora if flooding occurs;</p>
7	Changes in groundwater	<p>7.1 Ongoing abstraction from nearby mining may reduce the fill rate of the pit lake or reduce groundwater inputs into established lakes;</p> <p>7.2 changes in groundwater quality (salinity, metals, nutrients and pH) in the discharge area. Reduced exploitability of groundwater in high</p>

		evaporation areas, either regarding quality or quantity.
8	Connection to underground workings	8.1 Reductions in water quality; 8.2 greater inter-seasonal variation in pH.
9	River flow-thru	9.1 Changes in riverine water quality (both positive (e.g., nutrient additions), and negative, e.g., increased salinity) may adversely impact on endemic biota 9.2 changes in hydrologic management downstream, e.g., contaminants might impact on riverine processes.
10	Lake morphology	10.1 The influence of size and shape of the lakes for biological activity, both in the lake and riparian; 10.2 enhancement or reduction of wind mix through the lake orientation and area: depth ratio;
11	In lake storage	11.1 the possibility of oxidation due to the presence of reactive materials in water which may then release contaminants into the lake water impacting the water quality;
12	Overburden dumps	12.1 Contaminants can reduce lake water quality; 12.2 soils washing can smother aquatic plants or benthic algae; 12.3 changes in wind flow and microclimates can influence lake mixing and stratification.
13	Catchment morphology	13.1 Potential for the erosion of catchment areas due to the absence of natural flow; 13.2 impact on the hydrology of the lake.

(Source: McCullough & Lund, (2010) Mine Voids Management Strategy (IV): Conceptual Models of Collie Basin Pit Lakes).

7.3.10 Conclusions: The second case study

The second case study provides an analysis of how two State Agreements ratified in 1979 have been utilised to manage coal mining in WA. Although the regulatory clauses embodied therein emphasise the need for adopting “modern practice for the protection and management of the environment including rehabilitation and/or restoration of the mined areas” (Griffin Act, p.1), the mine rehabilitation work has not taken place as the regulatory clauses in both Acts enacted to manage coal mining are not mandatory. The State Agreements also do not contain specific time schedules for mine rehabilitation work to be completed by the two mining companies. Further, in both Agreements, there are no penalty clauses for defaulting the condition: “the protection and management of the environment”, hence, the government agency responsible for monitoring the Agreements (DJTSD/DSD) has not been able to assure environmental protection as in the case of Lake Kepwari example cited in this chapter.

Though WA has introduced mining rehabilitation legislation (*MRF Act*), it has no jurisdictional powers over State Agreements. Furthermore, mine rehabilitation work might be untenable as one of the current owners of the Griffin Coal are under administration due to financial losses, hence, the cost of any rehabilitation work of that company would become the responsibility of the State of Western Australia. As a combined effect of the regulatory flaws, and the financial encumbrances of one mining company, the proposed coal mine rehabilitation work in WA may remain as an unresolved legacy for many more years to come, and provide evidence that two specific State Agreements enacted to manage coal mines have not been able to assure environmental protection.

7.4 Conclusions of two case studies

The two case studies included in this chapter addressed research objective two of the PhD study. In the uranium case study, I focused only on the approval of the uranium project as the operational phase is yet to commence. In this case study, I identified complex legal issues about the validity of the central legislation—the *Yeelirrie Act* under which the project has been approved. I also identified its environmental regulations, and the difficulties of implementing them for future mining rehabilitation work as the existing State legislation on mining rehabilitation (*MRF Act*) has no authority over the mining operation concerning the mine closures and rehabilitation work to protect the environment. Another critical issue that I identified in the uranium case study is the absolute power of the Minister in charge of the mining approval process in WA. In the example of Yeelirrie project approval, I provided evidence of how the former Minister for Environment ignored the scientific evidence presented by the Environmental Protection Agency about the potential environmental harm including the loss of rare species of fauna impacting biodiversity. Thus, Yeelirrie uranium mine case study

supports the issues identified in the literature review about the Ministerial power and authority on mine approval (Chapter Four, section 4.5.2).

Another issue I identified in the first case study is the dichotomy of the WA mining regulatory framework where due no rational grounds two types of regulatory systems have been adopted to approve three uranium mines under the *Mining Act* and the other; the Yeelirrie mine under a State Agreement. I also provided evidence about the validity of the *Yeelirrie Act* due to ownership transfers that have not been ratified since 1982. The ownership changes after the first owner (tenement holders) of each Agreements have not been ratified as discussed in the two case studies. The ownership transfer issues raise questions not only about the ineffectual nature of enforcing the environmental regulations in all three SAs examined in this chapter, but also the possibility of passing the sovereign risks of mining rehabilitation liabilities to subsequent governments and future generations.

Concerning the coal mine operations in the second case study, I discussed the reasons for not implementing the environmental regulations embodied in the two SAs, and as a result how it has contributed to adverse environmental effects as revealed by scientific studies conducted about the impact on coal mining in the Collie Region.

In summation, the two case studies discussed in this chapter provided evidence about weaknesses of the State Agreements as ineffective regulatory tools from the perspectives of environmental protection. The main weakness is that the environmental regulations embodied in State Agreements cannot be implemented as they are not mandatory. As a result, passing the sovereign risks of mining rehabilitation liabilities to subsequent governments and future generations are inevitable.

CHAPTER EIGHT STRENGTHS AND WEAKNESSES OF THE MINING REGULATORY FRAMEWORK

8.1 Introduction

The objective of this chapter is to examine the strengths and weaknesses of the mining regulatory framework (MinReF) of Western Australia (WA). For the analysis presented in this chapter, I obtained data from three sources referred to in Chapter Six (Methodology and Methods). The first part of this chapter provides an overview of data collected for the analysis of the MinReF. This chapter also includes the findings of the two case studies discussed in Chapter Seven. The term MinReF is a construct designed to define State and Federal legislation, regulations, policies and other administrative tools such as policies and guidelines developed to manage the mining industry in WA. This framework is also responsible for managing all forms of mining encompassing minerals, gas and petroleum, but the analysis presented in this chapter is limited to examine regulations of two minerals, namely uranium and coal. I presented a schematic diagram in Chapter Five (Figure 5.1) when I first introduced the MinReF in this thesis. Figure 5.1 includes key components of a conceptual model embodied in the MinReF.

In this chapter, I focus on one distinctive component of the MinReF, namely the environmental regulations of two types of minerals: uranium and coal. In the remainder of this PhD thesis, I will use the terms 'MinReF', 'mining regulatory framework' and 'regulatory framework' interchangeably referring to the mining regulatory framework of Western Australia. The analysis in this chapter focuses only on the regulations embodied in MinReF concerning the environmental protection relevant to uranium and coal mining in WA. Several aspects of the regulatory framework applicable to the scope of this study could be defined under four main categories. They are: (i) environmental protection during the life cycle of mining activities; (ii) regulating natural resources, such as land, water, fauna and flora affected by mining; (iii) rehabilitation of mine sites as essential post-mining activities; and (iv) adhering to overarching legislation, such as those laws related to environmental protection which exist to protect natural environment irrespective of the cycle of mining operations.

MinReF represents unique characteristics. First, the legislation and regulations considered under the MinReF have evolved since the enactment of the first formal mining legislation in WA, namely the *Mining Act 1904*. Second, the mining legislation and associated regulations in WA have gone through a legislative metamorphosis since 1904 up-to-now to help develop

a wide array of mining laws to support a variety of mining activities including employee safety³⁷ in WA and environmental protection. Third, the current MinReF covers several vital functions associated with mining operations in WA, such as approval of exploratory licences, mining tenements, transferring mining leases, and regulating the environmental impact due to mining. Since 2011, it also plays a role by receiving Mine Closure Plans with every new mining proposal. Fourthly, the MinReF includes a unique set of legislation commonly known as State Agreements (SAs) that have been designed as regulatory tools to support large resource development projects (Southalan, 2016; Barnett, 2014; Hillman, 2006). The SAs do not come under the current mining legislation (Southalan, 2016; Hillman, 2006). As a result, the mining projects operated under SAs do not come under the current legislation on mining rehabilitation. The SAs are contractual arrangements agreed between the State Government and a mining company (ibid), that are unique to each project. These contracts become legislation when they are ratified in the Parliament. The two case studies in Chapter Seven included an analysis of three SAs as regulatory tools from the perspectives of environmental protection.

There are vast amounts of legislation, regulations, and policies developed since 1978 to regulate environmental protection in Western Australia—the *Environmental Protection Act 1986*; *Environmental Protection Regulations 1987*; *WA Environmental Offsets Policy 2011*; on mining rehabilitation—*Mining Rehabilitation Fund Act 2012*; the use of water for mining—*Water Services Act 2012*; and a new legislation to protect biodiversity in WA – the *Biodiversity Conservation Act 2016*. Regulations associated with these mining-related laws are also needed to be considered within the MinReF. The rationale for some of the WA legislation such as the *WA Environmental Offsets Policy 2011* and the *Biodiversity Conservation Act 2016* appears to be redundant and superseded by Federal laws. For example, the Federal *Environmental and Biodiversity Act 1999 (EPBC Act)* and the Off-Set policies under the *EPBC Act*, still need to be considered under the MinReF because the *EPBC Act* and the associated regulations are considered Australia’s peak regulations on matters concerning environmental significance (Department of Environment and Energy, n.d.).

As there is interconnectivity of these pieces of legislation, regulations and policies, the broader framework needs to be mapped out first. Table 5.2 lists all relevant legislation, regulations and policies relating to this study and have been considered under the MinReF. The relevant legislation, regulations and policies in Table 5.2 are listed since the enactment of the *Mining Act 1904* (though the timeline of the study commenced from 1978) because the pre-1978 State

³⁷ In my analysis of legislation come under the MinReF (Table 5.2), I have excluded legislation and regulation concerning employee safety as they are out of the scope of this PhD study.

Agreement including the *Yeelirrie Uranium Act 1978* has been approved under the *Mining Act 1904* (Hunt et al., 2015, p.10). The legislation, regulations and policies listed in Chapter Five (Table 5.2) are extensive and cover a wide variety of issues.

Environmental protection is a complex subject as it covers several issues relating to air, water, and noise pollutions, acid mine drainage, impact on flora and fauna, and preservation of biodiversity (Azapagic, 2014). Azapagic’s framework relating to mining sustainability practices has nine variables to be considered with measurable indicators. However, his framework does not cover mandatory mine closure plans and relevant regulations to enforce such plans at the end of the life cycle of mining and safer storage of nuclear waste after uranium mining. Therefore, I have added two additional variables to the framework by Azapagic. The variables proposed by Azapagic (1 to 9) and the two additional variables proposed (10 to 12) are summarised in Table 8.1. Further, I have proposed the ability to measure indicators under the header ‘capacity to measure’ to the framework of Azapagic (2004) supplemented by additional comments.

TABLE 8.1 SUMMARY OF KEY SUSTAINABILITY ISSUES ASCRIBED TO ENVIRONMENT

No	Variable	Capacity to measure	Comments
1	Loss of biodiversity	Yes.	Need baseline data on pre-mining biodiversity conditions via an inventory before the commencement of mining operations.
2	Release of emissions to air (dust, toxic elements including acid mine drainage)	Yes.	Need clear, measurable indicators to measure emissions before and during the operation.
3	Increased carbon footprints contributing to local and national global warming	Yes.	Can be measured, but in current mining regulation, this aspect has not received much attention due to the absence of legislation to obtain regular reports from at least from large mine sites.
4	Loss of flora and fauna	Yes.	Need baseline data on pre-mining flora and fauna conditions.

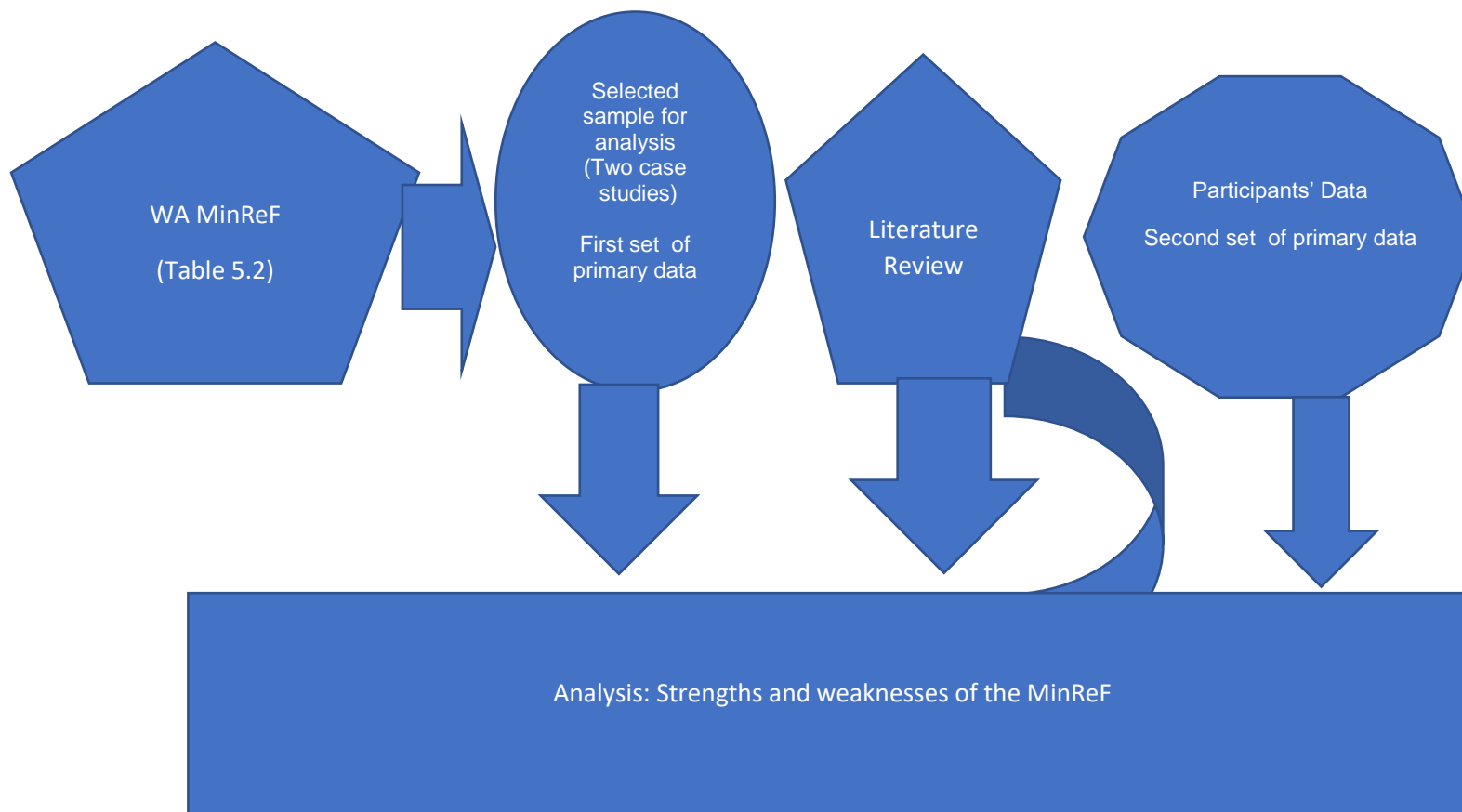
5	Impact on land, and inability to restore land & mine rehabilitation	Yes	Need clear measurable indicators to measure emissions during the operational phase of mining
6	The quantity of solid waste (tailing) Storage of uranium tailing (waste products in storage facilities)	Yes, (only estimated amount could be quantified)	Need to ensure proper waste storage facilities relevant to each mineral. Azapagic's framework does not have specific reference to uranium waste facilities. The waste material of uranium mining contain harmful radioactive material, and they should be kept in proper storage facilities (World Nuclear Org).
7	Liquid effluent pollution and related impacts	Estimated amount of effluent pollution.	Need regular reports with clear measurable liquid effluent pollution indicators during the operation of mining.
8	Use of water for mining and approaches adopted for sustainable water usage	Yes	Need regular reports with clear measurable water usage indicators during the operational phase of mining
9	Discharge of effluents and leachates (including acid mine drainage) to the physical environment	Yes	Need regular reports with clear measurable indicators during the life cycle of the mining operation
10	Availability of mine closure plans submitted when mining proposals are submitted.	Yes	Submission of mine closure plans (MCP) with mining proposals and their capacity to address all relevant environmental impact due to mining.
11	The applicability of mandatory legislation that enforces mining companies to implement mine closure plans.	Yes	Having a mine closure plans are not sufficient unless there are regulations binding companies to allocate funding to implement MCPs.

(Sources: Based on Azapagic, 2004 & Govinnage 2018)

“Environmental protection” is applicable and relevant to all the variable listed in Table 8.1. However, only limited legislation and regulations listed under the MinReF (Table 5.2) have legislative authority to regulate the variables listed therein. For example, under the *Environmental Protection Act 1986* variables two (air, noise and water pollutions); loss of flora (variable four); and liquid effluent (variable seven) may be regulated. Under the *Environmental and Biodiversity Act 1999* concerning biodiversity (variable one) could be monitored. However, the *EPBC Act* only addresses the large projects with significant environmental components. The *Mining Rehabilitation Fund Act 2012* addresses mines operated under the *Mining Act*. Hence, it has no authority to address mining rehabilitation of large resource projects managed under the State Agreements. In this study, my focus of the regulation on environmental protection primarily addresses biodiversity and mining rehabilitation work.

Figure 8.1 provides a conceptual model of the data sources used for the analysis of the MinReF in this chapter.

FIGURE 8.1 DATA COLLECTION FOR THE ANALYSIS OF THE MINING REGULATORY FRAMEWORK



8.2 Data description

To address the research question and four objectives of this research project, I used three sets of data: two sets of primary data and one set of secondary data which includes the information collected from an extensive literature review. The first set of primary data includes relevant State and Federal, legislation, regulations and policies as listed in Table 5.2. The legislation and regulations ratified in the Parliament are considered primary sources though they sit outside the reviews of the academic and grey literature (Coen,³⁸ 2018; University of New South Wales, n.d.; Adelaide University, n.d.).³⁹ Court decisions in case law and Acts of Parliament enacted as legislative instruments are also considered a source of primary data in a legal context (ibid). The first set of primary data includes the legislative instruments covering the Acts of Parliament and relevant to the scope of this study, such as the *Mining Act* and the *EPBC Act* etc.

The second set of primary data used for the analysis and the discussion in this chapter is drawn from qualitative data from individual interviews with a group of research participants (n = 16). A summary of the participants' professional categories and their work experience is listed in Table 8.2. Secondary data was also used from academic literature as well as the government agency reports. Based on the literature review, it was possible to use theoretical insights and "frame" the analysis of the interview material (Dekker, 2017, p.127).

8.3 Description of the research participants

For the analysis in this chapter, I interviewed sixteen research participants who are professionals with significant knowledge of the WA's mining sector. Some of them collectively had over a century of corporate memory with expert knowledge relevant to the scope of the study. For example, I estimated that three independent researchers I interviewed (see Table 8.2) had a collective corporate memory of nearly 70 years having worked in the public sector with responsibilities under the *Mining Act* and the State Agreements.

The research participants generally expressed their opinions openly, shared their views on the strengths and shortcomings of the legislation they are familiar with based on their past or present work. Five of the sixteen participants (Table 8.2) are academics and two of them were

³⁸ The issue about the primary concerning legislation was also discussed with Marilyn Coen who is the Librarian, Humanities, Curtin University (Coen, 2018).

³⁹ Legislation exists in two principal forms: Acts/Statutes, and delegated/subordinate Legislation, such as rules, regulations and by-laws. The Commonwealth now refers to delegated Legislation as legislative instruments (source: university of Adelaide, n.d.)

domiciled in other States but have published their work relevant to the scope of this study. All the academic participants expressed their opinions, views freely and also discussed their research by providing theoretical insights into the issues I raised with them (See Appendix B). The openness and frank opinions shared by the participants during the interviews could be due to two reasons. They are: (i) written assurance conveyed before the interviews confirming that their names, positions or agency name would not be revealed in the thesis, and (ii) the participant's awareness that this research had been approved and conducted according to the ethics policy of Curtin University involving human participants in social research.

Of the sixteen participants, four were well-informed public servants who have been working in the public sector holding regulatory responsibilities relating to mining and environmental legislation. Two participants were lawyers whose work related to mining laws in Western Australia. The three independent researchers have investigated issues related to the mining industry either as part of their academic research or work they have been engaged in the public sector agencies. Due to the mining industry's impact on the community, opinions from the broader community also solicited by interviewing two stakeholders working as opinion leaders on mining and environmental work.

Table 8.2 provides a profile of the sixteen research participants.

TABLE 8.2 SUMMARY OF EXPERTISE OF RESEARCH PARTICIPANTS

Nos	CATEGORY	AREA/S OF EXPERTISE
4	Regulators	The four participants had worked in key regulatory agencies. Their work experience covered environmental regulations, ecology, policy development and mining reform agendas of WA with an 'estimated corporate knowledge' of over 100 years.
2	Lawyers	The two lawyers had worked on key mining regulatory work primarily in WA. One of them had work experience in the WA public service.
5	Academics	All five participants had published books and, peer-reviewed journal articles covering issues such as mining sustainability, corporate social responsibility, licence to operate, uranium regulation and environmental protection issues. Three participants had practical knowledge of mining regulatory framework of WA and related subjects. One of the five participants is a practising lawyer.
3	Independent researchers	These participants had an 'estimated combined' work experience and collective corporate knowledge of over 70 years. All three of them had worked in the WA Government agencies responsible for some aspects the MinReF legislation. One of them had published a postgraduate dissertation on sustainable development, corporate governance focusing on the bureaucratic structure of one key government agency managing key legislation come under the MinReF of WA.
2	Other Stakeholders	These two participants represented the community interest issues on mining, environmental protection and also acted as public voices on such issues.

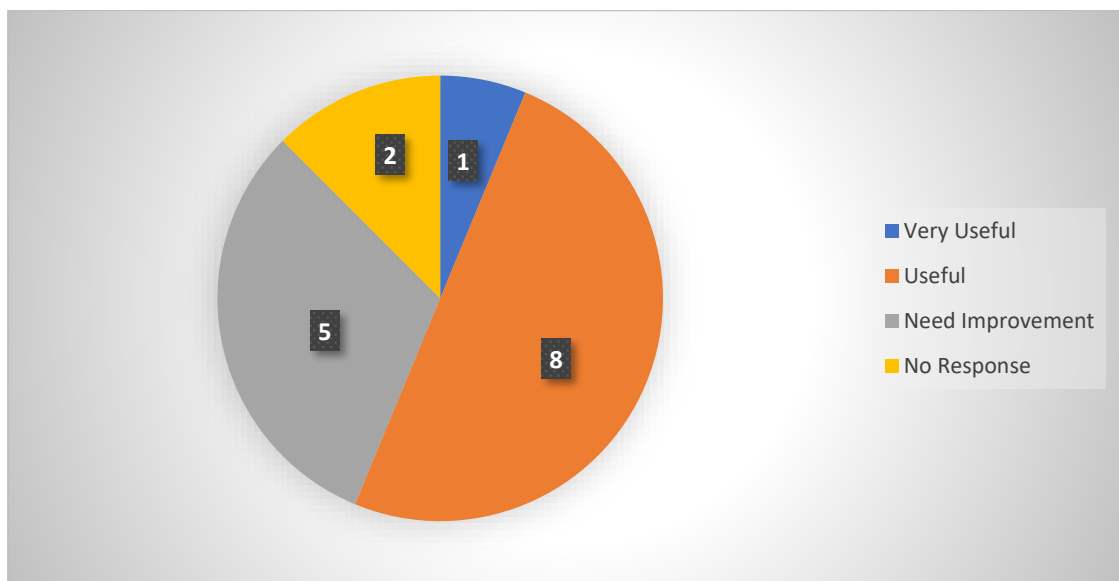
(Source: Primary research data)

The research participants do not include any representatives from mining companies which was a deliberate decision because of the regulatory focus of this research project. My objective was to understand the opinions and the perspective of the regulators rather than

how mining companies perceive or implement mining regulations. There is a need for such an investigation, but it is outside the scope of this PhD study.

A copy of the questionnaire used to gather qualitative data during the face-to-face interviews is presented in Appendix B. It contains all the key question I asked the participants. The first question was about the legislative definition of 'environmental protection'. Figure 8.2 represents a snapshot of the participants' opinions on 'environmental protection'.

FIGURE 8.2 PARTICIPANTS' VIEWS ON ENVIRONMENTAL PROTECTION



(Source: Primary data (n= 16))

Two participants did not respond to the question about the usefulness of the current definition of environmental protection. Eight of the interviewees found it useful, while five were of the opinion that it needs improvements. Only one person was of the opinion that the current definition is very useful. These responses indicate that there is some divergence of opinions and, in-depth face-face interviews helped shed light as to why this was the case. In essence, the mining regulatory framework of WA has both, weaknesses and strengths. They are discussed in the remainder of this chapter.

8.4 The Strengths of the WA mining regulatory framework

According to Chandler (2014, 165), the WA mining legislation is robust. Chandler notes:

“WA legislation provides a strong and comprehensive basis for regulating the environmental impacts of mining. But legislation alone cannot guarantee an effective regulatory regime.” (Chandler, 2014).

The Auditor General of Western Australia highlights that some aspects of the mining regulatory framework have worked effectively, such as the collection of Royalties (WAAG, 2011, p. 18). In a similar vein, some of the research participants also highlighted the strengths of the MinReF, as follows:

“if you consider the mining regulatory framework to be beyond the Mining Act, i.e. the Environmental Protection Act, the Water Act and other things, then we do have some reasonable pieces of legislation which, if implemented properly, have the potential to protect our environment.” (Participant # 2: External Stakeholder.)

“The strengths are that if you are really concerned about a project – that it’s really causing a problem – you can close them down. You know, overnight you can just close them down. That’s – you can say cease production, and that’s the real strength.”
(Participant # 12: Independent researcher)

Another research participant provided an insight highlighting another strength of the MinReF:

“The EPA provides the Minister with its considered advice based on everything that it has heard, what the companies have put in, whatever else it has found. However, the power – the strength of our system is that the Minister then looks at it more broadly and s/he then has to defend it to the public” (Participant #10: Regulator).

Although the above opinion highlights the power of the Minister as a positive feature of MinReF, this can be a double-edged sword as any person who holds this portfolio could disregard any advice based on empirical evidence pointing to negative impacts on the environment. For example, the former Environmental Minister, Albert Jacob overruled the EPA advice against approving the Yeelirrie uranium project (Shepherd & Tomlin, 2017).

A research participant who was a lawyer with significant experience in resource law in WA emphasised the strength of the MinReF:

“The strength is that there’s a lot of – legislatively the framework is actually really strong in WA and there’s also a pretty good history of environmental research and collecting environmental data and using environmental knowledge within the State”.

(Participant # 3: Lawyer)

Another participant highlighted the powers of the legislation under the MinReF:

“One is – it does force mine developers to think through their actions, their consequences, to quantify them, to predict them and to show how they are going to either avoid, mitigate or offset those impacts. And that discipline is there. It is enforced... And under the more recent legislation, them having to account on an annual basis how much environment they disturb, what kind of and what they are doing to redress that each year, rehabilitate each year where they can. So, those are the strengths from an environmental point of view” (Participant # 10: Regulator).

Despite the legislative provision for annual environmental reporting, the submission of annual reports by mining companies has not been enforced. According to the WA Auditor General:

“[o]nly 55 percent of sampled operators submitted their required Annual Environmental Reports (AERs) to DMP to provide regular information on whether they are minimising their impact on the environment. When the AERs were not submitted, DMP rarely followed up with the operator or took action (Western Australian Auditor General, 2011, p.8).

However, the Auditor General provides evidence that the agencies have not had in place strategies to coordinate and follow up on regulatory compliance. Furthermore, the participants highlighted some inherent weaknesses of the existing mining legislation which are described in section 8.5.

8.5 Research findings

This section outlines seven main findings which were identified from the analysis of the collected data supported by the review of legislation, and data collected from the research participants and literature review. The seven findings are: (i) inherent weaknesses of key legislation; (ii) unclear demarcations and overlap of legislation; (iii) ambivalence and dichotomy of the mining regulatory framework; (iv) lack of coordination of mining regulatory framework and multi-agency roles; (v) absence of an apex agency to coordinate mining regulations; (vi) delays in introducing environmentally-centric legislation; and (vii) lack of adaptive capacity, and these are discussed below.

8.5.1 Inherent weaknesses of key legislation Acts

In this section, I investigate a sample of mining legislation based on the data gathered from the legislative analysis (primary data), and perspectives gathered from a group of research participants. The sample of the legislation include: *Rights in Water and Irrigation Act 1914*; *Mining Act 1978*, *Mining Rehabilitation Fund Act 2012*, State Agreements, the *Environmental Protection Act 1986* and *Environmental Protection and Biodiversity Act 1999*.

8.5.2 Rights in Water and Irrigation Act 1914

This century-old *Act* regulates the rights in water resources and addresses the provision of water, management of water resources, and protection of water resources (*Rights in Water and Irrigation Act 1914*, p.1). Under section 26GX (d) of the *Act*, the Minister in charge of the portfolio has the authority: (i) to “provide water at sustainable levels of use; and (ii) the environmental impact of developing those sources” (*ibid*, p.52). However, the *Act* does not stipulate how to achieve the provisions of “sustainable use” of water, and the environmental impact indicating the weakness of this century-old legislation.

8.5.3 Mining Act 1978

The *Mining Act 1978* (*Mining Act*) plays a vital role in issuing different types of mining tenements. Any company – large or small, or an individual who wants to obtain a prospector’s licence or mining tenement cannot undertake any mining activity in WA without receiving the appropriate licenses under the *Mining Act*. Hence, it plays a crucial role within the MinReF. The *Mining Act* which evolved from the *Mining Act 1904*, is a symbol of the dynamic nature of the legislation under the MinReF. It has been amended 70 times, and as of 1 July 2015, the regulations associated with the *Act* have been amended 116 times (Hunt et al. 2015, p.7). These amendments primarily deal with administrative issues. A research participant confirmed the evolving nature of the *Act*:

“The Mining Act has evolved where if you go back to, you know, the 1904 Act, there’s been an evolution where environmental aspects have slowly been incorporated and we’ve gone through this year [another]...” (Participant # 8: Regulator)

Despite its evolutionary nature, the *Mining Act* has limitations as it has to operate under other legislation which limits its jurisdictional powers. As stipulated under section 6 (1) of the *Mining Act*, it needs to be operated under the *Environmental Act 1986*. A research participant who had served in the WA’s EPA confirmed the role and its limited jurisdiction powers:

“The Environmental Protection Act prevails over the Mining Act and if there is a dispute about the definition of “environment” and what should be included or what not, then the Environmental Protection Act will prevail over the Mining Act, if the two are in operation” (Participant # 11: Academic).

Hunt (2009) who has analysed various statutory issues of the *Mining Act* notes:

“As an instrument of government policy relating to mining, the Mining Act establishes the basic ground rules for finding and securing rights to mine minerals”. (Hunt, 2009, p.15).

The subordination nature of the *Mining Act* takes away its capacity to enforce environmental regulations. Another weakness of the *Mining Act* is that only recently it had been given powers to solicit Mine Closure Plans (MCPs). The 2011 Amendments to the *Mining Act* granted authority to call for MCPs when mining proposals are submitted for approval (DMP, EPA, 2015, p.4). By that time many major mineral projects in Western Australia have already been approved and were in operations. Hence, mine closure plans which are essential elements of environmental protection have only been incorporated into the *Mining Act* 40 years after it was enacted, leaving thousands of mining licences and tenements outside this provision.

The jurisdiction of the *Mining Act* is also subject to the powers of other legislation under the *Native Title Act 1993* (WA). According to Hunt et al., 2015:

“It is essential to consider the effect of the Native Title Act 1993 about exploration and mining on lands subject of native title” (Hunt et al., 2015, p.63).

A research participant who is an academic, and a practising lawyer highlighted that the *Mining Act* had incrementally evolved to accommodate environmental concerns:

“I don’t think we can say that the Mining Act as such was geared towards protecting the environment, but certainly over the years in its various iterations it has, I guess, adopted more favourable terms concerning the environment. But in the end, the Mining Act is not so much about protecting the environment. It is about facilitating mining activities” (Participant # 4: Regulator).

In a similar vein, a regulator considered the *Mining Act* as a mere rule book for granting mining tenements:

“From a purely philosophical point of view, the Mining Act is really about the rules. How does the government give out exclusive rights to explore or mine? So, it’s the exclusive right to carry out an activity.” (Participant # 8: Regulator).

Another participant who represents the community voices on environmental protection highlighted the limited powers of the *Mining Act*:

“There is no object in the Mining Act for protection of the environment. It is not an object of the Mining Act. There are no head powers in the Mining Act which empower the Department of Mining and Petroleum, the agency that gives effect to the Mining Act – there are no head powers to empower them for environmental protection. Instead the Mining Act has different objects and the objects of the Mining Act are to assist and facilitate the Environmental Protection Act using the Mining Act” (Participant #: 2, Stakeholder).

Since the enactment of the *Mining Act*, it never had regulatory powers to enforce mine rehabilitation which is an essential condition of environmental protection. Therefore, the Western Australian Government had to introduce a new regulation outside the *Mining Act* on mine rehabilitation through the *Mining Rehabilitation Fund Act 2012*. The evolution of the *Mining Act* indicates adding critical regulatory conditions such as mine closure plan (MCP) with new mining proposals which became mandatory in 2011 due to an amendment to the *Act*. However, each MCP submitted under the *Mining Act* is now subjected to the *MRF Act* for mine rehabilitation as the *Mining Act* has no jurisdictional powers on mine rehabilitation (Participant # 8).

