

# NI 43-101 TECHNICAL REPORT

## Scotia Mine Pre-Feasibility Study Technical Report

For ScoZinc Limited



## NOVA SCOTIA, CANADA

In accordance with the requirements of National Instrument 43-101 “Standards of Disclosure for Mineral Projects” of the Canadian Securities Administrators.

### Qualified Persons:

Timothy Carew, P.Geo. (SRK Consulting (U.S.), Inc.)

Tony Gilman, M.Sc., P.Eng. (Terrane Geoscience Inc.)

Tommaso Roberto Raponi, P.Eng. (Ausenco Engineering Canada Inc.)

Patrick Hannon, M.A.Sc., P.Eng. (MineTech International Limited)



**TERRANE**  
GEOSCIENCE INC.

**Ausenco**



*a Dynasafe Group Company*

Effective date: July 6, 2020

## Important Notice

This report was prepared following the format of Canadian National Instrument 43-101 for ScoZinc Limited by SRK Consulting (U.S.), Inc., Terrane Geoscience Inc., Ausenco Engineering Canada Inc., and MineTech International Limited. ScoZinc Limited is a wholly owned subsidiary of ScoZinc Mining Ltd.

The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in a Preliminary Feasibility Study, based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by ScoZinc Limited and ScoZinc Mining Ltd. (the “Company” or “ScoZinc”) subject to the terms and conditions of its contracts with SRK Consulting (U.S.), Inc., Terrane Geoscience Inc., Ausenco Engineering Canada Inc., and MineTech International Limited, and to the relevant securities legislation. The contracts permit ScoZinc to file this report as a Technical Report with Canadian securities regulatory authorities, pursuant to National Instrument 43-101, Standards of Disclosure for Mineral Projects. Any other uses of this report by any third party are at that party’s sole risk. The responsibility for this disclosure remains with ScoZinc. The reader of this document should ensure that this is the most recent Technical Report for the property as it is not valid if a new Technical Report has been issued. This report does not conform to SEC S-K 1300 guidelines.

## Copyright

This report is protected by copyright and may not be reproduced or transmitted in any form or by any means whatsoever to any person without the written permission of the copyright holder, other than in accordance with the original license granted to ScoZinc. That license specifically allows ScoZinc to distribute this report in its entirety to third parties subject to the above disclaimer.

## Table of Contents

<b>1</b>	<b>Executive Summary .....</b>	<b>23</b>
<b>2</b>	<b>Introduction and Terms of Reference.....</b>	<b>41</b>
2.1	Issuer .....	41
2.2	Terms of Reference .....	41
2.3	Purpose of Report .....	41
2.4	Basis of Technical Support.....	41
2.5	Site Visits .....	41
2.6	Units of Measure .....	43
2.7	Site Grid Parameters .....	43
2.8	SRK Declaration .....	43
2.9	Ausenco Declaration .....	44
2.10	Terrane Declaration .....	44
2.11	MineTech Declaration.....	45
2.12	Other .....	45
<b>3</b>	<b>Reliance on Other Experts .....</b>	<b>46</b>
<b>4</b>	<b>Property Description and Location.....</b>	<b>46</b>
4.1	Exploration Land Status .....	47
4.2	Aggregate Lease .....	54
4.3	Environmental.....	55
<b>5</b>	<b>Accessibility, Climate, Local Resources, Infrastructure and Physiography.....</b>	<b>56</b>
5.1	Accessibility .....	56
5.2	Climate.....	56
5.3	Local Resources & Infrastructure .....	56
5.3.1	Local Resources .....	56
5.3.2	Utilities.....	56
5.3.3	Communications .....	57
5.3.4	Administration.....	57
5.3.5	Mining Facilities.....	57
5.3.6	Processing Facilities .....	57
5.3.7	Concentrate Handling .....	58
5.3.8	Tailings Storage .....	58
5.3.9	Waste Rock Storage .....	59
5.4	Physiography .....	59
<b>6</b>	<b>History .....</b>	<b>60</b>
6.1	Modern Pre-mining Exploration .....	60
6.2	Ownership History .....	62
6.2.1	Scotia Mine Deposit (Main Zone).....	62

6.2.2	Getty Zone.....	63
6.3	Historical Mineral Resource and Mineral Reserve Estimates .....	64
6.3.1	Scotia Mine Deposit (Main Zone).....	64
6.3.2	Getty Zone.....	67
<b>7</b>	<b>Geological Setting and Mineralization.....</b>	<b>69</b>
7.1	Regional Geology .....	69
7.2	Property Geology.....	71
7.3	Mineralization.....	81
7.3.1	Main Zone Mineralization .....	81
7.3.2	Getty Zone Mineralization .....	81
<b>8</b>	<b>Deposit Types .....</b>	<b>83</b>
<b>9</b>	<b>Exploration .....</b>	<b>85</b>
9.1	Exploration History .....	85
9.1.1	Main Zone .....	85
9.1.2	Getty Zone.....	90
<b>10</b>	<b>Drilling .....</b>	<b>92</b>
10.1	Sample Length – True Width Relationship.....	92
10.2	Main Zone (pre-2011).....	92
10.2.1	Sample Statistics.....	93
10.3	Main Zone Drilling (post 2011) .....	96
10.3.1	Type and Extent of Drilling .....	96
10.3.2	Drilling Procedures .....	96
10.3.3	Sampling .....	97
10.4	Getty Zone.....	98
<b>11</b>	<b>Preparation, Analyses, and Security .....</b>	<b>99</b>
11.1	Sample Preparation and Analyses .....	99
11.1.1	Getty Zone (pre-2008).....	99
11.1.2	Main Zone (pre-2008) .....	99
11.1.3	Scotia Mine Deposits (2008).....	100
11.1.4	Main Zone (2011).....	102
<b>12</b>	<b>Data Verification.....</b>	<b>105</b>
12.1	Main Zone.....	105
12.1.1	Database Validation .....	105
12.1.2	Data Validation Conclusion .....	106
12.1.3	Verification Sampling .....	106
12.2	Historical Data Verifications.....	108
12.2.1	Getty Zone.....	108
<b>13</b>	<b>Mineral Processing and Metallurgical Test Work .....</b>	<b>109</b>

13.1	Introduction .....	109
13.2	Sample Description .....	109
13.3	Mineralogy .....	109
13.4	Review .....	110
13.5	Operational Data .....	110
13.6	Comminution Testing.....	111
13.7	Flotation Testing .....	112
13.8	Concentrate Solids Liquids Separation Testing .....	114
13.9	Predicted Metallurgical Results .....	115
13.10	Conclusions .....	116
13.11	Recommendations.....	117
<b>14</b>	<b>Mineral Resource Estimates .....</b>	<b>118</b>
14.1	Introduction .....	118
14.2	Resource Estimation Procedures .....	118
14.3	Resource Database .....	118
14.3.1	Density .....	118
14.3.2	Topography .....	119
14.4	Geological and Grade Shell (Mineralization) Modelling .....	119
14.5	Exploratory Data Analysis .....	120
14.6	Evaluation of Outliers .....	123
14.7	Compositing.....	123
14.8	Variography .....	124
14.9	Block Model and Grade Estimation .....	126
14.9.1	Block Model Geometry .....	126
14.9.2	Block Model Estimation.....	127
14.10	Model Validation .....	129
14.10.1	Visual Comparison .....	129
14.10.2	Swath Plots .....	134
14.11	Mineral Resource Classification .....	137
14.12	Mineral Resource Statement.....	137
14.12.1	Resource Pit Optimization Parameters.....	137
14.12.2	Mineral Resource Statement.....	140
14.12.3	Resource Sensitivity Analysis .....	140
<b>15</b>	<b>Mineral Reserve Estimate.....</b>	<b>142</b>
15.1	Introduction .....	142
15.2	Mineral Reserve Estimation.....	142
15.2.1	Orebody Description .....	142
15.2.2	Cut-Off Grade.....	143
15.2.3	Mining Dilution and Recovery .....	144

15.2.4	Mineral Reserves .....	145
15.2.5	Conversion of Mineral Resources to Mineral Reserves.....	145
<b>16</b>	<b>Mining Methods.....</b>	<b>146</b>
16.1	Introduction .....	146
16.2	Mine Design.....	146
16.2.1	Pit Optimization .....	146
16.2.2	Geotechnical Considerations .....	148
16.2.3	Ultimate Pit Design.....	151
16.2.4	Phased Pit Designs .....	160
16.2.5	Gypsum Assessment .....	162
16.2.6	Waste Management .....	164
16.2.7	Life-of-Mine Production Schedule .....	166
16.2.8	Ore Stockpile Management.....	169
16.2.9	Mining Equipment Fleet .....	171
16.2.10	Drilling & Blasting .....	173
16.2.11	Open-Pit Dewatering & Hydrology .....	175
16.2.12	Mining Workforce .....	177
16.2.12.1	Mining Operations .....	177
16.2.12.2	Mining Mobile Maintenance .....	178
<b>17</b>	<b>Recovery Methods .....</b>	<b>180</b>
17.1	Overall Process Design .....	180
17.2	Mill Process Plant Description .....	180
17.2.1	Plant Design Criteria .....	180
17.2.2	Stockpiling & Crushing .....	181
17.2.3	Grinding Circuit.....	183
17.2.4	Flotation Circuit .....	183
17.2.5	Dewatering Circuit.....	184
17.2.6	Concentrate Handling Circuit .....	184
17.2.7	Tailings .....	184
17.2.8	Flowsheet and Layout Drawings .....	184
17.3	Life of Mine Concentrate Production .....	192
17.4	Reagent Handling & Storage.....	194
17.4.1	Hydrated Lime .....	194
17.4.2	Sodium Cyanide .....	194
17.4.3	Zinc Sulphate .....	194
17.4.4	Copper Sulphate .....	195
17.4.5	Sodium Isopropyl Xanthate .....	195
17.4.6	Flocculant .....	195
17.4.7	Frother.....	195

17.4.8	Potassium Amyl Xanthate .....	195
17.5	Services & Utilities .....	196
17.5.1	Process/ Instrument Air .....	196
17.5.2	Low Pressure Air .....	196
17.6	Water Supply .....	196
17.6.1	Raw Water Supply System .....	196
17.6.2	Process Water Supply System.....	196
17.6.3	Gland Water .....	196
<b>18</b>	<b>Project Infrastructure.....</b>	<b>197</b>
18.1	Scotia Mine Workforce .....	199
18.2	Electrical Power Systems .....	199
18.3	Water Supply .....	202
18.3.1	Water Treatment Plant .....	202
18.3.2	Potable Water.....	202
18.3.3	Site Water Management .....	203
18.4	Medical Facilities .....	208
18.5	Telecommunications.....	208
18.6	Administration Building .....	210
18.7	Mine Services Building .....	211
18.8	Warehouse & Workshop.....	211
18.9	Equipment and Spare Parts Asset Inventory .....	213
18.10	Maintenance Garage .....	221
18.11	Core Preparation Building .....	222
18.12	Core Storage Building .....	223
18.13	Proposed Additional Mobile Fleet Workshops.....	225
18.14	Mill Processing Building.....	226
18.15	Tailings Storage Facility .....	238
18.16	Fuel Storage .....	240
18.17	Cold Warehouses & Storage Yard .....	240
18.18	Sewerage Treatment .....	241
18.19	Garbage Disposal .....	242
18.20	Mill Process Control Systems.....	242
18.20.1	Crushing Circuit.....	243
18.20.2	Grinding Circuit.....	243
18.20.3	Flotation Circuit .....	243
18.20.4	Concentrate Dewatering Circuit .....	244
18.20.5	Concentrate Loading & Transport .....	245
18.20.6	Tailings .....	245
18.20.7	Power .....	245

18.20.8	Air .....	246
18.20.9	Water .....	246
18.20.10	Existing Control Systems .....	246
18.20.11	Additional Control Systems & Upgrades .....	246
18.21	Fire Detection and Fire Suppression Systems .....	246
18.22	Explosives .....	247
18.23	Mine Services .....	247
18.24	Site Emergency Services & Rescue .....	248
18.25	Mobile Mining Equipment .....	248
18.26	Water Management System .....	249
18.27	Waste Storage Facilities .....	254
18.28	Laydown Areas .....	255
18.29	Transportation .....	257
18.29.1	International Airport Access .....	257
18.29.2	Railway Access .....	258
18.29.3	Highway Access Roads .....	259
18.29.4	Site Access Roads .....	260
18.29.5	Bridge .....	261
18.30	Logistics .....	263
18.30.1	Workforce Hours .....	263
18.30.2	Inbound Freight .....	263
18.30.3	Outbound Concentrate .....	263
<b>19</b>	<b>Market Studies and Contracts .....</b>	<b>269</b>
19.1	Market Studies .....	269
19.2	Concentrate Volumes and Quality .....	270
19.3	Locked Cycle Test Results .....	278
19.4	Offtake Agreements .....	279
19.5	Contracts .....	280
19.6	Smelter Market .....	280
19.6.1	North American Smelters .....	280
19.6.2	Select International Zinc Smelters .....	281
19.7	Metal Prices .....	281
19.7.1	Macroeconomic Outlook .....	281
19.7.2	Zinc Producers & Markets .....	282
19.7.3	Zinc Prices – Short Term .....	285
19.7.4	Zinc Prices – Long Term .....	287
19.7.5	Lead Prices – Short Term .....	287
19.7.6	Lead Prices – Long Term .....	288
19.7.7	Zinc & Lead Metal Prices Adopted .....	289



19.8	Treatment Charges.....	289
19.8.1	Zinc Concentrate Treatment Charges.....	289
19.8.2	Lead Concentrate Treatment Charges .....	290
19.9	Conclusions .....	292
<b>20</b>	<b>Environmental Studies, Permitting and Social or Community Impact .....</b>	<b>293</b>
20.1	Scotia Mine Overview .....	293
20.2	Overview of Existing Information .....	293
20.2.1	Environmental Setting and Socio-Economic Setting .....	293
20.2.1.1	Socio-Economic Setting .....	296
20.2.2	Summary of Environment and Socio-Economic Issues .....	297
20.3	Environmental Management Plans .....	298
20.3.1	Tailings and Waste Rock Management .....	299
20.3.2	Site Monitoring .....	299
20.3.3	ARD Management Plan .....	301
20.3.4	Water Management.....	301
20.3.5	Chemicals, Fuel and Hazardous Material Management.....	303
20.4	Permitting.....	304
20.4.1	Overview of the Regulatory Process.....	304
20.4.1.1	Stage 1 – Environmental Assessment .....	304
20.4.1.2	Stage 2 – Permits, Leases and Approvals.....	305
20.4.2	Permits and Licences.....	306
20.5	Indigenous Background.....	306
20.6	Mine Closure.....	307
20.6.1	Temporary Closure .....	307
20.6.2	Permanent Closure .....	308
20.6.3	Post-Closure Monitoring, Maintenance and Reporting Program .....	309
20.6.4	Reclamation Bonding .....	311
<b>21</b>	<b>Capital and Operating Expenditure.....</b>	<b>313</b>
21.1	Sources of Estimated Costs .....	313
21.2	Capital Cost Summary.....	314
21.2.1	Pre-production Capital .....	315
21.2.2	Salvage Values .....	315
21.2.3	Pre-Production Capital Cost Inclusions and Exclusions .....	316
21.2.4	Pre-Production Direct Capital Costs – Mining.....	317
21.2.5	Pre-Production Direct Capital Costs – Processing .....	317
21.2.6	Pre-Production Direct Capital Costs – Site Infrastructure.....	319
21.2.7	Reclamation Costs .....	319
21.2.8	Pre-Production Indirect Costs .....	320
21.2.9	Pre-Production Contingency .....	320

21.2.10	Production Sustaining Capital .....	321
21.2.11	Working Capital .....	321
21.3	Operating Expenditure Estimate.....	322
21.3.1	Total Operating Expenses.....	322
21.3.2	Mine Operating Expenditure .....	325
21.3.3	Mill Operating Expenditure .....	327
21.3.4	General and Administrative Costs.....	329
21.3.5	Workforce Costs.....	330
21.3.6	General Consumables and Supplies Costs .....	332
21.3.7	Power Costs .....	332
21.3.8	Diesel Fuel Costs .....	334
21.3.9	Concentrate Transport Costs .....	334
<b>22</b>	<b>Economic Analysis .....</b>	<b>337</b>
22.1	Summary of Economic Results .....	337
22.2	Cash Flow Model Cost Sources .....	338
22.3	Cash Flow Model Assumptions .....	338
22.3.1	Unit of Currency .....	338
22.3.2	Metal Prices.....	338
22.3.3	Currency Exchange Rates .....	338
22.3.4	Discount Rates .....	338
22.3.5	Revenue Timing .....	339
22.3.6	Working Capital .....	339
22.3.7	Project Finance .....	339
22.3.8	Other Assumptions.....	339
22.4	Capital Expenditure .....	339
22.5	Sustaining Capital Expenditure .....	340
22.6	Operating Expenditure.....	341
22.7	Concentrate Sale Terms.....	341
22.8	Taxation and Royalties .....	343
22.8.1	Federal Taxation .....	343
22.8.2	Provincial Taxes .....	343
22.8.3	Property Taxes .....	343
22.8.4	Mineral Property Tax Pools.....	344
22.8.5	Federal Investment Tax Credits.....	344
22.8.6	Capital Cost Allowance .....	344
22.8.7	Provincial Royalties .....	344
22.8.8	Landowner Royalties.....	344
22.8.9	Workforce Burden .....	344
22.9	Cash Flow Financial Results .....	345

22.10	Economic Analysis .....	345
<b>23</b>	<b>Adjacent Properties .....</b>	<b>349</b>
<b>24</b>	<b>Other Relevant Data.....</b>	<b>350</b>
24.1	Mine Site Organization .....	350
24.1.1	Workforce Organization .....	350
24.1.2	Workforce Levels .....	352
24.1.3	Recruitment.....	353
24.2	Project Execution Strategy .....	354
24.2.1	Procurement Phase .....	354
24.2.2	Pre-Commercial Production Phase.....	355
24.2.3	Commercial Production Phase.....	356
<b>25</b>	<b>Interpretations and Conclusions .....</b>	<b>357</b>
25.1	SRK Conclusions.....	357
25.2	Ausenco Conclusions .....	358
25.2.1	Processing Opportunities .....	358
25.2.2	Mill Risks .....	358
25.3	Terrane Conclusions .....	359
25.4	MineTech Conclusions .....	359
<b>26</b>	<b>Recommendations.....</b>	<b>360</b>
26.1	SRK Recommendations .....	360
26.2	Ausenco Recommendations.....	360
26.3	Terrane Recommendations .....	361
26.4	MineTech Recommendations.....	363
<b>27</b>	<b>References.....</b>	<b>364</b>
<b>28</b>	<b>Certificates .....</b>	<b>367</b>
<b>29</b>	<b>Glossary .....</b>	<b>373</b>

## List of Tables

Table 1-1: Pre-Feasibility Study Highlights .....	23
Table 1-2: Scotia Mine Resource Statement .....	28
Table 1-3: Scotia Mine Mineral Reserve Estimates .....	29
Table 1-4: Conversion of Mineral Resources to Mineral Reserves .....	29
Table 1-5: ScoZinc Permits and Approvals.....	35
Table 1-6: Economic Results Summary.....	36
Table 1-7: Capital Expenditure Summary .....	37
Table 1-8: Operating Expenditure Summary .....	37
Table 1-9: Metal Price Sensitivities Analysis .....	38
Table 1-10: Exchange Rate Sensitivities Analysis.....	38
Table 2-1: Qualified Persons & Report Contributors .....	42
Table 2-2: Site Grid Parameters .....	43
Table 4-1: Summary of ScoZinc Exploration Licenses .....	48
Table 4-2: Exploration License 06268 (20 Claims).....	48
Table 4-3: Exploration License 06959 (Getty Zone, 16 Claims).....	49
Table 4-4: Exploration License 08936 (1 Claim).....	49
Table 4-5: Exploration License 09069 (1 Claim).....	49
Table 4-6: Exploration License 51016 (3 Claims).....	50
Table 4-7: Mineral Lease 10-1 (38 Claims).....	51
Table 4-8: Mineral Lease 40058 (1 Claim).....	51
Table 4-9: Mineral Lease 40059 (1 Claim).....	51
Table 4-10: Property Ownership, ScoZinc Limited .....	52
Table 6-1: Historical Milling Records .....	60
Table 6-2: Historical Resource and Reserve Estimates .....	66
Table 6-3: Previous Mineral Resource.....	66
Table 6-4: Previous Mineral Reserve Estimate.....	67
Table 6-5: Historic Resource Estimates for Getty Zone .....	67
Table 6-6: Mercator NI 43-101 Compliant Resource Estimate for Getty Zone.....	68
Table 10-1: Historical Surface and Underground Diamond Drilling Activity .....	93
Table 10-2: Descriptive Statistics.....	94
Table 10-3: 2011 Drill Collar Summary.....	98
Table 11-1: 2011 Sampling Standards .....	103

Table 12-1: Holes That Were Verified During the Database Validation .....	105
Table 12-2: Results of Verification Sampling (2004 Drilling Program by ScoZinc).....	107
Table 12-3: 1997 Drilling Program by Westminer .....	107
Table 13-1: Master Composite Mineral Content .....	110
Table 13-2: Historical Operational Data.....	111
Table 13-3: SMC Test Results.....	111
Table 13-4: Bond Ball Mill Work Index Test Results.....	111
Table 13-5: Proposed ScoZinc Mine Production Plan (first 5 years).....	114
Table 14-1: Density – Non-Mineralized Materials.....	118
Table 14-2: Summary Statistics – GRFM ZN and Pb Assays .....	123
Table 14-3: Default Values by Zone .....	124
Table 14-4: Composites Summary Statistics.....	124
Table 14-5: Variogram Parameters by Zone – Zinc.....	125
Table 14-6: Primary Block Model Geometry.....	127
Table 14-7: Secondary Block Model Geometry .....	127
Table 14-8: Estimation Parameters .....	128
Table 14-9: Resource Pit Optimization Parameters .....	138
Table 14-10: Scotia Mine Resource Statement .....	140
Table 14-11: Resource Sensitivity Within the Resource Pit Shell .....	141
Table 15-1: Optimization Inputs for Zinc-Equivalent Calculation.....	144
Table 15-2: Scotia Mine Mineral Reserve Estimates.....	145
Table 15-3: Conversion of Mineral Resources to Mineral Reserves .....	145
Table 16-1: Pit Optimization Parameters Used for Mine Planning .....	147
Table 16-2: Geotechnical Pit Slope Parameters.....	148
Table 16-3: Geotechnical Waste Dump Parameters .....	150
Table 16-4: Design Basis for Ultimate Pit Design.....	151
Table 16-5: Tonnage and Grade by Pit Phase .....	160
Table 16-6: Phased Pit Sequencing .....	160
Table 16-7: 2004 Gypsum Assay Results Within Ultimate Pit.....	162
Table 16-8: Waste Dump Design Criteria .....	164
Table 16-9: Waste Storage Capacity vs. Waste Storage Required.....	165
Table 16-10: Waste Movement Sequence.....	166
Table 16-11: Diluted LOM Mine Production Schedule.....	168

Table 16-12: Ore Stockpile Grade Ranges .....	169
Table 16-13: Mine Production Ramp Up Schedule .....	172
Table 16-14: Mining Heavy Equipment Fleet Requirements .....	173
Table 16-15: Mining Workforce During Peak Operation .....	177
Table 16-16: Mine Maintenance & Site Services Workforce During Peak Operation.....	178
Table 17-1: Key Plant Process Design Criteria.....	182
Table 18-1: Mobile Mining Equipment Fleet Requirements.....	249
Table 19-1: Zinc Concentrate Grades: Scotia Mine vs. Other Zinc Projects .....	269
Table 19-2: Concentrate Treatment Charges .....	270
Table 19-3: Scotia Mine Mineral Reserve Estimates .....	272
Table 19-4: Scotia Mine Historical Zinc Concentrate Specifications .....	276
Table 19-5: Scotia Mine Historical Lead Concentrate Specifications .....	276
Table 19-6: Forecast Variations in Grades, Recoveries and Metal Concentrate Produced .....	277
Table 19-7: Scotia Mine Metallurgical Performance Analysis.....	278
Table 19-8: North American Smelters.....	280
Table 19-9: Select International Smelters.....	281
Table 19-10: Zinc Prices Used in Financial Analysis.....	287
Table 19-11: Lead Prices Used in Financial Analysis.....	289
Table 19-12: Prices of Zinc and Lead Used in Financial Analysis.....	289
Table 19-13: Zinc Concentrate Treatment Charges .....	290
Table 19-14: Lead Concentrate Treatment Charges .....	291
Table 20-1: ScoZinc Permits and Approvals.....	306
Table 20-2: ScoZinc Reclamation Plan.....	310
Table 21-1: Sources of Inputs to Capital and Operating Expenditure Estimates .....	314
Table 21-2: Summary of Capital Costs .....	314
Table 21-3: Pre-production Capital Costs.....	315
Table 21-4: Salvage Value Capital Estimates.....	316
Table 21-5: Pre-production Capital Costs Inclusions and Exclusions .....	316
Table 21-6: Recommended Pre-Production Cost Items .....	317
Table 21-7: Reclamation Bond Requirements .....	320
Table 21-8: Total Sustaining Capital Costs.....	321
Table 21-9: Total Operating Expenditure Summary .....	322
Table 21-10: Scotia Mine Workforce Labour Levels.....	330

---

Table 22-1: Economic Results Summary.....	337
Table 22-2: Forecast Metal Prices by Project Year .....	338
Table 22-3: Capital Expenditure Summary .....	340
Table 22-4: Sustaining Capital Expenditure Summary .....	340
Table 22-5: Unit Operating Expenditure .....	341
Table 22-6: Zinc Concentrate Indicative Smelter Charges .....	342
Table 22-7: Lead Concentrate Indicative Smelter Charges.....	343
Table 22-8: Cash Flow Financial Results .....	345
Table 22-9: Metal Price Sensitivities Analysis .....	346
Table 22-10: Exchange Rate Sensitivities Analysis.....	346
Table 22-11: Cash Flow Model .....	348
Table 24-1: Scotia Mine Departments .....	350
Table 24-2: Scotia Mine Workforce Positions (Year 1).....	353

## List of Figures

Figure 1-1: Ultimate Pit and Waste Dump Design .....	30
Figure 1-2: Overall Plant Layout .....	31
Figure 1-3: Plant Flow Diagram .....	32
Figure 1-4: Scotia Mine Concentrate Production .....	34
Figure 4-1: Location of Scotia Mine .....	46
Figure 4-2: Scotia Mine Location Relative to Halifax .....	47
Figure 4-3: Exploration Licenses, Mineral Leases, and Real Property Boundary (Surface Rights) .....	49
Figure 4-4: Real Property Map, ScoZinc Limited .....	53
Figure 4-5: Getty Zone Mineral Claims Location Map .....	54
Figure 5-1: Scotia Mine Processing Facilities (or Plant) .....	58
Figure 7-1: Regional Geology Map .....	70
Figure 7-2: Stratigraphic Section of the Windsor Group .....	73
Figure 7-3: Top-of-Carbonate Contour Map .....	74
Figure 7-4: Geological Cross-Section A-A' .....	75
Figure 7-5: Geological Cross-Section B-B' .....	76
Figure 7-6: Geological Cross-Section C-C' .....	77
Figure 7-7: Getty Zone Geological Map .....	78
Figure 7-8: Getty Zone Stratigraphic Column .....	79
Figure 7-9: Carbonate Bank Cross-Section .....	80
Figure 10-1: Sample Histogram for Zn and Pb .....	95
Figure 10-2: Sample Interval Histogram .....	96
Figure 13-1: Zinc Recovery as a Function of Head Grade (2008 Production Data) .....	113
Figure 13-2: Lead Recovery as a Function of Head Grade (2008 Production Data) .....	113
Figure 13-3: Lead Recovery Model for Cash Flow Analysis .....	116
Figure 13-4: Zinc Recovery Model for Cash Flow Analysis .....	116
Figure 14-1: GRFM Solid – Perspective View .....	120
Figure 14-2: Section View – Getty, Looking SE .....	120
Figure 14-3: Boxplot – GRFM Zinc Assays .....	121
Figure 14-4: Boxplot – GRFM Lead Assays .....	122
Figure 14-5: Typical Directional Variogram – Zinc .....	125
Figure 14-6: Plan View of Zn and Pb Block Grades and Cross-Section .....	130
Figure 14-7: Main Zone Cross-Section Comparing Assay Composite Grades .....	131



Figure 14-8: Getty Zone Cross-Section Comparing Assay Composite Grades .....	132
Figure 14-9: Northeast Zone Cross-Section Comparing Assay Composite Grades .....	133
Figure 14-10: Easting Swath Plot for Zn and Pb.....	135
Figure 14-11: Northing Swath Plot for Zn and Pb .....	136
Figure 14-12: 3D Isometric View of the Resource Pit and Block Model (Zn% Grade Shown) .....	139
Figure 15-1: Resource Block Model.....	143
Figure 15-2: Orebody with Surface Constraints.....	143
Figure 16-1: Constrained Optimized Pit Shell.....	147
Figure 16-2: Pit Slope Design Details .....	149
Figure 16-3: Waste Dump Design Details.....	150
Figure 16-4: EOP Surface Year 1 .....	151
Figure 16-5: EOP Surface Year 2 .....	152
Figure 16-6: EOP Surface Year 3 .....	152
Figure 16-7: EOP Surface Year 4 .....	153
Figure 16-8: EOP Surface Year 5 .....	153
Figure 16-9: EOP Surface Year 6 .....	154
Figure 16-10: EOP Surface Year 7 .....	154
Figure 16-11: EOP Surface Year 8 .....	155
Figure 16-12: EOP Surface Year 9 .....	155
Figure 16-13: EOP Surface Year 10 .....	156
Figure 16-14: EOP Surface Year 11 .....	156
Figure 16-15: EOP Surface Year 12 .....	157
Figure 16-16: EOP Surface Year 13 .....	157
Figure 16-17: EOP Surface Year 14 .....	158
Figure 16-18: Ultimate Pit Design & Waste Dump Design .....	159
Figure 16-19: Phased Pit Sequencing .....	161
Figure 16-20: Gypsum Stockpile Locations .....	163
Figure 16-21: Typical Cross Section Showing Gypsum Intersection with Pit .....	164
Figure 16-22: Waste Dump Design.....	165
Figure 16-23: Mill Throughput per Month with Head Grades.....	169
Figure 16-24: Ore Stockpile Balances per Month .....	170
Figure 16-25: ROM Ore Stockpile Area .....	171
Figure 16-26: Monthly Mine Production .....	172

Figure 16-27: 3D View of Underground Workings Network Within the Main Zone Pit .....	174
Figure 16-28: Overburden Slope Depressurizing Well Locations .....	176
Figure 16-29: Mine Infrastructure Layout .....	179
Figure 17-1: Processing Plant .....	181
Figure 17-2: Overall Process Flow Diagram .....	186
Figure 17-3: Overall Plant Layout .....	187
Figure 17-4: Crushing Area Section .....	188
Figure 17-5: Sizing Screen Area Section .....	189
Figure 17-6: Dewatering and Concentrate Handling Section .....	190
Figure 17-7: Reagent Flow Sheet .....	191
Figure 17-8: Annual Ore Processed .....	192
Figure 17-9: Annual Ore Processed & Concentrate Production .....	192
Figure 17-10: Zinc Concentrate Production .....	193
Figure 17-11: Lead Concentrate Production .....	193
Figure 18-1: Site Aerial Photo (2017) .....	197
Figure 18-2: Proposed Site Layout Mining Additions (Plan View) .....	198
Figure 18-3: Proposed Site Layout Processing Additions (Plan View) .....	198
Figure 18-4: 8,000 kVA Transformer .....	200
Figure 18-5: Mine Dewatering Transformer and Substation .....	200
Figure 18-6: Existing Electrical System Single-Line Diagrams .....	201
Figure 18-7: Water Treatment Plant and Water Storage .....	202
Figure 18-8: Pumping Station at Gays River .....	203
Figure 18-9: Proposed New Reservoir Location .....	204
Figure 18-10: Tailings Pond .....	205
Figure 18-11: Polishing Pond .....	206
Figure 18-12: Storm Water Pond .....	207
Figure 18-13: Scotia Mine Site Supply and Distribution .....	208
Figure 18-14: Administration Building .....	210
Figure 18-15: Mine Technical Services & Operations Building .....	211
Figure 18-16: Warehouse & Workshop .....	212
Figure 18-17: Site Warehouse Receiving Bay .....	213
Figure 18-18: Selected Processing Assets .....	214
Figure 18-19: Selected Processing Assets .....	215

Figure 18-20: Selected Processing Assets .....	216
Figure 18-21: Selected Warehouse Assets .....	217
Figure 18-22: Selected Maintenance Assets .....	218
Figure 18-23: Selected Maintenance Assets .....	219
Figure 18-24: Selected Mining Assets .....	220
Figure 18-25: Maintenance Garage .....	221
Figure 18-26: Maintenance Garage (interior).....	222
Figure 18-27: Core Preparation Building .....	223
Figure 18-28: Core Storage Building .....	224
Figure 18-29: Core Storage Building (interior) .....	224
Figure 18-30: Sample Dome Structure .....	225
Figure 18-31: Existing Mill Processing Building – South Side Exterior View .....	227
Figure 18-32: Existing Mill Processing Building – North Side Exterior View .....	227
Figure 18-33: Existing Mill Fine-Ore-Bin (Silo).....	228
Figure 18-34: Proposed Additions to Mill Process Building .....	229
Figure 18-35: Crushing Circuit .....	230
Figure 18-36: Grinding Circuit.....	231
Figure 18-37: Flotation Circuit.....	232
Figure 18-38: Zinc Thickener Tank .....	232
Figure 18-39: Concentrate Dewatering Area .....	233
Figure 18-40: Concentrate Loadout Area .....	233
Figure 18-41: Plant Control Room .....	234
Figure 18-42: Reagent Tanks .....	235
Figure 18-43: Wet Metallurgical Laboratory.....	236
Figure 18-44: Dry Metallurgical Laboratory.....	236
Figure 18-45: Large Main Deck Maintenance Bay .....	237
Figure 18-46: Large Ground Floor Maintenance Bays .....	237
Figure 18-47: Tailings Storage Facility .....	238
Figure 18-48: Tailings Storage Facility Decant Tower.....	239
Figure 18-49: Tailings Storage Facility Causeway .....	239
Figure 18-50: Diesel Fuel Farm .....	240
Figure 18-51: Underground Sewerage Treatment System.....	241
Figure 18-52: Effluent Treatment System – Septic Leach Field .....	242

Figure 18-53: Nova Scotia Electricity Transmission System .....	245
Figure 18-54: Water Supply and Distribution Systems Flow Sheet .....	251
Figure 18-55: Tailings Storage Pond .....	252
Figure 18-56: Polishing Pond.....	252
Figure 18-57: Discharge Weir .....	253
Figure 18-58: Storm Water Pond .....	253
Figure 18-59: Waste Dump .....	254
Figure 18-60: Waste Rock Storage – Waste Dump Design .....	255
Figure 18-61: Laydown Area.....	256
Figure 18-62: Secondary Laydown Area (Proposed New Reservoir Location) .....	256
Figure 18-63: Distance from the Scotia Mine Gate to Halifax Stanfield Airport.....	257
Figure 18-64: Halifax Stanfield Airport Non-Stop Flight Destinations .....	257
Figure 18-65: Route from Scotia Mine to Milford CN Railway Siding .....	258
Figure 18-66: Milford CN Railway Siding .....	259
Figure 18-67: Spring Weight Road Restrictions.....	260
Figure 18-68: Mine Access Road.....	261
Figure 18-69: ScoZinc’s Bridge.....	262
Figure 18-70: ScoZinc’s Bridge & Highway Access.....	262
Figure 18-71: Container Handling Facility.....	264
Figure 18-72: Onsite Container Weighbridge .....	265
Figure 18-73: Route From the Scotia Mine to the Fairview Cover Container Terminal.....	266
Figure 18-74: Fairview Cove Container Terminal .....	267
Figure 18-75: Milford CN Railway Siding .....	268
Figure 19-1: Historical Zinc Treatment Charges .....	272
Figure 19-2: Forecast LOM Concentrate Production .....	273
Figure 19-3: Forecast Annual Production of Zinc Concentrate.....	273
Figure 19-4: Forecast Annual Production of Lead Concentrate .....	274
Figure 19-5: Forecast Ore Processed and Annual Concentrate Production .....	275
Figure 19-6: Composite Cash Costs for Other Zinc Mines vs. Scotia Mine .....	284
Figure 19-7: C1 Cost Curve – Base Case & Probable Projects vs. Scotia Mine.....	284
Figure 19-8: Expected Demand for Minerals by 2050 .....	286
Figure 19-9: Historical Lead Treatment Charges.....	292
Figure 20-1: Historical Average Monthly Rainfall.....	294

Figure 20-2: Historical Average Monthly Temperature .....	294
Figure 20-3: Historical Average Monthly Snowfall .....	295
Figure 20-4: ScoZinc Monitoring Locations .....	300
Figure 20-5: Scotia Mine Water Process Flow Chart.....	303
Figure 21-1: Scotia Mine Average C1 Cash Cost.....	323
Figure 21-2: Annual Cash Operating Expenditure .....	323
Figure 21-3: Annual Cash Operating Expenses by Cost Centre .....	324
Figure 21-4: Annual Cash Operating Expenses by Cash Cost Component (LOM).....	324
Figure 21-5: LOM Mine Cash Operating Expenditure .....	326
Figure 21-6: Annual Mine Cash Operating Expenditure .....	326
Figure 21-7: LOM Mill Cash Operating Expenditure .....	328
Figure 21-8: Annual Mill Cash Operating Expenditure .....	328
Figure 21-9: LOM G&A Cash Operating Expenditure.....	329
Figure 21-10: Annual G&A Cash Operating Expenditure .....	330
Figure 21-11: Annual Workforce Levels.....	331
Figure 21-12: Workforce Levels by Cost Centre.....	331
Figure 21-13: Annual Power Distribution .....	333
Figure 21-14: Annual Site Power Costs.....	333
Figure 21-15: Annual Diesel Consumption Costs.....	334
Figure 21-16: Monthly Container Transport Frequency.....	335
Figure 21-17: Annual Container Transport Costs .....	335
Figure 22-1: Project Economics Sensitivity Diagram.....	347
Figure 23-1: Carrolls Farm and Carrolls Corner Prospects .....	349
Figure 24-1: LOM Average Workforce Levels.....	350
Figure 24-2: Ownership and Management Organizational Structure .....	351
Figure 24-3: Annual Average Workforce Levels .....	352
Figure 29-1: Karst Development in Limestone.....	377

## Abbreviations

Abbreviation	Unit or Term
A	Ampere
AA	Atomic absorption
ANFO	Ammonium nitrate fuel oil
Ag	Silver
°C	Degrees Celsius
CCD	Counter-current decantation
COG	Cut-off grade
cfm	Cubic feet per minute
ConfC	Confidence code
CRec	Core recovery
CSS	Closed-side setting
CTW	Calculated true width
CWA	Clean Water Act
°	Degree (degrees)
dia.	Diameter
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
FA	Fire assay
ft	Foot (feet)
ft <sup>2</sup>	Square foot (feet)
ft <sup>3</sup>	Cubic foot (feet)
g	Gram
gal	Gallon
g/L	Gram per litre
g-mol	Gram-mole
gpm	Gallons per minute
g/t	Grams per tonne
ha	Hectares
HDPE	Height Density Polyethylene
HFRA	Healthy Forests Restoration Act
hp	Horsepower
HTW	Horizontal true width
ICP	Inductively coupled plasma
IDW	Inverse distance weighting
IFC	International Finance Corporation
ILS	Intermediate Leach Solution
IRR	Internal Rate of Return
kA	Kiloamperes
km	Kilometer or Kilometre
kV	Kilovolt
kVA	Kilovolt-ampere
kW	Kilowatt
kWh	Kilowatt-hour
kWh/t	Kilowatt-hour per metric tonne
L	Liter or Litre
L/sec	Liters per second
L/sec/m	Liters per second per metre
lb.	Pound
LHD	Long-Haul Dump truck
LLDDP	Linear Low Density Polyethylene Plastic
LOI	Loss on Ignition
LOM	Life-of-Mine
M	Million
MACT	Maximum Achievable Control Technology
MARN	Ministry of the Environment and Natural Resources
MDA	Mine Development Associates
mm	Millimetre

Abbreviation	Unit or Term
MME	Mine & Mill Engineering
MPO	Mine plan of operations
Mt	Million tonnes
MTW	Measured true width
MW	Million watts
MWMP	Meteoritic Water Mobility Procedure
m.y.	Million years
mVA	Megavolt-amperes
NGO	Non-governmental organization
NI 43-101	Canadian National Instrument 43-101
NPV	Net Present Value
OSC	Ontario Securities Commission
%	Percent
Pb	Lead
PFS	Preliminary Feasibility Study or Pre-Feasibility Study
PLC	Programmable Logic Controller
PMF	Probable maximum flood
POD	Plan of Development
ppb	Parts per billion
ppm	Parts per million
QA/QC	Quality Assurance/Quality Control
RC	Reverse circulation drilling
RoM or ROM	Run-of-Mine
ROW	Right-of-way
RQD	Rock Quality Description
SEC	U.S. Securities & Exchange Commission
sec	Second
SG	Specific gravity
SPT	Standard penetration testing
t	Tonne (metric ton) (Equal to 2,204.6 pounds)
T&E	Threatened or endangered
t/h	Tonnes per hour
t/d	Tonnes per day
t/y	Tonnes per year
TSF	Tailings storage facility
TSP	Total suspended particulates
µm	Micron or microns
V	Volts
VFD	Variable frequency drive
W	Watt
WPCP	Water pollution Control Permit
XRD	X-ray diffraction
y	Year
yrs	Years
Zn	Zinc
ZnEq	Zinc Equivalent

# 1 Executive Summary

## Introduction

This Pre-Feasibility Study Technical Report was prepared by SRK Consulting (U.S.), Inc., Terrane Geoscience Inc., Ausenco Engineering Canada Inc., and MineTech International Limited, in accordance with the requirements of National Instrument 43-101 (“NI 43-101”), “Standards of Disclosure for Mineral Projects”, of the Canadian Securities Administrators (“CSA”) for Filing on CSA’s “System for Electronic Document Analysis and Retrieval” (“SEDAR”).

This report discloses the results of a recently completed Mineral Resource Estimate (“2019 MRE”) based on new NI 43-101 Mineral Resources completed in December 2019 and filed on SEDAR on January 31, 2020, entitled, “Mineral Resource Estimation for Scotia Mine, Nova Scotia, Canada”. No additional mineral resource data has been completed since the 2019 MRE.

## Highlights

This 2020 Pre-Feasibility Study (“2020 PFS”) is based on optimization work completed over the past six months, including the 2019 Mineral Resource Estimate which more than doubled the total Measured and Indicated Resource tonnages, equating to a total increase of 105%.

The results of the 2020 PFS indicate a Base Case pre-tax Net Present Value (“NPV”) of \$156 million using a 8% discount rate, with an Internal Rate of Return (“IRR”) of 52% and a post-tax NPV (@8%) of \$115 million, with a post-tax IRR of 49%.

The pre-taxation and post-taxation NPVs for the Base Case with the Project’s expected IRRs are illustrated in the table below, all at a Canadian/US dollar exchange rate of 1.41:1. See Table 1-1.

**Table 1-1: Pre-Feasibility Study Highlights**

Pre-Tax Net Present Value (Discount Rate 8%)	\$156M
Pre-Tax Internal Rate of Return	52%
After-Tax Net Present Value (Discount Rate 8%)	\$115M
After-Tax Internal Rate of Return	49%
EBITDA (Annual Average)	\$17.1M
Payback Period (Years)	2.4
Pre-Production CAPEX (incl \$2.7M contingency & \$1.2M finance)	\$30.8M
Metal Production Zinc (5 Year Annual Average)	35M lbs
Metal Production Lead (5 Year Annual Average)	15M lbs
Zinc Concentrate Grade (LOM Average)	57%
Lead Concentrate Grade (LOM Average)	71%
Processing Throughput Rate (Tonnes Per Day)	2,700
Life of Mine (“LOM”) (Years)	14.25
Ore Reserves Mined (LOM Total)	13.66Mt
Zinc Ore Grade (LOM Average)	2.03% Zn
Lead Ore Grade (LOM Average)	1.10% Pb
Net Revenue After Royalty & Treatment Charges	\$822M



Operating Cash Flow Before Taxes	\$335M
Financing Costs	\$4.6M
C1 Costs Over LOM <sup>1</sup>	US\$0.59/lb
Total Operating Cost (Per tonne Milled LOM)	\$53.72/t
All-In-Sustaining-Cost (ZnEq) <sup>1, 2</sup>	US\$0.60/lb
Zinc Price (LOM Average)	US\$1.19/lb
Lead Price (LOM Average)	US\$0.89/lb
Foreign Exchange Rate (CAD:USD)	0.71

All dollar amounts are expressed in Canadian Dollars unless otherwise noted.

<sup>1</sup> After Lead credits deducted

<sup>2</sup> All-In-Sustaining-Costs ("AISC") are C1 Costs plus Sustaining Capital and Financing Costs

This 2020 PFS indicates an average annual production of approximately 33,313 tonnes of zinc concentrate and 10,189 tonnes of lead concentrate, containing approximately 35 million pounds of zinc and 15 million pounds of lead per 12-month period over the life of the mine.

Average annual earnings before interest, taxes, depreciation and amortization ("EBITDA") are \$17.1 million per year and cumulative EBITDA earnings of \$360 million over a mine life of 14 years, using Base Case metal price forecasts of US\$1.16 per pound for zinc and US\$0.83 per pound for lead in Year 1 on average.

Pre-production Capital Costs, including refurbishment and upgrades to the processing plant, pre-commercial production costs and mining pre-stripping costs are estimated at \$30.8 million, including \$2.7 million contingency and \$1.2 million finance costs, with a payback of 29 months (2.4 years) from commercial production.

ScoZinc has determined that a number of project execution phases are required for a successful commencement of sustained commercial production, namely, a procurement phase, pre-commercial production phase, and a commercial production phase.

Due to ScoZinc's existing Environmental Assessment Approvals and Industrial Approvals, and high-level care and maintenance status, the Scotia Mine has a relatively short time frame to commercial production of between 9 to 12 months under these existing Approvals. As such, the Scotia Mine is considered a near-term producer.

## Location, Ownership and History

The Scotia Mine deposit (“the Property” or “Project”) is located approximately 62 kilometres northeast of Halifax city centre in the community of Gays River in the Halifax Regional Municipality (“HRM”). The Property’s general location is 45°02’ North, 63°21’ West. Year-round access to the Project is by paved highway roads and is approximately 15 kilometres off the Nova Scotia provincial highway along Route #224. The Halifax International Airport is located 33 kilometres southwest of the mine site. The total Property (or Project) consists of 648 hectares of mineral rights in the form of three contiguous mineral leases, including land with exploration potential for zinc and lead mineralization. ScoZinc also owns real estate property of 712.5 hectares, which includes the mineral leases and adjoining areas.

The Property lies in a rural-residential area of central Nova Scotia that is typified by rolling topography and abundant surface water.

The climate is variable because of mixed continent and maritime weather patterns. Updated mean annual temperature is 6.2°C, mean annual precipitation is 1,363 mm, and yearly evapo-transpiration is estimated to be 560 mm. The relatively mild climate (for Canada) permits year-round operations.

The main zone of the Scotia Mine was discovered in 1973 by the Imperial Oil Enterprises (“Esso”)/Cuvier Mines joint venture. Esso initiated mine development in 1978 and commissioned the mill in 1979 to produce 554,000 tonnes of over a 3-year period at grades of 2.1% Zinc and 1.4% Lead. The mine closed in 1982 due to ground water inflow and operating losses caused by low metal prices. Seabright Resources Inc. acquired the mine and mill in 1984 and processed gold in 1985. Western Mining Corporation acquired Seabright in 1988 and mined in 1990 a total of 187,000 tonnes over a fifteen-month period with average grades of 7.47% Zinc and 3.50% Lead. In 1991, production was suspended again due to groundwater inflow and economic considerations. Savage Resources Canada Limited acquired the mine in 1997, but were taken over by Pasminco Resources Canada Company (“Pasminco”), after which Regal Mines Limited purchased Pasminco in 2002 but then sold to OntZinc Corporation leaving a 2% NSR Royalty to Pasminco. OntZinc became HudBay Minerals Inc. and sold the Scotia Mine to Acadian Gold Corp. (“Acadian”), in 2006, for \$7 million. Acadian commenced mining and processing during 2007 and 2008, but placed the mine on care-and-maintenance due to high operating costs and depressed metal prices.

In February 2011, Selwyn Resources Limited (“Selwyn”) purchased ScoZinc Limited and all of its assets, including the Scotia Mine and ScoZinc’s exploration claims, for \$10 million less a deduction relating to increased reclamation bonding requirements that were being determined at the time of the acquisition. Selwyn changed its name to ScoZinc Mining Ltd., and owns 100% of the ScoZinc Limited subsidiary, which, in turn holds the mineral rights to the Main and Getty Zones, the mining rights and surface rights (real property rights) for the Scotia Mine deposit and an Environmental Assessment (“EA”) (environmental registration) for the Scotia Mine.

ScoZinc currently holds five exploration licenses covering 41 claims in the immediate vicinity of the Scotia Mine Deposit. Each individual claim covers an area of approximately forty acres (16.2 hectares). In total, the 41 claims cover approximately 664 hectares (1,641 acres). These licenses are located along strike from the Scotia Mine Deposit and include favourable host rocks similar to those at the mine site.

## Geology and Mineralization

The Property is underlain by basement rocks of the Cambro-Ordovician Meguma Group which had significant local topographic relief due to rift faulting and erosion. Locally, a veneer of Horton Group, red-brown conglomerate and sandstone mark the base of the unconformably overlying Lower Carboniferous rocks which host the Main and Getty Zones.

In areas where the basement rocks formed islands in the Carboniferous Sea, coral reefs formed along the shores. These carbonate rocks are the Gays River Formation. The Mac Cumber Formation is time-equivalent to the Gays River Formation. The Mac Cumber and Gays River Formations are overlain by evaporites of the Carrolls Corner and Stewiacke Formations.

The Scotia Mine Deposit consists of three main zones of mineralization referred to as the Main (formerly Gays River deposit), Getty and Northeast Zones. The Main zone lies along the southside of the Gays River main branch, immediately east of the confluence with the Gays River south branch. The Getty zone lies just northwest of the Main and North-East zones on the western side of Gays River. The two zones are separated by less than one kilometre.

The Gays River Formation mineralization has long been considered a Mississippi Valley-type lead-zinc deposit. This type of deposit is carbonate-hosted, classified as a typical open space filling type, and hosted in a dolomitized limestone. The limestone developed as a carbonate build-up on an irregular pre-Carboniferous basement topographic high where conditions allowed for growth of reef-building organisms.

The zinc-lead bearing Gays River Formation trends in an east-north east direction across the Property. Locally, the mineralization dips up to 45° on average, and up to vertical in places, to the north-northwest which is the depositional slope of the front of the Gays River reef unit. The dip tends to be horizontal in the back reef area (south of the main trend). The mineralization is present as sphalerite and galena and grades from massive Pb-Zn mineralized material in the fore reef to finely disseminated, lower grade material in the back reef. In the mine area, the Gays River Formation is overlain either by the evaporites of the Carrolls Corner Formation and/or overburden.

## Exploration and Data Management

The Scotia Mine has extensive diamond drilling and blast-hole drilling on a large portion of its mining leases and associated exploration licences. A total of 1,831 holes or 121,870 metres has been drilled to date. All of the data from these holes has been included in this Pre-Feasibility Study and the 2019 mineral resource estimation by SRK (the “2019 MRE”).

## Royalties

For the Scotia Deposit, ScoZinc owns the real property covering all the defined mineral resources on the mining leases, so no royalty to any landowner is applicable. However, there is a small 25-acre portion on ScoZinc’s real property that is subject to a sand, gravel and fill royalty of \$1.00 per metric tonne to Gallant Aggregates. This royalty does not impact the Scotia Mine’s Pre-Feasibility Study.

For the Getty deposit, ScoZinc has a 1% royalty with Globex Resources Ltd. (“Globex”), which provides Globex with a 1% Gross Metal Royalty (“GMR”) interest in the associated claims. Agreement terms also

allows ScoZinc to purchase 50% of the GMR for \$300,000. ScoZinc's Life of Mine plan indicates that such a royalty would only be applicable in the last few years of the 14-year mine life.

Nova Scotia provincial royalty of 2% also applies on all net revenue generated from the Project.

### **Mineral Resource Estimate**

SRK reviewed the sampling results and verified that the sample types and density are adequate for estimating Mineral Resources. The sampling results are representative of the mineralization. The available information and sample density allow an estimate to be made of the size, tonnage and grade of the mineralization in accordance with the level of confidence established by the Mineral Resource categories in the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Standards.

Mineral Resource estimation was completed for the Scotia Mine Deposit, including the Main, Getty and Northeast Zones. Geological modeling and mineral resource estimation were conducted using GEMS™ modeling software (Version 6.8.2). Drilling and sampling information from programs completed up to 2012 have been incorporated into the geological model and mineral resource estimation. No drilling has occurred on the property since 2012.

Mineral resources for the Scotia Mine Deposit have been classified as Measured, Indicated and Inferred categories based on CIM Definition Standards in accordance with NI 43-101 reporting guidelines. The initial classification criteria consider a combination of geometric criteria (based on overall drill hole spacing), and estimation quality criteria.

- Measured blocks require a minimum of three holes within 20 metres radii, nominally corresponding to a maximum drillhole spacing of 28 metres. The mean distance to the nearest three holes is 12.5 metres.
- Indicated blocks require a minimum of three holes within 50m radii, with a nominal maximum spacing of 70 metres. The mean distance to the nearest three holes is 30 metres.
- Inferred – all other blocks estimated in the mineralized zone.

Mineral resources are reported with respect to cut-off values calculated using the assumed processing costs and recoveries, and metal prices. The resource is also constrained by an optimized (Whittle™) pit shell, which is based on optimistic metal prices, in order to demonstrate that the defined resources have reasonable prospects of eventual economic extraction, which is a CIM Definition Standards criterion. All classification categories (Measured, Indicated and Inferred) were considered in the resource pit optimization.

The Scotia Mine Deposit mineral resource summary statement is provided in Table 1-2: Scotia Mine Resource Statement, December 14, 2019 – SRK Consulting (U.S.), Inc., with an effective date of December 14, 2019.

**Table 1-2: Scotia Mine Resource Statement, Decemeber 14, 2019 – SRK Consulting (U.S.), Inc.**

Classification	Zone	Mass (kt)	Zn (%)	Pb (%)	ZnEq (%)
<b>Measured</b>	Getty	60	1.38	1.25	2.58
	Main	4,130	2.57	1.30	3.81
	North East	130	3.18	1.88	4.98
	<b>Total</b>	<b>4,320</b>	<b>2.57</b>	<b>1.32</b>	<b>3.83</b>
<b>Indicated</b>	Getty	8,090	1.24	0.81	2.02
	Getty South	840	1.58	0.25	1.82
	Main	9,870	1.92	1.01	2.89
	North East	2,330	2.88	1.15	3.98
	<b>Total</b>	<b>21,130</b>	<b>1.75</b>	<b>0.92</b>	<b>2.64</b>
<b>Measured and Indicated</b>	Getty	8,150	1.24	0.82	2.03
	Getty South	840	1.58	0.25	1.82
	Main	14,000	2.11	1.09	3.16
	North East	2,460	2.89	1.19	4.04
	<b>Total</b>	<b>25,450</b>	<b>1.89</b>	<b>0.99</b>	<b>2.84</b>
<b>Inferred</b>	Getty	950	1.35	0.54	1.87
	Getty South	770	1.53	0.25	1.77
	Main	2,980	1.49	0.79	2.25
	North East	310	2.01	0.74	2.72
	<b>Total</b>	<b>5,010</b>	<b>1.50</b>	<b>0.66</b>	<b>2.13</b>

Source: SRK, 2019

- Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that any part of the Mineral Resources estimated will be converted into Mineral Reserves;
- Open-pit resources stated as contained within a potentially economically minable open-pit; pit optimization was based on assumed prices for zinc of US\$1.35/lb, and for lead of US\$1.14/lb, a Zn recovery of 86% and a Pb recovery of 93%, mining and processing costs varying by zone, and pit slopes of 45 degrees in rock and 22 degrees in overburden;
- Open-pit resources are reported based on a Zinc Equivalent (ZnEq) cut-off grade of 0.90%. The ZnEq grade incorporates Zn and Pb sales costs of US\$0.19/lb and US\$0.11/lb respectively, and a 2% royalty charge; and
- Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding.

### Mineral Reserve Estimate

The Scotia Mine Measured and Indicated Mineral Resource, calculated by SRK and dated December 2019, was converted into a Mineral Reserve estimate.

The Scotia Mine Mineral Reserve Estimates are classified as either Proven Reserves or Probable Reserves and are provided in the Table 1-3 overleaf.

Total diluted Mineral Reserves are 13.66 million tonnes with a Zinc Equivalent grade of 3.09 percent.

**Table 1-3: Scotia Mine Mineral Reserve Estimates**

Mineral Zone	Classification	Tonnage (t)	Zinc Grade (%)	Lead Grade (%)	Zinc Equivalent Grade (%)
Scotia Mine	Proven	3,370,000	2.46	1.21	3.62
Scotia Mine	Probable	10,290,000	1.88	1.07	2.91
Scotia Mine	Total	13,660,000	2.03	1.10	3.09

Notes: 2020 Mineral Reserves are as of 01 May 2020 and based on a design cut-off grade of 1.5% ZnEq grade. Cut-off grades are based on a Zinc metal price of US\$1.10/lb, recovery of 89%, a Lead metal price of US\$0.95/lb, and mining recovery of 92%. Average unplanned dilution and mining recovery factors of 12% and 92%, respectively, are assumed.

The conversion of Measured and Indicated Mineral Resources to Proven and Probable Mineral Reserves is shown for the Scotia Mine deposit in Table 1-4.

**Table 1-4: Conversion of Mineral Resources to Mineral Reserves**

Scotia Mine	Mineral Resources			Mineral Reserves			Conversion Factor <sup>1</sup>		
	Measured	Indicated	Total	Proven	Probable	Total	Measured/Proven	Indicated/Probable	Total
Tonnage (Mt)	4.32	21.13	25.45	3.37	10.29	13.66	78	49	54
Zinc Grade (%)	2.57	1.75	1.89	2.46	1.88	2.03	52	75	57
Lead Grade (%)	1.32	0.92	0.99	1.21	1.07	1.10	57	71	60

Note 1: Metal conversion factors reflect total metal content.

## Mining

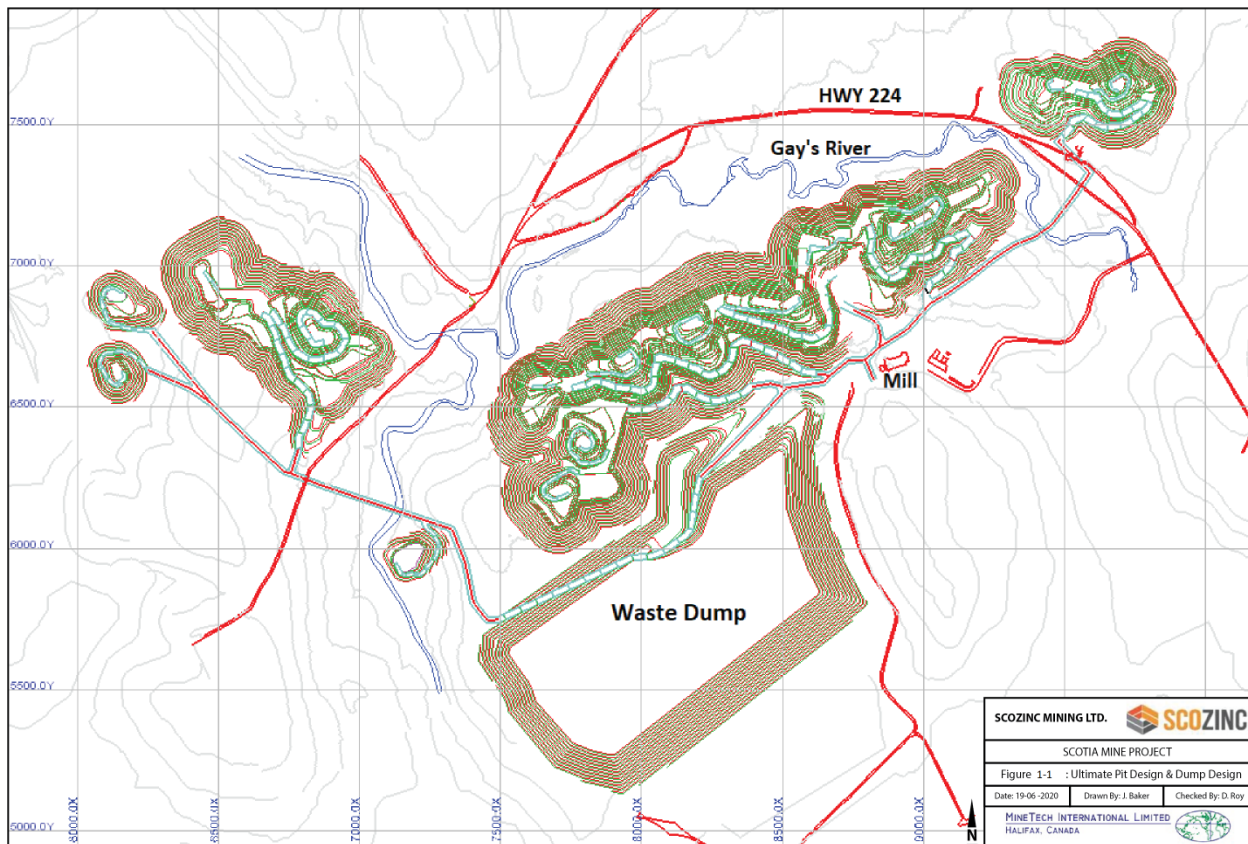
The Scotia Mine deposit covers a total strike length of approximately 4 kilometres, with some surface constraints in between, and a vertical distance of approximately 120 metres. All mining is from open-pit operations with an expected mine life of approximately 14 years. Mining operations will be conducted utilizing 4 shifts, 12 hours each shift, covering 24 hours per day. The 4 shifts will be on a 4-days on, 4-days off, 4-nights on, 4-nights off rotation.

The Scotia Mine mineral resources will be extracted using conventional load and haul (truck & shovel) mining methods as determined by optimized pit designs and life-of-mine schedules. Mining operations will be completed using an owner/operator fleet of excavators, loaders, haul trucks and ancillary support equipment as well as some rental equipment. Equipment requirements have been determined based upon required production rates and haulage cycles using equipment specifications provided by local authorized equipment suppliers and manufacturers.

The open-pits will be mined on 5-metre-high benches with double benching being utilized on the lower benches which are primarily comprised of hard rock. Drilling and blasting are only required for 40 percent of the total material mined over the life of mine plan, which accounts for all of the hard rock to be mined from the pits. The remaining 60 percent is largely comprised of overburden and has been proved to be free digging material based on past operations and will not require blasting. Drilling and blasting will be performed using contract services.

The ultimate open-pit and waste dump design is shown in Figure 1-1.

**Figure 1-1: Ultimate Pit and Waste Dump Design**



Source: MineTech, 2020.

The Ultimate Pit Design was divided into 6 phases to optimize development sequences and production requirements. Waste has been subdivided into overburden, gypsum, and carbonate waste rock. Inferred resource material inside the Ultimate Pit Design has been included as carbonate waste rock and totals approximately 1,450,000 tonnes at 1.5% Zn and 0.7% Pb. Waste storage will consist of a combination of backfilling the mined pits and stockpiling in the waste dump. Using the Ultimate Pit Design and the pit phase sequencing, a Life-Of-Mine (“LOM”) mining schedule was developed by month and is based on operating 24 hours/day, 365 days/year. The LOM production schedule is based on providing a mill feed of approximately 1 million tonnes per annum at an average grade of 2.03% Zinc and 1.10% Lead, which has a zinc equivalent grade of 3.09%.

The water table at the Scotia Mine is divided into two horizons: the overburden horizon and the bedrock horizon. ScoZinc plans to utilize 60 geotechnical depressurizing pumping wells, in conjunction with in-pit pumping via submersible sump pumps, to dewater the overburden horizon. The bedrock horizon will be dewatered using the existing deep well infrastructure in conjunction with in-pit temporary wells that access the underground workings. Horizontal wells will also be utilized in the karst gypsum to deal with the localized trapped water and will be allowed to drain into strategically placed in pit sumps which will then be pumped to the tailings storage facility (“TSF”). All in pit water will be pumped to the TSF. Water from the 60 depressurizing pit perimeter wells will be discharged into either a reservoir or the Gays River, however most

of this water will be used as processing water in the mill. A similar setup will be utilized in the North East and Getty pits.

### Metallurgy and Mineral Processing

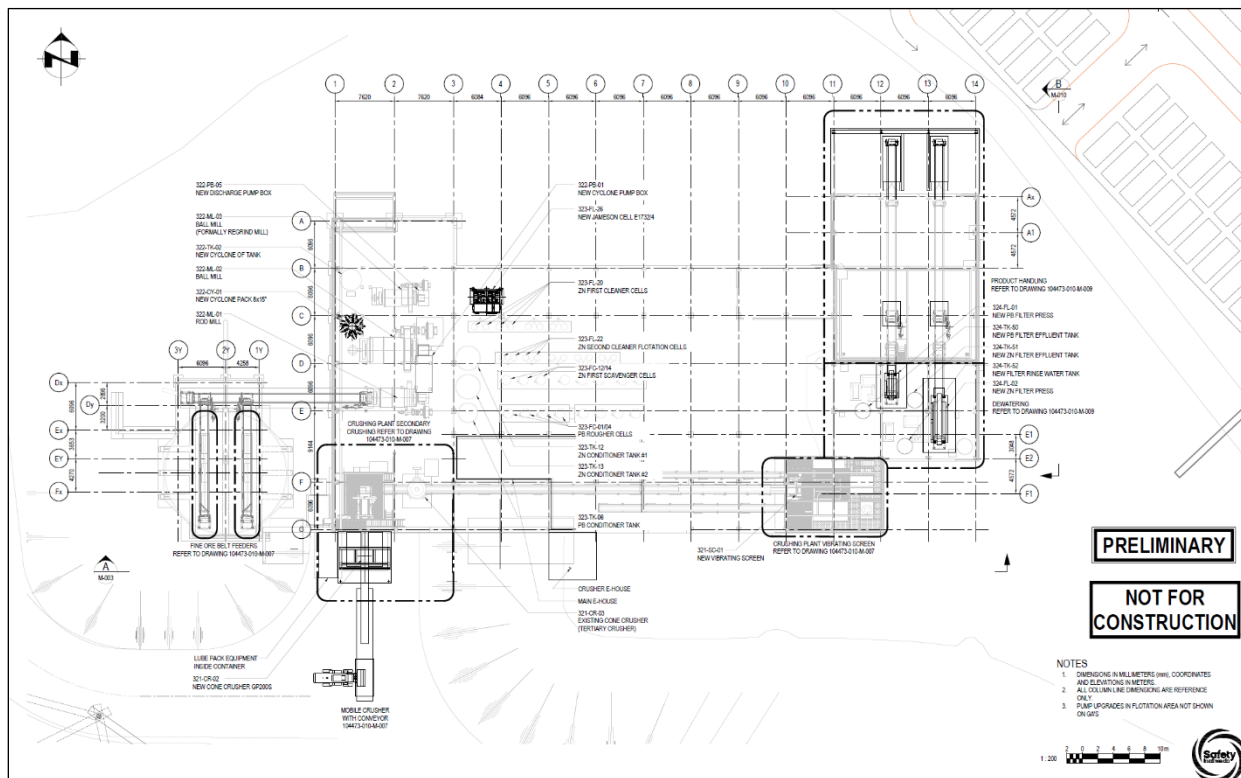
Metallurgical data from past production data and more recent metallurgical test work is available on the carbonate hosted zinc-lead deposit. The combined data shows that the zinc and lead minerals liberate well from the host rock, resulting in relatively high metal recoveries and concentrate grades. The simple mineralogy and metallurgy present the opportunity to consistently achieve high recoveries and concentrate grades over the life of mine plan.

The process design criteria, based on historical data and plant design improvements, include overall average zinc concentrate grades of 57% with an average 86.6% recovery, and the overall average lead concentrate grade of 71% with an average 89.1% recovery. Due to the carbonate hosted deposit, the zinc and lead concentrates have very low levels of impurities or deleterious minerals, resulting in the ScoZinc concentrates to be proven to be a clean, high-ranking concentrate.

The ScoZinc concentrator plant (or Mill) was last operated in 2009 at 2,200 tonnes per day from the original name plate design of 1,500 tonnes per day using conventional crushing, grinding flotation, concentrate dewatering/drying, and rehandling loadout. After extensively reviewing all past production and incomplete engineering work, new final design work as part of the Pre-Feasibility Study has confirmed that with relatively minor upgrades to the comminution, flotation and dewatering circuits, the plant can consistently operate at 2,700 tonnes per day without major capital expansion.

The new overall plant layout is provided in the following figure.

**Figure 1-2: Overall Plant Layout**



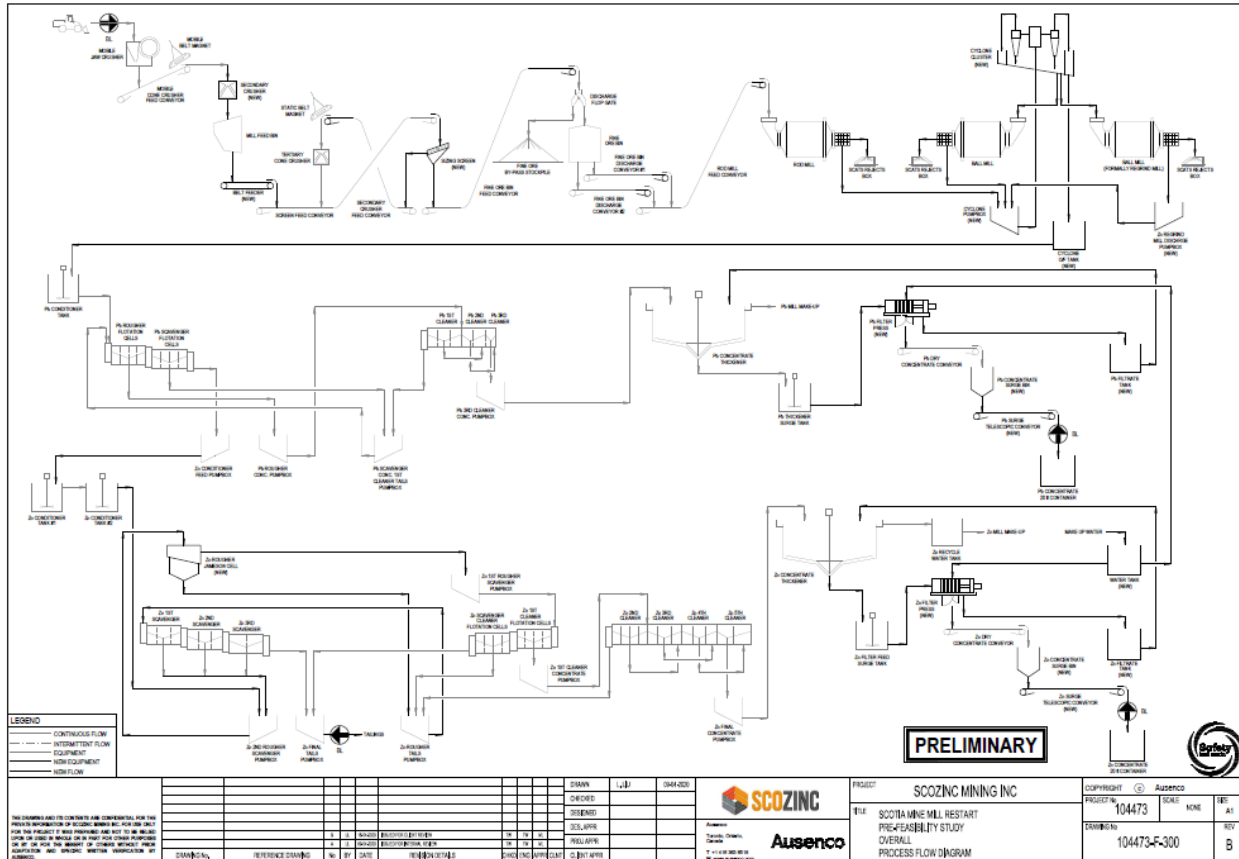
Source: Ausenco, 2020.



During the pre-commercial production phase, ScoZinc intends to complete the plant upgrades including the installation of new primary and secondary crushers, reconfiguration of the grinding circuit, addition of Jameson cells, installation of filter presses for concentrate dewatering, and the installation of an efficient direct concentrate container loading, handling and transport system.

The new plant flow diagram is provided in the figure directly below.

Figure 1-3: Plant Flow Diagram



Source: Ausenco, 2020.

**Site Infrastructure**

The Scotia Mine is conveniently located 33 kilometres from Halifax’s International Stanfield Airport (YHZ) in Nova Scotia with excellent infrastructure in place including processing facilities, waste dumps, a tailings pond, grid-power, all-season port terminal access, and all-season highways. Building infrastructure in place has an area of approximately 131,585 square feet. The mine site infrastructure is well established, as it has been on high level care & maintenance since 2009. ScoZinc equipment and spare parts asset inventory is assessed at approximately \$5.3 million.

As the Scotia Mine is fully permitted for operations, relatively minor upgrades and improvements to the mining and processing facilities to enable the operation to commence commercial production within a relatively short time frame of months. ScoZinc intends to expand the existing operations with the additions of ROM based primary and secondary crushers, a container handling yard, mobile fleet fuel bay and

additional mobile fleet maintenance workshop. Some of these opportunities require permitting and have been included in the Pre-Feasibility Study by way of temporary additions until permanent permitting can be provided. All mining and maintenance operations will be conducted by ScoZinc.

Electrical grid power systems are currently onsite with transformers and major motor control centres in place. Some of these systems will be replaced during the pre-production phases in order to ensure performance and reliability during commercial production.

Water for mineral processing is provided from pit perimeter wells designed to un-saturate the pit slopes and to provide clean water to the plant for optimal water quality. Water may also be sourced from the tailings pond. Additional water is sourced from the nearby Gays River and treated for potable water site needs and fire suppression.

The Tailings Storage Facility ("TSF") is permitted with 8 million tonnes of capacity. ScoZinc intends to either seek approval to expand the capacity by 6 million tonnes or use in-pit tailings disposal into its completed pits in approximately year 6 of the life of mine.

### **Site Access**

The Scotia Mine is located adjacent to sealed Highway 224, with a permanent 900 metre access road providing all season access to the operation. The Mine is located in the Halifax Regional Municipality, which is approximately 62 kilometres to downtown Halifax. Due to its convenient location and quality of potential personnel, ScoZinc expects most of its workforce will be sourced from the region.

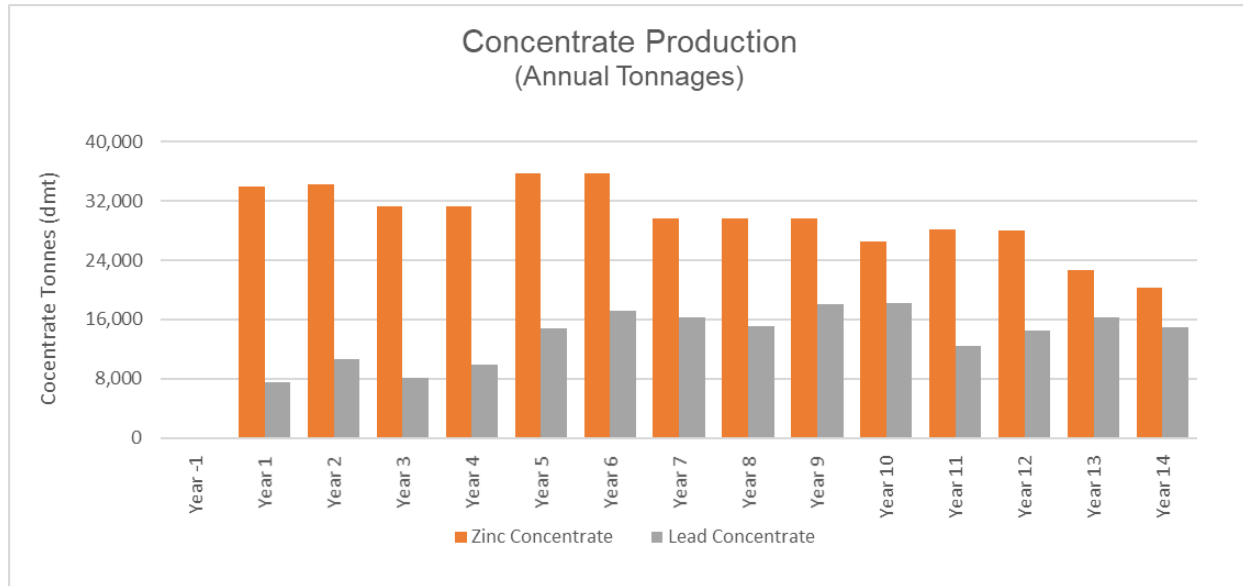
The transport and handling of freight and concentrate is possible year-round due to ScoZinc's location on an unrestricted highway. The Scotia Mine is also located near a Canadian National Railway line siding, the Nova Scotia provincial highway (102), deep-water ports and container handling terminals, and the Trans-Canadian National Highway.

### **Concentrate Marketing**

The Scotia Mine's carbonate-hosted orebody will produce high-quality zinc and lead concentrates through its 2,700 tonnes per day processing plant on the mine site. The concentrates will be loaded directly into lined 20' shipping containers, which will be sampled, sealed and weighed on site. ScoZinc personnel will transport the containers by all season highway to either the Fairview Cove Container Terminal or a nearby Canadian National Railway siding. The Scotia Mine's concentrate container handling system will avoid excessive costs and risks associated with rehandling, contamination, concentrate losses and excessive moisture build up employed historically.

ScoZinc has an initial offtake agreement by way of a Memorandum of Understanding, dated 3rd April 2018, with MRI Trading AG, for the Scotia Mine's lead and zinc concentrates for approximately 10 years of the 14-year mine life. The agreement provides competitive terms for 333,000 wet metric tonnes of zinc concentrate and 133,000 of lead concentrate from the Scotia Mine. ScoZinc expects to establish firm concentrate purchase contracts with one or more metal trading companies under terms consistent with the current market terms. ScoZinc is engaged in negotiations with a number of offtakers but has not yet finalized an arrangement due to the preparation of this Pre-Feasibility Study which represents a significant change from ScoZinc's recent Preliminary Economic Assessment.

**Figure 1-4: Scotia Mine Concentrate Production**



ScoZinc has also completed significant market studies to forecast commodity pricing, treatment charges, payables and penalties. Commodity pricing has been forecast for zinc to be an average of US\$1.16/lb in the first year of production to \$1.20/lb over the long-term, and for lead an average of US\$0.83/lb in the first year of production to \$0.90/lb over the long-term. Although treatment charges have begun to decline recently, ScoZinc has assumed that a gradual escalation will occur over the medium to longer term at US\$245/dmt to US\$275/dmt for zinc (by Year 3), with a decline to US\$250 for the remainder of the Mine Life and US\$175/dmt (Year 1 and Year 2) to US\$185/dmt (Year 3) and for the remainder of the Mine Life, for lead respectively.

**Permitting, Environmental and Community**

The Scotia Mine is an existing operation on high-level Care & Maintenance with substantial environmental databases, operating history, and valid permits and licenses that allow for the mining, processing of resources, and the shipping of zinc and lead concentrates.

Environmental responsibility and stewardship have been and continue to be a priority to ScoZinc. To that end, there are extensive monitoring programs at the Scotia Mine including but not limited to: Surface Water quality, Groundwater quality, Wetland, Wildlife and Vegetation. These programs have continued throughout Care & Maintenance and will be implemented for operations.

Roughly half of the mineral resources used in this economic analysis are already under permit and mining of those resources (Main Zone, Southwest Expansion) can begin immediately.

Another important aspect of the Project status with respect to permits, environment and community is that regulators and the community have experience with the Project and environmental baseline conditions are already well understood. In combination, these factors limit the overall permitting risk and anticipated timelines for permitting project expansions to include the entire mineral resource used in this analysis.

The current permitting table is provided overleaf.

Table 1-5: ScoZinc Permits and Approvals

SCOZINC PERMITS & APPROVALS						
COMMON NAME	NUMBER (if applic.)	FUNCTION	GRANTING AUTHORITY	STATUS	DATE GRANTED	EXPIRY
Environmental Assessment Approval - Main Mine Area	N/A	Environmental Review	Nova Scotia Environment (Then NS Dept. of Environment & Labour)	Approval in effect	2000-08-14	No Expiry
Environmental Assessment Approval - Southwest Expansion	N/A	Environmental Review	Nova Scotia Environment	Approval in effect	2011-10-07	2020-10-07* *date by which project (i.e. the project within the SW Expansion Area) commencement is required
Industrial Approval - ScoZinc Scotia Mine	2006-055136-05	Operating Permit - Scotia Mine	Nova Scotia Environment	Approval in effect	2017-02-23	2027-02-23
Industrial Approval - Sheet Harbour Bulk Solids Handling Facility	2007-057986-04	Operating Permit - Sheet Harbour Bulk Solids Handling Facility	Nova Scotia Environment	Approval in effect	2017-11-01	2027-11-01
Mineral Lease 10-1	10-1	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2010-04-02	2030-04-02
Mineral Lease 12-1	12-1, ("40058" in NovaROC system)	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2013-10-02	2033-10-02
Mineral Lease 12-2	12-2, ("40059" in NovaROC system)	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2013-10-02	2033-10-02

In addition, the risks and potential costs associated with environmental and community issues are well understood and based on operating experience and history of the mine. As such, the financial information for environment and community matters that are input into the financial model are considered accurate to a feasibility level.

