Contents

E	xecutive Summary	ES-1
EI	RMA Form HS-1	
C	ontext: Pest Control in New Zealand	1
Introduction		1
Α	Vertebrate Pests in NZ	2
	A.1 Possums	2
	A.2 Rabbits	3
	A.3 Deer	3
	A.4 Other Major Vertebrate Pests	4
в	Pest Control Methods	5
	B.1 Traps	5
	B.2 Poisons	6
	B.3 Biotechnology for Possum Control	9
С	1080 Use in Aerial Operations	9
	C.1 Rationale for and Importance of Aerial 1080 Operations	10
	C.2 Timing of 1080 Operations	12
	C.3 Outcome Monitoring	13
С	ontext: Pest Control Scenarios	16
D	An Alternative Option to 1080	17
Е	Summary of Pest Control Scenarios	18
	E.1 Current Situation	18
	E.2 Outcomes for Tb Control	19
	E.3 Outcomes for Conservation	24
F	Current Situation	28
	F.1 Current Patterns of 1080 use	28
	F.2 Pest Control Strategies	29
	F.3 Annual Use of 1080 and Aerial 1080 Operations	31
	F.4 Area under Sustained Management	32
	F.5 Current Tb Situation	34
	F.6 Current Conservation Situation	37
	F.7 Conservation Outcomes Achieved Collectively by Agencies	38
G	The Future with 1080	39
	G.1 Assumptions	39
	G.2 Future for Tb Control with 1080	40
	G.3 Future Outcomes for Tb Control with 1080	40
	G.4 Future for Conservation Management with 1080	44
н	The Future without 1080	46
	H.1 Assumptions	46
	H.2 Future for Tb Control without 1080	47
	H.3 Future Outcomes for Tb Control without 1080	48

	H.4 Future for Conservation Management without 1080	51
	H.5 Comparing Outcomes for Conservation	52
An	nex 1: Forecast outcomes of the distribution of infected herds by	
	2015 WITH 1080	57
An	nex 2: The forecast national position by 2015 with respect to the	
	status of infected wildlife and herds WITH 1080	58
An	nex 3: Forecast outcomes of the distribution of infected herds by	
	2015 WITHOUT 1080	59
An	nex 4: The forecast national position by 2015 with respect to the	
	status of infected wildlife and herds WITHOUT 1080	60
С	ontext: Case Studies	62
Ι	Case Studies	63
1	Applicant Details	70
	1.1 Name and Postal Address of Applicants	71
	1.2 About the Applicants	71
2	Application Type and Related Approvals Required	74
	2.1 Application Type	75
	2.2 Other Approvals	75
3	Information on the Substance	
3.1	Unequivocal Identification of the Substances	
an	d	
3.2	2 Chemical and Physical Properties of the Substances	76
	A Sodium Fluoroacetate (Technical Grade Active)	78
	B Stock solution (Soluble Concentrate) 200 g/L 1080	79
	C Pellets containing 0.4 – 0.8 g/kg 1080	80
	D Pellets containing 1 g/kg 1080	81
	E Pellets containing 1.5 – 2.0 g/kg 1080	82
	F Pastes containing 0.6 – 0.8 g/kg 1080	83
	G Pastes containing 1.5 g/kg 1080	84
	H Pastes containing 10 g/kg 1080	85
	I Gel containing 1.5 g/kg 1080	86
	J Gels containing 50 g/kg 1080	87
	K Gels containing 100 g/kg 1080	88
3.3	B Hazard Classification of 1080 and Formulations Containing 1080	90
	1 Introduction	91
	2 Summary of Hazard Classifications	92
	3 Hazard Classification	95
	4 Toxic Properties: Class 6	97
	4.1 Subclass 6.1 Acute Toxicity	97
	4.2 Subclass 6.3 Skin Irritation	98
	4.3 Subclass 6.4 Eye Irritation	98
	4.4 Subclass 6.5 Sensitisation	99
	4.5 Subclass 6.6 Mutagenicity	99
	4.6 Subclass 6.7 Carcinogenicity	100