8.5.4 Mining Rehabilitation Fund Act 2012

The *Mining Rehabilitation Fund Act 2012 (MRF Act)* was enacted in 2012. It has three objectives: (a) establishment of a Mining Rehabilitation Fund; (b) declaration of abandoned mine sites of the State and a non-refundable annual levy payable; (c) granting the authority for collecting the levy (DMIRS, n.d., MRF Act, 2012). The *MRF Act* became mandatory on 1 July 2014 (DMP, 2014). It is critical to recognise the enactment of the *MRF Act* which became a mandatory law for mines operating under the *Mining Act*. However, both the *Mining Act* and the *MRF Act* has no authority over the State Agreements (Morrison-Saunders et al. 2014), used for approving and managing large-scale resource projects including the uranium and coals mining operations discussed in two case studies in Chapter Seven. Despite the enactment of the *MRF Act*, it has no authority to request mine rehabilitation work of 64 projects operating under State Agreements (See Table 5.3).

A participant—a senior regulator, involved with mining regulations highlighted the fragmented structure of the MinReF, and questioned the rationale of having a separate legislation on mining rehabilitation (MRF Act) external to the *Mining Act*:

“We have introduced the MRF, mining rehabilitation fund; that was a separate Act. In some respects, I would have said, you should have stuck it in the Mining Act”.
(Participant # 8: Regulator).

8.5.5 State Agreements

State Agreements (SAs) are unique pieces of legislation first enacted in 1952 which continue to provide the legitimacy and support all major resource projects in WA (Barnett, 2014). According to the Government of Western Australia, a State Agreement “is a legal contract between the Western Australian Government and a proponent of a major project within the boundaries of Western Australia” (Government of Western Australia: Department of Jobs, Tourism, Science and Innovation. n.d.; para 3). Barnett describes SAs as legislative instruments that “allow the whole of State government requirements to be managed under a single Act for each [large-scale] project” (Barnett, 1996; p.315).

At present, there are 64 SAs which are considered active (djtsi.wa.gov.au, n.d.), and they are listed in Table 5.3. One of the inherent weaknesses of the SAs is that they do not operate within the current mining legislation (Southalan, 2016; Hillman, 2006). Each SA begins as a contractual negotiation between a company and the State Government, and companies negotiate what they expect the government to offer various privileged conditions sometimes

lower Royalty rates. One example of special conditions granted under a SA is the *Yeelirrie Act* which was granted special conditions as listed in Chapter Seven (Table 7.2).

Another weakness of the SAs is that any conditions on environmental regulatory compliance especially the mine rehabilitation work incorporated in them cannot be operationalised because the *MRF Act* has no jurisdictional powers over State Agreements. I analysed the environmental regulations incorporated into the *Yeelirrie Act* in Chapter seven, and how the uranium project was approved. In the second case study, I explained how the coal mines have been managed for many decades but have contributed to adverse environmental effects in the Collie Region due to inherent weaknesses of SAs. In both cases, the embodied environmental regulations have not been applied to ensure environmental assurance. Further, I found that the mining rehabilitation work at the end of mine operations have not been enforced as the embodied regulations are not mandatory. During a parliamentary debate which took place in 2016, the minister in charge of SAs under the State Development Portfolio confirmed that mining rehabilitation work under coal mines could not be guaranteed (Chapter seven, section 7.3.6). As a result, the mining companies can walk away at the end of mine's life cycle of projects operated under SAs (Participant # 8). The reasons are twofold. First, the SAs do not come under the current mining rehabilitation legislation (*MRF Act*). Second, the SAs are developed through negotiated agreements by granting benefits to multi-national and local companies ignoring public interest, such as environmental protection. All SAs are operating above the existing mining laws in WA (Southalan, 2016; Hillman, 2006).

The SAs do not demonstrate transparency under governance principles—a characteristic of public policies operating in liberal democratic societies focusing on public interests (Porter & Phillips, 2007; Ogus (2004; 2004a). The way economic benefits and incentives have been granted to companies under State Agreements (SAs) ignoring public interests, and also contravening environmental conditions and compliance as the current mining rehabilitation legislation (*MRF Act*) is not applicable to SAs. When discussing the uranium case study, I provided a list of exclusive benefits granted to the first owner of the uranium mine project through the *Yeelirrie Act 1978* (Chapter Seven; Table 7.2).

Once the conditions of the contractual agreement in each SA is finalised through negotiations between the government and a mining company, each Agreement needs to be ratified in the Parliament as legislation (Hillman, 2006). Once a SA is ratified, the conditions therein are fixed for the life cycle of the project. This issue was confirmed by a research participant—a senior regulator who stated:

“We are not really worried about the State Agreement, and they’re fixed in stone and the only way we can change it is, if there’s agreement between both government and the companies” (Participant # 8: Regulator, emphasis added).

The plausible reason for the Government of WA to be comfortable with the SAs may be since 80 per cent of the Royalties collected as income from mines comes from the projects under State Agreements opposed to 20 per cent from the mines operated under the *Mining Act* (Barnett, 2014). The same participant explained why the government is comfortable with the current status of the SAs despite their inherent weaknesses of not considered under the WA mining rehabilitation legislation, i.e. the *MRF Act*:

“Most of the Royalties come from State Agreements, which Charlie Court did years ago. It’s very much related to iron ore. Not all the iron ore operations in WA are under State Agreements. You’ve also got some of the heavy mineral sands downstream processing, petroleum as well. So, yeah, it’s quite a lot” (Participant # 8: Regulator).

Despite the significant income from mining Royalties from the projects under the State Agreements, there are adverse environmental impacts as mine closure plans and mining rehabilitation work are not mandatory for mines operating under SAs. Hence, there are financial liabilities and sovereign risks for unfunded environmental consequences; an issue identified in the Collie coal mining as discussed in Chapter Seven. There are 17,000 abandoned mines in WA (Government of Australia: Media Statement, December 2014, para twelve). Research participant # 8 highlighted the unfunded liability concerning the mine closure plans of projects under SAs. Mining companies could walk away at the end of the life cycle of mining without mine rehabilitation as the environmental assurance conditions of SAs are not mandatory. Participant # 8 highlighted this regulatory gap in SAs:

“What are the liabilities? Funded or unfunded? The answer I got for what it’s worth is under the Mining Act with the MRF, there’s a narrative that says the potential – the liabilities are funded and money for defaulting. However, for the State Mining Act agreements, the older ones, it is unfunded liability. If the companies walk away for some reason, there is an unfunded liability” (Participant #8: Regulator).

As the mining rehabilitation is a key issue of environmental protection whether the unfunded liabilities could be addressed under the WA environmental protection legislation need to be

explored. The next section provides a description and issues concerning the Environmental Protection Act 1986.

8.5.6 Environmental Protection Act 1986

As outlined in Chapter Five (section 5.7.2) the *Environmental Protection Act 1986 (EP Act)* comes under the jurisdiction of the newly re-structured agency now known as the Department of Water and Environmental Regulation (DWER). The *EP Act* was legislated eight years after the enactment of the *Mining Act*, and also has the authority to protect various environmental issue including vegetation conservation (EP Act, 1986, p.91). There is a hierarchy of mining regulatory framework, and the *EP Act* sits on top of other legislation. A participant confirmed the same:

“The Environmental Protection Act is sitting at the top of the pile and then you’ve got other acts underneath it in various relationships to each other” (Participant #:11, Academic).

Further, the *EP Act* carries an authority to prosecute individuals or corporations for criminal negligence (EP Act, p.89), and has the power to declare environmentally sensitive areas, (Op. cit, p.91). The jurisdictional power of the *EP Act* is broader than the powers under the *Mining Act*.

The DWER is also responsible for providing guidelines for Environmental Impact Assessments under the *EP Act*. A “review” was carried out by a team of independent lawyers (Quinlan, Heenan, Govinnage, 2016) in In 2016. According to the review, “the EPA’s current policy structure is inadequate to provide the necessary guidance for all users of the documents and ... this situation adversely affects both the use and the development of policy instruments generally”. (ibid, p. viii). About the agency’s power in conducting environmental impact assessments, Quinlan et al. note:

“The conduct of an environmental impact assessment and resulting report under s 44 of the EP Act is clearly “administrative action” that can be subject to judicial review and may be declared invalid where it is occasioned by an error of law. Nevertheless, there are a number of features of the EPA’s powers which distinguish it from those usually exercised by administrative bodies” (Quinlan et al., 2016, p. vi).

The findings of the Quinlan et al., reveal that despite the powers of the *EP Act*, the way it has been implemented has flaws, leading the agency to develop “several ‘types’ of policy instruments with different purposes” (ibid).

In addition to the implementation functions of the *EP Act*, the DWER has a responsibility of implementing the Federal *EPBC Act*, and the issues relating to this function are discussed in the next section. The *EP Act* also has some responsibilities of mine closure planning work in WA. According to a publication titled *Administration of Mine Closure Plans*:

“[E]xisting operations that are not administered under the Mining Act 1978 and mine closure is not regulated under the Environmental Protection Act 1986. Operators are expected to liaise with the appropriate regulator(s) about requirements for mine closure planning and are encouraged to have in place mine closure planning and implementation consistent with these guidelines” (dmp.wa.gov.au: Administration of Mine Closure Plans, Section 8).

The words “existing operations that are not administered under the *Mining Act*” refers to the SAs. However, mine closure is not regulated under the *EP Act*, hence this represents a regulatory gap that cannot be managed by the *EP Act* to enforce mine closures of the projects come under the SAs.

8.5.7 Environmental Protection and Biodiversity Act 1999

The *Environmental Protection and Biodiversity Act 1999 (EPBC Act)* incorporates regulations for the protection of the physical environment including biodiversity in all Australian States and Territories, and natural and culturally significant places (*EPBC Act*). Under section 45 of the Act, the Federal Government has the authority to have bilateral agreements with State and Territories (Australian Government, *EPBC Act*: s. 45). A bilateral agreement under the *EPBC Act* is now in operation, and the WA Environmental Protection Authority states:

“The Western Australian Government (WA) has signed a new assessment bilateral agreement with the Commonwealth Government under the Commonwealth’s Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act*). The agreement was signed on 3 October 2014 and came into effect on 1 January 2015. The agreement allows WA to assess proposals likely to have a significant impact on the environment on behalf of the Commonwealth. The Commonwealth will still make the

approval decision under the *EPBC Act* relying on the WA assessment report. (Office of the Environmental Protection Agency. February 2015, para one & two).

The Federal Government has delegated the administration of the *EPBC Act* to the Western Australian Government through a Memorandum of Understanding (MoU) which became effective 1 July 2015. (Ibid) The MoU states:

“The purpose of the MoU is to set out the agreed arrangements that will be pursued by the Commonwealth and Western Australia to deliver a one-stop shop for environmental approvals under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and State legislation, removing duplication in assessment and approvals processes, while maintaining environmental outcomes (Commonwealth of Australia: Memorandum of Understanding, 2015)”.

However, a question remains whether the Federal Government has delegated the ‘legislative authority’ of the *EPBC Act* to the EPA, as the MoU is not a legal document. Sections C & D confirm that the;

“MoU is not a legal agreement. However, both Parties commit to using their best endeavours to achieve its purpose” (ibid, p.2).

The validity of the MoU could not be verified due to the absence of literature and court cases on this issue. The validity of the Australian Government’s MoU has not been challenged or tested in a Court of Law at the time of writing this thesis (August 2018).

In the uranium case study in Chapter Seven, the environmental approval process under the *EPBC Act* is discussed by outlining the conditions that would have been evaluated under the *Act*. Four months before the Commonwealth and State bilateral agreement came into effect, the *EPBC Act 1999* was audited by the Australian National Audit Office (ANAO). According to the ANAO audit report (2014) titled *Managing Compliance with Environment Protection and Biodiversity Conservation Act 1999 Conditions of Approval*, the administrative arrangements of the *EPBC Act* have not functioned adequately:

“Nearly 14 years after the enactment of the *EPBC Act*, Environment [Dept.] is yet to establish mature administrative arrangements to effectively discharge its regulatory

responsibilities in relation to approved control action” (Australian National Audit Office, 2014, p 16).

This issue was followed up to seek clarification on the audit finding on the *EPBC Act* from the Federal Government. Mr Greg Hunt, the then Minister for Environment responded by explaining the follow-up work undertaken in response to the ANAO Report (2014). The response from the then Federal Minister for Environment is given in Box 8.1.

BOX 8.1 THE FEDERAL GOVERNMENT’S RESPONSE TO THE NATIONAL AUDIT REPORT ON THE EPBC ACT

In response to the questions posed in your letter [2 April 2016], the Department of Environment (The Department) has implemented a number of measures to meet the recommendation of the performance audit. These include:

- A new Compliance Monitoring Program based on risk
- A risk prioritisation tool, developed in collaboration with Commonwealth Scientific and Industrial Research Organisation (CSIRO). The tools enable the Department to focus its efforts towards those approval that post the greatest potential risk to matters of national environmental significance.
- Standardisation of business practices and upgrade to it systems.
- More than 60 standard operating procedures are now in place to support compliance monitoring activities. Enhanced it systems have also improve the Department monitoring, compliance and intelligence capabilities.
- A quality assurance framework to ensure performance bench marking, review and continual improvement to compliance monitoring activities.

(Source, Greg Hunt. Minister for Environment (2 April 2016) Personal Communication (Appendix C)

(Source: Greg Hunt: Minister for Environment (2 May 2016) Personal Communication)

The response from the former Federal Minister for Environment reveals four issues. Firstly, the Federal Department of Environment has initiated action to address the adverse audit findings on Australia’s peak environmental legislation i.e. the *EBPC Act*. Secondly, the dependency of technology by introducing “more than 60 standard operating procedure to address an administrative shortcoming of the legislation. Thirdly, the legislative monitoring of centra versus periphery, i.e. as the *EPBC Act* now has been delegated to WA (and also other States and Territories), the compliance procedures should take place at the periphery (at the State or Territory level and not at the centre. Fourthly, the combined responsibility and in particular the monitoring of the *EPBC Act* being undertaken at the Federal level as per the

communication from the former Federal Minister for Environment (2013-2016). Under the Australian Constitution, the State agencies have no jurisdictional powers to make changes to Federal legislation, and in this context, the Federal *EPBC Act*.

8.6 Unclear demarcations and overlaps of legislation

The WA Auditor General's (WAAG) audit report (WAAG, 2011) is the first publicly available evaluation of the strengths and weaknesses of the mining regulatory framework of WA. The Auditor General observed that the framework could create “the potential for overlap, repetition or gap” (WAAG, 2011, p17). This observation can also be used as a baseline to find out how issues have progressed since 2011.

The participants shared a variety of opinions primarily highlighting the negative aspects of the framework. Two different perspectives were provided about the overlaps and duplication of the MinReF by two participants from two agencies responsible for two different roles on mining regulations. The first opinion emphasised the difficulties encountered by the mining companies due to overlap and duplications of legislation:

“When you go through the [mining] approval process, there’s actually a fair bit of overlap between the information that you might need to provide and also the conditions that may be imposed if your [proposal] get approved” (Participant #5: Lawyer)

Another participant also noted overlaps and duplication of legislation as significant weakness of the mining regulatory framework. Further, the participant provided a summary of the current situation highlighting the downside of the multi-agency structure:

“Yes, I think it is to do with the number of regulatory agencies that are involved, but that’s pretty much symptomatic of the fact there’s overlapping legislation as well... So, in my opinion, you want to streamline the number of different agencies that are involved. But to do that I believe you’d actually have to have legislative reform because, you know, the EPA and DWER are there essentially, because of the Environmental Protection Act. We’re there because of the Mining Act. You know...the water—Department of Water and other water agencies are there because of their various bits of legislation... a lot of them haven’t been updated since the 1920s and the 1940s. And then you get the Commonwealth agencies as well, obviously, because of the Environment Protection and Biodiversity Conservation Act. So, yes there’s – I think streamlining the number of

agencies that are involved, purely from a regulatory point of view is vital”
(Participant #5: Lawyer).

Concerning the old water-related legislation, the participant was referring to the *Rights in Water and Irrigation Act 1914* and the *Country Areas Water Supply Act 1947*.

This participant’s opinion was also validated through secondary data. The WA Auditor General observed:

“As well as spreading the requirement to provide assurance, the framework also creates the potential for overlap, repetition or gaps, and complicated processes for operators and agencies to navigate. Minimising these risks needs clear roles and responsibilities, effective coordination between agencies, sound internal processes and effective planning (WAAG, 2011, p.17).

Despite Auditor General's findings seven years ago, no significant improvements have taken place except name changes and shifting of roles from one agency to another:

“The Department of Mines, Industry Regulation and Safety was created on 1 July 2017 with the amalgamation of the Departments of Mines and Petroleum and Commerce. These structural changes are part of the WA Government’s State-wide public sector reforms. The new department will regulate the mining, building and construction industry with an elevated focus on worker safety. It will also assume consumer protection responsibilities’ (DMIRS, n.d., para. 9).

One plausible explanation for the continued overlap and duplication of legislation could be found by examining the “lead-agency” discourses of the individual agencies responsible for implementing an uncoordinated legislative framework (WAAG, 2011). Due to multiple agency structures of MinReF, some departments have developed unique organisational cultural discourses by providing “lead agency” narratives about their specific roles and responsibilities. The term “lead agency” has been defined as an “agency responsible for coordinating the approvals process (Premier and Cabinet, n. d. p.4). For example, in 2014 DMP claimed that it is the lead agency for regulating the mining industry in WA:

“Department of Mines and Petroleum is the lead agency for regulating mining and petroleum exploration and development activities. The environmental regulatory role of

Department of Mines and Petroleum operates within and contributes to the State and Federal regulatory framework.” (Government of Australia: Department of Mines and Petroleum, 2014, p.1).

Further to the lead agency discourse of the DMP, the then Department of State Development also claimed its role about the lead “agency for major resource, and industry infrastructure projects” (DPC., n.d., p.10). These agency narratives which are not embodied in legislation indicate that each agency’s claim for being the “lead agency” and, these narratives could be attributed to the ambivalence, and the dichotomy of the mining regulatory framework which is the focus of the next section.

8.7 Ambivalence and dichotomy of the mining regulatory framework

The term ‘ambivalence’ is used in this section in a legal context though it is also used in other disciplines. Sociologist Bauman (1991) in his work titled ‘*Modernity and Ambivalence*’ define ambivalence as “the possibility of assigning an object or an event to more than one category” (p.1). Further, he identifies two notions of ambivalence. According to Bauman, the first notion represents a feature of waste and the second—a weakness (p.15). Bauman’s second notion of weakness as embodied ambivalence is in alignment with the legal interpretation of the concept. For example, in Burton’s Legal Thesaurus (2007), the term ‘ambivalence’ denotes meanings such as dubiety, incertitude, indecisiveness, and indetermination suggesting that it is both a weakness and uncertainty. The additional term “dichotomy” which I added to this description indicates a contrast or duality.

The ambivalence and dichotomy of the MinReF are due to having two systems of mining regulations; one operating under the *Mining Act* and the other regulating the large resource projects under State Agreements. The unclear demarcation of legislation under the MinReF, allows both ambivalence and dichotomy are enabling one segment of the mines to be managed under the *Mining Act*, and exempting the projects under the State Agreements from the mandatory conditions such as mining rehabilitation. The dichotomy of the mining laws has engraved two sets of mining laws in WA, against the governance and equity principles under the Rule of Law where every individual and legal system should operate on the same level playing field as in other Capitalist Democratic Western societies.

Further, when it comes to environmental protection of mining, the regulative powers of environmental protection are divided under five State agencies with fissured boundaries (Chapter Five, Sections 5.6.1 – 5.8.1). While the *Mining Act* now has authority to request for

Mine Closure Plans along with new mining proposals, the final adjudication of the environmental protection rests with the *EP Act* which comes under the Department of Water and Environmental Regulation. Another example of the dichotomy of the MinReF is the division of the State and Federal legislation. Section six of the *Mining Act* states that environmental issues concerning a mining proposal which has significant environmental components (such as in approving uranium mining), needs to be evaluated under the *EPBC Act* which “is the Australian Government’s central piece of environmental legislation (Australian Government: Department of Environment and Energy (n.d., para 1).

The dichotomy of the mining legislation in WA is visible with regard to mining rehabilitation work as the current legislation (*MRF Act*) has limited authority. The *MRF Act* applies to all mines operated under the *Mining Act*, but it has no jurisdictions over the projects operated under State Agreements confirming two sets of legislation on mining rehabilitation work in WA. This particular feature of MinReF can be described as ‘legislative dichotomy’. Further insights into the dichotomy of SAs can be explained using the ‘politics of regulations’ and roles of government institutions and regulatory functions using theoretical discourses relevant to this study. Anthony Ogus (2004 & 2004a), explains relevant theoretical discourses using economics theories and ‘public interest policy’. Ogus’ work helps to understand the dichotomy of the mining legislation in WA. Ogus’ study (2004, pp 31 - 41) on regulation was first published in the 1990s. He examines the fundamental changes in the relationship between the state and the industrial sector. Utilising economic theories, Ogus critically examines how public law has been employed to regulate the industrial actors by offering benefits. Further, Ogus provides a systematic and comparative overview of the underlying forms of theories that drive social and economic regulation. He provides a case for the parallel existence of two sets of frameworks. The first set includes “public interest” theories that drive the effort to improve social and economic welfare in society. In the second set of economic theories, he suggests that regulations aim to satisfy the needs and demands of private interests. Ogus’s second set of the theory is helpful to explore why the State of Western Australia maintains two parallel systems of mine approval and management by favouring a class of mining companies operating under the SAs. Due to having two systems of mining approval; one depends on the *Mining Act* and the other using State Agreements, and the latter favouring companies that are willing to invest funds to undertake huge projects such as uranium mining in WA (Cameco Australia.com, 2015).

The ambivalence of the mining legislation also poses issues when it comes to mining reform agendas as the responsibility of which is divided among three agencies (DMP, 2014, p. 5).

For example, mining regulatory reform program (2012 - 2015), initiated by the Department of Mines and Petroleum had to operate in parallel with two other agencies:

“Over the past few years...Western Australian State Government agencies have ... progressed with implementing environmental regulatory reform programs. The three agencies with significant environmental regulatory responsibility in the mineral and energy sector (Environmental Protection Authority, Department of Environment Regulation and Department of Mines and Petroleum) regularly collaborate on reform proposals which are of an administrative, systems and legislative nature.” (Government of Australia: Department of Mines and Petroleum, 2014, p.5).

The above statement also confirms the multi-functional nature of the various agencies responsible for environmental regulations under the MinReF indicating the need for a better coordinated regulatory system.

8.8 Lack of coordination of the mining regulatory framework and multi-agency roles

During the first formal evaluation of the WA mining regulatory framework, the WA Auditor General (WAAG, 2011) noted two key issues relating to the difficulties of coordinating legislation and regulations that come under the MinReF. They are: (a) “The regulatory framework around the mining industry has been established over time”; and (b) “there are numerous agencies and pieces of legislation involved” (WAAG, 2011, p.14). Although the Audit report does not provide further analysis of these two issues supported by theoretical explanations, they are crucial to understand the factors of unclear demarcation and overlap of legislation. Further to the issues noted by the Auditor General, during this study, I identified five other features of the MinReF. They are: (a) the evolution of the legislation and regulations; (b) the drivers that influenced the form and shape of the structure of the regulatory framework; (c) the diverse roles and uncoordinated functions of the implementing agencies; (d) the current mode of formal and informal communication between implementing agencies and (e) the risks associated with the framework.

I have already identified two of the five features stated above. In Chapter Five (Section 5.2), I covered the historical factors, identified and listed (Table 5,2) how all key legislation and regulations have evolved since the enactment of the *Mining Act 1904* up to 2017. I also described in Chapter Five how two mining reform agendas had been implemented—the Keating Review (2009), and the Mining Reform Agenda (2012 – 2015) as drivers of legislative reviews and introduction of new legislation. For example, the enactment of the *MRF Act* in

2012, and the aborted *Mining Amendment Bill 2015* which aimed at introducing risk and outcome-based regulatory system (Chapter Five; section 5.3), which ended up with a Parliamentary inquiry due to community concerns (Chiat, 2017, para one).

In Chapter Five (section 5.6. – 5.8.1) of this thesis, I have already discussed the roles, functions and legislative jurisdictions of the implementing agencies and introduced various key legislation come under each agency. As the legislation and regulations come under the MinReF are implemented through a multi-agency system, it is now essential to identify how the legislation and regulation to explore how effectively they have been implemented. The WA Auditor General (WAAG, 2011) provides an insight using a term a term “dispersed approach” about the lack of evidence to “provide overall assurance on compliance with conditions” (Op. cit, p.17) highlighting “that no agency is responsible for providing assurance on overall compliance with conditions placed on mining (ibid). The WAAG further notes:

“Individual agencies report on aspects of their own activity and performance. For agencies other than DMP, mining is not their key activity and is not reported specifically. While DMP reports on mining issues, no agency reports on the overall compliance of industry, or on whether conditions provide the intended outcomes” (ibid).

However, the Auditor General does not explain the reasons for his finding. Three reasons were identified using the primary data. To gain insights into the issue of the “overall compliance”, I asked one of the research participants—a senior official with responsibilities on mining regulation focusing on the coordination of State Agreements between agencies:

“There are processes. Sometimes State Agreements are written in or approved by the State Development, but then it must be approved by the Minister for State Development. It also must be approved by the Minister for Mines as well. So, there is a lot of coordination and a lot of my people do a lot of work for the DSD because they say, ‘Here’s a State Agreement; under the Act this has to be done.’ The Act may say the Minister for Mines will grant this, but they still must go through the process even though at the end the minister must do it. They still have to do the process”. (Participant #:8; Regulator).

The above response provides an insider’s perspective on how both the formal and informal communication between two agencies takes place. Another participant who is a lawyer and

an employee of a key regulatory agency provided insights into the “regulatory layers” that exist within and between agencies and the difficulties encountered:

“The challenge is the way the agencies been set up; it’s almost like a splitting up of different aspects of the environment. So, you’ve got water; you’ve got heritage, you’ve got mining. Sometimes it’s split by industry, and sometimes it’s split up by the actual environmental issue. You’ve got parks and wildlife – so they focus on biodiversity – water, heritage, mining and everything else. So, whilst there is a common purpose. Obviously, when you start breaking everything up into individual components and having agencies specifically look at those components, there’s the ability for things either to be missed. As I’ve said before, there’s gross overlap and duplication”.

(Participant # 5: Lawyer)

The participant’s views were similar to observations of a radiologist examining an X-ray to diagnose an illness of a patient. The participant who used his legal and observational skills diagnosed a problem with communication between various components of regulations, highlighting how agencies interact. According to the participant, the agencies involved in mining regulatory functions have to deal with “chunks of regulatory responsibilities” in an environment already burdened with “gross overlap and duplication” of regulations. This is a good departure point to examine the fourth factor, identified at the beginning of this section: risks and outcomes of the regulatory framework.

The overall finding including the analysis of the two case studies and insights gained from research participants, three issues can be identified. First, the “fragmented nature” of regulatory functions that come under the MinReF. Second, the reasons for the fragmented nature of the MinReF could be attributed to historical reasons as the current framework has evolved through a legislative metamorphosis over 100 years, and how agencies have emerged to manage uncoordinated regulatory functions (participant # 5). It is important to note that both agency structures and legislation assigned to them do not fit into a well-designed montage of the regulatory framework. Third, is the Auditor General’s observation that the “regulatory framework around the mining industry “is large and complex...” (WAAG, p.14). The complexity of the regulatory framework has not added structures and processes to strengthen it, make it weaker, especially monitoring gaps and identifying weaknesses. Another research participant who was a member of an environmental advisory committee summarised the situation as a one-line statement confirming a weakness of the MinReF:

“That’s it– the monitoring end has been the weak end for 50 years!”

(Participant # 11: Academic).

In this context, it is important to consider the information provided by another participant about the fragmented nature of mining regulations. For example, according to the participant, the *Mining Act* is legislatively “fragment” as it does not cover all aspects of mining regulations as it operates within a dichotomised mining regulatory framework. The participant’s opinion supports the presence of features of the dichotomy and fragmented nature of the mining regulatory framework (Box 8.2).

BOX 8.2 A REGULATOR’S VIEWS ON THE FRAGMENTED NATURE OF MINING REGULATORY FRAMEWORK

“Safety is an integral part of mining, but it is a separate Act. And probably from a practical point of view having a separate Act means it’s quite clearly defined, and it’s tacked on to it. The other jurisdictions are going the other way where you put everything together... but having separate Acts! This is the safety bit, that’s that bit. You know, you could actually merge safety into the *Mining Act*, but **you’ve always got the environment, you’ve got other things**, and, basically, all you do is to have Sections; this part is for safety. This part for that etc – when you look at any of these Acts, they tend to do that anyhow. So instead of having a separate Act, you’ve still got the same Act, but you’ve got quite a few sections there. And that’s another way of doing things, right?

But you tend to end up with legislation that gone through a historical context, and the way you end up is really based on history... So, we’ve ended up with separate safety, but [part of] the environment is in the *Mining Act* and part of the new *Amendment Bill* was to take all the bits and pieces out and put it into one section. We’ve introduced the MRF, mining rehabilitation fund; that was actually a separate Act. **In some respects, I would have said, you should have stuck it in the Mining Act.**

(Source: Participant # 8: Regulator; emphasis added).

It is evident how history has played a role in forming and influencing the shape and form of the MinReF. Also, due to the evolutionary nature of the legislation various “bits and pieces” have been allocated to different agencies over time. When the gaps of the existing legislation were identified rather than amending relevant legislation with shortcomings or gaps, new Acts have been developed as separate legislation e.g. enactment of the *MRF Act* and the Regulations under it. Table 5.8 provided a timeline of the mining rehabilitation legislation in WA which includes several separate legislation related to mining rehabilitation. When perusing Table 5.8, a few important questions emerge. One is the amendment made to the *Mining Act* in 2010 to grant authority to request Mine Closure Plans (MCPs) when a new mining proposal is submitted. It was a positive action to address an obvious gap which had prevailed since the enactment of the *Mining Act* in 1978. When the MCP’s are received under the *Mining Act*, another team in the agency evaluates them, and some MCPs are referred to the EPA (Participant # 8). Though this practice sounds irrational, the receipt and evaluation of the MCPs by another part of the DMP (Environmental Division) may be due to the expertise (specialisation) required to evaluate MCPs. The practice of separation of action concerning the evaluation of MCPs by a separate team may be understood using the theory of “Bureaucracy” by Weber (1952, 2015), where he has written about specialised skills among the workforce to do various tasks based on employees technical skills. However, four years after the 2010 amendment to the *Mining Act*, when the DMP proposed new changes to the *Act* under the 2012 - 2015 Mining Reform Agenda, the Government considered the tenement holders to submit environmental reports by identifying “environmental risks” in a flexible manner (Government of Western Australia: Department of Mines and Petroleum, September 2014. p.8). Review of these practices and uncoordinated actions by agencies suggests the reason is the lack of a whole of government resource policy and not having an apex level organisation. An apex level organisation can monitor various practices of agencies responsible for implementing legislation and review and identify contradictory actions, gaps and deficiencies by supporting the improvement of the MinReF continuously.

The third issue about the MinReF is the overall ambivalence and dichotomy of the mining laws discussed in section 8.7 of this chapter. In this context, the emergence and the use of State Agreements (SAs) need to be reviewed considering the merits and demerits of SAs as discussed in Chapter Five (section 5.5). The first State Agreement was ratified in the early 1950s (Barnett, 1996) when policies on environmental assurance, technology and work conditions were different. The need for legislation to enact large resource projects would have been justified under the conditions prevailed at that time. However, if the same practices are still applied especially the absence of mandatory environmental protection conditions under

SAs, it raise questions about the management of State Agreements. Monitoring of legislation is essential as some of the legislation (*Mining Act*) is subject to change on a regular basis. (Hunt et al.,2015 p.7). However, this requirement has not been considered for projects operated under the State Agreement

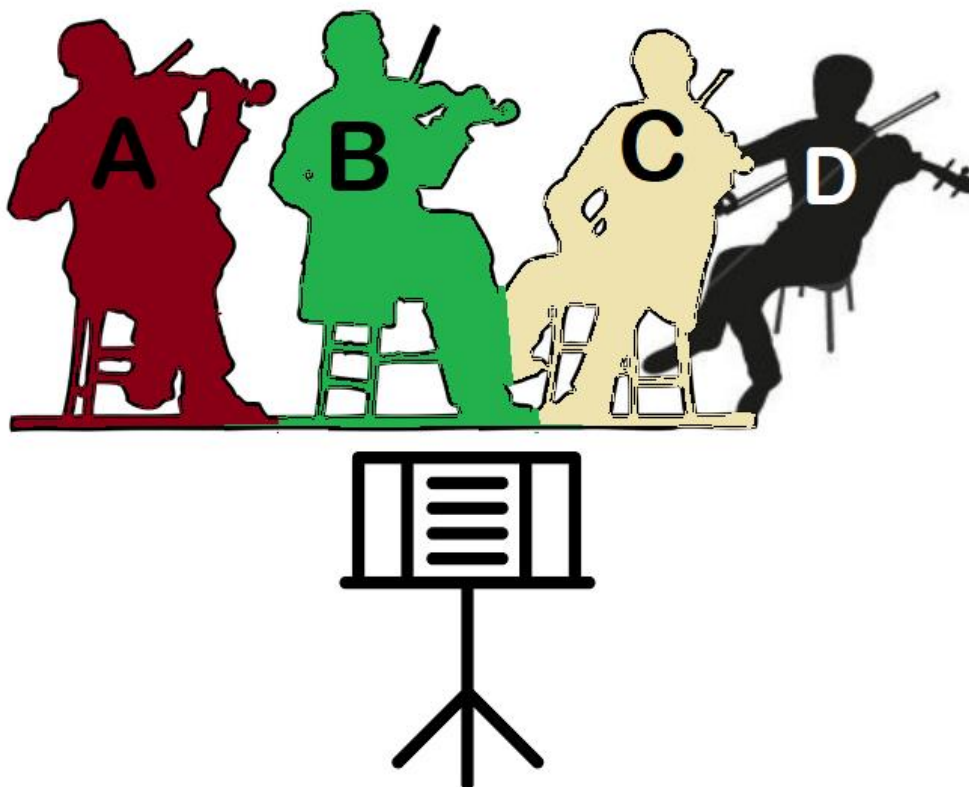
With the above issues in the background, I now want to focus on how to address the issues and weaknesses of the MinReF to justify the need for establishing an Apex Level Agency (APA) for effective coordination of legislation and regulations that come under the MinReF using an analogy. The use of analogies, metaphors and concepts for effective communication has been discussed in relations to disciplines such as sustainability, (Larson, 2014); public policy, (Guess and Farnham, 2011; and also, in educational psychology (Ausubel, Novak, & Hanesian, 1978). Concepts have been defined as particular sets of objects, events, symbols, properties, or situations that can be classified under one or more shared characteristics and are given common identifying labels or symbols (Merrill & Tennyson, 1977). Larson (2014), an ecologist by training, highlights the usefulness of analogies and metaphors in sustainability. I coined the phrase: “mining regulatory symphony of Western Australia” (MRSWA) to explain and highlight the need to address the long-felt and identified need of addressing the overlap and lack of coordination; a significant weakness of the MinReF confirmed by the findings of this study and other literature (WAAG 2004, 2011).