## Project Economic Metrics

The economic results of the Pre-Feasibility Study are provided in the summary economics results table below:

**Table 1-6: Economic Results Summary**

<b>Mine and Mill Parameters</b>						
Total ore mined (million tonnes)	13.66	Milling rate (tonnes per day)	2,700			
Mining rate (tonnes per day)	33,000	Zinc concentrate (tonnes per year) 5Yr avg	33,313			
Life of Mine (years)	14.25	Lead concentrate (tonnes per year) 5Yr avg	10,189			
<b>Life of Mine Statistics</b>						
Metal Production	Ore Grade (First 5 Years)	Ore Grade (LOM)	Concentrate Grade	Recoveries (LOM)	Annual Metal Production (5Yr avg)	Metal Payability
Zinc	2.25%	2.03%	57%	86%	35M lbs <sup>1</sup>	85%
Lead	0.82%	1.10%	71%	89%	15M lbs <sup>1</sup>	95%
<b>Project Assumptions Base Case</b>						
Zinc price (Year 1 avg)	US\$1.16/lb	All proven and probable mineral reserves				
Zinc price (LOM avg)	US\$1.19/lb	Exchange Rate (USD:CAD)				0.71
Lead price (Year 1 avg)	US\$0.83/lb	Discount Rate (base-case)				8%
Lead price (LOM avg)	US\$0.89/lb	Discount Rate (alternative)				5%
<b>Operating and Capital Costs</b>						
Operating Costs <sup>2</sup>	LOM	Capital Costs				LOM
Mining	\$1.81/t mined	Pre-production Capital Expenditure				\$28.1M
Mining	\$20.26/t milled	Contingency				\$2.7M
Processing	\$11.29/t milled	Total				\$30.8M
G&A	\$2.27/t milled	Working Capital (including Ownership Costs)				\$5.0M
TC & Freight <sup>3</sup>	\$19.89/t milled	Sustaining Capital				\$12.8M
Total	\$53.72/t milled	C1 Cash Cost <sup>4</sup>				US\$0.59/lb
Note 1: Metals contained in both lead and zinc concentrates						
Note 2: Includes concentrate trucking, port and ocean shipping charges						
Note 3: Includes all treatment charges and royalties						
Note 4: After lead credits deducted						
<b>Economic Results</b>					<b>Pre-Tax</b>	<b>Post-Tax</b>
Net Present Value @ 8% discount rate					\$156.4M	\$114.5M
Net Present Value @ 5% discount rate					\$205.8M	\$150.4M
Internal Rate of Return					52.3%	48.6%
Ownership/ Financing Costs					\$4.6M	
Payback Period (from First Revenue)					2.4 years	
Average Annual EBITDA					\$17.1M	

Rounding note: Rounding of numbers may influence statistic totals.

### Capital and Operating Expenditure

The capital expenditure (pre-production) determined to advance the Scotia Mine to commercial production within 9 to 12 months of Project financing are estimated to be \$28.1 million, excluding contingency of \$2.7 million. The Payback period for the capital is estimated at 2.4 years, including financing costs and contingencies.

The pre-production capital expenditure estimates for the Scotia Mine are provided in the following summary table:

**Table 1-7: Capital Expenditure Summary**

<b>Expenditure</b>	<b>Year -1</b>
Mining pre-stripping	\$8.1M
Mining capital costs	\$1.5M
Mill refurbishment	\$3.8M
Mill capital costs	\$8.5M
G&A equipment	\$1.1M
G&A capital costs	\$1.0M
Direct & Indirect capital costs	\$2.9M
Ownership costs	\$1.2M
<b>Sub-Total</b>	<b>\$28.1M</b>
Contingency	\$2.7M
<b>Total</b>	<b>\$30.8M</b>

Rounding note: Rounding of numbers may influence statistic totals

The operating expenditure estimates for the Scotia Mine are provided in the following summary table:

**Table 1-8: Operating Expenditure Summary**

<b>Major Cost Centre</b>	<b>Life of Mine Total cost</b>	<b>Life of Mine Unit cost</b>
Mining	\$276.7M	\$20.26
Processing	\$154.1M	\$11.29
SG&A	\$31.0M	\$2.27
TC & Freight	\$271.6M	\$19.89
<b>Total</b>	<b>\$733.4M</b>	<b>\$53.72/t milled</b>
	<b>C1 Cash Cost</b>	<b>US\$0.59/lb</b>

Rounding note: Rounding of numbers may influence statistic totals

## Economic Analysis

The Base Case economic model has been developed using both short-term metal price assumptions of US\$1.16/lb zinc, US\$0.88/lb lead, plus and long-term metal price assumptions of US\$1.20/lb zinc, US\$0.90/lb lead. Year 1 metal pricing averages US\$1.16/lb zinc and US\$0.83/lb lead. Year 2 metal pricing is on average US\$1.17/lb for zinc and US\$0.81/lb for lead. Year 3 metal pricing is on average US\$1.19/lb for zinc and US\$0.88/lb for lead. The short-term metal pricing is based on present market conditions anticipated for the first few years of production which naturally reduces the potential earnings of the Project, however ScoZinc is of the view that this approach represents a realistic approach since the Scotia Mine has the potential of commercial production within the short-term. Longer term metal price assumptions are US\$1.20/lb for zinc and US\$0.90/lb for lead.

The metal price assumptions used in this study are based on market consensus for the long-term prices of zinc and lead, including Sell-Side Mining Research, published by different investment banks, in Canada and internationally, and studies by independent consultants such as Wood Mackenzie Ltd., Fastmarkets MB, S&P Global Market Intelligence and Open Mineral AG, among others, as discussed on Section 19.

The Project's sensitivities to metal prices and foreign exchange rates are provided below.

**Table 1-9: Metal Price Sensitivities Analysis**

Zinc/ Lead Price US\$/lb	NPV Pre-Tax		NPV After-Tax		IRR		Payback Period	Average Annual EBITDA
	8% discount	5% discount	8% discount	5% discount	Pre- Tax	After- Tax		
0.95/0.75	\$45M	\$67M	\$35M	\$53M	20.9%	19.9%	5.3yrs	\$7.3M
1.00/0.80	\$72M	\$101M	\$55M	\$77M	28.8%	26.9%	4.8yrs	\$9.7M
1.05/0.85	\$100M	\$136M	\$75M	\$101M	36.8%	34.3%	4.0yrs	\$12.1M
<b>Base Case</b>	<b>\$156M</b>	<b>\$206M</b>	<b>\$115M</b>	<b>\$150M</b>	<b>52.3%</b>	<b>48.6%</b>	<b>2.4yrs</b>	<b>\$17.1M</b>
1.20/0.90	\$162M	\$212M	\$119M	\$155M	57.1%	53.1%	1.9yrs	\$17.5M
1.25/0.95	\$190M	\$246M	\$138M	\$179M	66.1%	61.1%	1.7yrs	\$19.9M
1.30/1.00	\$217M	\$280M	\$157M	\$202M	75.3%	69.1%	1.4yrs	\$22.3M

\*Scotia Mine Base Case: Year 1 average (US\$1.16/lb Zn, US\$0.83/lb Pb), LOM average (US\$1.19/lb Zn, US\$0.89/lb Pb)

**Table 1-10: Exchange Rate Sensitivities Analysis**

Exchange Rate CAD: USD	NPV Pre-Tax		NPV After-Tax		IRR		Payback Period	Average Annual EBITDA
	8% discount	5% discount	8% discount	5% discount	Pre- Tax	After- Tax		
0.55	\$295M	\$377M	\$211M	\$269M	96.8%	86.7%	1.2yrs	\$29.3M
0.60	\$244M	\$314M	\$176M	\$226M	79.7%	72.8%	1.4yrs	\$24.8M
0.65	\$200M	\$260M	\$145M	\$188M	65.8%	60.7%	1.8yrs	\$20.1M
<b>0.71*</b>	<b>\$156M</b>	<b>\$206M</b>	<b>\$115M</b>	<b>\$150M</b>	<b>52.3%</b>	<b>48.6%</b>	<b>2.4yrs</b>	<b>\$17.1M</b>
0.75	\$131M	\$174M	\$97M	\$128M	44.8%	41.6%	3.1yrs	\$14.9M
0.80	\$103M	\$139M	\$77M	\$104M	36.7%	34.1%	4.0yrs	\$12.5M
0.85	\$78M	\$109M	\$59M	\$82M	29.7%	27.7%	4.8yrs	\$10.3M

\*Scotia Mine Base Case

**Workforce**

During full-scale operations the Scotia Mine will employ an average of 148 people, with a peak of 165 full time personnel. The majority of the workforce will be scheduled to work on two 12-hour shifts, 365-days per year. Four roster teams are planned to operate on this basis across all operations departments. Administrative staff will work Monday to Friday, for a minimum of 10 hours per day.

It is expected that the majority of personnel will be sourced from the Halifax Regional Municipality (“HRM”) and reside within a short commute of the Scotia Mine.

**Project Execution**

ScoZinc has determined that a number of project execution phases are required for a successful commencement of commercial production, namely, a procurement phase, pre-commercial production phase, and a commercial production phase. Due to ScoZinc’s existing Environmental Assessment Approvals and Industrial Approvals, and high-level care and maintenance status, the Scotia Mine has however a relatively short time frame to commercial production of between 9 to 12 months under the existing Approvals. As such, the Scotia Mine is considered a near-term producer.

**Conclusions**

As part of the PFS’s interpretations and conclusions, the Qualified Persons have provided the following summary conclusions on the Technical Report:

SRK Conclusions

The December 2019 mineral resource update includes a total Measured and Indicated mineral resource of 25.4Mt at a Zn-equivalent grade of 2.84% (1.89% Zn and 0.99% Pb), at a cut-off grade of 0.9% Zn-equivalent. An additional Inferred mineral resource of 5.0Mt at a Zn-equivalent grade of 2.13% (1.55% Zn and 0.66% Pb) is included.

Ausenco Conclusions

Historical metallurgical test data and plant operating data were reviewed to support the engineering for the reopening of the ScoZinc operation. The data shows that high grade lead and zinc concentrates can be produced at high recoveries. The process plant design criteria have been selected according to the metallurgical data available and are appropriate for a PFS level study. The process plant has been redesigned for a throughput of 0.99Mt/a.

Throughout the development of the 2,700t/d PFS, several opportunities and risks have been identified that are material to the Project’s outcomes.

Terrane Conclusions

The Scotia Mine site is geotechnically and hydrogeologically challenging; however, with sufficient data collection, design, monitoring and maintenance, Terrane is of the opinion these challenges can be addressed. Based on our assessment of the data and site experience from historical open-pit mining, we consider the slope design parameters herein adequate for a Pre-Feasibility level Study.



### MineTech Conclusions

The Scotia Mine carbonate hosted lead-zinc deposits are ready for development. ScoZinc has completed much of the engineering work and has obtained supplier quotes for mining equipment and estimates for mill equipment upgrades. Drawings for development and mining have been completed. An economic analysis has confirmed that the Scotia Mine Project is feasible at US\$1.20/ pound zinc and US\$0.90/ pound lead, over the life of the mine. The area has been explored sufficiently to provide good data for this Pre-Feasibility level Study.

The plan calls for a stockpiling of low, medium and high-grade ore before starting the mill. Pre-production overburden stripping and stockpile building is also necessary prior to production. The proposed budget is sufficient to employ this strategy.

The estimated Proven and Probable Reserves are 13.66 million tonnes at 2.03% zinc and 1.10% lead, with a Zinc Equivalent grade of 3.09%. There are also 5 million tonnes of Inferred Resources.

There is enough operational information available about the deposit to make informed decisions regarding operations.

Additional drilling and sampling are not required to come to a decision to fund the Project.

### **Recommendations**

As part of its assessment in the Technical Report, the Qualified Persons have recommended that:

- Final engineering designs be completed for the plant upgrades as soon as possible
- Long lead items be ordered or conditionally secured to reduce the execution periods
- Updated hydrology studies to better design, size and cost water management facilities
- Optional additional exploration to further increase the resource and potential mineral reserves
- Complete additional or deferred metallurgical test work, including flotation testing of representative samples from the most recent mine production schedule to confirm recoveries and concentrate grades, and specific testing to support the selection of the proposed Jameson cell in the zinc flotation circuit
- Lead and zinc concentrate filtration tests to provide equipment selection parameters
- Continue engineering work to reduce EPCM costs and equipment lead times

The above recommendations include both optional and essential items. The cost of essential items is estimated at \$100,000. The cost of optional items is estimated at \$1,150,000.

## **2 Introduction and Terms of Reference**

### **2.1 Issuer**

This Report was prepared for ScoZinc Limited and the responsibility for disclosure remains with ScoZinc Mining Ltd. ScoZinc Limited is a wholly owned subsidiary of ScoZinc Mining Ltd.

### **2.2 Terms of Reference**

ScoZinc Limited, on behalf of ScoZinc Mining Ltd., engaged SRK Consulting (U.S.), Inc. in November 2019 to complete a mineral resource update for the Scotia Mine zinc-lead deposit, and after which engaged Terrane Geoscience Inc., Ausenco Engineering Canada Inc. and MineTech International Limited to complete a Preliminary Feasibility Study (or “Pre-Feasibility Study” or “PFS”) on the Scotia Mine plus a NI 43-101 Technical Report in accordance with the requirements of National Instrument 43-101 (“NI 43-101”), “Standards of Disclosure for Mineral Projects”, of the Canadian Securities Administrators (“CSA”) for lodgment on CSA’s “System for Electronic Document Analysis and Retrieval” (“SEDAR”).

A summary of the Qualified Persons (“QP”) and their responsibilities is shown in Table 2-1 overleaf.

### **2.3 Purpose of Report**

The purpose of this report is to provide disclosure of a complete and independent Pre-Feasibility Study conforming to NI 43-101 standards and Form 43-101 F1.

### **2.4 Basis of Technical Support**

This Technical Report is based in part on internal Company Technical Reports, previous owners’ Technical Reports and studies, maps, published government reports, company letters and memoranda, and public information as cited throughout this report and listed in the References (Section 27). Several sections from reports authored by other consultants have been directly quoted in this report and are so indicated in the appropriate sections.

Digitised and hard copy material for all exploration activity since inception of exploration on the property was supplied by ScoZinc Mining Ltd. (“ScoZinc”).

Extensive reference was made to Cullen *et al* (2011) report titled, “Technical Report on a Mineral Resource Estimate, Getty Deposit.”

### **2.5 Site Visits**

The most recent site visit dates for each of the Qualified Persons are listed in Table 2-1.

**Table 2-1: Qualified Persons & Report Contributors**

<b>Qualified Person</b>	<b>Professional Designation</b>	<b>Employer</b>	<b>Independent of ScoZinc</b>	<b>Date of Last Site Visit</b>	<b>Report Sections</b>
Timothy Carew	P.Geo.	SRK Consulting (U.S.), Inc.	Yes	September 19, 2012	1,4,5,6,7,8,9,10,11,12,14,25
Tony Gilman	M.Sc., P.Eng.	Terrane Geoscience Inc.	Yes	February 24, 2020	1,2,3,15,16,21,24,25,26,27,28
Tommaso Roberto Raponi	P.Eng.	Ausenco Engineering Canada Inc.	Yes	None	1,2,13,17,18.14,18.20,21.2.5,21.3.3,25.2,26.2
Patrick Hannon	M.A.Sc., P.Eng.	MineTech International Limited	Yes	June 18, 2020	1,2,3,15,16,18,19,20,21,22,23,24,25,26,27,28

## 2.6 Units of Measure

Unless otherwise stated, all units used in this report are metric. Unless otherwise stated, the legal currency used is the Canadian dollar.

## 2.7 Site Grid Parameters

A site mine grid was used throughout the report. The grid is a simple translation with almost no rotational deviation from the Nova Scotia Grid, which is a 3° Modified Transverse Mercator projection using an ATS 77 datum. Based on the site mine grid offset from the Nova Scotia grid, the elevation datum is 500.11 metres above Mean Sea Level. For reference, the co-ordinates of two points, in both site and Nova Scotia grids, are reported in Table 2-2.

The same site grid was used for both the Main and Getty Zones.

**Table 2-2: Site Grid Parameters**

Scotia Mine Site						
Control Monument	Mine Grid			ATS 77, NS Grid		
	Site Grid North (m)	Nova Scotia Grid East (m)	Elev. MSL+500 (m)	North (m)	East (m)	Elev. (m)
No. 4	6,869.72	8,597.50	531.33	4,988,509.11	5,591,210.89	31.25
No. 7	7,019.95	8,866.55	530.69	4,988,659.37	5,591,479.94	30.58

## 2.8 SRK Declaration

SRK's opinion contained herein and effective December 14, 2019 is based on information collected by SRK throughout the course of SRK's investigations, which in turn reflect various technical and economic conditions at the effective date of this report. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This report may include technical information that requires subsequent calculations to derive sub-totals, totals and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, SRK does not consider them to be material.

SRK is not an insider, associate, or an affiliate of ScoZinc Mining Ltd. and neither SRK nor any affiliate has acted as advisor to ScoZinc Mining Ltd., its subsidiaries or its affiliates in connection with this Project. The results of the technical review by SRK are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

Disclaimer: SRK has assumed that all the information and technical documents listed in the References section of this report are accurate and complete in all material aspects. While all of the available information

that was presented was carefully reviewed and believed to be correct, SRK cannot guarantee its accuracy and completeness. SRK reserves the right, but will not be obligated to revise this report and conclusions if additional information becomes known subsequent to the date of this report.

The author has relied largely on the documents listed in Section 27 and the site visits for the information in this report. However, the conclusions and recommendations are exclusively those of the author. The results and opinions outlined in this report are dependent on the aforementioned information being current, accurate and complete as of the date of this report and it has been assumed that no information has been withheld which would impact the conclusions or recommendations made herein.

## **2.9 Ausenco Declaration**

This report was prepared as a NI 43-101 Technical Report for ScoZinc Mining Ltd. (“ScoZinc”). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Ausenco Engineering Canada Inc. (“Ausenco”) services, based on: 1) information available at the time of preparation, 2) data supplied by outside sources, 3) assumptions, conditions, and qualifications set forth in this report. This document and its contents are for the private information and benefit only of ScoZinc, for whom it was prepared and for the particular purpose which ScoZinc described to Ausenco. The contract permits ScoZinc to file this report as a Technical Report with Canadian securities regulatory authorities pursuant to NI 43-101, Standards of Disclosure for Mineral Projects. The contents of this document are not to be reused in whole or in part, by or for the benefit of others without prior adaptation by, and the prior specific written permission of Ausenco. Ausenco takes responsibility for Chapters 13 and 17.

Particular financial and other projections, analysis and conclusions set out in this document, to the extent they are based on assumptions or concern future events and circumstances over which Ausenco has no control are by their nature uncertain and are to be treated accordingly. Ausenco makes no warranty regarding any of these projections, analysis and conclusions. Ausenco, its affiliates and subsidiaries and their respective officers, directors, employees and agents assume no responsibility for reliance on this document or on any of its contents by any party other than ScoZinc.

The user of this document should ensure that this is the most recent Technical Report for the property as it is not valid if a new Technical Report has been issued.

## **2.10 Terrane Declaration**

Terrane Geoscience Inc. (“Terrane”) was part of preparation of portions of Section 16 of this report to be included in an NI 43-101 Technical Report for ScoZinc Limited. (“ScoZinc”). The quality of data, and engineering design recommendations contained within this report are considered acceptable for the level of effort required at this stage of the Project. Our recommendations are based on 1) data available up to the time of writing this report, 2) data supplied by third party, and 3) commonly accepted engineering practices and assumptions. The agreement between ScoZinc and Terrane allows ScoZinc to file this report as a Technical NI 43-101 Report with Canadian securities regulatory authorities pursuant to, Standards of Disclosure for Mineral Projects. The contents of this document are not to be reused by any third party for the benefit of others without written permission of Terrane. Terrane implies no warranty regarding any of engineering design, analysis and/or conclusions.

Terrane has no financial interest and is not an associate or affiliate of ScoZinc Mining Ltd. and Terrane has in no way acted as advisor to ScoZinc Mining Ltd. or its affiliates. All users of this report have the responsibility to ensure that this document / Technical Report for the Property is the most up to date version.

## 2.11 MineTech Declaration

MineTech International Limited's ("MineTech") mining and geological engineers, Patrick Hannon, M.A.Sc., P. Eng., Q.P., Wm., Douglas Roy, M.A.Sc., and Martin Corbett, P. Eng. completed a review of this NI 43-101 Technical Report on the feasibility of mining the ScoZinc zinc-lead deposit at Gays River, Nova Scotia.

MineTech reviewed Sections 1, 2, 3, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 28. MineTech suggested several minor changes.

MineTech's Patrick Hannon will sign off as having reviewed the report that was written by ScoZinc technical personnel.

The assumptions regarding the mining method, environmental conditions, and estimates of capital and costs are reasonable for this level of study. In MineTech's experience, the costs assumptions are within the +15%/-12% maximum probable variation envelope.

As with all predictions of future events, there are going to be unforeseen challenges to the recommended plan. MineTech's opinion is as of July 6, 2020.

The CIM Definition Standards requires the completion of a Preliminary Feasibility Study as the minimum prerequisite for the conversion of Mineral Resources to Mineral Reserves. This Pre-Feasibility Study meets that standard.

*"A Preliminary Feasibility Study is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open-pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations and the evaluation of any other relevant factors which are sufficient for a Qualified Person, acting reasonably, to determine if all or part of the Mineral Resource may be classified as a Mineral Reserve." CIM DEFINITION STANDARDS – For Mineral Resources and Mineral Reserves (2010)*

MineTech is completely independent of ScoZinc Limited and all work completed for the Company is done on a fee for service basis.

## 2.12 Other

All monetary amounts provided in this Technical Report are expressed in Canadian dollars unless specifically stated otherwise.

This report has an effective date of July 6, 2020.

### 3 Reliance on Other Experts

Sections 4 through 13 of this report include information taken directly from the 2019 MRE by SRK.

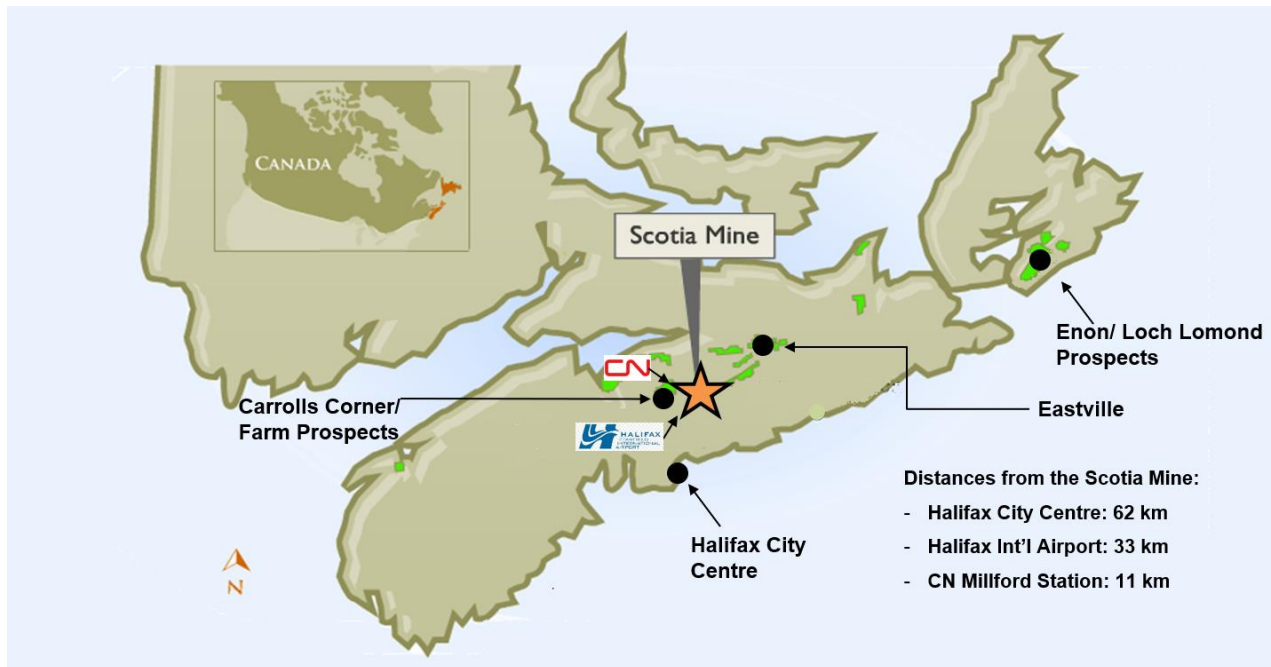
### 4 Property Description and Location

The Scotia Mine (“the Property”) is located approximately sixty kilometres northeast of Halifax, Nova Scotia in the community of Gays River in the Halifax Regional Municipality (“HRM”). The Property’s general location is 45°02’ North, 63°21’ West.

The Property encompasses the Getty, Main and North-East zones of the Scotia Mine deposit and consists of 615 hectares of mineral rights, including land with exploration potential for zinc/lead mineralization, and 568.4 hectares of land ownership (real property). See Figure 4-1 and Figure 4-2 below.

The Getty Zone property consists of 62 contiguous mineral claims, of approximately 992 hectares.

**Figure 4-1: Location of Scotia Mine**



**Figure 4-2: Scotia Mine Location Relative to Halifax**



Source: MineTech, 2020

## 4.1 Exploration Land Status

### Exploration Licenses

ScoZinc currently holds five exploration licenses covering 41 claims in the immediate vicinity of the Scotia Mine Deposit (Figure 4-3). Each individual claim covers an area of approximately forty acres (16.2 hectares). In total, the 41 claims cover approximately 664 hectares (1,641 acres). These licenses are located along strike from the Scotia Mine Deposit and include favourable host rocks similar to that at the mine site.

Exploration License no. 06959 covers the Getty Zone of the Scotia Mine deposit.

All exploration licenses were in good standing and registered to ScoZinc Limited as of January 27, 2020. Issue dates range from May 2, 1997 to May 6, 2006. The ScoZinc exploration licenses are summarized in Table 4-1.

Table 4-2 through to Table 4-6 provide details on each ScoZinc exploration licenses in the immediate vicinity of the Scotia Mine Deposit.



**Table 4-1: Summary of ScoZinc Exploration Licenses**

Exploration License Number	Number of	Claim Reference Map	Issue
	Claims		Date
6268	20	11E/03B	May 2, 1997
06959 (Getty Zone)	16	11E/03B	October 20, 2006
8936	1	11E/03B	December 21, 2009
9069	1	11E/03B	August 19, 2005
51016	3	11E/03B	May 6, 2016

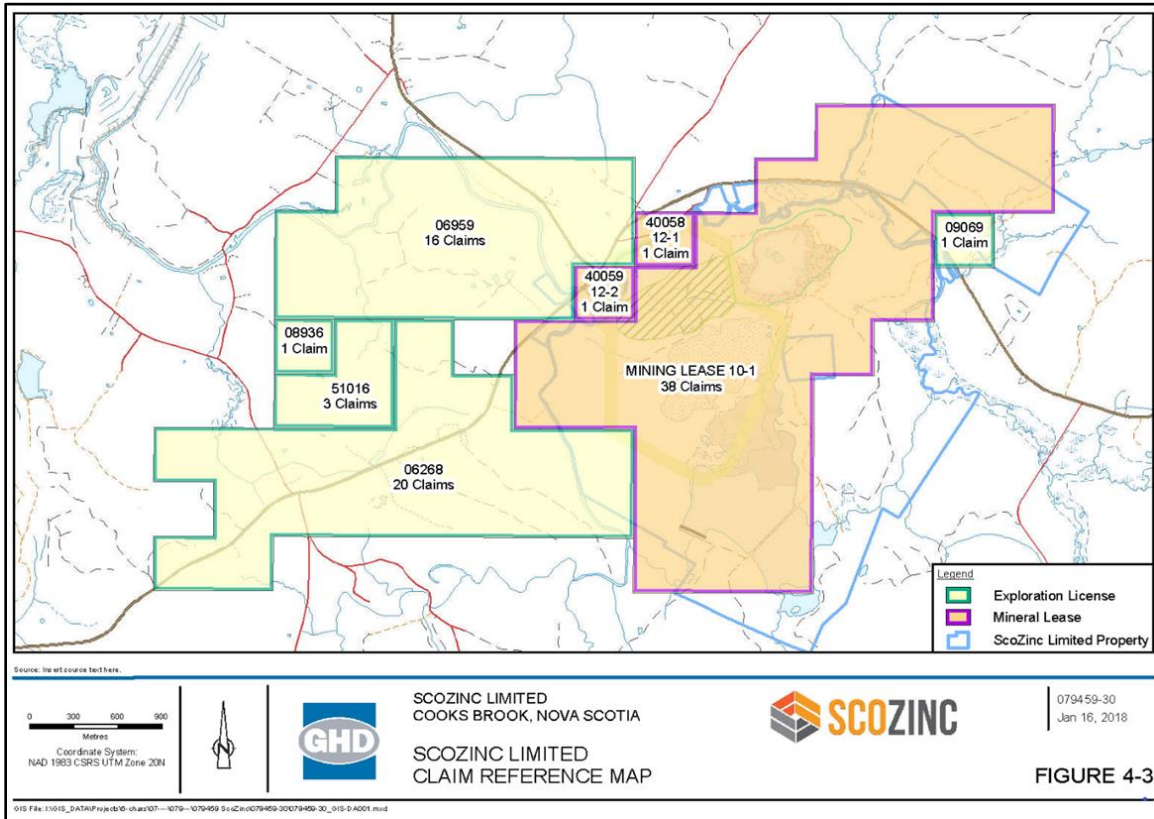
Source: ScoZinc, 2019

**Table 4-2: Exploration License 06268 (20 Claims)**

Claim Reference Map	Tract	Claims	Anniversary Date	Issue Date
11E/03B	19	ABCDEFGHI LMN	May 2, 2021	May 2, 1997
	18	ABCEFGH		
	7	NO		

Source: ScoZinc, 2019

**Figure 4-3: Exploration Licenses, Mineral Leases, and Real Property Boundary (Surface Rights) for the Scotia Mine Deposit**



Source: ScoZinc, 2019

**Table 4-3: Exploration License 06959 (Getty Zone, 16 Claims)**

Claim Reference Map	Tract	Claims	Anniversary Date	Issue Date
11E/03B	30	BCDEFGHJKLM	October 20, 2021	October 20, 2006
	31	ABGHJ		

Source: ScoZinc, 2019

**Table 4-4: Exploration License 08936 (1 Claim)**

Claim Reference Map	Tract	Claims	Anniversary Date	Issue Date
11E/03B	18	P	December 21, 2021	December 21, 2009

Source: ScoZinc, 2019

**Table 4-5: Exploration License 09069 (1 Claim)**

Claim Reference Map	Tract	Claims	Anniversary Date	Issue Date
11E/03B	28	F	August 19, 2021	August 19, 2005

Source: ScoZinc, 2019

**Table 4-6: Exploration License 51016 (3 Claims)**

Claim Reference Map	Tract	Claims	Anniversary Date	Issue Date
11E/03B	5	QKJ	May 6, 2016	May 6, 2021

Source: ScoZinc, 2019

### Royalty Agreement

Exploration License 06959, which covers the Getty Zone of the Scotia Deposit, is subject to an agreement between ScoZinc Limited and Globex Resources Ltd., that provides Globex with a 1% Gross Metal Royalty (“GMR”) interest in the associated claims. Agreement terms also allow ScoZinc to purchase 50% of the GMR for \$300,000. The original agreement, signed in 2006, was between Globex Resources and Acadian Mining Corporation, but Acadian assigned the agreement to (its then subsidiary) ScoZinc Limited in May of 2011.

### Mineral Leases

Three Mineral Leases, 10-1, 40058 and 40059, entirely cover the Main and Northeast Zones of the Scotia Mine Deposit, and this includes the existing Scotia Mine infrastructure. The Mineral Leases convey the mining rights to all minerals except coal, uranium, salt and potash.

Mineral Lease 10-1, consisting of 38 claims, was originally granted by the Nova Scotia Government to Westminer Canada Limited on April 2, 1990, and subsequently renewed for an additional 20-year term on April 2, 2010. Mineral Lease 10-1 was originally granted as a “Mining Lease.” However, changes to the Nova Scotia Mineral Resources Act that came into effect in November 2004 changed the terminology such that existing “Mining Leases” are now known as “Mineral Leases.” The anniversary date of Mineral Lease 10-1 is April 2 of each year, and the expiry date is April 2, 2030, at which time the lease may be renewed again.

Mineral Leases 40058 and 40059, consisting of just 1 claim each and covering a portion of the Southwest Expansion area of the Main Zone, were issued by the Nova Scotia Government for a 20-year term on October 2, 2013. The anniversary date of Mineral Leases 40058 and 40059 is October 2 of each year, and the expiry date is October 2, 2033, at which time they may be renewed.

Table 4-7 to Table 4-9 lists the claims comprising the Mineral Leases, while Figure 4-3 shows the location of the three leases.

The Nova Scotia government currently holds a reclamation security (bond) for each of the three Mineral Leases. As of December 31, 2019, the amount of reclamation security for Mineral Lease 10-1 was \$2,874,285.69, the reclamation security for Mineral Lease 40058 was \$10,949.48, and the reclamation security for Mineral Lease 40059 was \$10,949.48.

As of December 31, 2019, the reclamation security for the three Mineral Leases totaled \$2,896,184.65.

**Table 4-7: Mineral Lease 10-1 (38 Claims), Map Sheet (NTS) 11E-03B**

Tract	Claims	Number of Claims
5	NOP	3
19	JKPQ	4
20	BCDE FGK LMNO PQ	13
28	DEKL MNOP	8
29	ABCD FGH JKQ	10
<b>Total</b>		<b>38</b>

Source: ScoZinc, 2019

**Table 4-8: Mineral Lease 40058 (1 Claim), Map Sheet (NTS) 11E-03B**

Tract	Claims	Number of Claims
29	E	1
<b>Total</b>		<b>1</b>

Source: ScoZinc, 2019

**Table 4-9: Mineral Lease 40059 (1 Claim), Map Sheet (NTS) 11E-03B**

Tract	Claims	Number of Claims
30	A	1
<b>Total</b>		<b>1</b>

Source: ScoZinc, 2019

**Surface Rights (Real Property)**

ScoZinc Limited owns outright approximately 703 hectares (1,736 acres) of land (real property) within the Scotia Mine Deposit area. These properties encompass the entire surface infrastructure of the existing mine and most of the resource within the Main and Northeast Zones of the deposit (refer to Table 4-10 and Figure 4-4 overleaf).

The boundaries were established through legal surveys.

Table 4-10: Property Ownership, ScoZinc Limited

Property Identification Number ("PID")	Area (hectares)	Area (acres)
369363	20.23	50.00
373423	2.29	5.65
373621	40.47	100.00
522201	35.13	86.80
522623	32.10	79.33
20080495	23.24	57.42
20080511	4.05	10.00
20080529	3.52	8.70
20158176	1.78	4.40
20158184	2.43	6.00
20223418	1.81	4.48
20313250	0.65	1.60
20416384	1.21	3.00
40227951	46.70	115.40
40227969	2.27	5.60
40227985	0.29	0.72
40290256	49.21	121.60
40290264	43.64	107.83
40291452	220.56	545.00
40312092	13.35	33.00
40746786	24.12	59.60
40757577	73.35	181.26
40763872	13.76	34.00
41094400	33.04	81.63
41239542	0.01	0.03
41283268	10.12	25.00
41358128	0.57	1.40
41358136	2.83	7.00
<b>Total</b>	<b>702.73</b>	<b>1,736.45</b>

Source: ScoZinc, 2019

Figure 4-4: Real Property Map, ScoZinc Limited



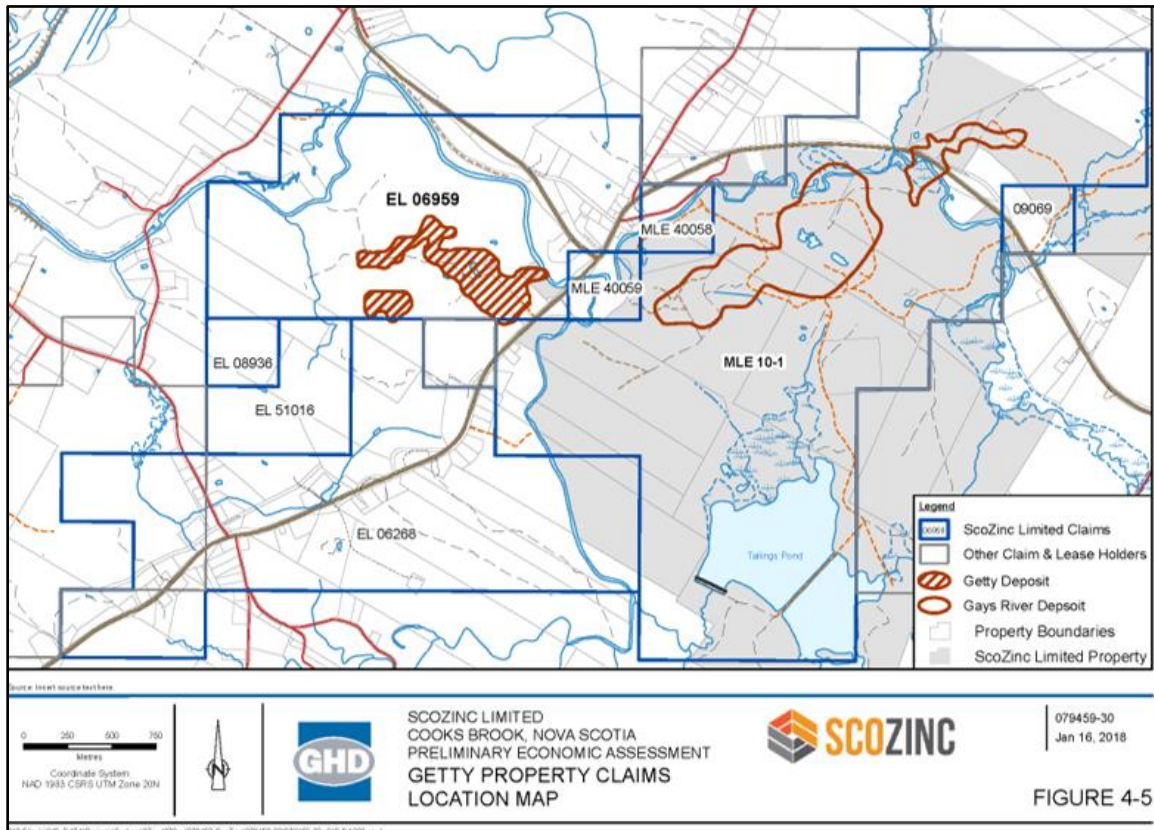
Source: ScoZinc, 2019

### Getty Zone

Cullen et al (2011) described the surface or real property rights that cover the Getty Zone:

“Acadian advised Mercator that surface rights to lands covering the Getty Zone are owned under separate titles by Allan Benjamin, David Benjamin and Heather Killen. Mercator did not review the access agreements for purposes of this report but assumes that similar access permission to enter the lands for exploration purposes will be established by Selwyn. The mineral exploration claims and permits currently in place with respect to the Getty Project are adequate for execution of technical programs recommended in this report. Permits necessary to do the proposed program will be applied for as required. There is adequate suitable land within the claim area for the recommend work program and future mining activities; however, Selwyn does not hold surface rights to this land. Selwyn will negotiate suitable purchase arrangements when the economic viability of the Project has been demonstrated.”

Figure 4-5: Getty Zone Mineral Claims Location Map



Source: ScoZinc, 2019

## 4.2 Aggregate Lease

An aggregate lease covers the Scotia Mine property (Main Zone). Gallant Aggregates signed a thirty-year lease agreement to mine and remove aggregate from the property at a cost of one dollar per tonne of material that is removed from the property. The lease was signed on May 15, 2003 and entitled Gallant, with certain limitations, to mine anywhere on ScoZinc's land. The agreement contains a renewal clause and gives Gallant the right of first refusal to purchase the surface rights (real property titles). A major condition of Gallant's lease is that metal mining takes precedence over aggregate mining. Therefore, Gallant's lease would not interfere with zinc and lead mining operations.

In January 2008, Gallant exercised its option under the Gallant Agreement to purchase approximately 25 acres of the Scotia Mine property. Concurrent with the transfer of the property, ScoZinc and Gallant executed a License, Option and Royalty, which terminated the Original Agreement and granted Gallant the right to access the Scotia Mine property to access existing water infrastructure and to obtain electrical power. The License, Option and Royalty Agreement grants Gallant the right to remove, extract and process sand, gravel, fill and obtain materials from the over burden and waste material created by ScoZinc at the Scotia Mine site for the greater of \$25,000 per annum or \$1.00 per metric tonne. In addition, Gallant has a right of first refusal to purchase the Scotia Mine property if ScoZinc plans to sell the property after mining operations are completed or abandoned.

### 4.3 Environmental

Between 1997 and 2000 work proceeded on an Environmental Registration Document. This document, which was submitted with the regulatory authorities in September 1999, addressed the environmental concerns of a surface and underground mining operation along with the diversion of a 500-metre section of the Gays River to accommodate the pit design. On August 4, 2000, the Open-Pit Lead/ Zinc Mine and River Diversion Project proposed by Pasma Resources Canada Company received Environmental Assessment approval.

The Environmental Registration Document covered only part of the deposit. This area was mined by ScoZinc Limited in 2007-2008. Mineral resources in this area have not been exhausted. However, additional Environmental Assessment work is required before the mine can expand very far outside of its current footprint, either west along strike in the Main Zone or northeast, across Gays River to the Northeast Zone.

On October 7, 2011, ScoZinc (owned by Selwyn/ScoZinc Mining) received approval from Nova Scotia Environment, a department of the provincial government, for its proposed Southwest Expansion of the previously mined Main Pit. On May 18, 2012 ScoZinc received an amended Industrial Approval allowing expansion of the existing mine to include the Southwest Expansion of the previously mined Main Pit.

Prior to expansion outside the currently permitted area, updated plans would have to be approved by the Nova Scotia government and an updated Industrial Approval (essentially an environmental operating permit) would be required.



## **5 Accessibility, Climate, Local Resources, Infrastructure and Physiography**

### **5.1 Accessibility**

The Scotia Mine Deposit (“the Property”) is located approximately 62 kilometres northeast of Halifax, Nova Scotia along the border between Colchester and Halifax Counties (45°01'55" North Latitude and 63°21'30" West Longitude). It lies approximately one kilometre east of the community of Gays River. Access to the Property is by paved roads and is approximately fifteen kilometres off the Trans-Canada Highway, along Route #224. The Halifax International Airport is located 33 kilometres southwest of the mine site.

Portions of Highway #224 and Highway #277 are subject to spring weight restrictions. Truck weights are limited for a period that normally lasts six weeks.

### **5.2 Climate**

The property is situated in central Nova Scotia where northern temperate zone climatic conditions are present and are moderated by relative proximity to the Atlantic Ocean. Distinct seasonal variations occur, with winter conditions of freezing and potentially substantial snowfall expected from late November through late March. Spring and fall seasons are cool, with frequent periods of rain. Summer conditions can be expected to prevail from late June through early September, with modest rain fall. (Cullen et al, 2011)

The following climate information reported for nearby Halifax International Airport during the 30-year period ending in 2000 characterizes seasonal precipitation and temperature trends in the area. The average July daily mean temperature for the reporting period was 18.6 degrees Celsius with a corresponding average maximum daily temperature of 23.6 degrees Celsius. Average daily winter temperature for January was minus 6 degrees Celsius with a corresponding average daily minimum being 10.6 degrees. Updated mean annual temperature is 6.2°C, and mean annual precipitation is 1,363.6 mm. Yearly evapo-transpiration is estimated to be 560 mm. Climate conditions permit many exploration activities, such as core drilling and geophysics, to be efficiently carried out on a year- round basis. Other activities, such as geochemical surveys and geological mapping are typically limited by winter snow cover. (Cullen et al, 2011)

### **5.3 Local Resources & Infrastructure**

#### **5.3.1 Local Resources**

The property is situated in central Nova Scotia where northern temperate zone climatic conditions are present and are moderated by relative proximity to the Atlantic Ocean. Distinct seasonal variations occur, with winter conditions of freezing and potentially substantial snowfall expected. ScoZinc’s strategic location near the Halifax International Airport and industrial parks of Halifax, ensure that an extensive workforce, equipment, and mine site series are readily available both locally and the Halifax region.

#### **5.3.2 Utilities**

Electrical power is on the mine site provided from the Nova Scotia electricity grid. Using ScoZinc’s transformers and power lines on site, power is currently reticulated to all necessary equipment on site at industrial power rates.

Water and sewerage treatment systems are in place and operational.

See Section 18 for more details on the extensive list of utilities on site.

### **5.3.3 Communications**

All communications on site are via telephone lines, mobile cellular connections, microwave link to fibre optic internet cable, and VHF radio.

See Section 18 for more details on the extensive system of communications presently available on site.

### **5.3.4 Administration**

The Scotia Mine has an existing fully operational administration building of concrete and steel construction. The building is in very good condition and contains offices, board rooms, meeting rooms, workspaces, IT support facilities, and fire protection.

See Section 18 for more details on the administrative facilities on site.

### **5.3.5 Mining Facilities**

The Scotia Mine has a number of permanent surface buildings for mining related support activities constructed from concrete and steel. Buildings include: Mine Technical Support and Operations Building, Core Processing Building, Core Storage Building (Dome Structure), Mobile Equipment Workshop, Tire Bay, Light Vehicle Workshop.

See Section 18 for more details on mining facilities available presently on site.

The Scotia Mine will require a surface mining fleet to remove the overburden and extract the zinc and lead ores from the open-pits. A number of mining equipment providers with nearby facilities have provided preliminary equipment pricing and maintenance contract proposals on the size and number of pieces of equipment ScoZinc requires.

### **5.3.6 Processing Facilities**

ScoZinc's processing facilities were designed and built in 1978/1979 with a nominal ("nameplate") capacity of 1,350 tonnes per day (Figure 5-1). However, during 2007-2008, ScoZinc (owned by Arcadian Mining) operated the mill for extended periods at rates over 2,000 tonnes per day. It was initially built to treat the zinc/lead ore from the Main Zone Mine. In 1986, it was modified to treat gold ores using gravity and flotation circuits. In 1989, it was again reworked to treat zinc/lead ore from the Scotia Mine then being operated by Westminer Canada Ltd. ("WMC"). The Processing Plant (historically referred to as the concentrator) has been well maintained and is ready for start-up over a 3 to 5 months period at minimum upgrade and refurbishment cost.

The Mill (or Processing Plant) is setup for two stage crushing, three stage grinding, flotation cells, thickening tanks, disk filtration and rotary kiln concentrate drying. The Mill building contains an analytical laboratory, metallurgical testing laboratory, control room, maintenance area and office facilities. The building total area is approximately 73,000 square feet. ScoZinc has planned various upgrades to the Processing Plant to

most processing circuits of the mill, especially crushing, flotation and concentrate drying using filter press systems. These upgrades will increase the daily average throughput to 2,700 tonnes per day.

**Figure 5-1: Scotia Mine Processing Facilities (or Plant)**



See Section 18 for more details on the processing facilities available presently on site.

### **5.3.7 Concentrate Handling**

All zinc and lead concentrate will be transported to buyers in lined 20' shipping containers directly from the mine site. ScoZinc will handle all concentrate laden and unladen containers to ensure high quality concentrate controls and lower costs. Using the Scotia Mine's on site weightometer and new container handling systems and facility, laden containers are to be transported via sea, rail or highway network. From the mine gate on all season highways, the Fairview Cover Container Terminal is 62 km, and the Milford Canadian National ("CN") Railway siding is 11 km.

See Section 18 for additional details on ScoZinc's concentrate handling systems.

### **5.3.8 Tailings Storage**

The Scotia Mine has an existing fully permitted Tailings Storage Facility ("TSF") which is designed to store a total of 10 million tonnes of tailings. The TSF currently has 2 million tonnes stored, and ScoZinc intends

to expand the TSF by approximately 6 million tonnes to meet the additional tailings deposition required for the larger mine life. In-pit tailings disposal is also being reviewed as a potential alternative.

See Section 18 for additional details on the TSF.

### **5.3.9 Waste Rock Storage**

There is existing storage area for waste rock on the property. The main area for storage lies adjacent to the tailings pond on its northwest shore, on the foot wall side of the deposit. With the exception of potentially economic rock (including potentially gypsum), all waste rock materials from the pit will be stored in the Waste Rock Dump.

See Section 18 for additional details on ScoZinc's waste rock storage facilities.

## **5.4 Physiography**

The property is in a rural-residential area of central Nova Scotia that is typified by rolling topography and abundant surface water. The Main zone lies along the south side of the Gays River main branch, immediately east of the confluence with the Gays River south branch. The Getty Zone lies immediately west of the Main Zone, on the north side of Highway 224.

The Gays River water shed is characterized by gently rolling topography, having a maximum elevation of 170 metres, an extensive cover of deciduous forest, a small population and local agricultural land development. Lakes, ponds and rivers are sparsely distributed throughout the watershed. Typical vegetation consists of northern black spruce, balsam fir and juniper with birch in more wet areas. Areas of open bog occur on part of the claims. Currently, parts of the forest are being harvested or thinned.

## 6 History

### 6.1 Modern Pre-mining Exploration

#### Overview

The Gays River Formation has seen exploration since the 18<sup>th</sup> century. Modern exploration on the Gays River Formation began in the early 1970's. Cullen et al note that: "First reports of zinc-lead mineralization in the Gays River area date to the late 1800's and from this time until the 1950's exploration consisted of limited amounts of mapping, pitting, trenching and sampling with up to 3% lead values being reported. Most activities focused on the area immediately around the adjacent Scotia Mine site, particularly along the South Gays River, where out cropping Gays River Formation dolomite hosting low grade zinc and lead mineralization was trenched and drilled in the 1950's in the "Gays River Lead Mines Area" (Campbell, 1952). (Cullen et al, 2011, Section 5.2)

#### Scotia Mine Deposit Main Zone

The history of the Project begins with its discovery in the early 1970's by Cuvier Mines. Cuvier and Imperial Oil Limited ("ESSO") carried out exploration work and delineated the mineralized zone, which was then identified as being four kilometres long, 220 metres wide with depths varying from 20 to 200 metres. Initial development consisted of an exploration decline driven in 1975/76 with mine development starting in 1978 and mill commissioning in October 1979.

From 1979 until 1981, ESSO operated the mine and targeted the lower grade ore using a lower cost, bulk room and pillar mining method approach. Though Esso carried out some test mining in the higher-grade mineralization near the carbonate contact, it was not part of the mine plan at that time. During this period, 554,000 tonnes of lead/zinc ore was mined with an average grade of 2.12% zinc and 1.36% lead (see Table 6-1 below). Due to low metal prices, problems caused by high rates of water influx and difficult ground conditions, mining was suspended in 1981 and the mine was allowed to flood.

**Table 6-1: Historical Milling Records**

	Mill Feed			Concentrate Produced				Metal Recovery (%)	
	Tonnes	Pb (%)	Zn (%)	Tonnes Pb	Tonnes Zn	Pb (%)	Zn (%)	Pb (%)	Zn (%)
Esso (1979-1981)	550,000	1.4	2.1	10,000	17,000	73.6	61.5	95.6	90.5
WMC (1989-1991)	190,000	3.5	7.5	8,000	21,000	75.6	61.2	90.9	90.2
ScoZinc (2007)	337,000	0.85	2.14	3,359	8,694	64.4	75.5	55.4	66.7
ScoZinc (2008)	1,795,271	1	2.92	29,894	74,423	72.1	87.8	58.6	83.2
<b>Total</b>	<b>1,795,271</b>	<b>1</b>	<b>2.92</b>	<b>29,894</b>	<b>74,423</b>	<b>72.1</b>	<b>87.8</b>	<b>58.6</b>	<b>83.2</b>

Source: MineTech, 2012

In 1985, Seabright Resources purchased the property and modified the mill circuits to treat gold ore from other Nova Scotian properties.

In 1988, Westminer Canada Limited (“WMC”) purchased Seabright Resources. WMC began dewatering the underground mine in 1989. Their extraction method was to use narrow vein, cut and fill mining to extract the higher-grade ore zones. The mine was placed back into operation and reached commercial production in March 1990. During the period of operations by WMC (August 1989 to May 1991) the mine produced 190,000 tonnes of ore at an average grade of 7.5% zinc and 3.5% lead. Mining was curtailed due to low metal prices, mining method problems and high rates of water influx. Also, for corporate reasons, WMC decided to focus on larger scale mining ventures. Following suspension of mining at Main Zone Mine, WMC commissioned several studies to characterise the local hydrology of the mine and to control the ground water in the mine. These results were never tested during mining, since a cyclic low in metal prices, among other factors, prompted WMC to place the property up for sale.

In late 1996, Savage Zinc, Inc. purchased the Main Zone Mine property from WMC and formed a wholly owned subsidiary named Savage Resources Canada Company (“Savage”). Savage started to rehabilitate the property, shops, equipment and office with the aim of starting production in 1997.

When Savage took over the operation of the former Main Zone mining facility, the underground workings were flooded to the surface. After purchasing equipment and hiring employees, the mine dewatering phase started on June 7, 1997. With an installed pumping capacity of 9,000 USGPM, the average pumping rate to reach the 425 metre level was 5,200 USGPM. This level was reached during late August 1997. During this period of dewatering, men and equipment went underground to clean out the workings while management carefully examined the ground conditions. They decided to prepare a mine plan that considered an open-pit design. Later, after much review during a period of depressed metal prices, it was decided to abandon the proposed underground mining activities and keep the mine dewatered to the 425 level. The electrical equipment was removed and the pumps were shut off on April 1, 1998. At present the mine is flooded above the portal.

Savage concluded that an open-pit operation was feasible and initiated environmental permitting, including provisions for a diversion of a portion of the Gays River. The Environmental Assessment plan was approved August 2000. The operating plan was never initiated, probably due to low metal prices at the time.

ScoZinc Limited (“ScoZinc”), purchased by Acadian Mining (ADA: TSX.V) in 2006 as its wholly-owned subsidiary, continued with Savage’s plan and surface-mined the deposit during 2007 and 2008. ScoZinc mined 1.1 million tonnes of surface ore and stripped 9.4 million tonnes of over burden (refer to Table 6-1). Due to a drastic plunge of base metal prices nearly coinciding with the mine’s re-opening, ScoZinc placed the mine on care-and-maintenance status near the end of 2008.

In 2008, ScoZinc also drilled 17 diamond drill holes through the Northeast Zone (refer to Section 10).

In April 2011, Selwyn Resources Limited (“Selwyn”) purchased ScoZinc with plans to reopen the mine amid high and rising metal prices.

An August 2011 Preliminary Economic Assessment (“PEA”) of the ScoZinc operation, prepared by Allnorth Consultants Ltd. with Colin Fisher, P.Eng., as Qualified Person, found an average earnings before interest, taxes, depreciation and amortization (“EBITDA”) for the first three years of operations of \$26.2 million per annum, and an internal rate of return of 63.9%. The PEA was limited to the Main Zone, and did not consider the river diversion discussed in Section 4.6. See the Selwyn press release dated August 30, 2011 for more information.

## **Getty Zone**

The following is adapted from Section 5 of Cullen et al (2011): “With the exception of regional soil geochemical surveying by Penarroya Ltd. in 1964 (Rabinovitch, 1967) that did not identify the Getty Zone, no substantial mineral exploration efforts appear to have been carried out on the current Getty property prior to its acquisition by Getty in 1972.

Exploration in the current deposit area was initiated in 1972 by Getty and joint venture partner Skelly Mining Corporation under terms of an option - purchase agreement with Millmore-Rogers Syndicate”.

“Discovery of the Getty zinc-lead zone is attributed to drill hole GGR-12 which was completed in 1972 and intersected 4.63 metres of dolomite grading 15.48% combined zinc-lead, beginning at a down hole depth of 93.11 metres. Subsequent completion of over 200 holes by Getty and Imperial on and around the property served to delineate a nearly continuous mineralized zone measuring approximately 1300 metres in length and up to 200 metres in width (Comeau, 1973, 1974; Comeau and Everett, 1975)”.

“Getty retained MPH Consulting Limited (“MPH”) to assess three development scenarios for the deposit and Riddell (1976) reported results of this work, which showed that production of 375,000 tonnes per year would be necessary to support a viable, stand-alone open-pit operation”.

“In 1980 economic aspects of developing the deposit based on an in-house tonnage and grade model were assessed by Esso (MacLeod, 1980). This study concluded that mining through open-pit methods as an ore supplement to the Main Zone deposit would be economically viable, provided that important operating assumptions were met. The earlier MPH work was also reviewed at this time and some economic models updated. None of the work indicated that profitable stand-alone development of the deposit could be expected under market conditions of the time. George (1985) subsequently reviewed earlier evaluations and also reached a negative conclusion regarding development potential”.

“In 1992 Westminer completed a resource estimate and preliminary economic assessment of the deposit based on Getty drilling results, with potential development in conjunction with the adjacent Main Zone deposit being considered (Hudgins and Lamb, 1992). Results showed that milling of about 550 tonnes per day of Getty ore could be undertaken at a low cost if excess milling capacity at Main Zone was being filled by such material. Westminer also indicated that zinc oxide production from the deposit would result in a substantially better financial return to the mine in comparison with a conventional smelter contract for sulphide concentrates”.

“In December 2007 Mercator completed an inferred resource estimate for the property, on behalf of Acadian, which was reported by Cullen et al. (2007) and update by Cullen et al. (2008). Acadian completed a total of 138 new drill holes in support of these estimates.” (Cullen et al, 2011, Section 5.2)

## **6.2 Ownership History**

### **6.2.1 Scotia Mine Deposit (Main Zone)**

The Scotia Mine Deposit (Main Zone) was discovered in 1973 by the Imperial Oil Enterprises (“Esso”) and Cuvier Mines Limited (“Cuvier”) joint venture. Esso initiated mine development in 1978, commissioned the mill in 1979, developed the underground mine and began mining and milling.

Seabright Resources Inc. ("Seabright") acquired the Scotia Mine property and mill in 1984. Despite a favourable feasibility study, Seabright did not reactivate the Scotia Mine due to depressed metal prices at the time. Seabright converted the mill for gold processing and processed gold ore from several satellite properties.

The Scotia Mine property was acquired by Westminer Canada Limited ("Westminer"), a Canadian subsidiary of Western Mining Corp of Australia, in 1988, at which time a review of the potential for mining the deposit was undertaken. Westminer dewatered the mine and continued mining and milling.

In 1997, Savage Resources Canada Limited acquired the Scotia Mine assets from Westminer. Savage concluded that an open-pit operation was feasible and initiated environmental permitting, including provisions for a diversion of a portion of the Gays River. Savage was subsequently taken over by Pasma Resources Canada Company ("Pasma Resources") and the Environmental Assessment plan was approved by the Nova Scotia Minister of the Environment in August 2000. The operating plan was never initiated.

Regal Mines Limited ("Regal Mines") purchased Pasma Resources in February 2002. Regal was owned 50% by OntZinc Corporation ("OntZinc") and 50% by Regal Consolidated Ventures Limited ("Regal Consolidated"). As part of the sale, Pasma Canada Holdings Inc. ("Pasma Holdings") retained a 2% net smelter return ("NSR") royalty on future production. OntZinc acquired Regal Consolidated's 50% interest in December 2002 to own 100% of Pasma Resources. Savage Resources Limited was the successor of Pasma Holdings and held the 2% royalty.

OntZinc later changed its name to HudBay Minerals Inc. ("Hudbay") after purchasing, through reverse takeover, Hudson's Bay Mining and Smelting in December 2004. Hudbay owned Scotia Mine through its wholly-owned subsidiary, ScoZinc Limited ("ScoZinc").

In 2006, Acadian Gold Corp. ("Acadian Gold") purchased 100% of ScoZinc and all of its assets (consisting mainly of Scotia Mine and its infrastructure) from OntZinc for \$7 million. Acadian Gold subsequently changed its name to Acadian Mining Limited ("Acadian Mining"). On May 29, 2007, ScoZinc exercised its option to buy-out the 2% NSR for \$1,450,000.

ScoZinc reactivated the mill and continued surface mining the deposit during 2007 and 2008. Depressed metal prices forced ScoZinc to place the mine on care-and-maintenance status.

In February 2011, Selwyn Resources Limited ("Selwyn") purchased ScoZinc and all of its assets, including the Scotia Mine and ScoZinc's exploration claims, for \$10 million less a deduction relating to increased reclamation bonding requirements that were being determined at the time of the acquisition. In a May 2, 2011 letter, the Nova Scotia government informed ScoZinc that the increased bond requirement amounted to \$1,887,790 (refer to Section 4.3 and Appendix 2). On June 1, 2011 Selwyn announced the closing of the sale and therefore acquiring 100% of ScoZinc and all of its assets.

### **6.2.2 Getty Zone**

The following is adapted from Cullen et al (2011), Section 5.1:



The Getty Property was acquired by Getty in 1972, at which time Getty and joint venture partner Skelly Mining Corporation began exploration under terms of an option - purchase agreement with Millmore-Rogers Syndicate.

Claims covering the Getty Zone were placed under closure in 1987 by the Nova Scotia government and a tender was subsequently let for acquisition of exploration rights to the property. In 1990 Westminer Canada Limited ("Westminer") was deemed the successful bidder and awarded a Special Exploration Licence for further assessment of the deposit. Attempted renewals of the Getty Special Exploration Licence by Westminer for three consecutive years were not successful.

Between 1992 and September 2006 Getty property claims were maintained under government closure and no work was carried out.

Pasminco Resources Canada Company ("Pasminco") acquired the adjacent Main Zone and infrastructure in 1999 through purchase of Savage Resources Inc., and in 2000 Pasminco submitted an application to NSDNR for a Special Mining Lease covering the deposit. No lease was issued and the closed status of the property was maintained.

In September 2006, the provincial government tendered exploration rights to the closed Getty property and Exploration Licences 6959 and 6960 were subsequently issued to Acadian on October 20, 2006 as successful bidder under the tendering process.

### **6.3 Historical Mineral Resource and Mineral Reserve Estimates**

The following resource and reserve estimates are historical in nature, have not been extensively audited by the authors, were not prepared according to National Instrument 43-101 (except where noted) and should not be relied upon.

#### **6.3.1 Scotia Mine Deposit (Main Zone)**

Numerous resource estimates have been carried out over the past thirty years since the discovery of the Scotia Mine mineralization. These resource estimates have been based on differing underlying parameters including varying minimum thickness of intercept, differing cut-off grades, utilisation of zinc equivalent or independent lead and zinc minimum grades, etc. Resource figures have ranged throughout the years from an initial 12,000,000 tonnes at 7% zinc-equivalent (drill-indicated) in 1974 (Patterson, 1993) to the 1985 figure of 980,000 tonnes at 5.35% lead and 9.42% zinc (mineable) at a 7% zinc-equivalent cut-off (Hale and Adams, 1985).

Westminer (Nesbitt Thompson, 1991; WMC, 1995) reported resources that were outlined by over 1,300 underground and surface holes in addition to the information derived from the underground workings. The calculations were based on a minimum true thickness of two metres with a cut-off of 7% zinc-equivalent. The total geologic reserves were quoted as 2,400,000 tonnes averaging 6.3% Pb and 8.7% Zn (Table 6-2). A mineable reserve was also quoted as 1,370,000 tonnes averaging 5.3% Pb and 9.8% Zn.

In 1992, Campbell, Thomas and Hudgins reported that there was potential for mining an additional 800,000 tonnes of lower grade mineralization via open-pit methods. The authors went on to say "there is excellent potential to expand the underground reserves, particularly in the eastern section of the mine. Underground

development in the western and central zones resulted in significant expansion of the reserves as ore zone continuity has generally been better than had been originally interpreted from the drill information”.

In Claude Poulin’s July 1, 1998 memo titled “Scotia Mine, Mineral Resource Status,” he reported the deposit’s resources. Higher grade [greater than 7% Zn-equivalent ( $\% \text{Zn} + 0.5 \times \% \text{Pb}$ )] and lower grade zones (greater than 2% but less than 7%) were outlined by Savage’s geologists. The higher-grade zone consists of massive sulphide and lies at the contact between the dolomite and the Trench or evaporite units. The lower grade zone consists of disseminated zinc and lead within the dolomite. These outlines were transferred to a block model by Tim Carew, manager of Gemcom Services in Reno, Nevada. Inverse distance squared weighting was used to calculate block grades. Top-cut values of 15% Zn and 10% Pb were used. No dilution or mining recovery factors were applied to the calculations. Undiluted resources are reported in the Table 6-2 overleaf.

The reader should note that the Resources were unclassified. They were not separated into Measured, Indicated and Inferred categories “due to the lack of geostatistical information” [Poulin, 1998 (1)]. Those Resources were not entirely independent and did not follow NI 43-101 guidelines, as the report predated that Standard.

Reserves were estimated through a pit optimisation process carried out on the Central portion of the deposit. These were reported in Claude Poulin’s July 1, 1998 memo titled “Scotia Mine, Mining Reserve Status.” Zinc and lead prices were US\$0.55 and US\$0.36 per pound, respectively. The optimised pit, which considered diverting Gays River by moving it toward the highway, was sent to Mine Design Associates (“MDA”) for practical pit design. Savage supplied the economic and geotechnical parameters to MDA. Dilution and recovery factors of 20% and 90%, respectively, were used.

Reserves included Resources that lie northeast of the highway. These would be accessed using underground methods. For this material, dilution and recovery factors of 25% and 90%, respectively, were used. The estimated Reserves are reported in Table 6-2 overleaf. Those Reserves were not entirely independent and did not follow NI 43-101 guidelines, as the report predated that Standard.

It was discovered during the current mineral resource estimation process that an error was made when calculating resource and reserve grades during the 1998 estimate. When estimating block grades in the High-Grade Zone, lower grade (less than 7% Zn-Eq) assays in the zone were filtered-out because they were thought to belong to a separate domain. Likewise, in the lower grade Disseminated Zone, higher grade (greater than 7% Zn-Eq) were filtered-out. This incorrectly increased the grade of the high grade zone, which increased the overall resource and reserve grade by approximately 1% Zn-Eq. The error had less of an effect on the lower grade zone. The error was corrected during the 2019 mineral resource estimate.

**Table 6-2: Historical Resource and Reserve Estimates**

Estimator	Category	Tonnes	Zinc Grade	Lead Grade
Westminer (1991)	“Geologic Reserve” (Undifferentiated)	2,400,000	8.70%	6.30%
	Reserve (Underground)	1,370,000	9.80%	5.30%
Savage (1998)	Resource (Undifferentiated):			
	Higher Grade	1,700,000	11.1% <sup>1</sup>	4.7% <sup>1</sup>
	Lower Grade	3,400,000	2.6% <sup>1</sup>	1.3% <sup>1</sup>
	Total	5,100,000	5.5% <sup>1</sup>	2.4% <sup>1</sup>
	Reserve (Undifferentiated):			
	Northeast (Underground)	360,000	8.60%	4.30%
	Central (Open-Pit)	19,000,001	4.1% <sup>1</sup>	1.6% <sup>1</sup>
	Total	2,260,000	4.80%	2.00%

Source: MineTech 2012

<sup>1</sup>It was discovered during the current study that an error had been made during the grade estimation process in 1998.

It should be noted that the above referenced Historical Resources and Reserves estimates were not carried out in accordance with the Canadian Institute of Mining and Metallurgy and Petroleum CIM standards on Mineral resources and Reserve Definitions (“CIM Standards”) and therefore do not conform to Sections 1.3 and 1.4 of NI 43-101.

In 2006, MineTech International Limited (“MineTech”) carried out a National Instrument 43-101-compliant resource and reserve estimate. MineTech’s results are reported in Table 6-3 and Table 6-4 below.

**Table 6-3: Previous Mineral Resource (Roy et al, 2006)**

Mineral Resources <sup>2</sup>					
Category	Volume (m <sup>3</sup> )	SG	Tonnes	Zinc Grade	Lead Grade
Measured (Surface)	680,000	2.78	1,880,000	3.80%	1.60%
Indicated					
Surface	810,000	2.77	2,250,000	3.20%	1.40%
Underground <sup>1</sup>	381,000	2.9	1,110,000	6.60%	3.70%
Sub Total	1,190,000	2.82	3,360,000	4.30%	2.20%
<b>Measured + Indicated (Surface &amp; Underground)</b>	<b>1,870,000</b>	<b>2.8</b>	<b>5,240,000</b>	<b>4.10%</b>	<b>2.00%</b>
Inferred	652,000	2.76	1,800,000	3.10%	1.10%

Source: MineTech 2012

Notes:

1. Northeast Underground Zone
2. Undiluted Resources

**Table 6-4: Previous Mineral Reserve Estimate (Roy et al, 2006)**

<b>Mineral Reserves</b>					
<b>Category</b>	<b>Volume (m<sup>3</sup>)</b>	<b>SG</b>	<b>Tonnes</b>	<b>Zinc Grade</b>	<b>Lead Grade</b>
Proven Reserve (Surface)	630,000	2.78	1,750,000	3.20%	1.30%
Probable Reserve					
Surface	610,000	2.76	1,690,000	2.50%	1.00%
Underground	395,000	2.9	1,150,000	5.70%	3.20%
Sub Total	1,005,000	2.83	2,840,000	3.80%	1.90%
<b>Total Proven &amp; Probable Reserves (Surface &amp; Underground)</b>	<b>1,635,000</b>	<b>2.81</b>	<b>4,590,000</b>	<b>3.60%</b>	<b>1.70%</b>

Source: MineTech 2012

Notes: Dilution equals 15% and mining recovery equals 90%

### 6.3.2 Getty Zone

The following is taken from Cullen et al. (2011):

“Four previous estimates of tonnage and grade for in-situ mineralization comprising the Getty Zone are available in the public record. The earliest of these was prepared for Getty by MPH Consulting Limited (Riddell, 1976) and was revised in 1980 as part of a Mine Valuation Study carried out for Esso (MacLeod, 1980). Subsequently, Westminer developed an in-house estimate and preliminary economic assessment of the deposit based on historic drilling (Hudgins and Lamb, 1992). The fourth estimate was completed in December 2007 by Mercator for Acadian and reported by Cullen et al (2007)”.

“Results of the first three historic estimates are presented below in Table 6-5 and all pertain to areas currently covered by Acadian exploration licences. These pre-date National Instrument 43-101 (“NI 43-101”) and have not been classified under Canadian Institute of Mining, Metallurgy and Petroleum Standards for Reporting of Mineral Resources and Reserves: Definitions and Guidelines (the CIM standards). On this basis they should not be relied upon. Table 6-6 presents the Cullen et al. (2007) NI 43-101 compliant resource estimate completed by Mercator, which has an effective date of December 12, 2007”.

**Table 6-5: Historic Resource Estimates for Getty Zone Not NI 43-101 Compliant (from Cullen et al, 2011)**

<b>Reference</b>	<b>Tonnes</b>	<b>Zn &amp; Pb (%)</b>	<b>Zn (%)</b>	<b>Pb (%)</b>
Riddell (1976)	4,470,400	3.71	1.87	1.84
MacLeod (1980)	3,149,600	2.97	1.60	1.37
Hudgins and Lamb (1992)	4,490,000	3.20	1.87	1.33

Notes: With regard to the historic mineral resource estimates stated above 1) a qualified person has not done sufficient work to classify the historical estimate as current mineral resources or mineral reserves; 2) the issuer is not treating the historical estimate as current mineral resources or mineral reserves as defined in Sections 1.2 and 1.3 of NI 43-101; and 3) the historical estimate should not be relied upon.

**Table 6-6: Mercator NI 43-101 Compliant Resource Estimate for Getty Zone (effective December 12, 2007) (from Cullen et al, 2011)**

Reference	Tonnes	Zn & Pb (%)	Zn (%)	Pb (%)
Cullen et al (2007)	4,160,000	3.21	1.81	1.40

Riddell (1976) used a 2% (zinc% + lead%) cut-off, Macleod (1980) used 1.5% zinc cut-off and Hudgins and Lamb (1992) used a 1.5% zinc-equivalent cut-off defined as zinc equivalent = zinc% + (lead % x 0.60).

Figures for the previous Mercator estimate that are presented in Table 6-6 reflect application of a 2% zinc + lead cut-off. The Riddell (1976) and MacLeod (1980) estimates are based on drill-hole-centered polygonal methods of volume estimation along with subjectively determined specific gravity factors reflecting general experience.

Both estimates include length-weighted drill hole grade assignments to polygons with subsequent tonnage-weighting to determine deposit grades.

In contrast, Hudgins and Lamb (1992) used Surpac® deposit modeling software, a cross sectional method of volume estimation, a single assigned specific gravity factor of 2.75 g/cm<sup>3</sup> and calculated average deposit zinc and lead grades as the length-weighted averages of all qualifying drill hole intercepts.

## 7 Geological Setting and Mineralization

### 7.1 Regional Geology

An excellent summary of the regional and deposit geological settings of the Scotia Mine area is supplied by Patterson (1993). There is also a “special issue devoted to zinc-lead mineralization and basinal brine movement, lower Windsor Group (Viséan), Nova Scotia Canada” released as Volume 93 by Economic Geology in 1998. The bulk of the descriptions below are taken from those publications.

The Scotia Mine Deposit occurs along the southern margin of the large (more than 250,000 km<sup>2</sup>) and deep (more than 12 kilometres) late Palaeozoic Fundy (Magdalen) Basin, bordered on the northwest by the New Brunswick platform, and on the south by the Meguma platform (Figure 7-1 overleaf). During the late Palaeozoic, the Fundy Basin was divided or segregated through a complex series of grabens into deep linear successor basins or sub-basins, which are now interpreted (Fralic and Schenk, 1981) as small pull-apart basins. Subsequent basement subsidence, fragmentation and block faulting produced the irregular pre-Carboniferous topography that was partly filled-in by early Carboniferous clastics, and later flooded by middle Carboniferous seas. Carboniferous sediments consisting of terrestrial conglomerates, and sandstones, siltstones and marine limestones and evaporites, were deposited in this Fundy Basin which probably remained active during and after the Carboniferous, and may have had a major impact in the ore-forming process. These sub-basins contained thick accumulations of terrestrial and shallow marine sediments, and therefore could provide substantial volumes of basinal fluids (Ravenhurst, 1987).

In their 2011 report, Cullen et al. give further detail about the Carboniferous strata:

“The Getty Zone is hosted by lower Mississippian age dolostone of the Windsor Group's Gays River Formation. Well defined carbonate banks characterize this formation and in most instances are associated with well-defined paleo-basement high features. On depositional basin scale, Gays River Formation bank carbonates and laminated limestone of the laterally equivalent Macumber Formation mark the onset of marine depositional conditions after a prolonged period of predominantly terrigenous clastic sedimentation represented by Horton Group siliciclastic rocks”.

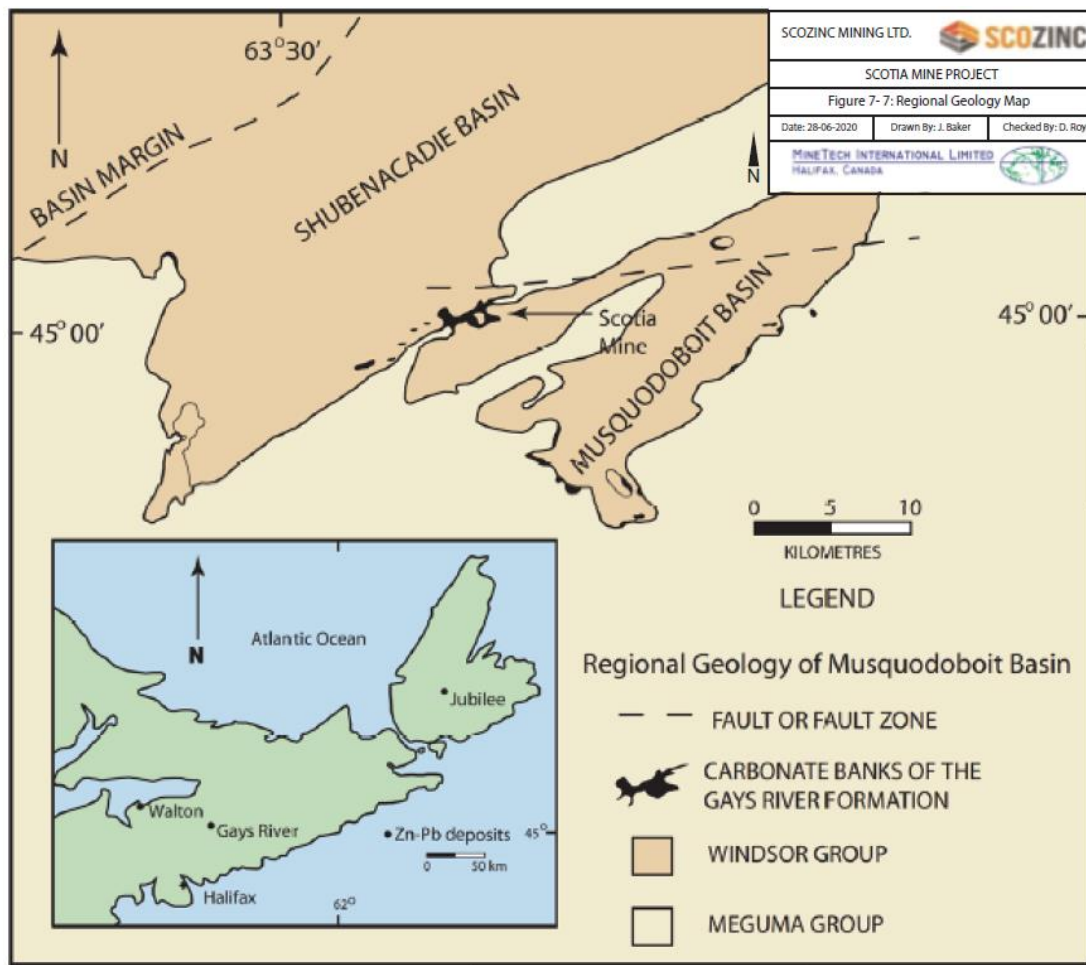
“Carboniferous strata in Central Nova Scotia occur within the Shubenacadie and Musquodoboit sub-basins of the larger Maritimes basin and were described by Giles and Boehner (1982). Geometry of both sub-basins was significantly influenced by strong northeast trending structural grain in basement sequences of the Cambro-Ordovician Meguma Group. Deformation was heterogeneously distributed across the sub-basins and at present is now represented by northeast trending normal and thrust faults which are locally associated with open to moderately folded structural domains. Deformation features are essentially absent near the southern margins of the basins but become more prevalent and pervasive toward the northern limits, where effects of the regionally significant Cobequid-Chedabucto fault system are represented. Minor faults or fracture zones may be present at Getty but no structural complexity is evident in either the surface morphology or drill logs.” (Cullen et al., 2011, Section 6)

The Scotia Mine Project area is underlain by the Cambro-Ordovician metasediments of the Meguma Group which form the pre-Carboniferous basement upon which the Gays River carbonate host rock was deposited. The Meguma rocks were tightly folded during the Acadian Orogeny into long northeast-southwest anticlines and synclines which have been faulted and jointed. Erosion of this basement into irregular knobs and ridges

was controlled by these structures prior to the deposition of overlying sediments (the Gays River carbonate). Unconformably overlying the Meguma Group are clastic sedimentary rocks of the Horton Group and marine sedimentary rocks of the Windsor Group which overstep the Horton near the basin margins and rest directly on Meguma basement. It is these Windsor Group carbonates which have been the host for the carbonate-hosted base metal sulphide and associated sulphate deposits in Nova Scotia.

Over 100 base metals occurrences, including a few deposits, are hosted by Lower Windsor Group marine carbonate rocks in Nova Scotia. About half of these occur within the Kennetcook, Shubenacadie, Musquodoboit and River Denys sub-basins. In addition to the Scotia Mine Deposits, the most significant examples include the Walton deposit and the Jubilee deposit. Walton has two types of mineralization: concordant sheets of barite contain lenses of lead-rich and copper-rich mineralization. Between 1941 and 1978, 4.5 million tonnes containing over 90% BaSO<sub>4</sub>, and 0.4 million tonnes containing 0.52% Cu, 4.28% Pb, 1.29% Zn and 350 g/t Ag were produced (Sangster, Savard and Kontak, 1998). At the Jubilee deposit on Cape Breton sulphides cement fault-related breccias and replace adjacent limestone; there are reported, unclassified resources (e.g. Fallara and Savard, 1998) of 0.9 million tonnes containing 5.3% Zn and 1.4% Pb.

**Figure 7-1: Regional Geology Map**



Source: MineTech, 2020

## 7.2 Property Geology

The Gays River Formation and its lateral equivalent, the Macumber Formation, form the basal carbonate units of the Windsor Group. There is an angular unconformity between the marine sediments (Gays River Formation and Macumber Formation) and the underlying basement rocks. The underlying 380-400 million-year-old basement rocks consist of greenschist facies meta-turbidites of the Meguma Group that form a northeast-trending, paleotopographic high which separates the Shubenacadie and Musquodoboit basins, and over which the Gays River carbonate bank developed (Kontak, 1998; Savard & Chi, 1998). The property's stratigraphy is shown in Figure 7-2. The basement is overlain by a laterally extensive, but discontinuous, talus breccia composed of centimetre- to metre-size, rounded to sub-rounded fragments of Meguma Group lithologies cemented by dolostone. Overlying the basal breccia or directly in contact with the basement rocks is a carbonate build-up composed of various bank and interbank facies: algal, coral and bryozoan bafflestones, skeletal packstones and wackestones. Contours for the top of the carbonate contact are shown in Figure 7-3. The carbonate bank can be traced basinward into a laterally extensive, thinly laminated, 3 to 18 metres thick argillaceous, bituminous dolostone or limestone unit referred to as the Macumber Formation.

Overlying the carbonate rocks are evaporites (gypsum, anhydrite, halite and minor potash) with minor interbeds of dolostone and mudstone, all of which constitute the Carrolls Corner Formation. Nearby, 5 kilometres to the southwest, the gypsum is being mined at the National Gypsum Quarry.

In the deposit area, the contact between the evaporites of the Carrolls Corner Formation and the carbonates of the Gays River Formation was deeply incised by a palaeochannel during a period of uplift and erosion during the Cretaceous period. It was filled-in by sedimentary debris (boulders, sands, silts, clay and gypsum fragments) to which a Cretaceous age has been assigned. This dense, over-compacted debris has been termed "Trench" material; it occurs adjacent to the massive sulphide mineralization. Near the contacts, highly permeable, open channel-type structures have caused locally high rates of water flow that have been an impediment to underground mining.

Both the bedrock and "trench" sediments are overlain by 20-40 metres of glacial till, which is locally cut by glacial-fluvial sands and gravels. Three geological cross sections are included as Figure 7-4, Figure 7-5, and Figure 7-6. Figure 7-6 represents the prototypical cross-sectional geology for the deposit. Figure 7-7 illustrates the Getty Area Stratigraphic column.

Cullen et al (2011) describe the Getty Zone in Section 7.1 & 7.2 ('Stratigraphy' and 'Deposit Type', respectively) of their report:

"Stratigraphy: Geology in the Getty Zone area has been interpreted from compiled results of Giles and Boehner (1982) plus results of various mapping and diamond drilling campaigns carried out in the area. The actual deposit does not outcrop, but was delineated by Getty through drilling" (e.g. Bryant, 1975, Comeau, 1973, 1974; Palmer and Weir, 1988a, b).

"As represented in Figure 7-7 the Getty Zone is hosted by a northwest trending Gays River Formation carbonate bank complex that occurs as a direct extension to the larger, northeast trending carbonate bank that hosts Scotia Mine's zinc lead resources and reserves. Both banks developed along paleo-basement



highs comprised of Cambro-Ordovician age Goldenville Formation quartzite and greywacke. At Getty host dolostone ranges in true thickness from less than a metre to a maximum of about 45 metres”.