	4.7 Subclass 6.8 Reproductive/Developmental Effects	100
	4.8 Subclass 6.9 Target Organ Systemic Toxicant	102
	5 Ecotoxic properties: Class 9	105
	5.1 Subclass 9.1 Aquatic Ecotoxicity	105
	5.2 Subclass 9.2 Soil Ecotoxicity	107
	5.3 Subclass 9.3 Terrestrial Vertebrate Ecotoxicity	110
	5.4 Subclass 9.4 Terrestrial Invertebrate Ecotoxicity	112
	6 References	116
3.4	Default Controls	126
-	1 Controls for 1080 and products containing 1080	127
	2 Controls (based on HSNO classifications)	130
	3 Controls	133
	3.1 HSNO Hazardous Property Controls	133
	3.2 HSNO Lifecycle Controls	138
	3.3 Controls for Stationary Container Systems	146
	3.4 Additional Controls	146
	3.5 Transitional Controls	149
	Annex 1: ACVM Controls	150
35	Life Cycle	158
0.0	1 Manufacture of 1080 Products	160
	1.1 Import and Delivery to Manufacturing Site	160
	1.2 Manufacture of 1080 Formulations	160
	1.3 Manufacturing Site Management	161
	1.4 Disposal of Waste from Manufacturing	162
	2 Transport and distribution	162
	3 Application	162
	3.1 Aerial Application	164
	3.2 Ground Application	165
	3.3 Operating Procedures and Standards	166
	3.4 Disposal of Waste from Application	166
	4 1080 in the Environment	167
	4.1 Post-application	167
	4.2 Landfill Disposal	168
4	Risks, Costs and Benefits	
4.1	Identification of Risks. Costs and Benefits	170
	1 General Approach	171
	2 Risk Assessment Methodology	171
	2.1 Magnitude of Effect	172
	2.2 Likelihood of Effect Occuring	172
	2.3 Assigning the Level of Risk or Benefit	172
	3 Identification of Benefits and Adverse Effects	173
	4.1A Effects on the Market Economy	180
	Benefits Register	182
	Register of Adverse Effects	195
	4.1B Effects on Social and Community	208