In my analogy, I consider the implementing agencies under the MinReF as “players” (actors) of a musical symphony playing their single musical instruments (legislation) without the direction of a conductor. I adopted the definition of a symphony as “extended musical composition for orchestra in several movements” (Dictionary.com, n.d.). When compared the current situation of the WA mining legislation, and the ‘Bureaucracy’ responsible for implementing them through multiple agencies having “several movements”, the analogy—the “mining regulatory symphony of Western Australia” (MRSWA) could be justified. It conveys that each agency responsible for a function under the MinReF makes just one or two musical movements (sounds) using one or two instruments (legislation) without the directions of a conductor (absence of a whole-of-government direction). Then it becomes clear that individual performance could not bring a harmonised “sound of music” as in a musical orchestra or a symphony. Without a conductor to emphasise and justify having an Apex Level Agency (ALA) to coordinate the different legislative functions of the mining regulatory symphony of WA that do not have

systems and strategies at present, for coordination and monitoring the legislation and regulations under the MinReF effectively.

Figure 8.3 provides a visual representation of the analogy of the “mining regulatory symphony of Western Australia”.

FIGURE 8.3 MINING REGULATORY SYMPHONY OF WESTERN AUSTRALIA



(Govinnage, 2018)

Legend: The people, A B C D with musical instruments symbolises the environmental regulatory agencies such as Departments of Mines, Petroleum, Industry, Resources and Safety, and Water and Environmental Regulation

The empty lectern symbolises the absence of a conductor, representing the absence of an apex level agency to coordinate the mining regulatory framework.

The participants’ responses also justified the MRSWA analogy. A participant commented on the nature of the framework:

“The framework is comprehensive, and it covers everything, but it is actually not targeted and streamlined enough. There’s a lot of overlap and duplication, so there’s a loss of efficiency, and sometimes there’s over-regulation”

(Participant # :7 Manager/administrator – Environmental compliance).

The research participant’s words such as “not targeted and streamlined” support the notion that the mining legislative framework has no entity and procedures for overall coordination. As a result, each agency plays their legislative instruments in the absence of a conductor as in a musical orchestra or in a symphony with no conductor to direct and harmonise the music of various instruments used by the players of a symphony. During my interviews with the participants, I also asked their opinion about the weaknesses of the MinReF as a standard question⁴⁰ enquiring whether lack of coordination among agencies could be better explained by using the WA’s “mining regulatory symphony” analogy.

A senior regulator responded:

“We have a symphony, but I think sometimes there’s dissonance. I’m not sure if that dissonance is orchestrated in a healthy way, so that there’s healthy tension or if it’s just someone didn’t tune their instrument very well. I honestly don’t know. But you’re right. There are many actors. I think for significant developments, significant mining proposals, and most of them are pretty significant in the end; I think it’s appropriate that we act as the conductor” (Participant #10: Regulator).

To provide a few more insights, I am quoting directly from a transcript of the interview with one of the participants:

“INTERVIEWER: Do you think that there’s a strong symphony of legislation taking place, but there is no conductor? There is no apex level body to coordinate. You need a conductor to have orchestrated symphony! This is my original idea; there’s a wonderful instrument playing, but it’s not coordinated properly. Do you agree? Is it a good analogy?”

⁴⁰ The question I asked should not be considered as a “leading or a biased question” because before the interviews, I had acquainted myself with all the literature and knew the weaknesses of the MinReF as per the findings of the Auditor General (WAAG, 2011). On this occasion, my objective was to obtain feedback to validate the use of the analogy only. See the original question in the: questionnaire for Participant (Appendix B).

PARTICIPANT: I think it's a beautiful analogy and I agree with it. It speaks eloquently to the issue. In the end, it's the community that's the conductor. This is the job of the community in a way" (Participant #4: Academic/Lawyer).

Another participant, a retired senior public servant who had worked in key agencies responsible for resource development, and now an independent researcher with an overall experience of over 30 years also commented on the 'Mining Symphony Regulation' analogy.

"I would suggest that you just change your analogy slightly because you're trying to create a model. It's not a symphony without a conductor. It's, basically, a symphony with each of the players coming to the concert with a different sheet of music. So, when you think about those agencies, it's that each of those agencies says they're looking after the environment, but they have other responsibilities, and they weight the environment against those other responsibilities. So, the department, our old Department of Industries and Resources, it would have had a greater emphasis on getting the project happening than it did getting the environment working. So, its sheet of music in front of it when it turns up to the concert is we're going to play a sheet of music, we need state development, and we'll try to look after the environment as we do it. The other musical player that came along, the EPA; it came along with a sheet of music, which was we must look after the environment and if it's going to impact state development, so be it. My argument is you have an orchestra of people who all have different musical scores in front of them" (Participant #15: Independent researcher).

The participant's insights into the conflicting objectives of the agencies are useful to understand the lack of coordination of mining regulations:

The next section outlines the need for an apex-level agency to address the weaknesses of the MinReF identified in this chapter.

8.9 Absence of an apex level agency to coordinate mining regulations

The analysis of the strengths and weaknesses of MinReF confirmed that there is no apex-level agency to coordinate the mining regulatory framework in WA. The bureaucratic structure responsible for implementing various legislation under the MinReF confirms that they are implemented through a multi-agency approach, and each agency with its jurisdictional powers managing uncoordinated regulatory functions that come under each agency. The WA Auditor General also provided some insights into this issue in 2011 (WAAG, 2011).

WA has a history of over 120 years of bureaucracy centred around one key Department which is now known as the Department of Mines, Industry, Resources and Safety (DMIRS). The first bureaucratic agency to manage the mining industry in WA was established on 1 January 1894 as the Department of Mines (State Records Office of WA, n.d., para one). The name of the agency was changed as the Department of Minerals and Energy on 1 July 1992 (ibid). Since then the agency has undergone several names changes, and assumed its current name on 1 July 2017 by merging the bulk of the Department of Commerce with the former Department of Mining and Petroleum” (DMIRS. 2017, para three). Further to DMIRS, there are four other agencies implementing mining related regulations in WA. They are: (a) Department of Water and Environmental Regulation (DWER); (b) Department of Jobs, Tourism, Science and Innovation (DJTSI); (c) Department of Planning, Lands and Heritage (DPLH), and to a lesser extent (d) Department of Biodiversity, Conservation and Attractions. All of these agencies work under specific legislation, and operate under different jurisdictions, but none has any authority to coordinate whole of government mining regulatory work. This gap was first identified in 2011 by the WA Auditor General who observed that a:

“...number of agencies are responsible under numerous pieces of legislation, regulation and policy for monitoring compliance with the conditions placed on mines. The Department of Mines and Petroleum (DMP), the Department of Environment and Conservation (DEC), the Department of State Development (DSD), the Department of Indigenous Affairs (DIA), and the Office of the Environmental Protection Authority (OEPA) all have key roles in regulating mining. The Department of Water (DoW), the Department of Planning, and local government authorities are also often involved”. (WAAG, 2011, p.6).

However, seven years after the above observation by the Auditor General, no successive governments have responded to the findings as the same agency structure still exists today under different names such as DMP becoming DMIRS and DSD which carry responsibilities

for SAs now named DJITIS. When perusing the legislation listed in Table 5.2, it becomes clear that the agencies responsible for mining legislation, regulations and policies have been adding a few more legislation since 2011. The mining legislation enacted by the State of Western Australia since 2011 are listed in Table 8.3.

TABLE 8.3 MINING LEGISLATION ENACTED BY THE WESTERN AUSTRALIAN GOVERNMENT SINCE 2011

YEAR	LEGISLATION	AGENCY
2011	WA Environmental Offsets Policy – 2011	EPA/DWER
2011	WA Environmental Offset Policy and Guidelines	EPA/DWER
2012	Water Services Act 2012	DoW/DWER
2012	Mining Rehabilitation Fund Act 2012	DMP/DMIRS
2013	Rehabilitation Fund Regulations 2013	DMP/DMIRS
2014	Agreement between the Commonwealth of Australia and Western Australia relating to environmental assessment ⁴¹	DWER [EPA]
2015	The Mining Legislation Amendment Bill	DMIRS [DMP]
2015	Guidelines for Preparing Mine Closure Plans	DMIRS/DWER [DMP/EPA]
2016	Abandoned Mines Policy, 2016	DMIRS [DMP]
2016	Biodiversity Conservation Act 2016	DBCA
2017	Restriction of Uranium mine approval policy	DMIRS

(Source: State legislation and regulations as listed above)

⁴¹ The Commonwealth Government confirms the Memorandum of Understanding “signed with Western Australia (WA), setting out governments’ commitment to the process, timing for implementation of the policy, and key principles”. Source: <http://www.environment.gov.au/protection/environment-assessments/bilateral-agreements/wa#current-assessment>

8.10 Delays in introducing environmentally-centric legislation and regulations

Analysis of the mining regulatory framework confirmed the delays in of introducing legislation in Western Australia. Enacting legislation takes time, and it is not an easy task. For example, considering the time consumed to replace the *Mining Act 1904* with the current *Mining Act* is over ten years which is more than two times the life cycle of two Federal Parliaments. The list of legislation included in tables 5.2 represent a wide variety of legislation and regulation developed since 1904 and there are only few legislation covering environmental protection. However, these additions are single pieces of legislation, and no legislation exists to coordinate multiple agency functions to avoid duplication and improve coordination on environmental compliance.

There is no statutory reporting or public information on the cost of developing legislation. The timeline (Table 5.2) of WA mining legislation is an indicator to understand the time consumed to develop mining legislation and regulations. For example, after a review of the *Mining Act 1904*, it took twelve years to develop, enact and proclaim the *Mining Act 1978*, and to repeal the 1904 Act. Taking twelve years to replace one single piece of legislation is equivalent to four times of the life of the Federal Parliament. Though the inquiry into the old *Act* commenced in 1970, it took ten years to develop and enact the new *Mining Act 1978*. Although the new *Act* was enacted in 1978, the proclamation of the *new Act*, and the repeal of the *Mining Act 1904*, took place on 1 January 1982. (Hunt et al., 2015 p.10). Hunt et al. (2015) explain the reasons for this delay. There had been “many tenements under the old Act” including “74 coal mining leases, 85 mineral leases and 4 licences to treat tailings” and they were “all [needed] to “remain current” before the new *Mining Act* was proclaimed. Though the additional archival material was not available to ascertain other reasons to identify the four-year delay to proclaim the new *Act*, it indicates ineffective mining tenement management prevailed in the late 1970s. Mining rehabilitation legislation was not included into *Mining Act* by adding mining rehabilitation regulations. Instead, the Government introduced separate legislation under the *MRF Act* in 2012, and it became mandatory on 1 July 2014 (*MRF Act*; Gorey, McHenry, Morrison-Saunders, Mtegha, & Doepel., 2016)

When reviewing the issues behind the second mining reform agenda from 2012 to 2015 with only one legislative outcome (*MRF Act*), but no results from the efforts to amend the primary objective (amendment of the *Mining Act*). It is another example of delays to introduce much needed environmental regulations into the MinReF. Although, the first formal mining legislation was enacted in 1904, it took over 80 years to introduce environmental protection regulations i.e. the *Environmental Protection Act 1986*; and over another 25 years to introduce

the *Mining Rehabilitation Fund Act 2012*. One plausible reason for this delay might have been the lack of environmental awareness as the global sustainability agendas emerged only after the publication of *Our Common Future* in 1987. The global sustainability drivers and how they have influenced the mining industry was discussed in Chapter Two. About the delays of legislating the *MRF Act*; one participant provided feedback explaining why the mining rehabilitation regulation was not added into the *Mining Act*.

*“We are not going to have a separate Act. We will have a separate Section.” We have introduced the MRF, mining rehabilitation fund; that was a separate Act. **In some respects, I would have said, you should have stuck it in the Mining Act.***

*They said, “Oh, it is convenient to have a separate Act because then we do not have to worry about things.” But you’ve got the MRF, which is the mining rehabilitation – it is more attuned—if you’re going to do environmental aspects in the Mining Act, but **the rehabilitation of abandoned mine are not in it, it doesn’t make sense!**”* (Participant #8: emphasis added).

This insider’s perspective provides insights that do not appear in the literature on introducing mining rehabilitation legislation in WA. Another example of delays and not initiating action to rectify the gaps is that the State Agreement have not been reviewed to add mandatory environmental conditions. Though the first State Agreement was enacted in the early 1950s (Barnett, 1996), a formal evaluation of the SAs did not take place until the WA Auditor General carried out an audit on SAs and tabled a report in the Parliament in 2004 (WAAG, 2004). However, 14 years after the 2004 Audit Report on State Agreements, no follow-up action such as introducing mandatory environmental compliance regulations into the SAs have not taken place. A participant provided an insider’s perspective for guarding SAs and why any State policies or structural changes have not been made to SAs.

*“**Under the State Agreements, we don’t look at the environmental aspects. So, we brought in the MRF— mining rehabilitation fund...No; it doesn’t impact on State Agreements.** So, there’s been informal discussions, why don’t you do it? We’ve also got – under the State Agreement there may also be some environmental aspects, but that’s covered by Department of State Development. We don’t do it”* (Participant #8: Regulator; emphasis added).

The participant’s explanation revealed three issues. First, is that “guarding of SAs” implies the economic incentives of the SAs providing about 80 per cent of Royalties from the WA mining

operations. Second, the confirmation about the limitation of the *MRF Act* as it has no jurisdictions over SAs. Third, the issues about one agency (DMP) "handballing"⁴² the agency responsibility to another (Department of State Development)⁴³ as stated in the Auditor General's Report (WAAG, 2011, p.31).

The delays and inactions to introduce environmental regulation into the SAs could also be attributed to lack of an "adaptive capacity" and absence of a culture of continuous improvement to address gaps and deficiencies of legislation and regulations come under the MinReF. These observations led to identifying the need for a new approach by enhancing adaptive capacity by advancing governance for using theoretical approaches discussed by Cleaver & Whaley, 2018; Karpouzoglou, Dewulf, & Clark, 2016; Holling (1978).

8.11 Lack of adaptive capacity

The overall weaknesses of the MinReF suggest that it needs to be strengthened and interject with new inputs to address the current gaps and deficiencies by introducing processes, procedures for it to be an innovative policy framework. This section describes this concept supported by a new theoretical framework (Figure 8.4). Having identified both the strengths and weaknesses of the MinReF, this thesis proposes the need to introduce a new theoretical framework to be named as "Adaptive Capacity". It is an innovative policy approach to be introduced under the MinReF. In this thesis, "Adaptive Capacity" is defined as "an ability to adjust and make improvements to the mining regulatory framework of Western Australia" (ADMINREF) in response to the changing needs of society to cope with the consequences of the legislative shortfall through innovative policy discourses". Among these inputs include an amendment to expand the scope and the jurisdictional powers of the *MRF Act* 2012. The objective of strengthening the *MRF Act* is to enable it to cover mining rehabilitation work under the State Agreements.

The existing literature provides examples of adaptive governance and coping mechanisms covering subjects such as climate change and social-ecological applications (Karpouzoglou et al., 2016; Vink, Dewulf & Termeer. 2013; Berkes, 2007; Adgar, 2000). However, the literature does not provide practical approaches to address weaknesses in regulatory systems

⁴² I borrowed the term 'hand ball' (handballing) from Australian (Aussie) Rule Football games where 'handball' means 'a player receives a handpass from another player, play continues' (wikipedia.org) to indicate as an analogy.

⁴³ The name of the DSD was changed as DJTSI on 1 July 2017, and the management of SAs still remains with the agency (DJTSI, 2017).

such as the MinReF which has unique characteristics with roots in WA's colonial past. MinReF has legislation with a history of over 100 years which is still being used to regulate access to water for mining activities (Abstraction of *Groundwater: Water and Irrigation Act 1914*) and also new legislation such as the *WA Biodiversity Conservation Act 2016* representing the regulatory needs of an old and a new world.

Cleaver and Whaley, (2018) have introduced a framework— "adaptive governance" in their recent work titled "*Understanding process, power, and meaning in adaptive governance: a critical institutional reading*" (ibid). They present their framework as an emerging concept to examine issues in a changing world with a globalised perspective where the world has new challenges such as climate change and how to gain "legitimacy and endurance" to face such challenges. Further, Cleaver and Whaley (2018) provide insights into understanding processes, power, and meaning of adaptive governance by defining a framework which they describe as "key elements". I found their key elements (ibid) could be used to evaluate the features of the MinReF considering both its strengths and weaknesses. In this context, the issues Cleaver and Whaley (2018) review, and the concepts put forward to discuss "new institutional economics to get the instruction right" (ibid, figure 1, chart 3) is also useful. Their approach identifies an "institutional turn" by focusing on factors covering 'political', 'cultural and historical', 'sociological' "institutionalism" (ibid). The adaptive governance framework as proposed by Cleaver and Whaley, (2018), does not include or discuss "triple bottom" line approach relating to sustainability or sustainable development principles which are relevant to the scope of this PhD study. However, I found the key elements of adaptive governance capacity (Cleaver and Whaley, 2018) as a practical guide to conceptualising the strengths and weaknesses of the MinReF of WA. The key elements of adaptive governance and the strengths and weaknesses of the mining regulatory framework is compared in Table 8.4.

TABLE 8.4 KEY ELEMENTS OF ADAPTIVE GOVERNANCE AND STRENGTHS AND WEAKNESSES OF MINING REGULATORY FRAMEWORK COMPARED

Key elements of adaptive governance	MinReF
Key element (a): Multiple cross-scale institutions	<p>The analysis of the MinReF did not provide substantial evidence of “experimentation”. The mining reform agenda program (2012 – 2015) could be cited as an “experimentation” process that aimed to amend the <i>Mining Act</i> to include environmental provisions. However, the amendments proposed were never approved. (Chapter Five, section 5.3). It is evident that the 2012 -2015 mining reforms have not followed up any of the recommendations from the previous reform agenda (Keating Review, 2009) (Chapter Five, section 5.3).</p> <p>MinReF shows signs of “change”, such as replacing the <i>Mining Act 1904</i> by introducing a new <i>Mining Act 1978</i>, and also enacting the <i>MRF Act</i> in 2012. However, these changes have not addressed gaps and deficiencies, such as introducing environmental compliance under the State Agreements (Chapter Eight; Section 8.5.5).</p>
<p>“Multiple cross-scale institutions facilitate experimentation, learning, and change” (Cleaver and Whaley, 2018, Table 1 – 5)</p>	
Key element (b): Complexity and scale	MinReF
<p>“Social-ecological systems are inherently complex” (Cleaver and Whaley, 2016, Table 1, para 1-5).</p>	<p>The legislation and regulations which come under the MinReF are inherently complex (Chapters Five and Eight). However, this complexity has contributed to overlap of legislation, and lack of coordination among the implementing agencies. There are inherent</p>

	weaknesses in key legislation (Chapter Eight, Section 8.5), poor coordination and information sharing between agencies (WAAG, 2011).
The key element (c): Resilience	MinReF
“The capacity of a social-ecological system to absorb natural or human shocks” (ibid).	MinReF displays some sign of resilience through the evolution of the mining laws that have helped to form the structure of the current framework. However, this capacity has not addressed weaknesses such as lack of coordination and fixing the gaps identified by the Government Auditor General (WAAG 2004 & 2011). The current agency practices instead display ambivalence and dichotomy of legislation. (Chapter Eight; Section 8.7).
Key element (d): Shared vision – multilevel networks of actors	MinReF
“Self-organizing, multilevel networks of actors enable learning, trust, power-sharing, information transfer, and shared visions” (ibid).	MinReF is implemented by “multi-level actors”, but the agencies function as standalone silos. As a result, each agency has developed different discourses, and cultures confine to each agency but have no linkage to “multilevel networks of actors’. The only sharing and shared vision are represented by the <i>Mine Closure Guidelines Policy</i> developed in collaboration between the DMP & EPA (2012). However, these guidelines are not applicable to the State Agreements that provide 80 per cent of the Royalty incomes from mining operations in WA (Chapter Five; section 5.5).

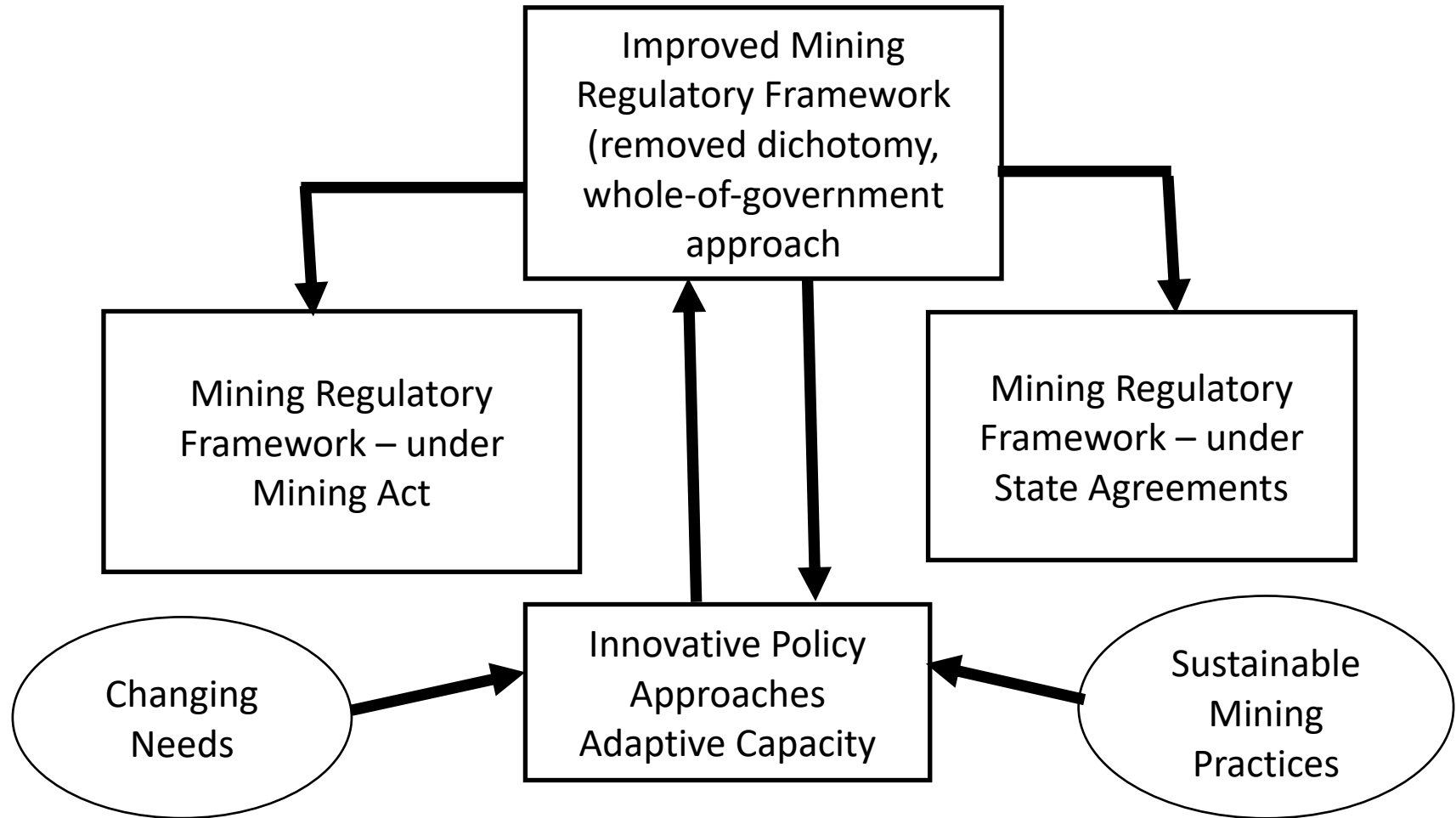
<p>The key element (e): Institutions, adaptation, and social learning Institutions.</p> <p>These are “system of rules, laws, policies, and norms” (ibid).</p>	<p>MinReF does not display any signs of adaptation about environmental protection over the years and lacks effective, innovative policies. i.e. challenges such as climate change and addressing the mining legacies of over a century. Also, the Government of WA has not yet developed a whole-of-government resource development policy or has developed an apex-level agency to coordinate the mining regulatory functions (Chapter Eight, section 8.9.).</p>
<p>Key element (f): Outcomes</p> <p>Outcomes are described as “having a social-ecological resilience lens, assumes adaptive governance” for desired outcomes (ibid).</p>	<p>MinReF</p> <p>The MinReF does not show any specific elements of “social-ecological resilience” as the Government of WA has not managed the MinReF effectively and yet to develop an adaptive capacity for continuous improvements. As a consequence, MinReF represents gaps and deficiencies such as not having strategies to address the legacy of 17,000 abandoned mines. Evidence from the uranium and coal case studies (Chapter Seven) suggests that there are significant sovereign risks concerning future mining rehabilitation liabilities, as the environmental protection conditions therein cannot be enforced.</p>

(Adapted from: Cleaver and Whaley, 2018)

8.12 New theoretical framework

While it is useful to gain insights from the work of Cleaver and Whaley, (2018) to help understand the strengths and weaknesses of the MinReF, their work does not suggest ways and means of further improving the mining regulatory framework of WA. The literature reveals many works by others (Karpouzoglou et al. 2016; Chaffin et al. 2014; Cote & Nightingale 2012; Plummer 2009; Armitage, Plummer, Berkes, Arthur, Charles, Davidson-Hunt, Diduck, Doubleday, Johnson, Marschke, McConney, Pinkerton, & Wollenberg. 2009) who have contributed to help understand how adaptive governance have worked in several areas such as resilience towards climate change, ecosystem management, collaboration, learning and multi-level governance. However, these works are not either directly or indirectly relate to mining and environmental management, hence, cannot be used as a method to address issues relating to the MinReF of WA. As discussed in Chapter Five of this thesis, the WA mining regulatory framework has evolved over a period of 100 years. MinReF consists of many regulations implemented by several agencies. Further to having century-old legislation such as the *Abstraction of Groundwater: Water and Irrigation Act 1914*, it includes legislation such as the *EPBC Act* as an external input from the Federal government to evaluate projects with significant environmental components. Further to the *EPBC Act*, the MinReF also includes several other Federal legislation and regulations that govern uranium mining, radiation control and transportation (see Table 7.4). As a result of the legacies of the past, the WA regulatory framework needs to address issues relating to rehabilitating 17,000 abandoned mines. Due to these unique characteristics of the MinReF, any overseas models or frameworks are not relevant to address and remedy the weaknesses of the MinReF. Therefore, having identified both the strengths and weaknesses of the MinReF, this thesis proposed a new theoretical framework—Adaptive Capacity for the improvement of the mining regulatory framework of Western Australia (ADMINREF). Figure 8.4 provides key elements of a new theoretical framework developed as a conceptual model to improve the MinReF of WA.

FIGURE 8.4 ADAPTIVE CAPACITY FOR THE IMPROVEMENT OF THE MINING REGULATORY FRAMEWORK



In alignment with the work of Cleaver and Whaley (2018); Gunderson (1999), and Holling (1978 & 1996), the ADMINREF incorporates environmental management policies and practices. The argument of learning lessons from past mistakes and adapting to changing contexts and environmental circumstances provides further justification for a new framework. In oppose to the current dichotomy representing two sets of regulatory systems for approving and managing mining activities in WA, the proposed model aims to build on the existing strengths of the MinReF aiming to develop one integrated regulatory framework. The proposed new model (see Figure 8.2) has two main elements—improved MinReF which eliminates the regulatory dichotomy and is managed with a whole-of-government approach, and an apex body which is in charge for the constant adaptation of the MinReF. This framework uses innovative policy approaches in response to inputs coming from changing socio-economic needs and the transitioning of the mining sector to more sustainable practices. The improved MinReF should be able to influence the existing mining operations under the Mining Act, and State Agreements and better align them with the overall requirements for environmental protection. This improved adaptive MinReF continually interacts with the apex body by adopting new approaches and sending signals about unresolved challenges. As the process of adapting and improving MinReF evolves, it is assumed that it may result in reforming the *Mining Act*, *MRF Act* and the State Agreements in some future point in time. However, the new theoretical framework needs to be refined further as it has not been implemented as a policy initiative. It needs to advance and build on the sustainable development principles which are the focus of this study.

The ADMINREF emphasises the need to focus on developing a capacity to cope with changes and uncertainty by continuously enhancing relationships between management interventions and environmental changes as proposed by Cleaver and Whaley (2018) in their work on adaptive governance. Further, Holling (1978 & 1996), and Gunderson (1999) support the need to test environmental management policies and practices as hypotheses, and their works justify developing the ADMINREF as a new framework to suite Western Australian issues, and conditions. However, examining the strengths and weaknesses of the MinReF, one cannot find examples of either testing of hypotheses for improved environmental regulations, let alone critically evaluating untested assumptions proposed to strengthen it. For example, the Government of Western Australia did attempt to test a hypothesis to improve the weaknesses of the MinReF. As discussed in Chapter Five (Section 5.3), the WA Government proposed the mining tenement holders to identify “environmental risks” without suggesting any standard risk management methodology or any practical conceptual model supported by a resource management policy. Had the proposal were implemented by amending the *Mining Act 1978*, it would have ended up with a different type of environmental risks identified by the companies.

To avoid such mistakes, the regulatory agencies need to develop an appropriate framework by evaluating the real issues to be tackled and propose strategies to assure environmental protection.

The above issues were considered in conceptualising the ADMINREF as proposed in this thesis (Figure 8.4). The crucial point to note about many of the attributes associated with the ADMINREF can be justified within the standard spectrum of adaptive governance, the principles of governance, and public interest policy (Cleaver and Whaley, 2018; Fukuyama, 2010, Ogus, 2004), validate the core principle of the proposed new framework. The standard spectrum of governance includes principles such as transparency and the rule of law, under which the equity principle is applied across all issues of lawmaking. These principles would exclude granting privileges for one group of mining operators which is visible in the current use of State Agreements—a unique feature of MinReF which allows regulatory dichotomy with different privileges granted to one group of mining companies.

The proposed new model (see Figure 8.4) has two main elements—improved MinReF which eliminates the regulatory dichotomy and is managed with a whole-of-government approach, and an apex-level body which is in charge for the constant adaptation of the MinReF. This framework uses innovative policy approaches in response to inputs coming from changing socio-economic needs and the transitioning of the mining sector to more sustainable practices. The improved MinReF should be able to influence the existing mining operations under the *Mining Act*, and State Agreements and better align them with the overall requirements for environmental protection. This improved adaptive MinReF continually interacts with the apex-level body by adopting new approaches and sending signals about unresolved challenges. As the process of adapting and improving MinReF evolves, it is assumed that it may result in reforming the *Mining Act*, *MRF Act* and the State Agreements in some future point in time.

8.13 Summary

In this chapter, I analysed the strengths and weakness of the Mining Regulatory Framework of WA using three sets of data. Further, I engaged in a discussion reflecting on the findings of this study and the ability to contribute to new knowledge on the mining regulatory framework of Western Australia. I systematically examined in detail both the strengths and weaknesses and also incorporating the findings of the two case studies. I proposed a new theoretical framework to address the weaknesses of the MinReF and further improve it. The finding from the analysis were presented under seven thematic framework. They are: (i) inherent weaknesses of key mining legislation; (ii) unclear demarcations and overlaps of legislation; (iii) ambivalence and dichotomy of the mining regulatory framework; (iv) lack of coordination

of mining regulatory framework and multi-agency roles; (v) absence of an apex-level agency to coordinate mining regulations; (vi) delays in introducing environmentally-centric legislation and regulations, and (vii) lack of adaptive capacity. If the weaknesses of the MinReF are not addressed, future generations will suffer. The amount of funds required for mining rehabilitation expenditure has not been accurately calculated. Further, the authority under the *MRF Act* cannot remedy the problem of 17,000 abandoned mines in WA. The limited jurisdiction of the *MRF Act* raises the question of whether the government needs to look for innovative approaches from Australia and elsewhere outside the regulatory framework. New approaches need to be explored to determine whether any best practices are available to learn lessons so that the unanswered problems of the WA mining regulatory framework could be addressed.

The next chapter identifies literature on best practices and presents five examples to explore possibilities by addressing the third research question of this PhD study.

CHAPTER NINE BEST PRACTICE MODELS AND ENVIRONMENTAL REGULATORY STRATEGY OF WESTERN AUSTRALIA

9.1 Introduction

This chapter provides examples of best practices and highlights the need to address the problems of 17,000 abandoned mines and calls for change through innovative approaches. This chapter focusses on the following areas. First, I identify the problematics of defining the term 'best practice' to ascertain whether there are standard definitions that I could employ to address the research objective. Secondly, I review literature in a broader context to understand how the terminology has been used in several disciplines, including by Australian and international standard agencies. Thirdly, I examine how two WA Government agencies implementing mining and environmental regulations have used the term 'best practice'. Further, in this chapter, I compare two WA government models. Finally, I provide five Australian and overseas examples as best practices of environmental protection relating to mining operations and rehabilitation work that I consider as "beyond compliance" efforts defined as "environmentally friendly actions not required by law" (Lyon and Maxwell, 2004, p. 240).