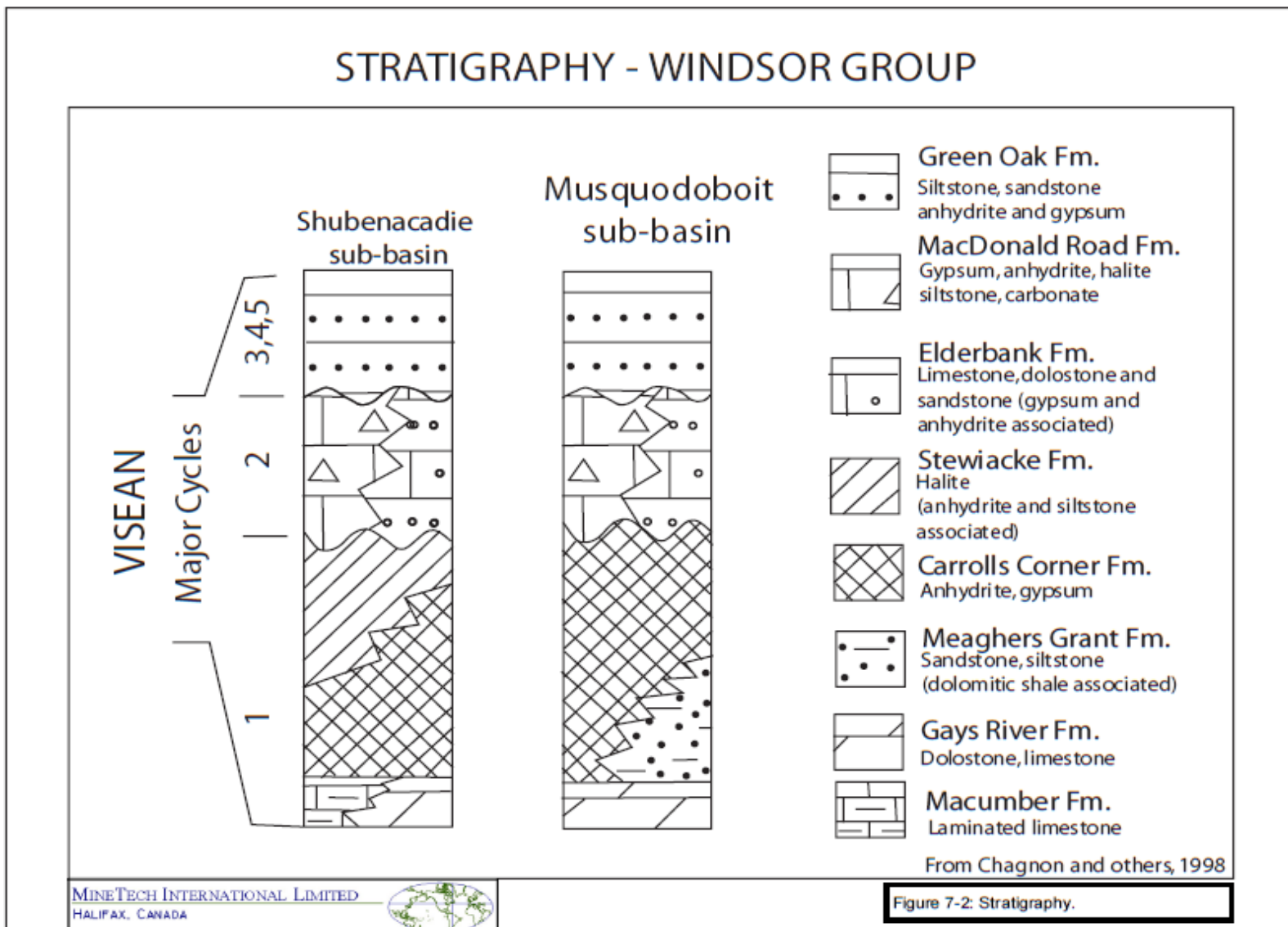
“The carbonate host sequence occurs above a thin sedimentary breccia or conglomerate unit comprised predominantly of Goldenville Formation debris with a small carbonate matrix component resting unconformably on Goldenville Formation basement. Carrolls Corner Formation evaporites lie stratigraphically above the Gays River Formation and are comprised locally of gypsum and anhydrite with minor amounts of interbedded dolomitic limestone and siltstone. With possible exception of local clay and sand accumulations of Cretaceous age, Carrolls Corner Formation rocks are the youngest sequences of the local bedrock. Section 2 presents a stratigraphic column for the deposit area”.

“Historical and the current drilling on the Getty property has shown that evaporite cover at the Gays River Formation contact was in many instances preferentially removed by erosion and karst-related solution processes during Cretaceous time, leaving a trough or trench parallel with the carbonate contact in many areas. Stratified Cretaceous fill sedimentary material followed by Quaternary material of glacio-fluvial origin infilled this trough, and is termed "Trench" material on the adjacent Scotia Mine property. Similar material exists in some areas adjacent to the Getty Zone but in many instances is difficult to distinguish from less consolidated overburden material that is of glacial origin”.

“The Getty Zone carbonate bank forms a northwest extension to the adjacent Gays River bank that hosts Scotia Mine zinc-lead resources and reserves. While broadly similar, carbonate bank slopes at Getty are generally gentler than those seen at Main Zone. Figure 7-4 depicts a typical bank cross section illustrating occurrence of thickest carbonate on the bank top, with progressive thinning down dip on the paleo-topographic high. Variations existed locally in basement paleo-slope angles and appear to have directly influenced corresponding carbonate bank morphology. Areas with steep basement slopes tend to show rapid thinning of carbonate away from the thicker bank tops, with correspondingly steep contact surfaces with overlying evaporites. Gentle slope areas show greater lateral and down-dip continuation of thicker carbonate and corresponding lower average contact dips with the overlying evaporite. Based on the drilling carried out to date at Getty, the maximum carbonate thickness encountered along the basement high trend is 45.48 metres in drill hole GGR-221”.

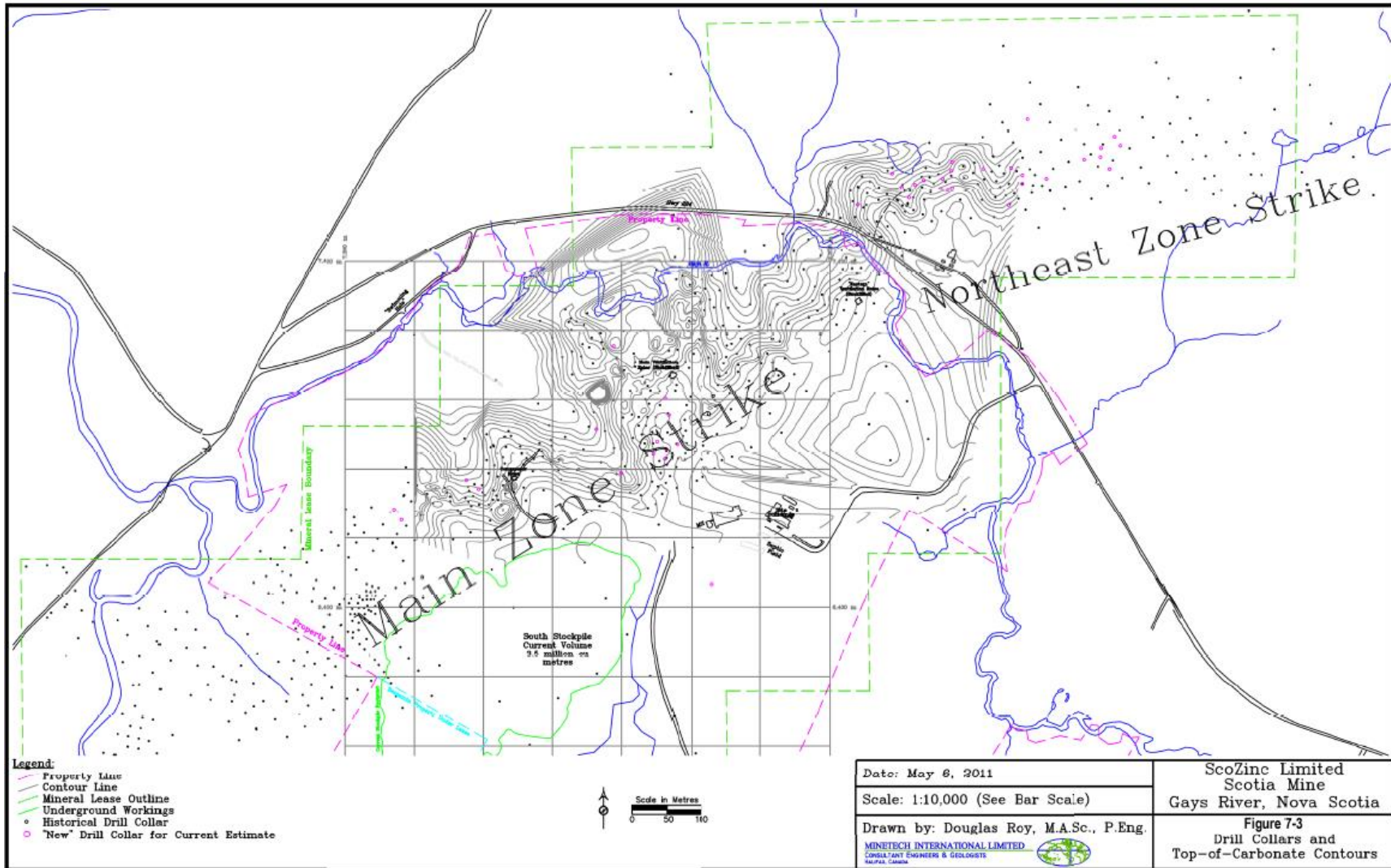
“Gays River Formation carbonate banks include intricately intercalated algal, peloidal and coralline lithofacies, with abundance of bindstone, bafflestone, packstone and micrite. These facies show transition downdip to thin (typically <5 metres), variably laminated algal/silty carbonates that are lateral equivalents to laminated carbonates of the Macumber Formation. The latter occurs basinward of the underlying Horton Group's stratigraphic pinchout and is not present in the deposit area.”

Figure 7-2: Stratigraphic Section of the Windsor Group



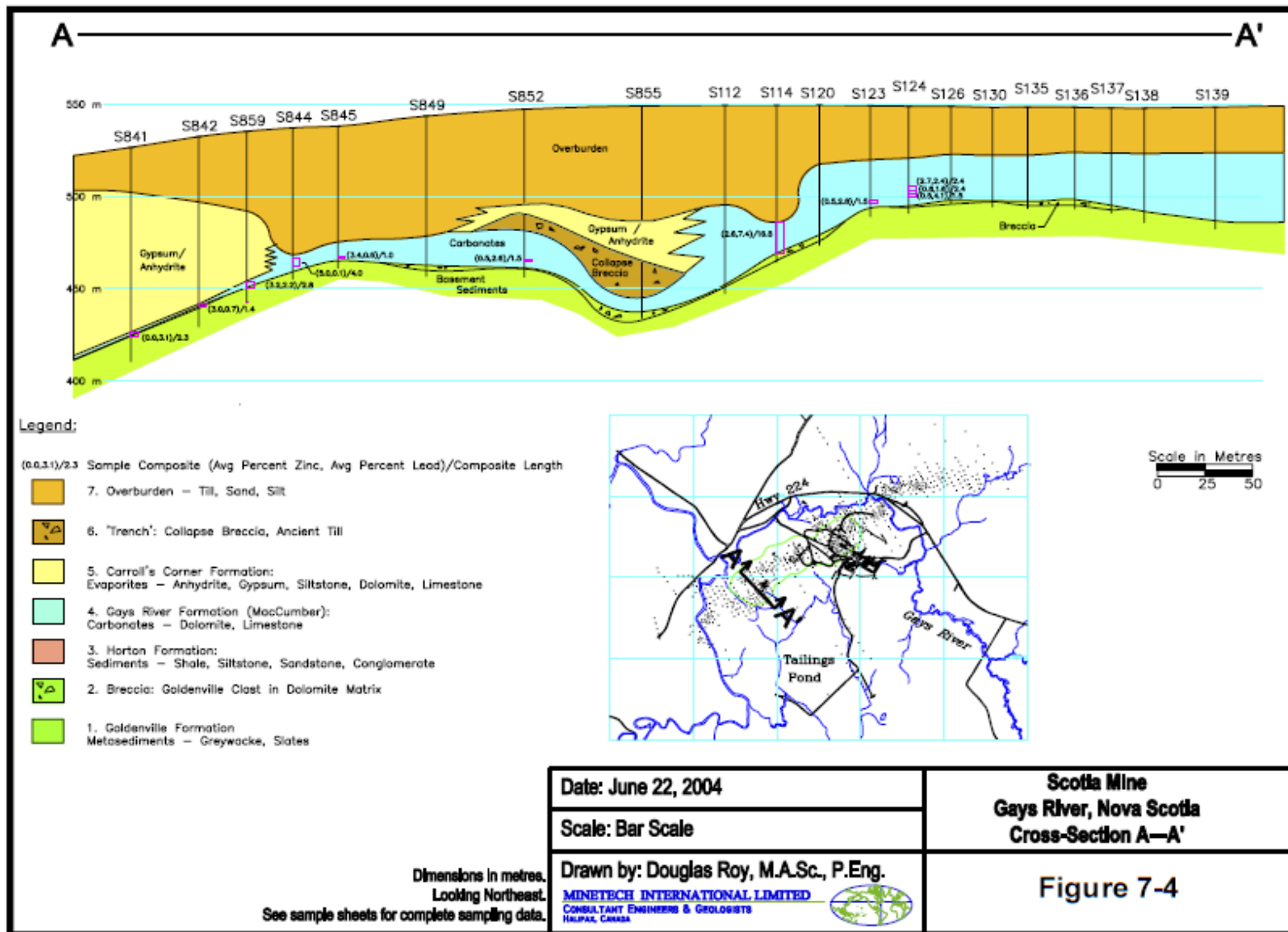
Source: MineTech, 2012

Figure 7-3: Top-of-Carbonate Contour Map



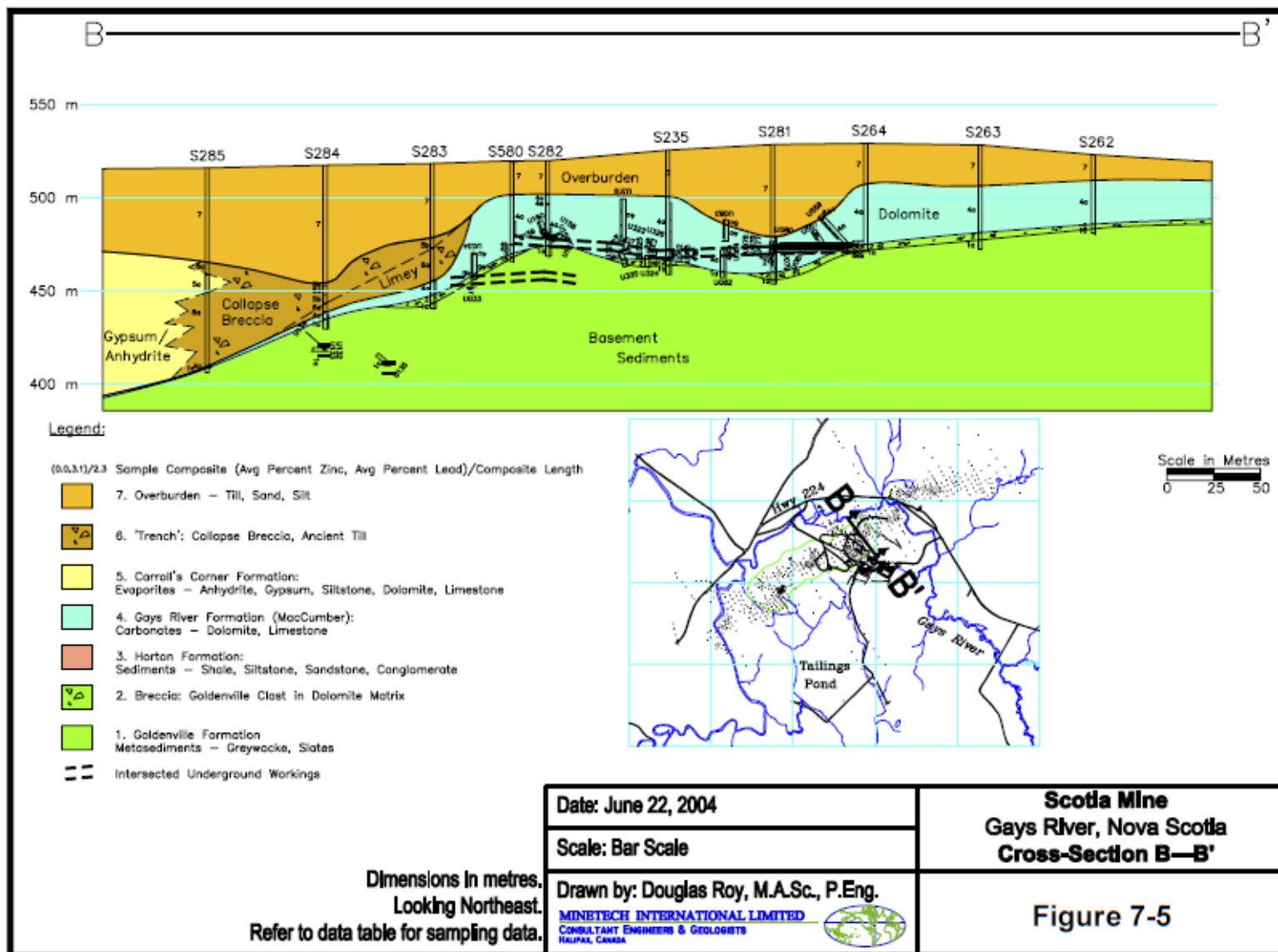
Source: MineTech, 2012

Figure 7-4: Geological Cross-Section A-A'



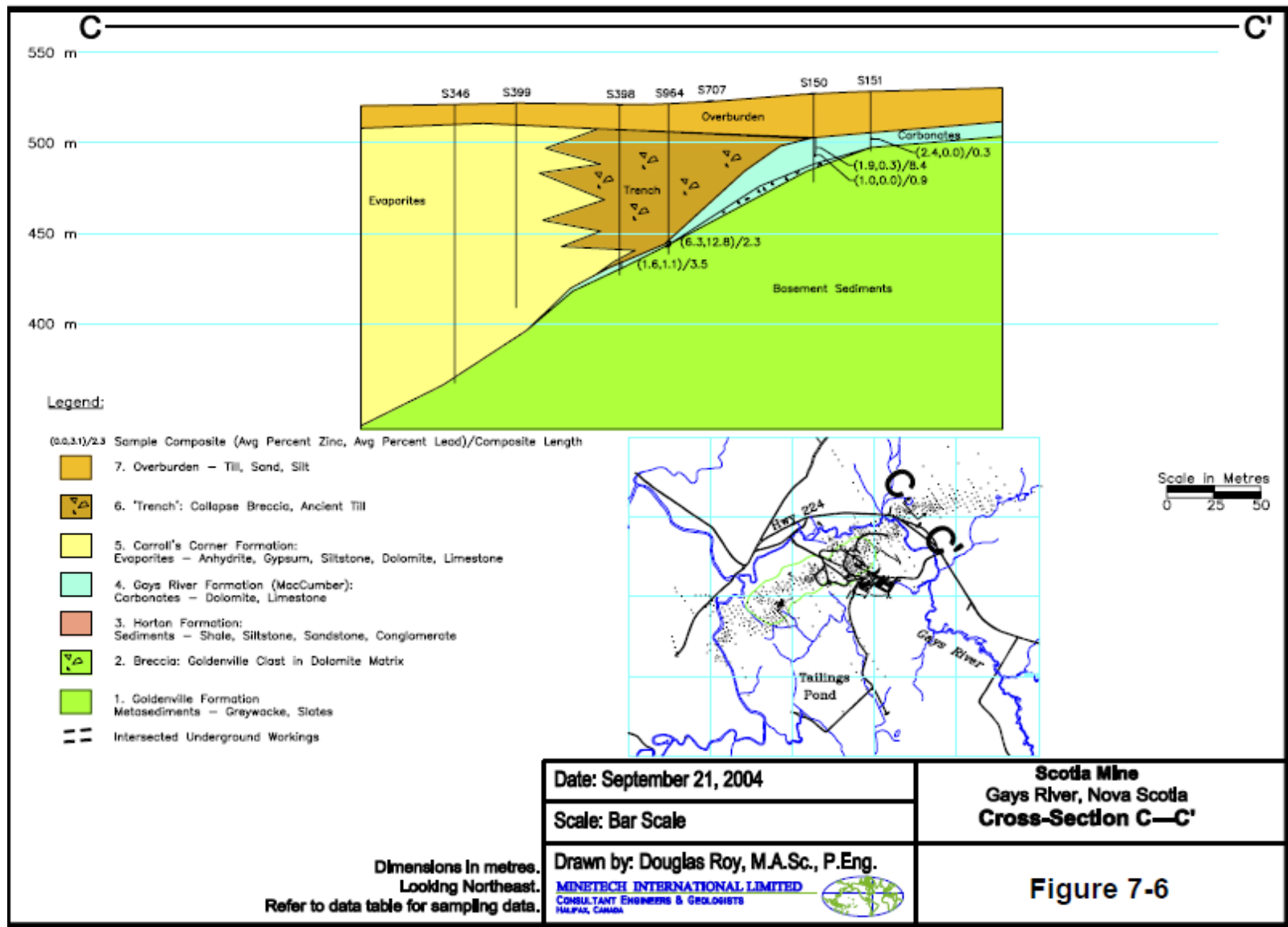
Source: MineTech, 2012

Figure 7-5: Geological Cross-Section B-B'



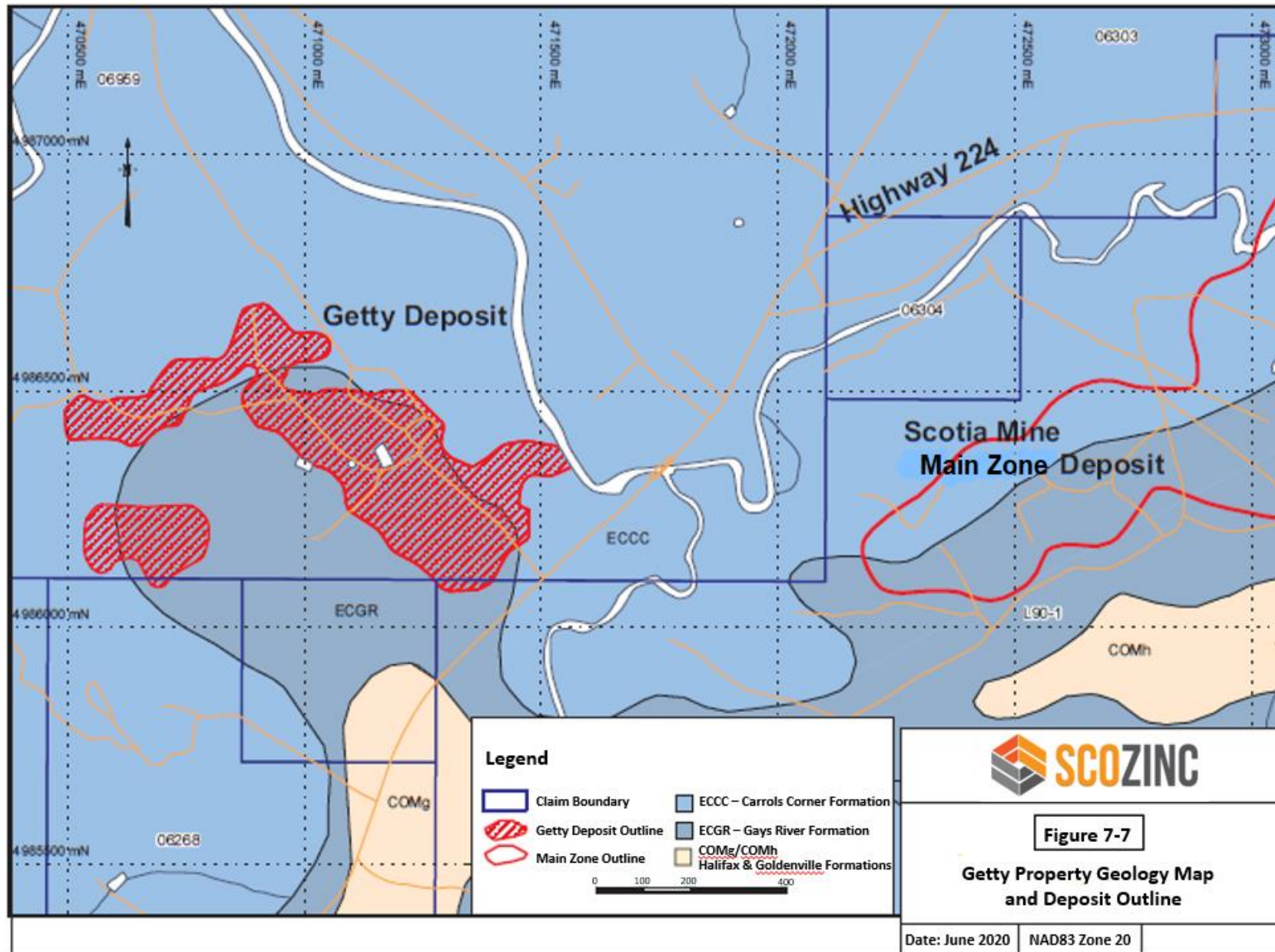
Source: MineTech, 2012

Figure 7-6: Geological Cross-Section C-C'



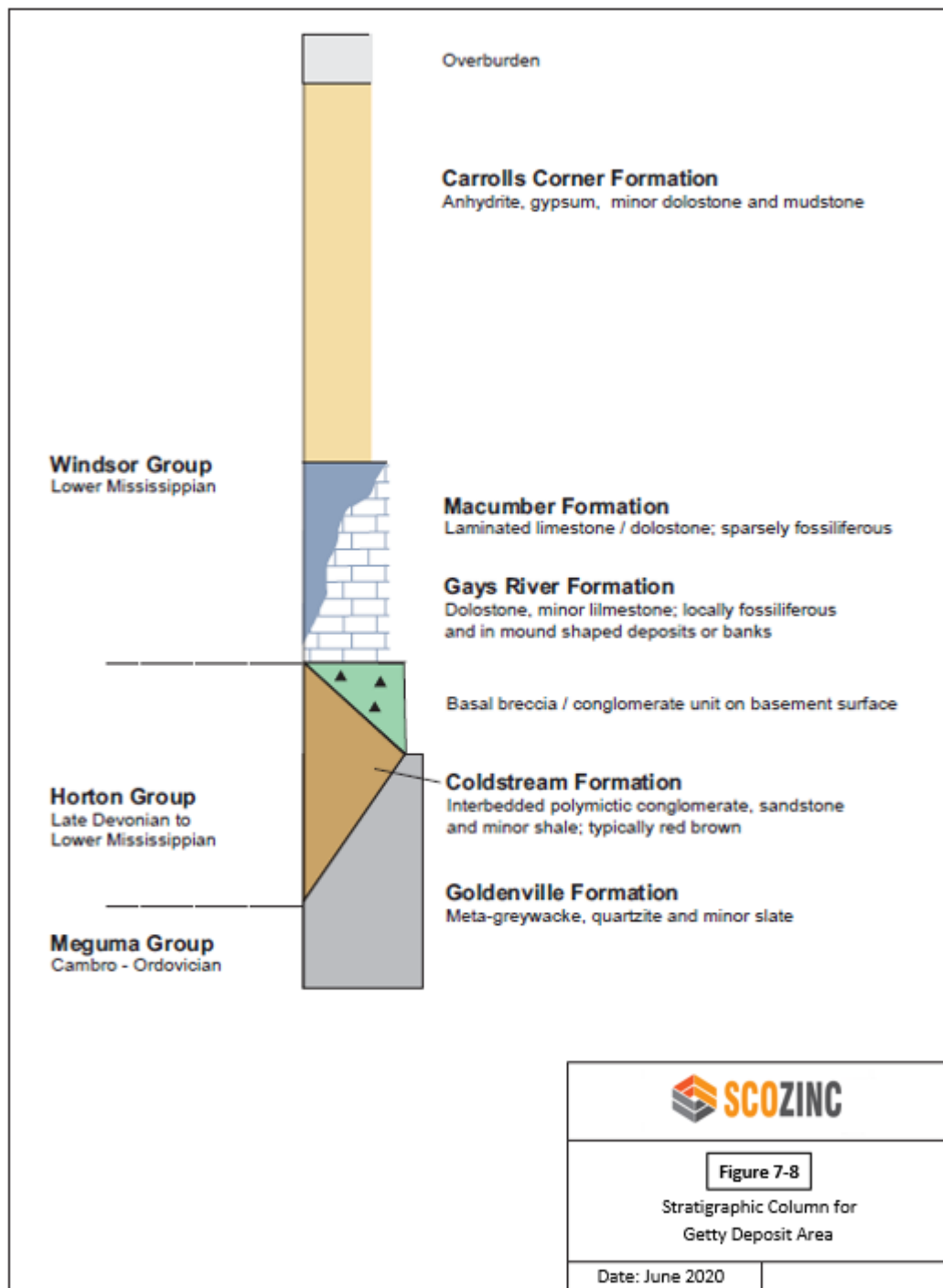
Source: MineTech, 2012

Figure 7-7: Getty Zone Geological Map



Source: MineTech, 2020

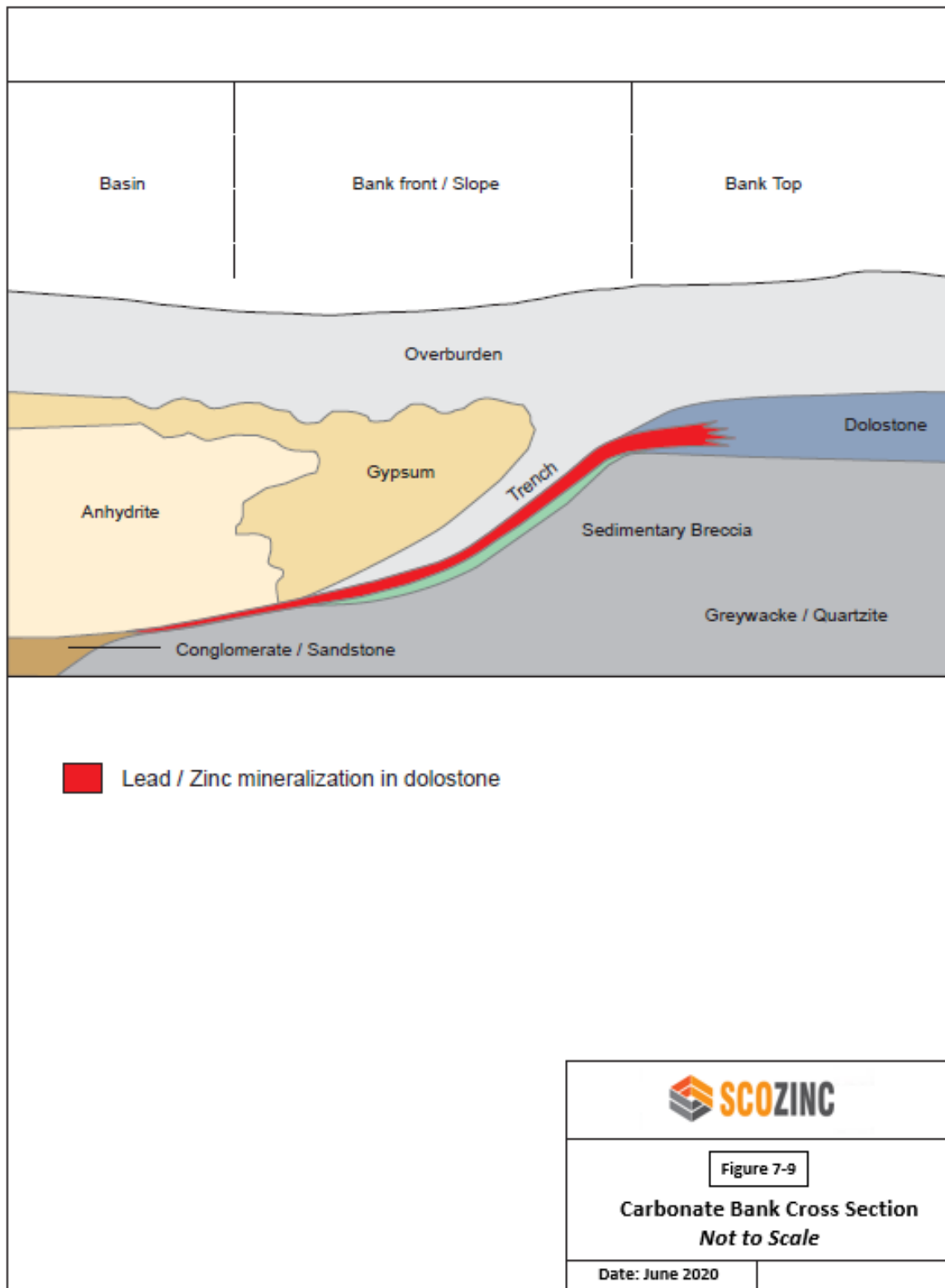
Figure 7-8: Getty Zone Stratigraphic Column



Source: MineTech, 2020



**Figure 7-9: Carbonate Bank Cross-Section**



Source: MineTech, 2020

## 7.3 Mineralization

### 7.3.1 Main Zone Mineralization

Nesbitt Thomson Inc. (1991) describe the high-grade mineralization as consisting of a massive sulphide zone in contact with the evaporite or Trench, ranging in thickness from 0.1 to 5.0 metres and locally containing up to 78% Pb and 57% Zn. On the footwall of the massive sulphide, there is a zone of disseminated material (>7% Zn equivalent) which, in places, is up to 12 metres in thickness. Locally disseminated mineralization (>2% Zn equivalent) extends up to twenty metres into the footwall. The parameters used to calculate “Zn equivalent” are unknown but would have reflected the prices of zinc and lead at the time.

The Main Zone is essentially controlled by a sinuous paleo coastline. The main part of the deposit is shallow (generally <150 m deep), has a dip length of approximately 100 m and a strike length following the paleo-coastline over a straight-line distance of 2 km (Nesbitt Thomson Inc., 1991).

The mineralization at the Main Zone consists of massive and/or disseminated ore hosted predominantly by the carbonate rocks, with extensions down into the basal breccia unit. The massive mineralization consists of fine-grained (<10-20 m), Fe-poor, beige-coloured sphalerite and medium to coarse-grained, Ag-poor galena (<10-20 ppm Ag in galena concentrates) (Kontak, 1998; Savard and Kontak, 1998), is restricted to the carbonate-evaporite contact and is 1 to 3 metres in true thickness. Disseminated mineralization, consisting of yellow to orange, millimetre-size euhedral sphalerite and millimetre-to-centimetre-size euhedral galena, fills in primary porosity in the dolomitized carbonates and walls of primary cavities (Kontak, 1998).

Sphalerite and galena constitute about 99.5% of metallic minerals. Other sulphide minerals are marcasite, pyrite and chalcopyrite, while gangue minerals include calcite, dolomite, fluorite, barite and selenite (Patterson, 1993).

### 7.3.2 Getty Zone Mineralization

The following is taken from Section 8 (Mineralization) of Cullen et al (2011):

“Zinc and lead sulphide mineralization are found throughout the Getty carbonate bank, along with trace amounts of iron sulphide in isolated areas. Base metal sulphides are also present to a lesser extent in carbonate matrix of the underlying conglomerate/breccia unit and within calcite or micrite filled fractures and joints present in underlying Goldenville Formation greywackes. While not extensively reported to date, galena has also been documented locally at the Scotia Mine [Main Zone] deposit in thin (<20cm thick) discordant, steeply dipping veins that generally trend north-south (B. Mitchell, personal communication, 2007)”.

“Drilling to date on the Getty Zone has shown that massive to submassive high grade mineralization like that commonly present along steep bank front zones at Scotia Mine is not present to a significant degree at Getty (Bryant, 1975). However, a clear association of higher zinc and lead grades with dolostone intervals on the northeast and north slopes of the Getty bank is recognized and lower grades over thicker

intervals occur within the carbonate sections at the top of the bank. Mineralization is more poorly developed along the southwest side of the bank”.

“Sphalerite is the predominant base metal sulphide phase present and is typically honey yellow to buff or beige in colour and finely crystalline. Based on drill core observations, Bryant (1975) specified the following four modes of sphalerite occurrence within the deposit, with the first being the most common: (a) disseminated mineralization showing concentrations from trace to 10% or more, (b) semi-massive and massive mineralization as seams and replacements along bedding surfaces or laminae, (c) massive, porosity filling or surface coating mineralization in fossiliferous and vuggy carbonate, (d) mineralization associated with secondary calcite in small stringers and veinlets”.

“Silver is a trace constituent of the Getty sulphide assemblage but is not present at levels of economic significance. This parallels the situation at adjacent Scotia Mine where Roy et. al. (2006) reported historic silver values in mill concentrates that were typically less than 40 parts per million.” (Cullen et al, 2011, Section 8).

## 8 Deposit Types

The Scotia Mine Deposit mineralization has long been considered a Mississippi Valley-type (“MVT”) lead-zinc deposit (MacEachern and Hannon, 1974). Characteristics of sedimentary formations that host MVT lead-zinc mineralization include shallow-water, shelf-type carbonate rocks with reefs around the peripheries of intra-cratonic basins, karst structures, limestone-dolomite interfaces and proximity to a major hydrocarbon-bearing basin. The archetypical MVTs occur in the United States in several famous districts surrounding the Michigan-Illinois Basin which also has significant hydrocarbon production. Each of the districts is enormous, with resource potential of 75 million to 750 million tonnes and individual deposits in the order of 1 to 100 million tonnes.

Other MVTs have been mined in the past in Canada (e.g. Pine Point in the Northwest Territories, Nanisivik mine in Nunavut, and Newfoundland Zinc) and in Ireland.

MVTs are thought to have formed when hot, basin-derived, oil field-type brines, formed at depths of more than 2 km, migrated towards lower pressure areas around the basin periphery. Mineralization precipitated from the brines when they encountered porous areas like reefs, karst breccias or sedimentary traps.

Sangster and others (1998) draw on their own and others’ evidence to conclude that all Windsor Group lead-zinc deposits are epigenetic relative to their enclosing strata, exhibiting both open-space filling and host-rock replacement. At the Scotia Mine Deposit, textures (including fossils) have been preserved; representing volume-for-volume replacement of original limestones by dolomite, and the sulphides are, in turn, replacements and porosity fillings within the previously altered host rocks. Kontak (2002) feels that petroleum in fluid inclusions in the Scotia Mine Deposit mineralization suggest a role of hydrocarbons in the mineralising process, like many MVTs, but Sangster and others (1998) point to basement rocks underlying the Palaeozoic sedimentary rocks as the source of the mineralising fluids.

The temperatures of formation of the Scotia Mine Deposit (and others in Nova Scotia) are higher than most North American MVTs and compare more favourably with the clearly epigenetic MVTs of the Central Ireland Basin (Sangster and others, 1998). The Irish deposits also occur in Upper Paleozoic (Carboniferous) carbonate rocks, predominantly in shallow-water carbonates and a mudbank limestone (reef). The Irish deposits are also preferentially associated with east-northeast-trending faults which are thought to have acted as conduits for mineralising hydrothermal fluids; basement lineaments may also have controlled deposition. As with the Scotia Mine Deposit, sphalerite and galena are the main sulphides; barite is also usually present (Exploration and Mining Division Ireland, 2004). Seven economic deposits have been mined or are currently in production in Ireland. The largest of these, the world-class Navan deposit, had total production and proven + probable reserves of 82.1 million tonnes containing about 10.6% Zn+Pb; its annual production is 2.5 million tonnes of ore. Other producers and former producers had resources between about 8 and 18 million tonnes and grades of 9-25% Zn+Pb (Exploration and Mining Division Ireland, 2004).

It is noteworthy that two major carbonate-hosted zinc-lead deposits discovered in Ireland since 1986 occur down-dip from areas where considerable exploration, including diamond drilling, had been carried out over the prior 20 years (Patterson, 1993). Similarly, the MVT deposits of the Viburnum trend in the

U.S.A. were discovered at depths of 300 metres by understanding of the regional geology of the hosts rocks of the Old Lead Belt about 80 km away.

Cullen et al (2011) describe the Getty Zone in Section 7.2 of their report, quoted below in part:

“Genetic Model [original section: DEPOSIT TYPE (7.2)]”

“The adjacent Scotia Mine deposit (Main Zone) has been the subject of extensive academic and government research and reporting since its discovery in 1973. Much of this work was summarised by Roy et. al. (2006) and the deposit is a considered an example of the Mississippi Valley Type (MVT) class of carbonate hosted, stratabound, base metal deposits. Prominent examples of the paleo-basement high deposit setting occur along the Viburnum Trend of Southeast Missouri, but are characterised in that area by dominance of lead mineralization over that of zinc (Sangster et. al., 1998; Akande and Zentilli, 1983; MacEachern and Hannon, 1974)”.

“Localization of base metals within the Getty bank complex is believed to have resulted from interaction between metal-bearing basinal fluids, potentially sourced in the Horton Group stratigraphic section or in basement sequences, and chemical reductants, possibly including hydrocarbon, that were present at sites of deposition within the bank. Kontak (1998, 2000) reported on fluid inclusion and other studies of ore from the adjacent Scotia Mine property and concluded that saline brines in the 100° C to ≤ 250° C temperature range were involved in the main mineralizing process and that these temperatures are higher than those typically seen in MVT districts. Héroux, et. al (1994) studied organic maturation and clay mineral crystallinity characteristics of Gays River Formation rocks of the Musquodoboit and Shubenacadie basins and identified a corridor of higher interpreted heat flow that occurs in part over the Scotia Mine Deposit areas and is consistent with the higher fluid temperatures previously noted. It is clear that zinc and lead mineralization were superimposed on lithified and dolomitized host rocks (Akande and Zentilli, 1985; Kontak, 1998).” (Cullen et al, 2011)

## 9 Exploration

### 9.1 Exploration History

The Scotia Mine Deposit zones were explored more-or-less contemporaneously. Major drilling campaigns on both zones first started in the mid-1970s. Esso Minerals was primarily involved with the Main Zone while Getty Northeast Mines Limited was primarily involved with the Getty Zone. During the 1980s, Seabright and Westminer carried out some drilling on the Main Zone and during the late-2000's, ScoZinc chiefly drilled the Getty Zone.

#### 9.1.1 Main Zone

Lead-zinc mineralization at Scotia Mine was first mentioned in records dating back to 1824. Knowledge of the occurrence may even go back to the early 1700's when French soldiers reportedly used the lead for making ammunition (MacEachern and Hannon, 1974). Other early references to Gays River lead were made in 1868 by J. W. Dawson in "Acadian Geology" and by H. Howe in "Mineralogy of Nova Scotia".

The earliest recorded prospecting may have been trenching along the outcrops in 1873-1874. Additional trenching and pit sinking were carried out in 1928. Assessment records do not indicate any resumption of interest in the area until 1951. From the first reports of mineralization in the area in the early 1800's, exploration activity up to 1950 had yielded best values of 3% lead (Patterson, 1993).

1951

Maritime Barytes Limited acquired the property at Scotia Mine and carried out a surface exploration program involving some trenching and sampling. Gays River Lead Mines subsequently became involved in the evaluation of the property and commenced a drill program to delineate the occurrences of lead and zinc. A total of 67 delineation drill holes were completed by mid-1952 and an additional seven holes were completed for exploration in the vicinity.

The drilling by Gays River Lead Mines Limited outlined four zones of mineralization in an area about 400 metres by 900 metres. Over 800,000 tonnes of mineralised (galena, sphalerite, pyrite, marcasite and chalcopyrite) Windsor Group carbonate were defined overlying and flanking a northeast-trending anticlinal Meguma greywacke basement high. Grades for the four zones ranged from 1.10% to 3.50% combined lead plus zinc with an average of 2.32% combined lead plus zinc. Most, if not all, assays were from sludge samples.

1962

Gunnex Limited carried out extensive soil sampling in the Scotia Mine area in 1962. Anomalies were encountered only over areas of previously known mineralization where overburden was thin. An induced polarisation survey indicated only a very weak response over known mineralization and did not add any new target areas. The lack of encouraging response on the periphery of the earlier defined mineralised area prompted Gunnex to forego any further exploration activity.

1968 – 1969

In 1968 and 1969 Penarroya Canada Limited completed extensive soil sampling and geological mapping in the Scotia Mine and Meaghers Grant areas. Two diamond drill holes in the Meaghers Grant area intersected minor zinc mineralization. No drilling was carried out in the Scotia Mine area even though a number of soil anomalies had been identified. Most of the major anomalies corresponded with previously known mineralization. Two new anomalous areas were, however, defined. They occur near Carrolls Corner and in the Black Brook area east of the Gays River and define a northeast trending geochemical high. The latter area is close to the northeast end of the presently defined Main Zone itself.

1971

Texasgulf Inc. drilled four diamond drill holes in the Scotia Mine area in 1971. One hole adjacent to a Gays River Lead Mines drill hole confirmed significant mineralization in the carbonates. The remaining holes tested one soil anomaly southeast of Gays River and two areas northwest of Gays River. No encouraging mineralization or carbonate build-ups were intersected in the last three holes and work was terminated.

1972 – 1984

In 1972 personnel of Cuvier Mines Limited (“Cuvier”) prospected the Scotia Mine area and located significant mineralised float material to the south of the old occurrence (MacEachern and Hannon, 1974) and subsequently acquired the ground. Cuvier also outlined geophysical and geochemical anomalies. In September of 1972 Cuvier optioned the property to Imperial Oil Enterprises (“Esso”) with Esso holding a 60% interest and acting as the operator. Cuvier formed a joint venture with Preussag Canada Ltd. (“Preussag”) to finance Cuvier’s 40 % interest in the property.

Both Cuvier and Esso were of the opinion that the area had the proper geological setting for a Mississippi Valley-type deposit. Esso recognised the possible existence of a reef complex trending north-easterly from the old Scotia Mine drilling site. The source of the mineralised boulders had not been located and a combination of deep glacial till and lack of outcrop would necessitate fence-type drilling in geologically favourable areas for the purpose of obtaining geological information as well as locating any mineralised areas.

A total of 20 holes were drilled prior to drilling the discovery hole 2.5 kilometres northeast of the original showing along the postulated reef trend. The discovery hole intersected 3.35 metres averaging 7% zinc (MacEachern and Hannon, 1974).

From October 1972 to August 1974, Esso/Cuvier drilled off the deposit and identified 12,000,000 tonnes averaging 7% Zn + Pb (Patterson, 1993) over an area of approximately 4 kilometres by 220 metres at depths ranging from 20 to 200 metres (450 surface core holes).

The initial mine development by Esso began with developing the exploration decline in 1976 across the central portion of the mineralised zone to verify mining conditions, the grade and continuity of the mineralization and to provide bulk samples for metallurgical testing. The decline was 760 metres in length but by mid-1979 some 1,800 metres of drifting and 744 metres of underground development had been

completed. The deepest workings were at a vertical depth of 100 metres. In December of 1977 Esso purchased Cuvier's and Preussag's interests in the property and formed Canada Wide Mines to develop and mine the deposit.

During the next two years various feasibility studies were carried out. Recoverable proven plus probable reserves were then estimated at 4.7 million tonnes at 2.8%Pb and 4.2%Zn (WMC, 1995). Esso commenced with the construction of the mill and other facilities in August of 1977. The 1,350 tonne processing plant was commissioned in October of 1979 and the mine was further developed to support a 1,350 tonne per day operation.

From 1978 until 1981, Esso operated the mine and targeted the lower grade mineralization using a trackless, lower cost, bulk room and pillar mining method approach. The higher grade mineralization near the carbonate contact was not part of the mine plan. Operations continued until August 1981 when production was suspended except for an underhand cut and fill technique test stope. Mining conditions exacerbated by bad ground conditions and excessive water inflow caused the operation to be suspended. During the operation, a total of 553,688 tonnes of mineralised material averaging 1.36% Pb and 2.12% Zn were produced and run through the mill – 272,000 tonnes of waste were also removed. Throughout this period efforts to achieve the full production rate, as well as efforts to mine areas of higher grade mineralization were complicated by the combination of the complex geological setting and the severe hydrological problems.

The plant was shut down in 1982 as a result of operating losses due to lower than expected grades, higher than expected operating costs, the difficult water problems and low metal prices.

Seabright Resources Inc. acquired the mine and mill in 1984 but despite a favourable feasibility study did not reactivate the mine due to depressed metal prices at the time.

A summary table of all known drilling at the Main Zone by all exploration companies over the years is included as Table 10-1. A map depicting the location of the surface holes is included as Figure 7-3.

#### 1985 – 1987

Seabright's primary intention was the usage of the mill facility to process gold ore from their outlying properties, and a secondary intent to later re-open the Main Zone mine (WMC, 1995). At the time, Seabright was mining (bulk sampling) gold-bearing quartz veins from four small operations; Beaver Dam, Forest Hill, Caribou and Moose River, all located within the Meguma Group (Cambro-Ordovician).

The milling facility was converted for gold processing. The mine was not re-opened at that time by Seabright as a sharp drop in zinc prices rendered the underground mining operation uneconomic.

#### 1987 – 1991

In 1988, Westminer Canada Limited ("WMC") purchased Seabright Resources. A review of the deposit, including the drilling of 89 surface core holes, led WMC to a positive production decision based on a reinterpretation of the geology and mining method. They began dewatering the underground workings in early 1989. Following the success of the mine dewatering and a test mining period to assess the suitability



of the proposed narrow vein cut and fill mining method to extract the high grade ore zones, the mine was placed back into production. It reached commercial production rates in March 1990 (WMC, 1995) at a rate of 800 tonnes per day.

WMC's initial approach was to drive small 2.5x2.5 metre cut and fill stopes adjacent to the "Trench" material. Dry waste rock backfill was placed after each lift. In most areas, the method allowed the high-grade ore on the carbonate-Trench contact to be extracted. In one area WMC successfully tested the room and pillar mining method (Nesbitt Thomson, 1991). A total of 187,010 tonnes of ore at an average grade of 3.5% Pb and 7.47% Zn were mined during WMC's involvement on the property.

Hydrological difficulties causing poor ground conditions continued to play a factor in the mine operation. In May 1991, rising water levels due to the spring runoff forced the cessation of mining in a number of stopes and WMC decided to place the mine in project mode. Following the suspension of production in 1991, WMC carried out an extensive program to understand the mine hydrology and concluded that the groundwater could be successfully managed so that mining operations would no longer be adversely affected.

WMC has identified the Eastern zone of the deposit as an area for possible early development because ground conditions are substantially better due to the hanging wall being generally gypsum/anhydrite rather than Trench. The grade is also higher relative to other sections of the deposit. The Eastern area appears promising for additional resources. WMC thoroughly assessed the property in 1991 and prepared a revised mine plan to resume mine production. The revised plan provided for more mechanisation of the mining method, institution of paste backfill, increased groundwater drainage through screened drainage wells and a revised pumping system. However, the operation was WMC's only lead and zinc producer, was not associated with any downstream smelting facilities and was a smaller operation relative to other corporate assets. For these reasons, the property did not fit within WMC's corporate strategy to focus on large scale operations and for this reason the property was sold to Savage Resources.

#### 1996 – 1999

After acquiring the Scotia Mine in 1996, Savage conducted two exploration drilling programs to fill in the gaps from prior drilling and improve the mineral resource estimate on the mine property. In December 1996, 36 diamond drill holes, totalling 1,325 metres were drilled in the central mine area adjacent to the underground mine entrance to test the continuity of the disseminated low grade mineralization in the back reef (known as the sand pit area –an area of commercial aggregate). In April and May 1997, an additional 30 diamond drill holes totalling 2,339 metres were drilled in the Northeast zone (as identified by WMC). Both programs were successful and confirmed the presence of low grade (in the central area) and high grade mineralization (in the Northeast zone). According to Cullen (1997), the results of the drilling (based on a 7% Zn-equivalent cut-off grade) enhanced some areas of the Northeast zone and diminished other areas. He also states that a complete revision of some of this area (with additional drilling evaluation) be completed prior to any production decision.

Savage dewatered the underground workings from June to August 1997 and started to rehabilitate the mine before a decision was made to extract the ore in the main, central zone using open-pit methods. An

open-pit design was prepared using appropriate technical criteria for ore mining and waste stripping (Gemcom and Whittle™ 3-D Optimization). The preliminary mine plan assumed the processing of 1,350 tonnes per day with the ore coming from a combination of underground (1,000 tonnes per day) and open-pit operations (350 tonnes per day).

In early 1999 ownership of Savage was transferred to the Australian mining company Pasma Canada Limited (“Pasma”).

#### 2001 – 2003

Regal Mines Limited (“Regal Mines”) purchased Pasma Resources Canada Company (“Pasma Resources”) and its assets in February 2002. Regal was owned 50% by OntZinc Corporation (“OntZinc”) and 50% by Regal Consolidated Ventures Limited (“Regal Consolidated”). As part of the sale, Pasma Canada Holdings Inc. (“Pasma Holdings”) retained a 2% net smelter return (NSR) royalty on future production. OntZinc acquired Regal Consolidated’s 50% interest in December 2002 to own 100% of Pasma Resources. Savage Resources Limited is the successor of Pasma Holdings and held the 2% royalty. Pasma Resources was later renamed ScoZinc Limited (“ScoZinc”). The mining and environmental permits are still in force and are held by ScoZinc along with all the Scotia Mine assets.

#### 2004 – 2006

Exploration activity by ScoZinc included diamond core drilling, a hydraulic mining test, prospecting of the general area, geological compilation of past relevant data and two lines (ten samples) of Mobile Metal Ion Geochemistry (MMI) across areas of known mineralization covered by thick accumulations of glacial till. The results of the MMI survey were inconclusive.

A hydraulic mining test was performed to determine whether such a method might be useful to uncover the glacial overburden and some of the Trench material in the area of the low grade, potentially surface mineable resources. This was primarily performed near the area of the sand pit next to the original portal. Generally, the test showed that it is possible to mine the sandy overburden in the current pit bottom using dredging methods.

Six holes were drilled through the “Trench” unit using a soil drilling rig. The Trench is a geological unit that occurs between the gypsum and dolomite units. The purpose of this program was to characterize the soils that make up the Trench. Four holes were drilled in the Central Zone near the current pit. The two other holes were drilled near the highway (Hwy 224) in the East Zone.

The soil holes in the Central Zone around the current pit consisted mainly of dark brown clay with fine-to-medium grained sand. Rock fragments, rounded-to-angular, were occasionally noted. The soil holes in the East Zone near the river and highway consisted of fine-to-medium grained sand with minor clay. This observation may be an important factor during future mining. Permeability underneath the river is expected to be high to a depth of at least 20-30 metres. This will adversely affect slope stability should the walls of an open-pit approach the river.

Twenty-five diamond core drill holes (1,845.3 metres) were completed by ScoZinc on the Scotia Mine property. Seventeen of these holes were meant to further define the lead and zinc mineralization

contained within the reef carbonate while the remaining eight holes were meant to test the gypsum potential immediately overlying the mineralised zones.

Four holes (477 metres) were completed in the north-eastern portion of the deposit while thirteen holes (1,172 metres) were completed in the central area of possible lower grade open-pit mineralization. The program was moderately successful in the central area with zinc values consistently in the 2 to 4% range over 1 to 2 metres (see Table 10-1). The drilling program in the northeastern zone proved less successful with mineralised intervals being quite thin.

Four holes (673.3 metres) were drilled in the northeast zone and an additional four in the central area to test the overlying gypsum in the hanging wall of the base metal mineralization. The holes were drilled to obtain core samples of the gypsum deposits that immediately overlie the mineralised zones. The purpose of the samples was to carry out early tests of gypsum consistency and quality as well as to confirm preliminary estimates of the probable size of the gypsum resource adjacent to the mineralised trend.

In most of the diamond drill holes, a gypsum “cap,” 20-30 metres thick was encountered. Grade was highest (greater than 90% gypsum) near the bedrock surface and decreased with depth. At 20-30 metres depth, gypsum grade dropped below 80%, transitioning to anhydrite over an interval of approximately ten metres. Because the gypsum was quite hard, it was difficult to visually determine the contact between gypsum and anhydrite.

2007 – 2008

ScoZinc began surface mining the deposit in 2007 and carried on into 2008. Due to a drastic fall in metal prices, ScoZinc placed the mine on care and maintenance status.

In 2008, ScoZinc drilled 17 diamond drill holes through the Northeast Zone (refer to Section 10).

2011

Selwyn drilled a further 39 drill holes totaling 4,950.50 metres between August 11 and October 11, 2011 (see Section 10.2.2).

### **9.1.2 Getty Zone**

A description of mineral exploration work that was carried out on the Getty Zone was given in Cullen et al (2011):

“... with the exception of regional soil geochemical surveying by Penarroya Ltd. in 1964 (Rabinovitch, 1967) that did not identify the Getty Zone, no substantial mineral exploration efforts appear to have been carried out on the current Getty property prior to its acquisition by Getty in 1972.

“Exploration in the current deposit area was initiated in 1972 by Getty and joint venture partner Skelly Mining Corporation under terms of an option-purchase agreement with Millmore-Rogers Syndicate”.

“Discovery of the Getty zinc-lead deposit is attributed to drill hole GGR-12 which was completed in 1972 and intersected 4.63 metres of dolomite grading 15.48% combined zinc-lead, beginning at a down hole depth of 93.11 metres. Subsequent completion of over 200 holes by Getty and Imperial on and around the property served to delineate a nearly continuous mineralized zone measuring approximately 1,300 metres in length and up to 200 metres in width (Comeau, 1973, 1974; Comeau and Everett, 1975)”.

“Mercator completed a NI 43-101 compliant Inferred Mineral Resource Estimate for Acadian on the Getty Zone with an effective date of December 12, 2007. This initial estimate was subsequently updated in a new NI 43-101 compliant resource in 2008 (Cullen et al., 2008) after a total of 10,620 metres of drilling in 138 diamond drill holes had been completed by Acadian on the Getty property under the direct supervision of Mercator staff. The information used to complete these estimates was compiled from the 2007-2008 drilling by Acadian plus historical drilling undertaken prior to Acadian’s involvement in the property”.

“Acadian initiated a major diamond drilling program on the Getty property in July 2007, and Mercator provided all site supervision, logging, sampling and quality control/quality assurance services to Acadian for this program, which consisted of 138 diamond drill holes. The purpose of the drilling was to upgrade geological confidence in the deposit, provide a basis for the new mineral resource estimate and to provide a higher category classification to the mineral resource estimate (Cullen et al, 2008).”

## **10 Drilling**

### **10.1 Sample Length – True Width Relationship**

The sample intervals do not necessarily represent true widths. The orientation of the deposit is variable, meaning the true width of any given intercept must be calculated with reference to the geological model. The orientation of the deposit is well known and is described in Section 7.2.

### **10.2 Main Zone (pre-2011)**

To date, 1,419 diamond core drill holes have been drilled on the Main Zone (refer to Figure 7-3 and Table 10-1). The majority were drilled to determine the characteristics of the zinc and lead mineralized dolomite.

ScoZinc drilled 17 holes totaling 1,613 metres through the Northeast Zone in 2008. These collars, as well as the collars from ScoZinc's 2004 program, are shown in magenta in Figure 7-3.

ScoZinc Mining drilled a further 39 drill holes totaling 4,950.50 metres between August 11 and October 11, 2011 (see Section 10.2.2).

Most of the 914 surface holes were drilled vertically. The azimuth and dip of the 467 holes drilled from the underground workings was variable.

Generally, holes were drilled so as to fully penetrate the dolomite reef and continue on until no more mineralization was found. This resulted in most drill holes being drilled a few metres beyond the dolomite reef.

Historical logs are provided in the previous Technical Report for the property (MineTech, 2006).

**Table 10-1: Historical Surface and Underground Diamond Drilling Activity**

From	To	Holes with Info <sup>2</sup>	Metres	Time Frame	Company
<b>Surface Holes<sup>1</sup></b>					
1	72	70	2,951.17	1951-1952	Gays River Lead Mines
73	740	646	59,123.60	1972-1982	Imperial Oil/ Canada Wide Mines
741	900	89	7,596.80	1985-1995	Seabright, then Westminer (undifferentiated)
901	966	66	3,664.00	1997	Savage/ Pasmenco
967	991	25	1,864.30	2004	ScoZinc
1130-08	1146-08	17	1,613.50	2008	ScoZinc
MNZ-001	MNZ-39	39	4,950.50	2011	Selwyn
<b>Subtotal</b>		<b>952</b>	<b>81,764.40</b>		
<b>Underground Holes<sup>1</sup></b>					
1	341	318	7,460.70	1979-1982	Imperial Oil/ Canada Wide Mines (undifferentiated)
342	651	149	4,434.90	1985-1995	Seabright, then Westminer
<b>Subtotal</b>		<b>467</b>	<b>11,895.60</b>		
<b>Total</b>		<b>1,419</b>	<b>93,660.00</b>		

Source: MineTech, 2012

Notes: <sup>1</sup> Data supplied by ScoZinc

<sup>2</sup> The electronic database does not contain information for underground holes 342-499

### 10.2.1 Sample Statistics

The following summary is taken from MineTech International Ltd.'s 2012 Technical Report.

Sample statistics were calculated for sampling within the carbonate. All samples for which at least one metal (zinc or lead) was assayed were considered. Most samples were assayed for both zinc and lead. Depending on the amount of visible mineral, some samples were assayed for only one metal. The total sample count was 8,022.

The samples from the 2011 drill program were not included in the sample statistics calculations.

The mean sample interval length was 1.44 metres with a standard deviation of 0.82 metres (Table 10-2). Skewness is a measure of symmetry, or more precisely, the lack of symmetry. The positive value for

skewness indicates that the data is skewed right, meaning that the right tail is heavier than the left tail. This is also shown in the histogram in Table 10-3. The aggregate sample length was 11,522 metres.

The mean zinc grade was 3.55%. From the histogram, we can see that zinc assays are approximately lognormal. The range in zinc content was zero to 62.10%. Theoretically, the maximum possible zinc assay is 67.10% - the zinc content of pure sphalerite.

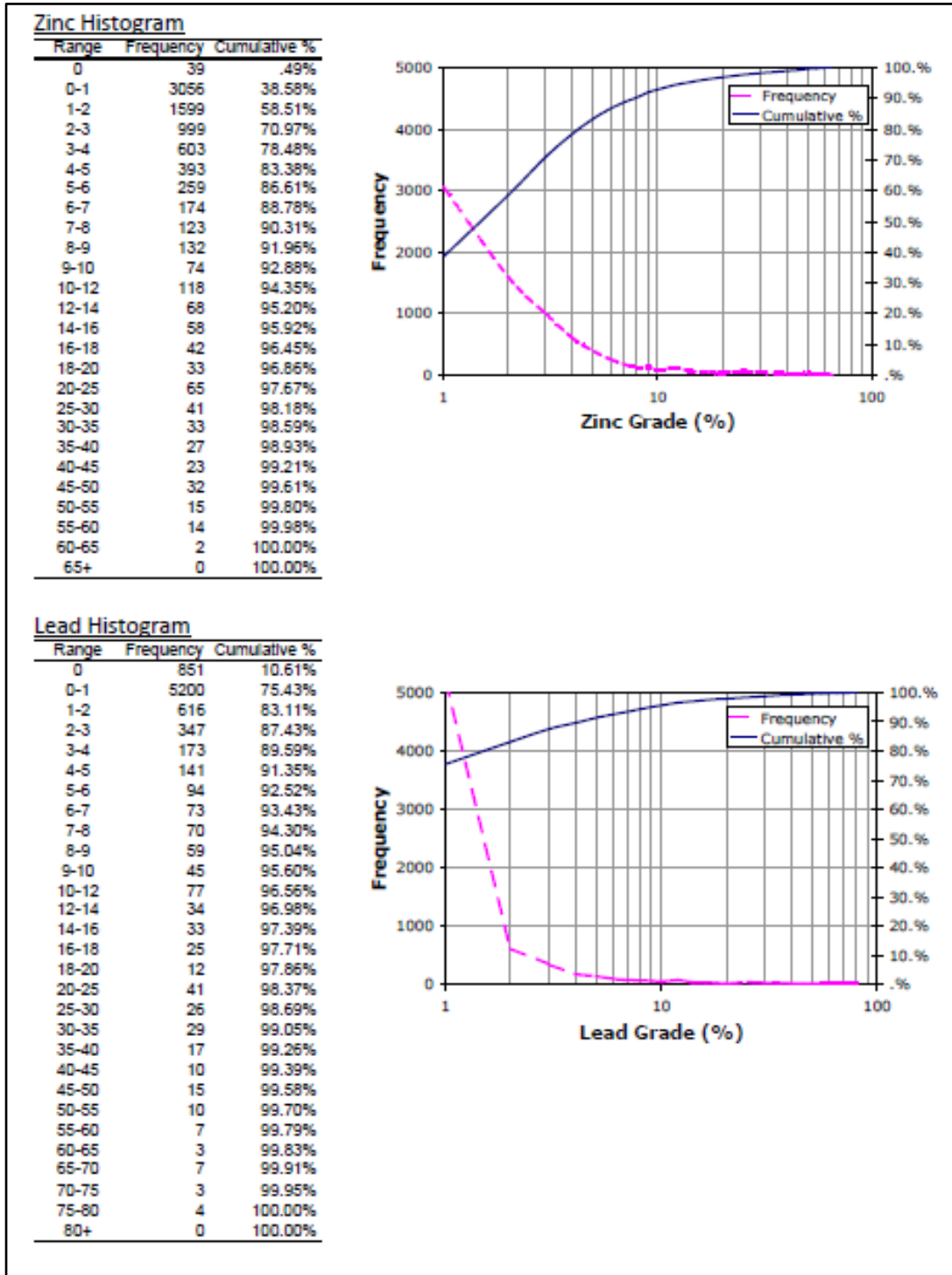
The mean lead grade was 1.91%. From the histogram, we can see that lead assays are also approximately lognormal. The range in lead content was zero to 79.50%. Theoretically, the maximum possible lead assay is 86.6% - the lead content of pure galena.

**Table 10-2: Descriptive Statistics**

<b>Descriptive Statistic</b>	<b>Zinc Grade (%)</b>	<b>Lead Grade (%)</b>
Mean	3.55	1.91
Standard Error	0.08	0.07
Median	1.52	0.12
Mode	0.02	0.01
Standard Deviation	6.79	6.24
Sample Variance	46.17	38.99
Kurtosis	25.17	52.86
Skewness	4.60	6.56
Range	62.10	79.50
Minimum	0.00	0.00
Maximum	62.10	79.50
Sum	n/a	n/a
Count	8,022	8,022

Source: MineTech, 2012

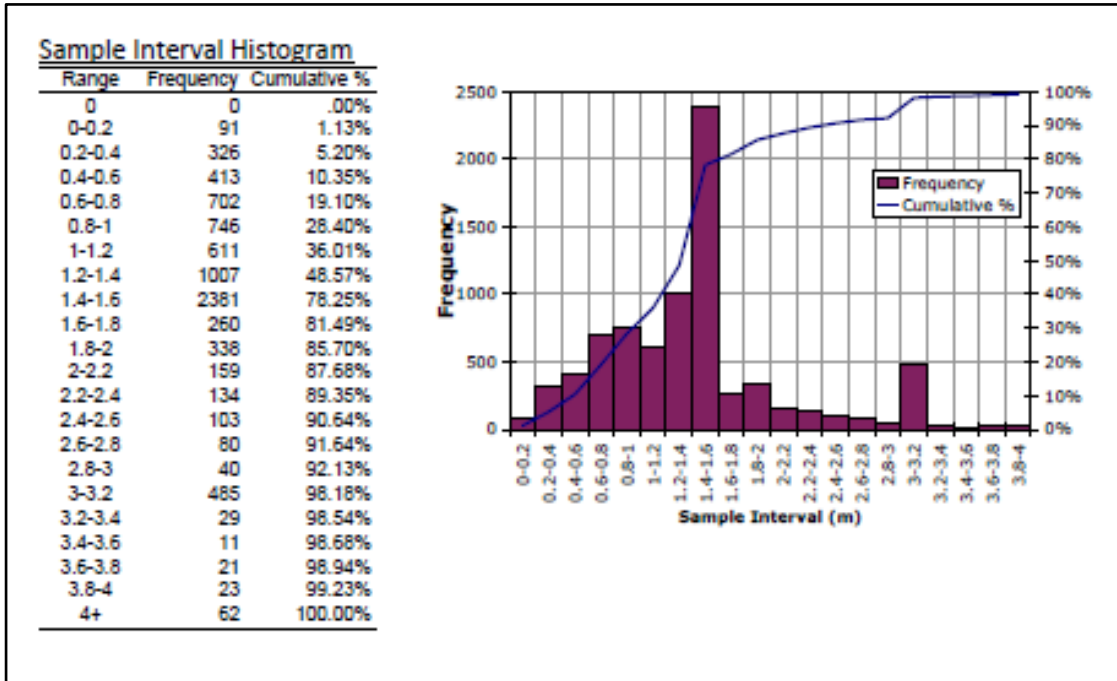
Figure 10-1: Sample Histogram for Zn and Pb



Source: MineTech, 2012



Figure 10-2: Sample Interval Histogram



Source: MineTech, 2012

### 10.3 Main Zone Drilling (post 2011)

#### 10.3.1 Type and Extent of Drilling

ScoZinc Mining drilled a further 39 drill holes (Table 10-3) totalling 4,950.50 metres between August 11 and October 11, 2011. Of the 39 holes drilled, 34 were drilled on Mineral Lease 10-1 and five were drilled on Exploration License 6959. Three of the 39 holes were drilled to the north-east of the existing pit, while the remaining 36 were drilled in a broad area to the southwest of the pit. The deepest hole was 195 metres deep, the shallowest was 43 metres, and the mean depth was 128 metres. Drilling was carried out by the Logan Drilling Group of Stewiacke, Nova Scotia.

Drill holes were planned to target zinc-lead sulphide mineralization that possessed the potential to expand upon the current mineral resource or provide greater definition. Targets were primarily chosen to the southwest of the current mine pit, along the margins of, and clustered toward the southwest extent of the Main Zone.

#### 10.3.2 Drilling Procedures

Once targets were determined, drill collar locations were calculated using a projected drill hole inclination that would intersect the Gays River Formation carbonate bank front at an angle closest to perpendicular. Targets were fine-tuned based on ground factors, including terrain, proximity to watercourses, and property boundaries.

Drilling was carried out under the direction of ScoZinc Exploration staff. A skid-mounted Longyear-38 diamond drill was used to complete all drill holes, and was dragged onto each drill pad with the assistance of a small John Deer bulldozer. In addition to the drill, a covered water pump and drill rod sloop were also dragged to the area by bulldozer.

All recovered core was boxed, lidded and returned to the ScoZinc core shack where it was logged and sampled by ScoZinc exploration staff.

All drill core was logged, cut and sampled by ScoZinc staff at the ScoZinc core shack, ScoZinc mine complex. Both geotechnical and geological data was collected from all drill core. Geotechnical data collected included Total Core Recovery, RQD, strength and weathering data, "Q System" discontinuity orientation data, and RMR system data. Geological data collected included stratigraphic contacts, as well as all lithological, mineralogical, and structural observations of note.

### **10.3.3 Sampling**

Thirty-eight drill holes intersected the Gays River Formation ("GRFM"). Silver and base metal analyses were conducted by a 23-element, four-acid digestion, ore-grade ICP-AES technique. Drill hole MNZ-005 was not sampled, as it did not intersect GRFM.

A total of 722 samples were submitted to Acme Analytical Laboratories in Vancouver ("Acme"). Of those 722 samples, 559 samples (77.4%) were actual core samples and 163 samples (22.6%) were QA/QC samples (see Section 11.4).

All but one drill hole (MNZ-005) successfully intersected the mineralized Gays River Formation, although thicknesses and grades were somewhat variable.

Table 10-3: 2011 Drill Collar Summary

Hole ID	UTM Easting	UTM Northing	Elev. (m)	Az (true)	Dip	EOH (m)
MNZ-001	472840.32	4986616.85	23.8	154	-75	165.1
MNZ-002	472817.22	4986556.71	32.51	155	-75	194.9
MNZ-003	472745.12	4986528.99	37.54	152	-65	161
MNZ-004	472705.01	4986537.07	39.28	155	-60	152
MNZ-005	472909.24	4986221.07	44.15	160	-87	56
MNZ-006	472581.14	4986477	45.45	158	-70	176
MNZ-007	472714.91	4986245.28	46.25	158	-80	63
MNZ-008	472548.94	4986453.18	46.78	143	-70	194
MNZ-009	472577.79	4986408.98	45.01	155	-70	167
MNZ-010	472668.51	4986234.87	47.74	152	-80	92.3
MNZ-011	472467.67	4986438.44	42.8	157	-70	179
MNZ-012	472492.13	4986422.43	43.95	150	-50	165
MNZ-013	472593.28	4986232.83	51.07	158	-75	80
MNZ-014	472460.65	4986399.3	45.53	152	-60	147.5
MNZ-015	472403.74	4986408.57	45.69	154	-65	143
MNZ-016	472334.97	4986387.29	44.59	146	-65	161.8
MNZ-017	472317.75	4986327.62	46.19	140	-75	187
MNZ-018	472435.54	4986153.22	51.11	150	-62	101
MNZ-019	472248	4986285.53	42	160	-81	164
MNZ-020	472347.33	4986078.11	52.03	151	-80	65
MNZ-021	472173.21	4986281.68	37.36	152	-66	155
MNZ-022	472077.24	4986272.6	20.88	150	-70	135
MNZ-023	472207.9	4986094.9	46.49	148	-80	74
MNZ-024	472238.97	4986038.08	47.46	134	-87	68
MNZ-025	472310.88	4985911.89	46.89	150	-87	43.2
MNZ-026	472087.89	4986245.72	26.58	150	-52	136
MNZ-027	472135.85	4986130.58	40.68	150	-60	84
MNZ-028	472044.77	4986205.24	20.97	338	-79	140
MNZ-029	472047.95	4986148.28	27.68	152	-51	95
MNZ-030	472099.7	4986061.13	38.52	163	-86	74.4
MNZ-031	472044.76	4986202.24	20.97	237	-65	136
MNZ-032	472125.32	4985935.07	53.32	323	-79	116
MNZ-033	472078.81	4985964.98	48.72	217	-76	143
MNZ-034	471955.78	4986084.56	31.66	150	-83	106
MNZ-035	471937.9	4986048.18	33.99	147	-65	122.7
MNZ-036	471954.85	4986081.72	31.36	276	-70	164
MNZ-037	473401.79	4986905.02	18.47	145	-86	191
MNZ-038	473488.02	4986897.65	19.42	126	-64	133.9
MNZ-0039	473667.1	4986733.54	30.92	170	-87	53

Source: MineTech, 2012

## 10.4 Getty Zone

Drilling on the Getty Zone is described in Cullen et al (2011), and the reader is directed to that report for further details.

# 11 Preparation, Analyses, and Security

## 11.1 Sample Preparation and Analyses

### 11.1.1 Getty Zone (pre-2008)

Sample preparation, analysis and security measures for the Getty Zone were described in Cullen et al (2011). In part, Cullen et al remark that:

“Reports documenting the Getty and Esso drilling programs in the Getty zone area do not provide detailed descriptions of sample preparation methodologies, analytical procedures or security considerations. However, both Getty and Esso were major, reputable exploration companies carrying out exploration programs in various settings at that time. More specifically, Esso was also in the process of defining reserves at the adjacent Main Zone mine at the time and appears to have employed the same operating protocols for Getty drilling as were applied at the adjacent development property. Mercator is of the opinion that, while not specifically detailed in historic reporting, procedures employed by both Getty and Esso for sample preparation, record keeping, chemical analysis, and security, would have met industry standards of the day. This assertion is supported by review of original drill logs and supporting data, physical review of archived core and through recognition that both companies completed resource estimate and preliminary development assessments based on the same historic drilling results.” (Cullen et al, 2011, Section 12.1)

### 11.1.2 Main Zone (pre-2008)

There is no written record regarding the sampling method employed during the early exploration years (i.e.: pre-1970's) in the Scotia Mine area.

The exploration approach and sample collection procedures employed by the more recent exploration efforts reflects thorough sampling methodology and documentation procedures. Exploration activity was carried out in a professional manner by a team of local, experienced geologists and technicians supervised by Esso's, Seabright's, Westminer's, Savage's, and ScoZinc's professional staff. The work has been well organised throughout their exploration efforts and more recently computer facilities were available to generate reports and prepare maps, etc. from the vast database.

The assay data and other parameters for all core drilling programs and underground work were entered into a computerised database using Microsoft Excel and resource estimate generating software programs. The quality control and validation of the coded data included steps to ensure that the assay intervals and the sample locations were correct. To ensure accuracy of the database, all assays were coded and the data entry system automatically checked for interval overlaps. The coded assays were also printed and a visual inspection was completed for comparison with the original (logged) data sheets. The sample locations were validated with appropriate plotting and visual checks against the original sections and plans.

Core drilling was carried out using North American service providers with the collection of BQ and NQ core. The portions of core to be analysed were either split or sawed into two sections with one half submitted for analysis, the other half remaining in the core tray. All sampling procedures were carried out on site.

Sampled core lengths were determined visually. All drill holes were logged, noting lithology, structure, alteration and mineralization. Core recovery was generally greater than 90%. Early in the exploration

program, the samples were sent via air cargo to several analytical laboratories; however, after the construction of the mill facility, the internal laboratory was used.

Core samples from Savage's 1997 drilling program and ScoZinc's 2004 drilling program were submitted to the Minerals Engineering Centre of Dalhousie University (formerly Technical University of Nova Scotia) in Halifax. The laboratory is independent of Savage, ScoZinc and Selwyn. The laboratory is not International Standard Organisation (ISO) accredited.

According to the Minerals Engineering Centre, the core sample preparation procedure was as follows: the samples were dried, and then crushed in one or more jaw crushers, depending on the original size, to under one-quarter inch. The sample was then split in a Jones riffle to a mass of 150-200 grams. The sample was then pulverised using a ring and puck pulveriser to 80% minus 200 mesh (75 microns). Then it was put into either a bag or a vial. Rejects were kept for six months.

The sample analysis procedure consisted of the following: one-gram sample lots were digested with hydrochloric-nitric-hydrofluoric-perchloric acids. Elements were determined by Flame Atomic Absorption with detection limit of 1 ppm. Arsenic was determined by atomic absorption/hydride generation method.

Reference standards from CanmetMATERIALS ("CANMET"), the largest research centre in Canada, were routinely used as internal checks on the accuracy of the analysis.

### **11.1.3 Scotia Mine Deposits (2008)**

Cullen (2011) provided the following description for the sampling methods that were used for the 2008 drilling program (Scotia Mine Deposits).

#### **Sample Security and Chain of Custody**

In accordance with the sample protocol established by Mercator for the 2008 drilling program, all drill core was delivered from the drill site to the secure and private core logging facility at Acadian's Scotia Mine by either Logan Drilling Limited staff or Mercator field staff. Drill core logging was carried out by a Mercator geologist who also marked core for sampling and supervised core splitting by a technician using a rock saw. Sample tag numbers from a three tag sample book system were used for the program, with one tag showing corresponding down hole sample interval information placed in the sampled core boxes at appropriate locations, one tag lacking down hole interval information placed in the core sample bag for shipment to the laboratory, and the third tag with sample interval information retained in the master sample book for future reference and database entry purposes. After sampling, core boxes were closed and placed in storage at the Scotia Mine site. Sealed sample bags were placed in an ordered sequence prior to insertion of quality control samples, preparation of sample shipment documentation, checking, and placement in plastic buckets for shipment by commercial courier to Eastern Analytical Limited ("Eastern"), a recognized commercial laboratory located in Springdale, Newfoundland. A check pulp sample split was prepared at Eastern for every 25<sup>th</sup> submitted sample and these were labelled, placed in a sealed envelope and returned to Mercator. After insertion of certified standard and blank samples, all check samples were sent to ALS Chemex in Sudbury, Ontario for independent analysis of zinc and lead levels. All other prepared pulps and coarse reject material was stored at Eastern until the end of the program, at which time they were shipped back to Scotia Mine for secure archival storage.

## Laboratory Procedures

### Core Sample Preparation

Core samples received by Eastern were organized and labelled and then placed in drying ovens until completely dry. Dried samples were crushed in a Rhino Jaw Crusher to consist of approximately 75% minus 10 Mesh material. The crushed sample was riffle split until 250 to 300 grams of material was separated and the remainder of the sample was bagged and stored as coarse reject. The 250 – 300 gram split was pulverized using a ring mill to consist of approximately 98% minus 150 Mesh material. All samples underwent ICP analysis, for which a 0.50g portion of the pulverized material was required. Those samples containing greater than 2,200 ppm of zinc or lead were then processed using ore grade analysis for which 0.20g of pulverized material was required. Laboratory sample preparation equipment was thoroughly cleaned between samples in accordance with standard laboratory practise.

Check sample splits of pulverised core were submitted to the ALS Chemex laboratory facility in Sudbury, Ontario as part of the project quality control and assurance protocol. This material was prepared in approximately 100-gram bagged splits by Eastern and returned to Mercator for subsequent submission to ALS Chemex. Since the received split material had already been pulverised, further preparation was limited to homogenization and splitting of a 0.4g portion for subsequent analysis.

### Core Sample Analysis

Eastern Analytical procedures outlined below pertain to all core samples from the 2008 drill program.

**ICP Analysis:** A 0.50-gram sample is digested with 2ml HNO<sub>3</sub> in a 95° C water bath for ½ hour, after which 1ml HCL is added and the sample is returned to the water bath for an additional ½ hour. After cooling, samples are diluted to 10ml with deionized water, stirred and let stand for 1 hour to allow precipitate to settle.

For ore grade analysis base metals (lead, zinc, copper), a 0.20g sample is digested in a beaker with 10ml of nitric acid and 5ml of hydrochloric acid for 45 minutes. Samples are then transferred to 100ml volumetric flasks and analyzed on the Atomic Absorption Spectro-Photometer ("AA"). The lower detection limit is 0.01% and the upper detection limit is >2,200 ppm lead or zinc.

For silver, a 1,000 mg sample is digested in a 500ml beaker with 10ml of hydrochloric acid and 10ml of nitric acid with the cover left on for 1 hour. Covers are then removed, and the liquid is allowed to evaporate leaving a moist paste. 25ml of hydrochloric acid and 25ml of deionised water are then added and the solution is gently heated and swirled to dissolve the solids. The cooled material is transferred to 100ml volumetric flask and is analyzed using AA. The lower detection limit is 0.01oz/t of silver with no upper detection limit.

A prepared sample is digested in 75% aqua regia for 120 minutes. After cooling, the resulting solution is diluted to volume (100 ml) with de-ionized water, mixed and then analyzed by inductively coupled plasma - atomic emission spectrometry or by atomic absorption spectrometry.

### 11.1.4 Main Zone (2011)

#### Site Procedures

All drill core was logged, cut and sampled by ScoZinc staff at the ScoZinc core shack, ScoZinc mine complex. Sampling of mineralized core from the Gays River Formation and adjacent units involved breaking the mineralized range into 20-150 cm samples, inserting regular QA/QC duplicate, blank and standard samples as per company protocol, and halving each sample longitudinally with a diamond bladed rock saw. One half of the sample was placed back in the core box for storage, and the other half was bagged and sent away for assay in Vancouver.

