

## Contents

<b>1. General Safety Information.....</b>	<b>11</b>
1.1     The Law at Work .....	11
1.2     Occupational Health and Safety Act 2004.....	11
1.2.1 <i>Main Duties of Employers.....</i>	11
1.2.2 <i>Duty of Employers to Consult .....</i>	12
1.2.3 <i>Duties of Employees .....</i>	13
1.2.4 <i>Duties of Others.....</i>	13
1.3     General Safety Rules .....	14
1.3.1 <i>Employee Safety Rules.....</i>	14
1.3.2 <i>Workplace Behaviour .....</i>	15
1.3.3 <i>Alcohol and Illicit Drugs .....</i>	15
1.3.4 <i>Smoking in the Workforce .....</i>	16
1.4     General Safety Measures .....	17
1.4.1 <i>Hierarchy of Controls.....</i>	17
1.4.2 <i>Personal Protective Equipment .....</i>	18
1.4.3 <i>Safety Signs .....</i>	19
1.4.4 <i>Risk Assessment.....</i>	20
1.4.5 <i>Isolation.....</i>	20
1.4.6 <i>Tags and Lockout.....</i>	21
1.4.7 <i>Environmental Incidents and Correct Disposal Techniques .....</i>	22
1.4.8 <i>Entry into a Confined Space.....</i>	23
1.4.9 <i>Working at Height .....</i>	24
1.4.10 <i>Guarding.....</i>	26
1.4.11 <i>Dust Management.....</i>	28
1.4.12 <i>Exposure Standards.....</i>	30
<b>2. Equipment Knowledge.....</b>	<b>35</b>
2.1     Glossary of Terms.....	35
2.1.1 <i>General Terms .....</i>	35
2.1.2 <i>Capital Items.....</i>	38
2.1.3 <i>Resource Terms .....</i>	40
2.1.4 <i>Inventory Items.....</i>	41
2.2     General Crusher Issues.....	43
2.2.1 <i>Manganese Composition and Profiles .....</i>	43
2.2.2 <i>Lubrication.....</i>	46
2.2.3 <i>Bolts and Fasteners .....</i>	46
2.3     Jaw Crusher .....	47
2.3.1 <i>General Jaw Crusher Components .....</i>	47
2.3.2 <i>Single Toggle Jaw Crusher .....</i>	53
2.3.3 <i>Granulator .....</i>	54
2.4     Cone Crusher .....	55
2.4.1 <i>General Cone Crusher Components .....</i>	55
2.4.2 <i>Top Supported Cone Crusher .....</i>	58
2.4.3 <i>Bottom Supported Cone Crusher .....</i>	60
2.4.4 <i>Gyratory Crusher .....</i>	62
2.5     Impactor .....	63
2.5.1 <i>General Impactor Components .....</i>	63
2.5.2 <i>Rock-on-Steel Vertical Shaft Impact (VSI) .....</i>	66
2.5.3 <i>Rock-on-Rock Vertical Shaft Impact (VSI) .....</i>	67
2.5.4 <i>Horizontal Shaft Impact (HSI).....</i>	68
2.6     Roll Crusher .....	70

<b>3.</b>	<b>Undertake Service and Maintenances .....</b>	<b>75</b>
3.1	Site Preparation.....	75
3.1.1	<i>General Site Requirements .....</i>	75
3.1.2	<i>Safety Considerations .....</i>	75
3.1.3	<i>Ancillary Equipment .....</i>	76
3.1.4	<i>Plant Entry, Exit and Access.....</i>	76
3.1.5	<i>Power Supply .....</i>	76
3.1.6	<i>Inventory .....</i>	76
3.1.7	<i>Waste Management.....</i>	76
3.1.8	<i>Maintenance Welding .....</i>	76
3.2	Conduct Servicing Checks.....	77
3.2.1	<i>Daily Service Checks.....</i>	78
3.2.2	<i>Twice Daily Service Checks .....</i>	82
3.2.3	<i>Weekly Service Checks.....</i>	87
3.2.4	<i>Monthly Service Checks .....</i>	94
3.3	Start Up and Operate Plant .....	96
3.4	Routine Servicing - Diagnostic and Trouble Shooting .....	97
3.4.1	<i>Jaw Crushers.....</i>	97
3.4.2	<i>Cone Crushers.....</i>	100
3.4.3	<i>Impactors.....</i>	106
3.4.4	<i>Roll Crusher .....</i>	108
<b>4.</b>	<b>Key Tasks.....</b>	<b>112</b>
4.1	Task 1: Fixed Jaw Removal and Replacement .....	113
4.1.1	<i>Equipment Requirements .....</i>	113
4.1.2	<i>Safety Requirements .....</i>	113
4.1.3	<i>Procedure - Prepare Work Area.....</i>	114
4.1.4	<i>Procedure - Remove Jaw face.....</i>	115
4.1.5	<i>Procedure - Replace Jaw face .....</i>	117
4.2	Task 2: Remove and Replace Mantle and Concave in a Gyratory Crusher.....	119
4.2.1	<i>Equipment Requirements .....</i>	119
4.2.2	<i>Safety Requirements .....</i>	119
4.2.3	<i>Procedure - Prepare Work Area.....</i>	120
4.2.4	<i>Procedure - Remove and Replace Mantle .....</i>	120
4.2.5	<i>Procedure - Remove and Replace a Concave (or Bowl Liner) .....</i>	127
4.3	Task 3: Changing Motor Pulley and V-belts on a Jaw Crusher .....	130
4.3.1	<i>Equipment Requirements .....</i>	130
4.3.2	<i>Safety Requirements .....</i>	130
4.3.3	<i>Procedure - Prepare Work Area.....</i>	130
4.3.4	<i>Procedure for Changing Motor Pulley and V-belts on a Jaw Crusher.....</i>	131
4.4	Task 4: Removing and Replacing Hammers in an Impactor .....	134
4.4.1	<i>Equipment Requirements .....</i>	134
4.4.2	<i>Safety Requirements .....</i>	134
4.4.3	<i>Procedure - Prepare Work Area.....</i>	134
4.4.4	<i>Procedure – Example: Remove and Replace Hammers in a small Impactor .....</i>	135
4.5	Task 5: Changing Lubricants in a Gyratory Crusher.....	137
4.5.1	<i>Equipment Requirements .....</i>	137
4.5.2	<i>Safety Requirements .....</i>	137
4.5.3	<i>Procedure - Prepare Work Area.....</i>	137
4.5.4	<i>Procedure - Changing Lubricants in a Gyratory Crusher .....</i>	138

<b>5. Appendices.....</b>	<b>142</b>
5.1 Acknowledgements .....	142
5.2 Legislation and Contacts .....	143
5.2.1 <i>Contacts</i> .....	143
5.2.2 <i>Legislation</i> .....	144
5.3 Sample Risk Management Forms .....	145
5.4 Crushing/Screening Operator's Pre Start and End Day Safety Checklist .....	150
5.5 Sample Crusher Monitoring Charts .....	153