9.2 Problematics of defining best practice

The analysis of secondary sources reveals the diverse nature of the literature that provides different meanings to the term 'best practice', both in the context of environmental regulations and other disciplines, such as education, medicine and engineering. All of these disciplines require professional accreditation processes to work in respective areas based on accepted standards. For example, for teaching accreditation in education, a postgraduate qualification is required for school teachers in Australia (Edith Cowan University, n.d.; University of Western Australia, n.d) and the situation is no different in countries like the United Kingdom (University of Dundee). In medicine, even before progressing into specialised areas such as surgery, psychiatry and general practice, formal registration is required to practice medicine and register with an agency in each country of practice (medicalboard.gov.au, n.d.). In engineering, all graduates need accreditation by a national body that reviews and assesses their qualifications. However, in comparison, there is no specialised training for regulators and an accreditation process, except for lawyers, either to work in areas such as regulations or environmental management in the WA public sector. My work experience and observations of practices for over two decades also confirm this. For example, I have worked with geologists who have qualifications in geology, and engineers specialised in engineering work and chemists who have studied specialist tertiary courses to work in their specialised areas of

work, and who were then working in the area of environmental management with no additional formal accreditation on regulatory work. Against this background, it is useful to review the literature on the use of the terminology of ‘best practice’ models to explore opportunities to improve current practices in the mining sector.

The term ‘best practice’ is not a homogeneous or well-defined concept. It has been used to give different meanings to diverse human endeavours in various fields in Australia and overseas. For example, the Australian education sector (Ingvarson, Reid, Buckley, Kleinhenz, Masters, & Rowley, 2014); medical profession representing over 30 different specialised areas (British Medical Journal.com, n.d.); and engineering (engineersaustralia.org, n.d.) have used the term ‘best practice’ within different contexts. In relating to environmental regulation on mining, Australian Federal Government agencies led by high-level politicians have also endorsed different terminology for ‘best practice’ (AGPS, 1995). For example, concerning mining, the term ‘best practice’ appears in one of the Australian Government publications titled *The Leading Practice: Sustainable Development Program for the Mining Industry* (2011) – one of a series of handbooks published to share “Australia’s world-leading expertise” in mine management and planning. It documents various best practices of mining companies across Australia. Canavan and Bishop (2011). The ‘Foreword’ of this publication states that its purpose is to “provide practical guidance on environmental, economic and social aspects through all phases of mineral extraction, from exploration to mine construction, operation and closure” (Canavan and Bishop; 2011, p.i).⁴⁴ However, nowhere in the book the term ‘best practice’ has been defined. It is implied as a synonym to “leading practice”. Also, the term “sustainable development” seems to be seen as a substitute for best practice or “a good way to do business”:

“sustainable development means that investments in minerals projects should be financially profitable, technically appropriate, environmentally sound and socially responsible. Businesses involved in extracting non-renewable resources have come under mounting pressure to embed the concept of sustainability into strategic decision-making processes and operations. In addition to these considerations, responsible corporations have been able to move towards sustainability by developing a range of appropriate stewardship initiatives. Economic development, environmental impact and social responsibilities must be well managed, and productive relationships must exist

⁴⁴ One of the authors of the Foreword’ was the former Foreign Minister. Julie Bishop, and by endorsing the statement in this key publication support my point how different professional and even politicians misjudge when defining terminology.

between governments, industry and stakeholders. Achieving such a situation is simply a 'good way to do business' (Australian Government, 2011, p,7).

The above citation illustrates that the terminology of 'best practice' has been perceived and interpreted differently by agencies of national significance in Australia. The work of Rein & Schön (1993) discussing frame analysis and public policy explains the "argumentative turn in policy analysis and planning" (p145-166) about misjudgements in a policy context. Undoubtedly, the Australian Government's definition of 'sustainable development' is a misjudgement.

There appear to be two ways of understanding the term "best practice". First, as a standard, that is as good practice that everybody should follow and; Second, as exemplary, that is an example of what good performance is possible in a particular area which everybody should aspire to achieve. When used in the first sense, the term 'best practice' is often represented as standards developed by professional bodies. The second serves as an arena for researchers and managers to explore to find ways to improve the current ways of doing things better. To further examine these two terminologies, I identified a few examples from SAI GLOBALA—the Australian standard organisation (Saiglobal.com) which include the term "best practice" representing a range of disciplines and subjects. The samples illustrate how the term 'best practice' has been used by Australian and global standard organisations (Table 9.1).

TABLE 9.1 EXAMPLES OF BEST PRACTICE STANDARDS

STANDARD	TITLE	DESCRIPTION	CATEGORY
SNZ HB 8134.6:2006	Best Practice Guidance for Community Services for People with Dementia.	This is a voluntary standard aim at organisations. Moreover, support workers in home-care programs to assist people diagnosed with dementia.	Standard
SR CWA 16373:2011 (Published by the National Standards Authority of Ireland)	Best practice approach for electromagnetic induction (EMI) measurements of the near surface.	This standard provides approaches to measuring EMI.	Standard
PD ISO/IEC TR 12785-3:2012 Published by the British Standards Institution.	Information technology. Learning, education, and training. Content packaging. Best practice and implementation guide	Under this standard, several guidelines are discussed,	Standard & Guidelines
NSSF 0010	Best Practice: How to survive, innovate and grow in an ever-changing world	This is not a standard but a book that states the strategic and commercial benefits of using standards.	Book

(Source: Extracted from Saiglobal.com. n.d.).

The rest of this chapter adopts the second meaning of the term “best practice” focusing on environmental regulations, namely as exemplary performance. The rationale for selecting the

second meaning is that they deal with mining-related subjects including eco-system and mining rehabilitation as those subjects fall within the scope of the study.

In the academic literature, there are references to examples relating to best practice methods that deal with mining rehabilitation and environment (Morrison-Saunders, McHenry, Sequeira, Gorey, Mtegha, & Doepel, 2016; Gorey, et al, 2016; Finucane, 1995; Best Practice Environmental Management in Mining, 1995) implying the second meaning of the term; “as exemplary, that is an example of what good performance is possible in a particular area which everybody should aspire to achieve”. Examples under the second category include specific approaches to mine closure planning; mine rehabilitation and ecosystem approach to environmental management. For example, Morrison-Saunders et al. (2016) write about integrating mine closure planning with environmental impact assessments. Finucane (1995) appraises a mining company operating in the Pilbara Region in WA on issues such as early planning for environmental management, mine rehabilitation, and an ecosystem approach to environmental management. A journal article titled ‘Best Practice Environmental Management in Mining (1995) describes:

“best practice management is the name given to a joint programme partnership between the Australian mining industry and the Environmental Protection Agency (EPA) to document best practice environmental management in mining” (p.207).

9.3 Regulating environmental protection by Western Australian agencies

In this section, I discuss the approaches adopted by the Department of Mines and Petroleum (DMP) – the main agency responsible for the implementation of environmental regulations in Western Australia. When DMP introduced a regulatory reform (2012 – 2015) among other issues, and proposed changes to the *Mining Act*, and published a series of documents including background information for public consultation. In one of the papers titled, *Environmental Regulation Strategy*, the agency included its objective to introduce ‘risks and outcome based regulatory system’ based on ‘best practice’ (Government of Western Australia: Department of Mines and Petroleum, November 2014. P.1).

To compare different meanings assigned to the term ‘best practice’ by the regulatory agencies on mining and environmental protection in WA, first, I examine two models to further illustrate the point about the subjectivity of the term. Secondly, I compare the WA Government’s proposed ‘best practice’ model for mining regulation against the principle of regulatory design principles by Gunningham & Sinclair (1999).

9.3.1 Best practice model of the Department of Mining, Industry, Resources and Safety

In this section, I discuss how DMP/DMIRS has introduced the 'best practice' terminology below. In reference to the second mining reform agenda (2012 – 2015), the Department of Mines and Petroleum (DMP/DMIR) introduced its 'regulatory reform' proposals as follows:

“DMP continues to focus on ensuring that resources development in Western Australia occurs in a manner that is safe, environmentally acceptable, and achieves community confidence.

Over the last four years, the Western Australian Government has implemented substantial improvements in reforming approval processes. Consistent with this reform strategy, in May 2012 DMP announced the implementation of its Reforming **Environmental Regulation (RER) program to fully integrate risk and outcomes-based approach to implement the principles of best practice environmental regulation into its regulatory functions**. The petroleum industry has been regulated under risk-based legislation since 2000, and the necessary legislative framework for mining is currently under development (Government of Western Australia: Department of Mines and Petroleum, November 2014. *Environmental Regulatory Strategy*. P.1, emphasis added).

In the same document, the DMP/DMIR describes the agency's “regulatory strategy in alignment with the principles of best practice government administration” (ibid, p.4). The government best practice model as proposed by the mining regulatory agency DMP/DMIRS is of particular interest to this research. The DMP's proposed environmental strategy (2014) includes a model suggesting the agency's approach to adopting a risk and outcome based best practice:

“The strategy model of the Department of Mines and Petroleum is described as aligned with the following way of delivering environmental regulation in the State:

“Effective – DMP's service delivery contributes to the achievement of environmental outcomes

Targeted – DMP's service delivery is targeted on minimising risk to environmental outcomes

Proportional – DMP's service delivery is proportional to risk or harm.

Predictable and consistent – DMP's service delivery is predictable and consistent according to clear standards, procedures and guidelines.

Authoritative – DMP is well informed, evidence-based, detects non-compliance, undertakes effective enforcement, and has an excellent reputation

Efficient – DMP has clear procedures and processes utilising information systems, innovation

Transparent – Information is well managed and available and informs operational decision making, policy development and public opinion.

Accountable – DMP will be subject to public and industry scrutiny on the performance of its service delivery.

Inclusive – DMP engages with industry and the community to promote environmental compliance and set standards”.

(Source: Government of Western Australia: Department of Mines and Petroleum. 2014. P.4).

Although the above best practice model of DMP/DMIRS appears a responsible approach to best practices based on the words used to describe it. However, the reality is that there are obstacles to implement environmental regulations due to current gaps and deficiencies within the MinReF as discussed in Chapter Eight. Further, the best practice model of the Department of Mines and Petroleum will not guarantee any environmental protection as there are other agencies responsible for the environmental regulation of the mining sector. The other major player is the Department of Water and Environmental Regulation. These two agencies have developed two sets of best practice models with different emphasis (Table 9.2).

TABLE 9.2 TWO BEST PRACTICE MODELS OF WESTERN AUSTRALIAN REGULATORY AGENCIES

BEST PRACTICE DISCOURSE OF DEPARTMENT OF MINES AND PETROLEUM ⁴⁵	ENVIRONMENTAL REGULATORY DISCOURSE OF DEPARTMENT OF WATER AND ENVIRONMENTL REGULATION⁴⁶
Effective	Effective regulation across government
Targeted	Evidence-based
Proportional	Risk-based
Predictable	
Authoritative	Consistent
Efficient	
Transparent	Transparent
Accountable	Responsive
Inclusive	

(Adopted from Government of Western Australia: Department of Mines and Petroleum. 2014. DWER, n.d).

There seems to be a level of diversity of characteristics of the two models, and only two of best practice characteristics; “effective and “transparent” overlap as presented in Table 9.2. This could be explained as the DWER does not deal with supporting economic dimensions such as approving mining proposal as DMP does.

⁴⁵ Since 1 July the DMP name was changes as DMIRS. Source for the best practice model was derived from: (Government of Western Australia: Department of Mines and Petroleum. (November 2014)

⁴⁶ Source of DWER’s best practice model was extracted from: <https://www.der.wa.gov.au/our-work/regulatory-framework>

Table 9.2 illustrates subjectivity and differences in defining the term ‘best practice’ adopted by two government agencies in WA. Four plausible explanations could be suggested for the different WA government agencies using diverse terminology on environmental regulations concerning mining. First, due to the multi-agency approach of implementing the legislation and regulations that come under the MinReF, provide opportunities for each department to interpret and develop their discourses and narratives on agency-specific interpretations and narratives which operate external to the legislation (Chapter Three, section 3.6). Secondly, how agencies have evolved developing agency-specific legislation. This study revealed how historical reasons had influenced agencies not only to develop agency specific legislation such as the *Mining Act* but also to progress agency specific discourses (see Chapter Four, section 3.7). For example, DMP/DMIRS, the agency responsible for mining regulations was established in 1894 as the Department of Mines for managing mining operations in WA (State Records Office of WA, n.d., para one). As a result, it has evolved by adding new functions over the years and have formed into the new agency it is today. Thirdly, how some of the agencies have been entrusted to implement Federal legislation as in the case of WA, the Department of Water and Environmental Regulation is now responsible for implanting the *EPBC Act* (see section 8.5.7 in Chapter Eight. These factors would have played a role and influenced each department to have agency-specific interpretations to develop ‘best practice’ models to suite agency specific legislation. Finally, the lack of an apex-level agency to coordinate and provide resource policy development and the absence of a whole-of-government approach on mining and environmental regulations through an apex-level agency (Chapter Eight, section 8.9).

Despite the good intentions of proposing ‘best practice’ models by two key government agencies, the following weaknesses of the current legislative framework (MinReF) prevent these arrangements to functions as “best practice” models:

- (1) Uncoordinated multi-agency approach** – the multi-agency approach of implementing the MinReF provides opportunities for each department to interpret and develop their discourses and narratives on agency-specific interpretations and models;
- (2) The interplay between State and Federal legislation** – the accountability about environmental performance varies depending on specific legislation and in some cases, it is the State responsibility (e.g. the *Mining Act*) while when a proposal has a significant environmental component, it is the responsibility of the Federal legislation (e.g. the *EPBC Act*);
- (3) Historical path dependence** – new functions are added to existing agencies to cover environmental-related regulations. Some cases, there may be an inherent conflict between these functions. For example, the environmental regulation functions were added to the

portfolio of the DMP/DMIRS to its original responsibilities related to managing mining operations by issuing mining tenements.

(4) Lack of an apex coordinating body – there is no apex-level agency to coordinate and provide policy development and regulatory standards for environmental protection for mining operations in WA (Chapter Eight, section 8.9).

The “best practice” models of WA regulatory agencies have not been legislated; hence, they do not form a part of any of the legislation or other regulations examined within the MinReF (Chapter Eight, also see Table 5.2). Furthermore, the five regulatory design principles by Gunningham & Sinclair (1999) included in Chapter Four (Table 4.1) seem not applicable to the best practice models proposed by the two Western Australian agencies. The five principles of Gunningham & Sinclair (1999) are discussed below by comparing them with the elements of two WA ‘best practice’ models.

Principle one – Policy mixes incorporate instruments and institutional combination:

The DMP and DWER models do not conform to this principle as the mining companies have to follow regulations such as the Mine Closure Plans under the *Mining Act* and the Environmental Impact Assessment (EIA) as required under the *EP Act* and obtain approval for the clearance of native vegetation (Section 5, EP Act).

Policy mixes according to Gunningham & Sinclair (1999), incorporate economic mechanisms. Such mechanisms tend to be efficient, but only if they are properly designed and coordinated with other relevant legislation. Due to its non-coercive nature (principle one), it has low reliability to support regulations available to assure environmental protection. The institutional combination may help deliver multi-agency legislation and regulations which are contradictory when interpreted within the realities of mining which aligns with an agency’s core function, be it economic or environmental. If an apex-level agency exist, then it can provide room for all interests to come together and merge at a whole-of-government strategy supporting environmental protection under appropriate legislation.

Principle two – Less interventionist measures:

During the Mining Regulatory Reform Agenda (2012 – 2015), DMP proposed changes to the “functional” *Mining Act* as the agency considered the regulations thereon are prescriptive, and proposed a ‘less interventionist measure’:

“Mining Act 1978 is functional. However, the environmental regulatory framework established by the Act has resulted in a prescriptive approval process. This requires an amendment to enable the development of an outcome-based and risk-based regulatory system” (Ministerial Advisory Panel. (2012). December 2012. P.6).

However, this approach was not implemented, and, the proposed amendments to the *Mining Act* was never materialised (Chapter Five; section 5.3). According to Gunningham & Sinclair (1999), regulatory interventionist measures have two components: (a) prescription, and (b) coercion. Prescription refers to the extent to which external parties determine the level, type and method of environmental interventions and protection. Coercion refers to the extent to which parties or instruments place negative pressure, but, could be exercised through a price signal, which mining companies, by and large, cannot avoid. Environmental protection would be difficult to implement without using prescription and coercion..

Principle three – Escalate up an instrument pyramid to the extent necessary to achieve policy goals:

The third principle of regulatory design (Gunningham & Sinclair, 1999) is not visible in the DMP’s model as there is no apex-level agency to which the problems could be escalated up for resolution. On the other hand, the third element of the DWER best practice model states the need to adhere to regulatory rules. No condition under the *EP Act* has flexibility. The third regulatory design principle is not visible in the DMP’s model as there is no apex-level agency to which the problems could be escalated up for resolution. On the other hand, the third element of the DWER model implies the need to adhere to regulatory rules. No condition under the *EP Act* has the flexibility such as non-submission of EIAs for review and approval, they are mandatory regulatory conditions under the existing legislation (*EP Act 1986*, Section 50, p.89; Section 51B, p.91).

The instrument pyramid makes the process of environmental regulation and protection complex and allows for different behaviours to be tolerated. Updates or improvements in one instrument may not be immediately translated into adjustments in the other instrument/s. For example, the requirements under the *EBPC Act* or *MRF Act* were not translated into the State Agreements retrospectively despite the assumption that the two legislations represent an instrument pyramid. This has allowed limited responsibility concerning the *EPBC Act* for projects under State Agreements. For example, some of the large iron ore mines operated under State Agreements in the Pilbara Region in WA has significant environmental consequences. This issue was raised by the government’s environmental protection agency which highlighted “Western Australia’s Pilbara needs a long-term plan to protect its fragile

environment from massive mining developments” (abc.net.au, (2014, para one). Non-submission of EIAs for review and approval, as these are mandatory regulatory conditions under legislation (EP Act 1986, Section 50, p.89; Section 51B, p.91).

Principle four – Empower participants:

This principle supports the empowerment of the participants. The WA’s ‘best practice’ regulatory models emphasise the need for accountability and transparency, rather than empowering participants. However, as discussed in Chapter Seven (table 7.2), the privileges granted to large resource projects operating under 64 State Agreements (SAs) indicate the empowerment of participants which are large mining companies generating large profits and contributing to the State’s budget through Royalties. Any such significant benefits have not been offered to participants under the MinReF.

Under the Mining Act, the participants would be the exploratory and tenement licence holders. Given the remoteness of many of the mining operations, there would be only small Aboriginal and other communities that could be seen as participants or stakeholders. However, there are many wildlife speices that might be affected with no or little opportunity to represent these important species. For example, in the case of the Yeelirrie uranium mining approval, one of the affected “participants” is stygofauna comprising of 73 species which do not exist anywhere else in the world (Young, 2017, para four). It is not clear how such participants can truly be empowered.

Principle five – Maximise opportunities for win-win outcomes:

This principle encourages the regulators to look for opportunities to seek win-win solutions instead of penalties or prosecution. This regulatory principle is not explicitly included in the DMP model while there may be opportunities for win-win outcomes; the “responsive” element of the DWER model may imply some potential for maximising win-win outcomes. The empirical evidence as presented in the case of the coal mines in Collie and the 17,000 abandoned mines sites in Western Australia indicate that this principle has not been followed up yet.

The intention of this principle is excellent, particularly if applied at a design stage of the regulatory framework. However, it is crucial to identify who are the potential “winners”. When such an understanding is narrowed down to humans or groups in power within society, there may be enormous environmental problems affecting the weakest and underprivileged people as well as other species that are not represented by any civil society. Given the enormity of the problems created by the lack of proper environmental regulations and compliance in WA,

a possible solution may be to give grace periods to the mining companies to contribute to mining rehabilitation under the *MRF Act* for win-win outcomes to avoid penalties and persecution. The rehabilitation of only 20 per cent of the abandoned mines has been estimated to cost between 3 to 5 billion dollars (Gorey et al. 2016; Government of Western Australia, 2016). Hence, the complexity of the environmental regulation of mining operations is much higher than the usual regulatory challenges, mainly as it involves responsibilities and accountability for species other than human beings. However, even if we accept the Gunningham & Sinclair (1999) principles as an applicable guiding framework relevant to this thesis, the 'best practice models' proposed by DMP and DWER still do not comply with these requirements.

The analysis of the best practice models of Western Australia demonstrates that there is a need for better incorporation of environmental protection. Even strong compliance is not enough because the requirements contained in the WA MinReF are fundamentally weak and do not guarantee positive environmental outcomes. The next section provides five examples, three from Australia including one from WA, and two overseas examples that highlight opportunities about the possibility to go beyond compliance and adopt environmentally friendly actions that would ensure environmental protection outside the regulatory framework.

9.4 Examples of innovative best practices

The examples cited in this section are indicative, and they provide mainly directional insights. The first example provides an overview of the Australian Government's Landcare Program ("ALCP") (2018) which offers useful information to gain insights into exploring approaches to support mine rehabilitation and environmental protection work. The second example is about an award-winning mining environmental restoration and mining rehabilitation program implemented by a mining company jointly with a community group in Western Australia. The third Australian example provides a summary of a Royal Commission investigating the potential of the nuclear fuel cycle in South Australia. The last two examples are about the reuse of two abandoned mines "for productive human use" in Europe that have received global attention as tourist destinations. The European examples provide innovative approaches adopted to utilise in difficult to rehabilitate abandoned mines for successful commercial activities. They are examples that support innovative emerging approaches (cnbc.com, 2015; mining.com, 2015) where the original environmental conditions could not be restored due to the way resources have been extracted or where mining has been carried out in underground tunnels for decades (fontina.com). The importance of these approaches may be relevant to WA which is the geographical focus of this study where according to Government records

confirm the presence of 17,000 abandoned mines (Government of Western Australia: Media Statement, 2014).

Under the current WA government pilot project on rehabilitating abandoned mines commenced in 2014, so far only three mines have been rehabilitated (DMP: Mining Rehabilitation Fund Yearly Report, 2017). At this rate, unless new and innovative approaches are explored as a matter of priority, it will take over 5600 years to rehabilitate the 17,000 abandoned mines in WA. Therefore, two examples from Europe were included to provide insights that “recovery of a mine site to a healthy ecological state or for productive human use” (Marinova, 2018) need to be explored as an innovative approach to rehabilitate abandoned mines in WA. All these examples are investigated and presented using secondary data sources.

9.4.1 Australia’s National Land Care Program

In August 2018, the Federal Department of Environmental and Energy launched the second stage of its work under the Coalition Government’s Land Care Program which has an overall budget of \$1 billion (Australian Government: Department of Environment and Energy, n.d.). The second phase of the Australian Land Care Program (ALCP) has a target of \$450 million invested through 47 organisations under the ALCAP (ibid). The ALCP has funded successful tenderers who have demonstrated the capability to deliver vital, sustainable programs including agricultural and land care for the benefit of regional communities.

“This program will be delivered at a local level by groups that know the lay of the land to help our farmers improve their productivity in the good years and the bad” (Australian Government: Department of Environment and Energy, n.d.).

The projects funded under the ALCP can be described as ‘best practice’ as it has natural resource management capability of delivering benefits not only for Australia’s environment but also as a potential as a model for mining rehabilitation across the country primarily due to the availability of financial resources and other factors listed in this section:

“Over the next five years, the Government is investing \$450 million in local and regional-scale projects that will help us meet the needs of our local communities while delivering on our national priorities and international obligations.”

“Through the Regional land Partnerships, the Australian Government will invest in projects that protect our threatened ecological communities, restore our globally-

important wetlands, and support recovery efforts for species identified under the Threatened Species Strategy,” Assistant Minister Price said. Australian Government: Department of Environment and Energy (n.d., para eight).

Four elements of the National Land Care Program (Table 9.3) would be useful as a model to explore for potential environmental restoration and mining rehabilitation programs that could be implemented outside the regulatory approach.

TABLE 9.3 NATIONAL LANDCARE PROGRAM – PARTICIPATION BY STATES AND TERRITORIES

(1) Protection threatened ecological communities	
(2) Restoration globally-important wetlands	
(3) Supporting recovery efforts for species identified under the ‘Threatened Species Strategy.’	
(4) Involvement of local community groups in Regional Australia	
Total Project cost	\$450 million
Total no. of community groups involved	47
Total no of WA community groups involved	7
The life cycle of the project	3 year

(Source: Australian Government: National Land Care Program, 2018)

The participants, primarily voluntarily community groups, are selected for grants under an open tender process. At present, there are no formal networking of these group with regulatory bodies to utilise them into assisting with environmental restoration or mining rehabilitation work. As these are public records and would be useful information to explore joint programs, Table 9.4 provides a list of WA participants of the program.

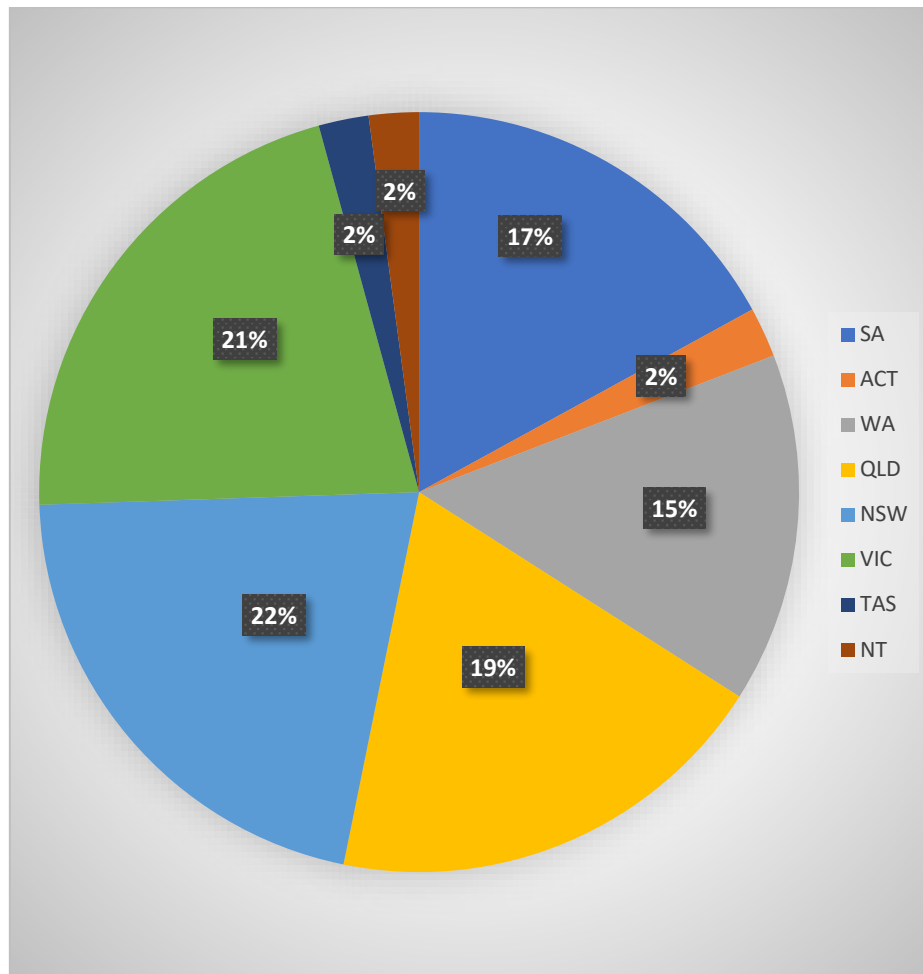
TABLE 9.4 WESTERN AUSTRALIAN COMMUNITY GROUPS PARTICIPATING IN NATIONAL LAND CARE PROGRAM

NO	AREA OF FOCUS	NAME OF THE GROUP
1	Avon River Basin	Wheatbelt Natural Resource Management Incorporated
2	Peer-Harvey Region	Peel-Harvey Catchment Council Inc
3	Northern Agricultural Region	Northern Agricultural Catchments Council Incorporated
4	Rangelands Region	Rangelands NRM Coordinating Group (Inc.)
5	South Coast Region	South Coast Natural Resource Management Inc
6	South West Region	South West Catchments Council
7	Swan Region	Perth Region NRM Inc

(Source: Department of Environment and Energy: Australian Government: National Landcare Program, 2018)

Figure 9.1 provides the percentage of funds allocated for each States and Territories.

FIGURE 9.1 NATIONAL LANDCARE PROGRAM – PARTICIPATION BY STATES AND TERRITORIES



(Source: Australian National Land Care Program, 2018).

The chart provides an overview of funding allocated for each State and Territories. Funds have been allocated to larger States that range from 15 percent to 22 percent of the total' funds. However, the Territories have received lower percentage including Tasmania under the ALCP. The data source does not reveal the no of community groups who applied for funding and the number of unsuccessful community groups who applied for funding in each geographical location. The resource allocation patterns would be useful for both the government sector and mining companies interested in mining rehabilitation or environmental restoration work. The ACLP has many potentials for such endeavours and could work in parallel with the regulatory framework. The potentials include: (a) involvement of community groups across Australia who are familiar with the local conditions; (b) regionally based people's experience would be useful to learn lessons; (c) Replicability; (d) assist mining companies to boost the bottom-line and add value to their ongoing formal rehabilitation work

within the existing regulatory framework. However, it is important to recognise that to operate as an effective model three critical factors need consideration. These include (i) voluntary community participation; (ii) the presence of a motivated core group at a local level utilising local human resources; and (iii) ability to tap into the local capacity to solve local environmental problems. The mining company working with the Greenbushes has a global presence, but the locally operated community group provides evidence of the presence of all four critical factors. Further, the next example of best practice from Western Australia also provides the possibility of achieving positive outcomes through a non-compliance framework (Lyon and Maxwell, 2004, p. 240).

Though the Land Care Program (LCP) operates outside a regulatory framework work, it supports Gunningham and Sinclair's (1999) fourth and fifth regulatory design principles of "empowerment" (of local communities) and supports the "win-win" outcomes.

The next section provides an example of a mining rehabilitation and restoration of the ecosystem implemented jointly by a mining company and a community group.

9.4.2 Mining rehabilitation and restoration of the ecosystem due to old mining legacies: Greenbushes, Western Australia

This section provides an example of an effective partnership program between an Australian mining company and a local community group working together to implement mining rehabilitation and eco-system restoration in South-West Australia. The company involved in this work is known as Talison Mining Company (hereafter referred to as the Company) which has its roots in tin mining in 1888 (Murphy, 9 July 2017, p.1). Greenbushes – the place of operation is located approximately 250 kilometres south of Perth and 90 kilometres south-east of the South-West port city of Bunbury (Talinson.com. n.d). The Company now known as Talison Lithium Pty Ltd (ibid) operates a mine site to extract ore to produce lithium. The mining at Greenbushes now covers a 100 square-kilometre area which includes over 20 abandoned pits and human-made dams (ABC: Landcare, 2017, p.1).

I selected this example to illustrate four issue. First, to highlight the importance of community participation and identify its role in land care programs; second, to find out whether a partnership is a useful approach for such endeavours; third, to gain insights about joint ventures of mining companies and local groups working together, and fourth, identify critical success factors as lessons to be learnt as replicable model.

The data for this example comes from four secondary sources. The first and second types of data was collected from websites and associated secondary sources describing the work of the mining company and the community group based in the region. The third set of data comes from the press reports and a TV documentary about the joint program produced by the Australian national broadcaster commonly known as Australian Broadcasting Corporation (ABC). Fourth, data come from the WA mining regulatory agency (DMP/DMIRS) that maintain documents about old mining tenements and other archival records of the Geological Survey of Western Australia revealing the history of the old tin mining that operated previously and had contributed to the formation of pit lakes.

The mining company now operates lithium mining under a tenement claimed to be one of the oldest mining tenements of Western Australia, and now is the world's largest producer of lithium ore (ABC: landline transcript, 2017, p.3). The Greenbushes mine site has a history of over a century. The original tenement of the Greenbushes commenced in 1883 long before the WA's first Mining Act 1904 came into force (ibid). Among the many archival records of the Geological Survey of Western Australia (GSWA), there are references to the origins of tin mining in Greenbushes (geodocs.dmp.wa.gov.au). The earliest record about the mine site appears in a report of 1891, submitted by the then government geologist, H. P. Woodward (ibid).

The Company claims to have a sustainability approach to its mining and work:

“Talisson Lithium is committed to sustainable development and regards the environmental management and rehabilitation of mining sites as among its highest priorities. The Company continuously reviews and improves its environmental management system to reduce the impact of mining on site and neighbouring communities.

The Greenbushes Lithium Operation has stringent environmental operating conditions. The site is certified to International Standards ISO 9001:2008 Quality Management System Requirements and ISO 14001:2014 Environmental Management System requirements by BVQI” (Talisson.com. n.d., para five).

The Company's responsibility of rehabilitating the old abandoned tin mines has been made easier due to the participation of a community group known as Blackwood Basin Group (BBG) which is composed of local people engaged in land rehabilitation work since its inception in 1991:

“The Blackwood Basin Group is a non-profit, community-based organisation that coordinates environmental management within the Blackwood River Catchment. Formed in 1990 from community-led concern about the declining health of the Blackwood River, the BBG has since worked with 54 catchment groups, assisted over 500 farming families and delivered more than \$16million of Landcare activities throughout this iconic river basin. We have a rich history of achievements for innovation in community-led action and faced many challenges along the way to remain a Landcare leader” (Blackwoodbasingroup.com, n.d., para one).

The Group Chair, Per Christensen is a retired biologist, and now living in the region (ibid). Below is the explanation of the Company manager about the encounter and the beginning of the joint partnership with BBG.