#### Laboratory Procedures

Samples were assayed at Acme Analytical Laboratories in Vancouver (“Acme”) for preparation and analysis. The Acme laboratory in Vancouver is certified ISO 9001 2008 compliant for the provision of assays and geochemical assays. Acme is independent of the issuer.

Samples were weighed, analyzed using four-acid digestion multi-element ICP-ES (Method 7TD), and tested for specific gravity (Method G8SG).

The general sample preparation method used by Acme for rock and drill core is described as follows:

Rock and Drill Core crushed to 80% passing 10 mesh (2 mm), homogenized, riffle split (250g, 500g, or 1,000g subsample) and pulverized to 85% passing 200 mesh (75 microns). Crusher and pulveriser are cleaned by brush and compressed air between routine samples. Granite/ Quartz wash scours equipment after high-grade samples, between changes in rock colour and at end of each file. Granite/ Quartz is crushed and pulverized as first sample in sequence and carried through to analysis.

Method 7TD is described by Acme as follows:

- 0.5g sample split is digested to complete dryness with an acid solution of H<sub>2</sub>O-HF-HClO<sub>4</sub>-HNO<sub>3</sub>. 50% HCl is added to the residue and heated using a mixing hot block. After cooling the solutions are made up to volume with dilute HCl in class A volumetric flasks. Sample split of 0.1g may be necessary for very high-grade samples to accommodate analysis up to 100% upper limit.

Method G8SG is described by Acme as follows:

- **G812 Specific Gravity Pulp, SG:** A split of dry pulp is weighed to a class A volumetric flask. Flask and pulp are weighed precisely on a top-loading balance. Measure and record the weight then calculate for specific gravity.
- **G813 Specific Gravity Core, SG:** Analysis can be conducted on whole samples of rock or core in irregular shape. Specific gravity is determined by measuring the displacement of water. A sample is dried at 105°C to remove all moisture then allowed to cool. The sample of the rock or drill core is first weighed in air then submerged in a container of water. Measure the mass of immersed sample and record the weight then calculate for specific gravity. Sample can also be coated with a thin layer of hot wax so that any soluble material in the core or rock is not in contact with the water.

### Quality Control Samples

Of the 722 samples sent to Acme, 51 were standards, 58 were duplicates, 54 were blanks, for a total of 163 QA/ QC samples. The remaining 559 were regular assays.

Of the blanks, all but one were at the lower detection limit for lead (0.01%) while a single sample was above the lower detection limit, with a value of 0.02% lead. Similarly, all but three of the blanks were at the lower detection limit for zinc (0.005%) while three samples were above the lower detection limit, with values of 0.01%, 0.02% and 0.04%.

Of the duplicates, 38 of the 58 had a difference in lead at or below the detection limit. For the remaining samples, the average difference was 0.24% lead; 9 samples had a difference at or above 0.20% lead, with the greatest difference being 0.91% lead.

24 of the 58 duplicates had a difference in zinc at or below the detection limit. For the remaining samples, the average difference was 0.19% zinc; 9 samples had a difference at or above 0.20% zinc, with the greatest difference being 0.95% zinc.

Two types of standards were used – Standard F (28 used) and Standard G (23 used). Both were created by WCM Sales Ltd. Standard F has a mean value of 1.240% lead and 2.000% zinc, while Standard G has a mean value of 6.680% lead and 3.780% zinc, both with a tolerance of +/- 2 standard deviations.

The table below summarizes the results:

**Table 11-1: 2011 Sampling Standards**

Standard	Expected Value	Average Tested Value	Minimum Tested Value	Maximum Tested Value
Standard F – Lead	1.240%	1.21%	1.14%	1.28%
Standard F – Zinc	2.000%	2.13%	2.02%	2.22%
Standard G – Lead	6.680%	6.55%	6.20%	7.11%
Standard G – Zinc	3.780%	3.91%	3.76%	4.06%

Source: MineTech, 2012

Results from the check samples are within acceptable limits.

### Umpire Assays

Split pulps of 135 samples were re-analysed at the ALS Minerals laboratory in Vancouver (“ALS”). ALS Minerals is a division of ALS Ltd., and is independent of the issuer and is certified to the ISO/IEC 17025:2005 by the Standards Council of Canada (“SCC”).

The comparison found that the vast majority of the split pulps are within a +/-15% tolerance. After correcting for the lower detection limit, two zinc samples containing less than 0.1% zinc and one lead sample containing more than 0.1% lead had a difference of more than 15% between the Acme and ALS assay



results. Overall, the results are acceptable and serve to confirm the results of the wider body of Acme lab samples.

## 12 Data Verification

### 12.1 Main Zone

SRK has reviewed the sampling results and verified that the sample types and density are adequate for estimating mineral resources. The sampling results are representative of the style of mineralization. The available information and sample density allow a reliable estimate to be made of the size, tonnage and grade of the mineralization in accordance with the level of confidence established by the Mineral Resource categories in the CIM Standards.

#### 12.1.1 Database Validation

A sample of 59 drill holes (4.3%) was selected for database validation. The collar locations, downhole survey data, geological logs and assay data in the database were compared against the original, written logs.

ScoZinc provided scanned original drill logs in Adobe (.pdf) format. An up-to-date copy of the electronic database of all drill hole information was also provided. An additional data file of drill hole coordinates was supplied, as many of the original drill logs did not have co-ordinates.

The 59 holes selected (See Table 12-1) were predominately located within areas with the highest economic potential, but the selection process also strived to provide good coverage for the whole deposit. This amounted to 4.3% of the more than 1,400 holes drilled on the property.

Printouts were made of the relevant sections of each of the holes and also of the assay data of the corresponding assay intervals. The assays were printed on the reverse of the drill logs. Co-ordinates on the log and database were manually compared.

The data in the Excel database and original drill logs were manually compared. They were found to be, for the most part, comparable. Many of the original drill logs, both underground and surface, did not have collar co-ordinates or downhole survey data. Another database was located that contained the required information. It is more than likely that the holes were surveyed, and the information filed in a separate location from the original logs.

**Table 12-1: Holes That Were Verified During the Database Validation**

S61	S352	S613	S882	U047	U206
S69	S390	S634	S938	U057	U217
S71	S404	S648	S939	U061	U218
S85	S423	S663	S943	U073	U246
S94	S431	S690	S956	U087	U259
S110	S466	S703	S975	U093	U290
S183	S473	S705	S976	U106	U297
S220	S555	S726	S980	U129	U321
S251	S568	S843	U003	U148	U337
S268	S574	S857	U008	U174	

Source: MineTech, 2012

The following holes were found to have discrepancies between the original data from the drill logs and the final database:

**S 69**

Data base 73.76 – 75.59 lead 0.01% Original Log 73.76 – 75.59 lead 0.32%.

**S 110**

Assay data for database match that on original log. However, a hand-written correction on the log shows reduced lead and zinc values.

**S 663**

Minor sample depth errors – not significant.

**S 703**

Assays on original log for interval 89.0 – 99.83 metres not shown. These were likely assayed at a later date.

**S 726**

Assay section on original log 77.72 – 83.82 m (6.1m) used on database. Original log interval was corrected by hand at a later date to 2 ft (0.61m).

**U 129**

Sample from 115' – 125' (10') misread as 115' – 128' (13'). Written entry on original log looks like 128'.

**U 218**

Azimuth on database shows 235 degrees, which is consistent with other angle holes with the same co-ordinates. However, a listing in another database shows an azimuth of 180 degrees. It is more than likely that the database listing is correct.

**12.1.2 Data Validation Conclusion**

With the exception of Hole S 110 and S 726 where significant assay intervals and values were involved, the remainder of the holes do not represent any factor that would change the status of the deposit. In general, the data transfer from the original logs was of high quality and the database was considered a valid representation of the mineral deposit.

**12.1.3 Verification Sampling**

The Scotia Mine property was visited by Mr. Reg Comeau of ACA Howe on June 17 and June 21 and on September 22 and September 26, 2004, in order to become familiar with the area and to conduct verification sampling on the property. Split, random, core samples were inspected and sampled from the site on the second visit from the 2004 drilling campaign in the area of the proposed low grade open-pit in the central portion of the deposit as well as the higher grade zone in the Northeast zone. A second set of core samples from the 1997 drilling campaign were later collected by Mr. Doug Roy.

Samples from 1997 and 2004 drilling campaigns were collected, packaged and independently shipped by Reg Comeau. All samples were taken from the remaining half core samples in the core boxes and were sawed in half reflecting a quarter core sample. The remaining quarter core was left in the core tray. The

samples were packaged and shipped to ACA Howe's office in Toronto, then shipped to and analyzed by SGS Toronto. The comparison of assay results is shown in Table 12-2.

The comparison of analytical results between SGS and the original 1997 samples and the samples from the 2004 drilling program (analyzed at Minerals Engineering Centre of Dalhousie University) was excellent.

SRK is satisfied that the assay data base for the property is sound and sufficient for the purpose of estimating mineral resources.

**Table 12-2: Results of Verification Sampling (2004 Drilling Program by ScoZinc)**

Hole #	From (m)	To (m)	Interval (m)	Original Assay Zn (%) Pb (%)		Howe Sampling Zn (%) Pb (%)	
<b>From Pit Area</b>							
S968	2.7	4.7	2	3.38	0.29	3.62	0.14
S969	8	10	2	2.15	0	2.22	0
S971	2.9	4.9	2	4.63	0	3.91	0
S972	14.3	16.3	2	1.86	0.18	2.06	0.17
S973	74	75	1	11.9	14.98	14.18	17.25
S974	66.8	68	2	2.46	2.22	2.59	1.95
S976	98.1	98.45	0.35	7.66	0.23	7.19	0.17
<b>Northeast Zone</b>							
S977	96	96.4	0.4	6.77	0.01	9.47	0.01
S982	133.3	133.6	0.3	0.84	0.32	0.84	0.18

Source: MineTech, 2012

**Table 12-3: 1997 Drilling Program by Westminer**

Hole #	From (m)	To (m)	Interval (m)	Original Assay Zn (%) Pb (%)		Howe Sampling Zn (%) Pb (%)	
<b>From Pit Area</b>							
S926	18.4	19.9	1.5	2.82	0.01	3.16	<0.01
	19.9	21.4	1.5	3.27	0.01	2.86	<0.01
S933	12.1	13.6	1.5	1.4	0.01	1.47	0.01
	13.6	14.9	1.3	2.78	0.01	2.45	<0.01
S936	8.5	9.8	1.3	3.73	0.01	4.2	<0.01
	11	12.2	1.2	1.02	0.01	0.98	<0.01
<b>Northeast Zone</b>							
S943	60.75	62	1.25	7.56	2.63	6.95	2.76
	62	63	1	3.16	5.7	2.78	3.3
S950	36	37.15	1.15	5.2	3.02	3.99	2.19
	37.15	38.25	1.1	17.37	1.07	15.54	0.67
S953	91.8	92.65	0.85	4.41	7.34	3.97	7.47

Source: MineTech, 2012

## 12.2 Historical Data Verifications

### 12.2.1 Getty Zone

Data verification measures for the Getty Zone were described in Cullen et al (2011):

“Review by Mercator of all government assessment reports and internal Acadian files available from the Scotia Mine site established that typed lithologic logs with complete assay records from the Getty drilling era were available. However, original sample record books, laboratory reports and other associated information were not found. The digital drill hole database used for the Westminer’s 1992 resource estimate was also obtained from Acadian and validated against the original hard copy drill log and assay record entries. Checking of digital records included manual inspection of individual database lithocode entries against source hard copy drill logs as well as use of automated validation routines that detect specific data entry logical errors associated with sample records, drill hole lithocode intervals, collar tables and down-hole survey tables. Drill hole intervals were also checked for sample interval and assay value validity against the original drill logs. Database entries were found to be of consistently acceptable quality but minor lithocode and assay entry corrections were made by Mercator. These were incorporated to create the validated and functional drilling database used in the resource estimate. As noted earlier, original assays certificates were not found for any of the historic drilling programs and no records of the laboratories to which samples were submitted for analysis, or methods of analysis, were documented in any of the historic drilling reports reviewed for the resource estimate”.

“As part of the validation process, Mercator staff visited the NSDNR Core Library in Stellarton, Nova Scotia to review and sample core from the archived Getty drill holes. Nineteen holes were examined but only one hole GGR-212 was re-logged in detail and ten holes were re-sampled and analysed for purposes of quality control and quality assurance. These provided additional verification of historical assays and logging results. Results of this and related programs are presented below under separate headings.” (Cullen et al, 2011, Section 13.1).

“Combined results of the Getty drill hole re-sampling and twin hole programs by Acadian generally support the earlier conclusion of Cullen et al. (2008), based on a smaller data set, that validated historic drilling information represented in Acadian’s Getty Zone database is of acceptable quality for resource estimation purposes.” (Cullen et al, 2011, Section 13.2.4)

## **13 Mineral Processing and Metallurgical Test Work**

### **13.1 Introduction**

Several sources of data have been collected in order to quantify the metallurgical response of ores from the ore deposits of the Scotia Mine Project. The study focused on historical test work and operating data. This was to determine if enough information exists to support restarting the existing mill, along with the design of comminution, flotation, or dewatering equipment. After review of the available data, it has been determined that enough information exists to support a PFS level study. The following reports and documents have been used to develop this review:

- Acadian Gold Corp., Resource, Reserve and Feasibility Report July 13, 2006
- SGS Comminution Test Report No. 11730-001 November 26, 2007
- Acadian Historical Production Data from 2008, 2009
- Selwyn Resources Ltd.' ScoZinc Mine; Preliminary Economic Assessment Update, December 2012
- ALS KM3677 Metallurgical Report, April 29, 2013
- FFP Systems Inc., Concentrate Filtration Tests Report, January 30, 2018
- ALS KM5548 Comminution Report, February 1, 2018

### **13.2 Sample Description**

Several test work campaigns have been included in the test work review. Each campaign was performed with a unique set of samples. SGS Comminution test work samples were collected from operations and received by SGS Lakefield in August 2007. Samples used for ALS KM3677 metallurgical test work were collected from coarse crushed rock samples received by ALS on January 11, 2013. Samples used for the ALS KM5548 Comminution Report were collected from drill core samples. Samples were split and the half core was provided to ALS for testing. ALS received the samples for testing on January 2, 2018.

### **13.3 Mineralogy**

As part of the ALS KM3677 test work, mineralogical testing was performed on a master composite. Particle Mineral Analysis ("PMA") was performed to determine the mineral content of the sample. The results are shown in the table overleaf.

**Table 13-1: Master Composite Mineral Content**

<b>Mineral</b>	<b>Mineral Content</b>
Galena	2.0
Sphalerite	3.2
Pyrite	0.3
Dolomite	55.4
Calcite	21.3
Copper Sulphides	0.1
Quartz	7.7
Felspars	3.3
Muscovite	4.2
Chlorite	0.8
Others	1.8

### 13.4 Review

The ScoZinc mine is a Mississippi Valley Type (“MVT”) lead zinc deposit. The sulphides are hosted primarily in carbonate with some replacement of silica. There are several very well known MVT mines (Pine Point and Nanisivik in Canada, Tara Mines in Ireland, the Balmat Mine in New York State, USA). MVT deposits are unique in their homogenous nature. The lead zinc mineralization is continuous and largely predictable. Obtaining representative samples is very straightforward as a result. Pyrite is a minor mineral which does not require significant suppression to produce high quality lead and zinc concentrates. Despite this operation being constructed in the 1970’s, there is limited metallurgical data available on past operations or current metallurgical testing. Operational data is available from 2008 and 2009 and this period is also briefly discussed in the 2012 Selwyn Report.

### 13.5 Operational Data

Operational data from the most recent operational run has been reviewed to set a baseline for the existing mill equipment. From 2007 to 2009, Acadian Mining operated the mill, using the existing equipment to produce lead and zinc concentrates.

A summary of the tonnages, and grades can be seen in the table overleaf. See Table 13-2.

**Table 13-2: Historical Operational Data**

Baseline Item	Unit	Variable
Start Date	-	June 2007
End Date	-	March 2009
Milled Tonnes	-	1,128,564
Average Feed Rate	TPD	1,841
Average Lead Head Grade	% Pb	0.94
Average Zinc Head Grade	% Zn	2.50
Average Lead Recovery	%	83
Average Zinc Recovery	%	81
Lead Concentrate Grade	% Pb	68
Zinc Concentrate Grade	% Zn	56
Lead Concentrate Production	TPD	21
Zinc Concentrate Production	TPD	66

### 13.6 Comminution Testing

Comminution test work was completed on eight samples which were combined into three composite samples used for testing. JKTeck SMC test was completed and can be seen below in the table below (see Table 13-3). Bond Ball mill work index tests were also completed and can be seen in the table below (see Table 13-4).

**Table 13-3: SMC Test Results**

Composite	DWi	Axb	S.G.	SAG Circuit Specific Energy (SCSE)
High Grade	4.12	74.1	3.04	8.00
Low Grade	4.58	58.9	2.70	8.34
HW-FW Composite	4.67	54.9	2.56	8.47

**Table 13-4: Bond Ball Mill Work Index Test Results**

Composite	F80 (µm)	P80 (µm)	BWi (kWh/tonne)
High Grade	2,716	88	8.7
Low Grade	2,770	88	9.4
HW-FW Composite	3,111	86	13.8



### 13.7 Flotation Testing

The most recent flotation test work includes locked cycle tests. These tests were performed from a composite sample produced predominantly from drill hole intervals from Phase 1 of the current mine plan, with limited intervals from Phase 2. Head grades for the composite sample used for the tests were 1.83% lead and 2.45% zinc. The tests were able to produce high quality lead and zinc concentrates with a lead concentrate grade of 69% lead and a zinc concentrate grade of 59% zinc. Achieved recoveries were 94% lead and 87% zinc. The lead head grade from this test program is higher than is contained in the current forecast mine schedule. Additionally, the test work recoveries are higher than were achieved in the last production run in 2008 and 2009.

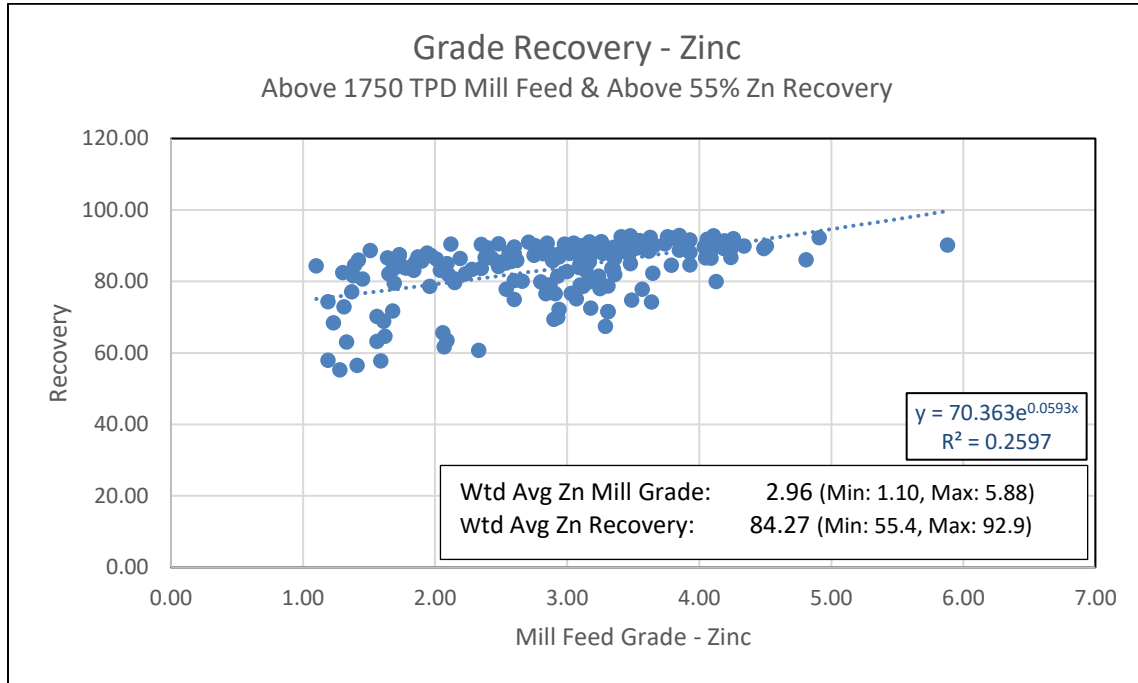
The original plant flowsheet included concentrate regrind for zinc rougher concentrate but does not appear to have been operated during the last production run. The 2013 ALS flotation testing program evaluated regrind for both lead and zinc rougher concentrates. The results showed no benefit for regrinding the lead rougher concentrate, but zinc final concentrate grades improved from regrinding the zinc rougher concentrate to  $k_{80} = 36 \mu\text{m}$  from 44% to 61% with a loss in recovery of 2%. The locked cycle test included a zinc regrind stage.

The test work reagent scheme was typical of lead zinc flotation circuits. Zinc sulfate and cyanide were used as sphalerite depressants before lead flotation. Ethyl xanthate was used as the lead collector. Copper sulphate was then used as the sphalerite activator before zinc flotation. SIPX was used as the zinc circuit collector. MIBC was used in both circuits, with W34 also used in the zinc cleaner. Lime was used as the pH modifier in both circuits.

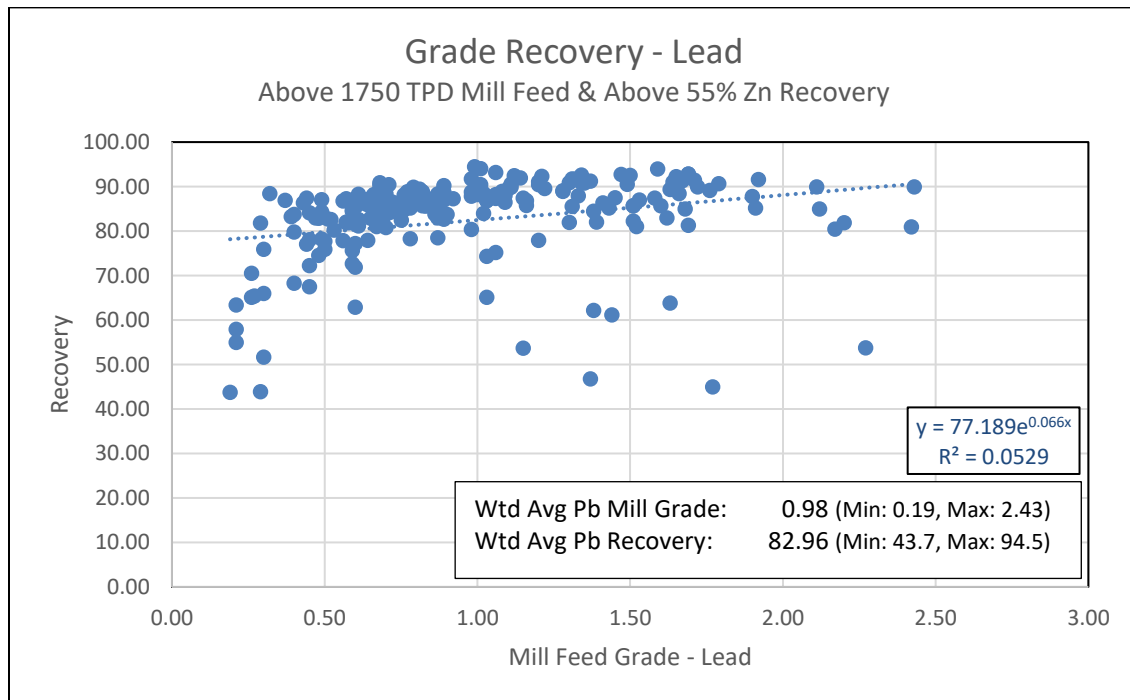
The 2008 and 2009 operating data show lead and zinc recoveries are relatively insensitive to head grades either through inherent mineralogy or limitations of the existing flotation equipment. Figure 13-1 shows historical zinc recovery as a function of head grade and Figure 13-2 shows historical lead recovery as a function of head grade.

The combination of the most recent test work and the historical production data provides sufficient information to support PFS level flotation design.

**Figure 13-1: Zinc Recovery as a Function of Head Grade (2008 Production Data)**



**Figure 13-2: Lead Recovery as a Function of Head Grade (2008 Production Data)**



The proposed ScoZinc life of mine production plan for the first 5 years of the mine life is shown in Table 13-5. Although the 2013 ALS flotation testing program was based on a sample with high head grades, the continuity and consistency of the mineralization allows for use of the available operating data for recovery estimates.

**Table 13-5: Proposed ScoZinc Mine Production Plan (first 5 years)**

Year	Total Tonnes (t)	Avg Pb Grade (%)	Avg Zn Grade (%)
1	970 500	0.61	2.31
2	985 500	0.86	2.27
3	985 500	0.66	2.10
4	988 200	0.80	2.09
5	985 500	1.16	2.35

The 2012 PEA offers some relevant data for concentrate grades and recoveries as it includes some of the last plant production statistics from 2008. Recommended grade and recoveries for inclusion in the Process Design Criteria are:

- 86% Zinc recovery and 57% Zn concentrate grade
- 88% Lead recovery and 70% Pb concentrate grade

These concentrate grades and recoveries are at the upper end of the production data shown in Figure 13-1 and Figure 13-2 above.

These recoveries are considered achievable after a suitable ramp up period with consistent ore production at the grades in the mine plan. During the ramp up period, recoveries will be in the order of 80% for lead and zinc based on the historical data.

### 13.8 Concentrate Solids Liquids Separation Testing

No historical solids liquids separation test results are available from the previous operations. Filtration tests were performed in 2018 by Fox Fluid Power (“FFP”), located in Mississauga, Ontario, Canada. The tests show lead and zinc concentrates can be dewatered with membrane type plate and frame filter presses to low moisture contents of approximately 8% and 10% moisture for lead and zinc concentrate, respectively. The report though does not include any engineering data to technically evaluate the results.

FFP provided an initial proposal based on low slurry density feed and an updated proposal based on thickened concentrate feed. The equipment selection is based on a 60-minute cycle time including 25 minutes of air drying. The calculated filtration duties for both concentrates is around 2 kg/h/m<sup>2</sup>, which is extremely low. Published data for lead and zinc pressure filtration shows cycle times of 7 to 10 minutes with filtration duties in the range of 300 to 600 kg/h/m<sup>2</sup> for clean concentrates. Published data for the Red Dog Pb-Zn mine shows operating filter duties of around 250 kg/h/m<sup>2</sup> for a complex zinc concentrate.

The plant currently has no concentrate filtration equipment. The original plant equipment included vacuum disk filters and kilns to dry the concentrates. This equipment configuration is now obsolete and is now typically replaced by pressure filters that produce concentrates at moisture levels suitable for transport.

FFP has provided an equipment proposal based on their test results. Membrane plate and frame filtration is likely not required and a simple plate and frame filter press is sufficient. With availability of concentrate sample, additional testing is recommended either with another vendor or with an independent laboratory such as SGS Lakefield Research or Pocock Industrial.

### 13.9 Predicted Metallurgical Results

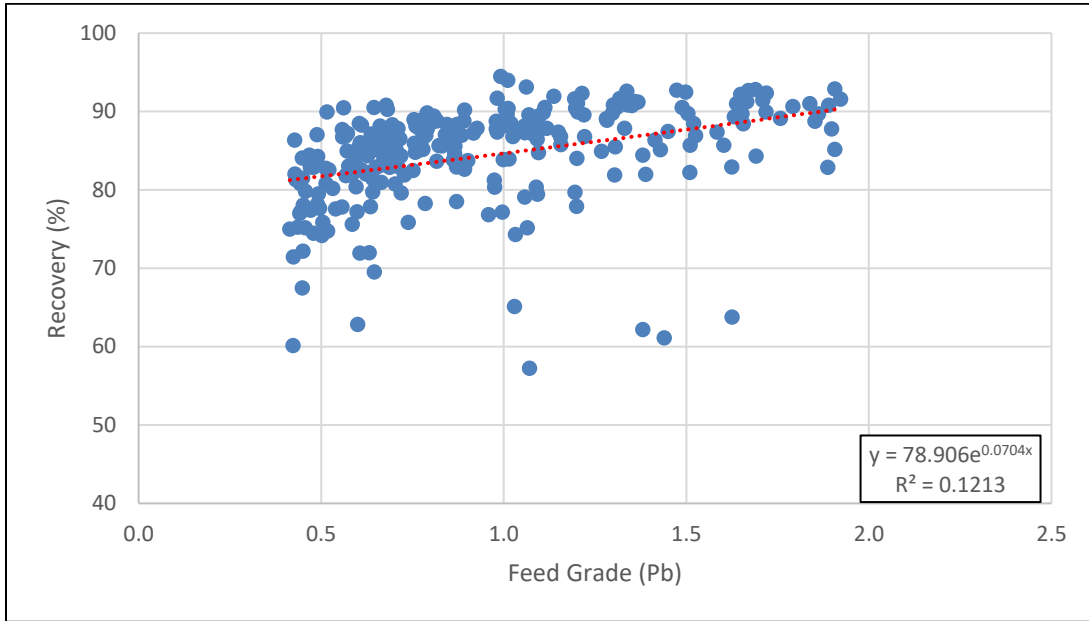
The test work and operational results were analysed to develop recovery models for both lead and zinc based on head grades. The model results are based on a grind of 80% passing 110  $\mu\text{m}$ . Historic data used for the recovery curves include the following filters in order to represent steady state operation:

- Daily tonnage below 1,750 tonnes per day were excluded from the data set
- Lead feed grade below 0.40% and above 1.93% were excluded from the dataset
- Zinc feed grade below 2.04% and above 2.88% were excluded from the dataset
- Days with zinc and lead recovery below 65% and 55% respectively, were excluded

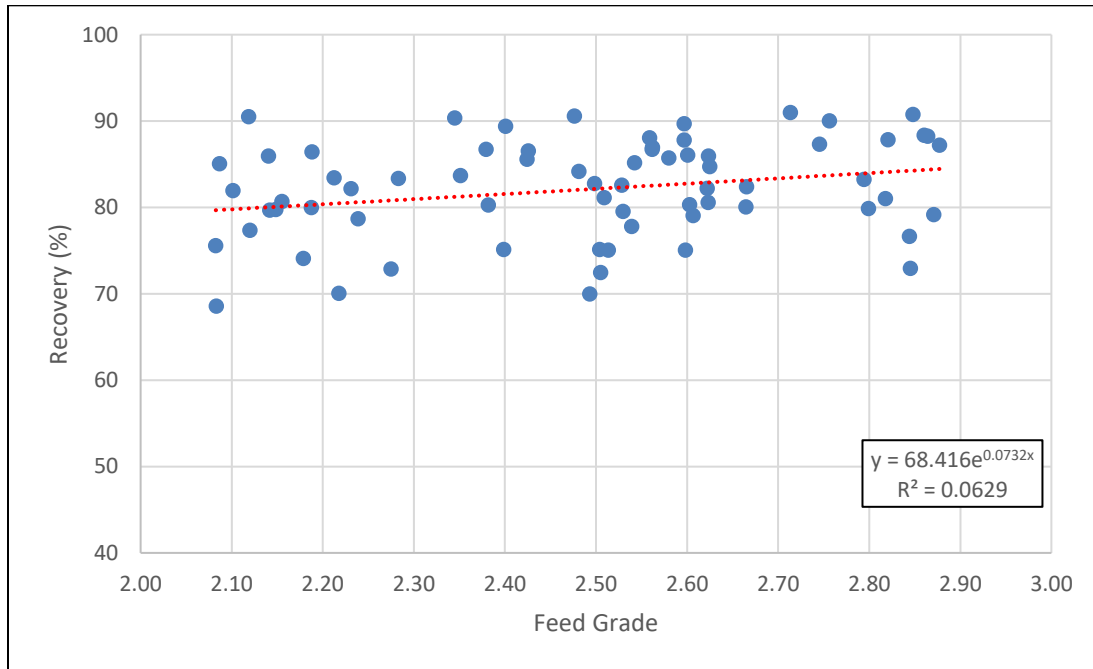
The resulting dataset was then used to develop grade recovery curves which would be used for estimating monthly average recoveries of both lead and zinc. These curves and their representative datasets can be seen in the two figures below. See Figure 13-3 and Figure 13-4 overleaf.

Zinc concentrate from the locked cycle tests was found to contain cadmium with concentrations as high as 2,866 g/tonne.

**Figure 13-3: Lead Recovery Model for Cash Flow Analysis**



**Figure 13-4: Zinc Recovery Model for Cash Flow Analysis**



### 13.10 Conclusions

The available metallurgical testing and historical production data is sufficient to support the PFS in terms of comminution design and flotation design.

Given the homogeneous nature of the MVT deposit, historical plant recovery data is suitable for recovery modelling for both concentrates.

Operation of the zinc rougher concentrate re-grind mill is recommended to provide higher grade zinc final concentrate, or alternatively a high and low grade separation of the concentrate slurry to two separate ball mills (currently in place).

No historical concentrate dewatering data from previous operations is available, as the operation utilized highly inefficient rotary dryers (heated by oil burning furnaces) to dewater the concentrate.

The concentrate filter proposal from FFP is based on extremely low filter duties, such that a small filter press could be used to better match concentrate production levels.

### **13.11 Recommendations**

Ausenco recommends that FFP provide additional information on how their equipment proposal was derived to understand the very low filter duties.

Perform additional concentrate filtration tests on available concentrate samples with another vendor or with an independent laboratory.

Plan further metallurgical testing to support feasibility studies for the proposed plant expansion before purchasing equipment. Samples must be selected to represent future production by pit phase. This should include further investigating potential cadmium contamination.

## 14 Mineral Resource Estimates

### 14.1 Introduction

Based on data provided by the Company, SRK completed a geologic and grade estimation block model for the Project for evaluation purposes, using GEMS modeling software (Version 6.8.2). The data used in the resource model estimation include RC and core drill hole data, topographic surface data, and material density.

### 14.2 Resource Estimation Procedures

The resource estimation procedure followed the general flow listed below:

- Exploratory Data Analysis (EDA)
- Capping Analysis
- Compositing
- Variography
- Block Model Coding (Grade shells and geological domains)
- Grade Estimation
- Classification, based on drill hole spacing
- Resource Pit Optimization
- Resource Statement

### 14.3 Resource Database

#### 14.3.1 Density

Prior to 2007-2008, there was no record of any systematic whole-rock SG measurements being taken. A formula for specific gravity based on zinc and lead grades was, therefore, used for the mineralized zones. This formula, which was also used by Savage Resources for their 1998 resource estimate, was:

$$SG = 1 / (Pb\% / (86.6 \times 7.6) + Zn\% / (67.0 \times 4.0) + (1 - Pb\% / 86.6 - Zn\% / 67.0) / 2.7)$$

Selwyn undertook SG measurements on core from the 2011 drilling program, with 559 determinations in all and 250 determinations on intervals above the mineralized threshold of 0.5% zinc equivalent. On average the formula overestimated the SG by 0.4%, with a standard deviation of 3%. This difference is not considered to be material, and the formula-estimated values have been retained for the current estimate. Densities applied to the non-mineralized formations are tabulated in Table 14-1.

**Table 14-1: Density – Non-Mineralized Materials**

Rock Type	Density (t/m <sup>3</sup> )
Overburden	2.00
Trench	2.00
Carrolls Corner Evaporites	2.65
Goldenville Quartzite	2.65

Source: ScoZinc, 2019

### 14.3.2 Topography

Topographic data was sourced from the Province of Nova Scotia GIS gateway (GeoNOVA) in the form of Digital Terrain Model (“DEM”) data based on 2014 LIDAR surveys. SRK extracted contour data at 2 metre intervals for the creation of a triangulated topographic bounding surface. Contours in the vicinity of the existing pit lake were modified to reflect:

- The excavation at the end of open-pit mining, using blasthole data and survey pick-ups where available
- Subsequent backfill with overburden/trench material

## 14.4 Geological and Grade Shell (Mineralization) Modelling

Although the adjacent Getty, Main and North-East zones have been modelled as separate deposits/block models in previous studies, the mineralization is considered to be continuous through the Gays River Formation (“GRFM”) that hosts all three zones. Various methods and cut-offs were utilized in historical studies, and the current modeling is designed to provide a unified, more cohesive approach based on the GRFM as a whole.

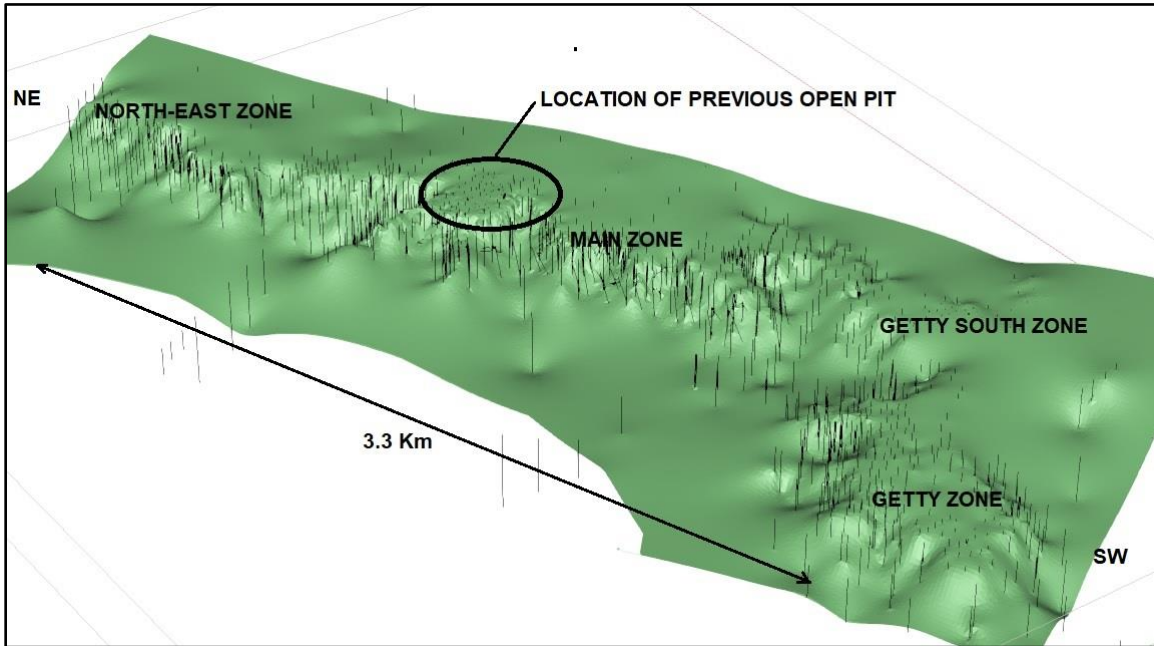
The GRFM has been modelled as a continuous 3D solid across the property, following a general geological trend at Azimuth 060°. Drillhole intersections with the footwall (lower) and hanging wall (upper) contacts were identified from geological logging, with both GRFM and footwall breccia intersections being considered. Numerous intersections of the breccia have been found to be mineralized. Drill holes that intersected the underlying Goldenville quartzites without intersecting the GRFM were assigned a minimum intersection length of 0.5m for control purposes. Triangulated (wireframe) upper and lower surfaces were created using a two-step process:

- Creation of a mesh of 3D gridded points using a Laplace gridding interpolation method, from which only interpolated grid points (from cells that did not contain any source data) were retained.
- Triangulation using a combination of the source data (drill hole intersects) and interpolated grid data to create final surfaces.

Following corrections for minor overlaps, the surfaces were stitched together to create a single, validated 3D solid (wireframe) of the GRF/ Breccia host volume. A perspective view is illustrated in Figure 14-1, and a sectional view in the Getty Zone is illustrated in Figure 14-2.

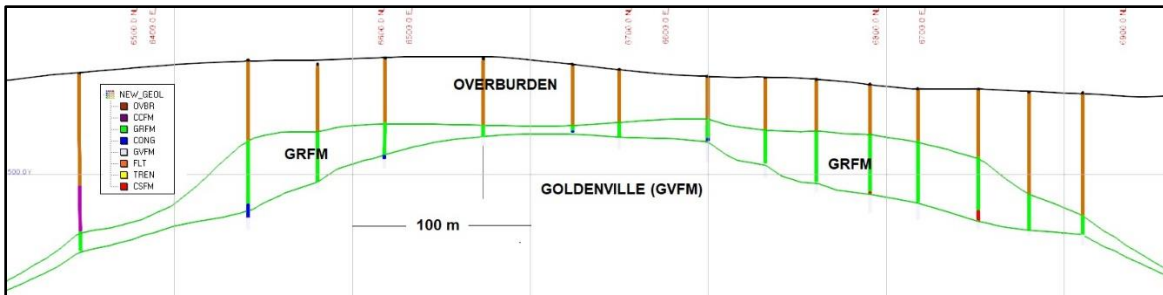


Figure 14-1: GRFM Solid – Perspective View, Looking ESE



Source: SRK, 2019

Figure 14-2: Section View – Getty, Looking SE

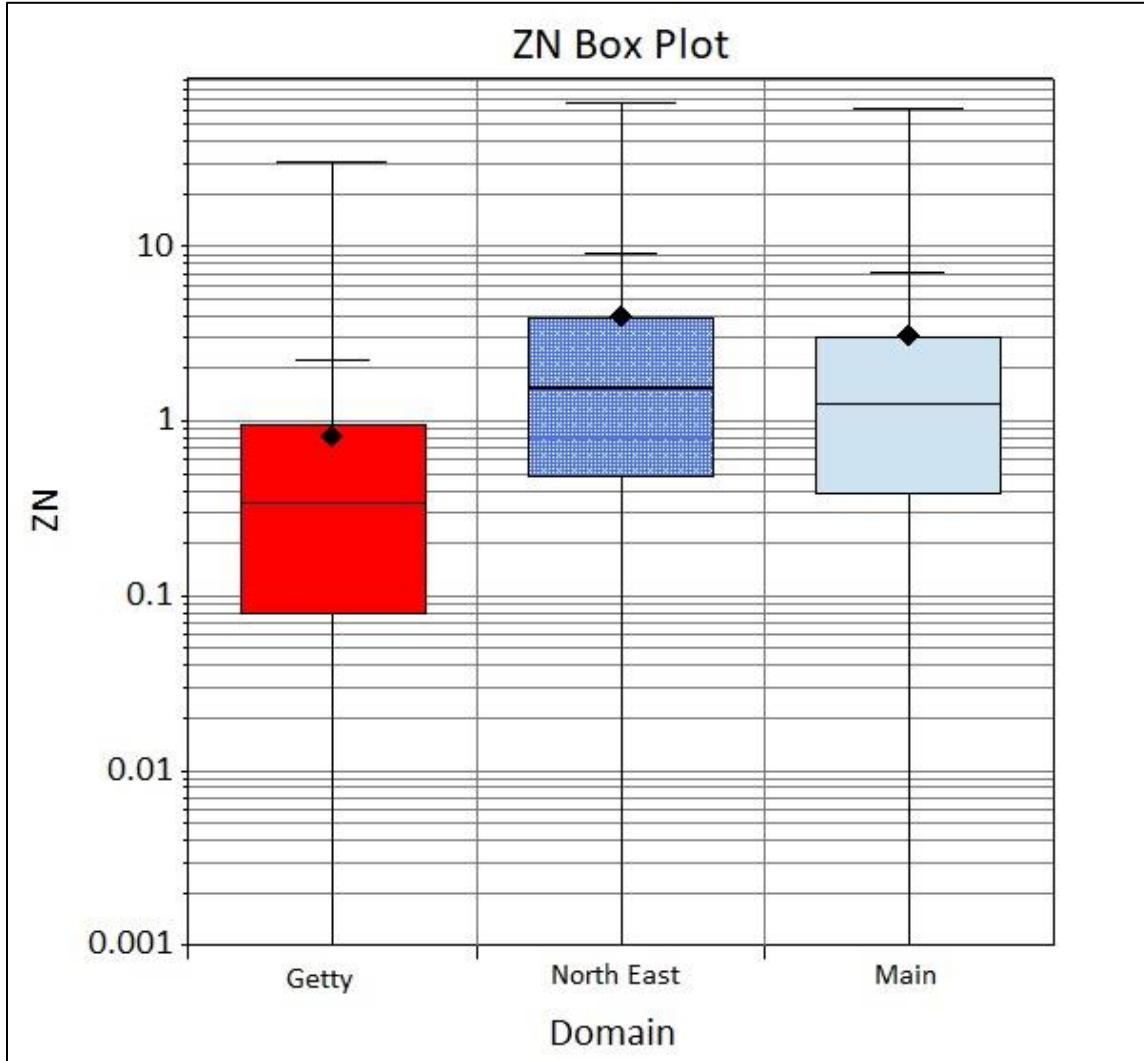


Source: SRK, 2019

### 14.5 Exploratory Data Analysis

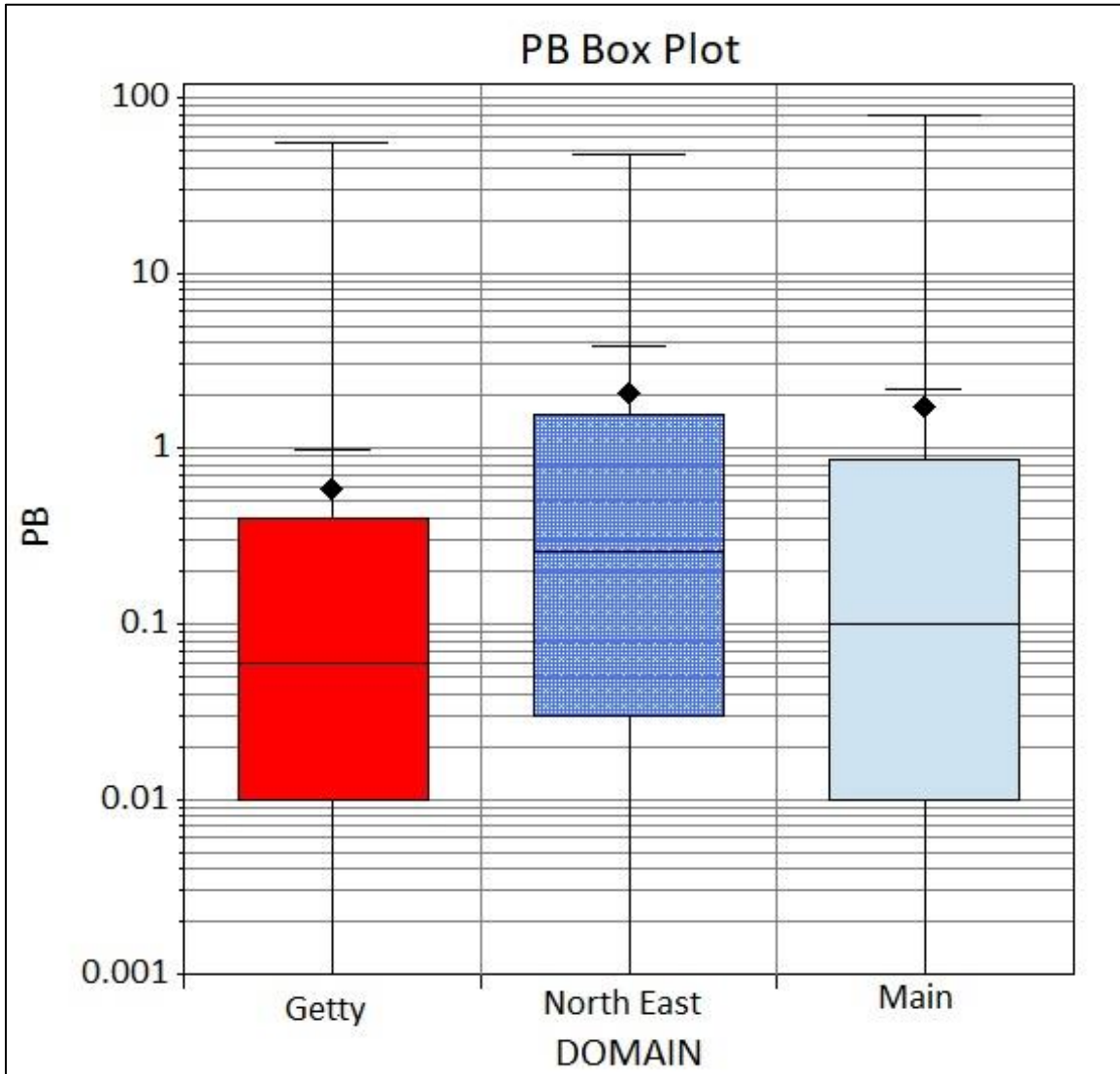
Exploratory data analysis was carried out to characterize the grade distribution within the modeled GRFM mineralized solid, by zone. Boxplots for zinc and lead assay data coded within the GRFM solid are illustrated in Figure 14-3 and Figure 14-4, and summary statistics are presented in Table 14-2.

Figure 14-3: Boxplot – GRFM Zinc Assays



Source: SRK, 2019

Figure 14-4: Boxplot – GRFM Lead Assays



Source: SRK, 2019

**Table 14-2: Summary Statistics – GRFM ZN and Pb Assays**

Domain	Count	Min	Max	Mean	Variance	St. Dev	CV
<b>Zn (%)</b>							
Getty	3,992.00	0.00	30.10	0.81	2.04	1.43	1.76
North East	991.00	0.00	67.06	4.00	55.10	7.42	1.86
Main	8,617.00	0.00	62.10	3.08	39.13	6.26	2.03
<b>Pb%</b>							
Getty	3,992.00	0.00	55.90	0.58	3.89	1.97	3.38
North East	991.00	0.00	47.20	2.08	28.07	5.30	2.54
Main	8,617.00	0.00	79.50	1.72	34.75	5.90	3.43

Source: SRK, 2019

As evidenced by the relatively high coefficient of variation (“CV”) values, the zinc and lead assay data within the mineralized zone exhibit a high degree of variability, and the Getty zone has a markedly lower grade relative to the Main and NE zones.

## 14.6 Evaluation of Outliers

High-grade capping was not applied to the assay data prior to compositing to 1.5m composites generated within the GRFM solid. Historical underground and open-pit mining have established/confirmed the continuity of higher-grade zones within the deposit, mainly along the hanging wall contact. Capping was therefore not considered to be appropriate in this case. A high-grade restriction was, however, applied during interpolation to limit the influence of these samples, with thresholds established on a per zone basis for zinc and lead

## 14.7 Compositing

Zinc and lead assay values were composited into 1.5m composites within the GRFM solid/domain, broken at the domain contacts as required. The 1.5m composite length was selected to retain a degree of the assay sample variability for estimation purposes. Residual intervals that occur at domain contacts were retained if  $\geq 0.6\text{m}$  in length (40% of nominal composite length). Missing zinc and lead assays values within composite intervals were assigned a default value calculated as the mean of the low-grade population, by zone. In the author’s opinion the use of a default value is supported primarily by production reconciliation data from historical open-pit mining, in addition to examination of drill core/chips and logging data. Historical sampling tended to be restricted to higher-grade (7% plus Zn) zones of interest for underground mining, but examination of core/chips and logs have established the pervasive presence of lower grade sulphide mineralization in unsampled intervals. Reconciliation data from historical open-pit mining exhibits a consistent positive reconciliation against blasthole data in volumes where holes with unsampled intersects occur. Lognormal probability plots for zinc and lead composites were examined to determine thresholds to define low-grade components, and calculation of the corresponding means. The minimums, threshold values and corresponding means are tabulated in Table 14-3.

**Table 14-3: Default Values by Zone**

Metal	Zone	Min (%)	Threshold (%)	Mean (%)
<b>Zn</b>	Getty	0.1	0.5	0.2
	North-East	0.1	0.4	0.23
	Main	0.1	0.4	0.23
<b>Pb</b>	Getty	0.1	0.3	0.18
	North-East	0.1	0.3	0.17
	Main	0.1	0.6	0.25

Source: SRK, 2019

Composite intervals were tagged with the GRFM domain code for interpolation purposes. Summary statistics for the composites are tabulated in Table 14-4 below.

**Table 14-4: Composites Summary Statistics**

Domain	Count	Min	Max	Mean	Variance	St. Dev	CV
<b>Zn (%)</b>							
Getty	4,031	0.00	12.05	0.75	1.27	1.13	1.50
North East	727	0.00	53.66	3.17	28.22	5.31	1.68
Main	7,781	0.00	57.80	2.62	23.42	4.84	1.84
<b>Pb%</b>							
Getty	4,031	0.00	21.16	0.43	1.33	1.15	2.71
North East	727	0.00	45.80	1.66	16.17	4.02	2.43
Main	7,781	0.00	77.22	1.35	17.69	4.21	3.13

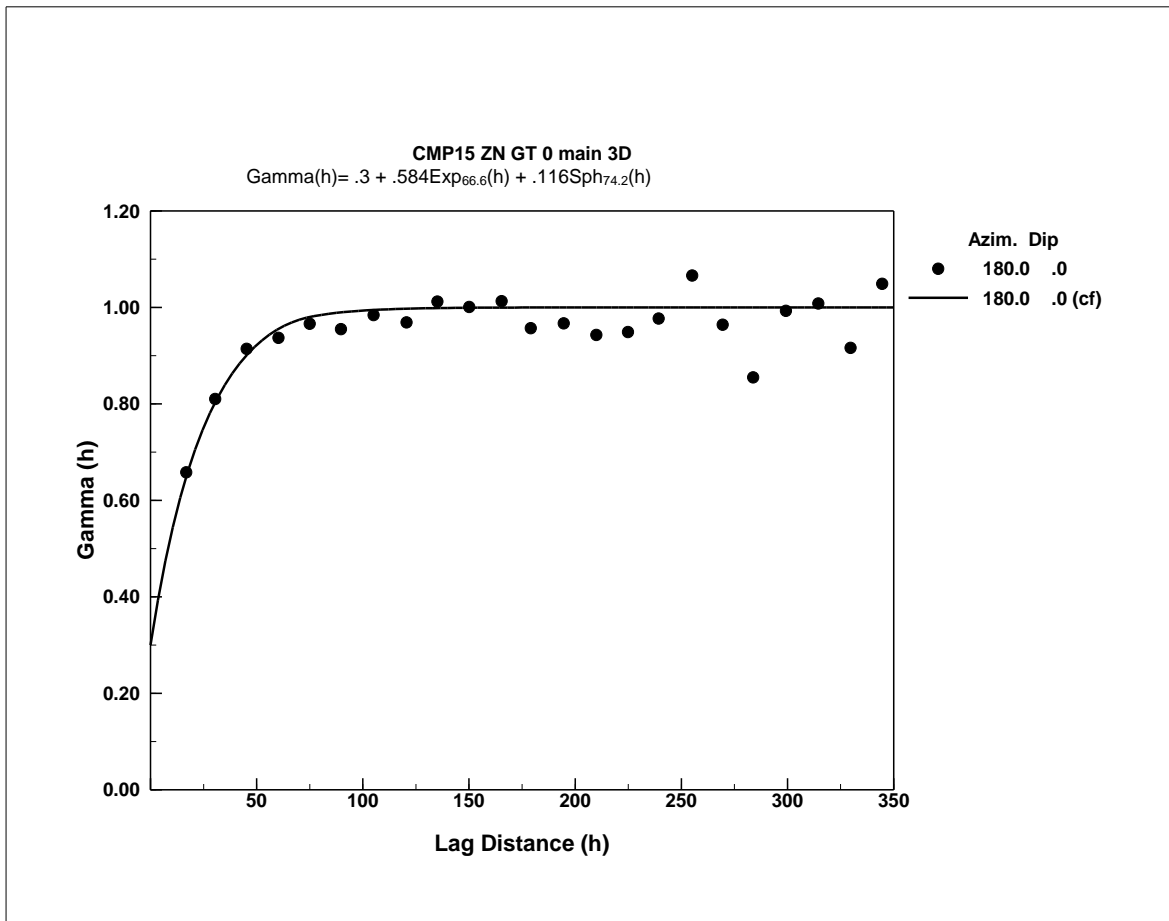
Source: SRK, 2019

## 14.8 Variography

The spatial continuity of composites within the GRFM zones was investigated through variographic analysis for zinc (primary metal) using the SAGE 2001™ variography package. The GRFM composite coordinates were first transformed into a modified model space to account for the variability in orientation of the host formation. This transformation is referred to as ‘unwrinkling’ and is described in Section 14.9. Down-the-hole correlograms were calculated to determine appropriate nugget values, in addition to 3D directional correlograms for use in variogram modeling. The correlogram measures the correlation coefficient between two sets of data, comprising values at the heads and values at the tails of vectors with similar direction and magnitude, and has been found to provide a stable estimate of spatial continuity. For ease of modelling, the correlogram value is subtracted from one and is presented in a similar graphical form to the variogram. In this report the correlograms presented this way are referred to as variograms. A typical directional

variogram is illustrated in Figure 14-5 and fitted variogram parameters for zinc by zone are tabulated in Table 14-5.

**Figure 14-5: Typical Directional Variogram – Zinc (Main Zone, Azimuth 180°/Dip 0°)**



Source: SRK, 2019

**Table 14-5: Variogram Parameters by Zone – Zinc**

Zone	Nugget	Type	Sill	Az/Dip (Deg.)			Range (m)		
				X	Y	Z	X	Y	Z
Getty	0.2	EXP	0.647	130/23	33/17	269/61	135	40	72
		EXP	0.153	120/75	297/15	207/-1	520	388	897
NE	0.754	EXP	0.207	19/20	296/18	245/63	74	72	71
		EXP	0.048	122/-12	36/16	176/69	69	63	78
Main	0.3	EXP	0.584	77/7	348/-5	294/81	20	92	39
		SPH	0.116	66/-2	336/2	103/87	1035	68	172

Source: SRK, 2019

## 14.9 Block Model and Grade Estimation

Given the variable geometry of the GRFM formation in both lateral and vertical axes, the GEMS Unwrinkle tool was utilized to assist grade modeling. Variographic analyses of spatial continuity and the various block estimation methods based on weighted distance interpolation, such as kriging or inverse distance, assume that the location of the relevant sample data reflects the mineralizing or depositional process, e.g. along a paleo-shoreline in this case. The distortion of this relationship introduced by geometric variation can be addressed in several ways, e.g. by the definition of several block model domains, each reflecting the local geometry of sections of the deposit. This approach can, however, result in a less cohesive grade model, often with obvious discontinuities at the domain boundaries. The Unwrinkle tool addresses variable geometry by 'flattening' the deposit and data into a second, regular space in which a more appropriate spatial relationship is preserved. Variography and grade modeling (block model) is done in this second space using transformed data. The estimated grade model information is then back transformed into the original space, typically by assigning back transformed block grades (centroids) to a second (primary) block model defined in this space.

The space to be unwrinkled is represented by triangulated surfaces and/or solids, and midpoints are developed from intersections with the modeled solids/surfaces. By moving the midpoints to a constant level, the space associated with the solids/surfaces is flattened/straightened out. The thickness, or distance between the two intersections, is also calculated and a Variable Thickness approach preserves this thickness, with its value typically changing with location. The handling of the midpoint and the thickness determines the transformation for the data point, with the new point offset from the specified level by an amount determined by its offset from its midpoint and the treatment of the thickness. In the Variable thickness case, the position of the data points relative to its associated midpoint, and the position of the data point relative to both surfaces is preserved.

A primary (normal space) percentage, or partial, block model was defined in GEOVIA GEMS™ to cover the volume of interest, with a rotation of 30° applied, to align the model east axis with the overall trend of the deposit (Azimuth 060°). A percentage block model in GEMS can accommodate multiple material types per block and stores corresponding percentages. A block size of 10x10x5 m was selected based on drill hole spacing, likely bench height for large scale open-pit mining, and for comparison purposes with previous models. The primary control for estimation is rock type, based on coding of a block model rock type attribute using the GRFM (3D geological solid) in conjunction with the topography surface and the underground excavation solid where applicable to account for excavations. Overlapping solids are assigned a precedence order in assigning the appropriate block percentages.

### 14.9.1 Block Model Geometry

The block model geometry for the primary (normal space) and secondary (transformed) is tabulated in Table 14-6 and Table 14-7.

**Table 14-6: Primary Block Model Geometry**

Coordinate	Origin	Block Size (m)	# Blocks	Extents (m)
Easting (m)	6747.37	10	420	4,200
Northing (m)	5176.79	10	200	2,000
Elevation (m)	600.00*	5	45	225

Source: SRK, 2019

**Table 14-7: Secondary Block Model Geometry**

Coordinate	Origin	Block Size (m)	# Blocks	Extents (m)
Easting (m)	6747.37	10	420	4,200
Northing (m)	5176.79	10	200	2,000
Elevation (m)	-70.00*	1.5	40	60

Source: SRK, 2019

Notes: \* Maximum elevation, i.e. top of top block. Model east axis is rotated 30° to align with Azimuth 060°

#### 14.9.2 Block Model Estimation

Block grades were estimated in the unwrinkled space by zone for zinc (%) and lead (%) using Ordinary Kriging (“OK”) and Inverse Distance Weighting (“IDW”) respectively. The interpolation process utilized 1.5m composites tagged with the GRFM rock type code to enable the use of boundaries. The interpolations were done in three passes, with progressively larger search distances and progressively relaxed requirements in terms of minimum number of samples and maximum number of samples per drill hole, and with protection of blocks estimated in earlier passes. The estimation parameters by zone and pass are tabulated in Table 14-8 overleaf.



Table 14-8: Estimation Parameters

Pass	Metal	Zone	Type	Sample Support			Search Neighborhood (Az/Dip in Deg, Distance in m)						HG Restriction			
				Min	Max	Max Hole	Az (P)	Dip (P)	Az (I)	Dist (X)	Dist (Y)	Dist (Z)	HG%	Dist (X)	Dist (Y)	Dist (Z)
1	Zn	Getty	OK	3	12	2	130	0	0	30	30	1	-	-	-	-
		Main	OK	3	12	2	348	0	0	15	15	1	14	5	5	1
		NE	OK	3	12	2	0	0	0	20	20	1	18	5	5	1
	Pb	Getty	IDW	3	12	2	130	0	0	30	30	1	-	-	-	-
		Main	IDW	3	12	2	348	0	0	15	15	1	19	5	5	1
		NE	IDW	3	12	2	0	0	0	20	20	1	12	5	5	1
2	Zn	Getty	OK	2	12	1	130	0	0	60	60	1	-	-	-	-
		Main	OK	2	12	1	348	0	0	30	30	1	14	5	5	1
		NE	OK	2	12	1	0	0	0	40	40	1	18	5	5	1
	Pb	Getty	IDW	2	12	1	130	0	0	60	60	1	-	-	-	-
		Main	IDW	2	12	1	348	0	0	30	30	1	19	5	5	1
		NE	OK	2	15	1	0	0	0	40	40	1	12	5	5	1
3	Zn	Getty	OK	1	12	-	130	0	0	90	90	1	-	-	-	-
		Main	OK	1	12	-	348	0	0	60	60	1	14	5	5	1
		NE	OK	1	12	-	0	0	0	60	60	1	18	5	5	1
	Pb	Getty	IDW	1	12	-	130	0	0	90	90	1	-	-	-	-
		Main	IDW	1	12	-	348	0	0	60	60	1	19	5	5	1
		NE	OK	1	15	-	0	0	0	60	60	1	12	5	5	1

Source: SRK, 2019

A block discretization of 5 x 5 x 3 was used with Ordinary Kriging estimation. The High Grade (“HG”) restriction value is a threshold value (%). The restricted search ranges are applied to samples with values exceeding this value, effectively limiting their influence to the block that they fall into. The threshold values were determined by examination of omni-directional indicator variograms, by zone, generated at the 75, 80, 90, 95, 97,5 and 99% percentile values, to determine a grade threshold above which the indicator variogram visibly degrades, which is an indication of a suitable threshold value.

Following block grade estimation in the secondary model space the block grades were then back transformed into normal space and assigned to the normal space model by block averaging.

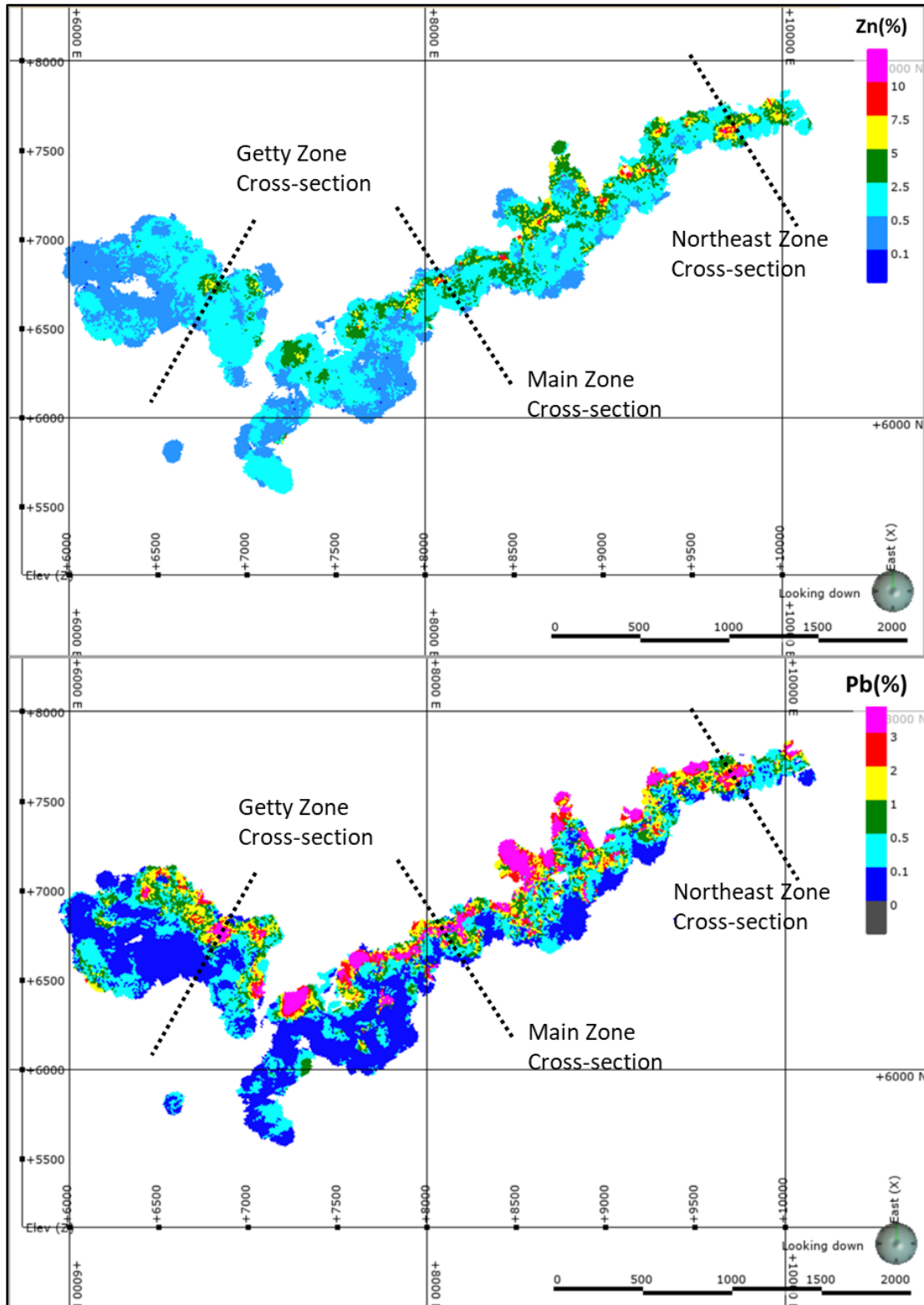
## **14.10 Model Validation**

Model validation was approached through visual and statistical methods. Visual comparison was done on sections and in plan for each area of the deposit. Statistical comparison was addressed using swath plots.

### **14.10.1 Visual Comparison**

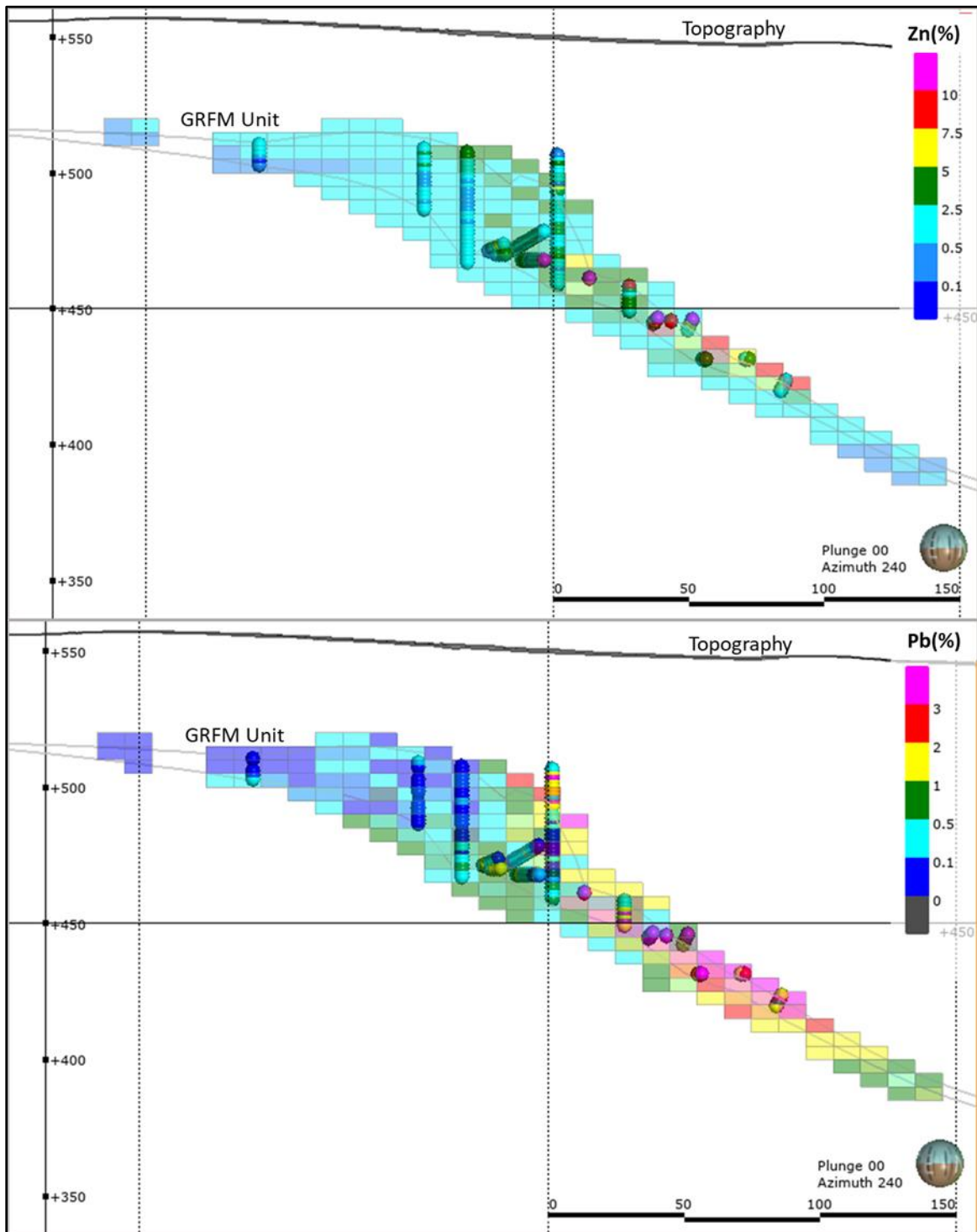
A visual inspection of the model in plan and section confirmed that grades were well correlated between the blocks and the composite data in each area. Example images showing block grades vs. composite grades are provided below in Figure 14-6 to Figure 14-9. Estimated block grades relative to topography and the underground workings are provided in Figure 14-10 and Figure 14-11 respectively.

**Figure 14-6: Plan View of Zn and Pb Block Grades and Cross-Section Locations for Main, Getty and Northeast Zones**



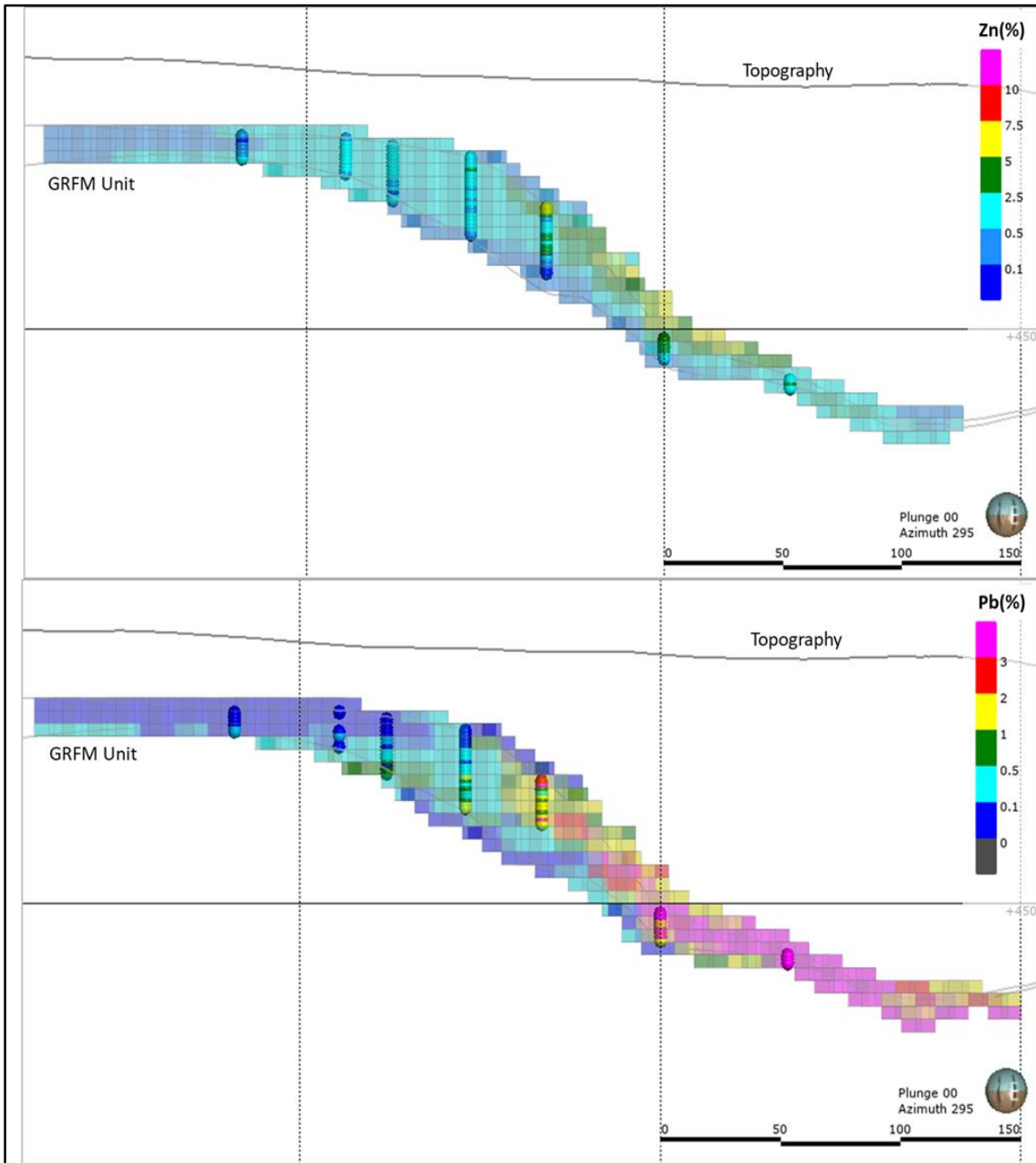
Source: SRK, 2019

Figure 14-7: Main Zone Cross-Section Comparing Assay Composite Grades to Estimated Block Grades for both Zn and Pb (Section Looking South-West)



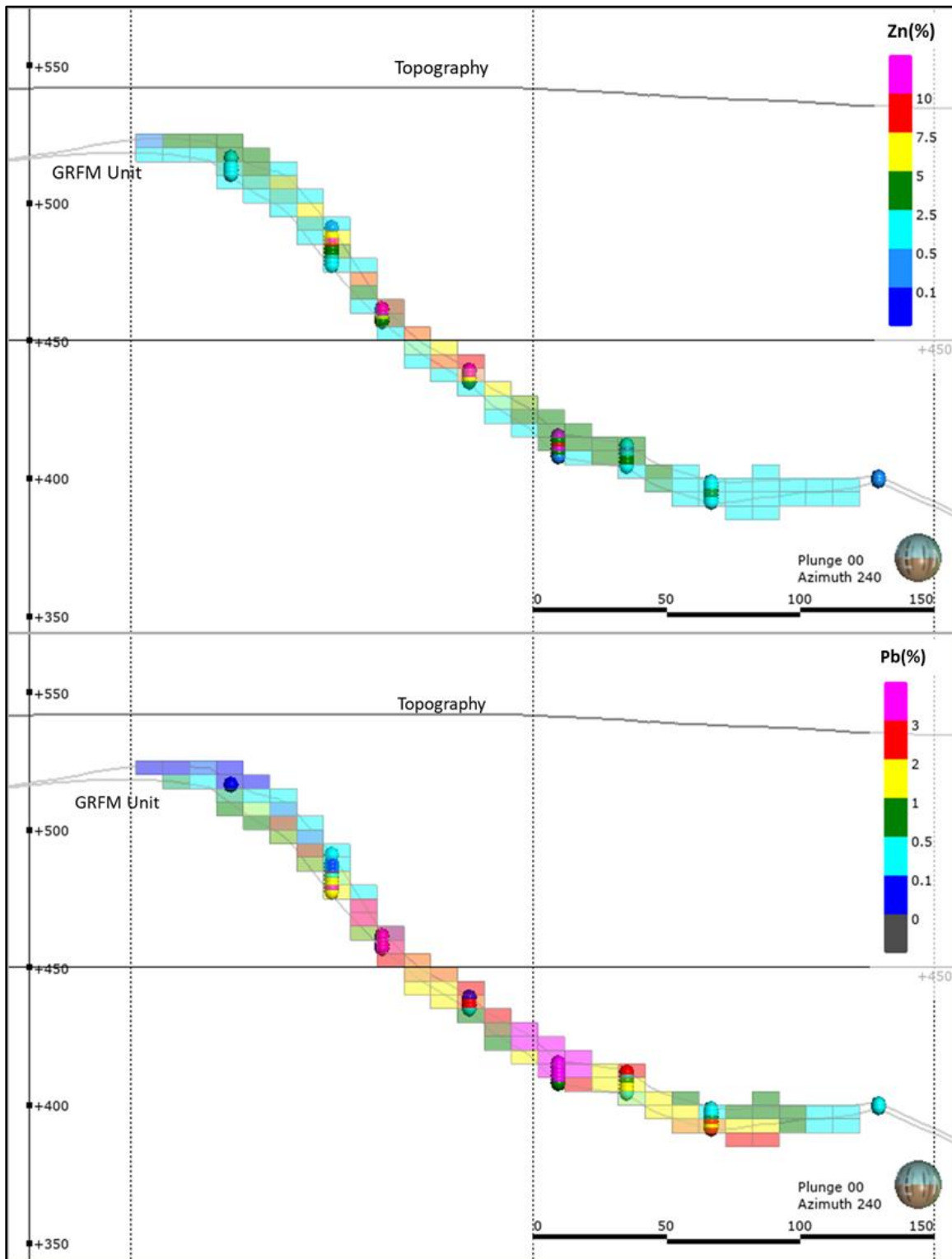
Source: SRK, 2019

**Figure 14-8: Getty Zone Cross-Section Comparing Assay Composite Grades to Estimated Block Grades for both Zn and Pb (Section Looking North-West)**



Source: SRK, 2019

**Figure 14-9: Northeast Zone Cross-Section Comparing Assay Composite Grades to Estimated Block Grades for both Zn and Pb (Section Looking South-West)**



Source: SRK, 2019

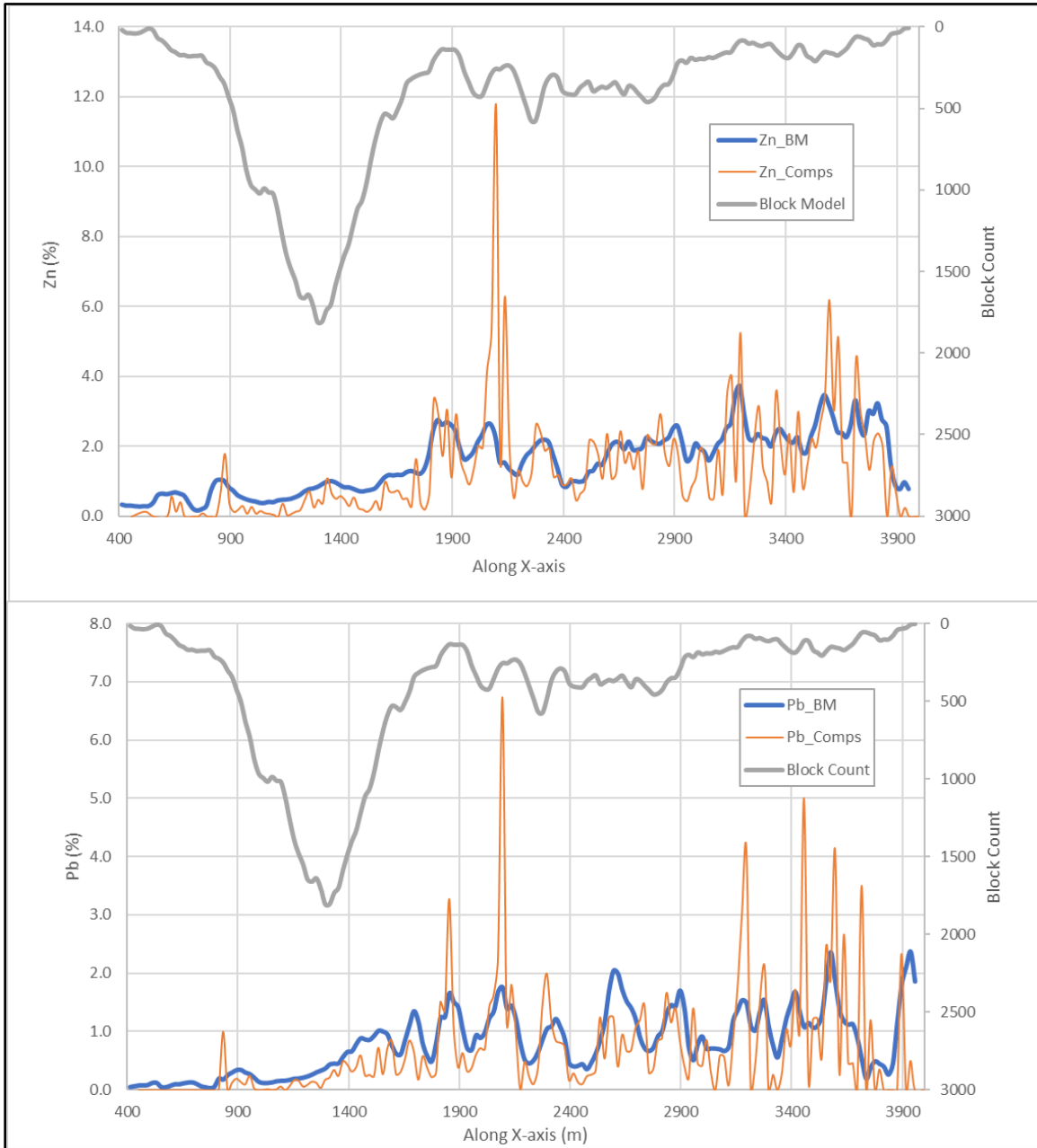
### 14.10.2 Swath Plots

A swath plot is a graphical display of the grade distribution derived from a series of bands, or swaths, generated in several directions through the deposit. Using the swath plot, grade variations from the block model estimate are compared to the distribution derived from the assay sample composite data used in the estimation process.