	Benefits Register	210
	Register of Adverse Effects	213
	4.1C Effects on Human Health and Safety	222
	Benefits Register	225
	Register of Adverse Effects with 1080	227
	Register of Adverse Effects without 1080	251
	4.1D Effects on the Environment	276
	Benefits Register	280
	Register of Adverse Effects with 1080	290
	Register of Adverse Effects without 1080	344
4.2	Significant Risks, Costs and Benefits	370
	A Effects on Market Economy	371
	A.1 Benefits to the Market Economy	371
	B Effects on Social and Community	379
	B.1 Benefits to Social and Community	379
	B.2 Adverse Effects on Social and Community	380
	C Effects on Human Health and Safety	385
	C.1 Adverse Effects on Human Health and Safety with 1080	385
	C.2 Adverse Effects on Human Health and Safety without 1080	387
	D Effects on the Environment	390
	D.1 Benefits to the Environment	392
	D 2 Adverse Effects on Environment without 1080	404
4.3	Assessment of Risks, Costs and Benefits Significant to Maori	408
4.3	Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process	408 409
4.3	Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment	408 409 410
4.3	Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori	408 409 410 411
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 	408 409 410 411 414
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health 	408 409 410 411 414
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 	408 409 410 411 414 417
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 	408 409 410 411 414 414 417 426
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views 	408 409 410 411 414 417 426 429
4.3 4.4	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views 	408 409 410 411 414 417 426 429 432
4.3 4.4	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 	408 409 410 411 414 417 426 429 432 433
4.3 4.4	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 	408 409 410 411 414 417 426 429 432 433 434
4.3	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes 	408 409 410 411 414 417 426 429 432 433 434 436
4.3 4.4 4.5	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes 	408 409 410 411 414 417 426 429 433 434 436 438
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori Consultation Process Methodology of Risk Cost Benefit Assessment Review of Consultation with Maori Issues of Significance in Relation to Treaty of Waitangi Outcomes Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes Assessment Tables Conclusion: Summary of Maori Views International Obligations Obligations for Conservation Outcomes Obligations for Climate Change Outcomes Proposed Management Overall Evaluation 	408 409 410 411 414 417 426 429 432 433 434 436 438 440
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes Proposed Management Overall Evaluation 1 Summary of Method 	408 409 410 411 414 417 426 429 432 433 434 436 438 440 441
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes Proposed Management Overall Evaluation 1 Summary of Method 2 Findings 	408 409 410 411 414 417 426 429 433 434 436 438 436 438 440 441 441
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes Proposed Management Overall Evaluation 1 Summary of Method 2 Findings 2.1 Market Economy 	408 409 410 411 414 417 426 429 432 433 434 436 438 436 438 440 441 441
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori 1 Consultation Process 2 Methodology of Risk Cost Benefit Assessment 3 Review of Consultation with Maori 4 Issues of Significance in Relation to Treaty of Waitangi Outcomes 5 Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes 6 Assessment Tables 7 Conclusion: Summary of Maori Views International Obligations 1 Obligations for Bovine Tb Control 2 Obligations for Conservation Outcomes 3 Obligations for Climate Change Outcomes Proposed Management Overall Evaluation 1 Summary of Method 2 Findings 2.1 Market Economy 2.2 Social and Community 	408 409 410 411 414 417 426 429 433 434 436 438 436 438 440 441 441 442 442
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori Consultation Process Methodology of Risk Cost Benefit Assessment Review of Consultation with Maori Issues of Significance in Relation to Treaty of Waitangi Outcomes Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes Assessment Tables Conclusion: Summary of Maori Views International Obligations Obligations for Bovine Tb Control Obligations for Climate Change Outcomes Obligations for Climate Change Outcomes Summary of Method Findings Market Economy Social and Community Human Health 	408 409 410 411 414 417 426 429 433 434 436 438 436 438 440 441 441 442 442 443
4.3 4.4 4.5 4.6	 Assessment of Risks, Costs and Benefits Significant to Maori Consultation Process Methodology of Risk Cost Benefit Assessment Review of Consultation with Maori Issues of Significance in Relation to Treaty of Waitangi Outcomes Issues of Significance in Relation to Environmental, Cultural and Health and Wellbeing Outcomes Assessment Tables Conclusion: Summary of Maori Views International Obligations Obligations for Bovine Tb Control Obligations for Climate Change Outcomes Obligations for Climate Change Outcomes Summary of Method Findings Market Economy Social and Community Human Health Environment 	408 409 410 411 414 417 426 429 432 433 434 436 438 440 441 441 442 442 443 443

	3 Conclusions	444
5	International Considerations of 1080	446
	1 Summary of Findings	447
	2 Objectives and Methods	447
	3 International Regulatory Status of 1080	448
	4 Current Registered Applications of 1080	449
	4.1 Australia	449
	4.2 Canada	451
	4.3 Israel	452
	4.4 South Africa	452
	4.5 United States	453
	5 Unconfirmed Status of 1080 Use in Other Countries	454
	6 Conclusions	455
	7 References	456
6	Miscellaneous	458
	6.1 Acronyms	459
	6.2 Glossary	462
7	Summary of Public Information	468
	7.1 Name of Substances for Public Register	469
	7.2 Purpose of Application	469
	7.3 Use Categories	469
	7.4 Executive Summary	469

Appendix A: 1080 Resource Documents

Appendix B: HSNO Classification of Proprietary Ingredients in 1080 Formulations (Confidential to ERMA)

Appendix C: 1080 References

Appendix D: Public Submission Analysis

Appendix E: Presentation Used in Consultation with Maori