“The Basin Group came to us. We saw it as a great opportunity for community engagement. So, we’ve allowed them to focus on how they wanted to change the wetlands, but we have been there to help them as required with resources at stages and just in ensuring that, you know, the longer-term plans are sustainable” (ABC: Landcare transcript, 2017, p.4).

The joint land and ecosystem rehabilitation commenced in 2012. Due to their environmental restoration work in the area. (ibid).

Brian Chambers the manager of the BBG provided an overview of the project:

“We have either planted nursery stock or transplanted fully grown plants – planted over 300 000 stems of those. We’ve done some 21 hectares of other revegetation around the place with fringing vegetation and more forest species, so that’s planted close to 50 000 seedlings” (ibid. p.)

According to Brian Chambers, the group had received \$1.6 million “grant to kick-start the project at Schwenke’s Dam, the biggest waterbody on the Talison site. The goal was to encourage rare and endangered waterbirds to the wetlands as well as to create new passive recreation sites” (ABC: Landline transcript, 2017, p.4). A team of researchers was employed by BBG to obtain an independent report on their rehabilitation of the Schwenke’s mine lake in Greenbushes.

Now the joint project has completed revegetation of “fully-grown plants and over 300,000 stems” over a mine site spreading over 21 hectares. A mining company alone cannot undertake such an activity unless they outsource such land rehabilitation activities by spending money. The voluntary intervention of a local community working with a mining company without any intervention from a regulator is in alignment with the fifth regulatory principle of “maximising “opportunities for win-win outcomes” (Gunnigham & Sinclair, 1999).

One natural advantage both the company and the BBG had was that the “mining voids have filled with winter rains over the years and become populated with plants, fish and insects, attracting birds from around the world” (Murphy, 2017, para two). This natural filtration of mining voids in the Greenbushes has been an advantage unlike the pit lakes in the Collie Region (Case Study two in Chapter Seven) where the abandoned mines have high acidic levels. Collaborative scientific studies (Keleher, Beatty & Allen, 2014) on the water qualities would undoubtedly be a critical success factor emerging from this ‘best practice’ example that has been implemented outside a regulatory framework. Undoubtedly, the example of Greenbushes joint company-community program could provide several lessons about the possibility of environmental protection that could work outside non-compliance methods. In this example, the presence and the willingness of both parties to work on a common goal is a critical factor for the success of the program. The availability of funding and the transfer of skills and approaches by the BBG participation appear to be another success factor and a lesson to learn. Nature has also played an important factor as the mining voids in the Greenbushes have been able to provide a medium for fauna to grow in mine voids, and adjacent land areas to re-plant vegetation easily.

9.4.3 Royal Commission on South Australia’s participation in the nuclear fuel cycle

This example provides a summary of an initiative of the South Australian Government that appointed a Royal Commission to enhance the State’s participation in the nuclear fuel cycle. This example was included as it is a unique and pathfinding action by a government undertaking and a high-level independent inquiry to find out the potential effects on human and environment due to uranium mining and disposal of nuclear waste. The rationale for including this example as a non-compliance best practice is due to three reasons. First, the appointment of a Commission to examine an important issue of uranium mining and storage of nuclear waste is unique as it is a pathfinding effort, hence, many lessons can be learnt from it. Second, it is an open and transparent enquiry under a Commission and the first of its kind on mining activities. Australia has a tradition of having such commissions since the 1850s (Parliament of Australia, n.d.). Usually, Commissions have been appointed in Australia to examine issues of significant public interest such as police corruptions in WA (2002 -2004) or

reasons for devastating bushfires in 2002 in Victoria (ibid). The third reason for citing the South Australian example is that it provides a contrasting approach to the policy adopted for uranium mining under the Barnett Government (2008 – 2017) in WA as an extension to the State's resource development approach under the Liberal Party agenda (Phillimore, 2014).

The Commission in South Australia on uranium nuclear fuel cycle commenced on 19 March 2015 with the aim to undertake an independent and comprehensive investigation into the potential for increasing South Australia's participation in the nuclear fuel cycle. Its terms of reference are:

evidence-based – meaning the findings to be supported with facts and to identify the basis for claims made.'

- open and transparent – offering interested parties to provide evidence for the Commission
- independent – To obtain view and opinions independent of government, industry and lobby groups (Government of South Australia, n.d.).

The Commission collected evidence from four sources for its enquiry (i) written submissions; (ii) oral evidence obtained via open public sessions; (iii) its research supported by overseas visits, and (iv) commissioned studies (ibid). After the appointment of the Commission, four background papers were issued outlining (a) exploration and mining of uranium in South Australia; (b) further uranium processing; (c) use of uranium for electricity generation; and (d) disposal and storage of nuclear waste. The objective was to invite interested people to respond to the four areas of enquiries. A three month-time framework was given for written submissions on oath as evidence for the consideration of the Commission. (ibid). More than 250 submissions were received from government agencies, community members, organisations and industry representatives.

The Commission held a series of open public sessions from September to December 2015 to April 2016. All the sessions were streamed live on the Commission's website. Transcripts and videos were made available to be downloaded from the website (ibid). Over 37 sitting days, the Commission heard from 132 witnesses from Australia and overseas, including experts from Belgium, Canada, Finland, Germany, South Korea, Spain, Switzerland, the United Kingdom and the United States of America (ibid).

The Commission engaged organisations with the expertise to provide detailed assessments of the commercial feasibility of establishing various nuclear facilities in South Australia. It also

wanted an analysis of the broader economic effects of investments made in developing nuclear industry related facilities. Further, the Commission obtained professional assessments about the leasing of nuclear fuel, the risks involved in transporting used fuel, the safety of conditions geological disposal facilities, and skills required for the development of establishing nuclear facilities in South Australia.

On 9 May 2016, Premier of South Australia Jay Weatherill released the findings of the Commission revealing the economic benefits. The findings suggested the possibility of injecting \$445 billion into the South Australia economy by establishing a nuclear waste disposal and storage facility from global nuclear power plants estimated to be more than 390,000 tonnes, a use of nuclear for generating electricity for the State (Government of South Australia, n.d.; Starick, 2016). The World Nuclear Association (WNA) reported that “fundamentally changed the nature of the global nuclear waste discourse,” and a multinational nuclear waste facility based in South Australia would provide a positive option for countries operating nuclear facilities. It would be a “viable alternative” to national projects (WNA, n.d., para eighteen).

In summation, this example provided a summary of an initiative of the South Australian Government to appoint a Royal Commission to enhance the State’s participation of the nuclear fuel cycle. This is a unique and pathfinding action by a government to find out potential effects on human and environment due to uranium mining and disposal of nuclear waste. The South Australian initiative has been recognised as an effort that has changed the “the global nuclear waste discourse by the World Nuclear Association, and the lessons from the inquiry have both nations and global significance.

9.4.4 Innovative approaches to re-use difficult to rehabilitate abandoned mines

There are “more than 60,000 abandoned mines across Australia” (abc.net.com, 16 Feb 2017, para one; mininglink.com.au, 2017). In Western Australia, there are 17,000 abandoned mine sites (Government of WesternAustralia, 2016). Around the world similar problems remain due to the legacy of mining (ukminingremain.co.uk, n.d.). Some these mine sites are difficult to convert into its original environmental landscape, and they “pose environmental, health, safety and economic problems to communities, the mining industry and governments in many countries (abandoned-mines.org, n.d., para one). However, both government and private sectors have taken action to re-use some of these difficult to rehabilitate abandoned mines through innovative approaches to re-use some of them for various purposes. Table 9.5 provides a sample of innovative global approaches of re-use of abandoned mines for benefits for humans across the globe.

TABLE 9.5 EXAMPLE OF RE-USE OF ABANDONED MINES

Country	State/Province	Type of old mine	Current use	Remarks	Source
Australia	Goulburn, New South Wales	Copper lead and zinc open-cut mine.	Use as bioreactor using methane to generate electricity. Current capacity: 22.5 MW.	The bio-reactor is operating since 2005.	Aussierernewables.com Source: https://www.aussierernewables.com.au/directory/woodlawn-bioreactor-100.html
Canada	Manitoba	Various abandoned mines including fourteen hazardous sites.	Restoration of lands by revegetation and engineered wetland to remove contaminants and to prevent runoff.	2015/16 estimated cost was \$37 million.	manitoba.ca Source: https://www.manitoba.ca/iem/mines/noami_nugget_may_2015_article.pdf
Canada	British Columbia, (Vancouver Island).	Limestone quarry.	Botanical garden.	The botanical garden was designated as a national historic site of Canada in 2004.	(Palmer, 2016) Source: http://mentalfloss.com/article/76571/15-adaptive-re-uses-old-mines

Italy	Valle d'Aosta valley	Copper	Cheese production, storage and tourist attraction.	This project was initiated by a group of farmers in collaboration with a private company	fontana-valledaosta.it Source: https://www.fontina-valledaosta.it/en-gb/warehouses
Poland	Wieliczka	Salt mine	Tourist attraction	This project is a government and private partnership venture,	Wieliczka -saltmine.com Source: https://www.wieliczka-saltmine.com/
Sweden	Dalarna	limestone quarry	Recreation	Concert hall and amphitheatre	(Truscott, 2011) Source: http://www.mining.com/old-mines-redux-finding-new-uses-for-abandoned-mines/

UK	Cornwall	Clay quarry	Eden Project Anglia Ruskin University, UK offers an online MSc in Sustainability with residential workshops at the Eden Project.	consisting of a number of contemporary gardens and exhibitions. Also used as a stage for summer concerts.	(Palmer, 2016) Source: http://mentalfloss.com/article/76571/15-adaptive-re-uses-old-mines https://www.edenproject.com/learn/further-and-higher-education/masters-course-in-sustainability
USA	White Pine, Michigan	Copper	Zettl Biotechnology Plant Systems	The company produced engineered plants for medical purposes. The conditions of the underground nursery could be sealed off from predation or contamination.	(cnbc.com, 2015) Source: https://www.cnbc.com/2015/10/22/striking-paydirt-innovative-new-uses-for-old-mines.html

9.4.5 Production and storage of cheese in an abandoned mine: Italy

This example is about a group of people who established a cooperative in the Valle d'Aosta valley in northern Italy producing world-class cheese using an abandoned copper mine where the operation stopped in the mid-1940s. This innovative work using an abandoned underground mine has also become a tourist attraction. At present, the cooperative has six cellars with a total storage capacity of approximately 150,000 cheeses. The Valle d'Aosta valley is one production site. Most of the warehouses were secured from military depots used during the Second World War, including the old copper mine operated until 1946. Even today, cheese is moved using the tracks that were previously used for transporting the copper ore from the underground mine (fontina.com, n.d., para one).

In 1957, a group of milk producers founded the cooperative known as Cooperativa Produttori Latte e fontina (Fontina.com, n.d., para one) with the objective of collecting, ageing and marketing the high-quality agricultural product of the d'Aosta valley. The initial group of members representing dairies and pastures was limited for 46, and it has now risen to 200 (ibid). In the following year (1958), the group with the sponsorship of private companies commenced producing cheese. At the end of 1958, the production number of Cheese was less than 40,000, and it has increased to about 300,000 today (ibid).

The group initially used underground military depots used during the Second World War, but were searching for warehouses suitable for making, and storing cheese as a part of their production expansion initiatives. The group found the underground abandoned mine in Santa Barbara in the municipality of Valpelline Preslong. In 1964, the abandoned copper mine was acquired, redesigned, and expanded for the production, maturation and preservation of cheese (Fontina.com).

Today, the visitor's centre of the Municipality of Valpelline Preslong is located at the entrance to the Fontina Cheese producer's warehouse (Lovevda.it, n.d.). It is open to the public, and visitors can see the production process and taste samples of various cheese produced in the abandoned underground copper mine (ibid).

The signs of the old copper mining are still visible including the rail carriage tracks that were used to move copper ore from the underground mine. (photograph 9.1).

PHOTOGRAPH 9.1 FONTINA'S VALPELLINE CHEESE FACTORY & WAREHOUSE



(Source: Alamy stock photo. (n.d.).

Undoubtedly, the cheese factory in Valpelline is a unique case and may be difficult to replicate. However, this example provides insights into the possibilities of converting any derelict mine with some utility value for re-use, provided an appropriate terrain, opportunity, community willingness, and private sector initiatives could come together.

Western Australia has 17,000 abandoned mines. In the South-West Region where the climate is conducive for making cheese has abandoned mines. There is a registered old mine shaft known as Witchcliffe-East Gold mine (minddat.org). It is located in one of WA's most popular tourist destination --- Margaret River, where commercial-scale cheese making takes place successfully. However, the factors that I identified: "terrain, opportunity, and community and private sector initiatives" based on the Valpelline cheese factory example, there are opportunities for Western Australia to learn from the Italian example.

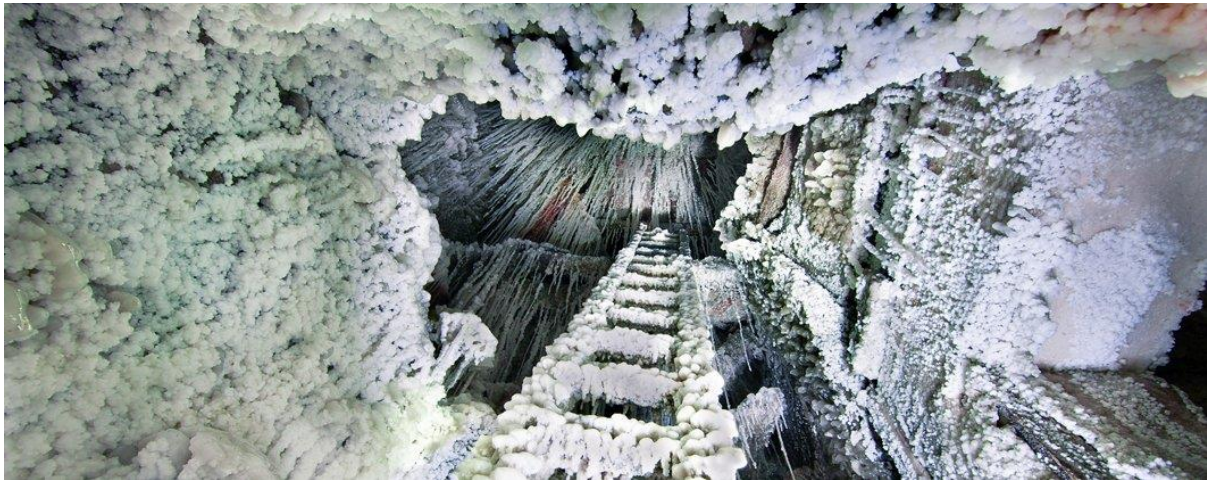
9.4.6 Wieliczka Salt Mine – Re-use of abandoned mine as a cultural centre and a tourist destination

This section provides an example of utilising difficult to rehabilitate abandoned mine in Europe and how it has been re-used as a centre of cultural significance and also as a tourist attraction. In this section, a brief description of its history, and the current use and the value of cultural and tourist centre is discussed.

The Wieliczka Salt Mine is located in the town of Wieliczka in the Kraków metropolitan area in southern Poland. It was of the world's oldest salt mines in operation. Commenced in the 13th century, the mine produced table salt continuously until 2007. The mine was used to produce table salt, and its operations ceased in 2007. The commercial-scale mining was abandoned in 1996 due to low pricing and mine flooding (Wieliczka -saltmine.com). According to the UNESCO, the “deposit of rock salt in Wieliczka and Bochnia has been mined since the 13th century. This major industrial undertaking has royal status and is the oldest of its type in Europe. (unesco.org, n.d. para one). During its entire operation, it was run by the Żupy krakowskie Salt Mines company (wieliczkasaltmine.net). The mine is currently recognised as one of Poland's official national places that attract local, European and international tourists. It houses dozens of statues, and four chapels carved out of the rock salt by miners and supplementary carvings by contemporary Polish artists.

When the Wieliczka rock salt operations ceased in 2007, it became an abandoned mine extending over nine levels of 327 meters deep and over 287 kilometres long hole underground (ibid). At present, it has 300 km of galleries with works of art, altars, and statues sculpted in the salt (ibid). Today, the abandoned Wieliczka salt mine has over “2,000 excavated chambers. Features include a large chapel ornamented with works of art, altars and statues – all carved from salt. There are also venues—a museum, sports hall, and rehabilitation and treatment centre for people with respiratory ailments” inside the abandoned mine (ibid). Further, it is also functioning as an international tourist destination. Visitors from anywhere in the world can make arrangements to visit and stay over using an online booking system (booking.com).

PHOTOGRAPH 9.2-- WIELICZKA SALT MINE: POLAND AN ABANDONED SALT MINE AS A CULTURAL AND TOURIST CENTRE



Wieliczka Salt Mine from above
(Source: www.wieliczka-saltmine.com)

In 1978, the UNESCO recognised Wieliczka salt mine under the World Heritage List of places of the natural and cultural heritage of outstanding value to humanity (wieliczkasaltmine.net n.d). However, The UNESCO delisted its World Heritage Status on 1 December 1998 “due to the success of measures undertaken for their restoration and preservation” (unesco.org, 1998, para one) by removing both the old city of Dubrovnik and Wieliczka Salt Mine from its List of Endangered Sites (*ibid*).

The selection of the “best practice” samples has limitations as they were not chosen randomly. The two European examples support that some abandoned mines could be re-used when it is difficult to “recovery of a mine site to its previous eco-system”. The two examples cited have been successfully transformed into productive human use, which has yet to happen in WA. Of the three Australian sample, all of them have been operated outside a regulatory framework with the initiatives of the community groups who had both the skills and desire to restore eco-systems voluntarily. However, the best practice samples cited in this chapter, are useful to learn lessons. Any regulatory parameters, however useful they are, work within a legislatively defined framework. Hence, they are rigid and goal-oriented. This was, an area that research participants have not been able to provide examples. One of the questioned asked form all research participants (n =16) was about their familiarity with or knowledge of best practices of regulatory approaches or environmental focused best practices. However, only one affirmative answer was received from one regulator who referred to a commissioned

consultancy where the consultant had rated the agency as one of the three best regulatory models in the world. As that consultancy had focused only on the gas and petroleum industry, it was not considered.

The primary aim of this research objective was not just to cite 'best practice' samples, but to explore whether innovative human actions aimed at protecting the environment could be established. Though all the examples are unique and diverse, they provide insights into a new scenario that such practices do prevail.

All the five cases cited in this chapter have functioned through "beyond compliance" efforts of "environmentally friendly actions not required by law" (Lyon and Maxwell, 2004). This lesson is of vital importance for WA where there are 17,000 abandoned mines and the burden of rehabilitating them have to be passed on to several future generations against the "intergeneration principle" of sustainable development. WA has abandoned mines all over the State. Thus, it provides opportunities to explore through further studies and sponsorship outside the regulations to obtain fresh insights. At least a few abandoned mines out of a larger sample of 17,000 could be identified and turned into tourist attraction centres where production and storage of agricultural or dairy linked with tourists following the example of Italy may be considered. However, the current mining rehabilitation legislation; the *MRF Act* is goal specific such as payment of a compulsory levy for the mines operated under the *Mining Act*, therefore not flexible, as it focused on rehabilitating a few selected mines out of 17,000 exist in WA. As discussed in the Italian cheese making warehouse example, an innovative group of dairy farmers in collaboration with the private sector has found and now successfully using an abandoned copper mine of the 1940s. These issues need to be further explored through future research.

9.5 Summary

The first part of this chapter discussed issues about the difficulties of defining 'best practice' definition due to a variety of reasons. The chapter describes two types of best practice models developed by two regulatory agencies in WA and reviewed their usefulness against the regulatory design principles. While analysing various definitions, and how WA government agencies have adopted 'best practice models', this chapter emphasised the need to look for innovative approaches beyond environmental regulations.

This chapter also provided an example about a Royal Commission into the nuclear cycle in South Australia aimed to identify empirical evidence outside a regulatory framework without implementing top-down government policy on uranium mining as happened in WA with no

inquiry or investigation. This chapter also included two WA environmental best practice models to gain insights and examine whether regulatory best practices could be framed external to regulations adopted by government agencies. The recommendation to look for “beyond environmental regulatory” approaches is an option to address the challenges faced by the WA Government. The chapter provided insights into approaches of re-using old mine sites that cannot be restored to its original conditions. To emphasise the need to look for innovative approaches for mining rehabilitation, this chapter provided real-world examples from Australia and Europe. The chapter provided five diverse examples that could be described as best practices based on emerging innovative approaches to difficult to rehabilitate mine sites by “re-using” them for productive human use. The five examples cited in this chapter have operated outside a formal regulatory framework and support justification for adopting new approaches to rehabilitate and re-use mine sites that could otherwise remain as a financial liability and environmental hazard for eternity.

CHAPTER TEN -CONCLUSIONS

10.1 Introduction

This PhD research was designed to answer the research question: “How is the mining regulatory framework in Western Australia being implemented legislatively to assure environmental protection during the mining life cycle?” The focus of this study was limited to examining environmental compliance by analysing the regulations that manage two types of minerals, i.e. uranium and coal. The research did not focus on the economic or social aspects of sustainable development principles concerning mining. Many other important issues related to the environmental protection of mining operations in WA were outside the scope of this research project. They include examinations of the regulatory framework of the petroleum and gas industry, the longitudinal impact of mining on ecosystems, and biodiversity to name a few examples. This thesis concentrated on only one, but a critical aspect of mining operations, namely what kind of regulatory framework is put in place, and how it is being legislatively implemented focusing on Western Australia. The State of Western Australia has a strong economy predominantly supported by mining. For example, the revenue from mining Royalties collected accounted for 29% of GSP in 2016 - 17. (Government of Western Australia: Department of Jobs, Tourism, Science and Innovation, 2018, para two. Further, WA's gross state product (GSP) of \$247.7 billion during 2016 – 17 contributed to 14% of Australia's gross domestic product (ibid).

There are many examples across the world, and in Australia where the income from the mining is enriching the economy. The economy of Queensland is similarly structured. Mining contributes significantly to the economies of Canada and many Latin American countries, such as Chile, Peru, Argentina and Mexico. Developing countries in Africa also heavily depend on mining to support national economies. Further, mining is also an essential activity in large economies, such as India and China where the mining industry employs millions of workers.

In this thesis, I identified positive elements of the regulatory framework such as the coverage of wide range of mining-related subjects, effectively collecting Royalties, and introducing mining rehabilitation legislation to address the legacies of over a century of mining as recent as 2012 by introducing the *MRF Act*. Secondly, I provided evidence that the *MRF Act* has limited jurisdictional power, and has no authority over the State Agreements. Thirdly, I identified several issues that have contributed to the weaknesses of the mining regulatory framework. Fourthly, I observed that some key legislation such as the *Mining Act 1978* had been developed through a ‘legislative evolution’ of over 100 years, without an overall direction and coordination. Fifth, the findings revealed that the MinReF consists of legislation with

inherent weaknesses such as unclear demarcations and overlaps of legislation, the ambivalence and dichotomy of the mining regulatory framework. Sixth, I identified that the MinReF and the agencies that are responsible for implementing various legislation had not developed an adaptive capacity to cope with changing needs and legislative shortfall such as how to rehabilitate 17,000 abandoned mines in Western Australia. Due to gaps and deficiencies of the current mining legislation, remaining abandoned mines cannot be rehabilitated during the present generation. The implication is the State of Western Australia has breached the central principle of sustainable development—the principle of intergenerational equity (United Nations General Assembly, 1987, p. 43) as the liability of rehabilitating 17,000 abandoned mines would be pass on to the next generation.

As a contribution to new knowledge and developing new theories, I proposed a new theoretical framework—ADMINREF to establish an ability to adjust and make improvements to the MinReF in response to the changing needs of society to cope with the consequences of the current legislative shortfall through innovative policy discourses. Finally, this thesis put forward a series of recommendations to address the gaps and weaknesses of the MinReF based on the findings of this PhD study.

10.2 Addressing the research question and objectives

Further to the primary research question, this PhD study included four research objectives, and they have been addressed in chapters seven, eight, nine and eleven respectively. The research question and the objectives were addressed by carrying out an analysis focusing on two case studies and reviewing the MinReF in WA. To address the research question and four objectives of this study, I used three sets of data—two sets of primary data and one set of secondary data which included the information extracted from an extensive literature review. The first set of primary data included the Federal and State legislation covering mining and the environment as they are considered primary data in legal studies. The second set of primary data was collected from a group of research participants (n = 16).

10.3 Research objective one

I answered the first research objective by identifying the strengths and weaknesses of the MinReF in Chapter Eight. While analysing the framework, I noticed positive elements of the framework such as the extensive coverage of mining-related subjects and the implementation of mining rehabilitation legislation (*MRF Act*) enacted in 2012. However, the downside was the *MRF Act* had not addressed the mine rehabilitation ‘problem’ that comes under the State Agreements (SAs). 17,000 abandoned mines are a part of the legacy of a century over mining operations in WA. The *MRF Act* has limited jurisdictional powers and cannot be applied for

SAs that have been developed to support large-scale resource projects. I argued that such issues have occurred due to the dichotomy of the mining legislation as a result of adopting two separate systems for approving and managing mining projects under the *Mining Act* and the State Agreements (SAs) respectively. I also found evidence that the two systems are engraved within the mining regulatory framework due to historical factors and gaps and deficiencies of the framework. I noticed these two systems are against the governance and equity principles of public policy.

10.4 Research objective two

Chapter Seven was devoted to address the second research objective, by developing two case studies using qualitative research methods. The two comprehensive case studies using qualitative research methods were developed based on an investigation to ascertain how environmental regulations have been implemented legislatively during the approval of a uranium mine project in the first case study, and key issues about the approval process. In the first case study, I identified issues about the validity of legislation used to approve the uranium mine. The conclusions from the case study confirmed the problematic nature of Yeelirrie Act 1978 utilised to approve the mine. Further, I discussed how the Ministerial authority overruled the scientific evidence against the approval of the uranium mine on environmental grounds including the adverse impact on biodiversity.

The second case study examined the environmental compliance of coal mines during the life cycles of mines located in the Collie Region in South-West West Australia and managed through a set of unique legislation called State Agreements. In this case study, legislation and regulations relating to the issuing of mining tenements, the provision of water and land access were also analysed by examining the role of the State's mining legislation and regulations. In both case studies, I focussed on environmental compliance. The analysis of the coal operations in the Collie Region provided evidence that the use of State Agreements has not assured environmental protection as at the end of the life cycle, many abandoned coal mines have contributed to adverse environmental effects. The findings of both case studies revealed flaws in the legislation used.

10.5 Research objective three

I addressed the research objective three in Chapter Nine, by identifying the diverse nature of the term 'best practice' and how it had been used in Western Australia by examining the 'best practice' models of two key agencies responsible for mining and environmental regulations. Secondly, I presented five examples of Australian and best practices of innovative approaches to ecosystem restoration and mine rehabilitation. The five best practice examples also reflect

key elements of 'corporate social responsibility, and 'licence to operate' introduced in Chapter Three of this thesis. Five examples provide new insights and suggest opportunities available to ensure environmental protection through ecosystem restoration and mine rehabilitation work external to the government regulations.

10.6 Research objective four

I addressed the fourth research objective in Chapter Eleven, by proposing ways and means of improving the MinReF to assure environmental protection. I proposed seven recommendations to address gaps and deficiencies identified as an outcome of the analysis of the MinReF. One of the critical gaps I found in the regulatory framework was the limited jurisdictional power of the *MRF Act* which is incapable of addressing the 'problem of mining rehabilitation' across WA.

10.7 Summary

This thesis describes an analysis of two case studies supplemented by the findings of a review that examined the strengths and weaknesses of the mining regulatory framework in Western Australia using three types of data sets. The overall findings of this PhD study were identified under seven thematic frameworks. They are: (i) inherent weaknesses of key legislation; (ii) unclear demarcations and overlap of legislation; (iii) ambivalence and dichotomy of the mining regulatory framework; (iv) lack of coordination of mining regulatory framework and multi-agency roles; (v) absence of an apex agency to coordinate mining regulations; (vi) delays in introducing environmentally-centric legislation; and (vii) lack of adaptive capacity.

The seven key findings represented three critical characteristics of the regulatory framework. They are (a) the "fragmented nature" of regulatory functions; (b) the way the legislation and regulations under the MinReF have evolved through a legislative evolution over a period of 160 years and are now implemented through multi-agencies, and (c) the absence of an apex-level agency to coordinate the regulatory functions effectively.

Though this research project identified significant gaps and deficiencies in the current regulatory system, they need not be considered as a negative evaluation of the mining regulatory framework in WA. If public policy makers look at the findings of this thesis, they will see opportunities to improve, without merely focussing on facilitating non-renewable resource extraction which is not sustainable as it has an end date in the future. Although this study only focuses on the regulatory framework regarding coal and uranium, the findings provide new and independent insights, and they supplement existing knowledge on the effectiveness of the overall mining regulations in WA and elsewhere. Insights gained from this study would be

useful to examine other mineral and petroleum (gas and oil) regulations that are not addressed in this study. Though the research and the findings are focused on WA, the methods used to conduct the research could be useful to address both national and global problems relating to environmental regulations concerning mining.

During this research project, I found that the Departments of Water and Environmental Regulations provide transparent information on environmental impact assessment submitted by companies for public perusal without deleting any information. Further, the Department of Mines, Industries, Resources and Safety provide access to open access database (MINDEX) via the agency website that provides mining company details and environmental reports. These initiatives are like flash-lights while walking in the dark passage of mining history in Western Australia. These initiatives could also be described as evidence that key regulatory agencies have begun to embrace the concepts of ‘corporate social responsibility’ and ‘licence to operate’. They are indeed good signs after the legacies of 100 years of mining in WA.

Concerning theory development, this research contributed in three ways. First, it examined relevant theories such as ‘Bureaucracy’ (Weber, 1952, 2015); ‘Discourse Analysis’ (Stubbe et al., 2003; ‘Public Interest Policy’ (Ogus, 2004 & 2004a); ‘Legal Doctrines’ (Hoecke, 2013), and ‘Regulatory Design Principles’ (Gunnigham and Sinclair, 1999) as investigative methodologies to analyse the environmental legislation and regulations come under the MinReF. Second, this study contributed a new theoretical framework—Adaptive Capacity for the improvement of the Mining Regulatory Framework of Western Australia” (ADMINREF) to eliminate gaps and deficiencies of the MinReF by adopting innovative policy approaches (Chapter Eight, Figure 8.4). Finally, this thesis includes a series of policy recommendations to address the current gaps and deficiencies of the MinReF, and they are included in Chapter Eleven.

In summation, this thesis focused on two case studies supplemented by an analysis of the strengths and weaknesses of the MinReF in WA. The summary of the findings was compared using a theoretical approach that describes key elements of adaptive governance with the findings of the analysis of the MinReF. The comparison of the summary of the findings against the key elements of the adaptive governance principles is presented in Table 8.4.

CHAPTER ELEVEN – RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

11.1 Introduction

From a sustainability point of view, mining is a very contested economic activity as it inherently uses non-renewable resources and impacts on the social and environmental health of the human and ecological communities where it operates. Mining, however, will continue into future driven by the need for mineral, gas and petroleum to improve the quality of life of current and future generations. However, insights gained from past activities, identifying mistakes made, and examining the strengths and weaknesses of the current practices are of paramount importance to create a better future to ensure that future generations would have the same benefits of the present generation as practicable as possible.

This research investigated how mining regulatory framework (MinReF) in Western Australia (WA) is being implemented legislatively to assure environmental protection following during the life cycle of mining through an in-depth analysis of two case studies, and a general investigation of the regulatory framework. The research question and the objectives of this PhD research examined the legislation, regulations, and other administrative tool come under the MinReF in WA by focusing on the environmental sphere of the sustainable development principles.

This PhD project identified several critical gaps and deficiencies of the MinReF in WA where a track record exists about developing mining legislation to support, and manage the mining industry for over a century. This study identified seven weaknesses of the MinReF and discussed in detail in Chapter Eight and summarised in Chapter Ten. The findings indicate some strengths, but also the weaknesses of the MinReF. It is important to note that the current gaps and deficiencies of the MinReF were identified not as problems, but as opportunities to assure environmental protection as this study provide directions to address the weaknesses. In response to the seven key findings. Further, this study, proposed a series of recommendations to address current gaps and reduce duplication of agency functions and proposed an adaptive capacity for the improvement of the MinReF of WA.

11.2 Recommendations

This study included a research objective to “propose ways and means of improving the Western Australian mining regulatory framework to assure environmental protection”. In line with the research objective, this chapter proposes recommendations to help achieve and address current gaps and deficiencies identified as an outcome of this research. One critical recommendation is to establish an apex-level agency to coordinate all resource development activities by adopting a whole-of-government strategy. Another proposal is to develop a resource development policy, as the State of Western Australia is yet to establish a well-coordinated approach to manage century-old mining operations. It is essential that any future changes to MinReF must be focused on the existing strengths without compromising them but, also exploring opportunities to address the current weaknesses which will position mining as a sector within the sustainable development concept and its principles as practicable as possible.

The recommendations put forward in this thesis (Table 11.1) are aimed to achieve this goal and address the fourth research objective of this study.