On a local scale, the profile obtained from the assay composite data typically displays a more variable profile than that obtained from the block model estimate. This reflects the smoothed nature of the block model estimate which is an outcome of the estimation process. However, the overall grade trend displayed in the swath plot should be similar between the block model estimate and underlying data.

Swath plots generated along east-west and north-south directions are provided in Figure 14-10 and Figure 14-11 for Zn and Pb. The swath plots were rotated to align with the rotation angle of the block model, using swath widths of 20m for both east-west and north-south orientations.

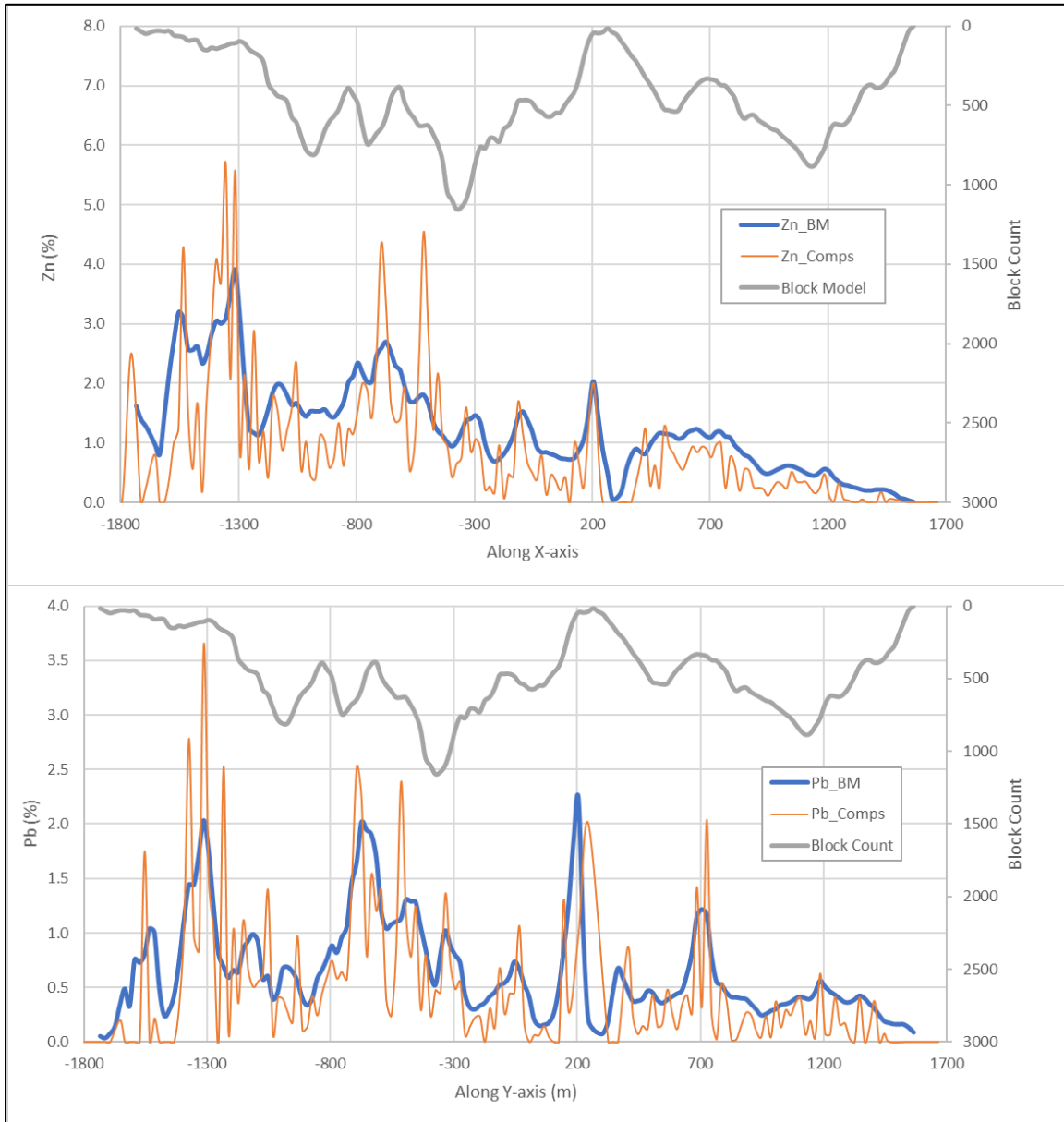
Figure 14-10: Easting Swath Plot for Zn and Pb



Source: SRK, 2019



Figure 14-11: Northing Swath Plot for Zn and Pb



Source: SRK, 2019

Based on the swath plots, there is a reasonable correlation between the block model and underlying data. The degree of smoothing in the block model estimate is evident in the peaks and valleys shown in some swath plots; however, this comparison shows reasonable agreement between the data sets in terms of overall grade distribution as a function of easting, and northing, especially where there are high tonnages (as shown by the block counts on the figures shown in grey). See Figure 14-10 and Figure 14-11 above.

## 14.11 Mineral Resource Classification

Mineral resources were classified into Measured, Indicated and Inferred categories based on CIM Definition Standards in accordance with NI 43-101 reporting guidelines. The initial classification criteria considers a combination of geometric criteria (based on overall drillhole spacing), and estimation quality criteria.

- Measured blocks require a minimum of three holes within 20m radii, nominally corresponding to a maximum drillhole spacing of 28 metres. The mean distance to the nearest three holes is 12.5 metres
- Indicated blocks require a minimum of three holes within 50 metre radii, with a nominal maximum spacing of 70 metres. The mean distance to the nearest three holes is 30 metres
- Inferred – all other blocks estimated in the mineralized zone

The initial classification was adjusted to account for the estimation of blocks in GRFM volumes with drill holes with unsampled intervals. Affected blocks were identified by means of a specific interpolation using composite data coded for missing data, and the blocks were re-classified as Inferred blocks on this basis.

## 14.12 Mineral Resource Statement

The resources are reported with respect to cut-off values calculated using the assumed processing costs and recoveries, and metal prices. The resource is also constrained by an optimized (Whittle™) resource pit, in order to demonstrate that the defined resources have reasonable prospects of eventual economic extraction, which is a CIM Definition Standards criterion. All classification categories (Measured, Indicated and Inferred) were considered in the resource pit optimization.

### 14.12.1 Resource Pit Optimization Parameters

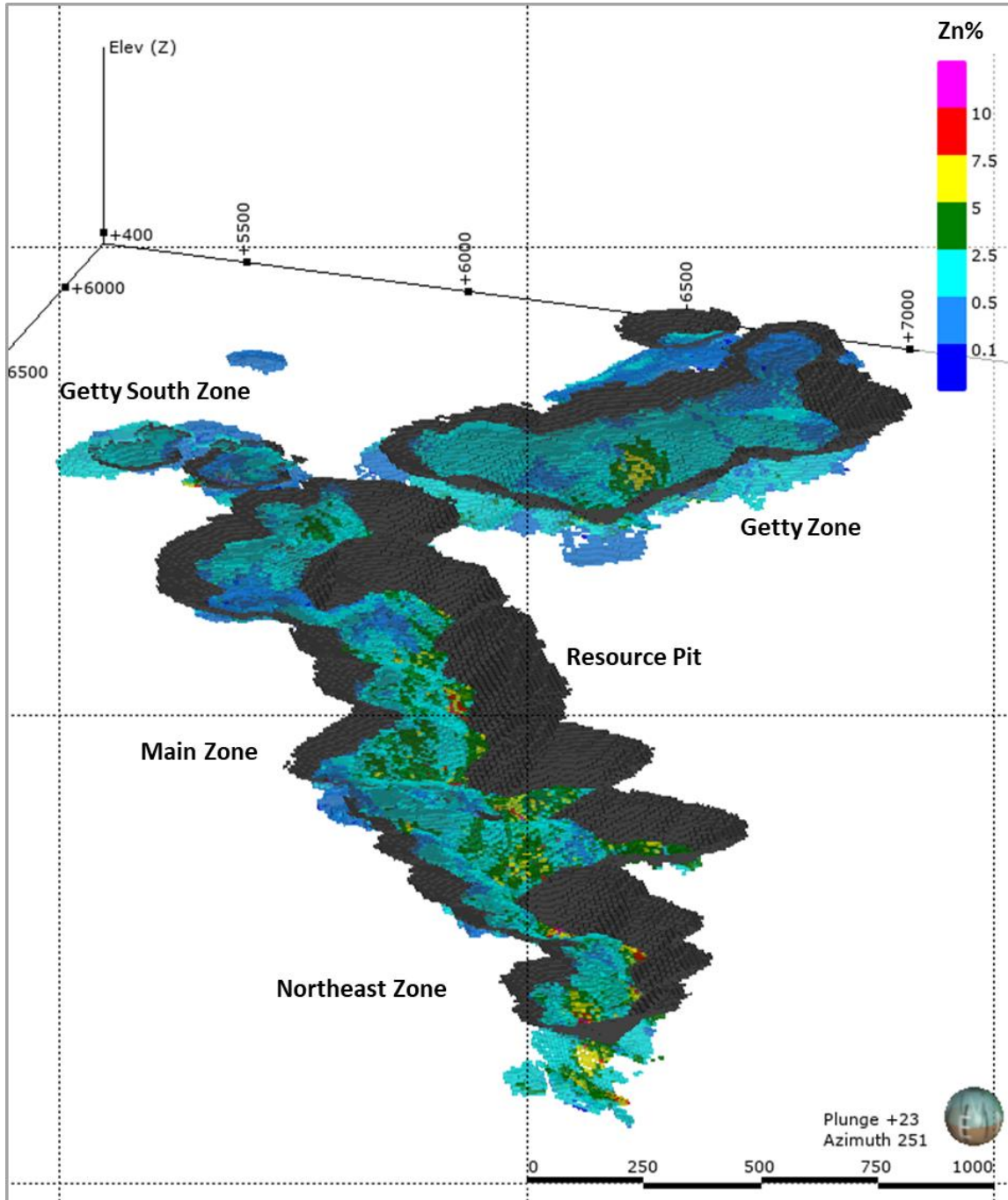
The resource pit optimization parameters are tabulated in Table 14-9, and a 3D isometric view of the resource pit is illustrated in Figure 14-12.

**Table 14-9: Resource Pit Optimization Parameters**

<b>Parameter</b>	<b>Value</b>	<b>Unit</b>
Mining Cost	Varies	C\$/t Mined
NE Zone Ore	3.27	C\$/t Mined
Main Zone Ore	3.09	C\$/t Mined
Getty Zone Ore	3.27	C\$/t Mined
Getty S Zone Ore	3.27	C\$/t Mined
Gypsum	2.52	C\$/t Mined
Quartzite	2.30	C\$/t Mined
Carbonate	3.09	C\$/t Mined
Overburden/Trench	1.74	C\$/t Mined
<b>Processing Cost (including G&amp;A)</b>	<b>19.11</b>	<b>C\$/t Processed</b>
Zinc Recovery	86	%
Lead Recovery	93	%
Zinc Price	1.35	US\$/lb
Lead Price	1.14	US\$/lb
Zn Offsite Costs	0.19	US\$/lb
Pb Offsite Costs	0.11	US\$/lb
Royalty	2.0	%
Exchange Rate	1.30	C\$/US\$
Slope Angle Rock	45	Degrees
Slope Angle Overburden	22	Degrees

Source: ScoZinc/ SRK, 2019

Figure 14-12: 3D Isometric View of the Resource Pit and Block Model (Zn% Grade Shown)



Source: SRK 2019

### 14.12.2 Mineral Resource Statement

The Mineral Resource Statement and explanatory notes are presented in Table 14-10 below.

**Table 14-10: Scotia Mine Resource Statement, December 14, 2019 – SRK Consulting (U.S.), Inc.**

Classification	Zone	Mass (kt)	Zn (%)	Pb (%)	ZnEq. (%)
<b>Measured</b>	Getty	60	1.38	1.25	2.58
	Main	4,130	2.57	1.30	3.81
	North East	130	3.18	1.88	4.98
	<b>Total</b>	<b>4,320</b>	<b>2.57</b>	<b>1.32</b>	<b>3.83</b>
<b>Indicated</b>	Getty	8,090	1.24	0.81	2.02
	Getty South	840	1.58	0.25	1.82
	Main	9,870	1.92	1.01	2.89
	North East	2,330	2.88	1.15	3.98
	<b>Total</b>	<b>21,130</b>	<b>1.75</b>	<b>0.92</b>	<b>2.64</b>
<b>Measured and Indicated</b>	Getty	8,150	1.24	0.82	2.03
	Getty South	840	1.58	0.25	1.82
	Main	14,000	2.11	1.09	3.16
	North East	2,460	2.89	1.19	4.04
	<b>Total</b>	<b>25,450</b>	<b>1.89</b>	<b>0.99</b>	<b>2.84</b>
<b>Inferred</b>	Getty	950	1.35	0.54	1.87
	Getty South	770	1.53	0.25	1.77
	Main	2,980	1.49	0.79	2.25
	North East	310	2.01	0.74	2.72
	<b>Total</b>	<b>5,010</b>	<b>1.50</b>	<b>0.66</b>	<b>2.13</b>

Source: SRK, 2019

Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that any part of the Mineral Resources estimated will be converted into Mineral Reserves;

Open-pit resources stated as contained within a potentially economically minable open-pit; pit optimization was based on assumed prices for zinc of US\$1.35/lb, and for lead of US\$1.14/lb, a Zn recovery of 86% and a Pb recovery of 93%, mining and processing costs varying by zone, and pit slopes of 45 degrees in rock and 22 degrees in overburden;

Open-pit resources are reported based on a Zinc Equivalent (ZnEq) cut-off grade of 0.90%. The ZnEq grade incorporates Zn and Pb sales costs of US\$0.19/lb and US\$0.11/lb respectively, and a 2% royalty fee;

Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding.

### 14.12.3 Resource Sensitivity Analysis

A resource sensitivity table within the resource pit shell (US\$1.35/lb Zn, US\$1.14/lb Pb) is provided in Table 14-11 overleaf.

**Table 14-11: Resource Sensitivity Within the Resource Pit Shell**

<b>Cut-off ZnEq (%)</b>	<b>Tonnage (kt)</b>	<b>ZnEq (%)</b>	<b>Zn (%)</b>	<b>Pb (%)</b>
2	15,400	4.01	2.56	1.51
1.9	16,400	3.89	2.49	1.45
1.8	17,500	3.76	2.42	1.39
1.7	18,700	3.63	2.36	1.33
1.6	20,000	3.5	2.28	1.27
1.5	21,400	3.38	2.21	1.21
1.4	22,700	3.26	2.14	1.16
1.3	24,100	3.15	2.08	1.11
1.2	25,700	3.03	2.01	1.06
1.1	27,300	2.92	1.95	1.02
1	28,900	2.82	1.89	0.97
0.9	30,600	2.72	1.82	0.93
0.8	31,900	2.64	1.78	0.9
0.7	32,700	2.59	1.75	0.88

Source: SRK, 2019

## 15 Mineral Reserve Estimate

### 15.1 Introduction

As defined by the Canadian Institute of Mining, Metallurgy and Petroleum (“CIM”) within the CIM Definition of Standards on Mineral Resources and Mineral Reserves as adopted by CIM Council on 10<sup>th</sup> May 2014, the definition of a Mineral Reserve is as follows:

*“A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Preliminary Feasibility or Feasibility level, as appropriate, that includes application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could be reasonably justified.”*

CIM guidelines require that only material categorized as Measured or Indicated Resources be considered for potential Mineral Reserves.

### 15.2 Mineral Reserve Estimation

All mine design and scheduling work has been completed to a level of detail and confidence appropriate for a Pre-Feasibility Study (“PFS”) using a Mineral Resource model generated by SRK on 14<sup>th</sup> December 2019. All mining at Scotia Mine will be achieved by conventional open-pit mining methods.

#### 15.2.1 Orebody Description

The Scotia Mine deposit is hosted within the Gay’s River formation (“GRFM”) of the larger Windsor Group. The depositional environment of the Scotia Mine is consistent along the strike of the deposit. There are no other geological constraints that contribute to defining the orebody.

The orebody is divided into three distinct zones by surface constraints as shown in Figure 15-2. The surface constraints being the Gays River and Highway 224.

Figure 15-1: Resource Block Model

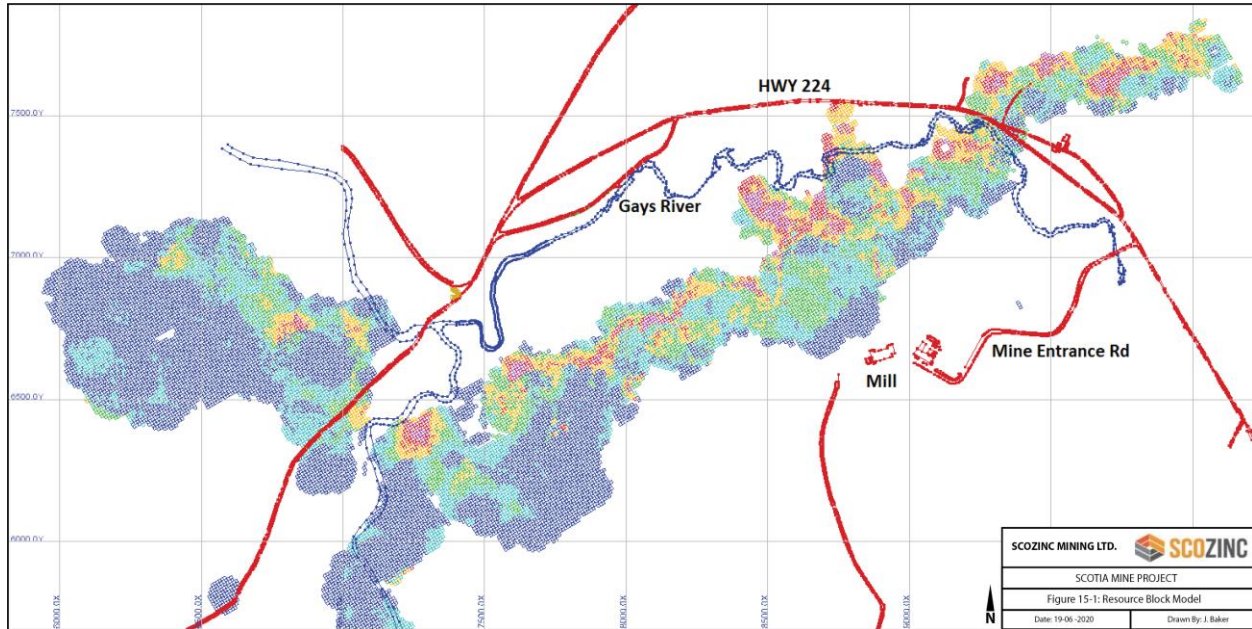
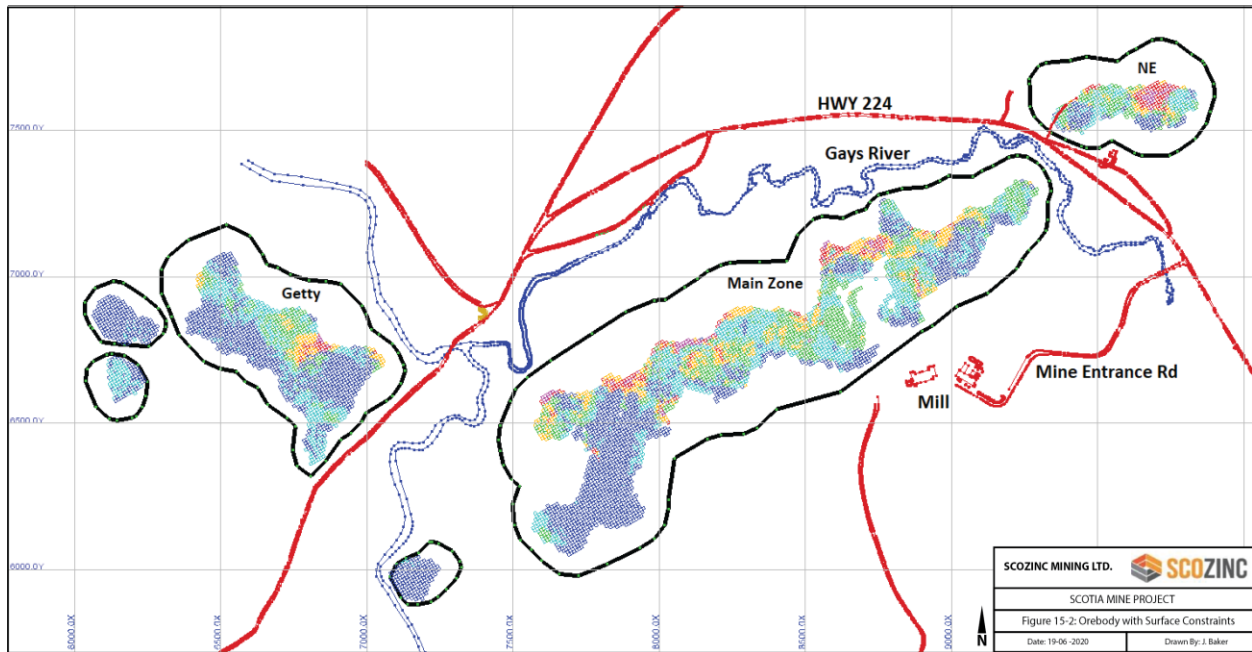


Figure 15-2: Orebody with Surface Constraints



15.2.2 Cut-Off Grade

Cut-off grade (“COG”) was determined during the selection of the optimized pit shell. Zinc Equivalent (“ZnEq”) was the variable used for determining the COG.

Table 15-1 provides the parameters used for calculating ZnEq during the optimization process.



**Table 15-1: Optimization Inputs for Zinc-Equivalent Calculation**

Variable	Unit	Value Applied
Price of Zinc	USD/Pound	1.35
Price of Lead	USD/Pound	1.14
Recovery of Zinc	Percentage (%)	86
Recovery of Lead	Percentage (%)	93
Selling Cost of Zinc	USD/Pound	0.19
Selling Cost of Lead	USD/Pound	0.11
Conversion of Pounds to Tonnes (metric)	Pounds/Tonne	2,204.6

ZnEq% grade was calculated using the following equation:

$$\text{ZnEq grade} = \text{Zn grade} + \text{Pb grade} \times \frac{(\text{Realized Lead Price} \times \text{Lead Recovery})}{(\text{Realized Zinc Price} \times \text{Zinc Recovery})}$$

Realized Pb price is  $1.14 \times 0.98 - 0.11 = 1.01$

Realized Zn price is  $1.35 \times 0.98 - 0.19 = 1.13$

$$\text{ZnEq grade} = \text{Zn grade} + \text{Pb grade} \times \frac{1.01 \times 0.93}{1.13 \times 0.86}$$

$$\text{ZnEq grade} = \text{Zn grade} + \text{Pb grade} \times 0.97$$

The COG determined by the pit optimization was 0.9% ZnEq grade. However, a COG of 1.5% ZnEq grade was chosen considering the following:

- Quantity of waste generated over the life of mine
- Strip ratio impact during the initial stages of mining
- Quantity of tailings generated
- Minimum and maximum production rates
- Minimum and maximum processing rates and recoveries
- Surface constraints (Gays River, Highway 224, waste dump optimal footprint)
- Cash flow constraints
- Investment payback period

### 15.2.3 Mining Dilution and Recovery

Geovia GEMS was used to create the pit designs and construct the resource block model. Volumes calculated in GEMS are done using weighted volume percent of each block, where a block can have multiple rock types represented as volume percent adding to 100%. The block model was transferred to Geovia Minesched to perform the life of mine (“LOM”) scheduling.

In order to transfer the block model to Minesched it had to be converted to a whole block model where each block can only contain one material type. Minesched is only capable of working with whole block models. During the conversion process the original GEMS resource model was diluted by 12 percent at a grade of 0.4% ZnEq.

A mining recovery of 92% was also applied which, when compared to previous open-pit operations at the Scotia Mine, is conservative.

#### 15.2.4 Mineral Reserves

The Scotia Mine Mineral Reserve Estimates are classified as either Proven Reserves or Probable Reserves and are provided Table 15-2.

Total Mineral Reserves are 13.66 million tonnes with a Zinc Equivalent grade of 3.09 percent.

**Table 15-2: Scotia Mine Mineral Reserve Estimates**

Mineral Zone	Classification	Tonnage (t)	Zinc Grade (%)	Lead Grade (%)	Zinc Equivalent Grade (%)
Scotia Mine	Proven	3,370,000	2.46	1.21	3.62
Scotia Mine	Probable	10,290,000	1.88	1.07	2.91
<b>Scotia Mine</b>	<b>Total</b>	<b>13,660,000</b>	<b>2.03</b>	<b>1.10</b>	<b>3.09</b>

Notes: 2020 Mineral Reserves are as of 01 May 2020 and based on a design cut-off grade of 1.5% ZnEq grade. Cut-off grades are based on a zinc metal price of US\$1.10/lb, recovery of 89%, a lead metal price of US\$0.95/lb, and mining recovery of 92%. Average unplanned dilution and mining recovery factors of 12% and 92%, respectively, are assumed.

#### 15.2.5 Conversion of Mineral Resources to Mineral Reserves

The conversion of Measured and Indicated Mineral Resources to Proven and Probable Mineral Reserves is shown for the Scotia Mine deposit in Table 15-3.

**Table 15-3: Conversion of Mineral Resources to Mineral Reserves**

Scotia Mine	Mineral Resources			Mineral Reserves			Conversion Factor <sup>1</sup>		
	Measured	Indicated	Total	Proven	Probable	Total	Measured/Proven	Indicated/Probable	Total
Tonnage (Mt)	4.32	21.13	25.45	3.37	10.29	13.66	78	49	54
Zinc Grade (%)	2.57	1.75	1.89	2.46	1.88	2.03	52	75	57
Lead Grade (%)	1.32	0.92	0.99	1.21	1.07	1.10	57	71	60

Note 1: Metal conversion factors reflect total metal content.

## 16 Mining Methods

### 16.1 Introduction

The Scotia Mine deposit covers a total strike length of approximately 4 kilometres, with some surface constraints in between, and a vertical distance of approximately 120 metres. All mining is from open-pit operations with an expected mine life of approximately 14 years. Mining operations will be conducted utilizing 4 shifts, 12 hours each shift, covering 24 hours per day. The 4 shifts will be on a 4 day on, 4 day off, 4 night on, 4 night off rotation.

The Scotia Mine mineral resources will be extracted using conventional load and haul (truck & shovel) mining methods as determined by optimized pit designs and life-of-mine schedules. Mining operations will be completed using an owner/operator of excavators, loaders, haul trucks and ancillary support equipment as well as some rental equipment. Equipment requirements have been determined based upon required production rates and haulage cycles.

The open-pits will be mined on 5-metre-high benches with double benching being utilized on the lower, which are primarily comprised of fair to good quality. Drilling and blasting are only required for 40 percent of the total material mined over the life of mine plan, which accounts for all of the hard rock to be mined from the pits. The remaining 60 percent is largely comprised of overburden and has been proved to be free digging material based on past operations and will not require blasting. Drilling and blasting will be performed using contract services.

Geotechnical and hydrological studies have determined that pit dewatering is necessary for maximizing pit wall stability, improving mining operations, and minimizing water ground flow from the nearby Gays River. A series of drainage wells are spaced along the perimeter of the main pits, with water pumped either to the mill for use as clean process water, or to sediment control dams located on the mine site for controlled discharge.

### 16.2 Mine Design

#### 16.2.1 Pit Optimization

A series of pit economic optimizations were generated utilizing Whittle™ Optimization software to define the optimal pit sizes and their configurations. Both constrained and unconstrained optimizations were completed based on a preliminary economic model and current commodity and operating costs to ascertain the optimal pit configurations considering all available reasonable factors. The optimized pit shell selection was based on the following criteria:

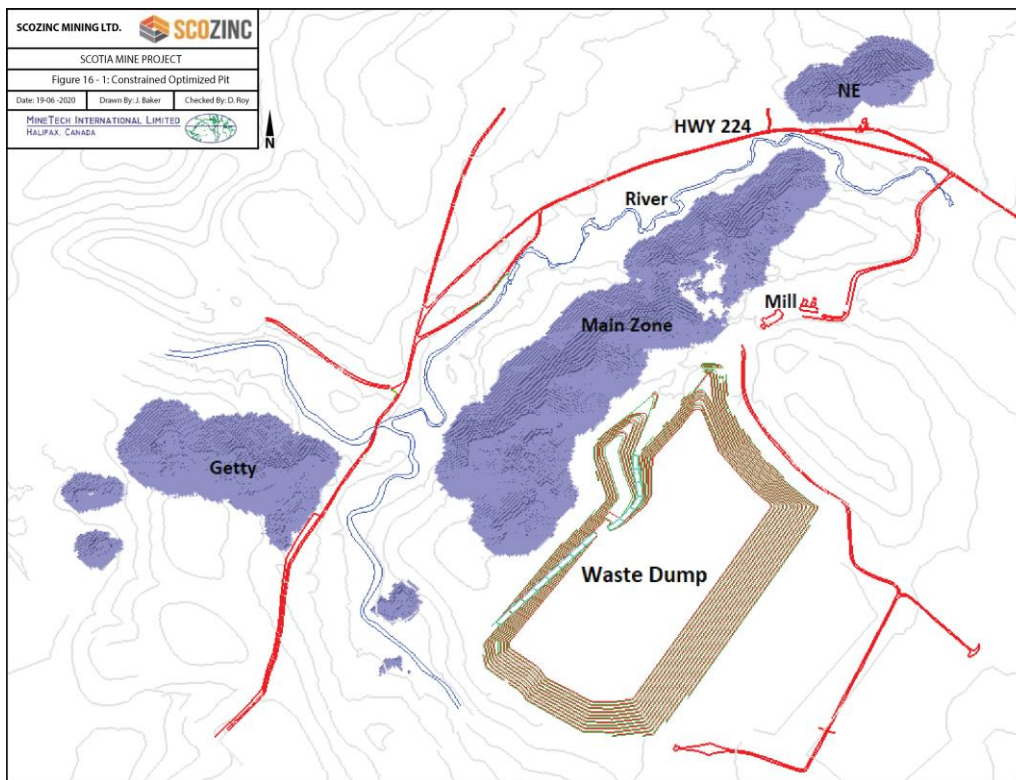
- Revenue
- Cut-off grade
- Strip ratio (amount of waste generated)
- Surface constraints (i.e. river, roads, current site infrastructure)

Using the selected optimal shell, an Ultimate Pit Design was created using GEMS software. The inputs to the pit optimization are shown in Table 16-1. The optimized pit shell selected for creating the Ultimate Pit Design is shown in Figure 16-1.

**Table 16-1: Pit Optimization Parameters Used for Mine Planning**

Mining Costs	\$2.06/t
Mining Recovery	95%
Mining Dilution	5%
Pit Slope OB	24 deg
Pit Slope Carb/QTZ	55 deg
Pit Slope Evaporite	51 deg
Processing Cost (incl. G&A)	\$13.2/t
Zn Recovery	89.0%
Pb Recovery	92.0%
Zn Price	US\$1.10/lb
Pb Price	US\$0.95/lb
Discount Rate	5%
Mining Limit	13.5MTPA
Processing Limit	1.0MTPA
Zn Offsite Costs	US\$0.16/lb
Pb Offsite Costs	US\$0.10/lb
Royalties	2%

**Figure 16-1: Constrained Optimized Pit Shell**



## 16.2.2 Geotechnical Considerations

A geotechnical study in February 2020 by Terrane Geoscience Inc. (“Terrane”) determined the pit wall design criteria to be applied for designing the open-pits. The study determined a range of slopes were available based upon saturated, partly saturated, and un-saturated pit faces. The design parameters were improved if unsaturated pit faces received secondary support via high-tensile mesh and soil anchor bolting. These open-pit slope design recommendations are based upon the geological, structural, geomechanically, and hydrogeological data available at the time of writing and presented herein. This design assumes that controlled blasting, fully drained conditions, on-going geotechnical monitoring, and on-going hydrogeological data collection will be completed throughout the life of the mine.

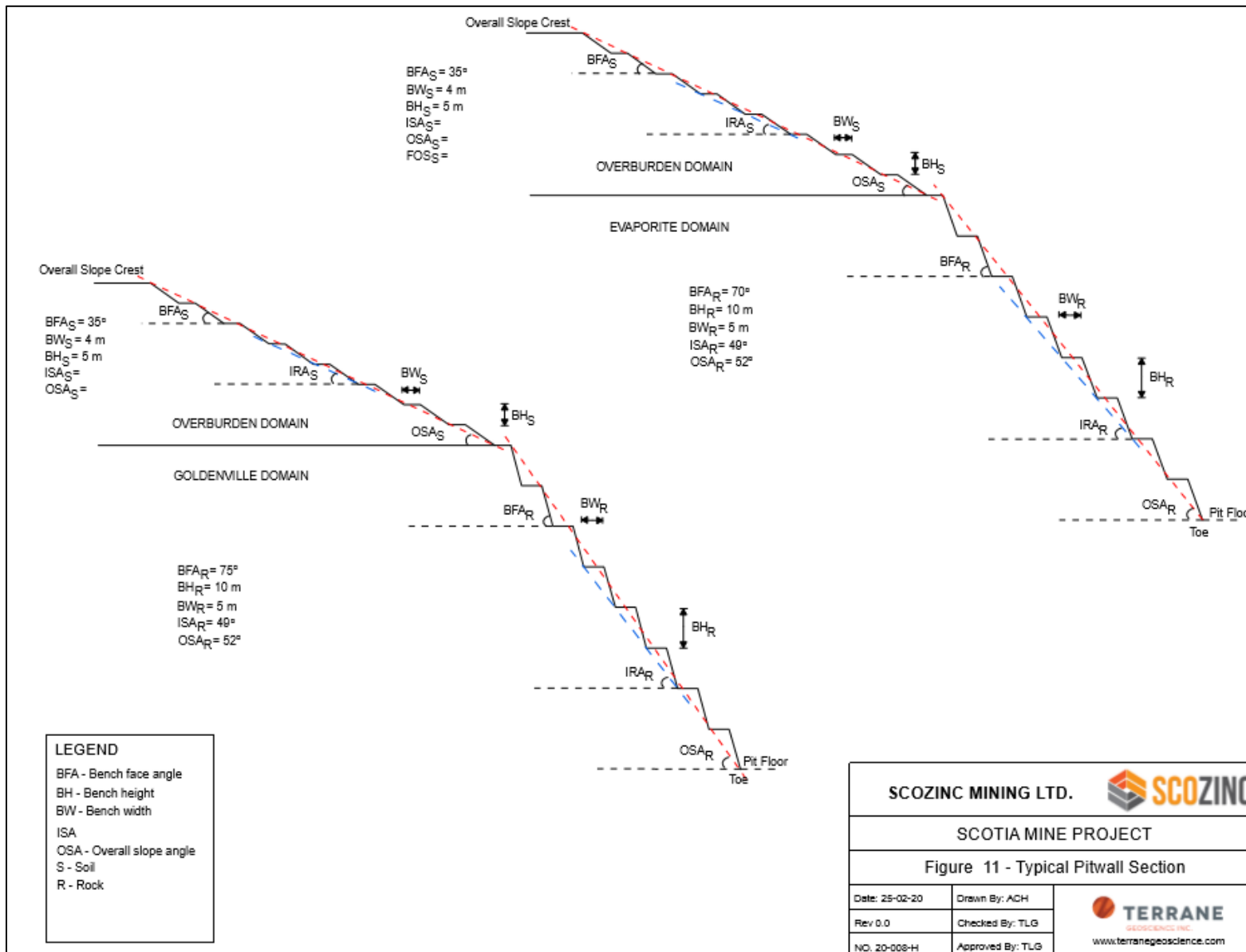
Groundwater pressure (i.e. porewater pressure) is also an important part of open-pit slope stability. Groundwater pressures act as buoyant forces directly opposing stabilizing forces in a pit slope. Controlling groundwater levels at the site is considered key to maintaining safe and economic pit slopes in both the overburden and bedrock at the Scotia Mine site. To achieve this overburden depressurization, a series of 60 pumping wells will be placed around the perimeter of the Scotia mine open-pits.

During the pit design process, allowance was made for incorporating truck access ramps, final ore zone access and general efficiencies in mine operations and sequencing. Generally, slopes were considerably shallower in final overburden faces. Table 16-2 summarizes the geotechnical pit slope parameters used in this study. Figure 16-2 shows the pit slope design profile.

**Table 16-2: Geotechnical Pit Slope Parameters**

<b>Overburden</b>	
Bench Height	5 m
Berm Width	4 m
Batter Face Angle (BFA)	35 deg
Inter Ramp Angle (IRA)	24 deg
Overall Slope Angle (OSA)	25 deg
<b>Hard Rock (Double Benching)</b>	
Bench Height	10 m
Berm Width	5 m
Batter Face Angle (BFA)	70 deg
Inter Ramp Angle (IRA)	49 deg
Overall Slope Angle (OSA)	51 deg
<b>Hard Rock (Single Benching)</b>	
Bench Height	5 m
Berm Width	4 m
Batter Face Angle (BFA)	70 deg
Inter Ramp Angle (IRA)	49 deg
Overall Slope Angle (OSA)	51 deg

Figure 16-2: Pit Slope Design Details



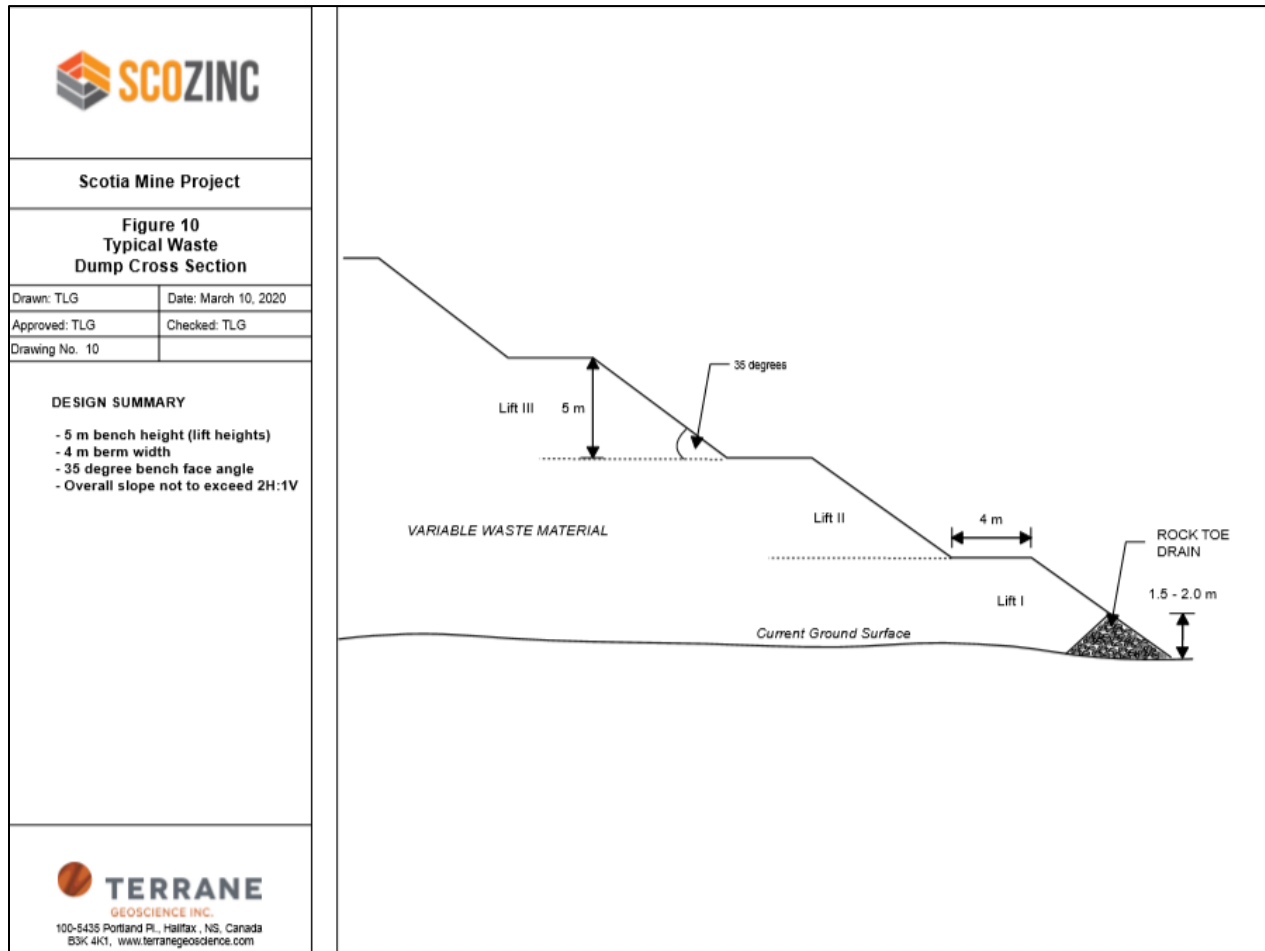
There are two areas in the pit design where, if the above slope criteria are utilized, the pit would encroach upon the 30m buffer zone along the Gays River. To compensate for this the Overall Slope Angles (“OSA”) used in overburden for these areas will be steepened from 25 degrees to 29 degrees and a slope stability mesh, with soil anchor bolting, will be installed to increase the strength of the slope and prevent instability. These areas can be seen in Figure 16-3.

In addition to the open-pit design recommendations, Terrane provided waste dump geotechnical recommendations as well, see Table 16-3. The waste dump design was guided by the British Columbia Mine Waste Rock Pile Research Committee, Mined Rock and Overburden Piles Investigation and Design Manual Interim Guidelines (1991). See Figure 16-3 for a schematic of the waste dump profile.

**Table 16-3: Geotechnical Waste Dump Parameters**

Waste Dump	Variable
Bench Height	5 m
Berm Width	4 m
Batter Face Angle (BFA°)	35°
Overall Slope Angle (OSA°)	25°

**Figure 16-3: Waste Dump Design Details**



### 16.2.3 Ultimate Pit Design

Using the optimized pit shell, geotechnical design criteria, and surface constraints an Ultimate Pit Design was created with ramps and benches. See Figure 16-18. In addition to the pit slope parameters shown in Section 16-2, the rest of the basis for the Ultimate Pit Design is shown in Table 16-4.

**Table 16-4: Design Basis for Ultimate Pit Design**

Primary Loaders/Haulers	120T Excavator/40T Truck/60T Truck
Two-Way Haul Road Width	21.5 m
One-Way Haul Road Width	10 m
Haul Road Grade	10%
Haul Road Grade (Bottom 4 Benches)	12%
Switchback Inside Turn Radius	7.5 m
Flat Switchbacks	Yes
Minimum Mining Width	30 m

All, wheeled, one-way haul road traffic will be limited to Komatsu HM 400 trucks and light duty vehicles and all one-way haul roads have been designed as such. Two-way haul road traffic has been designed to accommodate all wheeled vehicles onsite. A 5-metre retreat mining cut will be implemented on final benches with the minimum mining width of 30m or greater. A series of end of period surfaces (“EOP”) for each year were generated to show the progress of the mine throughout the LOM. They can be seen in Figures 16-4 to 16-17.

**Figure 16-4: EOP Surface Year 1**

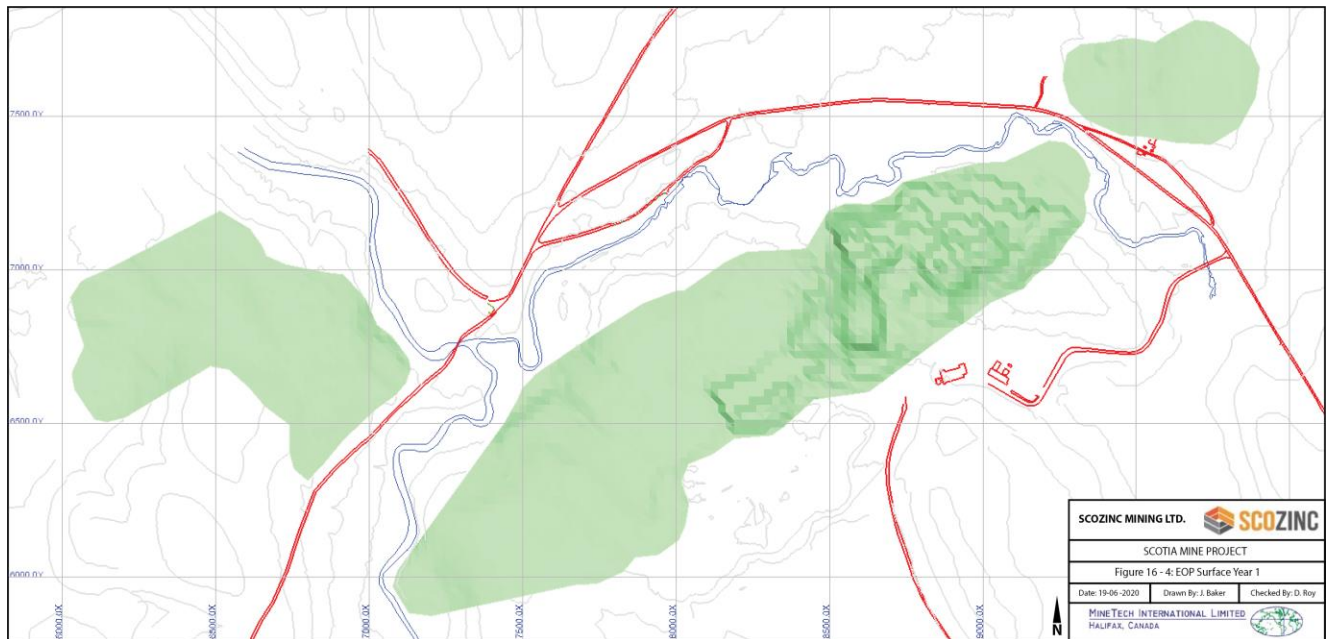




Figure 16-5: EOP Surface Year 2

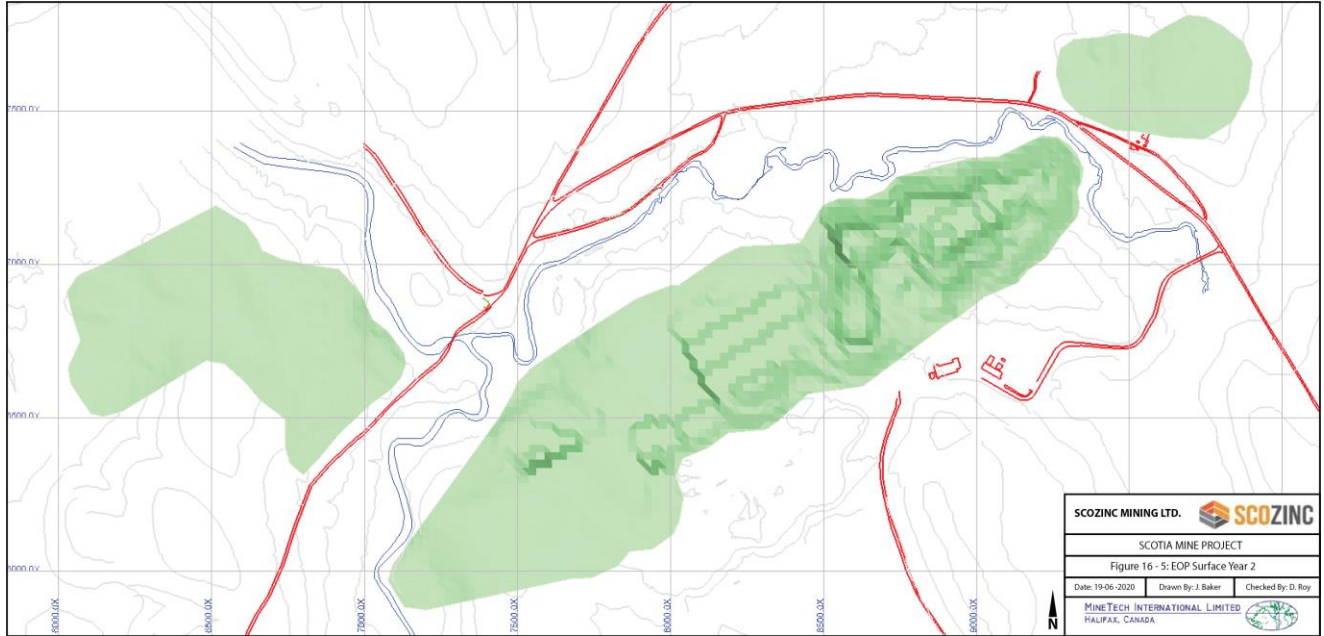


Figure 16-6: EOP Surface Year 3

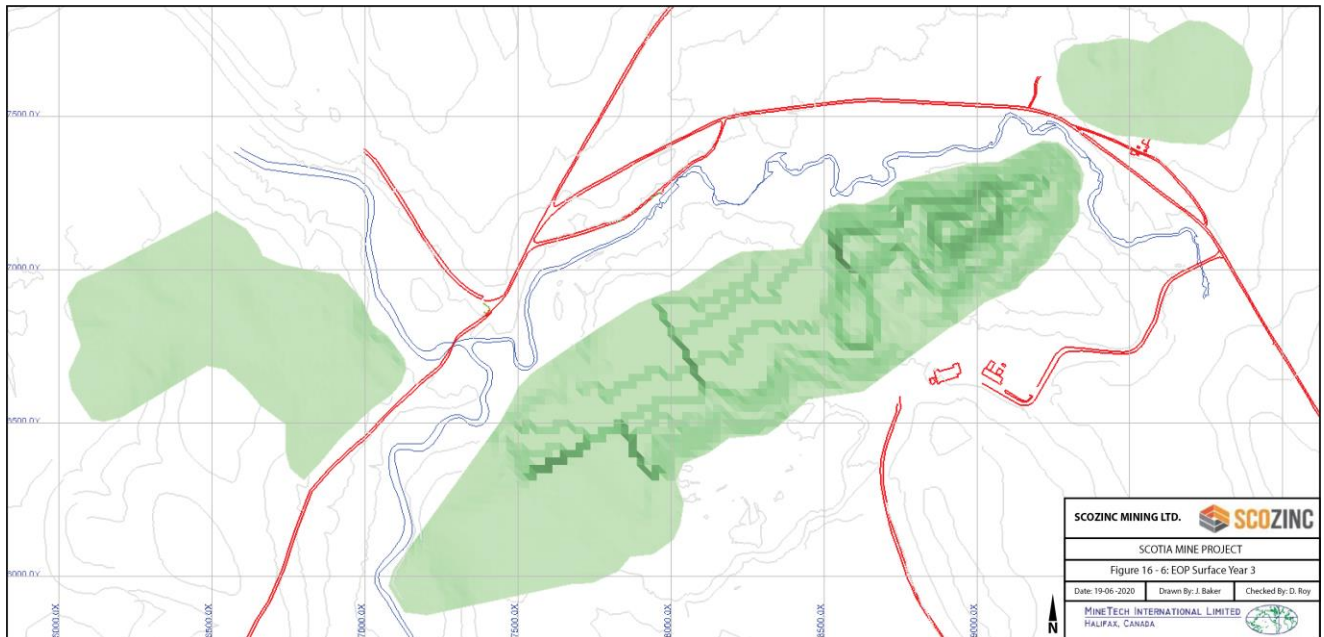


Figure 16-7: EOP Surface Year 4

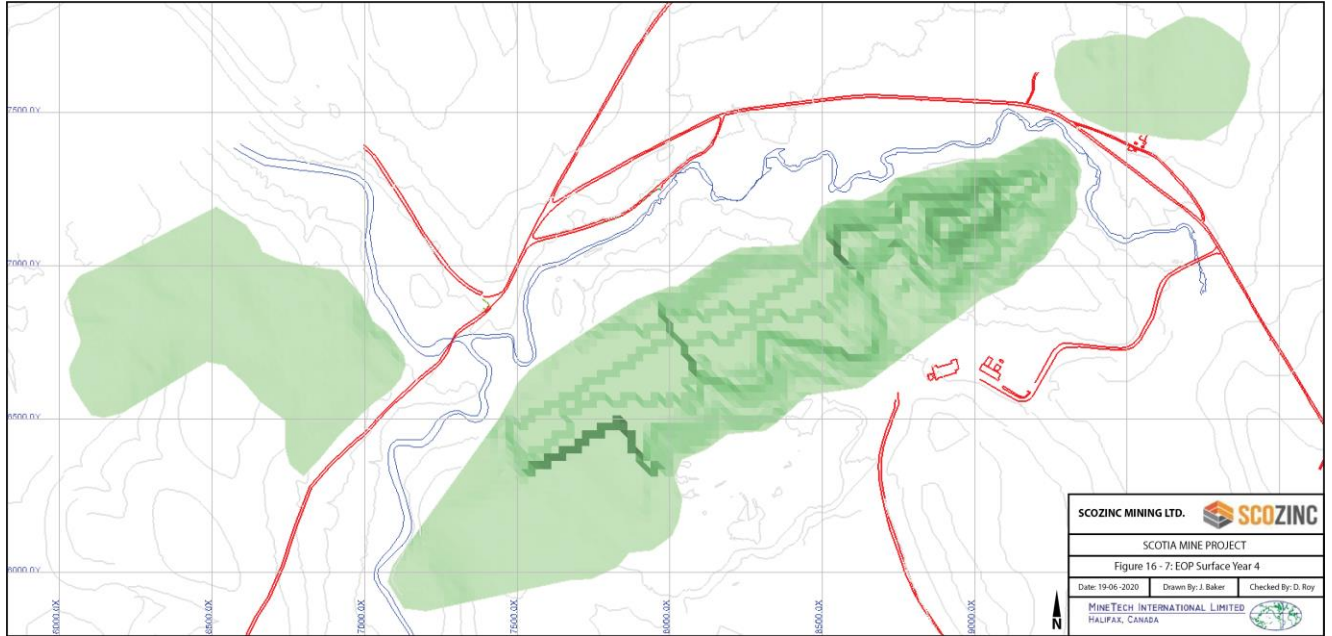


Figure 16-8: EOP Surface Year 5

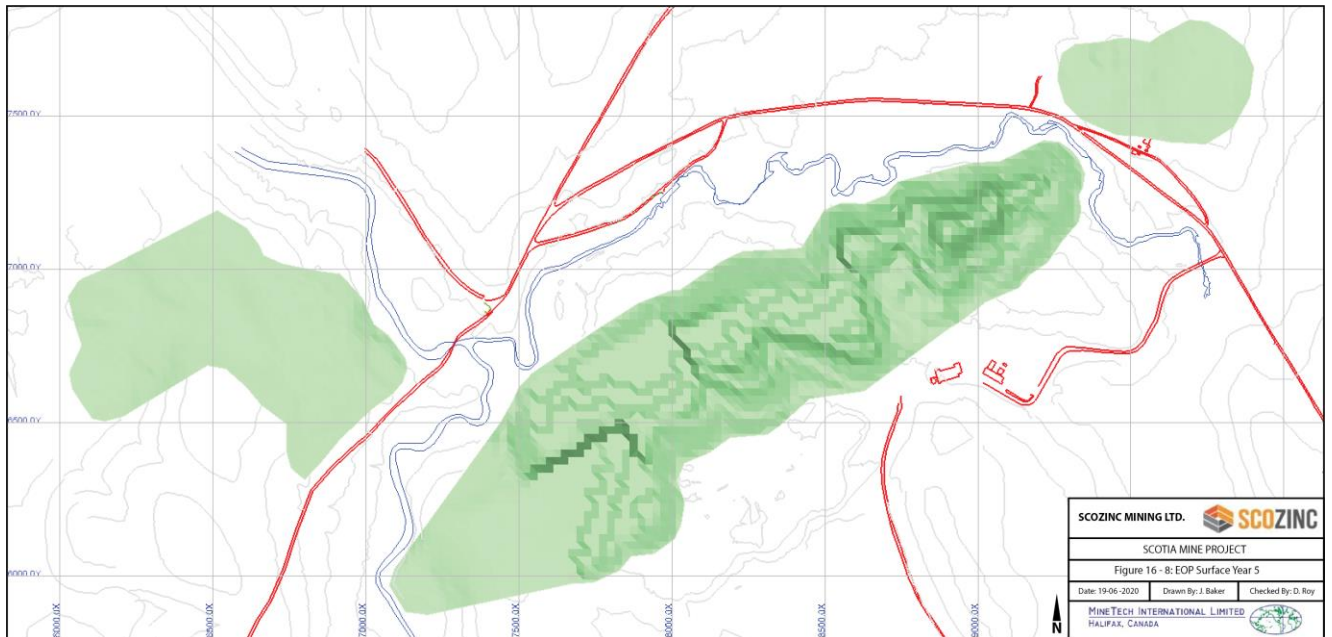


Figure 16-9: EOP Surface Year 6

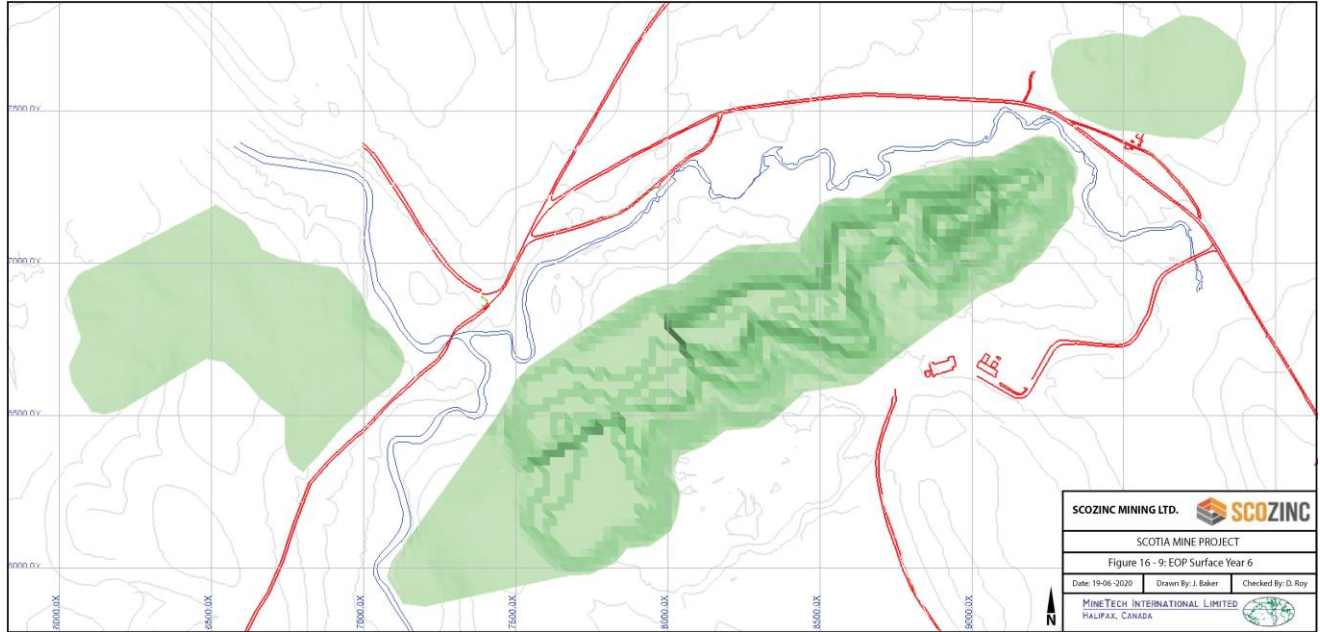


Figure 16-10: EOP Surface Year 7

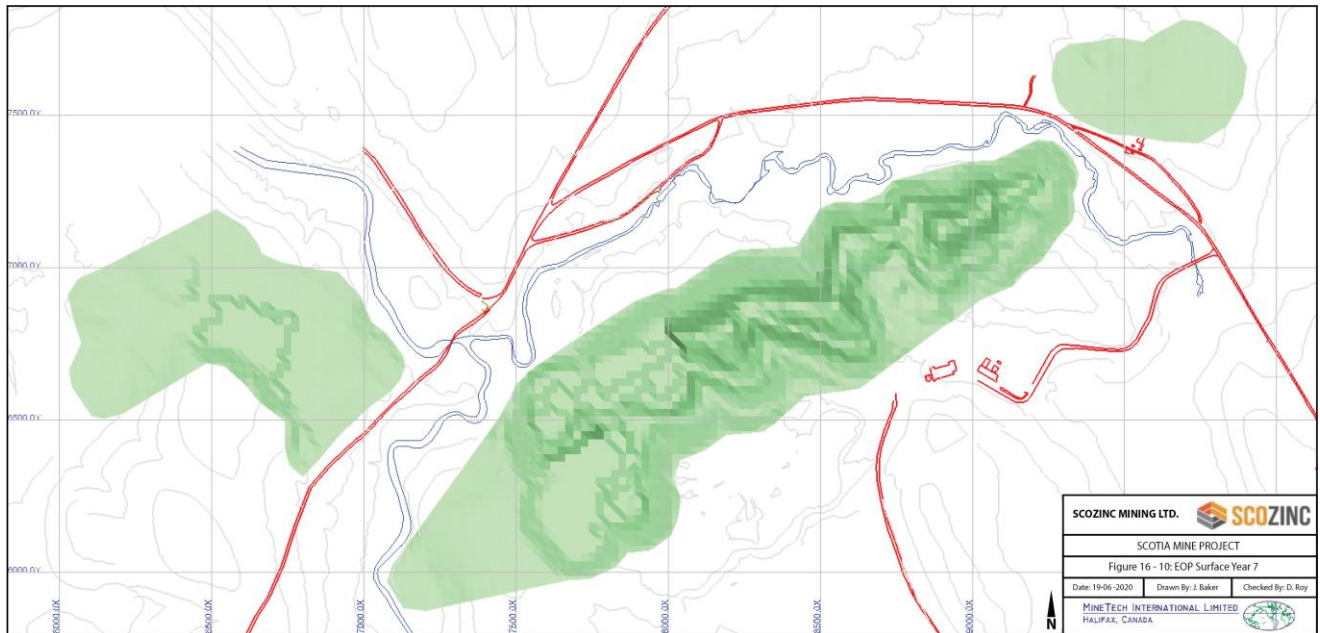


Figure 16-11: EOP Surface Year 8

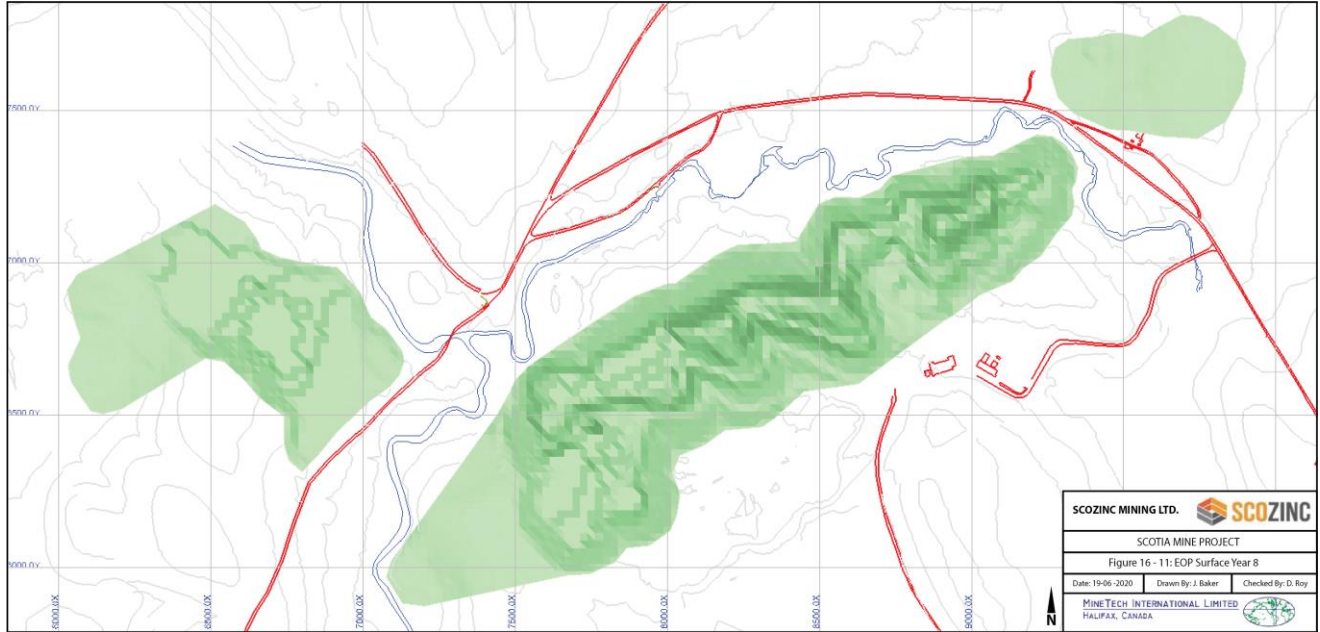


Figure 16-12: EOP Surface Year 9

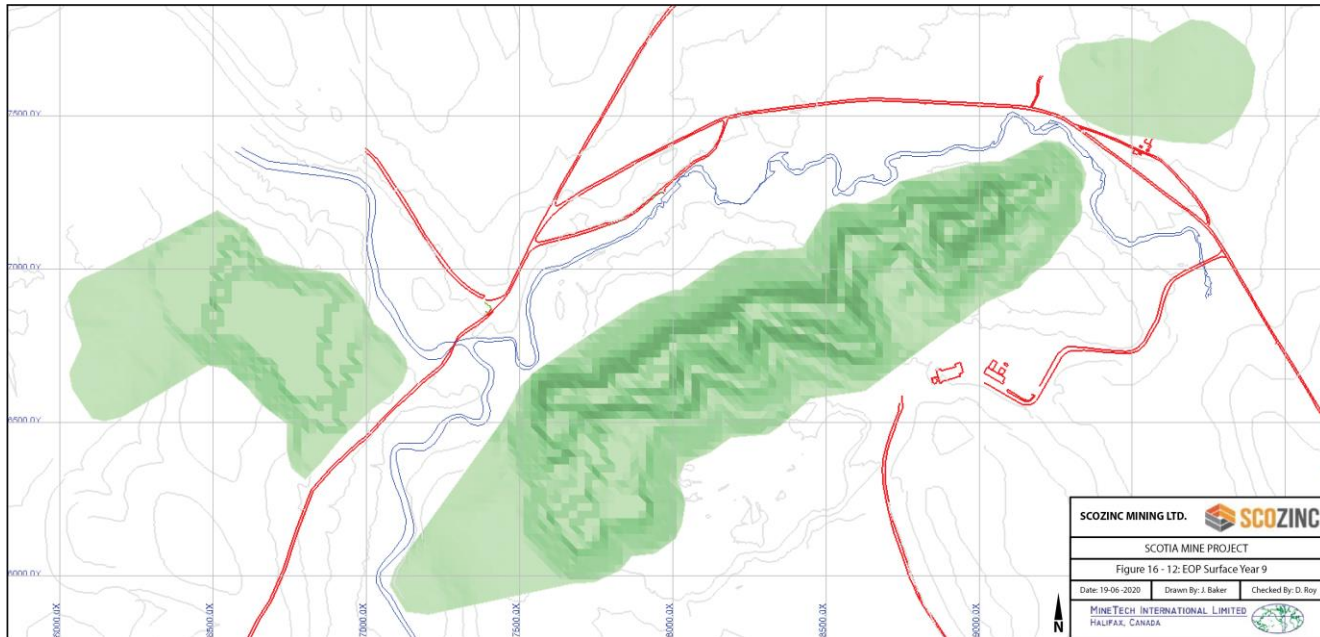


Figure 16-13: EOP Surface Year 10

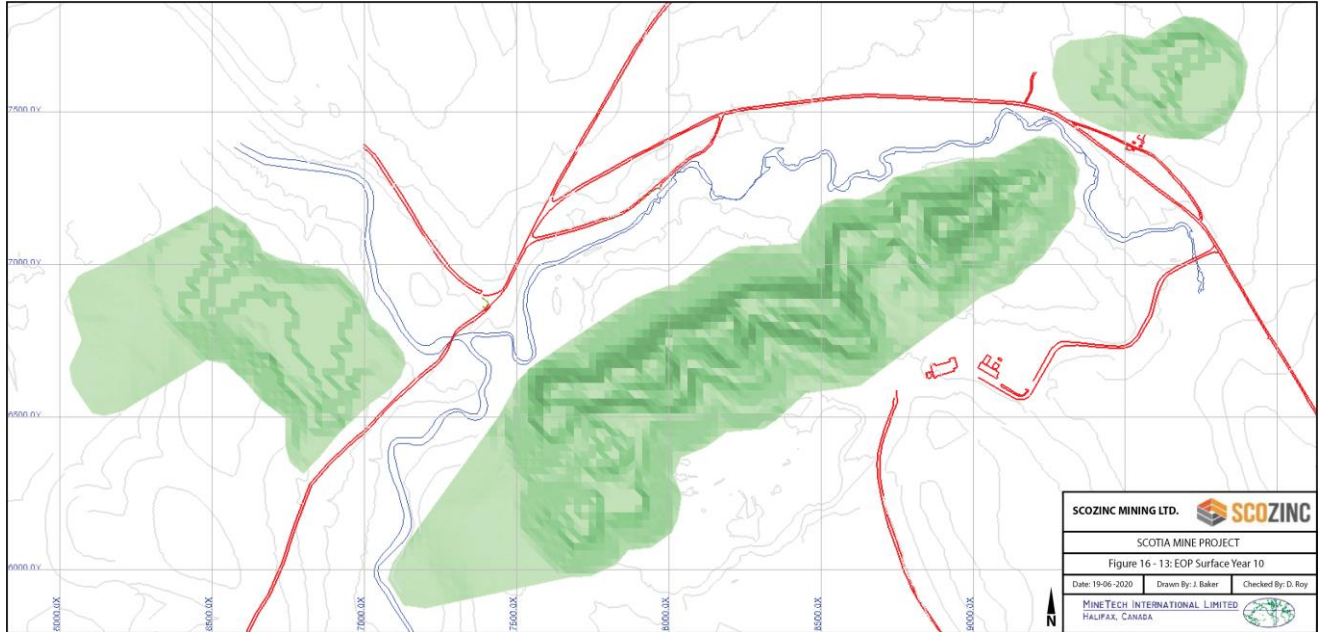


Figure 16-14: EOP Surface Year 11

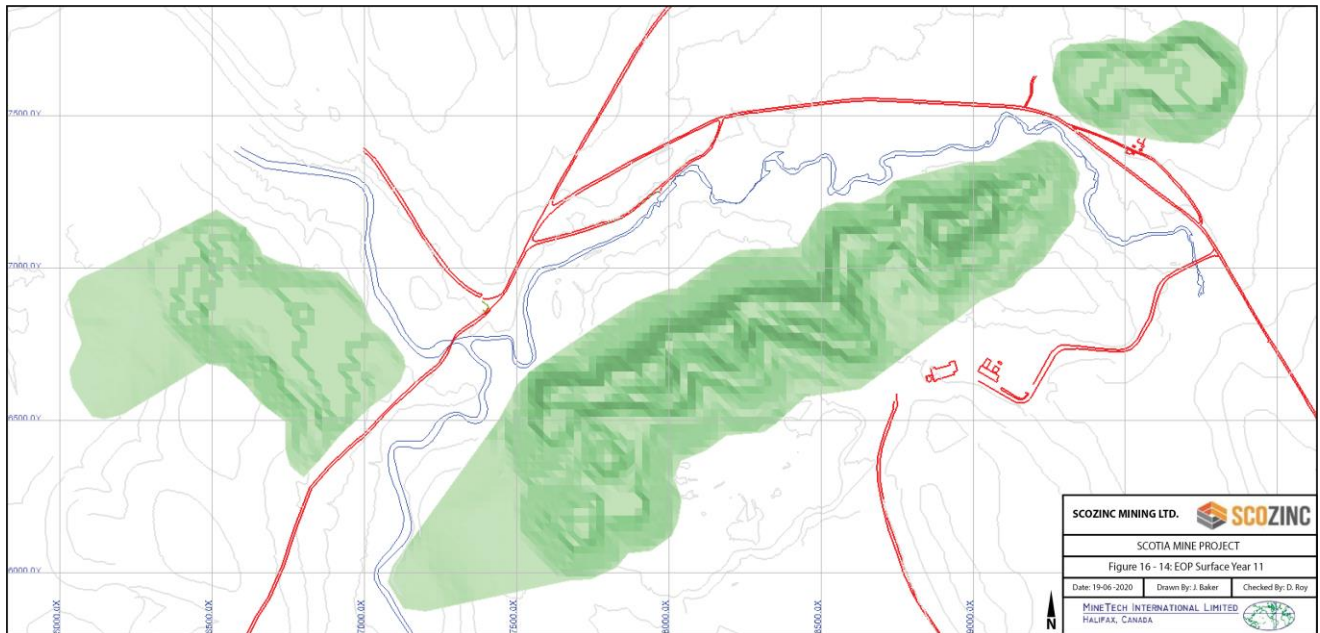


Figure 16-15: EOP Surface Year 12

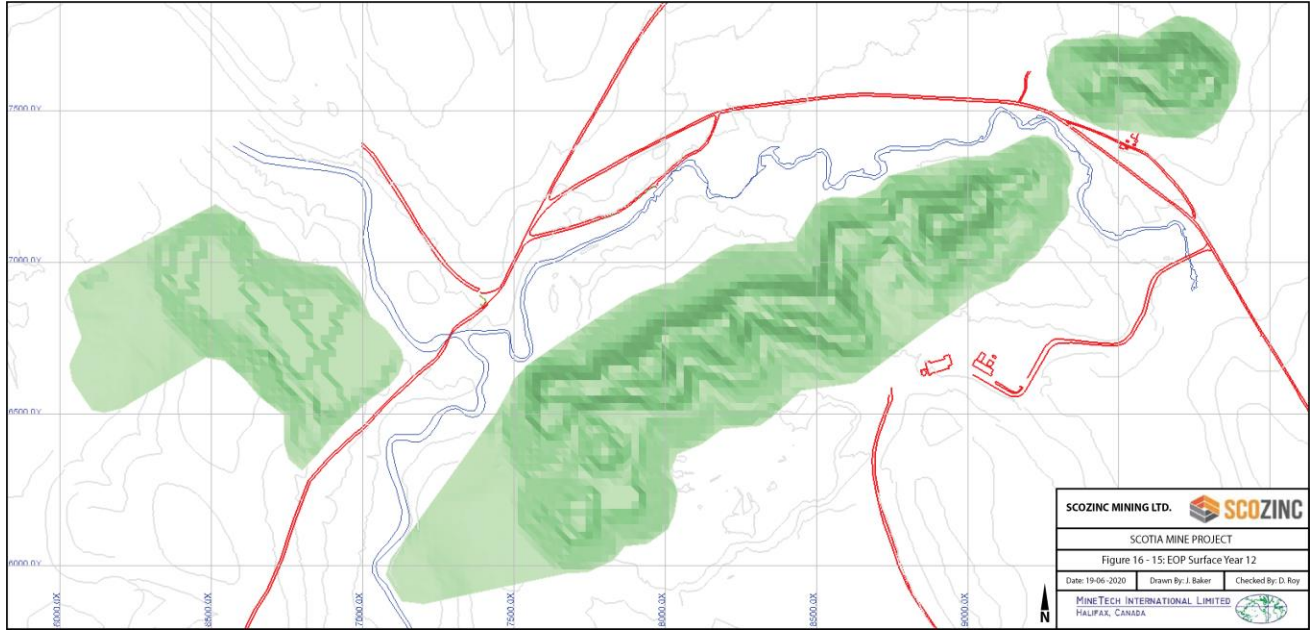


Figure 16-16: EOP Surface Year 13

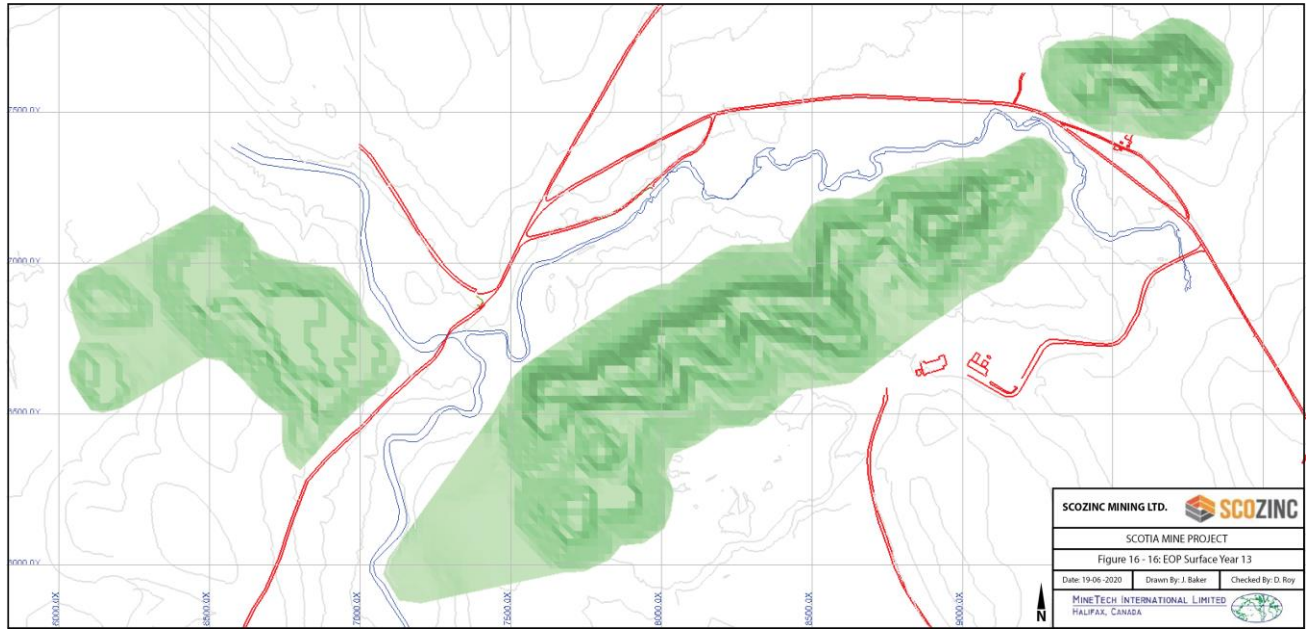


Figure 16-17: EOP Surface Year 14

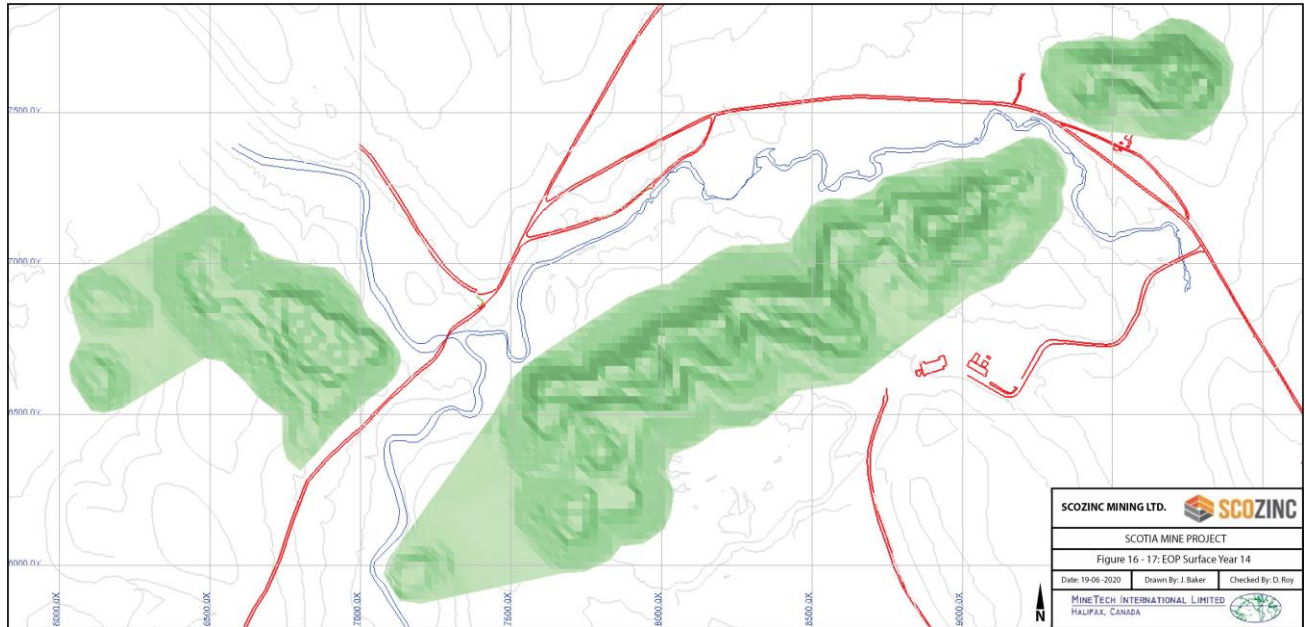
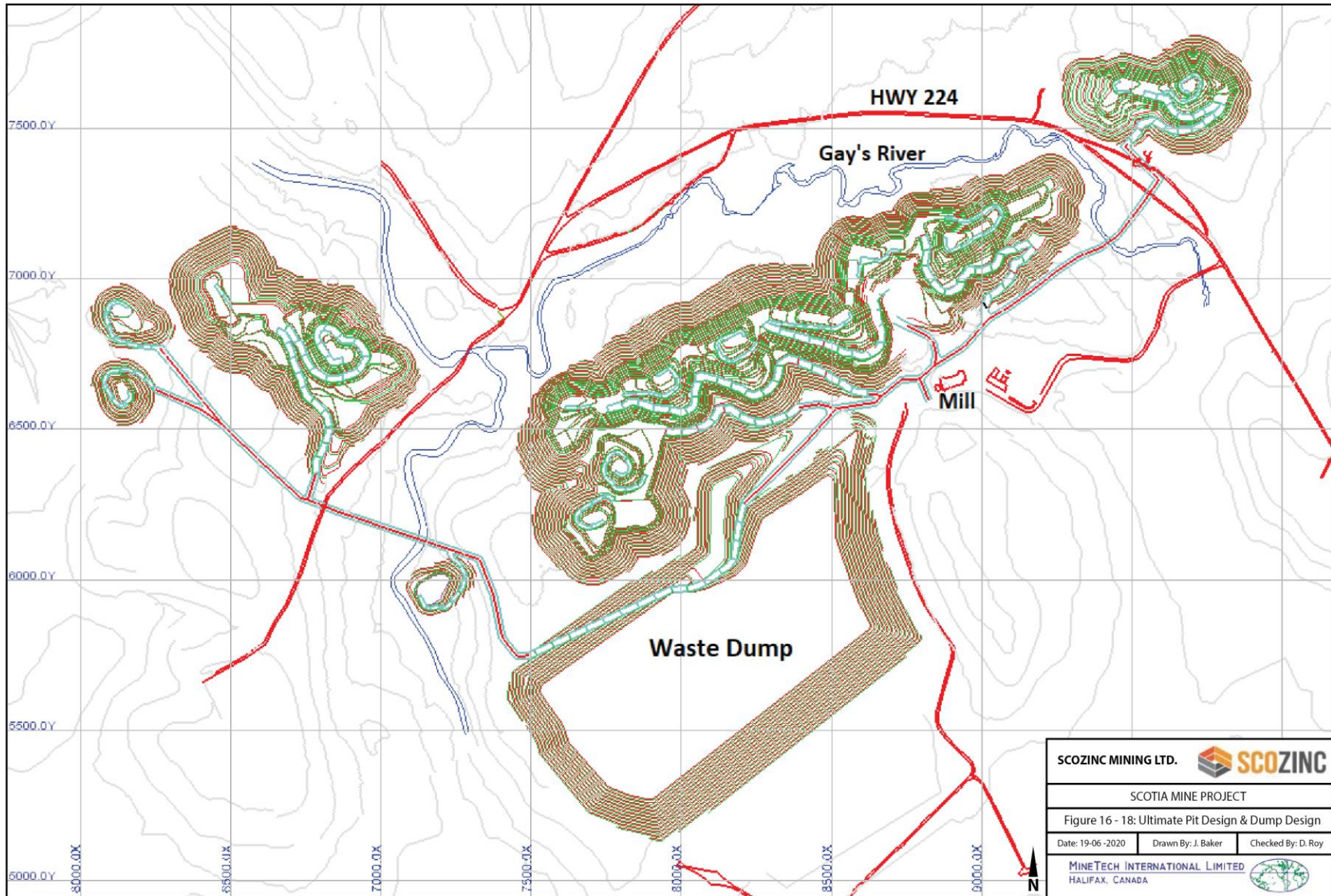


Figure 16-18: Ultimate Pit Design & Waste Dump Design





**16.2.4 Phased Pit Designs**

The Ultimate Pit Design was broken down into 6 phases to optimize development sequences and production requirements. These phases and their sequencing can be seen in Figure 16-19 and Table 16-6 respectively. Ore and waste tonnages, as well as Zn and Pb grades, provided by each open-pit phase, are listed in Table 16-5. Waste has been subdivided into overburden, gypsum, and carbonate waste rock. Inferred resource material inside the Ultimate Pit Design has been included as carbonate waste rock and totals approximately 1,450,000 tonnes at 1.5% Zn and 0.7% Pb.