TABLE 11.1 RECOMMENDATIONS TO ADDRESS GAPS AND DEFICIENCIES OF MINING REGULATORY FRAMEWORK

ISSUE	RECOMMENDATIONS (R)
<p>At present, there is no a whole-of-government Resource Development Policy for Western Australia despite having mining regulations operating for over 100 years.</p>	<p>(R 1) Develop a whole of Government Resource Development Policy</p>
<p>At present, there is no whole-of-government policy on mine rehabilitation and closure plans for the resource projects that operate under 64 State Agreements (and the ones that have already been revoked).</p> <p>The current mine rehabilitation legislation (<i>MRF Act</i>) is inadequate and does not cover the larger mines and resource projects regulated under the State Agreements.</p> <p>This dichotomy and ambivalence of mining legislation need to be addressed by proposing legislative solutions after a formal independent review of the current regulatory framework and ensure current legislative gaps are identified and remedied.</p>	<p>(R 2) Appoint an independent inquiry to identify costs for developing mine closures plans for large resource projects operating under the State Agreements (SAs).</p> <p>(R 3) Explore measures to collect mine rehabilitation levies by making amendments to the <i>MRF Act</i> to collect a regular levy (to be determined in consultation with mining companies that operate under SAs)</p> <p>(R 4) Assess environmental, economic and social risks associated with difficult to rehabilitate abandoned mine sites that could harm people and animals.</p> <p>(R 5) Explore and implement innovative mine rehabilitation programs including involving community groups to carry out mine rehabilitation work based on the global and Australian best practice examples.</p>
<p>There have been no regular formal evaluations of the efficiency of State</p>	<p>(R 6) Undertake an inquiry into the current state of operations and management of SAs.</p>

<p>Agreements (SAs) since this regulatory mechanism was established in 1952.</p> <p>The WA Auditor General conducted an audit into the status of SAs in 2004. However, the bulk of the findings have not been followed up.</p>	<p>The inquiry should include the validity of some of the old SAs such as the <i>Act</i> which is still used to manage the Yeelirrie uranium mine as in this study established evidence that the <i>Yeelirrie (Uranium) Mine Act 1978</i> may not be valid.</p>
<p>This research study found:</p> <p>(i) inherent weaknesses of key mining legislation; (ii) unclear demarcations and overlaps of legislation; (iii) ambivalence and dichotomy of the mining regulatory framework; (iv) lack of coordination of mining regulatory framework and multi-agency roles; (v) absence of an apex-level agency to coordinate mining regulations; (vi) delays in introducing environmentally-centric legislation and regulations, and (vii) lack of adaptive capacity. Most of these findings could be addressed by setting up an apex-level agency preferably under the Department of Premier and Cabinet to coordinate, monitor and continuous improvements of mining regulations in WA.</p>	<p>(R 7) Explore the feasibility of setting up a Resource development and management division (apex-level entity) preferably under the Premier and Cabinet.</p> <p>Most of the resources required could be secured by streamlining and restructuring the functions DMIRS & DJTSI.</p>

11.3 Future Research Agenda

The focus of this PhD project was limited to the findings that emerged from an in-depth examination of the Mining Regulatory Framework in Western Australia, and an evaluation of relevant regulations of two types of mining approval and operations through case study method. The PhD project was limited to examine the efficiency of the environmental compliance of the mining regulations in WA focusing on two minerals—uranium and coal. Several other research topics were not covered in this study (see Table 11.2), hence they need to be studied focusing on other aspects of the mining regulatory framework of WA. The

issues not covered in this study include evaluating the regulations of oil and gas industry, long-term effects on flora and fauna and the impact on biodiversity due to mining, air and water pollutions; longitudinal studies focusing on the environmental impact of the Yeelirrie project, and other uranium mines merit consideration.

As the mining industry is in transition to a more sustainable *modus operandi*, future research will be most needed to position the industry better and develop strategies to assure environmental protection. Even for Western Australia alone, the topics mentioned above merit consideration.

The sustainability agenda for the entire global mining sector is much broader and is likely to become a research priority focusing on more environmentally mining practices. This thesis was just a small contribution in this direction. Further, exploring areas of research are of paramount importance for the Australian and global mining industry. Table 11.2 provides some of these research topics that may be considered in future research projects.

TABLE 11.2 FUTURE RESEARCH AGENDA

NO	RESEARCH AREA	SUBJECT AREA/S	PROPOSED RESEARCH METHODS & STUDY AREAS
1	Effective strategies for implementing MinReF with the objective of minimising legislative overlaps	Public policy Legal research Academic research	Public policy Academic research Feasibility studies Independent Audit inquiries
2	Need for whole-of government resource policy	Policy development	Legal research Public policy analysis
3	Identification of current gaps and deficiencies of the <i>Yeelirrie Act 1978</i>	Legal research Academic research	Legal research Legislative amendments
4	Analysis of existing mining regulations covering gas and petroleum operations	Public policy Legal research Academic research	Case studies on public policy Legal research.
5	What lessons could be learnt from the 2011 - 2015 Mining Reform Agenda?	Public policy Legal research Academic research	Independent audit Legal research Independent public policy analysis
6	<i>Yeelirrie Agreement Act.</i> Its validity and ability to ensure future mine closure work: Identify legal issues.	Legal research Public policy	Legal analysis Economic models Public policy case studies
7	Yeelirrie project: Identify project risks; environmental and sovereign risks of mine rehabilitation liabilities.	Public policy	Legal research Academic research Cost-benefit analysis.

8	Yeelirrie project: Impact on the biodiversity	Legal research Academic research	Ecological case study
9	Yeelirrie project Economic sustainability	Economic- sustainability Economic research	Case study methods Cost-benefit analysis
10	Yeelirrie project: Social sustainability issues	Public policy Academic research	Case study methods
11	Collie coal mining: Social sustainability issues	Public policy Academic research	Case study methods
12	Collie coal mining: post-mining- environmental impact studies	Public policy Academic research	Case studies Scientific research
13	State Agreements: How to monitor cost benefits analysis	Public policy Academic research	Economic and public policy research
14	State Agreements: Monitoring of cost benefits analysis	Public policy Academic research	Economic models Cost-benefit Analysis
15	Regulatory compliance: Gas & petroleum regulations	Academic and public policy research	Case studies
16	Pit Lake rehabilitation	Academic research Public policy	Research into innovative approaches to be carried out by community groups and NGO's using seed funding under the <i>MRF Act</i>
17	Innovative mine rehabilitation	Public policy Mining engineering	Best practice models
18	Whole-of-government mining regulatory compliance	Comparative studies on regulations governing other mineral projects	Case studies and quantitative analysis

19	Whole-of-government mine rehabilitation approaches	Policy development	Research how accredited NGOs could undertake mine rehabilitation work under the specific guidelines of the regulatory agency (DMIRS)
20	Research into the refinement of “Adaptive Capacity” as a framework to identify and address the weaknesses of the MinReF	Public policy ‘Academic research Multi-disciplinary research	Independent audit Legal research Independent public policy analysis Sustainability research
21	Analyse various “discourses” of agencies implementing MinReF	Academic Research Content Analysis	Legal research Independent public policy analysis
22	Research into the work carried out by voluntary agencies such as the World Wildlife Fund (WWF) have initiated on promoting sustainable mining practices initiated by global mining focusing on the success stories of the mining companies towards the environment and sustainability practices.	Academic Research	Sustainability research

REFERENCES

PRIMARY SOURCES: AUSTRALIAN GOVERNMENT

Australian Bureau of Statistics. (1910). *Year Book Australia – 1910*. Retrieved from: <http://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbytitle/6893596390A01028CA2569E3001F5555?OpenDocument>

----- (2016) *2016 Census: QuickStats: Population - Sandstone & Wiluna*. Retrieved from: <http://quickstats.censusdata.abs.gov.au/>

Commonwealth of Australia: Parliamentary Education Office and Australian Government Solicitor (2010). *Australia's constitution: with overview and notes by the Australian Government Solicitor*. Retrieved from: <https://trove.nla.gov.au/nbdid/46716936>

Government of Australia. (1953). *Atomic Energy Act 1953*. Retrieved from: <https://www.legislation.gov.au/Details/C2004C00415/Download>

----- (1974). *Environmental Protection (Impact of Proposal Act 1974 (Cth))*. Retrieved from: <https://www.legislation.gov.au/Details/C2004C03785>.

----- (1978). *Environmental Protection (Nuclear Codes Act) 1978*. Retrieved from: <https://www.legislation.gov.au/Details/C2004A01831>

----- (1993). *The Native Title Act 1993*. Retrieved from <https://www.legislation.gov.au/Details/C2017C00178>

----- (1999). *Environmental Protection and Biodiversity Act 1999*. Retrieved from: <https://www.legislation.gov.au/Details/C2016C00777>

----- (1999). *EPBC: Memorandum of Understanding - Western Australia*
Retrieved from: <https://www.environment.gov.au/system/files/pages/71679b88.../wamou-2013.pdf>

SECONDARY SOURCES - AUSTRALIAN GOVERNMENT

Australian Government: Department of the Prime Minister and Cabinet. (n.d.). *Policy Implementation*. Retrieved from: <https://www.pmc.gov.au/government/policy-implementation>

Australian Government: Department of Environment and Energy. (n.d.). *National Landcare Program Phase Two*. Retrieved from: <http://www.environment.gov.au/promo/national-landcare-program-phase-two>

----.Environment Protection Agency. (1995). *Best practice environmental management in mining* Canberra: AGPS.

AusLit (n.d.) *Western Australian Current Acts*: Retrieved from: <http://classic.austlii.edu.au/au/wa/>

----.Geoscience Australia. (2013). *Australia's mineral resource assessment 2013 – Coal*
Retrieved from: <http://www.ga.gov.au/data-pubs/data-and-publications-search/publications/australian-minerals-resource-assessment/coal>

Government of Western Australia (Primary Sources)

Department of Premier and Cabinet. (n.d). *The Coal Mines Regulation Act, 1902*. Retrieved from

[https://www.slp.wa.gov.au/pco/prod/filestore.nsf/FileURL/mrdoc_14143.pdf/\\$FILE/Coal%20Mines%20Regulation%20Act%201902%20-%20%5B00-00-00%5D.pdf?OpenElement](https://www.slp.wa.gov.au/pco/prod/filestore.nsf/FileURL/mrdoc_14143.pdf/$FILE/Coal%20Mines%20Regulation%20Act%201902%20-%20%5B00-00-00%5D.pdf?OpenElement)

Department of Land Administration. (1997). *Land Administration Act, 1997*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_509_homepage.ht

Department of Biodiversity, Conservation and Attractions. (n.d.). *Biodiversity Conservation Act 2016*. Retrieved from:
<https://www.dpaw.wa.gov.au/plants-and-animals/468-biodiversity-conservation-act-2016>

Government of Western Australia. *Mining Act 1904* Retrieved from:
<https://www.legislation.wa.gov.au/legislation/statutes.nsf/RedirectURL?>

----- (1911). *Mines and Machinery Act 1911*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/law_a6811.html

----- (1914). *Rights in Water and Irrigation Act 1914*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_844_homepage.html

----- (1933). *Land Act* [Repealed Act] Retrieved from:
http://classic.austlii.edu.au/au/legis/wa/repealed_act/la193348/

----- (1950). *Wildlife Conservation Act 1950*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1080_homepage.html

Government of Western Australia: Department of Water and Environmental Regulations, (n.d). *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Retrieved from: <https://www.der.wa.gov.au/our-work/legislative-review-regulatory-reforms/84-environmental-protection-clearing-of-native-vegetation-regulations-2004>

Government of Western Australia. (1978). *Mining Act 1978*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_604_homepage.html

----- (1979). *Uranium (Yeelirrie) Agreement Act 1979 - First Schedule (1978)*. Retrieved from http://www5.austlii.edu.au/au/legis/wa/consol_act/uaa1978287/sch1.html

----- (1979). *Collie Coal (Griffin) Agreement Act 1979*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/...nsf/main_mrtitle_158_homepage.html

----- (1982). *Uranium (Yeelirrie) Agreement Amendment Act 1982*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/law_a6042.html

----- (1986). *Environmental Protection Act 1986*. Retrieved from:
https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_304_homepage.html

Government of Western Australia: Department of Justice. (1994). *Mines Safety and Inspection 1994*. Retrieved from: http://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_599_homepage.html

----- (2012). *Mining Rehabilitation Fund Act*. Retrieved from: https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_13067_homepage.html

----- (2013). *Mining Rehabilitation Fund Regulations*. Retrieved from: https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_13067_homepage.html

----- (2016). *Biodiversity Conservation Act 2016*. Retrieved from: https://www.legislation.wa.gov.au/legislation/.../main_mrtitle_1080_homepage.html

---- (n.d.). *Western Australian Legislation*. Retrieved from: <https://www.legislation.wa.gov.au/legislation/statutes.nsf/home.html>

Department of Mines and Petroleum. (2017). *Statistics Digest 2016 -2017*. Retrieved from: http://www.dmp.wa.gov.au/Documents/About-Us-Careers/AboutUs-StatisticsDigest_2016-17.pdf

Government of Western Australia: Department of Mines, Petroleum, Industry and Safety. (n.d.) *MINEDEX on the Web*. Retrieved from: <http://minedext.dmp.wa.gov.au/minedex/external/common/appMain.jsp>

Government of Western Australia: Department of Premier and Cabinet (n.d.). *Online publications*. <https://www.slp.wa.gov.au/options/online.htm>

OTHER: PRIMARY SOURCES

Anonymous, Research Participants No 1 - 16 (2016 & 2017)

GOVERNMENT OF WESTERN AUSTRALIA (SECONDARY SOURCES)

Department of Jobs, Tourism, Innovation, and Science (n.d.). *What is State Agreement?* Retrieved from: www.jtsi.wa.gov.au/what-we-do/manage-state-agreements/what-is-a-state-agreement

----- (n.d.). List of State Agreements. Retrieved from: www.jtsi.wa.gov.au/what-we-do/manage-state-agreements/list-of-state-agreements

----- (n.d.). *Western Australia: Economic Profile*. Retrieved from: https://www.jtsi.wa.gov.au/docs/default-source/default-document-library/wa-economic-profile-0818.pdf?sfvrsn=e539721c_4

----- (2018). *Annual Report 2017-18*. Retrieved from: https://www.jtsi.wa.gov.au/docs/default-source/home-page-publications-display/jtsi-annual-report-2017-18.pdf?sfvrsn=ee0b721c_6

Department of Water, Environment Regulation, (July 2017). *Best Practice Regulatory Principles*. Retrieved from: <https://www.der.wa.gov.au/our-work/regulatory-framework>

Department of Biodiversity, Conservation and Attractions, (n.d.). *About Us*. Retrieved from: <https://www.dbca.wa.gov.au/about>

Department of Mines and Petroleum. (2015). *Mining Legislation Amendment Bill 2015: What is the purpose of the Mining Legislation Amendment Bill 2015?* Retrieved from: <http://www.dmp.wa.gov.au/Environment/Mining-Legislation-Amendment-13912.aspx>

Department of Mines and Petroleum. (n.d). *Our Plan for Success to 2019*. Retrieved http://www.dmp.wa.gov.au/Documents/About-Us-Careers/DMP-OurPlanforSuccess_2019.pdf

----- (n.d). *What is the MRF?* Retrieved from <http://www.dmp.wa.gov.au/Environment/What-is-the-MRF-19522.aspx>

----- (n.d). *Abandoned Mine Project*. Retrieved from: <http://www.dmp.wa.gov.au/Environment/Abandoned-mines-projects-18193.aspx>

----- (n.d.). *Secure investment location* Retrieved from: <http://www.dmp.wa.gov.au/Investors/Secure-investment-location-18318.aspx>

Environmental Protection Agency. (August 2016). *Report and recommendations of the Environmental Protection: Yeelirrie Uranium Project: Report 1574* Retrieved from: www.epa.wa.gov.au/sites/default/files/EPA_Report/Rep%201574%20Yeelirrie%20PER%20030816.pdf

----- (n.d). (August 2016) *Appendix 3—Summary of Identification of Key Environmental Factors and Principle*. Retrieved from: www.epa.wa.gov.au/sites/default/files/EPA_Report/Rep%201574%20Yeelirrie%20PER%20030816.pdf

Government of Western Australia: Department of Mines, Industry, Resources & Safety. (2012). *Exploration Incentive Scheme funds 43 drilling programs* Retrieved from: <http://www.dmp.wa.gov.au/News/Exploration-Incentive-Scheme-22716.aspx>

----- (2009). Industry Working Group Report. (April 2009). *Review of Approval Processes in Western Australia: Prepared for the Minister for Mines and Petroleum*. Retrieved from: http://www.dmp.wa.gov.au/Documents/Investors/INV-ReviewofApprovalProcesses_April06.pdf

----- (2013). *Guide to Uranium in Western Australia*. Retrieved from: http://www.dmp.wa.gov.au/Documents/Investors/InvestorsUranium_WesternAustralia_Guide.pdf

----- (September 2014). *Mining Proposal Reform Discussion paper for public consultation*. Retrieved from: http://www.dmp.wa.gov.au/Documents/Environment/Mining_Proposal_Reform_Discussion_Paper.pdf

----- (2014). *Environmental Regulatory Strategy*). Retrieved from: www.dmp.wa.gov.au/Documents/Environment/ENV-ADMIN-050.pdf

----- (2014). *Mining Proposal Reform Discussion paper for public consultation*. September 2014. Retrieved from: http://www.dmp.wa.gov.au/Documents/Environment/Mining_Proposal_Reform_Discussion_Paper.pdf

Government of Western Australia: Department of Mines, Industry, Resources & Safety. (2015). *Annual Report 2014 – 2015*. Retrieved from: http://www.dmp.wa.gov.au/Documents/About-Us-Careers/DMP-AnnualReport_14-15-Executive_Report.pdf

----- (2014) *Environment Mining Proposal Reform Discussion Paper.pdf*
Retrieved from:
http://www.dmp.wa.gov.au/Documents/Environment/Mining_Proposal_Reform_Discussion_Paper.pdf

----- (2016). *Annual Report 2015 - 2016*. Retrieved from:
www.dmp.wa.gov.au/Documents/About-Us-Careers/AnnualReport_2015-16.pdf

----- (2017). *Annual Report 2016 - 2017*. Retrieved from:
http://www.dmp.wa.gov.au/Documents/About-Us-Careers/AnnualReport_2016-2017.pdf

----- (2017). *Mining Rehabilitation Fund Yearly Report 2017*. Retrieved from:
http://www.dmp.wa.gov.au/Documents/Environment/ENV-MRF_YearlyReport2017.pdf

----- (2013). *Consultation Paper: Proposed Amendments to the Mining Legislation*
Retrieved from:
http://www.dmp.wa.gov.au/documents/Environmental_Reform_Discussion_Paper.pdf

----- (2014). *Environmental Regulatory Strategy* . Retrieved from:
<http://www.dmp.wa.gov.au/Documents/Environment/ENV-ADMIN-050.pdf>

----- (2016). *Abandoned Mine Policy*. Retrieved from:
<http://www.dmp.wa.gov.au/Documents/Environment/ENV-MEB-201.pdf>

----- (2017). *Annual Report 2016- 2017*, p.1 Retrieved from:
http://www.dmp.wa.gov.au/Documents/About-Us-Careers/AnnualReport_2016-2017.pdf

----- (2018). *Exploration Incentive Scheme drives new exploration*. Retrieved from:
<http://www.dmp.wa.gov.au/News/Exploration-Incentive-Scheme-24268.aspx>

----- (n.d.). *Administration of Mine Closure Plans*. Retrieved from:
<http://www.dmp.wa.gov.au/Documents/Environment/ENV-MEB-370.pdf>

----- (n.d.). *Public sector awards & agreements*. Retrieved from:
<https://www.commerce.wa.gov.au/labour-relations/public-sector-awards-agreements->

----- (n.d.). Retrieved from: <http://www.dmp.wa.gov.au/About-Us-Careers/Divisions-1425.aspx>

----- (n.d). *Uranium*. Retrieved from: <http://www.dmp.wa.gov.au/Uranium-1459.aspx>
Environmental Protection Authority. (2016). *Report and recommendations of the Environmental Protection Authority. Yeelirrie Project: Cameco Australia Pty Ltd. Report 1574*

Department of Mines and Petroleum: Environment Protection Agency. (2015) *Guidelines for Preparing Mine Closure Plans*. Retrieved from:
<http://www.dmp.wa.gov.au/Documents/Environment/ENV-MEB-121.pdf>

Government of Western Australia: Ministerial Advisory Panel. (2012). *Reforming Environmental Regulation in the WA Resources Industry*. Retrieved from: http://www.dmp.wa.gov.au/Documents/Environment/Reforming_Environmental_Regulation_in_the_WA_Resources_Industry.pdf

Government of Western Australia: Public Sector Commission. (n.d). *Good governance guide – Code of Ethics and code of conduct*. Retrieved from: <https://publicsector.wa.gov.au/document/good-governance-guide---code-ethics-and-code-conduct>

Government of Western Australia: Media Statement. (31 March 2004). *Government terminates Yeelirrie uranium project State Agreement*. Retrieved from: <https://www.mediastatements.wa.gov.au/Pages/Gallop/2004/03/Government-terminates-Yeelirrie-uranium-project-State-Agreement.aspx>

----- Media Statement (24 December 2014). *Billion dollar refund supports WA mining jobs*. Retrieved from: <https://www.mediastatements.wa.gov.au/Pages/Barnett/2014/12/Billion-dollar-refund-supports-WA-mining-jobs.aspx>

----- Media Statement. (8 June 2014) *Stricter rules for new mine rehabilitation fund*. Media Statement, Hon. Bill Marmion. Minister for Mines and Petroleum; Housing. Perth, Western Australia. Retrieved from: <https://www.mediastatements.wa.gov.au/Pages/Barnett/2014/06/Stricter-rules-for-new-mine-rehabilitation-fund.aspx>

----- Media Statement. (16 January 2017). *Approval for Yeelirrie uranium project*. Retrieved from: <https://www.mediastatements.wa.gov.au/Pages/Barnett/2017/01/Approval-for-Yeelirrie-uranium-project.aspx>

----- Media Statement (20 June 2017). *McGowan Government announces uranium policy*. Retrieved from <https://www.mediastatements.wa.gov.au/Pages/McGowan/2017/06/McGowan-Government-announces-uranium-policy.aspx>

Office of the Environmental Protection Agency. (February 2015). *Information for proponents on environmental impact assessment under the new Assessment Bilateral Agreement* Retrieved from: http://www.epa.wa.gov.au/sites/default/files/Publications/Infosheet%20-%20assessment%20bilateral-proponent-February2015_0.pdf

----- (2014). Environmental Protection Bulletin No. 22: *Hydraulic fracturing for onshore natural gas from shale and tight rocks*. Retrieved from: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPB22-Fracking-171214.pdf

----- (1991). *Consultative environmental review premier mine expansion – EPA WA* Retrieved from: www.epa.wa.gov.au/sites/default/files/PER_documentation/A0601_R0601_CER.pdf

Office of the Environmental Protection Agency (2011). *Administrative Agreement between Department of Environment and Conservation and Department of Mines and Petroleum – April 2011*. Retrieved from: <http://www.dmp.wa.gov.au/Documents/Environment/ENV-NVAB-021.pdf>

Office of the Environmental Protection Agency (August 2016). *Appendix 3 - Summary of Identification of Key Environmental Factors and Principles* Retrieved from: www.epa.wa.gov.au/sites/default/files/PER_documentation/Yeelirrie%20Uranium%20Project%20-%20PER.pdf

State Records Office. (n.d). *Crown Lands and Surveys Department* Retrieved from: <https://archive.sro.wa.gov.au/index.php/crown-lands-and-surveys-department-au-wa-a60>

----- (n.d.). *AU WA A16, Department of Mines*, Retrieved from: <https://archive.sro.wa.gov.au/index.php/department-of-mines-au-wa-a16>

SECONDARY SOURCES

Abandoned-mine.org (n.d.). *About NOAM*. Retrieved from: <https://www.abandoned-mines.org/en/>

Academy of science. (n.d). *Uranium Mining, Processing and Nuclear Energy Review draft report*. Retrieved from: <https://www.science.org.au/supporting-science/science-policy/submissions-government/comment%E2%80%9494uranium-mining-processing-and>

Achen, Y. and Snidal, D. (1989). Rational Deterrence Theory and Comparative Case Studies, *World Politics*, 41(2), 143–169.

Adgar, W, N, (2000). Social and Ecological Resilience: Are They Related? *in Progress in Human Geography* 24(3):347-364

Adler, P. A. and Adler, P. (1987). *Membership Roles in Field Research*. Newbury Park, CA: Sage Publications.

Adelaide University, (n.d.). *What is legislation*. Retrieved from: <https://www.adelaide.edu.au/library/about/libraries/law/documents/what-is-legislation.doc>.

Aglietta, M. (1979). *A Theory of Capitalist Regulation: the US experience*. (trans). David Fernbach. London: New Left Books.

Alberti, M. (1996). Measuring urban sustainability. *Environmental impact assessment review*, 16(4-6), 381- 424.

Alamy stock photo. (n.d.). *The cheese factory in Valpeltine*. Retrieved from: <https://www.google.com.au/search?q=cheese+factory+in+Valpeltine&source>

Alvesson, M. & Kärreman, D. (2000). Varieties of discourse: On the study of organizations through discourse analysis. *Human relations*, 53(9), 1125-1149

American Heritage. (1992). *Dictionary of the English Language. (Third Edition)*. Houghton Mifflin Company. *c /f An Introduction to Axiom Systems* Retrieved from <http://www3.sympatico.ca/saburns/pg0102.htm>

Andersen, Hanne and Hepburn, Brian. (Summer 2016 Edition). *Scientific Method, The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), Retrieved from: <https://plato.stanford.edu/archives/sum2016/entries/scientific-method/>

- Anter, A (2014). *Max Weber's Theory of the Modern State Structure and Significance*. New York: Palgrave MacMillan.
- Armitage, D. R., Plummer, F., Berkes, R. I. Arthur, A. T., Charles, I. J., Davidson-Hunt, A. P., Diduck, N. C., Doubleday, D. S., Johnson, M., Marschke, P., McConney, E. W., Pinkerton, & E. K. Wollenberg. (2009). Adaptive co-management for social ecological complexity. *Frontiers in Ecology and the Environment*. 7(2):95-102.
- Armitage, D. F. B. and Doubleday, N. (eds). (2007). *Adaptive co-management: collaboration, learning, and multi-level governance*. Vancouver, British Columbia: UBC Press.
- Asmus, P. (2009, August 19). *When it comes to water, can corporations and community really coexist?* Retrieved from <http://peaceandjustice.org/article.php/20090820081745528>
- Assefa, G. & Frostell, B. (2007). Social sustainability and social acceptance in technology assessment: A case study of energy technologies. *Technology in Society*, 29(1), 63-78.
- aussierenewables.com. (n.d). *Woodlawn Bioreactor*. Retrieved from: <https://www.aussierenewables.com.au/directory/woodlawn-bioreactor-100.html>
- Australian Government: Department of Environment and Heritage. (14 August 2018). *Australia's National Land Care Program – Joint media release Regional Land Partnerships: a fresh start for Landcare*. Retrieved from: <http://www.nrm.gov.au/national-landcare-program>
- (n.d.) *Australian Mineral Commodities*. Retrieved from: <https://www.archive.industry.gov.au/resource/Mining/AustralianMineralCommodities/>
- Australian Mining Newsletter. (February 9, 2018). *WA Supreme Court dismisses conservationist appeal against uranium project*. Retrieved from: <https://www.australianmining.com.au/news/wa-supreme-court-dismisses-yeelirrie-uranium-mine-objections/>
- Australian National Audit Office. (ANAO), (2014). *Managing compliance with EPBC Act conditions of approval- Report No.43 2013–14*. Canberra, ACT: ANAO.
- Australian Parliament House. (n.d.). *Environmental regulation in Australia*. Retrieved from: <https://www.aph.gov.au/.../Environment/.../02%20Environmental%20regulation%20in%20>
- Australasian Institute of Mining and Metallurgy (AusIMM). (n.d). *About the AusIMM*, Retrieved from: <https://www.ausimm.com.au/content/default.aspx?ID=94>
- Australianpolitics.com. (n.d.). *Key feature of the Westminster System* Retrieved from: <http://australianpolitics.com/democracy/key-terms/westminster-system>
- Aussierenewables.com.au. (n.d). *Woodlawn Bioreactor*. Retrieved from: <https://www.aussierenewables.com.au/directory/woodlawn-bioreactor-100.html>
- Australian Broadcasting Corporation. (17 January 2017). *WA Government approves uranium mine despite environmental concerns*. Retrieved from <http://www.abc.net.au/news/2017-01-16/wa-government-approves-cameco-uranium-mine/8186514>
- (2 April 2013). *Federal approval for WA's first uranium mine*. Retrieved from: <http://www.abc.net.au/news/2013-04-02/federal-approval-for-wa-uranium-mine/4605580>

Australian Broadcasting Corporation. (9 July 2017). *Landcare: A transcript on Greenbushes mining and ecosystem rehabilitation program*.

----- (16 February 2017). *Mining report finds 60,000 abandoned sites, lack of rehabilitation and unreliable data*. Retrieved from <http://www.abc.net.au/news/2017-02-15/australia-institute-report-raises-concerns-on-mine-rehab/8270558>

----- (16 Oct 2014). *WA's Pilbara needs plan to protect environment from mining, EPA warns*. Retrieved from: www.abc.net.au/news/2014-10-15/epa-warns-pilbara-environment-needs-long-term-plan/5815724

Ausubel, D., Novak, J. & Hanesian, H. (1978). *Educational Psychology: A Cognitive View*. New York: Holt, Rinehart and Winston.

Azapagic, A. (2004). Developing a framework for sustainable development indicators for the mining and minerals industry. *Journal of cleaner production*. 12(6), pp. 639-662.

Baker, S. E. & Edwards, R. (2012). *How many qualitative interviews is enough: Discussion Paper*. Southampton, UK: National Centre for Research Methods

Barnett, C, Premier of Western Australia. (2014). *Australian Mining in Africa. Paper presented to Investing in African Mining Indaba*. Cape Town. <https://www.miningindaba.com/ehome/index.php?eventid=174097&&eventid=84507&tabid=186544>

Banks, G. (2003). *Minimum effective regulation and the mining industry*. Retrieved from: <https://www.pc.gov.au/news-media/speeches/cs20030603/cs20030603.pdf>

Bazeley, P. and K. Jackson, K. (2013). *Qualitative Data Analysis with NVivo* (2nd ed.) London: Sage

Bauman, Z. (1991). *Modernity and Ambivalence*. Cambridge: Polity.

Beer, S. H. (1982). *Britain Against Itself*, New York, W.W. Norton.

Berkes, F. 2007. Adaptive co-management and complexity: exploring the many faces of co-management. Pages 19-37 in D. Armitage, F. Berkes, and N. Doubleday, editors. *Adaptive co-management: collaboration, learning, and multi-level governance*. Vancouver: UBC Press.

Best Practice Environmental Management in Mining, Australian. (1995). *Journal of Environmental Management*, 2(4), 207-209.

Bice, S. (2014). What Gives You a Social Licence? An Exploration of the Social Licence to Operate in the *Australian Mining Industry*. *Resources*, (3), 62-80.

----- (2016). *Responsible Mining: Key Principles for Industry Integrity*. New York: Earthscan/Routledge.

Bice, S. & Moffat, K. (2014). *Social licence to operate and impact assessment, Impact Assessment and Project Appraisal*, 32(4), 257-262.

Boyer, R. & Saillard, Y. (2002). *Regulation Theory: The State of the Art*. London: Routledge.

- BNET Business Dictionary. (2009). *Corporate Social Responsibility*. Retrieved from <http://dictionary.bnet.com/definition/Corporate+Social+Responsibility.html>
- Bôas, R. C.V., Shields, D., Šolar, S. Anciaux, P & Önal, G. (editors).(2005). *A Review on Indicators of Sustainability for the Minerals Extraction Industries*. Retrieved from: <http://www.ibram.org.br/sites/1300/1382/00000743.pdf>
- Bridge, G. (2004). Contested terrain: mining and the environment. *Annual Review of Environment and Resources*, 29, pp.205-259.
- Brueckner, M.; Durey, A.; Mayes, R. & Pforr, C. (eds.) (2014). *Resource Curse or Cure: On the Sustainability of Development in Western Australia*. Berlin. Heidelberg: Springer Verlag.
- Black's Law Dictionary Free Online Legal Dictionary. (n.d.). *What is Regulation?* Retrieved from: <https://thelawdictionary.org/regulation/>
- Blackwoodbasingroup.com.au. (n.d.). *About us*. Retrieved from: <http://www.blackwoodbasingroup.com.au/about-us/>
- (n.d.). *Our Mission*. Retrieved from: <http://www.blackwoodbasingroup.com.au/about-us/our-mission/>
- (n.d.). *Committee members*. Retrieved from: <http://www.blackwoodbasingroup.com.au/about-us/committee-members>
- bonzie.com. (2012), *maps digital Altus: map of collie region and coal mine sites*. Retrieved from: <https://www.google.com.au/search?q=map+of+collie+region+and+coal+mines+bonzie.com>
- British Medical Journal (bmj).com.(n.d.). *BMJ Best Practice*. Retrieved from: <https://bestpractice.bmj.com/info/>
- Booking.com. (n.d). *Wieliczka Salt Mine Hotels*. Retrieved from: www.booking.com/Wieliczka/
- Burns, R. B. (1994). *Introduction to Research Methods* (2nd Ed). Melbourne: Longman Cheshire.
- Burton, W. (2007). *Burton's Legal Thesaurus*, (4th ed). NY, USA: McGraw Hill Professional
- Business Council of British Columbia, (May 2015) *Rethinking Social Licence to Operate – A Concept in Search of Definition and Boundaries*. In *Environment and Energy Bulletin*, 7(2), Retrieved from: <http://www.bcbc.com/content/1708/EEBv7n2.pdf>
- Cameco.com (2012). *Cameco Acquires Yeelirrie Uranium Project in Western Australia*. Retrieved from: <https://www.cameco.com/media/news/cameco-acquires-yeelirrie-uranium-project-in-western-australia>
- (2015). *Yeelirrie Project - Executive Summary - Cameco Australia*. Retrieved from www.epa.wa.gov.au/sites/default/files/EPA_Report/Rep%201574%20Yeelirrie%20PER%20030816.pdf

- Canavan, M and Bishop, J (2011). Forward, in *Leading Practice: Sustainable Development Program for the Mining Industry*. Canberra: Australian Government.
- Carson, R. (30 June 1962). *Silent Spring*. The New Yorker Magazine. Retrieved from <http://www.newyorker.com/magazine/1962/06/30/silent-spring-part-3>
- Carter, N. (2007). *The Politics of the Environment: Ideas, Activism, Policy*, (2nd ed), Cambridge: Cambridge University Press.
- Chiat, J. (10 May 2017). *Mining Bill subject to detailed consultation*. Retrieved from: <https://thewest.com.au/news/kalgoorlie-miner/mining-bill-subject-to-detailed-consultation-ng-b88470039z>
- Chandler, L. (2014). Regulating the Resource Juggernaut. In Brueckner, et al (eds.) in *Resource Curse or Cure: On the Sustainability of Development in Western Australia*. pp. 165-178. Berlin: Springer Verlag.
- Chaffin, B. C., H. Gosnell, & B. A. Cosens. (2014). A decade of adaptive governance scholarship: synthesis and future directions. *Ecology and Society* 19(3):56. <http://dx.doi.org/10.5751/ES-06824-190356>
- Cleaver, F. & L. Whaley. (2018). Understanding process, power, and meaning in adaptive governance: a critical institutional reading. *Ecology and Society* 23(2):49. <https://doi.org/10.5751/ES-10212-230249>
- cnbc.com. (22 October 2105). *Striking Paydirt: Entrepreneurs Find Innovative New Uses for Old Mines*. Retrieved from: <https://www.cnbc.com/2015/10/22/striking-paydirt-innovative-new-uses-for-old-mines.html>
- Colliecoal.com (n.d.). *Collie Coal history*. Retrieved from: <http://www.griffincoal.com.au/coal-education/collie-coal-history/collie-coal-history-early-mining/>
- Corrs.com.au. (n.d.). *Yanzhou Coal Mining Company's 3.5 Billion Acquisition of Felix Resources*. Retrieved from: <http://www.corrs.com.au/deals/yanzhou-coal-mining-company-s-3-5-billion-acquisition-of-felix-resources/>
- Cote, M. and A. J. Nightingale. (2012). Resilience thinking meets social theory. *Progress in Human Geography* 36(4), 475-489.
- Coalition for Energy Efficient Comminution. (n.d). *An introduction to CEEC*. Retrieved from: <https://www.ceecthefuture.org/about>
- Cochran, W. G. (2007). *Sampling Techniques* (3rd ed). New Delhi: Wiley India Pvt. Limited
- Coen, M. (30 August 2018). *What is primary sources*. Personal communication: email
- Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. (3rd ed). Thousand Oaks: Sage Publications.
- Creswell, J. W. & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. (4th ed). Thousand Oaks: Sage Publications.
- Crommelin, M. (1996). *State Agreements: Australian Trends and Experience*. AMPLA Yearbook 328, 330. Cited from Hillman (2006).

- Cruse, P. de. (1993). *A Modern Approach to Comparative Law*, Deventer, Boston: Kluwer.
- Danielson, L. (2002). *Mining Minerals and Sustainable Development Project*. Retrieved from: https://www.commddev.org/userfiles/files/1109_file_mining_minerals_and_sustainable.pdf
- Dictionary.com (n.d.). *Rule of Law*. Retrieved from: <https://www.dictionary.com/browse/rule-of-law>
- Doctors for the environment. (2013). *How coal burns Australia: The true cost of burning coal*. Retrieved from: http://dea.org.au/images/general/How_coal_burns_Aust._True_cost_of_burning_coal_04-13.pdf..
- Donaldson, T., & Dunfee, T. (1999). *Ties that bind: A social contracts approach to business ethics*. Boston: Harvard Business School Press.
- Dekker, R. (2017). Frame ambiguity in policy controversies: critical frame analysis of migrant integration policies in Antwerp and Rotterdam. *Critical Policy Studies*, 11(2), 127–145. Retrieved from: <https://doi.org/10.1080/19460171.2016.1147365>
- Deming, W. E. (1950). *Some Theory of Sampling*. New York: Wiley.
- Dempsey, N., Bramley, G., Power, S., & Brown, C. (2011). The social dimension of sustainable development: Defining urban social sustainability. *Sustainable development*, 19(5), 289-300.
- Denzin, N. K. & Lincoln, Y. S (eds). (2018). *The SAGE Handbook of Qualitative Research*. Los Angeles: Sage Publications.
- Dernbach, J. C. (1998). Sustainable development as a framework for national governance. Case. *Western Reserve Law Review*, (49)1, 1-103
- Doupé, G. & Alan J. Lybery; A., J. (2005). Environmental Risks Associated with Beneficial End Uses of Mine Lakes in Southwestern Australia. *Mine Water and the Environment*. 24: 134–138.
- Dresner, S. (2002). *The Principles of Sustainability*. London: Earthscan.
- Dye, T. R. (1972) *Understanding Public Policy*. Englewood Cliffs: Prentice-Hall.
- Earthday.org. (n.d) *About us*. Retrieved from: <https://www.earthday.org/about/>
- Economist.com, (2009). *Triple Bottom Line*. Retrieved from: <https://www.economist.com/news/2009/11/17/triple-bottom-line>
- Edith Cowan University. (n.d). *Get ready with Teacher Education*. Retrieved from: <http://www.ecu.edu.au/degrees/study-areas/teacher-education>
- Elkington, J. (2001). *Triple bottom line for 21st century business*. The Earthscan Reader in *Business and Sustainable Development*. 20-43.
- Elkington, J.(1998). *Accounting for the triple bottom line Measuring Business Excellence*. Retrieved from: emeraldinsight.com

- Environmental Defense Fund.(n.d). *About Environment Defense Fund*. Retrieved from: <https://www.edf.org/>
- Engineersaustralia.org, (n.d.). *Summary of Best Practice Guidelines for Engineering Faculties on Effective Industry Engagement in Australian Engineering Degrees*. Retrieved from: https://www.engineersaustralia.org.au/sites/default/files/content-files/2016-12/industry_engagement_forengineeering_-_summary_guidelines_as_at_aaee_conference.pdf
- Etten, V. J. E., Lund, M. A., McCullough, C. D.(2014). *Setting goals and choosing appropriate reference sites for restoring mine pit lakes as aquatic ecosystems: Case study from south west Australia*. DOI: 10.1179/1743286313Y.000000005
- Everingham, S. (31 May 2016). *Rum Jungle uranium mine in NT polluting environment 45 years after closure*. Retrieved from: <http://www.abc.net.au/news/2016-05-30/rum-jungle-uranium-mine-in-nt-polluting-environment-45-years-on/7460666>
- Fairclough, N. (1995). *Critical discourse analysis. The critical study of language. Language in social life series*. London: Longman.
- Fetzer, James, F. & Hempel, C. (Fall 2017 edition) *The Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed.), Retrieved from: <https://plato.stanford.edu/archives/fall2017/entries/hempel/>
- Filho, W. L., Marans, R. W., & Callewaert, J (.eds). (2018) *Handbook of Sustainability and Social Science Research*. Berlin: Springer Verlag.
- Finucane, S .(1995) Environmental Planning and Management in the Construction of a New Pilbara Mine. *Australian Journal of Environmental Management*, 2(3), 184-197.
- Flannery, T. & Stanley, F. (3 September 2014). *We must kill dirty coal before it kills us*. Retrieved from: <https://www.smh.com.au/opinion/we-must-kill-dirty-coal-before-it-kills-us-20140902-10b8lk.html>
- Fonseca, A., McAllister, M. L., Fitzpatrick, P. (2013). Measuring what? A comparative anatomy of five mining sustainability frameworks, *Minerals Engineering*, 46(47), 180 -186. <https://doi.org/10.1016/j.mineng.2013.04.008>
- fontana-valledaosta.it. (n.d.). *About Us*. Retrieved from: <https://www.fontina-valledaosta.it/en-gb/about-us>
- (n.d.). *Warehouses of Cooperativa latte e fontina*. Retrieved from: <https://www.fontina-valledaosta.it/en-gb/warehouses>
- Franks, D.; Brereton, D.; Moran, C. (2010). Managing the cumulative impacts of coal mining on regional communities and environments in Australia. *Impact Assessment and Project Appraisal*, 28(4): 299–312.
- Fraser Institute. (2017). *survey-of-mining-companies-2016-figures-and-tables.xlsx*. Retrieved from: <https://www.fraserinstitute.org/categories/mining>
- (2016). *Annual Survey of Mining Companies: 2016*. Retrieved from: <https://www.fraserinstitute.org/studies/annual-survey-of-mining-companies-2016>

- Fraser Institute - MiningFacts.org. (n.d.) *What is the Social Licence to Operate (SLO)?* Retrieved from <http://www.miningfacts.org/communities/what-is-the-social-licence-to-operate/>
- Friedman, M. (1970, September 13). *The social responsibility of business is to increase its profits*. New York: Times Magazine Inc.
- Freeman, R. (1994). The politics of stakeholder theory: Some future directions. in *Business Ethics Quarterly*, 4, 409-421.
- Friends of the Earth USA. (n.d). *About us*. Retrieved from: <https://foe.org/about-us/>
- Friends of the Earth Australia. (n.d.). *Uranium Mining in Australia*: Retrieved from: <https://www.foe.org.au/public-opinion-nuclear-power-australia>
- Fisher, D, E. (2010). *Australian Environmental Law: Norms, Principles and Rules*. Pyrmont: Thomson Reuters
- (2014). *Australian Environmental Law: Norms, Principles and Rules*. Pyrmont: Thomson Reuters.
- Fitzgerald, A. M. (2005). 'Mining Agreements in the Regulation of the Australian Minerals Sector', in Bastida, E, Wälde, T & Warden-Fernandez, J (eds.) *International and Comparative Mineral Law and Policy*, pp681-696. The Hague: Kluwer Law International
- (2002). *Mining Agreements: Negotiated Outcomes in the Australian Minerals Sector*. Chatswood, NSW: LexisNexis Butterworths Australia.
- Geddes, B. (2003). *Paradigms and Sand Castles: Theory Building and Research Design in Comparative Politics*. Ann Arbor: University of Michigan Press.
- General Mining Law (1872). *Mining Law of 1872*. Retrieved from: <http://www.encyclopedia.com/environment/educational-magazines/mining-law-1872>
- geodocs.dmp.wa.gov.au. (n.d). *Search for documents*. Retrieved from: <http://geodocs.dmp.wa.gov.au/document/documentSearchCriteria.do?from=topNav>
- Gerring, J. (2007). *Case Study Research: Principles and Practices*. Cambridge: University Press.
- Given, L. M. (2008). *The SAGE encyclopedia of qualitative research methods* (Vols. 1-0). Thousand Oaks, CA: SAGE Publications Ltd. DOI: 10.4135/9781412963909.
- Glaser, B. G and Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine Publishing Company.
- Globalreporting.org. (n.d.) *GRI: Empowering Sustainable Decisions*. Retrieved from: <https://www.globalreporting.org>
- (n.d). *ABOUT SUSTAINABILITY REPORTING*. Retrieved from: <https://www.globalreporting.org/information/sustainability-reporting/Pages/default.aspx>

- Globalreporting.org. (n.d) *GRI's History*. Retrieved from:
<https://www.globalreporting.org/information/about-gri/gri-history/Pages/GRI's%20history.aspx>
- Google. (2018) Map Data. Yeelirrie mine, Western Australia. Retrieved from:
<https://maps.google.com.au/>
- Gorey, P., Morrison-Saunders, A., Doepe, D., Mtegha, H. & McHenry, M.P. (2014). Dealing with mining legacies: from bonds to a central mining rehabilitation fund in Western Australia. *Dealing with mining legacies: from bonds to a central mining rehabilitation fund in Western Australia*. In: Mine Closure 2014: 9th International Conference on Mine Closures, 1 - 3 October, Johannesburg, South Africa. Retrieved from:
<http://researchrepository.murdoch.edu.au/id/eprint/26880/>
- Gorey, P., McHenry, M., Morrison-Saunders, A., Mtegha, H., & Doepel., D. (2016) Critical elements in implementing fundamental change in public environmental policy: Western Australia's mine closure and rehabilitation securities reform, *Australasian Journal of Environmental Management*, 23:4, 370-381.
- Govindarajalu, S. (2000). *Mining and sustainable development in Western Australia*. PhD Thesis. Curtin University of Technology. Western Australian School of Mines. Bentley: Curtin University of Technology.
- Govinnage, S. K. (2017). *State Agreements: Are they large resource development contracts or regulations*, Unpublished research report. Bentley: Curtin University Sustainability Policy Institute.
- (2018). *State Agreements. Regulatory tools for resource development or ratified contracts with undefined State liabilities*. (unpublished research notes). Bentley: Curtin University Sustainability Policy Institute
- (2018). *Content analysis of DMIRS discourses in Annual Reports 2014 – 2017*. (unpublished research notes). Bentley: Curtin University Sustainability Policy Institute.
- Giurco, D. & Petrie, J. G. (2007). Strategies for reducing the carbon footprint of copper: new technologies, more recycling or demand management? *Minerals Engineering*, 20(9), 842-853.
- Government Printer (GP). (1971). *Report of the Committee of Inquiry. Appointed to Inquire into and Report on the Operation of the Mining Act 1904- 1970*. GP: Perth. Cited from Hunt (2009).
- Government of South Australia. (n.d). *Nuclear Fuel Cycle Royal Commission*. Retrieved from: <http://nuclearrc.sa.gov.au>
- Grant, J., Manuel, P., & Joudrey, D. (1996). A framework for planning sustainable residential landscapes. *Journal of the American Planning Association*, 62(3), 331-344.
- Gray, R. & Milne, M. (2004). The Triple Bottom Line: Does it All Add Up? In *The triple bottom line, does it all add up? Assessing the sustainability of business and CSR*. (Eds). Henriques, A. & Richardson, J. pp 70-80. Sterling, VA: Earthscan Publications Ltd.
- Greenpeace.org. (n.d). *Timeline*. Retrieved from: http://www.tiki-toki.com/timeline/entry/594418/Greenpeace/#vars!date=2049-09-14_19:24:51!

- Griffin Coal Mining Company Pty Ltd, (1994). *Expansion of the Ewington Coal Mine – Ewington 11, Collie – Proposed change to environmental conditions*. Retrieved from: www.epa.wa.gov.au/sites/default/files/EPA_Report/1448_B764.pdf
- (n.d.). *Our History*. Retrieved from: <http://www.griffincoal.com.au/about-us/our-history/>
- Guess, G. M. and Farnham, P. G. (2011). *Cases in Public Policy Analysis* (3rd ed). Washington D. C.: Goerge Town University Press.
- Gunderson, L. (1999). Resilience, flexibility and adaptive management—antidotes for spurious certitude? *Ecology and Society* 3(1):7. <http://dx.doi.org/10.5751/ES-00089-030107>
- Guardian.com. (July 1, 2015). *Australia's largest woodlands 'will not be protected if it prevents mining*. Retrieved from: <https://www.theguardian.com/australia-news/2015/jul/01/australias-largest-woodlands-will-not-be-protected-if-it-prevents-mining>
- Gunningham, N., and D. Sinclair. (1999). Integrative Regulation: A Principle-Based Approach to Environmental Policy', *Law & Social Inquiry*/ (24)4: 853-896.
- Gunningham, N and Sinclair, D (1999b). *Regulatory pluralism: Designing environmental policy mixes for environmental protection*, *Law & Policy* 21: 49–76. doi.org/10.1111/1467-9930.00065.
- Hartman, H. L. and Mutmansk, J. (2002). *Introductory Mining Engineering* (2nd ed). Hoboken, NJ: John Wiley & Sons Inc.
- Helms, M. & Nixon, J. (2010). Exploring SWOT analysis – where are we now? A review of academic research from the last decade, *Journal of Strategy and Management*. 31(33),215.251.
- Hennink, M. M., Kaiser, B. N., & Marconi, V. C. (2017). Code saturation versus meaning saturation. In *Qualitative Health Research*, 27(4), 591-608.
- High Court of Australia, (1920). *A judgment in 1920 in the apparently-notorious Engineers' Case*. Cited from (Manetta, n. d.) in *Sovereignty in the Australian Federation - The Samuel Griffith Society*.
- Hillman, R. (2006). *The future role for state agreements in Western Australia*. Retrieved from www.austlii.edu.au/au/journals/AURELawJl/2006/58.pdf
- Hilson, G. (2000). Pollution prevention and cleaner production in the mining industry: an analysis of current issues. *Journal of Cleaner Production*, 8 (2), 119-126.
- Hilson, G. & Murck, B. (2002). Sustainable development in the mining industry: clarifying the corporate perspective. *Resources Policy*. 26 (5), 549-574.
- Hoecke, V. M. (ed) (2013). *Methodologies of Legal Research: Which kind of Method for What kind of Discipline*. London: Bloomsbury Publishing
- Holden, E., Linnerud, K. & Banister, D. (2014). Sustainable development: our common future revisited. *Global environmental change*, 26 (1), 130-139

- Holden, E., Linnerud, K. & Banister, D. (2017). The imperatives of sustainable development. *Sustainable Development*, 25(3), 213-226.
- Holmes, J. (2007). Monitoring organisational boundaries: Diverse discourse strategies used in gatekeeping. *Journal of Pragmatics*. 39(11), 1993-2016.
- Holling, C. S. (1978). *Adaptive environmental management and assessment*. London, UK: John Wiley & Sons
- Holling, C. S. and G. K. Meffert. (1996). Command and control and the pathology of natural resource management. *Conservation Biology* 10(2):328-337.
- Howlett, M. & Cashore, B. (2014). Conceptualizing Public Policy. In Engeli I. & Allison C.R. (eds) *Comparative Policy Studies*, London, UK: Palgrave Macmillan.
- Hunt, M. (2009.) *Mining Law in Western Australia* (5th edition). Sydney, NSW: The Federation Press.
- Hunt, M., Kavenagh, T., Hunt, J. (2015). *Hunt on Mining Law of Western Australia*. Annaldale, NSW: Federation Press.
- Hunt, G. Minister for Environment. (2 May 2016). *Personal Communication*
- International Union for the conservation of nature and natural resources "iucn" (1980). *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. Retrieved from: <https://portals.iucn.org/library/sites/library/files/documents/WCS-004.pdf>
- International Institute for Sustainable Development – Reporting Services "iisd.org" (n.d). *Earth Negotiations Bulletin*. Retrieved from: <http://enb.iisd.org/enb/>
- (n.d). *Sustainability Indicators & Sustainability Performance Management*. Retrieved from: <http://pubs.iied.org/pdfs/G00919.pdf>
- International Council on Mining and Metals. (2012). *Mining's Contribution to Sustainable Development: An Overview*. London: ICMM
- International Council on Mining and Metals (2003). *Principle 10*. Retrieved from: <https://www.icmm.com/en-gb/about-us/member-commitments/icmm-10-principles/icmm-principle-10>
- Ingvarson, I. Reid. K.; Buckley, S.; Kleinhenz, E.; Masters, G. N. and Rowley, G. (2004). *Australian Council for Educational Research: Best Practice Teacher Education Programs and Australia's Own Programs*. Retrieved from: http://research.acer.edu.au/teacher_education/13
https://research.acer.edu.au/cgi/viewcontent.cgi?article=1014&context=teacher_education
- International Institute for Environment and Development (IIED). (2002). *Executive Summary*. Retrieved from: <http://pubs.iied.org/pdfs/9084IIED.pdf>
- Intergovernmental Panel on Climate Change. "ipcc.ch" (n.d). *The Intergovernmental Panel on Climate Change*. Retrieved from: <https://www.ipcc.ch/organization/organization.shtml>
- Jacob, E. (1989). Qualitative Research: A Defense of Traditions. *Review of Educational Research*, 59(2), 229-235. Retrieved from <http://www.jstor.org/stable/1170416>

- Johnson, S. L. and Wright, H. H. (2003). *Mine void water resource issues in Western Australia: Western Australia, Water and Rivers Commission, Hydrogeological Record Series, Report HG 9*. Water and Rivers Commission, Perth, Australia.
- Jessop, B. (1995). The regulation approach, governance and post-Fordism: alternative perspectives on economic and political change? *Economy and Society*, 24:3, 307-
- (1988). Regulation theory, post-Fordism, and the state: more than a reply to Werner. in *Capital & Class* 34(1):147-168
- (1982). *The Capitalist State*, Oxford: Martin Robertson.
- John, P. (2003). Is There Life After Policy Streams, Advocacy Coalitions, and Punctuations: Using Evolutionary Theory to Explain Policy Change? *Policy Studies Journal*, (31)4.
- (2012). *Analysing Public Policy* (2nd ed), NY, USA: Routledge
- Kakulas, V. (3 Aug 2016). *WA's Environmental Protection Authority says no to Cameco Australia's proposed uranium mine*. Retrieved from: Retrieved from: <http://www.perthnow.com.au/news/western-australia/was-environmental-protection-authority-says-no-to-cameco-australias-proposed-uranium-mine/news-story/258678ea8b12d96ac5771196a9fb6c50>
- Karpouzoglou, T. A. Dewulf, & Clark. J. (2016). Advancing adaptive governance of social-ecological systems through theoretical multiplicity. *Environmental Science Policy*, 57, 1-9.
- Keleher, J, Beatty, S, Allen, M. (2014). *Aquatic fauna of Schwenke's Dam: a rehabilitated mine lake in Greenbushes. Report to the Blackwood Basin Group*. Freshwater Fish Group and Fish Health Unit, Murdoch University, Perth, Western Australia
- Keogh, A. (2009). The AusIMM Sustainability Committee—equipping our professionals with a balanced and informed. In *AusIMM News* (August 2009) Retrieved from: https://www.ausimm.com.au/content/docs/sustainability_committee_equippingbulletin.pdf
- King, G., Keohane, R. O. & Verba, S. (1994). *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton, NJ: Princeton University Press.
- King, A. (ed.) (1978). *The New American Political System*. Washington DC: American Enterprise Institute.
- Kirsch, S. (2010). Sustainable Mining, *Dialectical Anthropology*. 34, 87-93.
- Kommadath, B., Sarkar, R, and Rath, B.(2012). A fuzzy logic based approach to assess sustainable development of the mining and minerals sector. *Sustainable Development* 20: 386-399.
- Koerner, B, (2003). *What is Yellowcake, Anyway?* Retrieved from: <https://slate.com/news-and-politics/2003/07/what-is-yellowcake-anyway.html>
- Krizek, K. J. & Power, J. (1996). *A planners guide to sustainable development* (No. PAS Report No. 467). Washington, D.C.: American Planning Association.
- Layman, L. (1982). Changing resource development policy in Western Australia, 1930s-1960s. In Harman, E. J., Head, B.W., (eds). *State, capital and resources in the north and west of Australia*. pp 149- 166. Nedlands: University of Western Australia Press.

- Landgrafft, T. de (20 January 2016). *Western Australian Minister call on anti-nuclear lobby to 'accept WA mines'*. Retrieved from: www.abc.net.au/news/rural/2016-01-20/minister-urges-lobby-to-reconsider-anti-uranium-mining-stance/7101740
- Larsen, B. (2014). *Metaphors for Environmental Sustainability: Redefining Our Relationship with Nature*. New Haven: Yale University Press
- Leftwich, A. (1983). *Redefining Politics: People, Resources and Power*. New York: Methuen.
- Levi-Faur, D. (2005). The global diffusion of regulatory capitalism. *The Annals of the American Academy of Political and Social Science*, 598(1), 12-32.
- Lipset, S., M. (ed). (1981). *Party Coalitions in the 1980s*. 15-51, San Francisco: Institute for Contemporary Studies.
- Lipietz, A. (1988) Accumulation, crises, and ways out: some methodological reflections on the concept of "regulation", *International Journal of Political Economy* 18(2): 10-43
- (1986), New tendencies in the international division of labor: regimes of accumulation and modes of regulation, in Scott A. J., Storper M., eds., *Production, Work, Territory. The geographical Anatomy of Industrial Capitalism*, 16-40. London: Allen and Unwin.
- Lieberson, S (1987). *The Improvement of Social Research and Theory*. Los Angeles, CA: University of California Press.
- Locke, J. (1690). *The Two Treatises of Government*, (Third edition)
London: Orion Publishing Group, Limited
- Lovevda.it (n.d.). *Fontina Museum and visitors centre*. Retrieved from: <http://www.lovevda.it/en/database/8/museums/valpelline/fontina-museum-visitors-centre/1317>
- Long, S. (6 June 2005). *BHP Billiton takes control of WMC Resources*. *Abc.net.au*. Retrieved from: <http://www.abc.net.au/am/content/2005/s1385315.htm>
- Lund, M. (n.d) *Controlling Acidity in Flooded Collie (WA) Coal Voids – Is it necessary and how can it be achieved?* Retrieved from: <https://www.dlsweb.rmit.edu.au/conenv/envi1128/groundwork%20website/publicat/gw/grnd901/gacid.htm>
- Lund, M; McCullough, C. D & Kumar, R. N. (2012). *The Collie Pit Lake District, Western Australia: An Overview*. Retrieved from: <https://ro.ecu.edu.au/ecuworks2012/85/>
- Lund, M. (n.d) *Controlling Acidity in Flooded Collie (WA) Coal Voids – Is it necessary and how can it be achieved?* Retrieved from: <https://www.dlsweb.rmit.edu.au/conenv/envi1128/groundwork%20website/publicat/gw/grnd901/gacid.htm>
- Lyon, T. P., Maxwell, J. P. (2004). *Corporate Environmentalism and Public Policy*. Cambridge: Cambridge University Press.
- Lyon, T. P., & Maxwell, J. W. (2008). Corporate social responsibility and the environment: A theoretical perspective. *Review of Environmental Economics & Policy*, 2(2), 240-260.

- Maier, M. A. & Allen, M. (ed). (2017). *The sage encyclopedia of communication research methods* (Vols. 1- 4). Thousand Oaks, CA: SAGE Publications Ltd.
- Manetta, M. (1999). *Submission to the commonwealth joint parliamentary select committee on the republic referendum: The need for state parliamentary Consent*. Retrieved from: <https://www.samuelgriffith.org.au/papers/html/volume19/v19chap10.html>
- Manitoba.ca (n.d.). *A history of mine site rehabilitation in Manitoba*. http://www.manitoba.ca/iem/mines/oa_rehab_history.html
- Mann, T. (editor). (2013). *Australian Law Dictionary*. (2nd edition). Oxford: Oxford University Press.
- Marx, K. (1867). *Capital: A Critique of Political Economy (Volume I). The Process of Production of Capital*. Retrieved from: <https://www.marxists.org/archive/marx/works/1867-c1/>
- (1911). *A Contribution to the Critique of Political Economy*. Retrieved from: <https://onlinebooks.library.upenn.edu/webbin/book/lookupname?key=Marx%2C%20Karl%2C%201818%2D1883>
- Martonas, J. (2017). *The Effects of Mining on the Ecosystem*. Retrieved from: <https://sciencing.com/effects-mining-ecosystem-5946932.html>
- Marinova, D. (2018). *Personal communication*. Email 21 September 2018.
- Marsh, I. (2008). Politics, policy-making and pressure groups: Some suggestions for reform of the Australian political system. *Australian Journal of Public Administration*, 42/4, 433–458).
- Marsh, W. R; & Sherwood, D. H. (1980) *Proceedings of 26th Annual Rocky Mountain Mineral Law Institute*. Retrieved from: <https://www.rmmlf.org/publications/digital-library>
- Margetts, D. (2001). *Competition Policy State Agreement Acts and the Public Interest*. Thesis (MPhil). Perth: Murdoch University. Retrieved from: [http://parliament.wa.gov.au/parliament/library/MPHistoricalData.nsf/bdcebf6403782d9448257cae002a1d9c/f74e4683c7d53c7c482577590013ac69/\\$FILE/MP290%20Margetts%20D.pdf](http://parliament.wa.gov.au/parliament/library/MPHistoricalData.nsf/bdcebf6403782d9448257cae002a1d9c/f74e4683c7d53c7c482577590013ac69/$FILE/MP290%20Margetts%20D.pdf)
- Mason, L; Prior, T.; Mudd, G. M; Giurco, D. (2011) Availability, addiction and alternatives: three criteria for assessing the impact of peak minerals on society. *Journal of Cleaner Production*, 19 (9–10), pp. 958-966.
- McCafferty, P. (November 2017). *Personal communication*. Email: 23 November 2017
- McCullough, C. & Lund, M (2010). *Mine Voids Management Strategy (IV): Conceptual Models of Collie Basin Pit Lakes*. Centre for Eco System Management, Joondalup: Edith Cowan University.
- (2006). Opportunities for sustainable mining pit lakes in Australia, *Mine Water and the Environment*, 25:220–226
- (2009), *Mine Voids Management Strategy :Pit Lake Resources of the Collie Basin*. Centre for Eco System Management, Joondalup: Edith Cowan University.

- McKay, A.D. and Mieзитis, Y. (2001). *Australia's uranium resources, geology and development of deposits*. AGSO – Geoscience Australia, Mineral Resource Report 1. Retrieved from http://www.ga.gov.au/webtemp/image_cache/GA9508.pdf
- Mckinnon, S. (8 February 2018). *Conservationist lose appeal against Yeelirrie uranium mine approval* (The West Australian) Retrieved from: <https://thewest.com.au/business/mining/conservationists-lose-appeal-against-yeelirrie-uranium-mine-nod-ng-b88738598z>
- McKenzie-Mohr, D. (2000). Fostering sustainable behavior through community-based social marketing. *American Psychologist*, 55 (5), 531.
- McLellan, B. C., Corder, G. D., Giurco, D., Green, S. (2009). Incorporating sustainable development in the design of mineral processing operations—Review and analysis of current approaches, *Journal of Cleaner Production*, 17(16),1414-1425.
- medicalboard.gov.au. (n.d). *Regulating Australia's medical practitioners*. Retrieved from: <https://www.medicalboard.gov.au/>
- Mercer, D: The West Australian (18 January 2017). *Labor makes point of difference on uranium*. Retrieved from: <https://thewest.com.au/business/mining/labor-makes-point-of-difference-on-uranium-ng-b88358036z>
- Meyer, M. W and Brown, C. (1977). The Process of Bureaucratization *American Journal of Sociology*. 83:2, pp. 364-385.
- Merrill, M. D. & Tennyson, R. D. (1977). *Educational Technology Publications*. Ann Arbor: University of Michigan.
- Milgrom, T. (2008). Environmental aspects of rehabilitating abandoned quarries: Israel as a case study. *Landscape and Urban Planning*. 87(3), 172-179.
- Miles, M. B. and Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: Sage Publications.
- Mills, A. J., Durepos, G., & Wiebe, E. (2010). *Encyclopedia of case study research* (Vols. 10). Thousand Oaks, CA: SAGE Publications Ltd
- Mining and Energy Research Network. (2002) Sustainability Indicators & Sustainability Performance Management. Retrieved from: <http://pubs.iied.org/pdfs/G00919.pdf>
- millenniumassessment.org. (n.d). *Guide to the Millennium Assessment Reports*. Retrieved from: <https://www.millenniumassessment.org/en/index.html>
- Minerals Council of Australia (“MCA”) (n.d). *About MCA*. Retrieved from: <http://www.minerals.org.au/about-mca>
- Mining Facts Org. (n.d.). *What are abandoned mines?* Retrieved from: <https://www.miningfacts.org/Environment/What-are-abandoned-mines/>
- minddat.org, (n.d.). *Old Witchcliffe gold mines, Witchcliffe, Augusta-Margaret River Shire, Western Australia, Australia*. Retrieved from: <https://www.mindat.org/loc-265301.html>
- mining-technology.com. (n. d) . *Yeelirrie Uranium Project*. Retrieved from: <https://www.mining-technology.com/projects/yeelirrie-uranium-project/>

- mining.com. (n.d.). *Old Mines Redux: Finding New Uses for Abandoned Mines*. Retrieved from: <http://www.mining.com/old-mines-redux-finding-new-uses-for-abandoned-mines/>
- Mindat.org. (n.d.). *Elverdton-Mt Desmond Copper Mines, Ravensthorpe Shire, Western Australia, Australia*. Retrieved from: <https://www.mindat.org/loc-238884.html>
- Mininglink.com (2017). *There are 60,000 abandoned mines sites across Australia, according to mining report*. Retrieved from: <http://mininglink.com.au/story/there-are-60-000-abandoned-mine-sites-across-australia-according-to-mining-report>
- Mitchell, R. B. (2003). International Environmental Agreements: A Survey of Their Features, Formation, and Effects, *Annual Review of Environment and Resources*. Vol. 28:429-461.
- Molina, M, J. & Rowland, F. S.(1974). Stratospheric sink for chlorofluoromethanes: chlorine atom-catalysed destruction of ozone. In *Nature*. 49, 810–812.
- Morrison-Saunders, A., McHenry, M. P., Sequeira, A. R., Gorey, P., Mtegha, H. & Doepel, D. (2016) Integrating mine closure planning with environmental impact assessment: challenges and opportunities drawn from African and Australian practice. *Impact Assessment and Project Appraisal*. 34:2.
- Morrison-Saunders, A, Gorey, P, Doepel, D, Mtegha, H & McHenry M, P. (2014). *Enhancements in mine closure planning in Western Australia and possible applications for Africa*, paper presented at the 9th International Conference on Mine Closure (MC2014), Johannesburg, South Africa, 1– 3 October.
- Munawer, M. E, (2018). Human health and environmental impacts of coal combustion and post-combustion wastes in *Journal of Sustainable Mining*. 1(2), 87-96
- Murphy, S. (9 July 2017). *Conservation group helping nature reclaim WA's oldest mine site at Greebushes*. Retrieved from: <https://www.abc.net.au/news/2017-07-09/conservation-group-helping-nature-reclaim-was-oldest-mine-site/8683460>
- Mudd, G.M. and Patterson, J. (2010). Continuing pollution from the Rum Jungle U–Cu project: A critical evaluation of environmental monitoring and rehabilitation. *Environmental Pollution*.158(5), pp.1252-1260.
- Mudd, G.M. (2013). *Australia's mining legacies*. Retrieved from <http://arena.org.au/australias-mining-legacies-by-gavin-m-mudd>
- (2013). *Questioning the Sustainability of Mining: The Hard Sustainability Challenges Remain*. Annual Sustainable Minerals Institute Post-Graduate Research Conference", Brisbane, QLD
- (2010a). The Environmental sustainability of mining in Australia: key mega-trends and looming constraints. *Resources Policy*. 35. 98-115. 10.1016/j.resourpol.2009.12.001.
- (2010). *Questioning the Sustainability of Mining: The Hard Sustainability Challenges Remain*. Annual Sustainable Minerals Institute Post-Graduate Research Conference", Brisbane, QLD