**Table 16-5: Tonnage and Grade by Pit Phase**

Pit Phase	Ore (kt)	Zn%	Pb%	Ovb (kt)	Gyp (kt)	Mag (kt)	Carb (kt)
MZ PH1	3,667	2.28	1.11	17,458	7,622	1,525	2,704
MZ PH2	2,121	2.30	0.76	13,536	4,655	634	1,586
MZ PH3	1,937	2.25	1.19	17,562	7,811	818	2,416
MZ PH4	1,349	1.56	1.48	11,726	514	60	3,095
NE Phase	1,024	2.60	1.22	7,360	6,325	1,027	490
Getty Phase	3,556	1.49	1.08	22,483	3,925	545	3,680
<b>Total</b>	<b>13,654</b>	<b>2.03</b>	<b>1.10</b>	<b>90,125</b>	<b>30,852</b>	<b>4,609</b>	<b>13,971</b>

**Table 16-6: Phased Pit Sequencing**

Pit Phase	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
MZ PH1	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow							
MZ PH2	Blue	Blue	Blue											
MZ PH3		Cyan	Cyan	Cyan	Cyan		Cyan	Cyan	Cyan					
MZ PH4					Black	Black	Black	Black	Black	Black	Black			
NE Phase										Green	Green	Green		
Getty Phase								Red	Red	Red	Red	Red	Red	Red

Figure 16-19: Phased Pit Sequencing



### 16.2.5 Gypsum Assessment

Prior to 2004, there had been no work done as far as gypsum assaying at the Scotia Mine as historic drilling focused primarily on lead and zinc. While most of the gypsum core was saved, it was improperly stored and most of the gypsum weathered away. Therefore, there was no way to go back and assay the historic holes for Gypsum quality. Drill hole logging was done on all core and good records were kept, however, there were several different drilling programs throughout the years with different geologists performing the logging. This leads to uncertainty as far as consistency of the historic logs (i.e. were the same assumptions used, did the logger call gypsum anhydrite).

In 2004, fourteen vertical holes were drilled with the sole purpose of evaluating the Gypsum quality at the Scotia Mine (See Table 16-7). Eight of the holes are located on the North side of the river away from the current Ultimate Pit Design (or “UPD”), and seven of the holes are located in and around the current Ultimate Pit Design. From these holes the average Gypsum thickness was determined to be 31 metres with thicknesses ranging from 9 – 85 metres. The Gypsum is covered by 16 to 61 metres of overburden, averaging 38 metres. From the fourteen holes sixty-nine (69) samples were collected. The length weighted average grade was 93% gypsum. Only seven of these holes are of interest as they fall within the current Ultimate Pit Design. The assay results of these holes are provided in the table below.

**Table 16-7: 2004 Gypsum Assay Results Within Ultimate Pit**

Hole ID	Grade of Hole (%)	Thickness (m)
S975	91	44
S976	94	25
S979	91	30
S988	91	34
S989	91	26
S990	92	26
S991	95	39

In 2011, a gypsum resource study was undertaken by looking at the lithology data from the historic logs. From this data an upper and lower horizon of Gypsum was defined, and a Gypsum solid was created using Geovia GEMS software. The total tonnage of Gypsum that was defined as a possible resource was 18,300,000 tonnes. From this total resource tonnage, it was determined that 1,400,000 tonnes could be mined from the 2011 LOM pit. From the Scotia Mine restart study, a total of 5,100,000 tonnes of evaporate (Gypsum + Anhydrite) was planned to be mined from the UPD (Note: this tonnage was calculated from the 2011 resource block model, not the drill holes). This results in an Anhydrite: Gypsum ratio of approximately 3.5:1 within the UPD. During previous open-pit mining operations, Gypsum and Anhydrite was hauled to the dump as waste. Some Gypsum was also used as road base material for temporary roads.

The current Ultimate Pit Design has approximately 31,000,000 tonnes of evaporite (Gypsum + Anhydrite) scheduled to be extracted. At the previously calculated 3.5:1 Anhydrite: Gypsum ratio that would equate to approximately 9,000,000 tonnes of commercial grade gypsum contained in the UPD. In 2020 the Government of Nova Scotia commenced a study to evaluate the Province's gypsum resources. The Scotia Mine was identified as an area of high potential due to the large gypsum resource and established

infrastructure. The fully-funded government study will evaluate and estimate the current gypsum resource at Scotia Mine and the potential of Gypsum marketability.

ScoZinc will stockpile gypsum separately in the waste dump to ensure it is available should a market be found. An area has been demarcated for stockpiling Gypsum in the future should the need arise (see Figure 16-20).

**Figure 16-20: Gypsum Stockpile Locations**

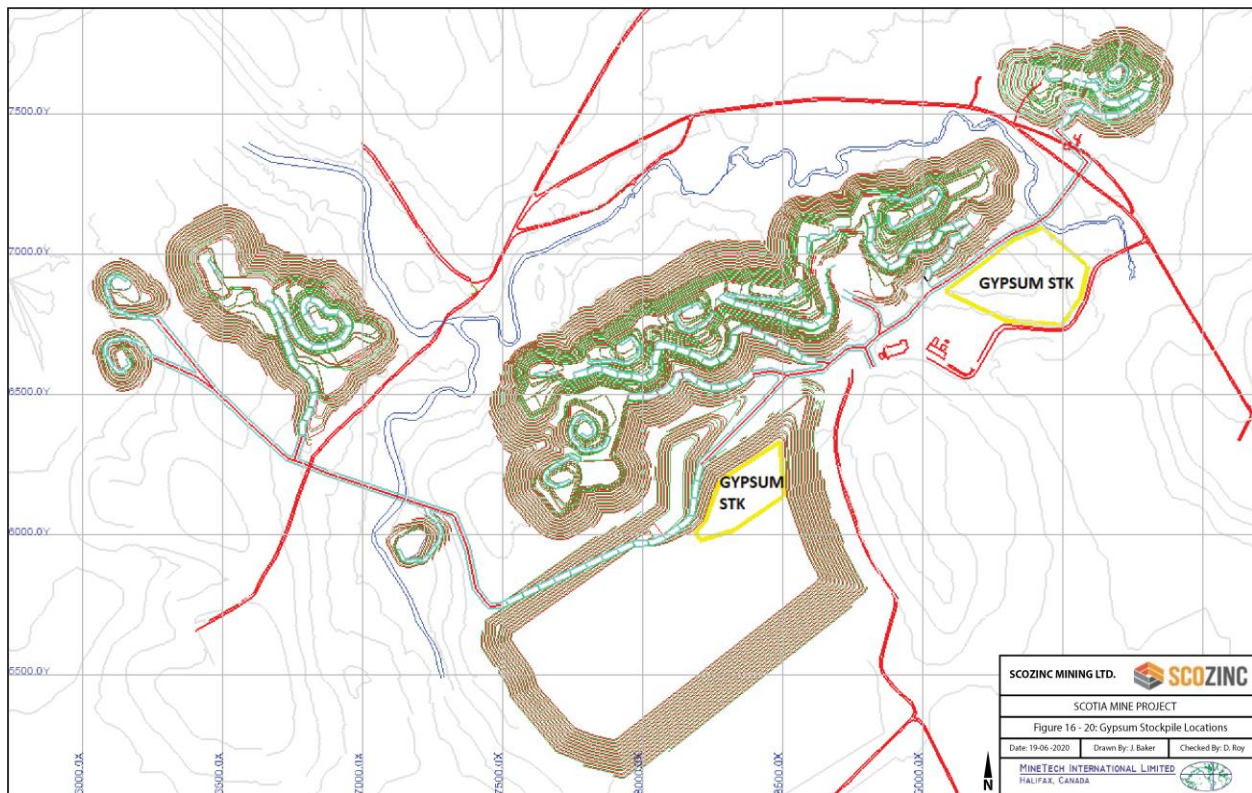
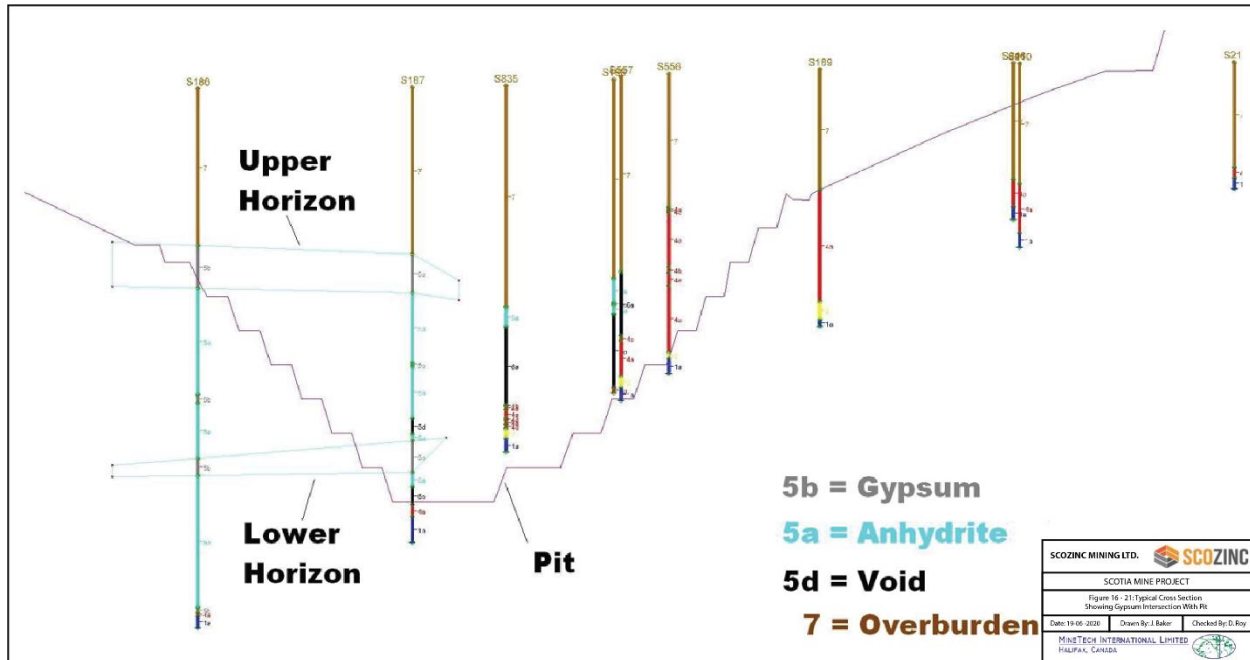


Figure 16-21 below shows a typical cross section of the Ultimate Pit Design with gypsum horizon intersections.

Figure 16-21: Typical Cross Section Showing Gypsum Intersection with Pit



16.2.6 Waste Management

Waste removed from the Ultimate Pit Design will consist of four materials: overburden, gypsum, meguma basement rock, and carbonate waste rock. Waste storage will consist of a combination of backfilling the mined pits and stockpiling in the waste dump. The waste dump, as seen in Figure 16-22, will consist primarily of overburden. Mineralized carbonate waste will be stockpiled in the waste dump separately for possible future use later should economics and commodity prices improve. Gypsum will also be segregated within the waste dump when possible in the event the company decides to try and market the gypsum. All meguma waste will be processed as road rock and placed on the haul roads. As the pits are developed and mined to completion they will be utilized as backfill locations.

The design criteria for the waste dump is listed in Table 16-8.

Table 16-8: Waste Dump Design Criteria

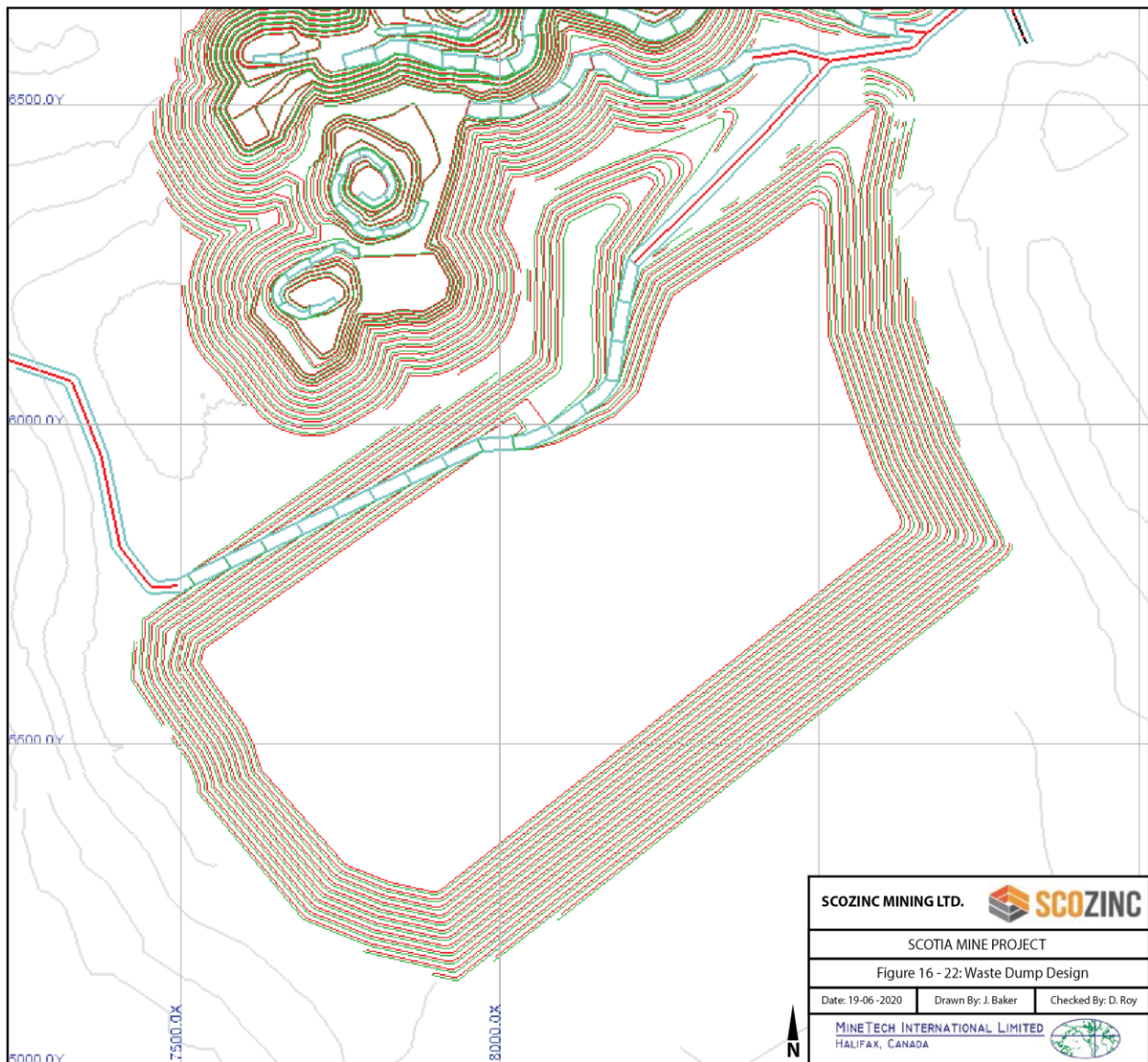
Waste Dump	
Dump Capacity	40M m <sup>3</sup>
Bench Height	5 m
Berm Width	4 m
Batter Face Angle (BFA)	35 deg
Overall Slope Angle (OSA)	25 deg
Dump Height	88 m
Haul Road Width	21.5 m
Haul Road Grade	8%
Swell Factor Overburden	1.4
Swell Factor Rock	1.3

The volume required for onsite waste storage versus the amount of waste storage available can be seen in Table 16-9.

**Table 16-9: Waste Storage Capacity vs. Waste Storage Required**

<b>Waste Storage Required</b>	<b>87 M m<sup>3</sup></b>
Waste Dump Capacity	40 M m <sup>3</sup>
Pit Backfill Capacity	48.1 M m <sup>3</sup>
<i>MZPH1 + Current Pit</i>	18.6 M m <sup>3</sup>
<i>MZPH2</i>	9.3 M m <sup>3</sup>
<i>MZPH3</i>	12.9 M m <sup>3</sup>
<i>MZPH4</i>	7.4 M m <sup>3</sup>
<b>Total Waste Storage Capacity</b>	<b>88.1 M m<sup>3</sup></b>

**Figure 16-22: Waste Dump Design**



The waste movement sequence, along with origin and destination, can be seen in Table 16-10.

**Table 16-10: Waste Movement Sequence**

Waste Storage Location	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
<b>To Main Dump</b>														
From MZ PH2														
From MZ PH1														
From MZ PH3														
From MZ PH4														
<b>To MZ PH2 Pit (Backfill)</b>														
From MZ PH1														
From MZ PH4														
<b>To MZ PH1 Pit (Backfill)</b>														
From MZ PH4														
From MZ PH3														
From Getty														
From NE														
<b>To MZ PH3 Pit (Backfill)</b>														
From Getty														
From NE														
<b>To MZ PH4 Pit (Backfill)</b>														
From NE														

**16.2.7 Life-of-Mine Production Schedule**

Using the Ultimate Pit Design and the pit phase sequencing, a Life-Of-Mine (“LOM”) mining schedule was developed by month and is based on operating 24 hours/day, 365 days/year. Geovia MINESCHED software was used considering the following criteria:

- Daily mine production rates
- Grades
- Multiple mining fronts
- Targeted mill grades and tonnages
- Mining fleet capacities
- Ore stockpile balance management
- Waste dump location and management
- Highway and road crossings
- Proximity to the Gays River
- Operating Expenditure

Table 16-11 presents a summary of the diluted annual mined production tonnages scheduled over the Life-Of-Mine totalling approximately 14 years. The LOM production schedule is based on providing a mill feed

of approximately 1,000,000 tonnes per annum at an average zinc equivalent grade of 3.00%. Figure 16-19 (above) provides an illustration for how the mining operations will sequence through the pit phases.

### **Mining Dilution & Recovery**

Mining dilution is waste rock that is mined with the ore and cannot be separated out prior to transport to the mill. The dilution can be planned, which is waste included in the design to make it practical and efficient, or unplanned which is waste mined due to overbreak (mining outside the plan limits) or sloughing from the back and walls due to geotechnical reasons.

Mining recovery is the recovery of the mineral resources included in the mine plan and does not apply to those mineral resources already excluded as being outside the mine plan. Recovery losses result from resources left behind during excavation, and ore that does not meet specified economic criteria.

Mining dilution and recovery and how it is calculated and applied to this Project is described in Section 15.2.3.



Table 16-11: Diluted LOM Mine Production Schedule

MINING		Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	TOTAL
<b>Material Mined</b>																	
SHG Ore	tonnes	1,464	6,249	0	1,146	8,855	10,437	13,698	1,454	8,761	5,719	7,460	1,448	8,828	0	0	75,519
Zn%	grade	5.26	3.91	0.00	11.69	12.17	9.75	6.31	2.27	3.56	4.54	1.05	6.48	6.46	0.00	0.00	6.31
Pb%	grade	0.00	10.00	0.00	8.57	8.84	6.13	5.57	8.34	8.61	6.70	12.58	4.91	7.21	0.00	0.00	7.84
HG Ore	tonnes	20,577	187,952	195,185	94,076	153,577	257,980	405,561	163,323	265,020	203,483	137,156	202,986	217,106	64,693	154,551	2,723,227
Zn%	grade	3.48	3.98	3.36	3.33	3.59	3.49	3.35	2.61	3.18	3.08	2.56	3.41	3.87	2.61	2.43	3.28
Pb%	grade	0.00	1.44	1.88	1.57	1.75	2.06	2.42	2.61	2.41	2.87	3.26	2.06	2.05	2.24	2.92	2.26
MG Ore	tonnes	98,887	498,649	570,902	512,584	571,976	390,314	588,654	504,904	468,701	506,900	519,024	381,874	519,728	536,699	402,066	7,071,863
Zn%	grade	2.43	2.23	2.08	2.16	2.02	2.09	1.96	1.87	1.93	1.69	1.70	1.93	1.65	1.42	1.67	1.89
Pb%	grade	0.00	0.53	0.73	0.61	0.83	0.92	0.93	0.93	0.97	1.18	1.00	1.03	1.04	1.23	1.20	0.92
LG Ore	tonnes	61,642	264,664	257,202	370,274	344,475	117,166	265,572	187,026	276,669	308,778	353,397	144,648	272,616	391,320	167,704	3,783,153
Zn%	grade	1.63	1.48	1.48	1.49	1.35	1.28	1.34	1.25	1.25	1.30	1.25	1.25	1.15	0.96	1.07	1.29
Pb%	grade	0.00	0.27	0.29	0.26	0.40	0.50	0.42	0.54	0.50	0.46	0.50	0.49	0.61	0.81	0.67	0.47
<b>Total Ore</b>	<b>tonnes</b>	<b>182,570</b>	<b>957,515</b>	<b>1,023,289</b>	<b>978,080</b>	<b>1,078,883</b>	<b>775,897</b>	<b>1,273,484</b>	<b>856,706</b>	<b>1,019,150</b>	<b>1,024,880</b>	<b>1,017,038</b>	<b>730,956</b>	<b>1,018,279</b>	<b>992,712</b>	<b>724,321</b>	<b>13,653,761</b>
Zn%	grade	2.30	2.38	2.18	2.03	2.11	2.54	2.32	1.88	2.09	1.86	1.66	2.22	2.03	1.32	1.69	2.03
Pb%	grade	0.00	0.70	0.84	0.58	0.89	1.30	1.35	1.17	1.28	1.33	1.22	1.22	1.20	1.13	1.45	1.10
Overburden	tonnes	4,055,012	10,422,451	8,994,179	11,022,075	8,846,942	7,832,946	5,448,424	6,757,227	6,104,887	4,869,946	5,587,802	3,451,941	3,533,442	2,706,248	490,752	90,124,277
Gypsum	tonnes	207,378	1,699,040	2,732,543	164,119	1,623,181	2,835,011	3,400,032	2,971,662	3,014,604	1,936,094	1,992,826	2,899,818	1,887,474	1,082,202	2,406,352	30,852,336
Carbonate	tonnes	347,826	988,672	774,064	1,520,388	1,692,535	455,919	919,940	1,431,601	1,199,939	730,244	996,972	261,185	653,599	1,513,192	485,090	13,971,167
Meguma	tonnes	0	167,321	437,925	222,506	252,457	327,725	699,620	296,398	311,419	313,366	167,170	686,100	182,472	34,646	510,559	4,609,685
<b>Total Mine Production</b>	<b>tonnes</b>	<b>4,792,786</b>	<b>14,235,000</b>	<b>13,962,000</b>	<b>13,907,169</b>	<b>13,494,000</b>	<b>12,227,500</b>	<b>11,741,500</b>	<b>12,313,594</b>	<b>11,650,000</b>	<b>8,874,529</b>	<b>9,761,808</b>	<b>8,030,000</b>	<b>7,275,267</b>	<b>6,329,000</b>	<b>4,617,075</b>	<b>153,211,226</b>
Total Ore	tonnes	182,570	957,515	1,023,289	978,080	1,078,883	775,897	1,273,484	856,706	1,019,150	1,024,880	1,017,038	730,956	1,018,279	992,712	724,321	13,653,761
Total Waste	tonnes	4,610,216	13,277,485	12,938,711	12,929,089	12,415,116	11,451,602	10,468,016	11,456,888	10,630,849	7,849,649	8,744,771	7,299,044	6,256,988	5,336,288	3,892,754	139,557,465
<b>Total Strip Ratio</b>	<b>ratio</b>	<b>25.25</b>	<b>13.87</b>	<b>12.64</b>	<b>13.22</b>	<b>11.51</b>	<b>14.76</b>	<b>8.22</b>	<b>13.37</b>	<b>10.43</b>	<b>7.66</b>	<b>8.60</b>	<b>9.99</b>	<b>6.14</b>	<b>5.38</b>	<b>5.37</b>	<b>10.22</b>

### 16.2.8 Ore Stockpile Management

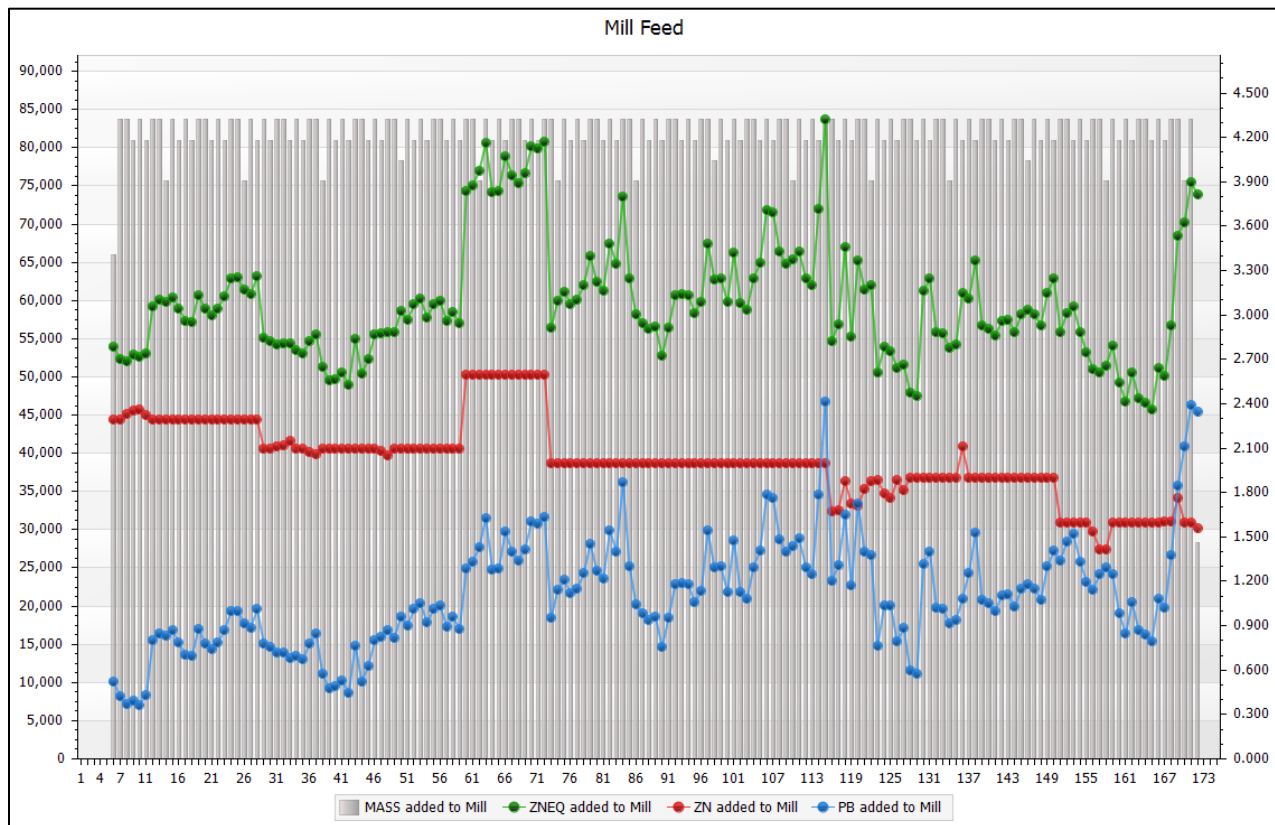
Ore stockpile management will play a key role in grade control at the Scotia Mine. It is important to keep a healthy ore stockpile to ensure that the head grades in the mill remain consistent. When the zinc head grade is consistent, and on target, it gives the mill the best chance to operate at its optimal design throughput and recovery. Therefore, when creating the LOM production schedule, a large emphasis was put into keeping the zinc head grade consistent. In order to achieve this objective, ore stockpiles for specific grade ranges were utilized as seen in Table 16-12.

**Table 16-12: Ore Stockpile Grade Ranges**

Ore Stockpile	Grade Range (ZnEq%)
Low Grade	1.5 – 2.0
Medium Grade	2.0 – 4.0
High Grade	4.0 – 10.0
Super High Grade	>10.0

The average head grade for the mill over the LOM is approximately 2.0% Zn and 1.0% Pb. The head grade of the mill feed as well as the mill throughput rate is shown in Figure 16-23.

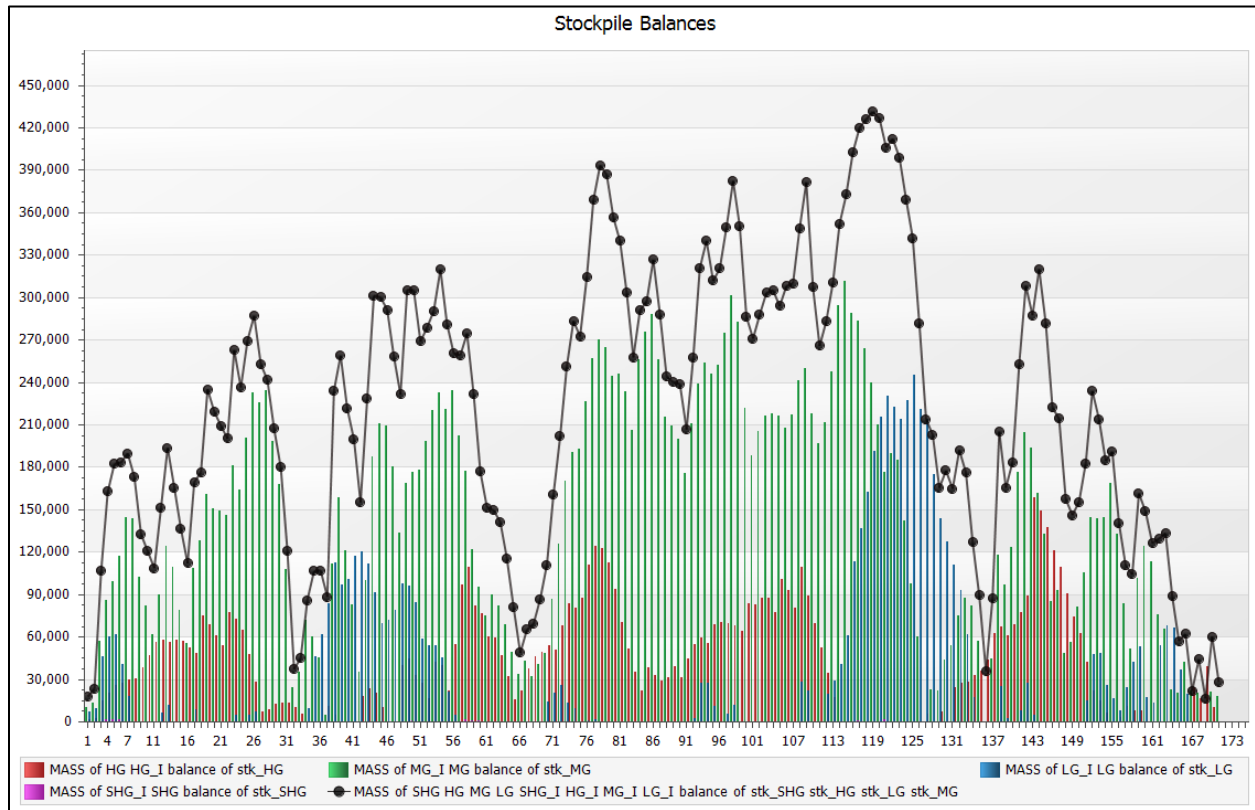
**Figure 16-23: Mill Throughput per Month with Head Grades**



The average size of the total ore stockpile for the LOM is approximately 180,000 tonnes. The largest the total ore stockpile gets during the LOM is 430,000 tonnes. The smallest the total ore stockpile gets during the LOM is 30,000 tonnes.

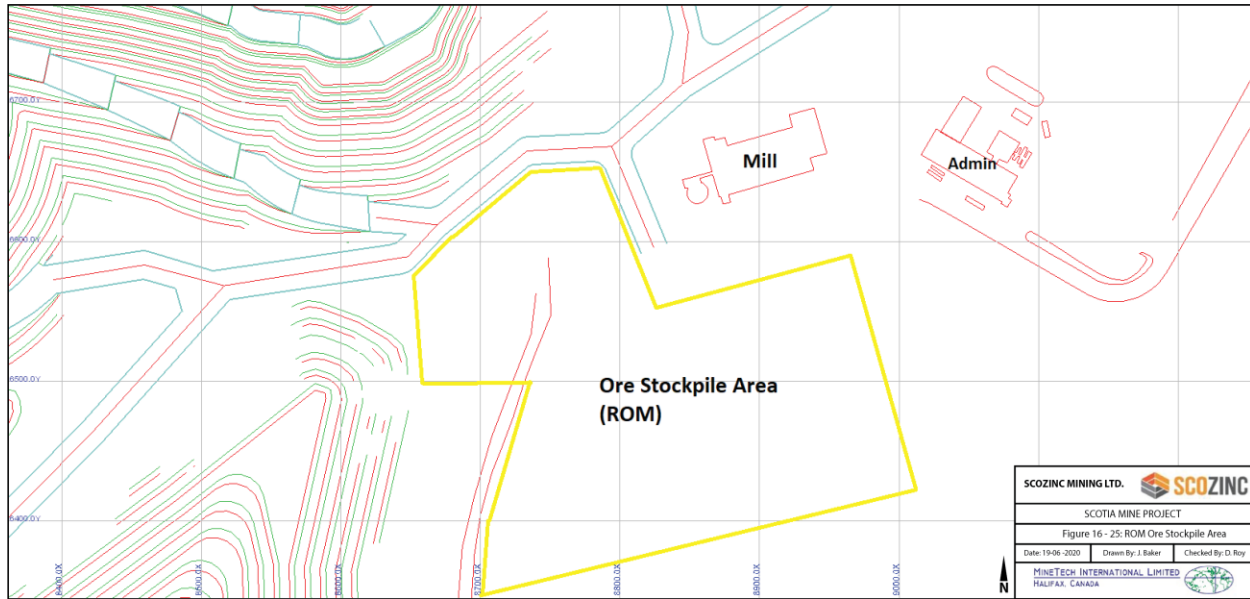
The ore stockpile balance by month for the LOM is shown in Figure 16-24.

**Figure 16-24: Ore Stockpile Balances per Month**



In order to accommodate the size of the ore stockpile, a Run-of-Mine (“ROM”) ore stockpile area will be demarcated next to the mill as shown in Figure 16-25 overleaf.

Figure 16-25: ROM Ore Stockpile Area



### 16.2.9 Mining Equipment Fleet

The open-pit mining operations will be performed as owner and operator. All mining equipment will be leased or obtained under a rental purchase option (“RPO”). Multiple local equipment suppliers were asked to provide budgetary pricing for lease/rental/RPO as well as a 30,000-hour Maintenance and Repair Contract (“MARC”) on various pieces of equipment. For the purposes of this study, ScoZinc has chosen to use the budgetary pricing provided by Komatsu Equipment.

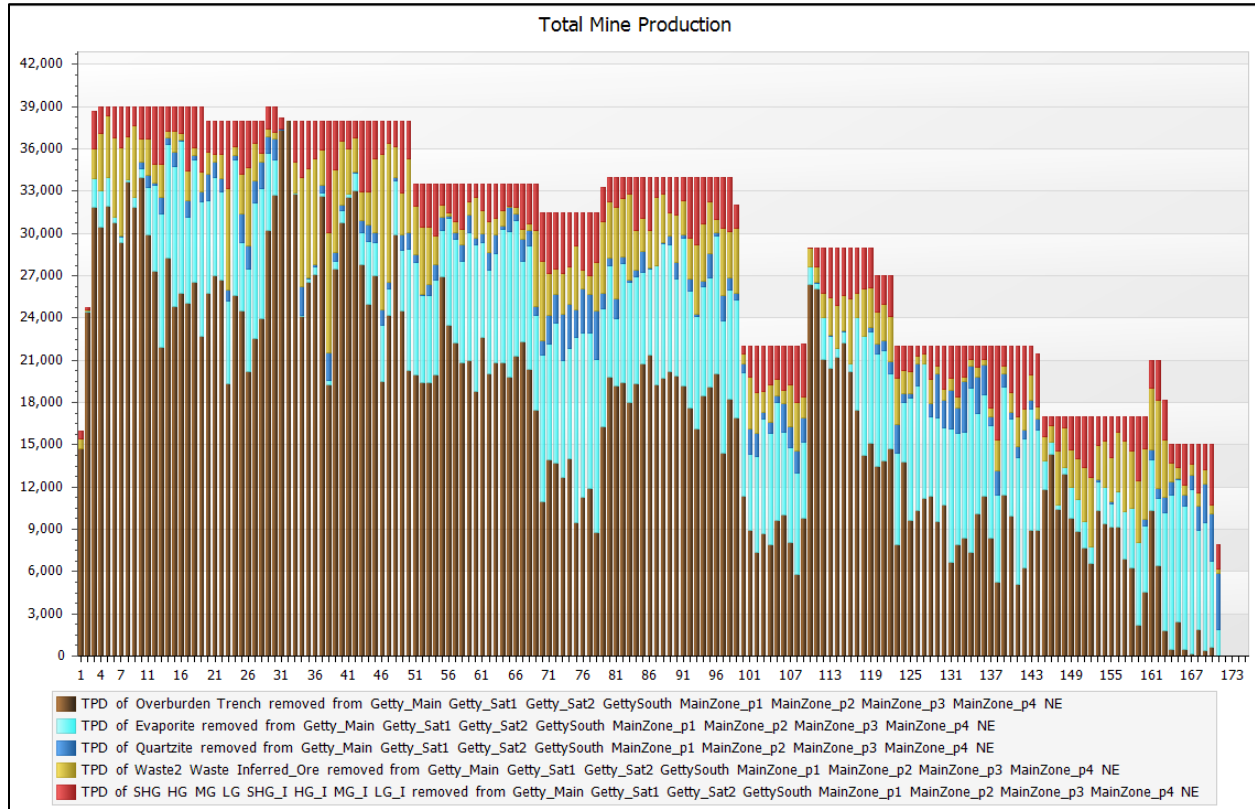
The quantity and type of equipment needed has been selected based on the production schedule requirements. There is a three month ramp up period as described in Table 16-13. The peak production rate reaches 39,000 tonnes/day and gradually decreases over the LOM to approximately 17,000 tonnes/day.

A 30,000-hour MARC between Komatsu and ScoZinc will also be utilized on all equipment purchased to cover the maintenance costs. After the 30,000 hours expires on each piece of equipment ScoZinc will hire its own maintenance personnel to maintain the equipment. The MARC will cover all maintenance expenses related to normal wear and tear except for tires and other consumables such as fuel, lubes, DEF etc.

Support equipment to the main mining fleet will include a grader, loader, boom truck, pickup trucks, service vehicles, water truck etc. Fuel will be delivered to site by a fuel supplier. The supplier’s fuel truck will deliver fuel directly to the tracked machines (i.e. dozers, excavators) in the mine daily as well as fill the main fuel tanks onsite. This fuel service has been successfully used in the past to provide cost-effective reliable refuelling to the mine site without ScoZinc having to purchase, maintain and operate the fueling equipment.

Table 16-14 shows the heavy equipment fleet requirements for the operation. Figure 16-26 shows the mine production rates required to achieve the LOM production schedule.

**Figure 16-26: Monthly Mine Production**



**Table 16-13: Mine Production Ramp Up Schedule**

Month	Tonnes Per Day
Month -5	16,000
Month -4	25,000
Month -3	39,000
Month -4	39,000

**Table 16-14: Mining Heavy Equipment Fleet Requirements**

Equipment	Number of Units	
	Capital	Operations
Komatsu PC1250LC Excavator	0	2
Komatsu PC490 Excavator with Hydraulic Hammer	0	1
CAT320 Excavator	1	0
Komatsu HD605 Rigid Frame Haul Truck	0	4
Komatsu HM400 Articulated Haul Truck	0	5
Komatsu WA600 Wheel Loader	0	2
Komatsu WA500 Wheel Loader	0	1
Komatsu D155AX Dozer	0	2
CAT16M Grader	1	0
Komatsu HM400-5 Water Truck	0	1

### 16.2.10 Drilling & Blasting

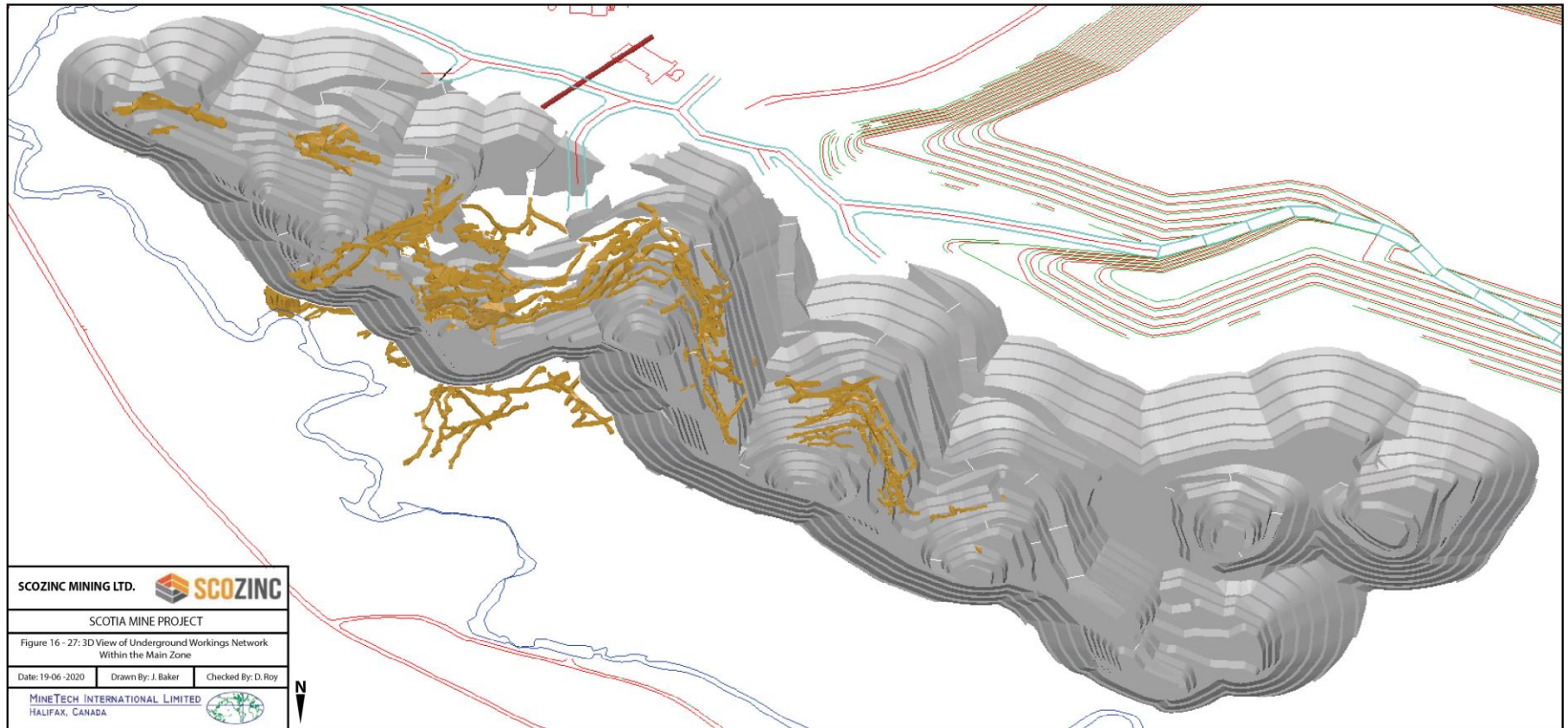
Drilling and Blasting activities at Scotia Mine will be done by a local contractor.

Drilling will be performed using standard hydraulic drills. Holes will be drilled 4.5 – 5.5 inches in diameter using square and staggered drill patterns where applicable.

Controlled blasting practices will be utilized on final bench walls. Blasting will be done in 5-metre bench lifts where possible.

Due to the presence of underground workings throughout the Main Zone of the Ultimate Pit Design, it will be necessary in some instances, due to safety considerations, to blast 10-metre and mine material in 5-metre lifts. The underground workings have been surveyed and modelled and, from past open-pit operations, have proven to be extremely accurate. Figure 16-27 shows the location of the underground workings network within the Main Zone of the Ultimate Pit Design.

Figure 16-27: 3D View of Underground Workings Network Within the Main Zone Pit



### 16.2.11 Open-Pit Dewatering & Hydrology

The historic operations have, at times, been disrupted by water inflow into the workings. These groundwater issues, in conjunction with weak metal prices, required the historic underground operation to be placed on care and maintenance on at least three separate occasions (J.D. Mollard & Associates, 1991). Dramatic increases in groundwater inflow into the underground workings occurred during large storms/ Gays River flooding events. Increased inflow was attributed to karst sinkholes, located adjacent to the river and which are normally dry, serving as a direct conduit into the underlying bedrock stratigraphy (Martec, 1991). Most of the hydrogeological work completed on the Scotia Mine property has been directed at the historical underground workings and their connection to surface water. To date, Golder (1991) provided the most comprehensive site study of the overburden hydrogeological conditions. The site can be broadly subdivided into two hydrogeological domains: overburden and bedrock. Both domains are considered connected via sinkholes; therefore, the bedrock domain is linked to both surface water and overburden aquifers. The overburden domain has not been assessed to the same level of detail as the bedrock domain. There are six primary overburden horizons on the site. These horizons can be classified into a series of aquifers and aquitards. The sandy units (i.e. Upper and Lower Sand) are permeable and water-bearing. In contrast, the clayey soils are low permeability and can act as aquitard horizons; these include the Upper and Lower Lacustrine Clay, the Red Till, and the Lower Till. It is possible that the overburden hydro stratigraphic succession could result in a series of perched water tables (Golder, 1991).

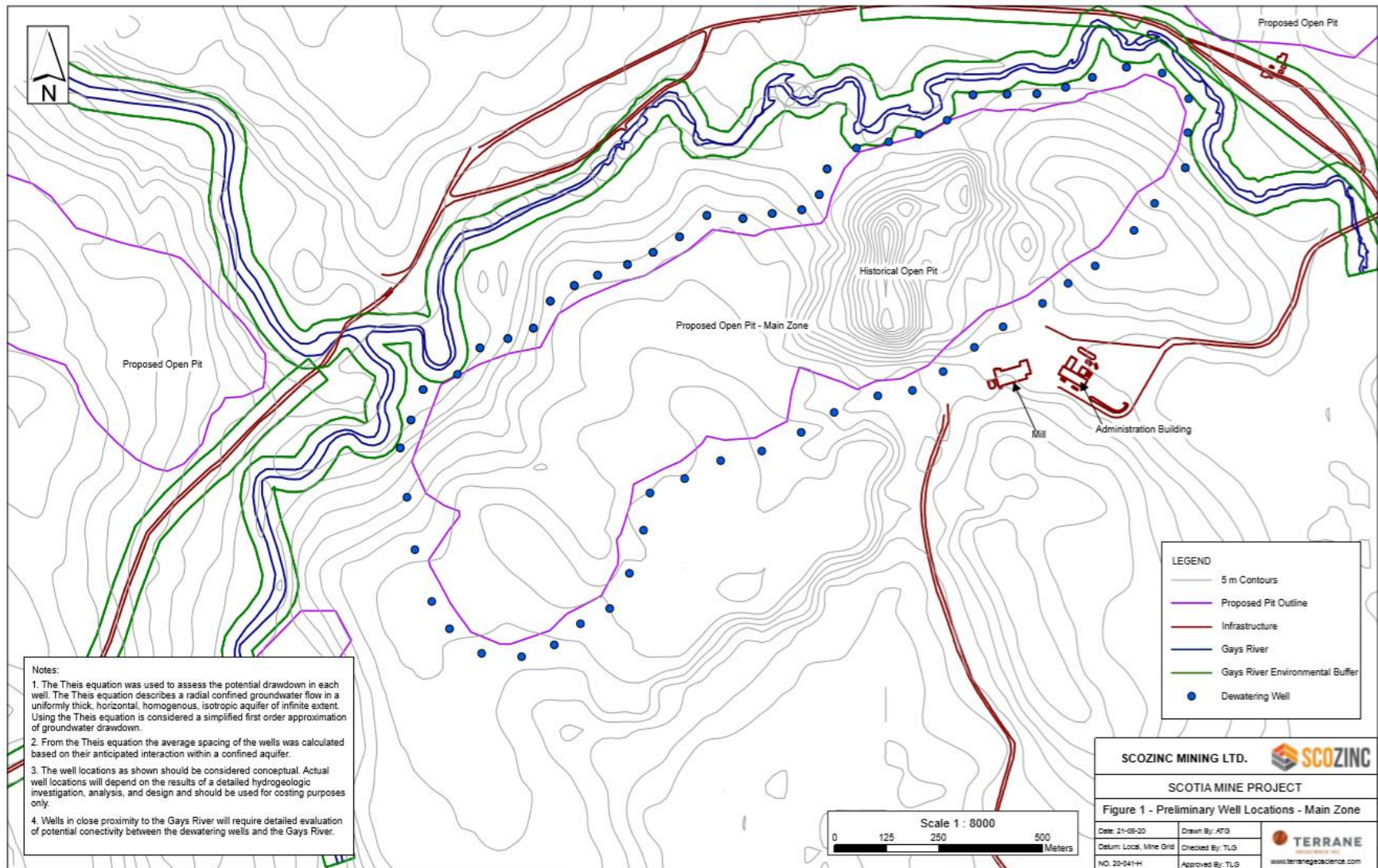
The Red Till is the most common clayey overburden horizon at the site and accordingly, is considered the principal aquitard controlling surface water infiltration. Historically, ground water levels have been lowered at the site up to 100 metres below the current Gays River elevation (~515 m Mine Grid). However, this effort focused solely on controlling bedrock inflow into underground workings and did not address water levels in the overburden.

During the 2008 open-pit operating period, through a combination of pit perimeter wells and in pit pumping at an average rate of approximately 5,900 US gallons per minute, the amount of water was maintained at acceptable operating levels. ScoZinc plans to improve upon this by utilizing the 60 geotechnical depressurizing wells, as seen in Figure 16.2.28, in conjunction with in-pit pumping to dewater the overburden horizon. The bedrock horizon will be dewatered using the existing deep well infrastructure in conjunction with in-pit temporary wells that access the underground workings. Horizontal wells will also be utilized in the karst gypsum to deal with the localized trapped water and will be allowed to drain into strategically placed in pit sumps which will then be pumped to the tailings facility.

All in-pit water will be pumped to the tailings facility. Water from the 60 depressurizing wells will be discharged into the Gays River, however some of this water will be used as processing water in the mill. A similar setup will be utilized in the North East and Getty pits.



Figure 16-28: Overburden Slope Depressurizing Well Locations



## 16.2.12 Mining Workforce

### 16.2.12.1 Mining Operations

The mining operation is planned to be developed and operated by ScoZinc personnel. Initial development of the Project will take 5 months. The mining operation will operate 24 hour/day, 7 days/week. All heavy equipment operators and maintenance personnel will work 12 hour/day shifts on a 4 days on, 4 days off, 4 nights on, 4 nights off schedule. All mining admin staff will work a 5-day work week.

ScoZinc will be responsible for all technical services including geology, mine planning, surveying and supervision of the mining personnel for scope of work and assurance that all mining standards and safety procedures are being diligently adhered to.

ScoZinc will provide all the workforce, equipment and facilities required for the development of the Project and LOM resource production. The mining workforce to be provided includes heavy equipment operators (“HEO’s”), supervisors, on-site safety supervisor, first aid attendant, training services and other support staff. Contractors will be used as required for Drill and Blast and other specialty work. The mining operation will ramp up to full production over the course of three months with maximum production starting in month four. Mining personnel will be added in accordance with the schedule.

The workforce required for mining over the LOM from start of Project to end of production is shown in Table 16-15 below.

**Table 16-15: Mining Workforce During Peak Operation**

Category	Personnel
Mine Manager	1
Mine Superintendent	1
Chief Mine Engineer	1
Mobile Maintenance Supervisor	1
Mobile Maintenance Mechanic	16
Geologist/GIS Tech	1
Surveyor	1
Heavy Equipment Operators (“HEO”)	51
Shift Supervisors	4
HEO Trainer	1
Utility/General Labourers	4
Samplers	2
<b>Total</b>	<b>84</b>

### 16.2.12.2 Mining Mobile Maintenance

As mentioned in Section 16.2.9, equipment will initially be leased from a local supplier. As a result, a 30,000-hour Maintenance and Repair Contract (“MARC”) between the equipment supplier and ScoZinc will be utilized. This will require only minimal ScoZinc mobile maintenance staff in the first three years of the LOM as the equipment supplier will be providing the maintenance staffing under the maintenance agreement.

ScoZinc will keep maintenance staff on in the first three years as there will be mining equipment onsite that will not fall under the MARC.

The current maintenance shop, which is too small to house the proposed new fleet, in conjunction with current storage tent will be utilized for critical spares storage as well as light vehicle maintenance. Maintenance work on heavy equipment will be performed outside in the maintenance laydown area (see Figure 16-29). This set up will be used during the first two years of the LOM, after which a maintenance building will be erected to accommodate the loaders, dozers, trucks, and support equipment (as shown in Figure 16-29 and Figure 18-30).

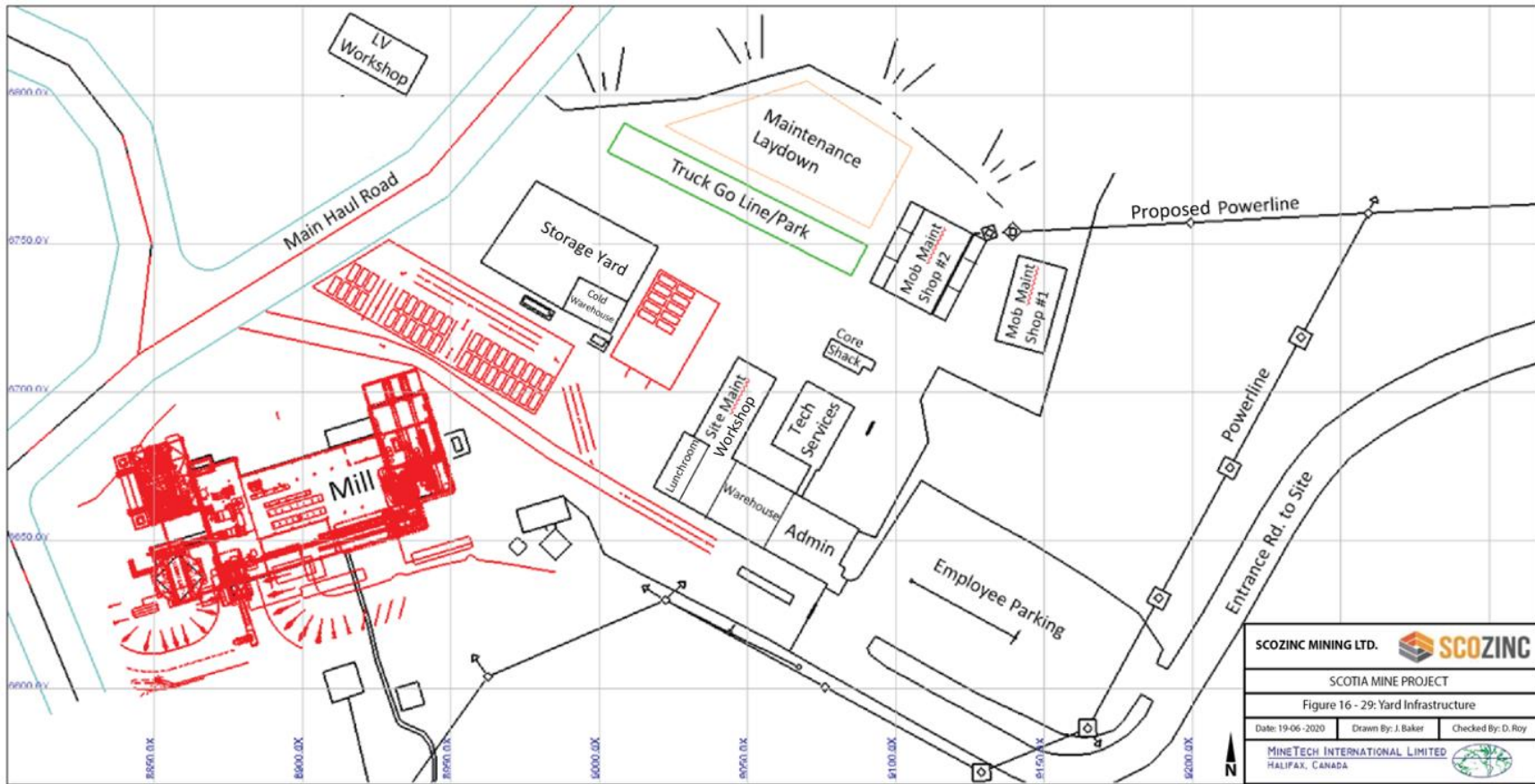
Maintenance performed on the larger excavators will continue to be outside in the maintenance laydown area.

Table 16-16 shows the Mine Maintenance and Site Services workforce during peak operation.

**Table 16-16: Mine Maintenance & Site Services Workforce During Peak Operation**

Category	Personnel
Mobile Maintenance Supervisor	1
General Foreman	1
Mechanics	16
Electrician	1
Plumber	1
General Labourers	4
<b>Total</b>	<b>24</b>

Figure 16-29: Mine Infrastructure Layout



## 17 Recovery Methods

### 17.1 Overall Process Design

The provided testwork was analysed and several options of process routes were addressed in the initial stages of the Pre-Feasibility Study. Based on the analysis, a process route was chosen as the best suited for the testwork results and subsequent economic analysis for the material. The unit operations selected are typical for this industry.

Per the mining production schedule, as the blended low-grade ore will be fed to the mill in the Life of Mine (“LOM”) which is 14 years. The Project will utilise a more capital cost-effective mill design, including a grind of 110µm at 2,700t/d.

Key process design criteria are listed below:

- Max throughput of 2,700t/d or 0.98Mt/a
- Lead head grade of 1.1% and zinc head grade of 2.39%
- Crushing plant availability of 60%
- Grinding and Flotation plant availability of 92%
- Dewatering and concentrate handling availability of 85%

### 17.2 Mill Process Plant Description

The Process design is comprised of the following circuits:

- Primary, secondary and tertiary crushing circuit
- Fine-Ore-Bin to buffer throughput to the grinding circuit
- Rod mill with trommel screen followed by 2 ball mills with cyclone classification (1 of the ball mills is the former re-grind mill)
- Pb and Zn flotation circuit
- Pb and Zn dewatering circuit
- Tailings discharge to tailings management facility
- Concentrate handling

#### 17.2.1 Plant Design Criteria

Key process design criteria for the mill during Phase 1 are listed in Table 17-1 (overleaf). All circuits are located in the large processing facility as shown below in Figure 17-1.

**Figure 17-1: Processing Plant**

### 17.2.2 Stockpiling & Crushing

The crushing circuit is designed for an annual operating time of 5,256 hours per annum or 60% availability.

Material is hauled from the mine to stockpiles. Provision for dumping on the ROM pad for blending and re-handling into the mobile jaw crusher feed hopper is provided. Material from the mobile jaw crusher (P80: -70mm) is crushed further by a new secondary cone crusher (P80: -40mm). The secondary crusher product then feeds a new sizing screen (6'x12' double deck). The oversize from the new sizing screen feeds an existing cone crusher (formally the existing Secondary Crusher) to produce a final tertiary crushed product (P80: -14.5mm).

The crushed material is conveyed to an existing Fine-Ore-Bin that provides approximately 10 hours of live storage. Given the milling operation is designed for an annual operating time of 8,059 hours per annum or 92% availability, this will result in excess crushed material production when the crusher is operational. The excess crushed material will allow routine crusher maintenance to be carried out without interrupting feed to the mill.

The Fine-Ore-Bin discharge area is equipped with 2 upgraded belt feeders to regulate feed at 122 t/h onto the rod mill feed conveyor.

The material handling and crushing circuit includes the following key equipment:

- Mobile Jaw Crusher
- New Secondary Cone Crusher
- New Sizing Screen
- Upgraded Conveyor Belt Drives & Pullies
- Existing refurbished Tertiary Crusher (Formally the Secondary Crusher)

**Table 17-1: Key Plant Process Design Criteria**

Design Parameter	Units	Value
Plant Throughput	t/d	2,700
Zn Head Grade – Design	%	2.0
Pb Head Grade – Design	%	1.0
Crushing Plant Availability	%	60
Mill Availability	%	92
SMC Breakage	Axb	74.1
Bond Ball Mill Work Index (BWi)	kWh/t	8.7
Bond Abrasion Index (Ai)	g	0.63
Primary Crusher		Sandvik Mobile Jaw QJ331
Ore Specific Gravity	-	2.68
Angle of Repose	degrees	37
Moisture Content	%	4.0
Rod Mill Dimensions		2.44 m' dia. X 3.66 m'
Rod Mill Installed Power	kW	300
Rod Mill Discharge Density	% w/w	70
Rod Mill Rod Charge	% v/v	45
Ball Mill Dimensions		3.35 m dia. X 4.57
Ball Mill Installed Power	kW	670
Ball Mill Discharge Density	% w/w	70
Ball Mill Ball Charge	% v/v	40
Ball Mill (Formally Regrind Mill) Dimensions		2.13 m dia. X 3.35 m
Ball Mill (Formally Regrind Mill) Installed Power	kW	187
Ball Mill (Formally Regrind Mill) Discharge Density	% w/w	70
Ball Mill (Formally Regrind Mill) Ball Charge	% v/v	40
Primary Grind size (P <sub>80</sub> )	µm	110
Classification		
Pb Concentrate Production	t/d	1.5
Zn Concentrate Production	t/d	4.6
Reagents		
Zinc Sulphate	g/t	1100
Sodium Cyanide	g/t	210
Potassium Ethyl Xanthate (PEX)	g/t	12
Sodium Isopropyl Xanthate (SIPX)	g/t	21
Methyl Isobutyl Carbinol (MIBC)	g/t	166
Copper Sulphate	g/t	500
Quick Lime	g/t	150
Flocculant (Lead Concentrate Thickener)	g/t	20
Flocculant (Zinc Concentrate Thickener)	g/t	30

### 17.2.3 Grinding Circuit

The grinding circuit consists of a rod mill followed by two ball mills in closed circuit with a new cyclone pack. The circuit is sized based on a cyclone overflow 80% passing size ( $P_{80}$ ) of 110  $\mu\text{m}$ . The rod mill slurry discharges through a trommel screen into the cyclone feed pump box.

The ball mills are fed by the cyclone underflow. The cyclone underflow launder is split to feed the two different sized ball mills. The ball mill discharges through a trommel and the oversize is screened out and discharged to a scats chute. Trommel undersize discharges into the cyclone feed pump box.

The former regrind mill discharges through a trommel and the oversize is screened out and discharged to a scats chute. Trommel undersize is pumped to the cyclone feed pump box.

Water is added to the cyclone feed pump box to obtain the appropriate density prior to pumping to the cyclones. Cyclone overflow gravitates to a new cyclone Over-Flow feed tank and then pumped to the Pb conditioner tank.

The grinding circuit includes the following key equipment:

- Existing 300 kW rod mill
- Existing 670 kW ball mill
- Existing 197 kW ball mill
- New cyclone feed pump box
- New hydrocyclones

### 17.2.4 Flotation Circuit

The flotation circuit begins with the agitated Pb conditioner tank which overflows into the Pb rougher flotation cells. The Pb rougher flotation concentrate feeds the Pb 1<sup>st</sup> cleaner and the Pb rougher tails feeds the Pb scavenger flotation cells. A 3<sup>rd</sup> cleaner concentrate feeds the final Pb concentrate pump box which feeds the Pb thickener.

The Pb scavenger concentrate and Pb cleaner tails feeds back to the Pb rougher flotation cells. The Pb scavenger tails are pumped to the Zn conditioner tanks.

The Zn conditioner tanks feed the new Zn rougher (Jameson Cell). The Zn rougher concentrate feeds the Zn 1<sup>st</sup> cleaner flotation cells and the Zn rougher tails feeds the Zn scavenger flotation circuit (former Zn rougher flotation circuit).

The Zn scavenger concentrate feeds back into the Zn rougher feed (Jameson cell) and the Zn scavenger tails, together with the Zn scavenger cleaner and 2<sup>nd</sup> cleaner tails, feeds the final tails pump box which goes to tailing storage facility ("TSF").

The Zn 1<sup>st</sup> cleaner flotation cells concentrate feeds the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> Zn cleaner flotation cells. The concentrate from the 5<sup>th</sup> cleaner feeds the Zn final concentrate pump box which feeds the Pb thickener.

The flotation circuit includes the following key equipment:

- Existing Pb conditioner tank
- Existing Pb rougher flotation cells
- Existing Pb rougher scavenger cells
- Existing Pb 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> cleaner cells
- Existing Zn conditioner tanks
- New Jameson rougher cell



- Existing Zn 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> rougher scavenger (former Zn rougher cells)
- Existing Zn 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> cleaner cells

### 17.2.5 Dewatering Circuit

The Pb and Zn concentrate feeds the Pb and Zn thickeners, respectively. The thickener underflow feeds the respective concentrate surge tanks before feeding the concentrate filter presses.

The filter presses are supplied with a dedicated compressor and receiver. The filter presses also require effluent management tanks and clean water tanks for filter cycle flow management.

The dewatering circuit includes the following key equipment:

- Existing Pb thickener
- Existing Zn thickener
- New Pb filter press
- New Zn filter press

### 17.2.6 Concentrate Handling Circuit

The dried cake from the Zn and Pb filters will fall onto existing Zn and Pb stockpile feed conveyors respectively. The Zn and Pb concentrate from the existing stockpile feed conveyors will feed into two 10-ton surge bins. These bins allow for contingency on concentrate handing delays (supplied by ScoZinc). The 10-ton surge bins will feed onto telescopic feed conveyors that will feed into lined concentrate 20ft containers. The concentrate containers will be replaced once filled with concentrate and taken to a container storage area for weighing and transport to either the Fairview Cover Container Terminal or the Canadian National (“CN”) Railway siding at Milford, NS. Concentrate loading is all performed under-cover in a purpose built annex-building to ensure the concentrate is handled in essentially a closed circuit. ScoZinc believes this new handling operation will maintain concentrate moisture levels, eliminate concentrate contaminates and ensure that the operation can be performed 24/7 without creating historical concentrate losses and dust issues.

The concentrate handling circuit includes the following key equipment (for both Pb and for Zn):

- 10-ton surge bins
- Telescopic conveyors

### 17.2.7 Tailings

Tailings are pumped from the tailings pump box to the TSF. The main equipment in this area includes:

- Existing pump box
- New tailings pumps
- New tailings discharge pipeline

### 17.2.8 Flowsheet and Layout Drawings

An overall process flow diagram showing the unit operations in the selected process flowsheet is presented in Figure 17-2.

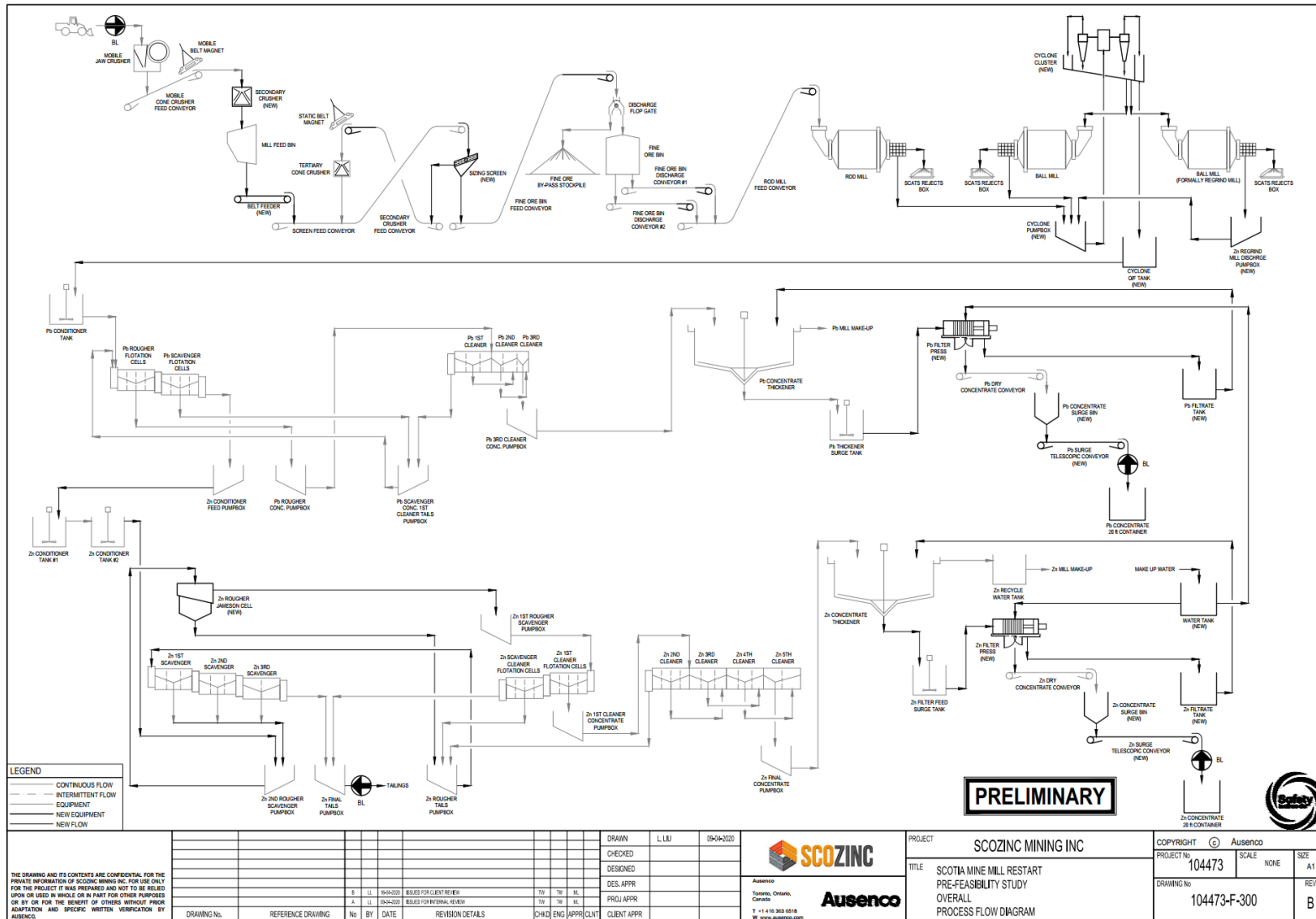
Plans and sections of the proposed plant areas where changes have been made are provided in Figure 17-3 to Figure 17-6.

Figure 17-7 shows the existing reagent flow sheet.

The changes made indicated in the figures below are as follows:

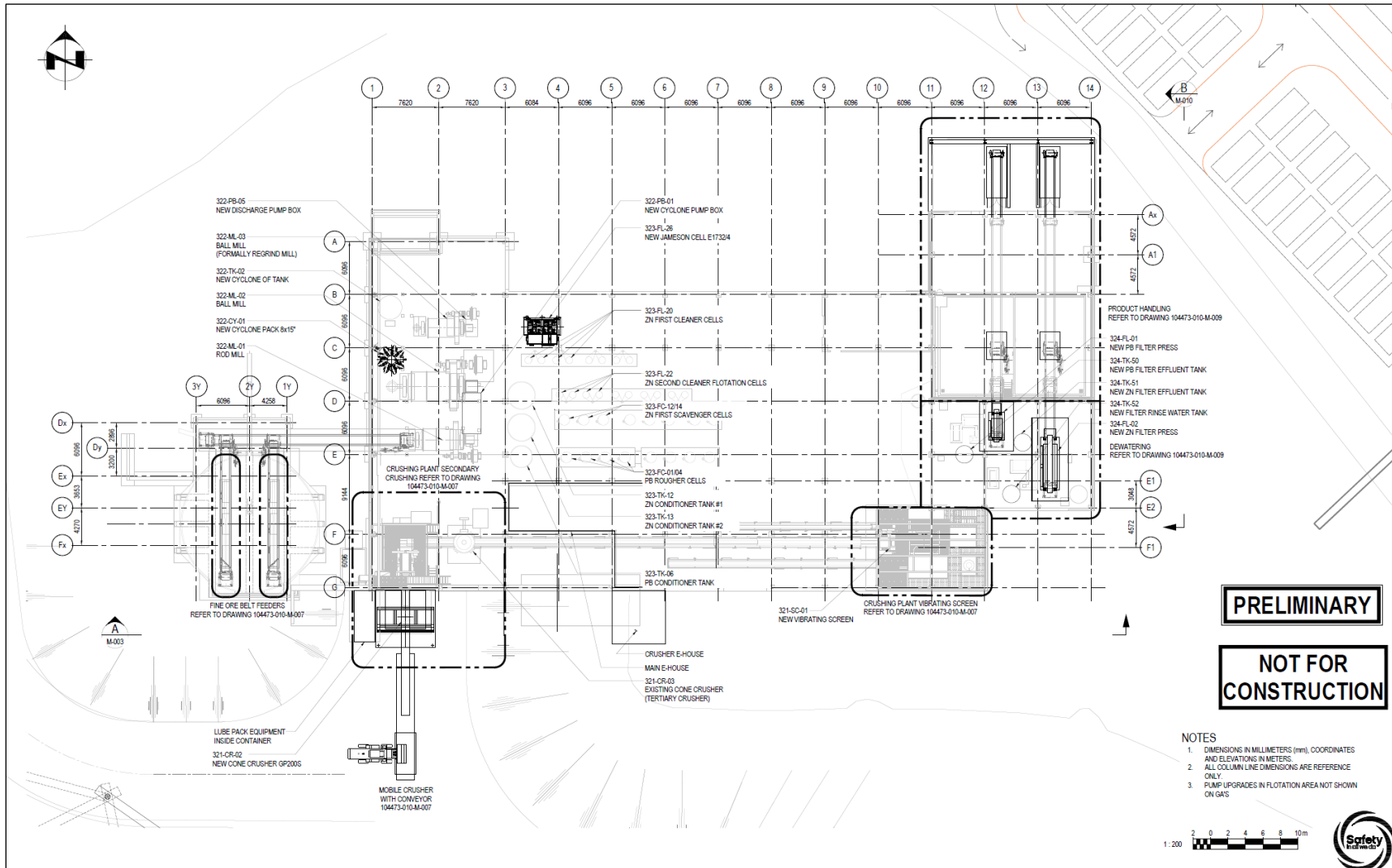
- Figure 17-3 shows all changes made to existing mill in relation to existing infrastructure. Namely:
  - Crusher area changes and additions
  - Screening area changes and additions
  - Flotation area additional Jameson Cell location
  - Dewatering area additions
  - Concentrate handling additions.
- Figure 17-4 shows new secondary crusher position on existing mill feed bin and new chutes to existing screen feed conveyor
- Figure 17-5 shows new double deck screen
- Figure 17-6 new filter presses and telescopic conveyors

Figure 17-2: Overall Process Flow Diagram



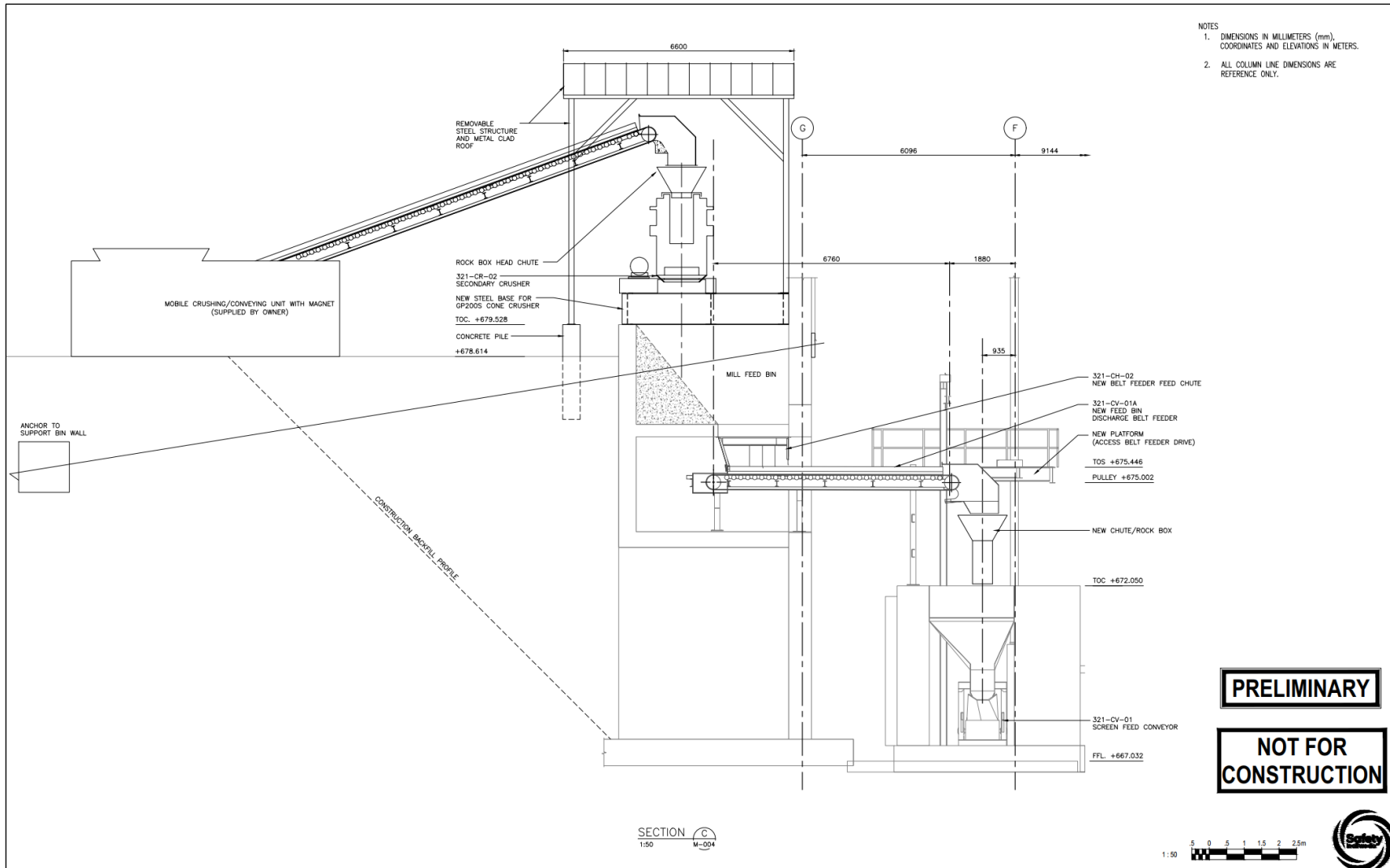
Source: Ausenco, 2020

Figure 17-3: Overall Plant Layout



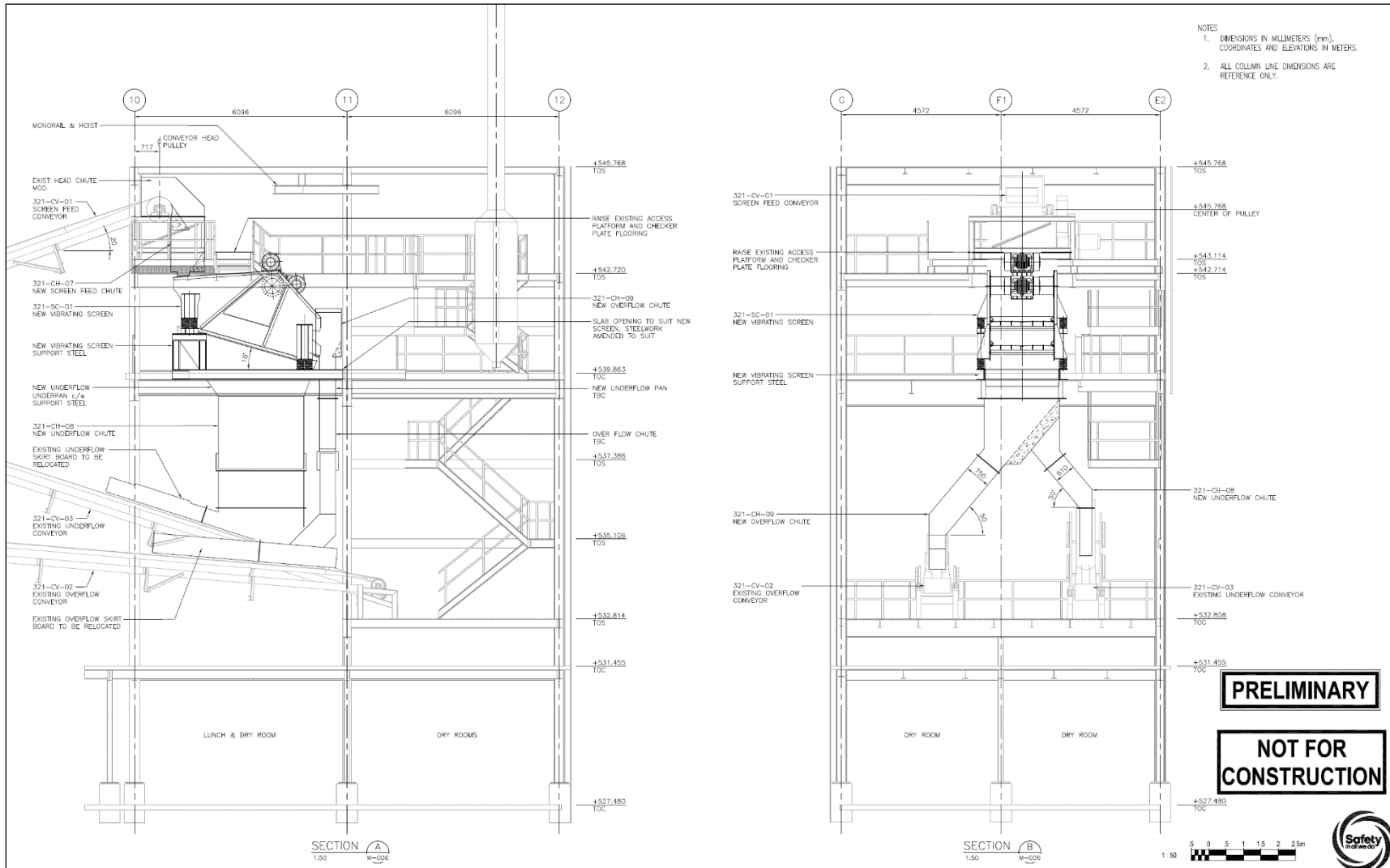
Source: Ausenco, 2020

Figure 17-4: Crushing Area Section



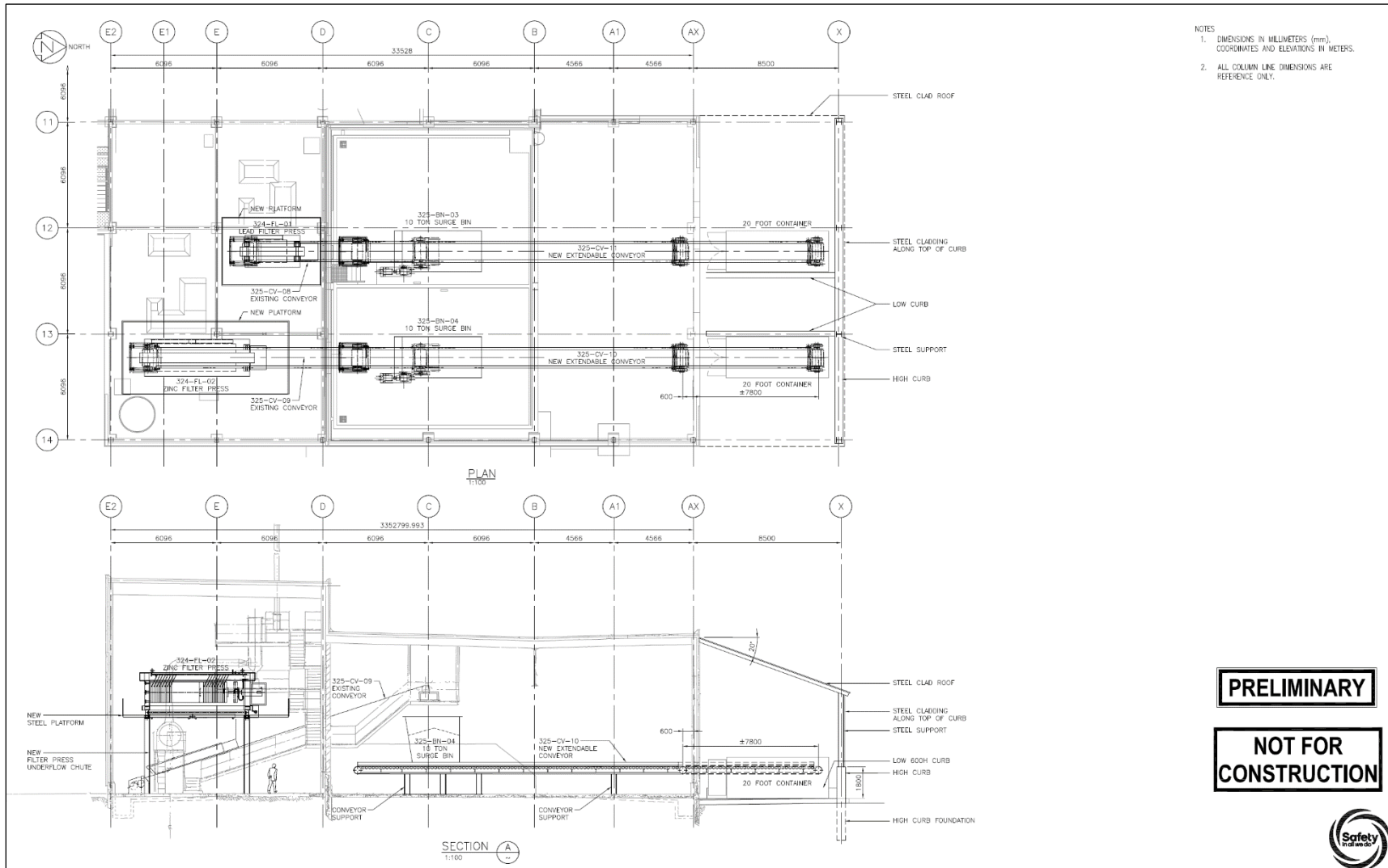
Source: Ausenco, 2020

Figure 17-5: Sizing Screen Area Section



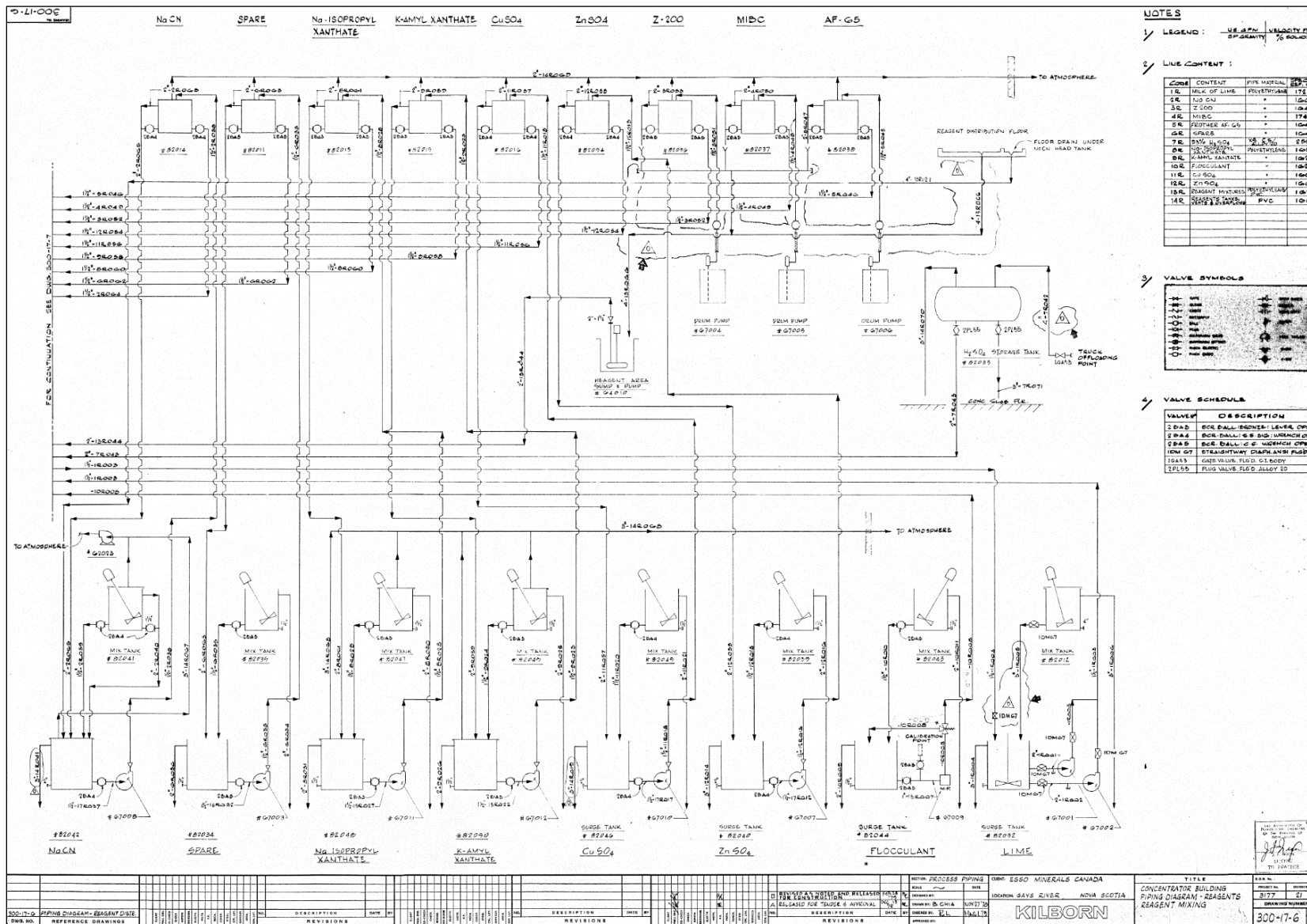
Source: Ausenco, 2020

Figure 17-6: Dewatering and Concentrate Handling Section



Source: Ausenco, 2020

Figure 17-7: Reagent Flow Sheet



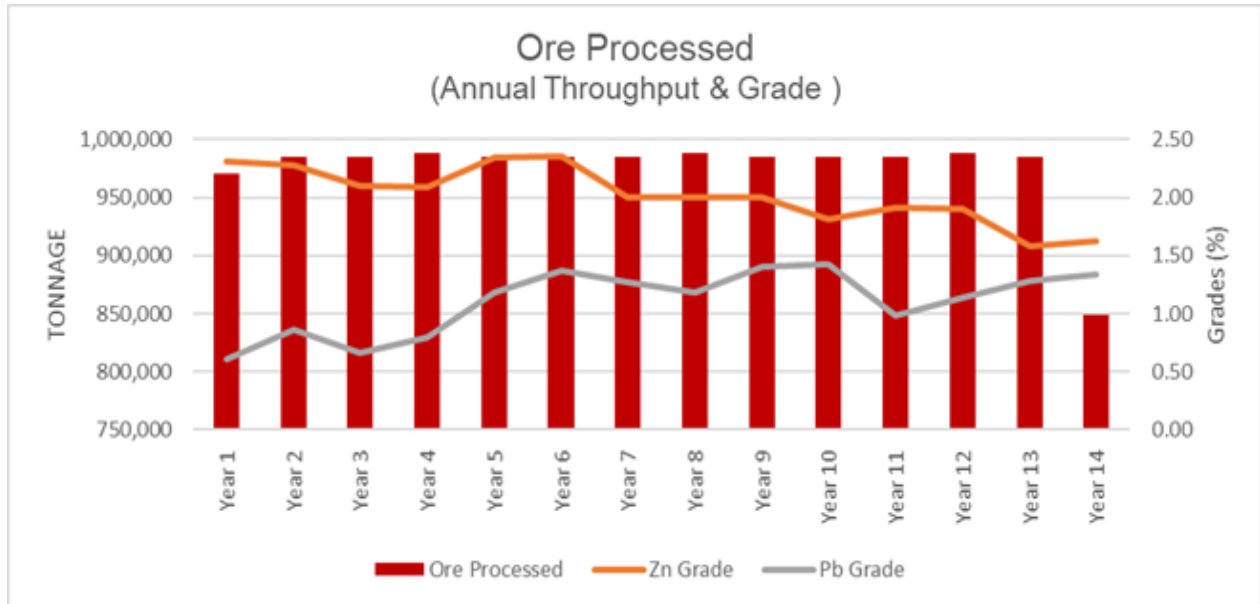
Source: Kilborn, 1978



### 17.3 Life of Mine Concentrate Production

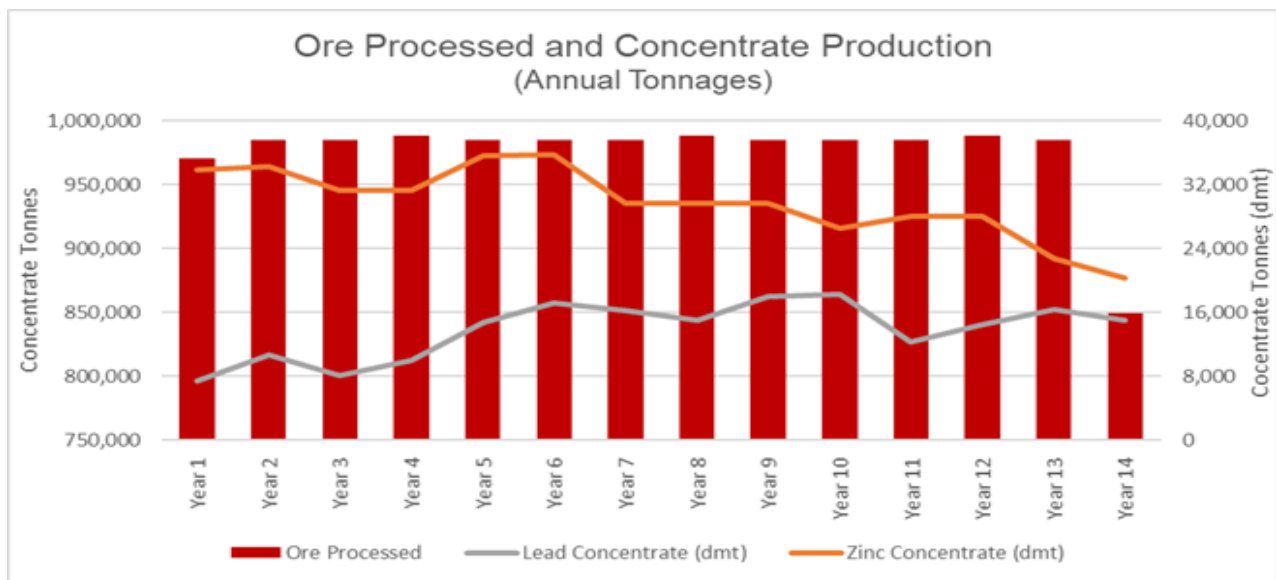
The Scotia Mine has a total ore throughput of approximately 1 million tonnes per year for all but the last year of its mine life. See Figure 17-8 below. This equates to an average throughput rate of 2,700 tonnes per day at average life of mine grades of 2.03% Zn and 1.10% Pb.

**Figure 17-8: Annual Ore Processed**



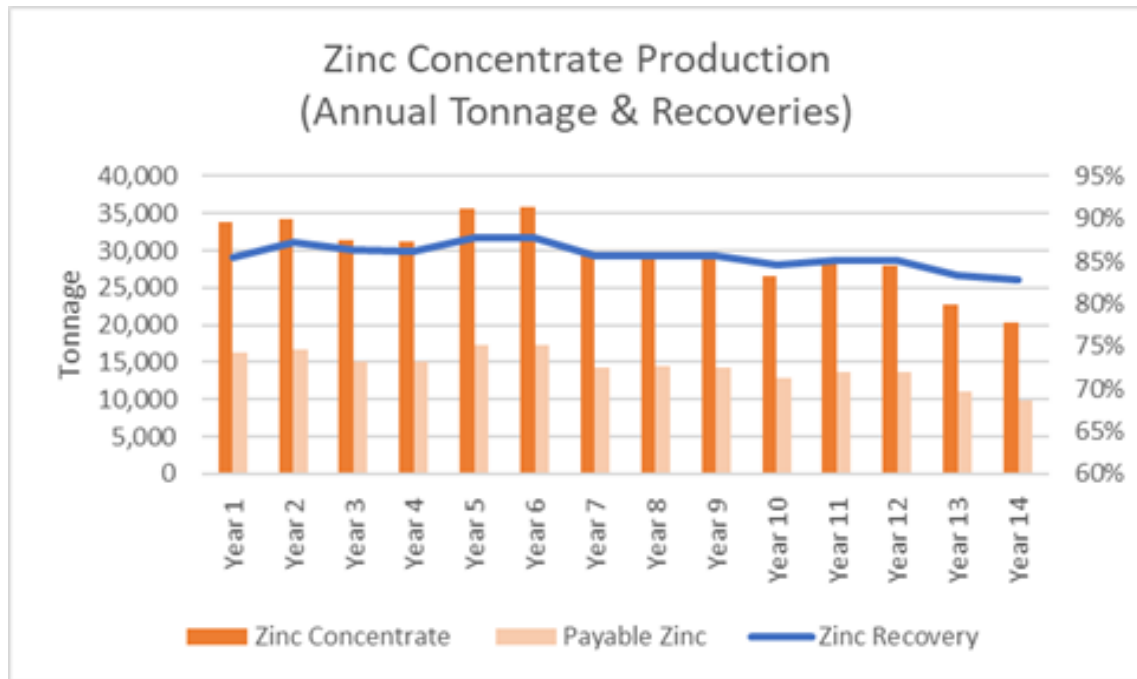
Two types of concentrate are produced over the mine life from the carbonate hosted orebody. Average concentrate tonnages per year are approximately 33,000 tonnes for zinc and 10,000 tonnes for lead over the life of the mine. The figure below shows the projected volumes of the two concentrates that can be produced each year at the Scotia Mine. See Figure 17-9.

**Figure 17-9: Annual Ore Processed & Concentrate Production**

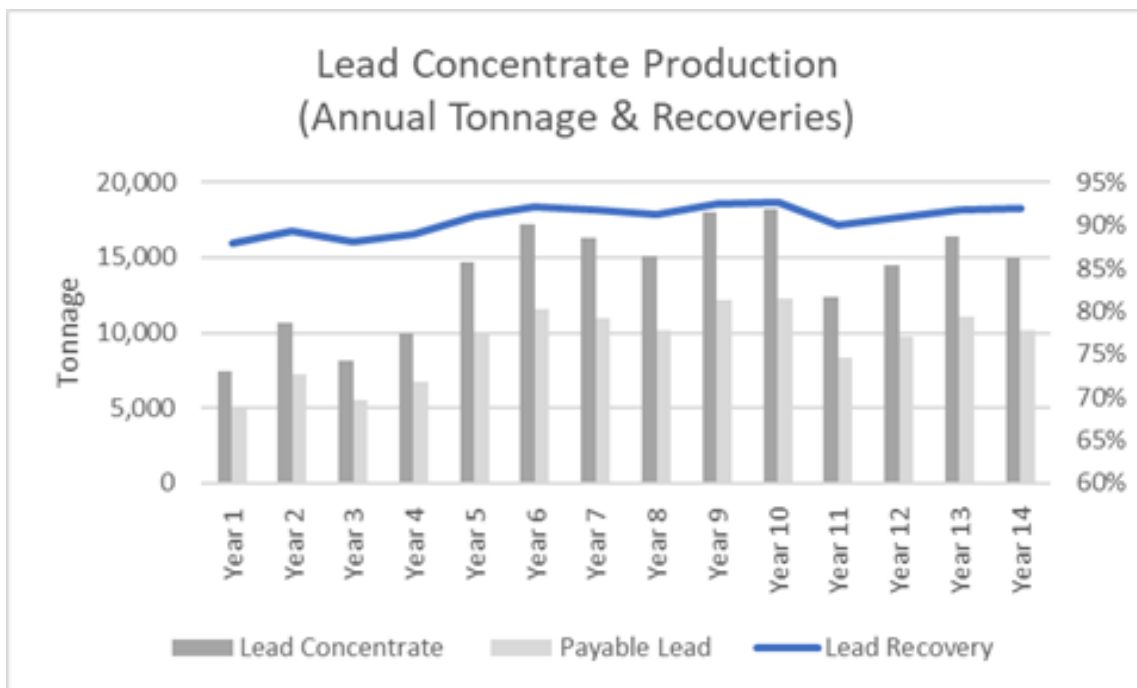


In terms of concentrate production, payable metal and recoveries, the following two figures provide the annual production profiles for the Zinc and Lead concentrates. See Figure 17-10 and Figure 17-11.

**Figure 17-10: Zinc Concentrate Production**



**Figure 17-11: Lead Concentrate Production**



## 17.4 Reagent Handling & Storage

Each set of compatible reagents mixing and storage systems are existing and located within curbed - containment areas to prevent incompatible reagents from mixing. See Figure 17-7 for reagent mixing and dosing system layout. Header tanks are fed via surge tanks containing mixed reagents in solution with water. Appropriate ventilation is available as there is an existing exhaust fan, but eyewash stations need to be checked for operational performance. Sumps and sump pumps are provided for spillage control.

The following reagents are required for the process:

- Hydrated lime
- Sodium cyanide
- Zinc sulphate
- Copper sulphate
- Flocculant
- Sodium Isopropyl Xanthate
- Potassium Ethyl Xanthate
- MIBC

### 17.4.1 Hydrated Lime

Hydrated lime is delivered in bags, which are lifted using a frame and hoist into the hydrated lime bag breaker on top of the mixing/storage tank. The solid reagent discharges into the tank and is slurried in process water to achieve the required dosing concentration. The slurried hydrated lime is pumped through a ring main with distribution points in leaching and cyanide destruction.

### 17.4.2 Sodium Cyanide

Sodium cyanide ("NaCN") is delivered to site in secured boxes containing the reagent bags. Bags are lifted using a frame and hoist into the sodium cyanide bag breaker on top of the tank. The solid reagent discharges into the tank and is dissolved in water to achieve the required dosing concentration.

After the mixing period is complete, cyanide solution is transferred to the cyanide storage tank using a transfer pump. Sodium cyanide is delivered to the flotation concentrate leach circuit, flotation tailings leach circuit, intensive leach circuit and elution circuit with dedicated dosing pumps. An extraction fan is provided over the sodium cyanide bag breaker/mixing tank to remove reagent dust that may be generated during reagent addition/mixing.

### 17.4.3 Zinc Sulphate

Zinc sulphate pentahydrate is delivered in solid crystal form in small bags and stored in the warehouse. Process water is added to the agitated zinc sulphate mixing tank. A pallet of bags is lifted using a frame and hoist, and periodically a single bag is placed on the zinc sulphate bag breaker on top of the tank. The solid reagent falls into the tank and is dissolved in water to achieve the required dosing concentration.

Zinc sulphate solution is transferred by gravity to the zinc sulphate storage tank, which has a stacked arrangement with the mixing tank. An extraction fan is provided over the zinc sulphate bag breaker/mixing tank to remove reagent dust that may be generated during reagent addition/mixing.

#### 17.4.4 Copper Sulphate

Copper sulphate pentahydrate is delivered in solid crystal form in small bags and stored in the warehouse. Process water is added to the agitated copper sulphate mixing tank. A pallet of bags is lifted using a frame and hoist, and periodically a single bag is placed on the copper sulphate bag breaker on top of the tank. The solid reagent falls into the tank and is dissolved in water to achieve the required dosing concentration.

Copper sulphate solution is transferred by gravity to the copper sulphate storage tank, which has a stacked arrangement with the mixing tank. An extraction fan is provided over the copper sulphate bag breaker/mixing tank to remove reagent dust that may be generated during reagent addition/mixing.

#### 17.4.5 Sodium Isopropyl Xanthate

Sodium Isopropyl Xanthate ("SIPX") is delivered in bulk bags. Process water is added to the agitated SIPX mixing tank. Bags are lifted into the bag breaker on top of the mixing tank. The solid reagent falls into the tank and is dissolved in water to achieve the required concentration. After the mixing period is complete, the SIPX solution is transferred to the SMBS storage tank using the SMBS transfer pump. The SMBS mixing area is ventilated using the SMBS area roof fan.

#### 17.4.6 Flocculant

Powdered flocculant is delivered to site in bulk bags and stored in the warehouse. A self-contained mixing and dosing system is installed, including a flocculant storage hopper, flocculant blower, flocculant wetting head, flocculant mixing tank, and flocculant transfer pump. Powdered flocculant is loaded into the flocculant storage hopper using the flocculant hoist. Dry flocculant is pneumatically transferred into the wetting head, where it is contacted with water.

Flocculant solution, at 0.50% w/v, is agitated in the flocculant mixing tank for a pre-set period. After a pre-set time, the flocculant is transferred to the flocculant storage tank using the flocculant transfer pump. Flocculant is dosed to the various high rate thickeners using variable speed helical rotor style pumps. Flocculant is further diluted just prior to the addition point.

#### 17.4.7 Frother

A Frother (Methyl Isobutyl Carbinol or "MIBC") is delivered as a liquid in IBCs and stored in the warehouse until required. A permanent bulk box is installed to provide storage capacity local to the flotation area. MIBC is used 'as-received' and without dilution. Diaphragm-style dosing pumps deliver the reagent to the required locations within the flotation circuit. A top-up of the permanent bulk boxes is carried out manually as required.

#### 17.4.8 Potassium Amyl Xanthate

Potassium Amyl Xanthate ("PAX") is delivered in granular powder form in bags and stored in the warehouse. Raw water is added to the agitated PAX mixing tank. Bags are lifted using a frame and hoist into the PAX bag breaker on top of the tank. The solid reagent falls into the tank and is dissolved in water to achieve the required dosing concentration. PAX solution is transferred by gravity to the PAX storage tank, which has a stacked arrangement with the mixing tank.

The mixing tank is ventilated using the PAX tank fan to remove any carbon disulphide gas. PAX is delivered to the flotation circuit using the PAX dosing pump. Actuated control valves provide the required PAX flowrates at several locations around the flotation circuit.

## **17.5 Services & Utilities**

### **17.5.1 Process/ Instrument Air**

High-pressure air at 700 kPa is produced by existing compressors to meet existing plant requirements. The high-pressure air supply is dried and used to satisfy both plant air and instrument air demand. Dried air is distributed via the air receivers located throughout the plant. (Reference: Kilborn drawing 300-17-5).

### **17.5.2 Low Pressure Air**

Low-pressure air for flotation is supplied by existing air blowers.

## **17.6 Water Supply**

### **17.6.1 Raw Water Supply System**

Raw water is supplied to an existing process water storage tank. Raw water is used for all purposes requiring clean water with low dissolved solids and low salt content, primarily as follows:

- Gland water for pumps
- Reagent make-up
- Raw water is treated and stored in the potable water storage tank for use in safety showers and other similar applications:
  - Fire water for use in the sprinkler and hydrant system
  - Cooling water for mill motors and mill lubrication systems (closed loop)

### **17.6.2 Process Water Supply System**

TSF decant return water meets the main process water requirements. Raw water from Gays pump station and or mining operations provides any additional make-up water requirements.

### **17.6.3 Gland Water**

One dedicated gland water pump is fed from the freshwater tank to supply gland water to all slurry pump applications in the plant.

## 18 Project Infrastructure

The Scotia Mine is conveniently located 33 kilometres from Halifax's International Stanfield Airport (YHZ) in Nova Scotia, Canada, with excellent infrastructure in place including processing facilities, waste dumps, a tailings pond, grid-power, all-season port & terminal access, and all-season highways. See Figure 18-1.

Fully permitted building infrastructure in place has an area of approximately 131,585 square feet.

Halifax is the provincial capital of Nova Scotia and, in combination with surrounding communities, forms a major center of population, government, business, education, industry, and transportation services. The mine site is 62 kilometres northeast of Halifax city centre and is directly accessible from the paved provincial Highway #277 or #224. The property area is rural and has been extensively developed for agricultural purposes in the past.

As the Scotia Mine is fully permitted for operations under its current Environmental Assessments and Industrial Approvals, relatively minor upgrades and improvements to the processing facilities enable the operation to commence commercial production within a relatively short time frame of months.

**Figure 18-1: Site Aerial Photo (2017)**



The mine site infrastructure is well established, as it has been on high level care & maintenance since 2009.

ScoZinc intends to expand the existing operations with the additions of a ROM based primary crusher, container handling yard, mobile fleet fuel bay and additional workshop, and alternative electrical energy sources such as a Compressed Natural Gas ("CNG") power generator and Photo-voltaic (or "PV") Solar Systems.

Some of these opportunities require further studies, permitting and costings, and hence, have not been included in the Pre-Feasibility Study. See Figure 18-2 and Figure 18-3 overleaf.

Figure 18-2: Proposed Site Layout Mining Additions (Plan View)

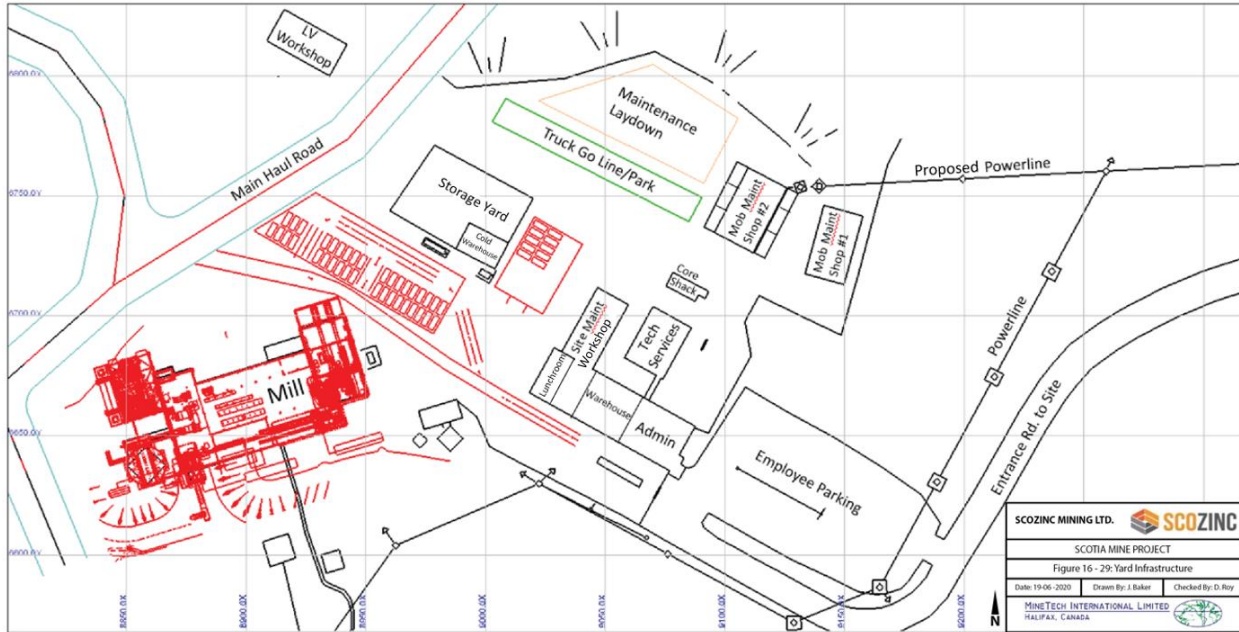
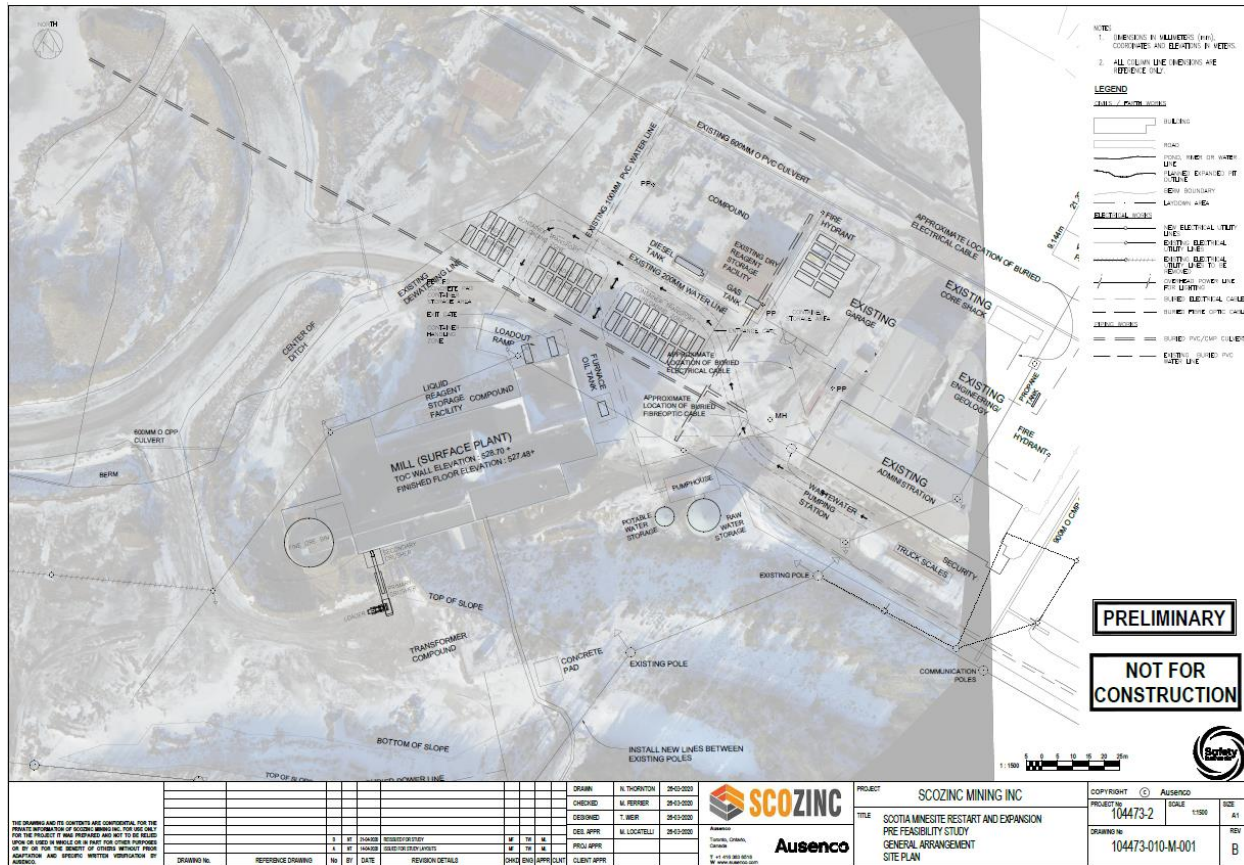


Figure 18-3: Proposed Site Layout Processing Additions (Plan View)



## 18.1 Scotia Mine Workforce

Due to the Scotia Mine's location, ScoZinc expects to directly and in-directly engage a high-quality labour force, with as many locally sourced personnel as possible. Personnel are currently and predominantly sourced from the Halifax Regional Municipality ("HRM") and neighbouring townships within Nova Scotia. Mine site accommodation is not required for the workforce.

The Scotia Mine expects to offer a shift-worker changeover bus service between the mine and two publicly designated parking points located at Fall River (Park Ride and Ride) and Milford (Bayberry Drive Parking). Both locations are on dual lane all-season highways 102/224 and 118, respectively. Management believes that such a service will improve the safety, convenience and cost of certain workers commuting after relatively long shift hours.

ScoZinc also owns a 3-bedroom fully furnished guest house on one of its exploration prospects adjacent to the mine. Management intends to utilize the guest house for certain short-stay visitors and guests to reduce costs of visits.

## 18.2 Electrical Power Systems

A permanent 25 kV three-phase electrical power line is provided to the mine site by Nova Scotia Power from the Elmsdale substation using the Nova Scotia provincial grid. Power poles are located along the perimeter of the Scotia Mine, which then cross the Gays River to the Mine Lease. From the entry point at Gays River, a number of power lines branch off to three separate transformers.

This system has provided consistent power to the Scotia Mine electrical transformers and electrical distribution network across site to the mill, all site buildings, security lighting, plus water pumping stations and dewatering pumps.

The current system consists of the following equipment:

- One large 8,000 kVA transformer sub-station for mill
- Six large transformers ranging from 1,500 kVA to 2,000 kVA
- Six small transformers ranging from 30 kVA to 45 kVA
- Over 4.5 kilometres of powerlines and power poles
- CAT Power trailered emergency generator

The electrical network of three-phase powerlines and power poles are in good condition. As a portion of the network will be relocated to account for the main pit expansion during the pre-production phase, replacement of any unserviceable components has been estimated in the capital expenditure.

To de-risk historical operating issues with the 8,000 kVA transformer overheating and future reliability, it will be replaced with a refurbished late-model unit of similar capacity. The existing transformer will be delegated as a backup unit (See Figure 18-4). The Motor Control Centre of the plant will also be upgraded with any new switches and breakers as necessary. The Motor Control Centre for the primary crusher was installed in 2008 and has only been used for trial crushing, and is considered to be in good working condition.

The other transformers and substations on site are in good or excellent working condition. See Figure 18-5.



**Figure 18-4: 8,000 kVA Transformer**



**Figure 18-5: Mine Dewatering Transformer and Substation**

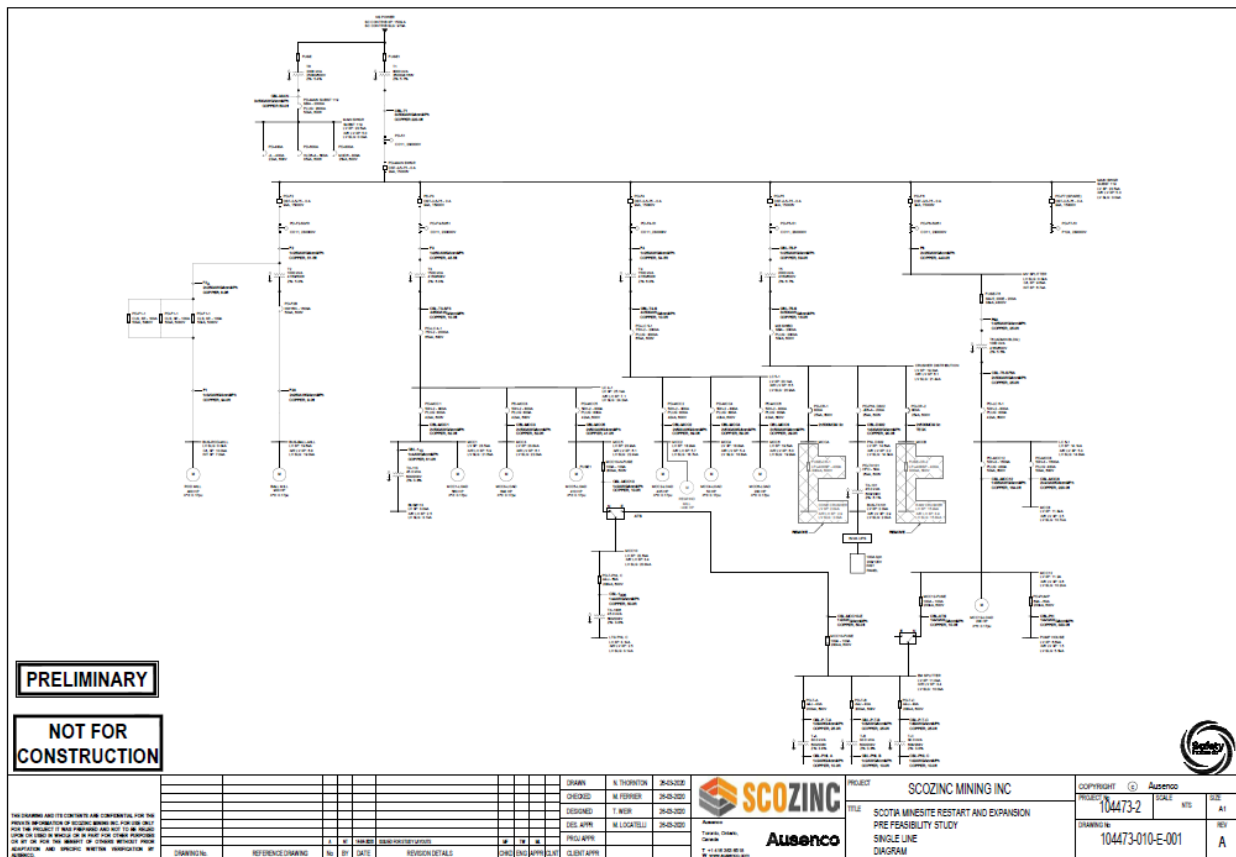


Although the existing site electrical system has been proven under operational levels, ScoZinc intends to upgrade certain aspects of the system with the following:

- Additional back up transformer to the 8,000 kVA transformer used at the Mill
- Upgraded backup generator
- Photo-voltaic (or “PV”) Solar Systems for Administration and support buildings
- Re-routing of the powerline for pit development needs

Load-sharing and load-shedding protocols will be a part of electrical system operating procedures. The Electrical Load to operate the Mill has an installed power of 2.7 MW. Site installed power is approximately 750 kilowatts, although this may be increased to up to 1.5 MW with the addition of pit dewatering wells in the mining operations. A single line diagram of the current installed power system is provided below (See Figure 18-6).

**Figure 18-6: Existing Electrical System Single-Line Diagrams**



## 18.3 Water Supply

### 18.3.1 Water Treatment Plant

ScoZinc has a water treatment system which includes a pumping station at Gays River, an enclosed water treatment building with pumps, treatment tanks & filters, and water storage of up to 1,098 m<sup>3</sup> (290,000 gallons). Total building size is 132 m<sup>2</sup> (1,422 square feet). The large water tank shown holds 986 m<sup>3</sup> (240,000 gallons), including 680 m<sup>3</sup> (180,000 gallon) fire water reserve for fire suppression, and the smaller tank 189 m<sup>3</sup> (50,000 gallons) is used for site potable water requirements. The building and tanks are in good condition with only minor repairs required over time. The water treatment system will be replaced with new filter media. See Figure 18-7 below.

**Figure 18-7: Water Treatment Plant and Water Storage**



### 18.3.2 Potable Water

Domestic water is currently pumped from the Gays River to a water treatment plant and 189 cubic metre (50,000 US gallon) storage tank. An intake system and pumping station is located near the mine entrance and provides up to 320 gallons per minute (~1,200 litres per minute) of fresh river water to the water treatment facility. The existing water treatment system will be upgraded with new filter media.

The pumping capacity is also sufficient to supply all the fire suppression requirement on the mine site. The building and pumps are in good condition, and the intake system will likely require some maintenance to remove sediment prior to use. See Figure 18-8.

Drinking water is provided to personnel from external sources.

**Figure 18-8: Pumping Station at Gays River**



### 18.3.3 Site Water Management

The Scotia Mine has five main sources of water for the site, namely:

- Water pumping from the Gays River
- Water pumping from open-pit perimeter wells
- Water inflows to the open-pit operations
- Water pumping from old underground workings
- Rainfall water catchment

Water for fire suppression and general site water needs is sourced from the Gays River using the mine's existing 320 US gallons per minute (~1,200 litres per minute or 1.21 cubic metres per minute) pumping station and water treatment plant. This Plant consists of mixing tanks, pumps, piping and control systems

designed to treat up to 320 gallons per minute. ScoZinc has an existing matching water licence of up to 320 gallons per minute. This pumping system is more than adequate for the life of the mine.

The majority of site water is provided for mineral processing and dust suppression operations by over 50 vertical wells of varying depths drilled on the perimeter of the open-pit mining operations. These wells are planned to intercept ground water before it enters the open-pit, thereby improving pit slope stability and mining operations, and also provide clean reliable water quality for mineral processing purposes. Although the majority of this well water is considered to be free of any contaminants, it will be pumped to a new reservoir located between the mill and the TSF (See Figure 18-9). With a proposed capacity of 5,000 cubic metres (1.3 million gallons), any sediments will be settled out before pumping to the mill as process water. Excess water from the reservoir will be either drained to the tailings pond or to the settlement pond depending on the quality of the excess water. The Reservoir will be divided into two or more ponds allowing for sediment collection and removal as required.

**Figure 18-9: Proposed New Reservoir Location**



Mine water (or surface water) sourced during mining operations is assumed to be contaminated with oil, mud and blasting residues, requiring that all water pumped from sumps in the open-pit operations to be transferred directly to the tailings pond for settlement. Any water wells located in the main pit which are designed to access the old underground workings (underground mine water) will be pumped to the tailings pond. Deep wells in the old underground workings were used in the past and were successful at keeping dry pit floors during much of the operating seasons.

Mineral process water (tailings) contains low concentrations of primarily zinc and lead metals plus residues from flotation chemicals. Tailings are discharged into an established and large valley-style Tailings Storage Facility (“TSF”) where residues are settled. See Figure 18-10.

Water is further settled with via a devoted three-celled polishing pond, where most of the remaining dissolved zinc metals precipitate out of the water before it flows into a catchment pond for final settling. After the catchment pond, water flows through a controlled culvert to Harrison Creek. See Figure 18-11.

ScoZinc rigorously tests and monitors all water discharge to the environment along this process. Water levels in the TSF, polishing pond and catchment ponds will fluctuate seasonally, increasing in the fall and spring months, and decreasing in the summer and winter months.

**Figure 18-10: Tailings Pond**



**Figure 18-11: Polishing Pond**

The Scotia Mine also has another storm pond near the main administration building which ensures that any site water near workshops and buildings are controlled and monitored before discharging to the environment. See Figure 18-12.

**Figure 18-12: Storm Water Pond**

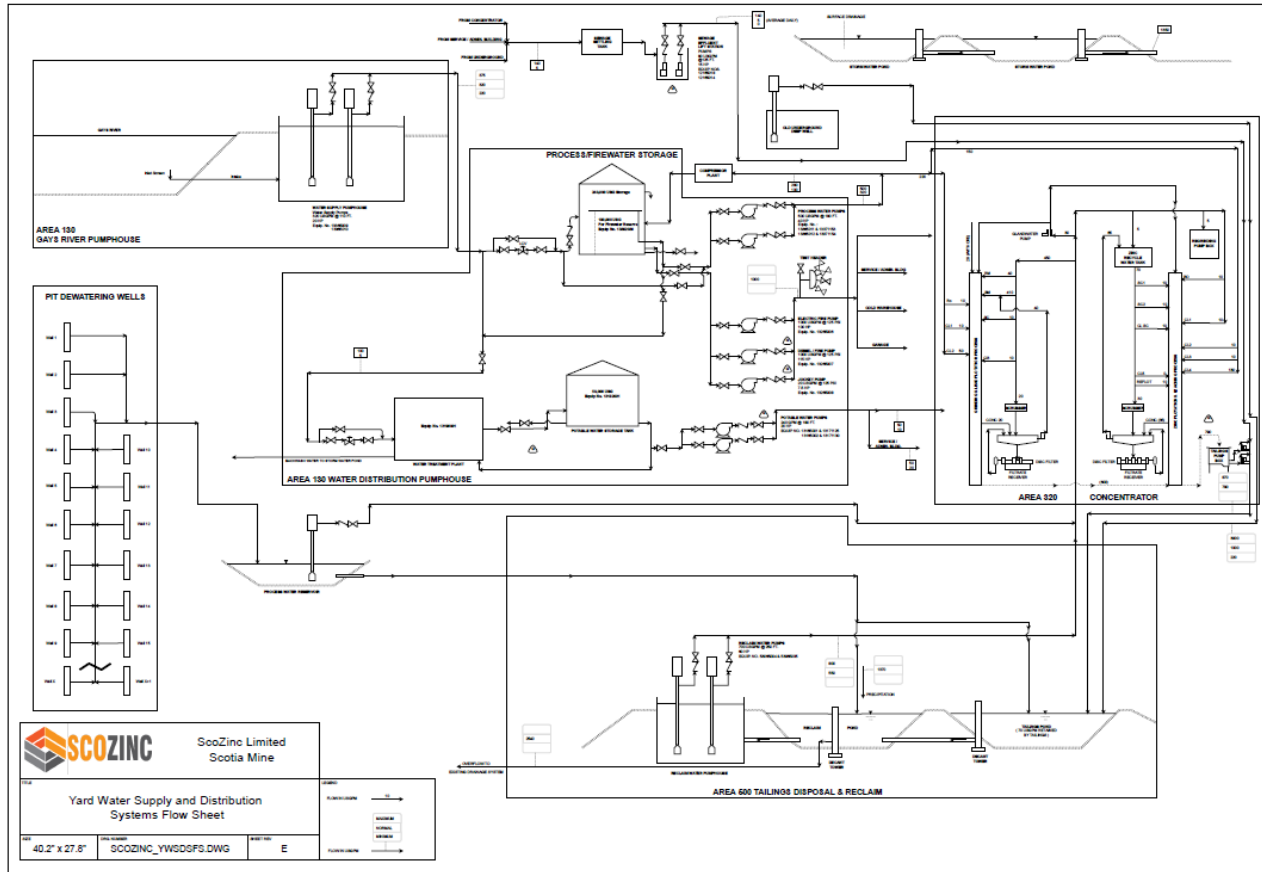
Effluent discharge from the Scotia Mine is controlled by an existing onsite effluent treatment system that includes a number of underground holding and processing tanks for solid and liquid human waste. Solid effluent is disposed off site via contract transfer services. Liquid effluent is pumped to a large existing perforated pipe leach field on the mine site. The Scotia Mine is confident the proven systems in place are satisfactory for the life of mine.

All water, treated and untreated, will be released to the Gays River according to the water quality protocols provided in the mine's Environment Assessment and Industrial Approval regulations. The Scotia Mine has a number of upstream and downstream monitoring points that it tests and independently assays to ensure appropriate controls are in place.

The site water management balance showing the site water supply and distribution is provided in the schematic plan as follows. See Figure 18-13.



Figure 18-13: Scotia Mine Site Supply and Distribution



### 18.4 Medical Facilities

The Scotia Mine has medical facilities on site, including a first aid treatment room and various emergency medical equipment. Basic medical support services will be provided on site during normal operations with a full-time paramedic, supported by appropriately trained first aid warehouse personnel. These personnel will also be responsible for any site emergency response.

For additional medical services, personnel may be transported to the nearby regional hospitals by sealed highway. The mine is 25 kilometres (20 minutes by road) from the Musquodoboit Valley Memorial Hospital, and 52 kilometres (33 minutes by road) to the Cobequid Community Health Centre in Lower Sackville, Halifax. Both hospitals provide 24-hour emergency services.

### 18.5 Telecommunications

Telecommunications on site currently include a national phone service, mobile phone cellular cover, and a high-speed internet service. All existing services are reliable and have been proven under previous operating periods.

The mine currently has a facsimile line and several telephone lines to a fully operational digital phone PABX system. The telephone lines are currently provided by Bell-Atlantic at a nominal monthly cost for external

and incoming communications, and the PABX system enables site wide calls between most rooms and offices across the mine site.

Mobile phone cellular coverage at the mine is excellent, with a number of providers offering mobile phone services in the area. The Scotia Mine uses a number of mobile phones for manage and site security services at regular provincial and national calling rates.

Internet access is currently in place with a national provider using a microwave link to a fiber-optic connection. A new fibre-optic service directly to site from the nearby fibre node is being planned to significantly upgrade the band-width on site and to enable the current IT network to be upgraded with additional high-speed modems and routers for fast offsite management and security monitoring.

A VHF radio system is also available across site for operations personnel, with a number of handsets available for use. This system will be upgraded as necessary.

## 18.6 Administration Building

The main Administration Building is of block-cavity steel-clad construction is 3,521 square feet in size (See Figure 18-14). The entire building is fitted with electric heating and cooling systems. The Administration Building includes the following:

- Security offices
- Management offices
- Open workspaces & lunchroom
- Conference room
- Server room & vault
- Change rooms including bathrooms and showers
- File storage
- All utilities (power, water, light)
- WIFI, Internet, & LAN connected
- Security system
- Kantech access control system

**Figure 18-14: Administration Building**



## 18.7 Mine Services Building

Connected by enclosed walkway to the Administration Building, the Mine Services Building is of block-cavity steel-clad construction approximately 5,076 square feet in size (See Figure 18-15). The building is provided with electric heating systems. This building is in excellent structural condition and provides operational and technical support to the mining operation, and contains:

- Supervisory and technical offices
- Open workspaces
- Operations meeting room
- Safety and training room
- Conference meeting room
- Environmental services room
- Survey equipment room
- Medical equipment room
- File storage
- All utilities (power, water, light)
- WIFI, Internet, & LAN connected
- Security systems

**Figure 18-15: Mine Technical Services & Operations Building**



## 18.8 Warehouse & Workshop

Connected to the Administration building, the Warehouse is of block-cavity steel-clad construction of 11,312 square feet in size (See Figure 18-16 and Figure 18-17). The Warehouse stores supplies and spare parts

for the site services and the mill. The Warehouse contains an inventory of equipment & spares with an assessed value of over \$5 million.

The Warehouse building is in good structural condition and contains the following:

- Supervisory offices
- Warehouse storage rooms
- Receiving bay with electric roller door
- Electrical bay, MCC room and storage
- Plumbing bay and storage
- Tool equipment store
- Equipment and spare parts
- Open workspaces & lunchroom
- First aid room, and Safety and training room
- Mezzanine storage areas (x2)
- All utilities (power, water, light)
- Internet/LAN connected, Security systems
- HVAC

**Figure 18-16: Warehouse & Workshop**



**Figure 18-17: Site Warehouse Receiving Bay**

## 18.9 Equipment and Spare Parts Asset Inventory

In addition to the existing infrastructure and processing equipment, ScoZinc owns an extensive amount of spare parts and equipment assets stored on the mine site buildings or in storage yards.

The Scotia Mine's asset register lists over 600 categorized items and their quantities with a recently assessed combined value of \$5.3 million.

The figures on the following seven pages provide images of some examples of the items listed in the asset register presently on site. See Figure 18-18 through to Figure 18-24.

**Figure 18-18: Selected Processing Assets**



**Process Building**



**Main Transformer**



**TSF Causeway**

Figure 18-19: Selected Processing Assets



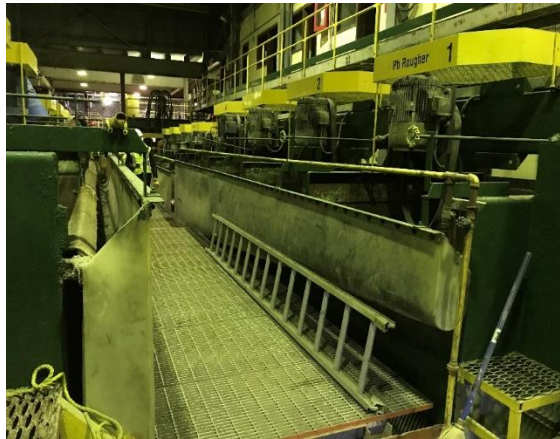
Grinding Mills



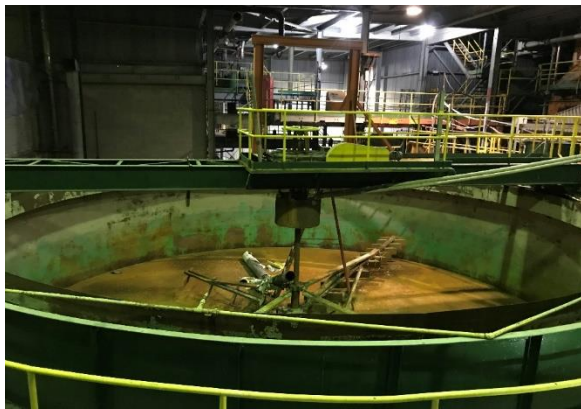
Flotation Banks



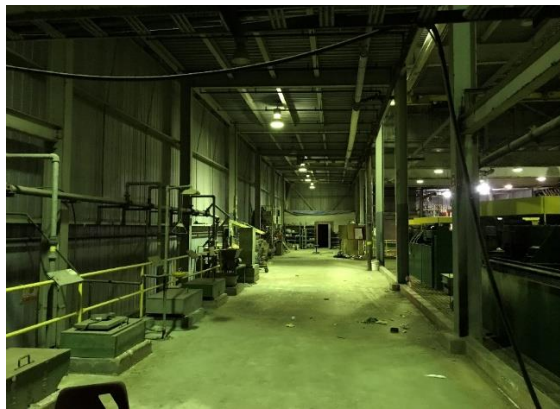
Zn Flotation Cleaners



Flotation Deck



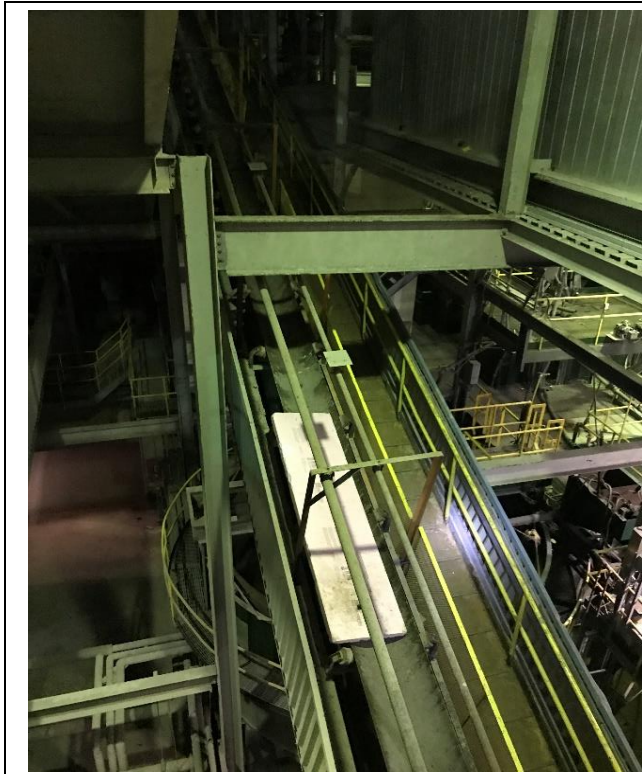
Zn Thickener Tank



Maintenance Deck



Figure 18-20: Selected Processing Assets



Conveyor Systems



MCC Panels

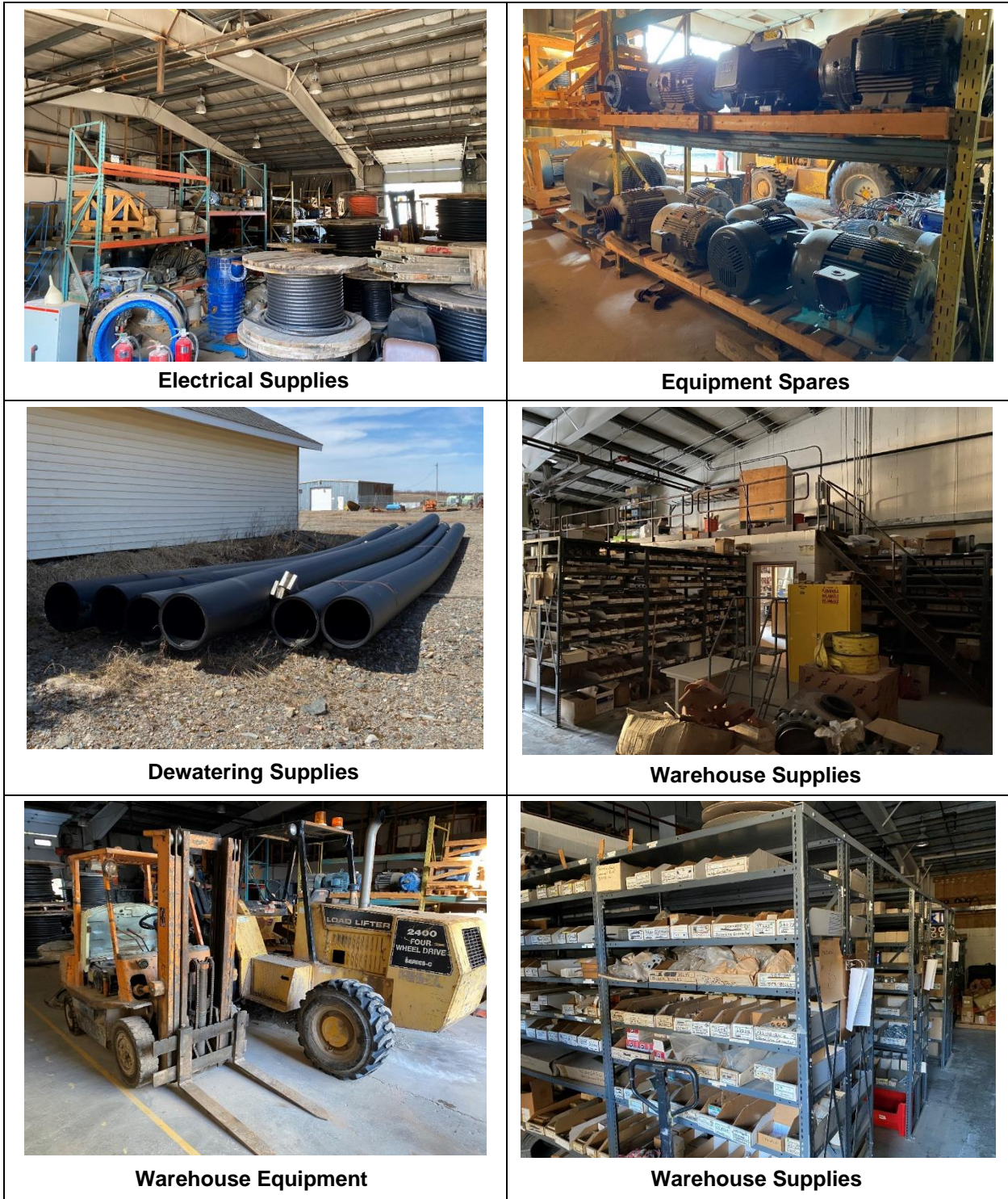


New Ball Mill



On-Stream XRF Analyzer

Figure 18-21: Selected Warehouse Assets



Electrical Supplies

Equipment Spares

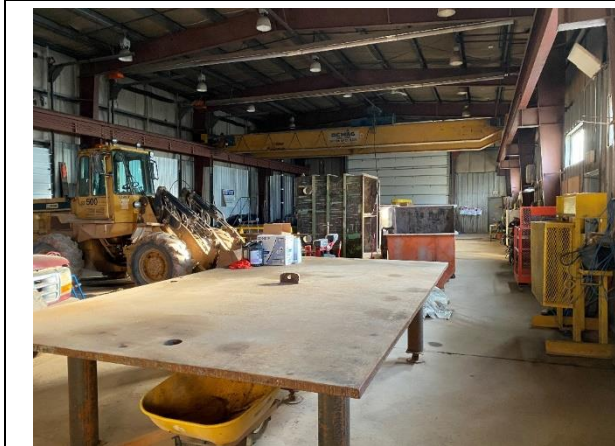
Dewatering Supplies

Warehouse Supplies

Warehouse Equipment

Warehouse Supplies

Figure 18-22: Selected Maintenance Assets



Maintenance Garage



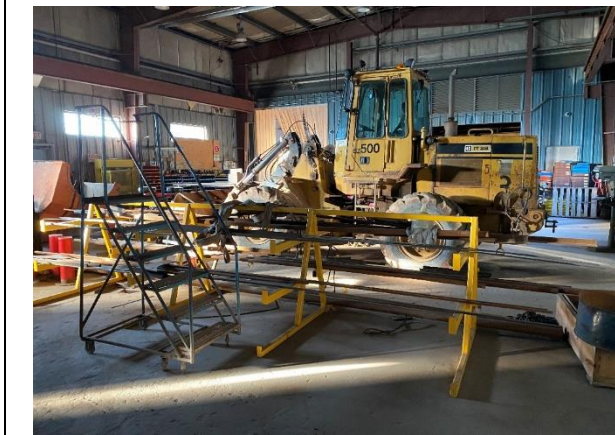
Maintenance Supplies



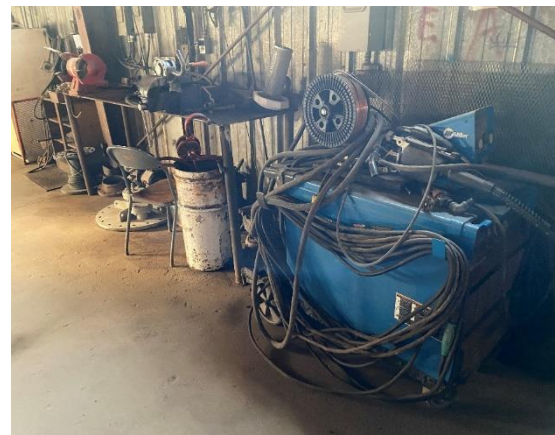
Garage Tool Store



Plumbing Workshop



Mobile Equipment



Workshop Equipment

Figure 18-23: Selected Maintenance Assets



Workshop MCC



Tire Service Bay



Workshop MCC



New Process Screen

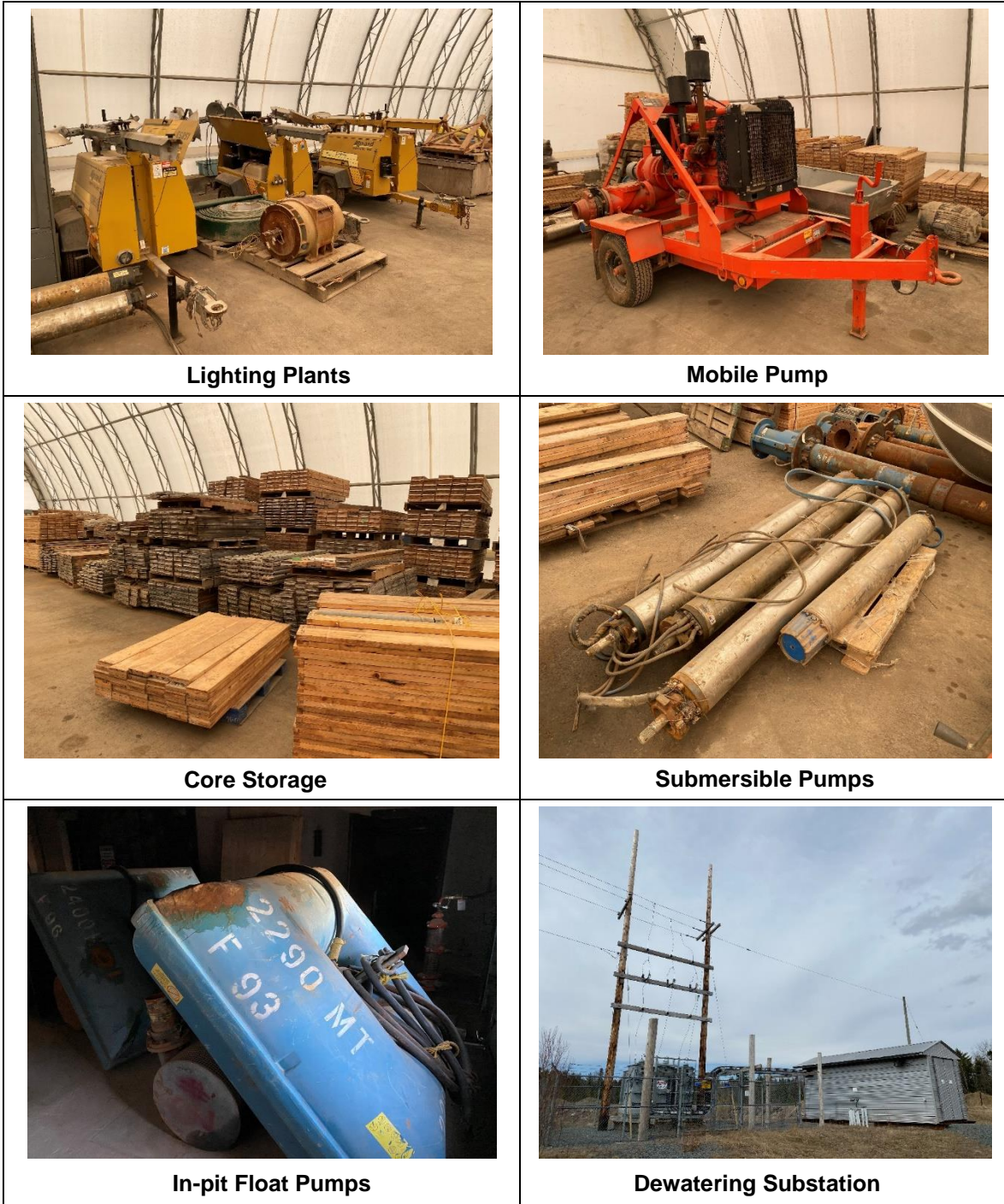


Heating Systems



Supervisor Offices

**Figure 18-24: Selected Mining Assets**



## 18.10 Maintenance Garage

Connected to the Warehouse building, the Maintenance Garage is of block-cavity steel-clad construction of 4,858 square feet in size (See Figure 18-25 and Figure 18-26). The Maintenance Workshop provides repair and maintenance services for site services equipment, fixed equipment maintenance, dewatering equipment, plus mobile equipment maintenance services for various small to medium mobile equipment.

The building is in good structural condition and contains the following:

- Supervisor office
- 4 equipment access bays
- Tool room
- Electrical workshop
- Plumbing workshop
- Tire lube bay
- Overhead 10-tonne gantry crane
- Storage rooms
- Open workspaces and Lunchroom
- All utilities (power, water, light)
- Internet/ LAN connected
- Heating
- Propane line for gas cutting
- Fire hydrants, Security systems

**Figure 18-25: Maintenance Garage**



**Figure 18-26: Maintenance Garage (interior)**

### **18.11 Core Preparation Building**

Nearby the Mine Operations Building is a diamond drill core preparation shed complete with drill core storage racks and a core cutting room for drill core preparation (See Figure 18-27). The building is 1,029 square feet in size.

The building is in excellent condition and contains:

- Core storage racks
- Open workspace
- Core logging area
- Core preparation area
- Core cutting area
- Power and light utilities
- Security systems

**Figure 18-27: Core Preparation Building**

## **18.12 Core Storage Building**

Nearby the Core Storage Building is a large 29.5m x 16.7m (14,878 square feet) dome building used for drill core storage and the temporary storage of various site services equipment. The building is in good working condition and will be converted to an additional mobile equipment workshop. See Figure 18-28 and Figure 18-29.

A new drill core storage yard will be constructed at a nearby location.



**Figure 18-28: Core Storage Building**



**Figure 18-29: Core Storage Building (interior)**



### 18.13 Proposed Additional Mobile Fleet Workshops

The existing Dome Core Shack structure (on a concrete pad) will be utilized as a mobile fleet workshop and warehouse for medium to large mining equipment (Mobile Maintenance Workshop 1). The building currently has power and is well located to the mining equipment “GO-LINE” and other equipment support maintenance and supervisory needs. ScoZinc has planned that the mining equipment supplier will manage the maintenance of mobile mining equipment in this facility.

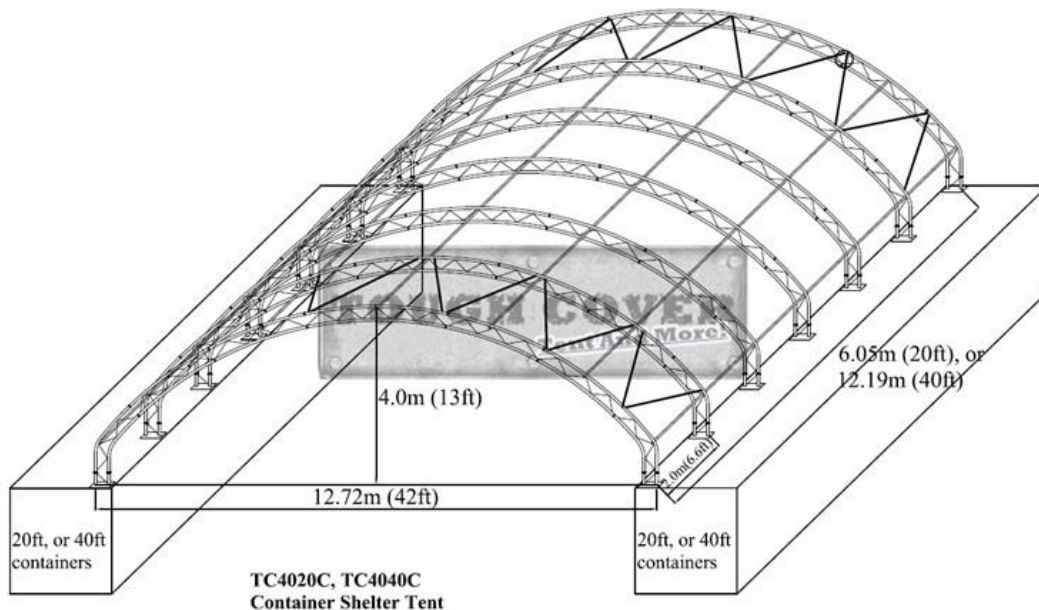
An additional parallel Dome structured workshop (Mobile Maintenance Workshop 2) will be built during the first year of operations to increase the number of covered bays for mobile equipment maintenance (See Figure 18-30). Due to the mobile equipment scheduled maintenance hours in the first two years of operation, the demand on mobile equipment maintenance will be considerably less than in later years as the mining equipment ages and requires progressively more maintenance hours to maintain performance levels.

The containers that form the foundation of the Dome Structures also have the advantage for use as workspaces, lubrication supplies storage, maintenance offices, and equipment parts storage. Propane powered gas heaters will provide some comfort to maintenance personnel as necessary.

The Mobile Mining Fleet Workshops will be initially managed by the mining equipment supplier under a MARC service contract, and contain the following:

- Spare parts storage inventory
- Parts warehouse
- Tool bay
- Utilities (power, propane, water)

**Figure 18-30: Sample Dome Structure**



Courtesy of Tough Cover Tents and Structures

## 18.14 Mill Processing Building

The existing Mill Building is a large, 4-level, 73,298 square foot building built of both cavity-filled concrete block and steel cladding (See Figure 18-31 through to Figure 18-33).

The building houses all the processing equipment and mill operations support offices. The building requires some minor upgrades to some facilities, but contains the following:

- Supervisory and technical support offices
- Crushing, Grinding, Flotation, Concentrate filtering and loading equipment
- Sample preparation laboratory
- Metallurgical laboratory
- Motor Control Centers
- On-Steam XRF Solution Analyzer System
- Grinding media and Reagent storage
- 4 levels of steel and concrete work decks
- Dust extraction units
- Storage rooms with roller door access
- Change rooms including bathrooms and showers
- Shift offices
- Open workspaces
- Lunchroom
- Medical room
- Safety and training room
- All utilities (power, water, light)
- WIFI, Internet, & LAN connected

**Figure 18-31: Existing Mill Processing Building – South Side Exterior View**



**Figure 18-32: Existing Mill Processing Building – North Side Exterior View**



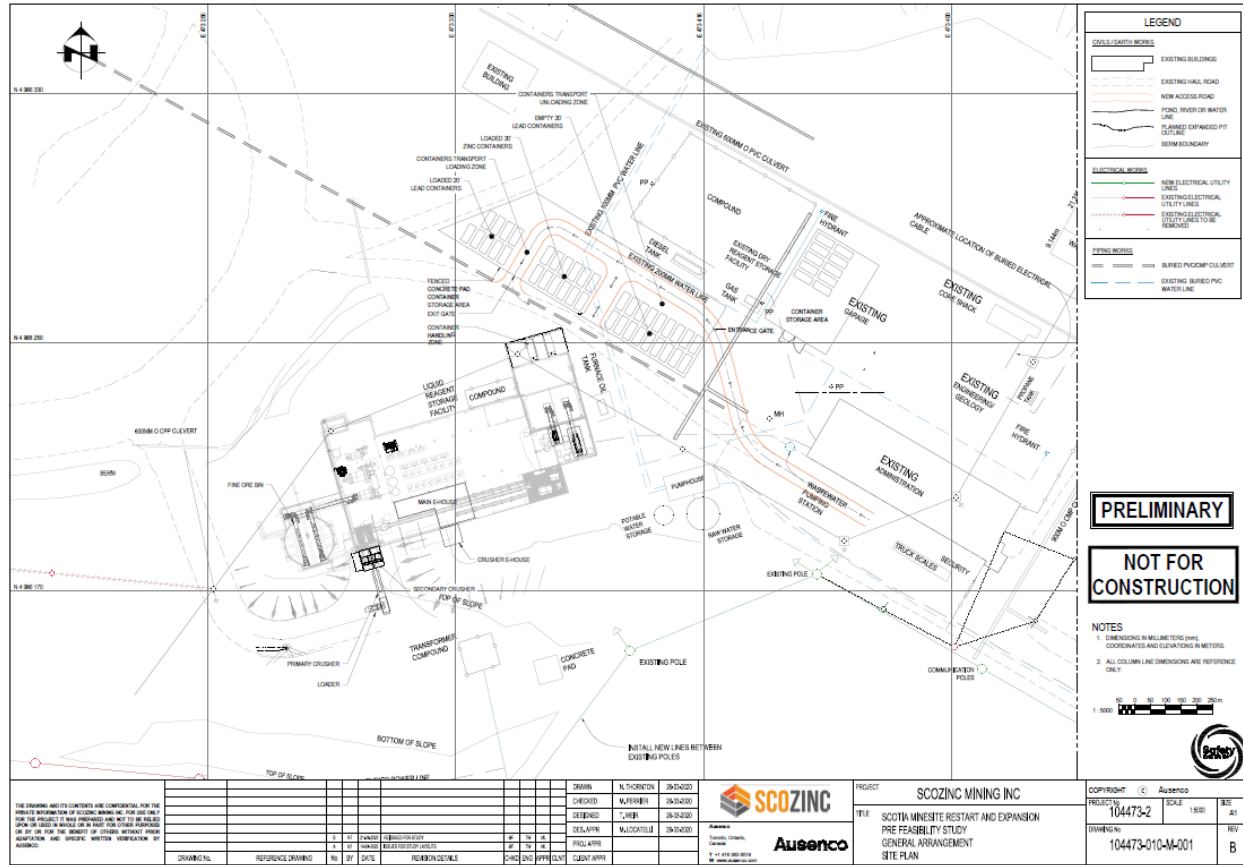
**Figure 18-33: Existing Mill Fine-Ore-Bin (Silo)**

The Mill Processing Building will be expanded with the addition of the following proposed new equipment:

- ROM based primary crusher and conveying system
- Concentrate Container Handling building
- Concentrate Container Yard

The figure overleaf indicates the proposed locations of the additions to the mill process building. See Figure 18-34.

Figure 18-34: Proposed Additions to Mill Process Building



Inside the Mill Processing Building, ScoZinc has the following:

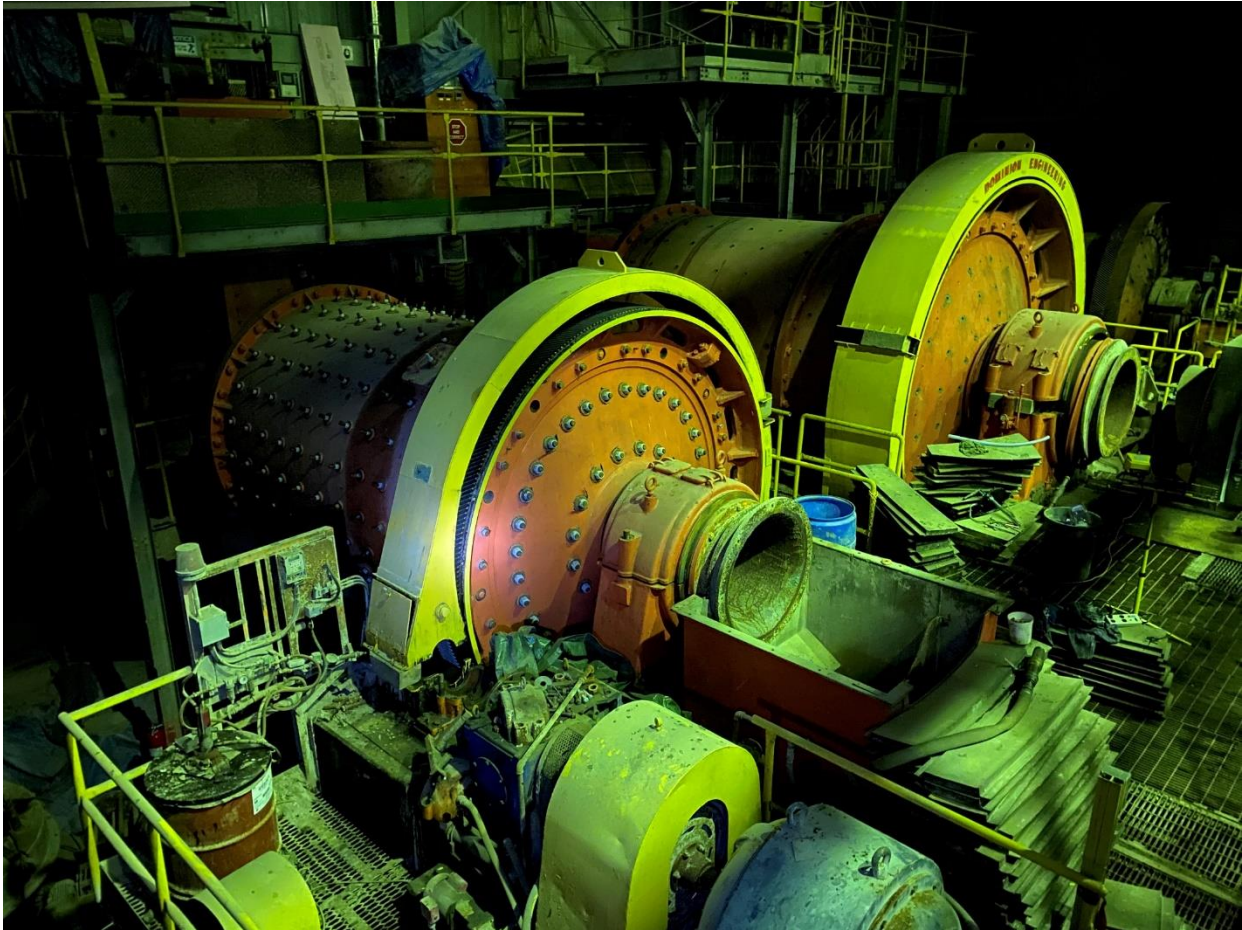
- Motor Control Centre (8 Mega Watt system)
- Crushing Area including conveyors, chutes, cone crusher
- Grinding Area including Rod Mill, Ball Mills, Cyclones, pumps
- Flotation Area including Denver flotation tanks, pumps and reagents, and 3t overhead gantry crane
- Thickener Area including a large zinc thickener pole tank and lead thickener tank
- Concentrate drying area
- Concentrate loadout building
- Control rooms
- Offices
- Metallurgical laboratories (dry and wet)
- Sample preparation laboratory
- Maintenance and storage bays
- Overhead gantry cranes (10t and 3t)

The following figures show the as-built layout of the various processing facilities. See Figure 18-35 through to Figure 18-46.