- Mudd, G.M. (2009). Sustainability reporting in Australia: An important part of the solution. In G. M. Mudd (Ed.), *Solutions for a Sustainable Planet - Proceedings of the SSEE 2009 International Conference* (pp. 1 - 12). Melbourne VIC Australia: Society for Sustainability and Environmental Engineering (SSEE)
- Mudd, G.M. (2009). *Prediction of Greenhouse Gas Emissions for the Olympic Dam Mega-Expansion*. Department of Civil Engineering, Monash University, April 200 Retrieved from: <http://users.monash.edu.au/~gmudd/files/2009-04-CO2-Pred-v-ODam.pdf>
- (2007). An Assessment of the Sustainability of the Mining Industry in Australia, *Australian Journal of Multi-Disciplinary Engineering*, 5 (1). 1-12.
- (2007a) *An analysis of historic production trends in Australian base metal mining*. *Ore Geology Reviews*, 32 (1–2), pp. 227-261.
- (2007b), *Resource Consumption Intensity and the Sustainability of Gold Mining*. In 2nd International Conference on Sustainability Engineering and Science: Talking and Walking Sustainability", New Zealand Society for Sustainability Engineering & Science (NZSSES), Auckland, New Zealand, February 2007.
- (2005). *An environmental history of uranium mining in Australia: a scientific review*. Australian Uranium Conference, Fremantle WA Australia
- 2004, *Sustainable Mining: An Evaluation of Changing Ore Grades and Waste Volumes*. Proc. "International Conference on Sustainability Engineering & Science", New Zealand Society for Sustainability Engineering & Science (NZSSES), Auckland, New Zealand, 6-9 July 2004).
- Needham, S. (2009). *Yeelirrie uranium deposit in Western Australia*. Retrieved from: <https://www.aph.gov.au/binaries/library/pubs/bn/sci/uraniumwa.pdf>
- Neuman, W. L. (2014). *Social Research Methods: Pearson New International Edition: Qualitative and Quantitative Approaches*. Harlow, Essex: Pearson.
- Natural Resource Defense Council "nrdc.org". (n.d). *About us*. Retrieved from: <https://www.nrdc.org/about>
- New Zealand Legal Information Institute "nzlii.org".(1901) *State Coal-mines Act 1901:1 EDW VII 1901 No 47*. Retrieved from: http://www.nzlii.org/nz/legis/hist_act/sca19011ev1901n47256/
- oecd.org. (2012). *Green Growth and Developing Countries A Summary for Policy Makers* Retrieved from: <https://www.oecd.org/dac/50526354.pdf>
- Ogus, A. (2004). *Regulations: Legal Form and Economic Theory*. Oxford, England: Hart Publishing.
- (2004 a). *W(h)ither the Economic Theory of Regulations? What economic theory of regulations?* In *The politics of regulation: Institutions and regulatory reforms for the age of governance* (eds, Jordana, J & Levi-Faur, D. Cheltenham, UK: Edward Elgar.
- Palmer, A. (2016). *15 Adaptive Re-Uses for Old Mines*. Retrieved from: <http://mentalfloss.com/article/76571/15-adaptive-re-uses-old-mines>

- Panegyres, S & Panckhurst, (2015), *Australia: WA Mineral Royalty Rate Analysis – A Quick Guide*, Retrieved from http://www.mondaq.com/article.asp?article_id=396450&signup=true
- Parliament of Australia. (n.d). *Royal Commissions and Commissions of Inquiry*. Retrieved from: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Browse_by_Topic/law/royalcommissions
- Parliament of Western Australia. (2004 March). *URANIUM (YEELIRRIE) ACT 1978, TERMINATION*. Retrieved from: [http://www.parliament.wa.gov.au/Hansard%5Chansard.nsf/0/bc230d26af2973c2c82575700016bf7f/\\$FILE/A36%20S2%2020040331%20p1380b-1380b.pdf](http://www.parliament.wa.gov.au/Hansard%5Chansard.nsf/0/bc230d26af2973c2c82575700016bf7f/$FILE/A36%20S2%2020040331%20p1380b-1380b.pdf)
- (2014 May) *Hansard question on Notice (No 2013)*. Retrieved from: (<http://www.parliament.wa.gov.au/parliament/pquest.nsf/c99dd775292ce5954825718e00176c69/0e39af7f1c3911ee48257cac001655ce?OpenDocument>)
- Paddenburg, T. (2014). *Pollution data reveals Collie coal emissions continue to rise*. Retrieved from: <https://www.perthnow.com.au/news/wa/pollution-data-reveals-collie-coal-emissions-continue-to-rise-ng-c69cf92a7f83f83241fd07a8271fc424>
- Pearce, B, Minister for Environment. (3 September 1992). *The Statement that a proposal may be implemented (pursuant to the provision of the Environmental Protection Act 1986 – Ewington Coal Mine, Collie*. Retrieved from: www.epa.wa.gov.au/sites/default/files/EPA_Report/1448_B764.pdf
- Petrova, S. L. (2012) *Social impacts of mining: A Western Australian community case study*, PhD Thesis. Curtin University, Bentley: Curtin University.
- Pearce and Walrath, (2001). in Pearce, A. & Walrath, L. (2001). *Definitions of Sustainability from the Literature*. Maven.gtri.gatech.edu/sfi/resources/pdf/definitions.pdf list refers to over 200 definitions of SD.
- Perelman, C. H. (1976). *Logique juridique. Nouvelle rhétorique* Dalloz; Paeis trans by Adler, R, and MacCormick N. (1989) *A theory of legal argumentation*, Oxford: Clarendon Press
- Pezzoli, K. (1997). Sustainable development: A transdisciplinary overview of the literature. *Journal of Environmental Planning and Management*. 40 (5), 549–574.
- Phillips, N. & Hardy, C. (2011). *Qualitative Research Methods: Discourse analysis*. Thousand Oaks, CA: Sage Publications.
- (2002). *Discourse analysis : investigating processes of social construction*. Thousand Oaks, CA : Sage Publications.
- Philimore, J. (2014). The politics of resource development of Australia. In Brueckner, M. et al (eds) *Resource curse or cure: On the sustainability of development in Western Australia*. 25-40, Berlin: Springer Verlag.
- Plummer, R. (2009). The adaptive co-management process: an initial synthesis of representative models and influential variables. *Ecology and Society* 14(2):24.

- Ponterotto, J. G. (2006). Brief Note on the Origins, Evolution, and Meaning of the Qualitative Research Concept Thick Description. *The Qualitative Report*, 11(3), 538-549. Retrieved from <https://nsuworks.nova.edu/tqr/vol11/iss3/6>
- Pope, J. (2007). *Facing the Gorgon: Sustainability assessments and Policy Learning in Western Australia*. PhD thesis, Perth: Murdoch University.
- Porter, J., & Phillips, P. (eds.). (2007). *Public Science in Liberal Democracy*. Toronto: University of Toronto Press.
- Potts, J., Lynch, M., Wilkings, A., Huppé, G., Cunningham, M & Voor., V. (2014). *State of Sustainability Initiatives Review 2014: Standards and the Green Economy*. Retrieved from: https://www.iisd.org/pdf/2014/ssi_2014.pdf
- Premiercoal.com.au. (n.d). *Sustainability & Environment*. Retrieved from: www.premiercoal.com.au/page/sustainability/environment/
- (n.d.). *Mine Rehabilitation*. Retrieved from: <http://www.premiercoal.com.au/page/sustainability/environment/mine-rehabilitation>
- Premiercoal.com.au. (n.d). *History* Retrieved from: <http://www.premiercoal.com.au/page/company-profile/history/>
- Public Service Commissioner. Western Australia (1908). *Third Annual Report*. c.f Spillman (1993).
- Quinlan, P.D., Heenan, E. M., Govinnage, S. U. (1986). *Independent Legal and Governance Review into Policies and Guidelines for Environmental Impact Assessments under the Environmental Protection Act 1986 (WA)*. Retrieved from: <http://www.epa.wa.gov.au/sites/default/files/EPA%20Legal%20and%20Governance%20Review%20-%20Final%20Report%20-%20Quinlan%20et%20al-170516.pdf>
- Ragin, C. C. (1994). *Constructing Social Constructing Research: social research: the unity and diversity of method*. Thousand Oaks, CA.: Pine Forge Press.
- Rein, M. and D. A. Schön. (1993). Reframing Policy Discourse. In *The Argumentative Turn in Policy Analysis and Planning*, edited by F. Fischer and J. Forester, 145–166. Durham, NC: Duke University Press
- (1996). Frame-critical policy analysis and frame-reflective policy practice. *Knowledge and policy*, 9(1), 85-104.
- Roche, C. & Mudd, G. (2014). An overview of mining and the environment in Western Australia In Brueckner, et al (eds.) in *Resource Curse or Cure: On the Sustainability of Development in Western Australia*. pp. 179-194. Berlin: Springer Verlag.
- Sai Global Ltd, au.(n.d). *Standards search*. Retrieved from: <https://infostore.saiglobal.com/en-au/Standards/SNZ-HB-8134-6-2006-1408065/>
- (n.d). *ISO 14001 Environmental Management System Training*. Retrieved from: https://www.saiglobal.com/en-au/training_courses/iso_14001_environmental_management_system_training/?gclid=

- Seale, C., Gobo, G., Gubrium, J., E. & Silverman, D. (2004), *Introduction: Inside qualitative research* in Seale, C., Gobo, G., Gubrium, J., E. & Silverman, D. (eds). *Qualitative research practices*. (pp 1-11). London: Sage.
- Schramm, W. (1971). *Notes on case studies: Working paper for the Academy for Educational Development*. Washington, DC. Cited from Yin. (2018. p.14).
- Shepherd, B & Tomlin, S. (17 Jan 2017). *Yeelirrie uranium mine approval defended by Albert Jacob amid environmental fears*. www.abc.net.au Retrieved from: <http://www.abc.net.au/news/2017-01-17/yeelirrie-uranium-mine-approval-defended-by-albert-jacob/8189108>
- Sheehy, B. (2015). Defining CSR: Problems and Definition. *Journal of Business Ethics* (131)3, pp 625–648
- Shine, R. (18 Apr 2016). *Prospectors call for Royal Commission into Department of Mines and Petroleum*. Retrieved from: <http://www.abc.net.au/news/2016-04-11/prospectors-call-for-royal-commission-into-department-of-mines/7317634>
- Singh, N. (1988). Sustainable Development as a Principle of International Law. in Pau de Waart, Paul Peters and Erik Denters (eds), *International Law and Development* (Martinus Nijhoff, Dordrecht).
- Smith, D. (2017). *Director General's Message: Department of Mines and Petroleum- Annual Report 2016-2017*. Retrieved from: http://www.dmp.wa.gov.au/Documents/About-Us-Careers/AnnualReport_2016-2017.pdf
- Smith, H, (2009). *Review of Western Australia's mining approvals processes – where to from here?* Retrieved from: <https://www.lexology.com/library/detail.aspx?g=fb20fc6b-c3e9-4cb9-9a2d-5e86113befd9>
- Smith, S. (2017). *Griffin Coal's parent company Lanco Resources in receivership*. Retrieved from: <https://thewest.com.au/business/mining/griffin-coals-parent-company-lanco-resources-brings-in-receivers-ng-b88466497z>
- Southalan, J. (2012). *Mining law and policy: international perspectives*, Annandale, NSW.: Federation Press.
- (2018). *Mining State Agreements: Understanding the Framework Conference Paper*. Retrieved from: https://www.researchgate.net/publication/324537399_Mining_State_Agreements_Understanding_the_Framework
- Spillman, K. (1993). *A Rich Endowment: Government and Mining in Western Australia 1829 -1994*. Perth, WA.: University of Western Australia Press.
- Stake, R. E. (2005). *Multiple Case Study Analysis*, New York: The Guildford Press.
- (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.
- sustainability-indices.com. *About us*. (n.d) Retrieved from: <http://www.sustainability-indices.com/>

- Strange, T. and Bayley, A. (2008). *OECD Insights Sustainable Development Linking Economy, Society, Environment*. Paris: OECD
- Starick, P: The Advertiser (February 17, 2016). \$445b into South Australian economy, Royal Commission reveals. Retrieved from: <https://www.adelaidenow.com.au/news/south-australia/nuclear-waste-dump-would-tip-445b-into-south-australian-economy-royal-commission-reveals/news-story/9c134d8b18020768b1e6c419d997982f>
- Stuart, K .(2010) Sustainable Mining in *Dialectical Anthropology*, Amsterdam. 34:1 pp. 87-93.
- Stubbe, M., Lane, C.; Hilder, J., Vine, E.; Vine, B., Marra, M., Holmes, J., Weatherall, A. (2003). Multiple discourse analyses of workplace interaction. *Discourse Studies*, Vol 5(3): 351–389.
- sustainabledevelopment.un.org (June 1992). *United Nations Sustainable Development*. Retrieved from: <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>
- (n.d). *World Summit on Sustainable Development (WSSD), Johannesburg Summit*. Retrieved from: <https://sustainabledevelopment.un.org/milestones/wssd>
- (n.d). *United Nations Conference on Sustainable Development, Rio+20*. Retrieved from: <https://sustainabledevelopment.un.org/rio20>
- (n.d). *Transforming our world: The 2030 Agenda for Sustainable Development* Retrieved from: <https://sustainabledevelopment.un.org/post2015/transformingourworld>
- Talison.com. (n.d). *Sustainability* Retrieved from: <http://www.talisonlithium.com/sustainability/environment>
- Thompson, S. A. (2000). *Managing the acidity of abandoned water filled coal mining voids in Collie (Western Australia) using organic matter*. Joondalup: Edith Cowan University. Retrieved from: <http://ro.ecu.edu.au/cgi/viewcontent.cgi?article=2353&context=theses>
- Tickell, A., & Peck, J. A. (1992). Accumulation, regulation and the geographies of post-Fordism: missing links in regulationist research. *Progress in Human Geography*, 16(2), 190-218.
- Todorov, V. & Marinova, D. (2010). *Information Theory Perspective on Modelling Sustainability*. In *Hawaii International Conference on Systems Sciences, Jan 5, 2010*, Hawaii, USA: The Institute of Electrical and Electronics Engineers, Inc.
- Topp, V., Soames, L., Parham, D., Bloch, H. (2008). *Productivity in the Mining Industry: Measurement and Interpretation. Productivity Commission Staff Working Paper*. Retrieved from: <https://www.pc.gov.au/research/supporting/mining-productivity/mining-productivity.pdf>
- Truscott, B. (2011). *Old mines redux finding-new uses for abandoned-mines*. Retrieved from: <http://www.abc.net.au/news/2011-08-18/old-mines-redux-finding-new-uses-for-abandoned-mines/2881144>
- Udy, S. H. (1959). Bureaucracy and Rationality in Weber's Organization Theory: An Empirical Study. *American Sociological Review*. 24(6), 791-795.

- Ukminingremains.co.uk (n.d). *Map of UK Sites - UK Mining Remains*. Retrieved from: [ukminingremains.co.uk http://www.ukminingremains.co.uk/map-of-uk-sites/4554338515](http://www.ukminingremains.co.uk/map-of-uk-sites/4554338515)
- unesco.org. (n.d.) *Wieliczka and Bochnia Royal Salt Mines*. Retrieved: http://whc.unesco.org/pg.cfm?cid=31&id_site=32
- (2018). *World Heritage Committee Removes Old City of Dubrovnik and Wieliczka Salt Mine from its List of Endangered Sites*. Retrieved from: unesco.org/en/news/147/.
- (1968). *Intergovernmental Conference for Rational Use and Conservation of the Biosphere*. Retrieved from: <http://unesdoc.unesco.org/images/0001/000172/017269eb.pdf>
- unenvironment.org. (n.d.). *About UN Environment*. Retrieved from: <https://www.unenvironment.org/about-un-environment>
- University of New South Wales. (n.d.). *Primary and Secondary Sources*. Retrieved from: <https://www.library.unsw.edu.au/study/information-resources/primary-and-secondary-sources>
- Union of concern scientist Inc [US], (n.d.). *Coal and air pollution*. Retrieved from: <https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/coal-air-pollution#.W5nF00xuLIU>
- United Nations General Assembly (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved from <http://www.un-documents.net/our-common-future.pdf>
- (2015). *Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1*, Retrieved <http://www.refworld.org/docid/57b6e3e44.html>
- United Nations Framework Convention on Climate Change “Unfccc”. (1998). *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. Retrieved from: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>
- Unhabitatde.org. (n.d).
- (2017). *UN Climate Change - ANNUAL REPORT 2017* Retrieved from: <http://unfccc.int/resource/annualreport/>
- unhabitat.org (1976). *The Vancouver Declaration on Human Settlements*. Retrieved from: http://mirror.unhabitat.org/downloads/docs/The_Vancouver_Declaration.pdf
- United State Council for International Business. (2015). *Good Governance & the Rule of Law*. Retrieved from: <https://www.uscib.org/docs/Governance%20and%20the%20Rule%20of%20Law.pdf>
- University of Western Australia. (n.d.) *Post graduate teaching qualifications – Future teachers*, (n.d.) Retrieved from: <http://www.education.uwa.edu.au/courses/future>
- University of Dundee.(n.d.). *PGDE Secondary Education*. Retrieved from: <https://www.dundee.ac.uk/study/pg/secondary-education/>
- Veatch, A. C. (1911), *Mining laws of Australia and New Zealand - Bulletin 505*, Government Printing Office, Washington DC. Retrieved from: <https://pubs.usgs.gov/bul/0505/report.pdf>

- Vink, M. J, A. Dewulf. A., Termeer, C. (2013). The role of knowledge and power in climate change adaptation governance: a systematic literature review. *Ecology and Society* 18(4):46. [http:// dx.doi.org/10.5751/ES-05897-180446](http://dx.doi.org/10.5751/ES-05897-180446)
- Walker, G. de, Q. (1988). *The rule of law: foundation of constitutional democracy*, (1st ed.). Carlton: Melbourne University Press
- wieliczka-saltmine.com. (n.d). Wieliczka Salt Mine. Retrieved from wieliczka-saltmine.com <https://www.wieliczka-saltmine.com/>
- Weber, M., Gerth, H.H., Mills, W. C. (1977). *Max Weber: essays in sociology*, London : Routledge & Kegan Paul Ltd.
- Weber, M 1952. The Essentials of Bureaucratic Organizations: An ideal type Construction. In *Reader in Bureaucracy*, Merton, R. K. et al., (ed). 18-27. New York, USA: Free Press
- Weber, M. (2015). Bureaucracy in *Weber's Rationalism and Modern Society*. Translated and edited by Tony Waters and Dagmar Waters, London: Palgrave-Macmillan.
- weforum.org. (n.d.). *Global Value Chain Policy Series: Environment*. Retrieved from: http://www3.weforum.org/docs/WP_Global_Value_Chain_Policy_Series_Environment_report_2018.pdf
- (2018). *Global Value Chain Policy Series: Environment*. Retrieved from: <https://www.weforum.org/whitepapers/global-value-chain-policy-series-environment-e1fee330-a5e3-42f2-b228-624ccc759801>
- Western Australian Auditor General "WAAG" (2011). *Ensuring Compliance with Conditions on Mining* Retrieved from: https://audit.wa.gov.au/wp-content/uploads/2013/05/report2011_08.pdf
- 2004). *Developing the State: The Management of State Agreement Acts*. Retrieved from: https://audit.wa.gov.au/wp-content/uploads/2013/05/report2004_05.pdf
- Worrall, R.; Neil, D.; Brereton, D.; Mulligan, D. (2009). Towards a sustainability criteria and indicators framework for legacy mine land. *Journal of Cleaner Production*, 17 (16), pp. 1426-1434.
- worldbank.org.(n.d.). *The Records of the Global Environment Facility*. Retrieved from: <http://www.worldbank.org/en/about/archives/history/exhibits/the-records-of-the-global-environment-facility>
- World Commission on Environment and Development. (1987). *Our common future. Report of the World Commission on Environment and Development*. G. H. Brundtland, (Ed.). Oxford: Oxford University Press.
- World Resource Institute (n.d.). *Extractive Industries*. Retrieved from: <https://www.wri.org/tags/extractive-industries>
- worldtrade.org. "wto.org" (n.d.). *The WTO*. Retrieved from: https://www.wto.org/english/thewto_e/thewto_e.htm
- (2011). *The Fifth WTO Ministerial Conference*. Retrieved from: https://www.wto.org/english/thewto_e/minist_e/min03_e/min03_e.htm

- Wolff, R. P. (1970). *In Defense of Anarchism*. Retrieved from: <https://theanarchistlibrary.org/library/robert-paul-wolff-in-defense-of-anarchism>
- Woods, M. (2011). *Collie coal mine sold to Chinese company*. Retrieved from: <http://www.abc.net.au/local/audio/2011/09/28/3328099.htm>
- World Nuclear Org. (2018). *Uranium mining overview*. Retrieved from: <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview.aspx>
- World Nuclear Association. (n.d.) *International Nuclear Waste Disposal Concepts*: Retrieved from: <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/international-nuclear-waste-disposal-concepts.aspx>
- World Wildlife.org. (n.d) *History*. Retrieved from: <https://www.worldwildlife.org/about/history>
- World Wildlife.org.uk. (n.d). *Responsible Oil, Gas and Mining*. Retrieved from: www.wwf.org.uk/what-we-do/area-of-work/responsible-oil-gas-and-mining
- Yin, R. K. (2018) *Case Study Research and Applications: Design and Methods* (6th ed). Thousand Oaks, CA: SAGE Publications Ltd.
- (2014). *Case Study Research Design and Methods* (5th ed.). Thousand Oaks, CA: Sage Thousand Oaks, CA: Sage.
- Young, E. (17 January 2017). *Minister approves WA uranium mine despite extinction threat*. Retrieved from: <https://www.watoday.com.au/national/western-australia/minister-approves-wa-uranium-mine-despite-extinction-threat-20170117-gtt2cm.html>
- Zhao, L. Y. L.; McCullough, C. D. & Lund, M. A. (2009). *Pit Lake Resources of the Collie Basin. MiWER/Centre for Ecosystem Management Report 2009 -10*. (Unpublished report to Department of Water). Joondalup: Edith Cowan University.
- Zeijl-Rozema, A., Cörvers, R., Kemp, R., & Martens, P. (2008). Governance for sustainable development: a framework. *Sustainable Development*, 16(6), 410-421.

Every reasonable effort has been made to acknowledge the owners of the copyright material cited in this thesis. I would be pleased to hear from any copyright owner who has been omitted or incorrectly acknowledged.

APPENDIX A INFORMATION SHEET FOR PARTICIPANTS



Date: 14 October 2016

Curtin University Sustainability
Policy (CUSP) Institute

GPO Box U1987
Perth Western Australia 6845

Office location
Building 209 Level 1
Kent Street
Bentley WA 6102

Telephone +61 8 9266 9030
Facsimile +61 8 9266 9031
Email culp@curtin.edu.au
Web sustainability.curtin.edu.au

INFORMATION SHEET

Information sheet for the research participants about the doctoral research project on the Mining Regulatory Framework (MinReF) of Western Australia

My name is Sunil Govinnage, and I am currently undertaking research towards a PhD degree at Curtin Sustainability Policy (CUSP). The title of my research project is “Environmental regulations of the mining industry: Two case studies from Western Australia”. My research focuses on the primary research question to explore: “How is the mining regulatory framework in Western Australia being implemented legislatively environmental protection during the mining life cycle?” My research will focus on two case studies. The first case study examines the environmental compliance and consequences of coal mines located in the Collie region in south-west Australia. The second case study will examine the regulatory framework consisting of the State and Federal legislation, employed to grant the approval of the environmental compliance as a prerequisite of mine operation.

I would like to find out about your opinions, views and perceptions on the WA's mining legislation in general, and the implementation of environmental protection regulations specifically, based on your work experience and/or research publications on this subject. This proposed semi-structured interview will take approximately 45 – 60 minutes. All the questions will be read out to you, and your answers will be recorded during the interview. In the analysis of data, your name or position will be not used or revealed, and the interviewee will always remain anonymous.

Consent: Your involvement in this research is entirely voluntary.

You will be given the opportunity to see the questions beforehand and decide whether you would like to participate in the interview. When you have ticked the AGREE box on the consent form, I will assume that you have agreed to participate in my research and allow me to use the information provided for this particular research. However, you have the right to withdraw at any stage of the interview process without having to give me a reason.

Confidentiality: The interview is anonymous, and your privacy is greatly respected; no personal information will be obtained or required for this research. The results from the interview will be presented only as the general discussion in my thesis, either to validate or further examine issues identified for the purpose of this research. The information collected will be used only for this particular research. In adherence to the university data management policy, the information gathered from this proposed interview will be kept as a typed-transcript in a secured server as per university data management policy, and after seven years the transcripts will be destroyed.

Further information: This research has been peer-reviewed and received the approval of the Human Research Ethics Committee of the Curtin University. (Approval number RDHU-89-15).

If you would like further information about my research, please feel free to contact me on 04322 47330 or by email: s.govinnage@postgrad.curtin.edu.au. Alternatively, you can contact my principal supervisor Professor Dora Marinova on 08 9266 9033 or via email: d.marinova@curtin.edu.au.

Thank you very much for your involvement in this research project, and your participation is very much appreciated.

Sunil K Govinnage (M.A. Science & Technology Policy, Murdoch)
PhD Candidate

APPENDIX B QUESTIONNAIRE

Thank you very much for granting time for an interview despite your busy schedule.

I'm Sunil Govinnage interviewing ===== in Perth on =====

First, I want to have your consent for this interview to be recorded and that I have provided you with an information sheet prepared for the participants of this research

Any information, you may provide will remain anonymous, and any issues that you will share with me for the purpose of my PhD research will not be associated with your name, position or the agency you are affiliated with.

I may use some of the information as qualitative statements in my thesis.

I want to begin the interview by asking your opinion of the term 'environmental protection' based on the WA Environmental Protection Act 1986 on page 1

The term 'environmental protection' is used to denote "the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected" (Government of Western Australia, 1986, p.17).

(1) In your view, is this a good working definition to cover core mining environmental regulations?

Do you have any comments?

(2) As you are aware, the mining industry needs a large quantity of water for mining operations. What is your opinion about the omission of water in this definition and, in particular, the lack of references to the prevention of ground water and nearby water resources (creeks, rivers, and reservoirs). Please elaborate your reasons?

(3) As you are aware, the current Mining Regulatory Framework (MinReF) could be broadly defined as State and Federal laws consisting of numerous policies, procedures and administrative tools managed by several existing agencies to regulate and manage the mining industry in WA.

(4) In your view, what are the strengths and weaknesses of the current MinReF as implemented in Western Australia?

Follow up question/s:

5.1 Please explain your reasons or provide examples of particular strengths of the MinReF;

5.2 Please explain your reason/s or provide examples of specific weaknesses of the MinReF.

5.3 What are your thoughts about the following opinion on the WA mining regulations regarding environmental impact? (Give a hard copy version of the following statement to the interviewee)

“WA legislation provides a strong and comprehensive basis for regulating the environmental impacts of mining. But legislation alone cannot guarantee an effective regulatory regime.”

Chandler, L. (2014). Regulating the Resource Juggernaut. In Brueckner, et al (eds.) Resource Curse or Cure: On the Sustainability of Development in Western Australia. pp. 165-178, Berlin: Springer Verlag

MINNING OPERATIONS

(6) In your opinion, are there appropriate checks and balances to ensure environmental protection during mine operations in WA? Please elaborate/expand including listing and describing some of the appropriate/relevant checks and balances.

ENVIRONMENTAL BEST PRACTICES

(7) Could you please discuss any national or international environmental best practices that you are aware of concerning approval, operation and/or closure of mines (either in Australia or elsewhere)? Please provide any information or references that you are aware of in academic writings on mining literature.

ON STATE AGREEMENTS

As you are aware, the State Agreements are “contracts between the Government of Western Australia and proponents of major resources projects.” (Department of State Development n.d.). They outline the terms and conditions stipulating the rights, obligations when developing a particular resource project. Once the proponent and the responsible agency have agreed to the terms of the contract, they will be ratified by the Parliament.

These Agreements function above the existing laws of the State and operate outside the jurisdictions of the WA Mining Act 1978, which is supposed to be the principal legislation regulating the Mining Industry in WA. The State agreements have an operational history of over 50 years in WA. They have been reviewed only once, in 2004, by the Auditor General of Western Australia examining their operational effectiveness.

(8) What is your opinion on approving long-term resource agreements which operate above/outside existing laws of the State without any public consultations, and ratifying them in the Parliament giving the authority to operate?

(9) In the context of public policy development processes, what are the strengths and weaknesses of the WA State Agreements? Please elaborate your reasons.

The literature reveals that Queensland is no longer adopting the long-term State Agreements to initiate and operate resource development projects where all the mining regulations are carried out through existing legislation.

(10) Do you think that WA should follow the practice of Queensland? If so, why?

(11) Do you have any thoughts/suggestions on improving the current processes of State Agreements with emphasis on improving the environmental regulations of the mining industry?

ON URANIUM MINING

When the Barnett government came to power in 2008, the moratorium on uranium mining was removed, and the government gave directions for the approval of uranium mines in WA. As of April 2015, two uranium mines have received the environmental approval process. A literature review suggests that lessons learnt from the uranium mining in the Northern Territory and South Australia have not been incorporated into the regulations of uranium mining in WA.

(12) In your view, what are the key lessons on environmental protection that WA could learn from the past uranium mining in the Northern Territory and South Australia?

POLICY RELATED QUESTIONS

The literature review on this research reveals the WA MinReF is being implemented through a multi-agency approach and regulations have not been properly followed through by responsible agencies, and that there are critical gaps in the current approach. For example, the WA Auditor General's report titled Ensuring Compliance with Conditions on Mining tabled in the Parliament in 2011 states:

"Monitoring and enforcement of environmental conditions need significant improvement. Currently [all] agencies can provide a little assurance that the conditions are being met.

Further, the Report reveals:

"Only 55 percent of sampled operators submitted their required Annual Environmental Reports (AERs) to DMP providing regular information on whether they are minimising their impact on the environment." (p.8).

As far as the information gathered from literature reviews suggests, this crucial issue has not been addressed through the ongoing mining regulatory reform process initiated by the Government of Western Australia through the Dept. of Mines and Petroleum (DMP).

(13) Why do you think that this key gap has not been addressed to date?

(14) What is your opinion on not addressing a key gap (deficiency in reporting) essential for monitoring and managing environmental conditions of mining?

The follow up question:

(15) Why do you think there has been a delay in addressing environmental compliance reporting shortcomings? Please elaborate.

The Environment Protection and Biodiversity Conservation Act 1999

As you know The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) "is the Australian Government's central piece of environmental legislation.

However, according to a bi-lateral agreement between the Federal and the State of WA which came into effect on 1 January 2015, the EPBC Act's authority to assess proposals that are likely to have a significant impact on national environmental significance will be now carried out by the WA Environmental Protection Agency.

(16) In your view, has the change of authority, through delegation of the Federal Government's responsibility to the State, enhanced or decreased the effectiveness ~~and~~ of EPA assessments of proposals that are likely to have a significant impact on national environmental significance?

(17) Why do you think this delegation has occurred and has this delegation weakened or strengthened the intention/purpose of the legislation?

Thank you very much for your time today.

**APPENDIX C THE FEDERAL GOVERNMENT'S RESPONSE TO THE
NATIONAL AUDIT REPORT ON THE EPBC ACT**

Parliament House, Canberra ACT 2600 Telephone (02) 6277 7920
Greg.Hunt.MP@environment.gov.au




The Hon Greg Hunt MP

Minister for the Environment

16-004235

Mr Sunil Govinnage - 7 MAY 2016

Dear Mr  Govinnage, C---«-4

I refer to your letter of 2 April 2016 to the Prime Minister, the Hon Malcolm Turnbull MP, concerning implementation of recommendations from a Performance Audit titled Managing Compliance with the Environment Protection and Biodiversity Conservation Act 1999. The Prime Minister has referred your letter to me for reply.

In response to the questions posed in your letter, the Department of the Environment (the Department) has implemented a number of measures to meet the recommendations of the Performance Audit. These include:

- A new Compliance Monitoring Program based on risk.
- A risk prioritisation tool, developed in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The tool enables the Department to focus its efforts towards those approvals that pose the greatest potential risk to matters of national environmental significance.
- Standardisation of business practices and upgrades to IT systems. More than 60 standard operating procedures are now in place to support compliance monitoring activities. Enhanced IT systems have also improved the Department's monitoring, compliance and intelligence capabilities.
- A quality assurance framework to ensure performance benchmarking, review and continual improvements to compliance monitoring activities.

These, and other, improvements in the Department's compliance monitoring capabilities are detailed at: www.environment.gov.au/system/files/resources/258bd190-8b66-4f01-a92c011-f4365fdc0/files/factsheet-compliance-enforcement.pdf.

The Department's Compliance Monitoring Program is now in its second year of implementation. The program outlines the Department's operational compliance monitoring activities; such as priority sectors and regions, key performance indicators for monitoring, audit, assurance and compliance functions, and a reflection of these activities in the previous year.

The Compliance Monitoring Program can be downloaded from:

www.environment.gov.au/epbc/publications/compliance-monitoring-program-2015-16.

Should you have any additional questions in relation to this matter, I encourage you to contact the EPBC Compliance Monitoring Team by emailing: EPBCmonitoring@environment.gov.au.

Thank you for writing on this matter.

Yours sincerely

A handwritten signature in black ink, appearing to be 'Greg Hunt', written in a cursive style.

Greg Hunt