Figure 18-35: Crushing Circuit



Figure 18-36: Grinding Circuit





**Figure 18-37: Flotation Circuit**



**Figure 18-38: Zinc Thickener Tank**



**Figure 18-39: Concentrate Dewatering Area**



**Figure 18-40: Concentrate Loadout Area**



Figure 18-41: Plant Control Room



Figure 18-42: Reagent Tanks



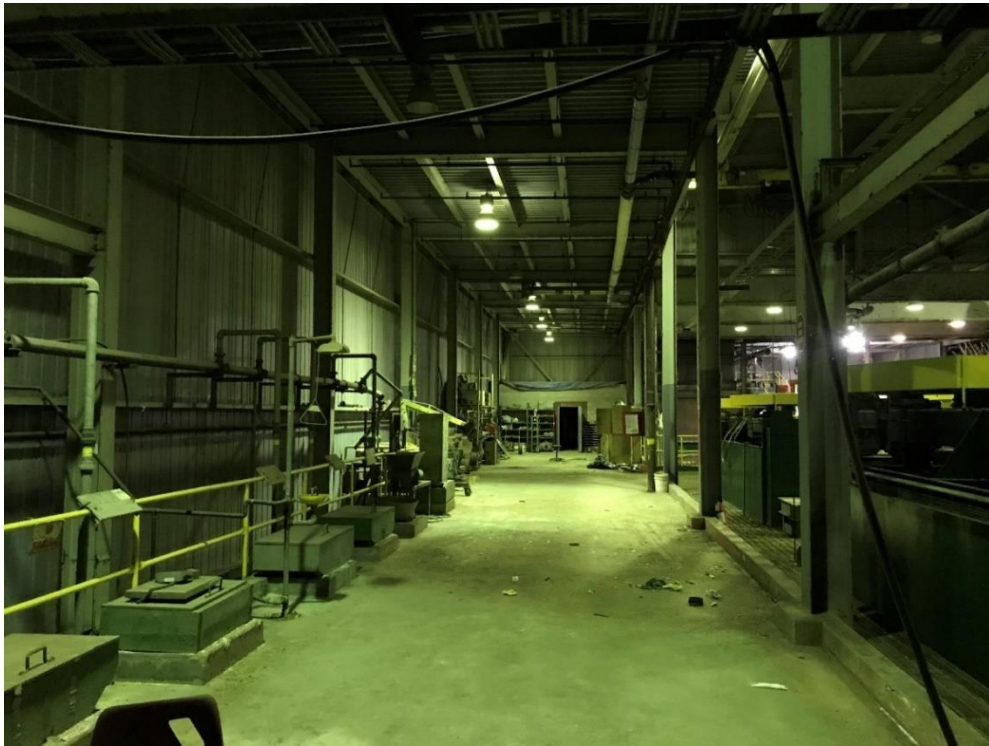
**Figure 18-43: Wet Metallurgical Laboratory**



**Figure 18-44: Dry Metallurgical Laboratory**



**Figure 18-45: Large Main Deck Maintenance Bay**



**Figure 18-46: Large Ground Floor Maintenance Bays**



## 18.15 Tailings Storage Facility

The existing Tailings Storage Facility (“TSF”) consists of a valley filled tailings depository beach, a tailings dam causeway, tailings pond, decant tower to a large polishing pond. See Figure 18-47, Figure 18-48 and Figure 18-49.

The TSF is a valley-fill storage method, which poses a very low risk of failure. The completed tailings beach is also progressively encapsulated with mine rock as part of the main waste rock storage dump.

The TSF permitted design capacity is 10 million tonnes, of which only 2 million tonnes have been deposited in the past. The Scotia Mine processing operations will fill the remaining capacity of the TSF in year 8, after which ScoZinc intends to deposit the remainder of the tailings for the mine life in the mined out main pit. ScoZinc considers that such in-pit tailings disposal is a more effective and further low risk method of tailings disposal, which also allows early progressive reclamation works on the TSF from year 8 onwards.

ScoZinc intends to submit its plans for approval to the appropriate government agency once detailed engineering has been performed.

**Figure 18-47: Tailings Storage Facility**



**Figure 18-48: Tailings Storage Facility Decant Tower**



**Figure 18-49: Tailings Storage Facility Causeway**





## 18.16 Fuel Storage

The mine site currently has one 45,722 litre diesel fuel tank and one 4,546 litre gasoline fuel tank on site. This fuel farm will be utilized for mining operations and site services. The self containment systems for both tanks currently meet the Canadian Environmental regulations. See Figure 18-50.

Imperial Oil have proposed to provide fuel to the mine site in conjunction with ESSO. ESSO will be providing fuel to ScoZinc's storage tanks, plus fuel directly to the Mobile Mining fleet. ScoZinc will also utilize a lubrication truck to service certain heavy mobile equipment that does not regularly access the mobile equipment workshops.

**Figure 18-50: Diesel Fuel Farm**



## 18.17 Cold Warehouses & Storage Yard

The Scotia Mine has an unheated Warehouse and fenced storage yard, designed to store various supplies in a separate secured area. Processing reagents will be stored as needed in the warehouse, with the yard used primarily for the storage of electrical equipment such as cables and spare transformers.

The building is fitted with exhaust fans and is fully operational, although some surface corrosion to the exterior of the building and roof skylights requires some minor maintenance work. The building is 4,654 square feet in size.

ScoZinc also has an additional 3,600 square foot workshop which will be used for light vehicle repairs and parts storage.

## 18.18 Sewerage Treatment

The existing sewerage treatment plant consists of several steel-concrete and fibre-glass underground storage and processing tanks with both gravity fed, and submersible pumping and control systems installed. See Figure 18-51 and Figure 18-52.

The system is currently in use and fully operational with check valves and electronic level alarm systems.

**Figure 18-51: Underground Sewerage Treatment System**



**Figure 18-52: Effluent Treatment System – Septic Leach Field**

### **18.19 Garbage Disposal**

Suitably trained members of the site work force will collect garbage from bins around the work sites and handle it as follows:

- Food waste: dumped at designated location on site
- Combustible scrap: stored in designated containers for disposal by external contractors
- Non-combustible scrap: stored in designated areas for collection external recycling contractors
- Hazardous waste: stored in designated containers for disposal by external contractors

### **18.20 Mill Process Control Systems**

ScoZinc has an extensive system of instrumentation and control technology in the mill, which was last upgraded in 2008. However, additional upgrades to the process control systems are planned both during the re-commissioning processes and as an ongoing modernization of the mill.

ScoZinc's general control system philosophy has been developed to include descriptions of the process, the existing process control equipment, and the new process control equipment to be installed for a 2,700 t/d processing throughput.

### 18.20.1 Crushing Circuit

The Run-of-Mine (“ROM”) ore is stockpiled at the plant site in 4 mineralized ore classes. The ore is fed by rear-dump haul truck or Front-End Loader (“FEL”) onto a fixed grizzly immediately before a primary crusher bin and primary jaw crusher. The grizzly bars are designed to prevent rocks above 800 mm in size from reaching the jaw crusher. Direct dumping by haul truck is the predominate method of ore feed in order to lower re-handling costs and to ensure that optimal head grades and throughputs are achieved. Any oversize ore will be ejected from the grizzly, for secondary breakage, using an excavator-mounted rock breaker. An electromagnet will remove the bulk of any ore feed which is contaminated by steel that is mined from the old underground mining areas in the main zone and southwestern extension.

From the primary crusher, ore size is reduced to at least 300 mm in size, after which a variable speed conveyor feeds the crushed material to a secondary conical crusher which reduces the passing size to 100 millimetres. Ore is then transferred via conveyors to a double deck vibrating screen, with 33 mm oversize reporting to a tertiary cone crusher. Undersize ore from the screen is conveyed directly to the 4,000-t concrete Fine-Ore-Bin. The crushing circuit is designed to process to 3,000 tonnes per day.

Ore is drawn from the Fine-Ore-Bin (“FOB” or Silo) via two variable speed vibrating feed conveyors, and then transferred to the grinding circuit. The Fine-Ore-Bin will have new cut-off gates for maintenance purposes, and increased air canons, to control ore levels in the bin.

### 18.20.2 Grinding Circuit

The grinding circuit is comprised of a rod mill in open circuit and two ball mills in closed circuit with cyclones operating on two separate grade range slurry streams. Ore from the Fine-Ore-Bin is fed directly into the rod mill, which has a design throughput capacity of up to 2,700 t/d. All ore is wet ground in the grinding circuit, with the primary feed slurry pumped to a cyclone feed sump which also is fed with the discharge of the two ball mills. The rod mill feed weightometer is used to control the speed of the ore feeders on the Fine-Ore-Bin to maintain the required feed rate. Water addition to the rod mill is ratio controlled to the feed rate.

The cyclones classify the primary feed slurry to produce a  $P_{80}$  of 110  $\mu\text{m}$  in the overflow. The coarse underflow flows to the two ball mills, operating in parallel, where it is reground before transferred to the flotation circuit. Water addition to the cyclone feed pump boxes is adjusted to maintain the required slurry level and to maintain the cyclone feed density.

### 18.20.3 Flotation Circuit

The flotation circuit consists of two flotation methods designed to separate zinc and lead slurries, and then maximize the recovery of the individual zinc and lead slurries. ScoZinc will utilize a Jameson Cell to provide additional zinc separation efficiencies, thereby increasing the zinc recovery in the plant.

#### Lead Flotation

The lead flotation reagents are added to the primary cyclone overflow slurry which is then conditioned in an agitated conditioning tank. The overflow from the tank flows through a bank of lead rougher flotation cells where the lead concentrate is floated. The concentrate is then pumped to a bank of cleaner cells where a final Lead concentrate is floated. The tailings from the rougher flows to a scavenger bank where Lead concentrate is also floated. This concentrate is recycled to the feed of the rougher bank to be

upgraded. The tailings from both the Lead scavenger and the Lead cleaner flotation slurries are pumped to the Zinc circuit.

Reagent addition rates are maintained at flowrates determined to provide the required addition rates. Metal grades from the on-stream analyzer are used to adjust reagent rates to maintain concentrate grades and recoveries.

Froth levels in the flotation cells are measured manually. Air addition rates are adjusted manually to maintain desired froth depths and concentrate production. Slurry levels in the flotation cells are measured manually and manual dart valves are adjusted to maintain the required slurry levels.

### **Zinc Flotation**

The slurries from the Lead tailings are conditioned in two conditioning tanks which are in series. The overflow from the last tank flows through the new Jameson Cell where zinc concentrate is floated. The former Zinc rougher cells now function in scavenger duty. The concentrate is then pumped to a series of cleaner cells where the final Zn concentrate is floated. The cleaner cells has 5 flotation stages and one cleaner/scavenger.

The tailings from the roughers flow to a scavenger bank where Zinc concentrate is floated. This concentrate is recycled to the Zinc conditioners. The tailings from the scavenger flow to a 2<sup>nd</sup> scavenger bank where the concentrate is recycled back to the feed of the 1<sup>st</sup> scavenger bank. The tailings from the 2<sup>nd</sup> scavenger are pumped to the tailings pond together with the tailings from the cleaner/scavenger.

Reagent addition rates are maintained at flowrates determined to provide the required addition rates. Metal grades from the on-stream XRF analyzer are used to adjust reagent rates to maintain concentrate grades and recoveries.

Froth levels in the flotation cells are measured manually. Air addition rates are adjusted manually to maintain desired froth depths and concentrate production. Slurry levels in the flotation cells are measured manually and manual dart valves are adjusted to maintain the required slurry levels.

#### **18.20.4 Concentrate Dewatering Circuit**

The final Zinc concentrate is pumped to a large Zinc thickener tank where the slurry is thickened to approximately 60% solids. The underflow is pumped to a surge tank which feeds a pressure filter. The filter press dewateres the concentrate to approximate 8% moisture. The filter cake drops into a Zinc concentrate surge bin and then conveyed directly into a line 20' shipping container. Each container is then sampled, weighed, and sealed for loading and transport to the concentrate buyer.

The final Lead concentrate is pumped to a Lead thickener where the slurry is thickened to approximately 70% solids. The underflow is pumped to a surge tank which feeds a pressure filter. The filter press dewateres the lead concentrate to approximately 6% moisture. The filter cake drops into a Lead concentrate surge bin and then conveyed directly into a line 20' shipping container. Each container is then sampled, weighed, and sealed for loading and transport to the concentrate buyer.

### 18.20.5 Concentrate Loading & Transport

After each loaded concentrate container is sampled, weighed, and sealed, ScoZinc will manage a concentrate container handling facility using devoted container handlers to receive and prepare empty 20' shipping containers, and then position each container in the zinc or lead covered loading areas.

ScoZinc intends also to transport the containers via road to the Fairview Container Terminal located in Halifax, or alternatively to a nearby Canadian National Railway siding located 11 kilometres from the Scotia mine gate.

### 18.20.6 Tailings

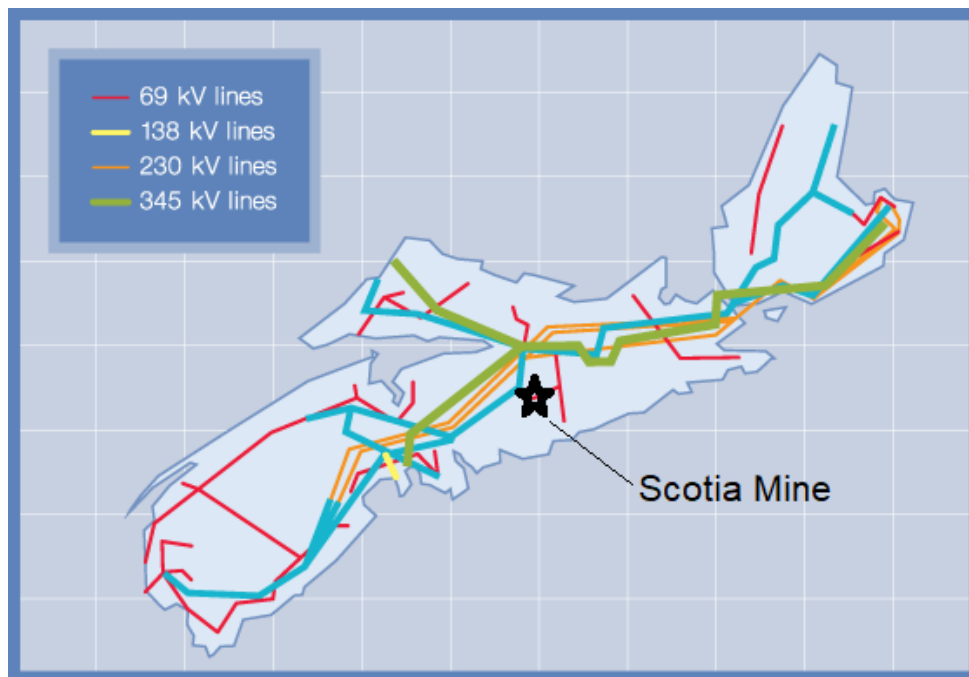
The tailings slurry from the flotation circuit is pumped to the Tailings Storage Facility ("TSF") pond where the tailings are settled out using a beaching deposition method. The supernatant water is discharged to a polishing pond and monitored. Water is then either discharged to the environment or pumped back to a process water reservoir as needed.

### 18.20.7 Power

ScoZinc has an 8 mega-Watt Motor Control Centre ("MCC") to distribute electrical power throughout the plant. It is expected that some of the MCC panels will need upgrading to ensure reliability during operations.

Power to the MCC is provided by Nova Scotia's transmission and distribution system, which provides reliable grid-power to the Scotia Mine (See Figure 18-53). ScoZinc also has a backup diesel generator for essential processing functions. Some of the MCC units contain soft-starter systems.

**Figure 18-53: Nova Scotia Electricity Transmission System**



Courtesy of Nova Scotia Power Inc.

### 18.20.8 Air

ScoZinc has a number of high-capacity air blowers used in the flotation circuit. Air compressors are also used in the mill for the dewatering circuit, general plant equipment and Fine-Ore-Bin canons, processing instrumentation and operational maintenance.

### 18.20.9 Water

Process water for the plant is primarily supplied via a new process water reservoir. The reservoir is designed to provide up to 5,000 litres of non-recycled water supplied from the mining operations pit perimeter wells. Additional water is available from the Polishing Pond. Fire suppression for the plant is provided by the Water Treatment plant, which sources its water from the Gays River.

### 18.20.10 Existing Control Systems

The existing plant control system consists of three conventional control panels:

- Crushing Circuit control panel located near the secondary/tertiary crushers
- Grinding Circuit control panel located adjacent to the rod and ball mills; and
- Flotation Circuit control panel located in the central control room

The control panels are equipped with conventional – and out-dated – alarm annunciators, panel mount indicators and controllers, start/stop push buttons that are hard wired into the MCC starters for the starting and stopping of the relevant drives, as well as drive ‘running’ indication lights.

### 18.20.11 Additional Control Systems & Upgrades

Additional plant control system panels will include:

- Primary Crushing Circuit control panel located near new primary crusher on the ROM
- Concentrate Dewatering Circuit control panel located adjacent to new filter presses
- Concentrate Load out Circuit control panel located Load out room

All new control panels will be fitted with conventional alarm annunciators, panel mount indicators and controllers, start/stop push buttons that are hard wired into the MCC starters for the starting and stopping of the relevant drives, as well as drive ‘running’ indication lights.

ScoZinc intends to progressively upgrade the primary control circuits with a Supervisory Control and Data Acquisition (“SCADA”) control system.

## 18.21 Fire Detection and Fire Suppression Systems

ScoZinc has an industrial fire detection and suppression ring system installed on all buildings on site, including the mill processing building, warehouse, workshop and administration buildings. Fire truck access points are also located throughout the complex.

The existing main control panel is located in the Water Treatment Plant. Portable fire extinguishers are also distributed throughout site, as well as exit and evacuation signage and muster points.

Water for fire suppression is drawn from ScoZinc's Gays River pumphouse to the water treatment facility. A water-ring main is installed around the mill and buildings. The fire suppression system operates as a wet system powered by electricity, with a backup diesel generator. These systems are in a care & maintenance state, but would require minor maintenance and upgrades to become operational.

For the Mill's Motor Control Centre ("MCC"), an industrial Halon automatic fire suppression system is installed. The system consists of a number of Halon tanks and is relatively new and unused.

The fire detection and suppression facilities are presently as follows:

- Administration Building
- Technical Services and Operations Building
- Warehouse
- Site Workshop
- Motor Control Centres ("MCC")
- Mill Building including offices, laboratories, crushing area, grinding area, flotation cells, concentrate filtration area, concentrate load out facility
- Water Treatment Plant

Portable handheld extinguishers (Carbon Dioxide & ABC Powder) are located throughout the buildings according to the type of extinguisher required for each location.

## **18.22 Explosives**

An external explosives contractor will provide and manage all explosives stored on site with the use of a devoted magazine storage yard.

Much of the explosive products to be used on site for blasting activities will be delivered and used on a daily basis from the contractor's off-site storage area. ScoZinc's expects that no explosives will be stored on site as has been the successful practice in the past.

## **18.23 Mine Services**

ScoZinc has a network of services providing support to the mining operation. Much of the existing services are in good condition and only require minor upgrades and adjustments. Such existing services include the following:

- Access ramps and roads
- Technical services to mining operations
- Power supply distribution to existing dewatering wells
- Water supply standpipes for dust suppression
- Communication systems throughout the site via VHF and mobile services
- Fuel dispensing bowsers for diesel and gasoline equipment

ScoZinc also intends to upgrade and modernize the following services:

- Power supply distribution to new pit perimeter dewatering wells
- Communication systems and signage



- Diesel fuel dispensing systems
- Access roads
- Future staging areas
- Additional work areas

Some minor road development will be required during normal pit mining sequences. Such development includes additional haulage roads, waste dump ramps, and stockpile areas.

Towards the end of the mine life, additional mining will require temporary river crossings and highway crossings. All construction costs have been included in the future operating costs of the operations development.

## **18.24 Site Emergency Services & Rescue**

As all of ScoZinc's operations are on surface, emergency services and personnel rescue are configured to address normal open-pit emergency requirements. The Scotia Mine has currently established a First Aide facility and rescue equipment including:

- First Aide Treatment room
- First Aide equipment including stretchers, bandages and basic emergency equipment
- First Aide Kits throughout the site

ScoZinc's operational plan includes a minor improvement of the First Aide Facility with modern emergency equipment and a new ambulance.

A mine site safety awareness program is also planned for implementation across site, based on the "Safety First" best practices.

## **18.25 Mobile Mining Equipment**

ScoZinc plans to purchase or lease-to-purchase its mobile mining equipment. A number of mining equipment suppliers are available in Nova Scotia, who have provided equipment proposals for the basis of executing the mine plan.

In addition, ScoZinc has a small existing fleet of site services equipment including lighting plants, mobile pumps, light vehicles and associated support equipment. Additional modern equipment needs have been included in both the capital and operating costs of the Project for the life of mine.

The mobile equipment fleet required for the operation and maintenance of all the surface facility areas (including the access ways) is listed in Table 18-1.

**Table 18-1: Mobile Mining Equipment Fleet Requirements**

Equipment	Number of Units	
	Capital	Operations
Komatsu PC1250LC Excavator	0	2
Komatsu PC490 Excavator with Hydraulic Hammer	0	1
CAT320 Excavator	1	0
Komatsu HD605 Rigid Frame Haul Truck	0	4
Komatsu HM400 Articulated Haul Truck	0	5
Komatsu WA600 Wheel Loader	0	2
Komatsu WA500 Wheel Loader	0	1
Komatsu D155AX Dozer	0	2
CAT16M Grader	1	0
Komatsu HM400-5 Water Truck	0	1

## 18.26 Water Management System

The main sources of water on site include the nearby Gays River, year-round precipitation (snow & rain), snow melt, mine pit water, and pit dewatering wells.

The Scotia Mine has a well established water storage & discharge system, which includes existing and operational storm water ponds, holding dams, a finishing pond, controlled weirs, drainage ditches, and a 18" HDPE pipe and pumping network in order to manage all sources of water on the mine site. The water storage & discharge system is currently in use and is fully operational. See Figure 18-54 through to Figure 18-58 below.

Water from the Gays River water is drawn using ScoZinc pumping facilities via a 320 gallons per minute (1,200 litres per minute) pump and an 8" supply line to the treatment and holding tanks on site. From these storage tanks, potable water is pumped to various locations on site including washrooms, lunchrooms, eye wash stations, and fire suppression purposes. Grey water is pumped to the sewerage treatment tanks and then to a leach field. Solid waste is collected in large concrete underground sewerage tanks and pumped out for disposal off site by contractor services on an as required basis.

Precipitation and water runoff are channelled on site with a system of drainage ditches to one of a number of storm water and settling ponds, the tailings dam and polishing pond. The size of the tailings pond and polishing pond offers a relatively long residence time for any solids to settle out. All water is monitored before and after discharging off site to the Gays River via a controlled weir from the polishing (or finishing) pond.

Mine pit water, which is assumed to be contaminated, will be pumped to the tailings pond for settlement.

Pit dewatering wells (non-contaminated water) located at the perimeter of the open-pits will primarily pump water to the mill for use as clean processing water. Any excess water will be pumped to the tailings pond or settlement ponds.

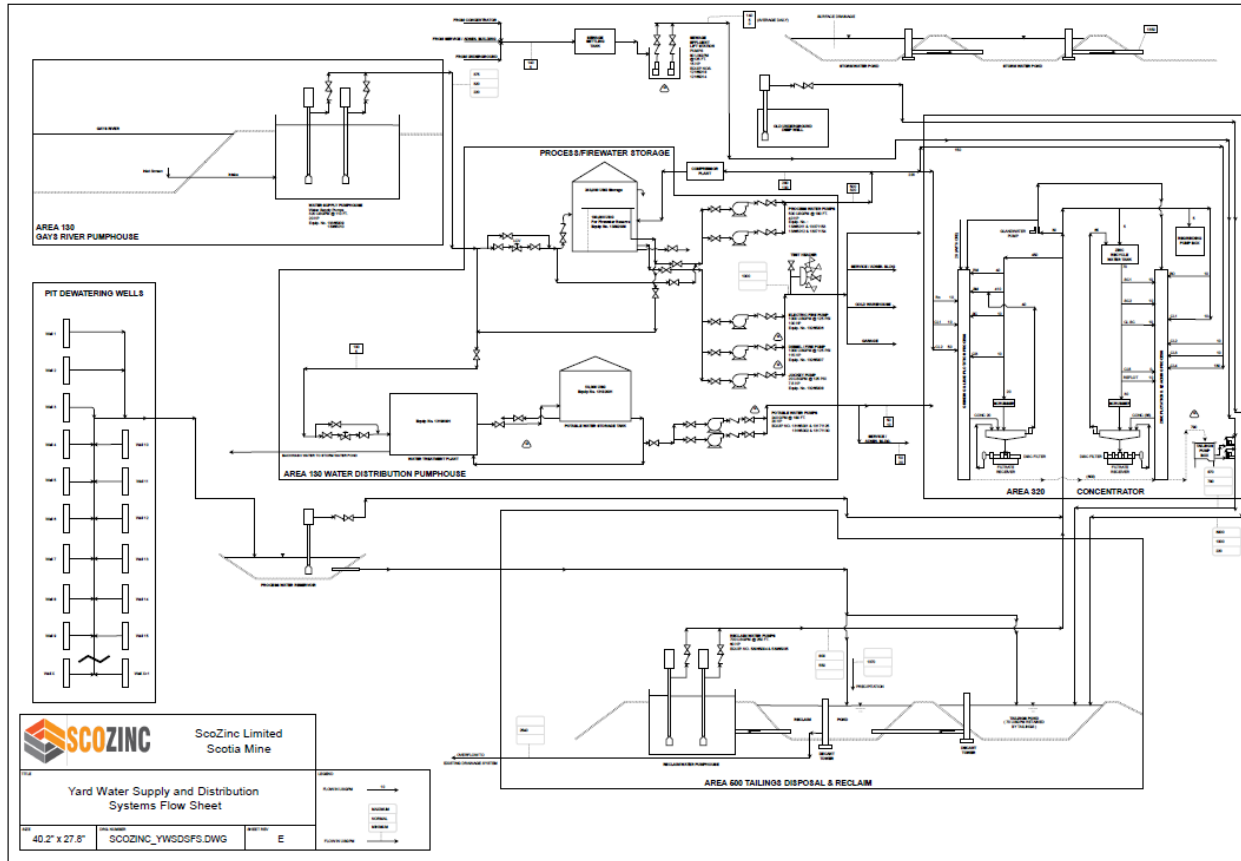
Mill process tailings (contaminated) is pumped to the tailings pond for settlement. If there is a shortage of clean pit dewatering water, water from either ScoZinc's Gays River pumping station, or the Polishing Pond pumping station, is capable of pumping additional water to the mill. Water pumped back from the Polishing Pond is considered recycled water.

To minimize the potential for a 1-in-100 year spring flood of the main pit during excavation, a large northern berm wall armoured with rip-rap will be constructed between the Gays River and the pit limit where required. Although the Gays River has a normal low flow rate, with virtually no water flow in summer, this berm will significantly minimise the risk of pit flooding during early spring when the water levels are 1 or 2 metres higher for short periods of time.

ScoZinc is also aware that the Gays River is locally hydraulically connected to the deeper portions of the main pit, necessitating that water levels in the Gays River be monitored. The Scotia Mine's polishing pond weir has the ability to increase or decrease the amount of water in the Gays River to ensure that the river does not dry out as a consequence of the mining operation's dewatering activities.

ScoZinc is also installing additional pit perimeter dewatering wells on the northern limits of the pits, which after settling and water monitoring, may be able to be discharged directly to the Gays River to assist in maintaining the minimum water flow rate as determined by ScoZinc's environmental approvals.

Figure 18-54: Water Supply and Distribution Systems Flow Sheet



**Figure 18-55: Tailings Storage Pond**



**Figure 18-56: Polishing Pond**



**Figure 18-57: Discharge Weir**



**Figure 18-58: Storm Water Pond**



## 18.27 Waste Storage Facilities

Waste rock from the open pits over the life of the mine will be continued to be stored on the mine site in waste storage facilities comprised of rock dumps, and back fill dumps into mined out areas.

The waste rock storage facility (or Waste Dump) is located adjacent to the tailings pond, such that any runoff has a natural path to the tailings pond on the east side. See Figure 18-59.

**Figure 18-59: Waste Dump**

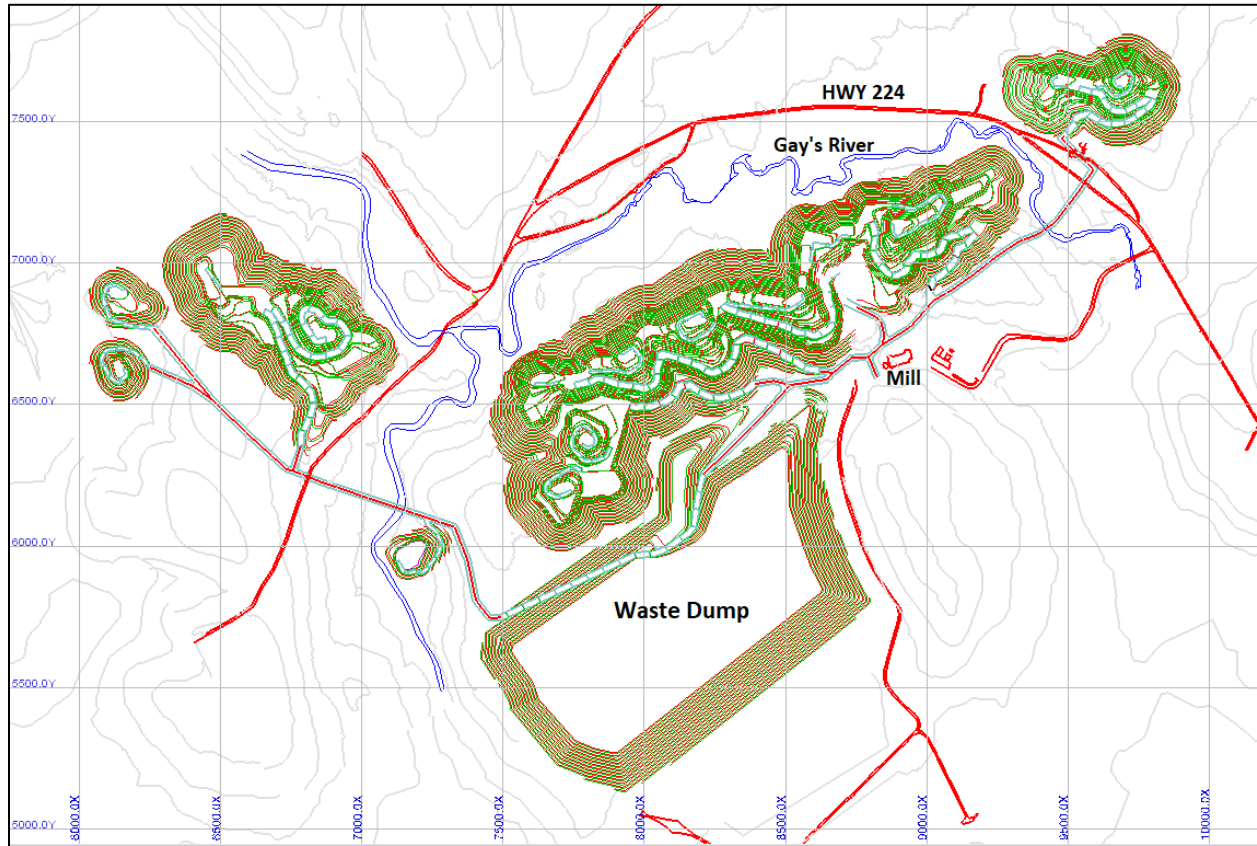


The figure overleaf also shows a design view of the waste rock storage facilities (prior to rehabilitation). See Figure 18-60.

Other than the one waste dump, all other waste rock is scheduled to be progressively dumped back into the mined out areas of the exhausted open pits.

The waste dump is to be progressively contoured and revegetated in accordance with the Environmental Rehabilitation (or Closure) plans approved by the Nova Scotia Department of Environment.

ScoZinc has budgeted for progressive reclamation measures in all its operational plans.

**Figure 18-60: Waste Rock Storage – Waste Dump Design**

## 18.28 Laydown Areas

The Scotia Mine has ample space for laydown areas adjacent to the mill building and the proposed new mine workshop and mining equipment parking and start line (or "GO" line).

See Figure 18-61 and Figure 18-62 below. The Secondary Laydown Area is planned to be converted to a process water reservoir from its current use as a temporary laydown area.



**Figure 18-61: Laydown Area**



**Figure 18-62: Secondary Laydown Area (Proposed New Reservoir Location)**

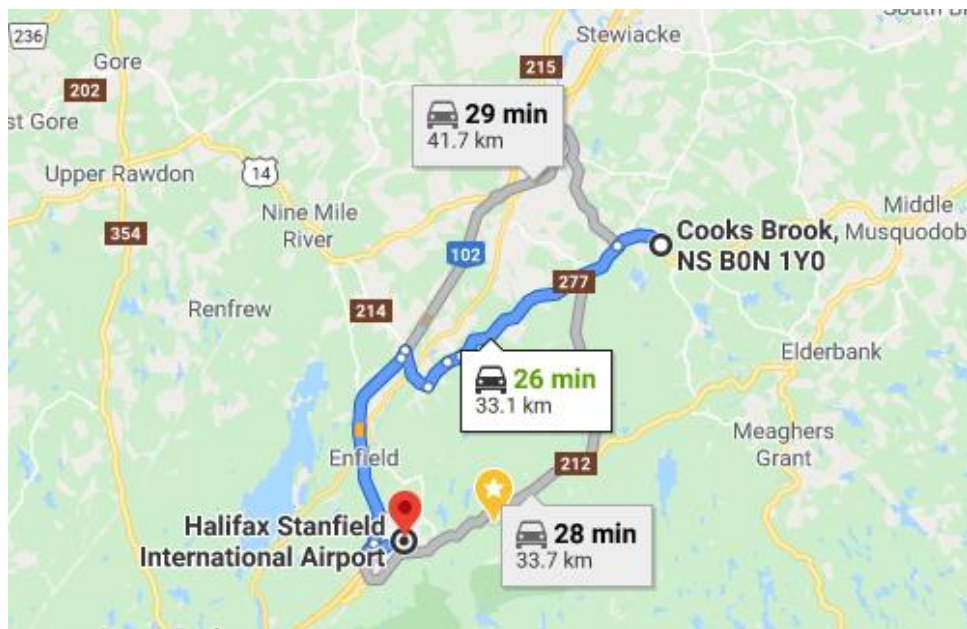


## 18.29 Transportation

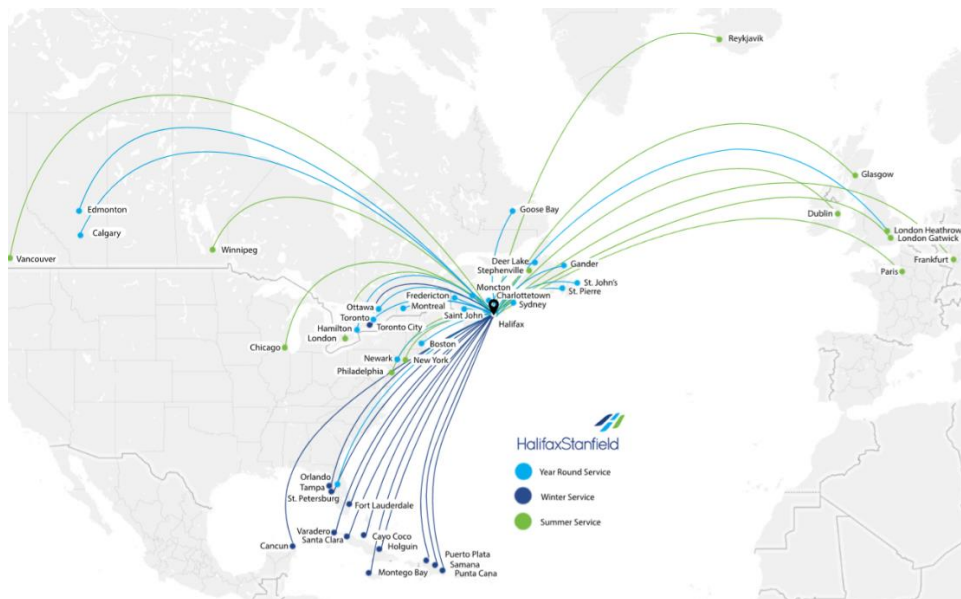
### 18.29.1 International Airport Access

The Scotia Mine is approximately 33 kilometres by sealed highway to the Halifax Stanfield International Airport (“YHZ”). The Stanfield airport typically offers non-stop flights to 21 cities in Canada plus flights to other European and US destinations. See Figure 18-63 and Figure 18-64.

**Figure 18-63: Distance from the Scotia Mine Gate to Halifax Stanfield Airport**



**Figure 18-64: Halifax Stanfield Airport Non-Stop Flight Destinations**

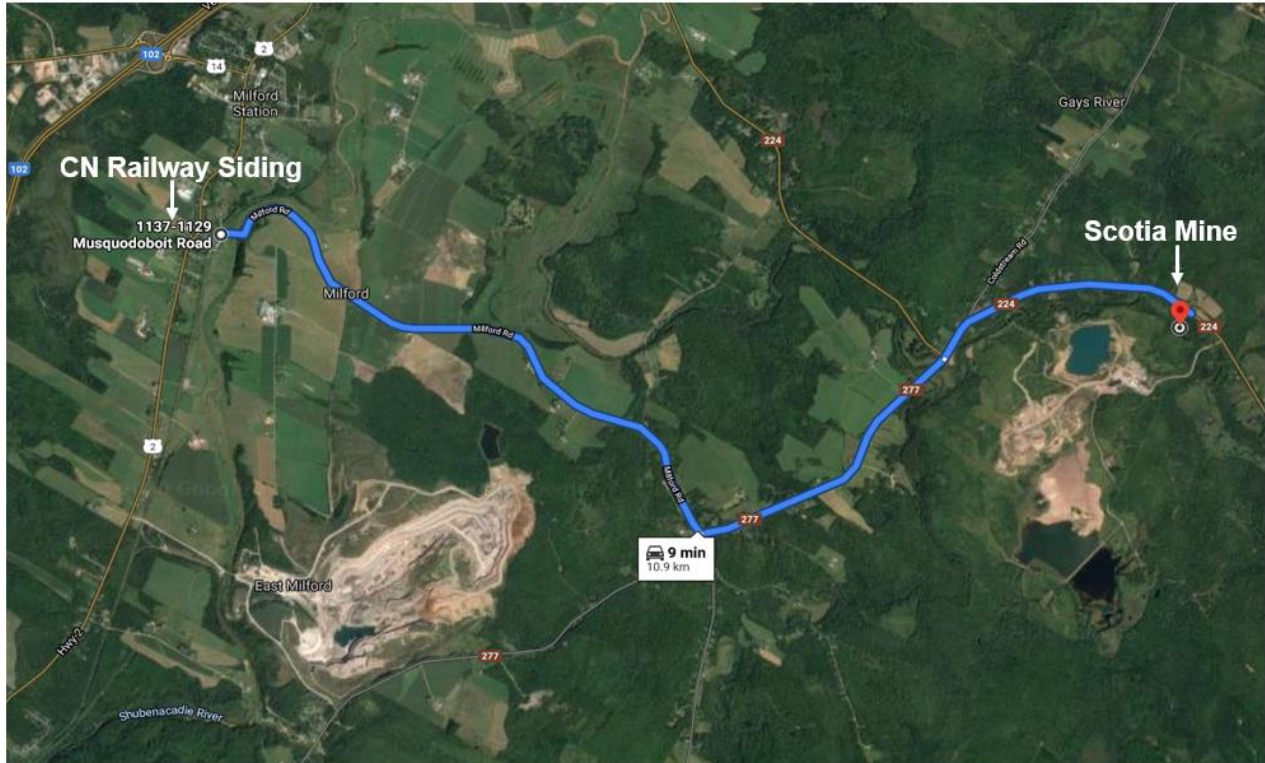


Courtesy of Halifax Stanfield International Airport

### 18.29.2 Railway Access

The Scotia Mine is approximately 11 kilometres by sealed highway to the Canadian Main railway line at the nearby town of Milford, Nova Scotia (See Figure 18-65). This main line is in active duty by several users, including National Gypsum, which operates a large gypsum mine some 4 kilometres from ScoZinc.

**Figure 18-65: Route from Scotia Mine to Milford CN Railway Siding**



The two sidings at Milford are currently in use by CN railway and a bulk handling materials company. ScoZinc would need to reach an agreement with either party to load concentrate containers using these conveniently located sidings on the main CN railway line. See Figure 18-66.

**Figure 18-66: Milford CN Railway Siding**

### 18.29.3 Highway Access Roads

ScoZinc has permanent all-season access via a highway network of sealed roads maintained by the Nova Scotia Provincial government. See Figure 18-67.

Although certain portions of the highway network are restricted each year by spring weight limitations, several highways in the area are exempt from this restriction.

The Scotia Mine is located on an exempt highway, which allows for unrestricted year-round highway access. See figure below courtesy of the Nova Scotia Department of Transport and Infrastructure, showing that the Scotia Mine has unrestricted access (shown in green shaded roads).

**Figure 18-67: Spring Weight Road Restrictions**

#### 18.29.4 Site Access Roads

From the mine gate at Highway 224, the mine access road is well built and in good condition for all season use (See Figure 18-68). The road is maintained for speeds of up to 40 kph, including profiling and snow clearance as necessary.

ScoZinc maintains the road in winter with a conventional truck mounted plow to remove snow, but a ScoZinc grader will perform the duty during full-scale operations.

**Figure 18-68: Mine Access Road**

### 18.29.5 Bridge

ScoZinc has a dual-support pilon bridge at the mine gate to cross the Gays River (See Figure 18-69 and Figure 18-70). This two-way bridge is in good condition and was recently upgraded in 2019.

ScoZinc may upgrade the bridge over the life of the mine, but considers the bridge currently capable of supporting the equipment to be brought to site for the mine's restart and all ongoing operations.

For very heavy loads, ScoZinc is considering a nearby natural seasonal ford crossing near to the location of the high voltage powerlines to site. This crossing was used historically as a second access road, and would require permitting to re-use the crossing.

**Figure 18-69: ScoZinc's Bridge**



**Figure 18-70: ScoZinc's Bridge & Highway Access**



## 18.30 Logistics

As the Scotia Mine is located on a sealed highway within the Halifax Regional Municipality (“HRM”), site logistics for the mine are considered excellent.

From the mine gate, the following key business facilities are located approximately:

- 33 kilometres to the Halifax International Stanfield Airport
- 62 kilometres to Halifax downtown city centre
- 62 kilometres to the Fairview Cover Container Terminal
- 54 kilometres to the Burnside industrial area of Dartmouth (in Halifax), which supplies heavy mining equipment, and has metal works, ports and other industrial suppliers

### 18.30.1 Workforce Hours

The majority of the Scotia Mine’s workforce will work on two 12-hour shifts, 365 days per year. Four roster teams are planned to operate on this basis across all operations departments.

Administrative staff will work Monday to Friday, for a minimum of 10 hours per day.

It is expected that the majority of personnel will reside within a short commute of the Scotia Mine.

### 18.30.2 Inbound Freight

Highway access to the mine gate and mine site is available all year round. The Scotia Mine is located on a seasonally unrestricted highway. ScoZinc therefore anticipates no issues for the bulk of all inbound freight.

For freight arriving to the mine site, a large car park and transport truck access road is currently in place. Once the freight has cleared entry procedures, truck drivers are escorted by logistics and/or security personnel to unload and receive their freight. The Scotia Mine has several receiving yards and areas, including the main heated warehouse and cold warehouse.

Modern receiving and tracking inventory controls are planned to be in place and managed by ScoZinc’s logistics and warehouse personnel.

The bulk of the inbound freight will consist of diesel fuel, spare parts, equipment, mining consumables, mill consumables, processing reagents, concentrate shipping containers, and general supplies to support the operation.

### 18.30.3 Outbound Concentrate

Over the life of the mine, the average annual concentrate production is approximately 30,000 tonnes (dmt) of Zinc and 14,000 tonnes (dmt) of Lead. Annual concentrate varies each year with peak outbound concentrate tonnes of 35,714 and 18,035 for Zinc and Lead respectively.

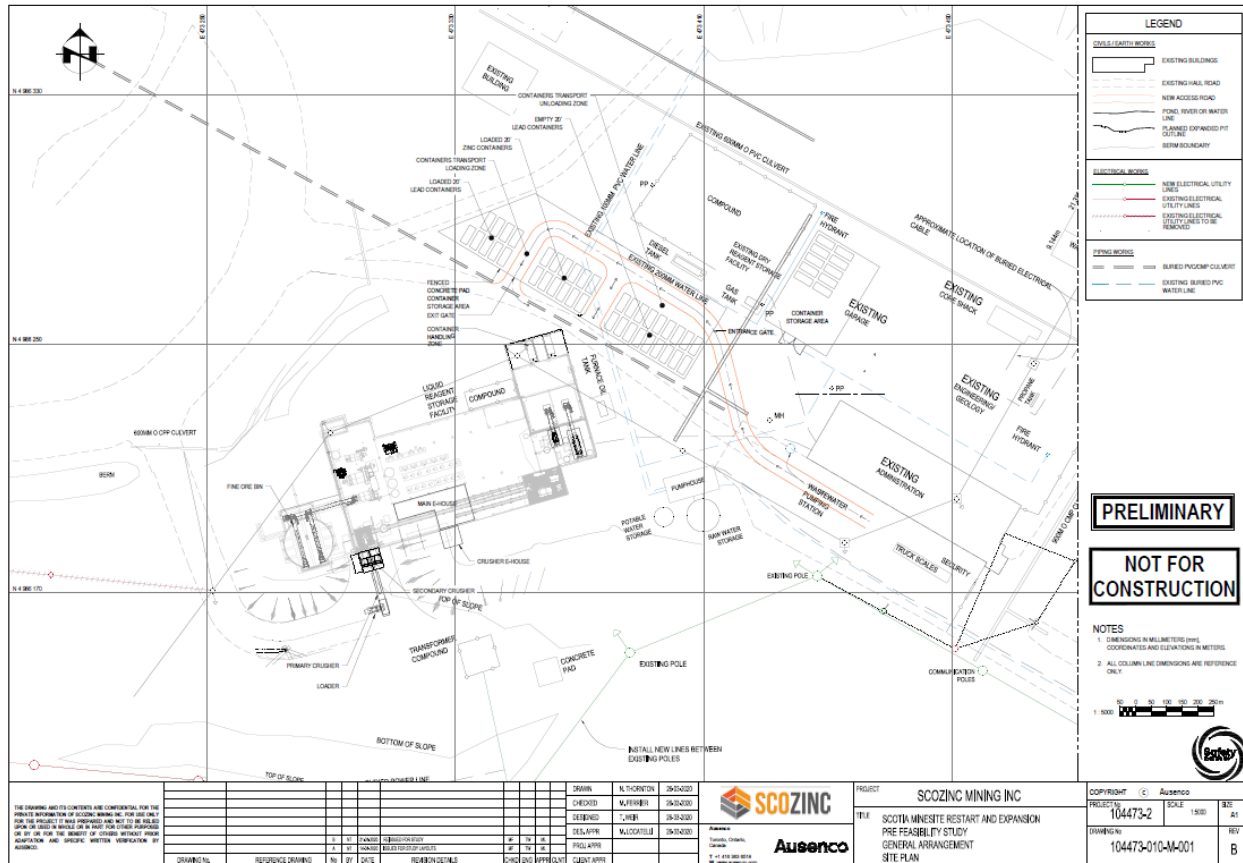
ScoZinc will be using standard 20’ sea containers, with disposable liners, to store and transport all zinc and lead concentrates from the mine to the concentrate buyer. An onsite container handling facility has been designed for this purpose which eliminates considerable operational cost, re-handle requirements,



insurance, environmental and safety risks, concentrate moisture increases, and concentrate losses in the concentrate sale process (See Figure 18-71).

The sealed containers will also ensure that the concentrate does not attract additional moisture during the transportation process, thereby providing strong moisture controls to the concentrate quality.

**Figure 18-71: Container Handling Facility**



Once concentrate for either zinc or lead is deposited into their respective lined containers, representative samples will be taken for assay sampling and quality control purposes. Containers will then be weighed on site and sealed by customs officers. ScoZinc’s flat-bed highway trucks will then transport the 20-tonne payload 20’ containers to one of several container handling ports in Halifax. All the ports are all year round, deep water seaports, connected directly through the Bedford Basin and Halifax sea ways to the Atlantic Ocean.

The weighbridge is in good condition, but will require some technological upgrades. See Figure 18-72 overleaf.

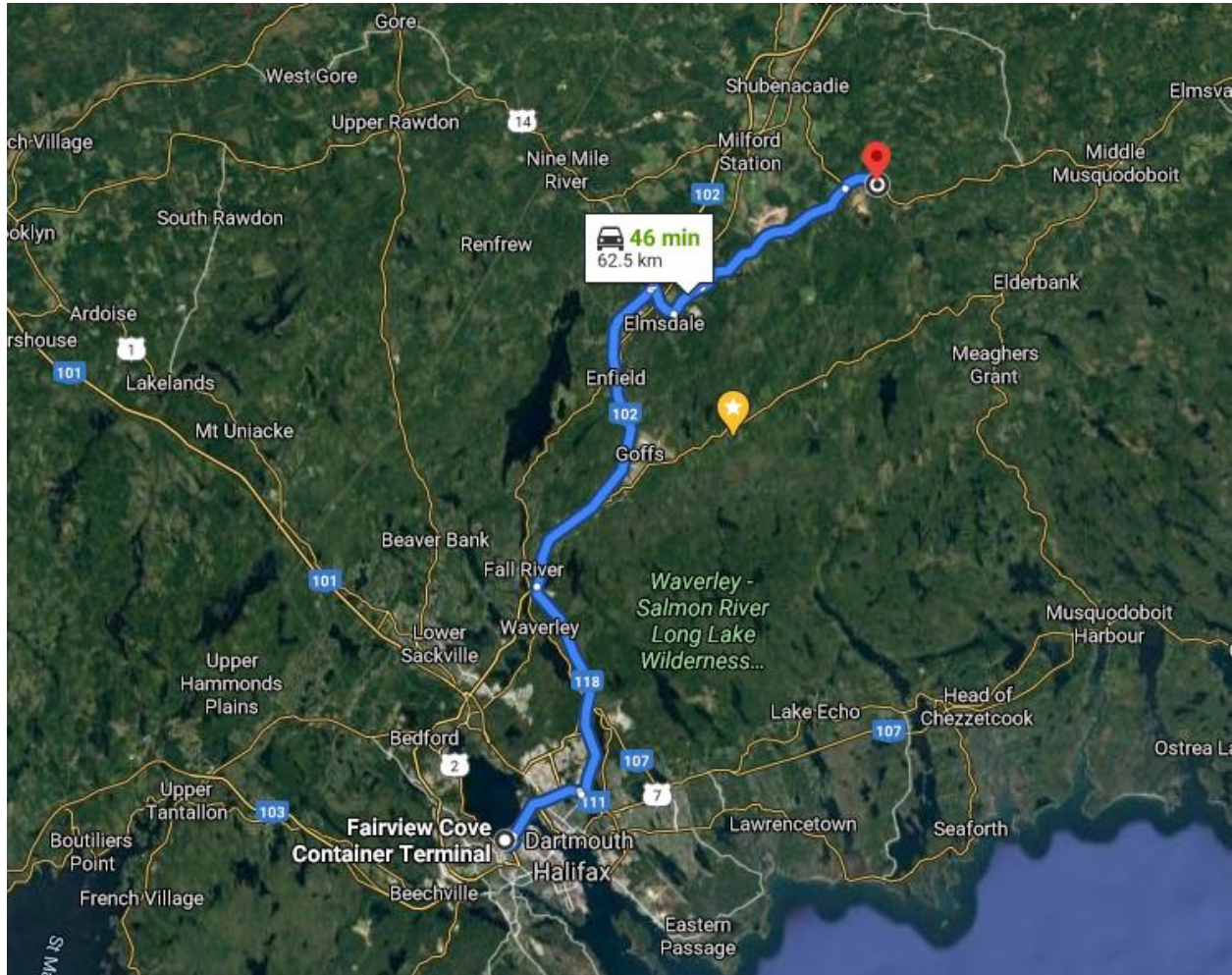
**Figure 18-72: Onsite Container Weighbridge**

ScoZinc has planned to initially use the Fairview Cover Container Terminal (“Fairview Cove”) which is located 62 kilometres from the mine gate by the Provincial highway network direct from the mine site. Fairview Cove’s own shipping brokers and operators will coordinate the concentrate receiving and shipping handling process to ensure low-cost efficient delivery to ScoZinc’s concentrate buyer.

ScoZinc will load and transport from the mine to Fairview Cove approximately 28 containers of Zinc per week, and 14 containers of Lead per week. This equates to a total of 42 containers per week, or up to 8 containers per day, 5 days a week.

For a 125-kilometre round-trip journey taking approximately 1.5 hours, ScoZinc has estimated that a Monday to Friday day-shift operation is all that is needed for one transport truck (See Figure 18-73). Additional flexibility can be provided for 6-day a week transport, or additional daily transport with a second container transport truck and driver.

**Figure 18-73: Route From the Scotia Mine to the Fairview Cover Container Terminal**



Ocean going container vessels will regularly transport ScoZinc’s concentrate to the concentrate buyer’s port of choice. It is expected that ScoZinc will receive payment for the concentrate on delivery to either the Fairview Cover Container Terminal, or on delivery to the buyer’s port of choice for smelting. See Figure 18-74.

**Figure 18-74: Fairview Cove Container Terminal**

Although ScoZinc intends to deliver all of its concentrate by sea to its buyers, the Scotia Mine's location on an unrestricted Canadian highway network and proximity to the Canadian National Railway line, provides a number of other alternatives for outbound concentrate delivery.

By highway, the Port of Montreal is approximately 1,200 kilometres from the mine site.

Rail transport facilities have also been used for concentrate shipping. Two railway sidings are located in the town of Milford (Nova Scotia) 11 kilometres from the mine gate by all season road (See Figure 18-75).

From the Milford siding, containers may be loaded on most rail trains and delivered to anywhere on the North American rail network, including Montreal and Chicago, for a relatively low cost.

**Figure 18-75: Milford CN Railway Siding**



## 19 Market Studies and Contracts

### 19.1 Market Studies

The principal commodities at the Scotia Mine are freely traded, at prices and terms that are widely known, so that prospects for sale of any production are virtually assured. Metal prices used in this study are based on long-term consensus forecasts by independent third parties, consultancies, investment banks and other financial institutions.

ScoZinc has several potential markets for concentrate sales. Historically, ScoZinc concentrate was sold to smelters in Europe, South Africa, and Asia through contracts with major trading companies. At that time (2007 to 2009), the Scotia Mine concentrates were deemed highly desirable by smelters due to their high concentrate quality, grading 57% Zn and 71% Pb, and low levels of deleterious metals (See Table 19-1). The zinc and lead to be mined over the current Life of Mine Plan (“LOM”), is from the same mineralized deposit as was mined during the period 2007 to 2009, and as such, the concentrate quality is expected to be the same or better due to improvements in the mill process plant: minimum 55% Zn and minimum 65% Pb.

**Table 19-1: Zinc Concentrate Grades: Scotia Mine vs. Other Zinc Projects**

Company	Project	Location	Zinc Concentrate Grade (%)
ScoZinc Mining Ltd.	Scotia Mine	Canada	55%-57%
Red River Resources Ltd.	Thalanga	Australia	56.7%
Titan Mining Corp.	Empire State Mines	USA	56.0%
Trevali Mining Corp.	Perkoa	Burkina Faso	52.8%
Heron Resources Ltd.	Woodlawn	Australia	51.0%
Trevali Mining Corp.	Rosh Pinah	Namibia	49.7%
Trevali Mining Corp.	Caribou	Canada	47.6%

Source: Company Technical Reports

These high-quality characteristics enable marketing of the ScoZinc concentrate at much more favourable terms than many other zinc and lead concentrate miners, as its purity is suitable for blending by smelters worldwide. When there are more deleterious or unwanted materials in the concentrate, the smelting process to extract metal is costlier and therefore some of these costs return to the miner in the form of additional discounts or penalties; in more extreme cases, certain smelters or trading houses would refuse to take on concentrates that are “too deleterious”.

Moreover, clean or high-quality concentrates are well sought by smelters worldwide, as they result in higher margins for the smelters, with some of these margins being transferred to the miners – ScoZinc – in the form of higher payments and lower or no penalties. ScoZinc expects to benefit from above average favourable smelting terms.

## 19.2 Concentrate Volumes and Quality

Historically, ScoZinc established multi-year concentrate purchase contacts with MRI Trading AG (“MRI”) and Trafigura AG (“Trafigura”) under terms consistent with the market terms at that time. The purchase contracts accounted for 100% of the zinc production and 100% of the lead production in which Trafigura and MRI each had the obligation to purchase 50% of the produced zinc concentrate. Trafigura also had the obligation to purchase 100% of the lead concentrate produced. In both cases, ScoZinc had obligation to sell its zinc and lead concentrate production under the established quantities and terms.

As per the April 3, 2018 news release, ScoZinc entered into a Memorandum of Understanding (“MOU”)/ strategic term sheet with MRI for life of mine offtake agreement for lead and zinc concentrates. This initial offtake agreement provides competitive terms for 333,000 wet metric tonnes (“wmt”) of zinc concentrate and 133,000 wmt of lead concentrate from the Scotia Mine. As a side note, mine production is usually quoted in terms of wet metric tonnes (“wmt”), and the metal price is based on dry metric tonnes (“dmt”). To adjust from wet to dry tonnes, an 8% reduction is applied to the wet tonnes to adjust for moisture content. It is important to understand whether something is being quoted in ‘dmt’ or ‘wmt’.

ScoZinc expects to establish additional concentrate purchase contracts with one or more metal trading companies under terms consistent with the current market terms. ScoZinc is engaged in negotiations with a number of additional offtakers but has not yet finalized an arrangement. In addition, for more effective discussions, ScoZinc wanted to complete this Pre-Feasibility Study (“PFS”) before advancing more detailed negotiations with other offtakers.

Treatment Charge and Refining Charge (“TC/RC”) is a deduction from payable zinc and it represents theoretically what it takes to convert a tonne of concentrates into metal. These are market driven/ negotiated commercial terms and are charged by a refinery to a mine and constitute revenue for a refiner and cost to a mine. Furthermore, the realized TC (Benchmark TC) is based on a different price basis each year and could be escalated or de-escalated based on the monthly average price. Conversely, Spot TC is continuously market negotiated and is typically not escalated/ de-escalated.

This PFS assumes that zinc long-term treatment and refining charges (“TC/ RC”) will continue a downward trend for Year 1 and Year 2, followed by a gradual escalation in Year 3, as shown in the table below. Conversely, the PFS assumes that the lead long-term TC will settle around US\$185/ dmt starting with Year 3, as shown in Table 19-2 below.

**Table 19-2: Concentrate Treatment Charges**

Commodity	Year 1	Year 2	Year 3	Remainder of Mine Life
Zinc (US\$ per dmt)	\$245	\$255	\$275	\$250
Lead (US\$ per dmt)	\$175	\$175	\$185	\$185

For the above Treatment Charge forecasts, ScoZinc has relied on market studies and published forecasts by independent consultants such as Wood Mackenzie Ltd., S&P Global Market Intelligence, Fastmarkets MB and Open Mineral AG. Open Minerals' one-month TC/RC expectation survey conducted in early April 2020 suggested that the industry, on average, expected terms at around US\$245 by the end of April (versus terms of over US\$315 less than two months before). According to Fastmarkets MB, in mid-March 2020,

Teck agreed on TCs of US\$299.75 with Glencore, then Korea Zinc both with no scales. Furthermore, according to Open Mineral AG, by mid-May 2020, offtake deals have been concluded at less than UD\$140/tonne of concentrate.

The lead TCs have followed the same downward trajectory over the last few months: according to Fastmarkets MB, depending on the silver content on a concentrate sample, the lead concentrate TCs benchmarks, for March 2020, were between US\$170 (low silver) to US\$180 (high silver). For April 2020, the lead TCs were between US\$135 (low silver) to US\$150 (high silver content).

Scotia Mine's lead concentrate is a low silver content concentrate and hence ScoZinc should benefit from the lower expected TCs for our lead concentrate.

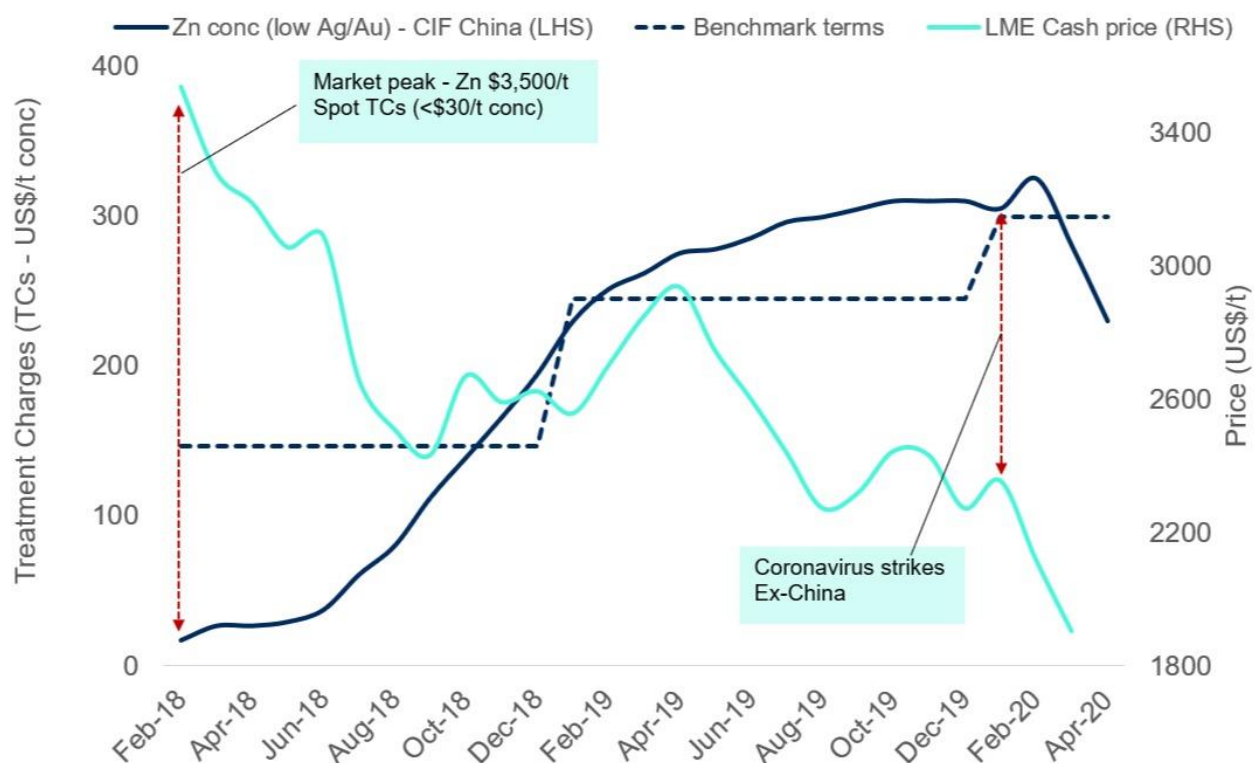
Against the backdrop of expected concentrate deficits during the first half of 2020 as a result of the COVID-19 Pandemic in Q1/Q2 of 2020, it is likely that spot TCs can (and will likely) fall further and perhaps faster than expected, in the coming months.

As of mid-April 2020, as per the below graph from Open Mineral, the Zinc spot charges are falling at faster rates than they shot up in 2018 Q3/Q4 (See Figure 19-1). In addition, as a result of the COVID-19 pandemic in 2020 Q1/ Q2, the closure of zinc mines in Peru and other parts of the world is having a major impact on smelters in China and the Chinese zinc smelters are fighting to buy zinc concentrates as mine supply falls, which should result in lower TCs for the short to medium term.

ScoZinc's concentrates are deemed highly desirable by smelters due to their high concentrate quality, historically grading 57% Zn and 71% Pb, and low levels of deleterious metals. These characteristics translate into premium prices for paid metals and, coupled with the decreasing trend in the TCs, are expected to result in improved economics for the Scotia Mine.



**Figure 19-1: Historical Zinc Treatment Charges**



Source: LME, Open Mineral Commercial terms

The December 2019 updated Mineral Resource Estimate resulted in an increase in Measured & Indicated tonnage of 105% (to 25,450,000 tonnes at a Zinc equivalent grade of 2.84%) and an increase in Inferred tonnage of 7% (to 5,010,000 tonnes at a Zinc equivalent grade of 2.13%) from previous resource estimates on the deposit.

This updated Mineral Resource Estimate has led to this PFS which gives the Scotia Mine an economic study and therefore a Reserve Estimate as per Table 19-3 below.

The Scotia Mine Mineral Reserve Estimates are classified as either Proven Reserves or Probable Reserves and are provided previously in Table 15-2 and Table 19-3 below. Total Mineral Reserves are 13.66 million tonnes with a Zinc Equivalent grade of 3.09 percent. For more information, see Chapter 15 – Mineral Reserve Estimates.

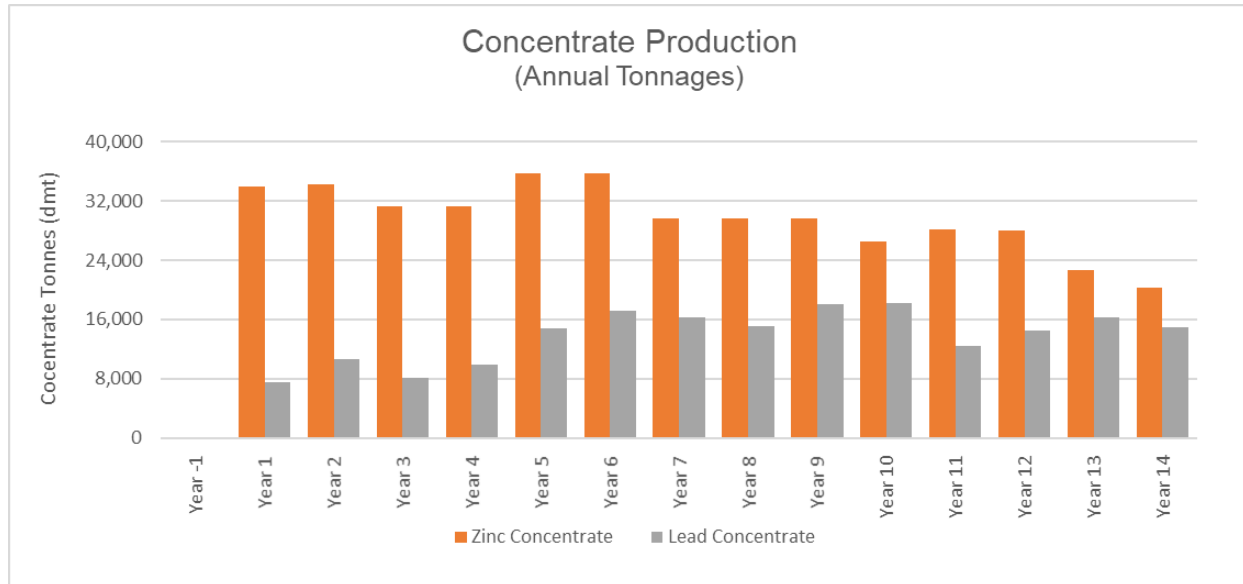
**Table 19-3: Scotia Mine Mineral Reserve Estimates**

Mineral Zone	Classification	Tonnage (t)	Zinc Grade (%)	Lead Grade (%)	Zinc Equivalent Grade (%)
Scotia Mine	Proven	3,370,000	2.46	1.21	3.62
Scotia Mine	Probable	10,290,000	1.88	1.07	2.91
Scotia Mine	Total	13,660,000	2.03	1.10	3.09

Notes: 2020 Mineral Reserves are as of 01 May 2020 and based on a design cut-off grade of 1.5% ZnEq grade. Cut-off grades are based on a Zinc metal price of US\$1.10/lb, recovery of 89%, a Lead metal price of US\$0.95/lb, and mining recovery of 92%. Average unplanned dilution and mining recovery factors of 12% and 92%, respectively, are assumed.

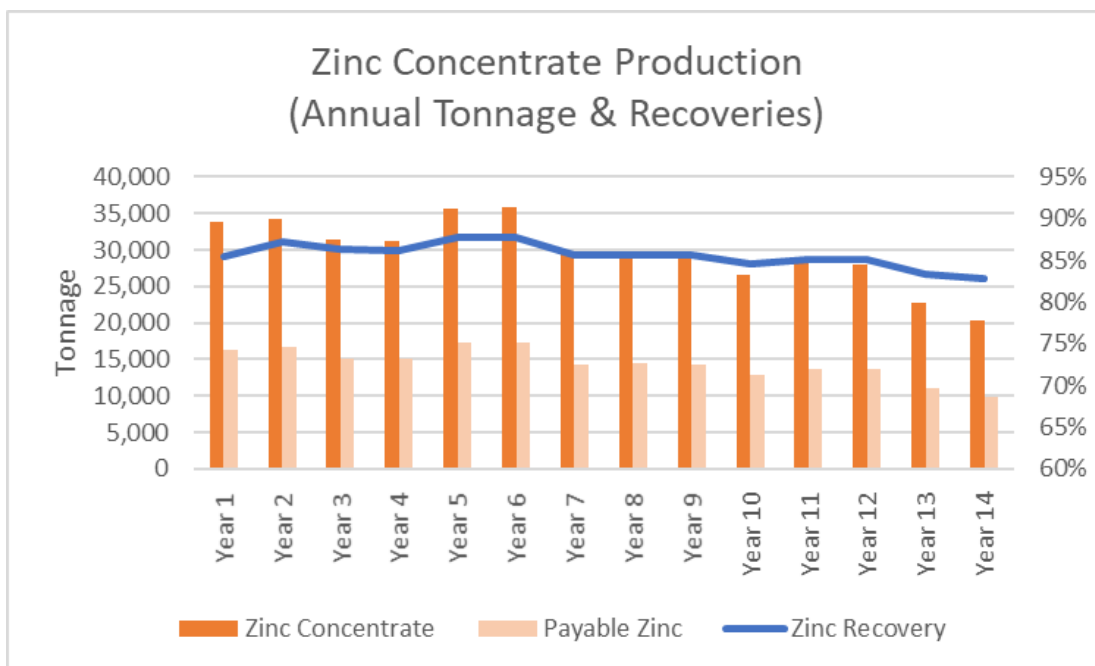
In terms of Payable Metal, it is expected that the final buyer will pay a percentage of the full zinc content, subject to a minimum deduction of units per dmt (“dry metric tonnes”), at the official LME Settlement quotation for Special High Grade Zinc, as published in the Metal Bulletin in London, averaged over the quotational period. The figure below shows the projected volumes of the two concentrates that will be produced at the Scotia Mine over the LOM. See Figure 19-2.

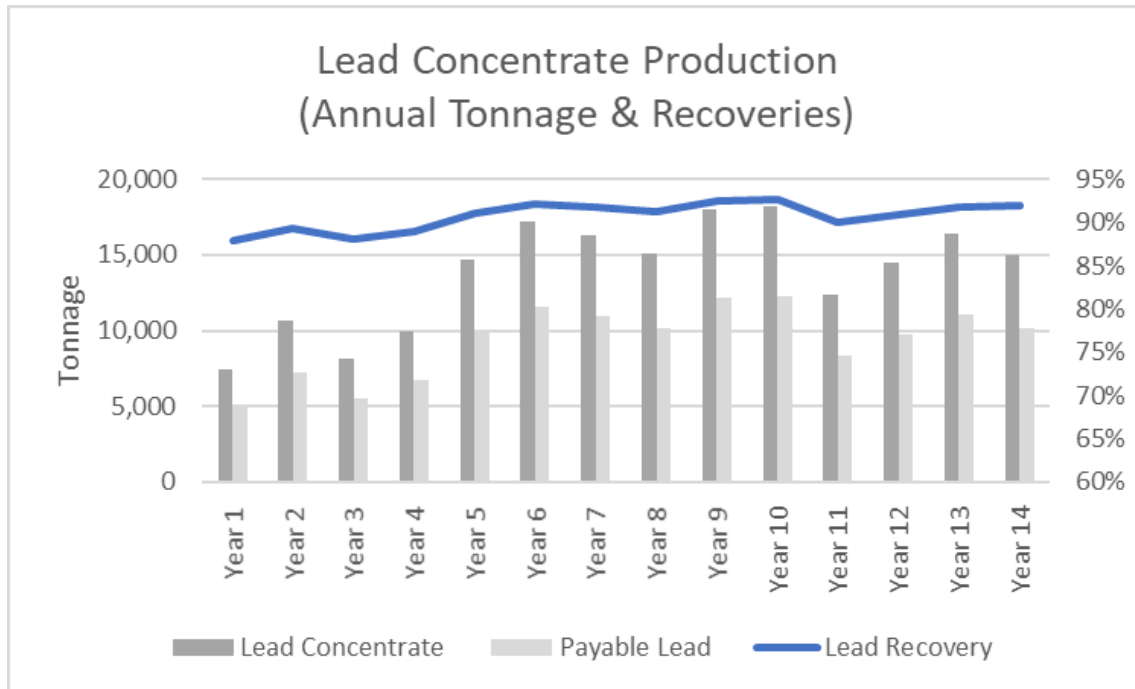
**Figure 19-2: Forecast LOM Concentrate Production**



While the mill will utilize separate flotation circuits for lead and zinc, at this time it is anticipated that two types of concentrate will be shipped: a zinc concentrate and a lead concentrate.

**Figure 19-3: Forecast Annual Production of Zinc Concentrate**



**Figure 19-4: Forecast Annual Production of Lead Concentrate**

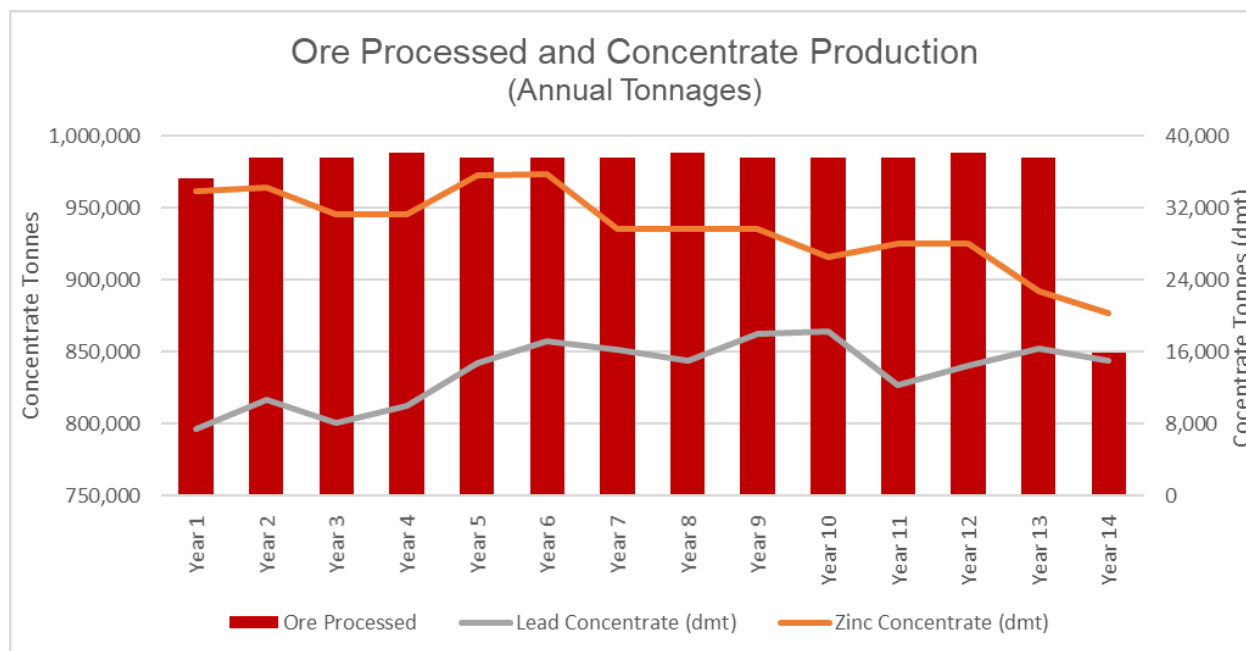
The annual variations in the volume of concentrate production is caused by a number of typical mining and processing production related factors that include:

- Tonnage feed available from the mine
- The mill processing rate is constant, but it is expected to increase over the years with planned improvements
- Variability in head-grades: later years are running lower zinc grades and have slightly lower zinc expected rates and higher lead grades (as per the mine plan and as described in more detail later in this chapter), and
- The grades are affected by the mining areas and stockpiles.

According to the Life of Mine plan (or “LOM” plan), during the first 5 months of operations (the pre-production phase), ore will be stockpiled, after which the ore will be treated in the mill with the first expected concentrate sales within 4 to 6 weeks of concentrate production commencing (the production phase). In addition, the LOM plan is designed for the first 6 years to access mainly the high-grade ore. See Figure 19-3 and Figure 19-4 above.

The Mill crushing circuit has a nominal maximum throughput of 3,000 tonnes per day for the life of mine and the Mill grinding circuit has a nominal throughput capacity of 2,700 tonnes per day (or 83,700 tonnes per month average). ScoZinc has not forecast to increase these nominal capacities, although it is generally accepted that processing operation improvements and technological advances will enable increases over the mine’s long operating life of 14 years. See Figure 19-5 overleaf.

**Figure 19-5: Forecast Ore Processed and Annual Concentrate Production**



No deleterious minor elements are expected in the concentrates from the Scotia Mine. The concentrates have been proven to be readily marketable, given their clean high-grade nature. When there are more deleterious or unwanted materials in the concentrate, the smelting process to extract metal is costlier and therefore some of these costs return to the miner in the form of additional discounts or penalties; in more extreme cases some, certain smelters or trading houses would refuse to take on concentrates that are “too deleterious”.

In contrast, clean or high-quality concentrates, are well sought by smelters worldwide, as they result in higher margins for the smelters, with a certain percentage of these margins being transferred to the miners – ScoZinc – in the form of higher payments and lower or no penalties. ScoZinc expects to benefit from above average favourable smelting terms.

The following two tables show the anticipated average concentrate specifications for both zinc and lead concentrates. See Table 19-4 and Table 19-5.

**Table 19-4: Scotia Mine Historical Zinc Concentrate Specifications**

<b>Mineral</b>	<b>Unit</b>	<b>Assay</b>
Zinc	%	58.06
Lead	%	1.43
Sulphur	%	28.86
Cadmium	%	0.38
Iron	%	0.34
Magnesium Oxide	%	1.18
Arsenic	%	0.02
Copper	%	0.07
Silica	%	0.75
Calcium Oxide	%	3.02
Silver	g/t	13
Gold	g/t	0.5
Mercury	Ppm	<5
Chlorine	Ppm	<50
Fluorine	Ppm	223

**Table 19-5: Scotia Mine Historical Lead Concentrate Specifications**

<b>Mineral</b>	<b>Unit</b>	<b>Assay</b>
Lead	%	68.84
Zinc	%	7.60
Silver	g/t	31.4
Iron	%	0.24
Sulphur	%	12.4
Silica	%	0.64
Magnesium Oxide	%	0.81
Copper	%	<0.01
Aluminum Oxide	%	0.38
Nickel	%	<0.01
Arsenic	%	<0.01
Bismuth	%	<0.01
Antimony	%	0.002

**Table 19-6: Forecast Variations in Grades, Recoveries and Metal Concentrate Produced**

<b>Metal production</b>		<b>Year -1</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>
Zinc Concentrate	tonnes	0	33,903	34,327	31,330	31,294	35,714	35,785	29,635
Lead Concentrate	tonnes	0	7,461	10,696	8,104	9,953	14,732	17,210	16,279
Zinc Recovery	percentage	0.0%	85.4%	87.3%	86.3%	86.2%	87.8%	87.8%	85.7%
Lead Recovery	percentage	0.0%	87.8%	89.3%	88.1%	88.9%	91.1%	92.2%	91.8%
Recovered Zinc	tonnes	0	19,165	19,566	17,858	17,838	20,357	20,397	16,892
Recovered Lead	tonnes	0	5,252	7,594	5,754	7,066	10,460	12,219	11,558
Zn Metal Payable from Smelter	percentage	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Pb metal Payable from Smelter	percentage	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Payable Zinc	pounds	0	35,913,565	36,665,508	33,464,519	33,426,254	38,147,472	38,223,052	31,654,271
Payable Lead	pounds	0	10,999,854	15,905,653	12,051,222	14,799,865	21,907,125	25,591,225	24,206,862
Payable Zinc	tonnes	0	16,290	16,631	15,179	15,162	17,303	17,338	14,358
Payable Lead	tonnes	0	4,989	7,215	5,466	6,713	9,937	11,608	10,980
Zinc Price	C\$/pound	1.61	1.64	1.65	1.68	1.69	1.69	1.69	1.69
Lead Price	C\$/pound	1.22	1.16	1.14	1.24	1.27	1.27	1.27	1.27
Zinc Price	US\$/pound	1.14	1.16	1.17	1.19	1.20	1.20	1.20	1.20
Lead Price	US\$/pound	0.87	0.83	0.81	0.88	0.90	0.90	0.90	0.90

<b>Metal production</b>		<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Year 12</b>	<b>Year 13</b>	<b>Year 14</b>	<b>TOTAL</b>
Zinc Concentrate	tonnes	29,716	29,635	26,612	28,115	28,040	22,728	20,311	417,144
Lead Concentrate	tonnes	15,072	18,035	18,248	12,349	14,495	16,356	15,014	194,004
Zinc Recovery	percentage	85.7%	85.7%	84.7%	85.2%	85.1%	83.3%	82.8%	
Lead Recovery	percentage	91.2%	92.5%	92.6%	90.0%	91.0%	91.8%	91.9%	
Recovered Zinc	tonnes	16,938	16,892	15,169	16,026	15,983	12,955	11,577	237,612
Recovered Lead	tonnes	10,701	12,805	12,956	8,768	10,291	11,613	10,660	137,698
Zn Metal Payable from Smelter	percentage	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	
Pb metal Payable from Smelter	percentage	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	
Payable Zinc	pounds	31,740,996	31,654,271	28,424,984	30,030,826	29,950,704	24,276,566	21,695,116	445,268,105
Payable Lead	pounds	22,411,600	26,818,554	27,135,145	18,363,071	21,554,146	24,321,622	22,326,395	288,392,337
Payable Zinc	tonnes	14,397	14,358	12,893	13,622	13,585	11,012	9,841	201,970
Payable Lead	tonnes	10,166	12,165	12,308	8,329	9,777	11,032	10,127	130,813
Zinc Price	C\$/pound	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.68
Lead Price	C\$/pound	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.25
Zinc Price	US\$/pound	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.19
Lead Price	US\$/pound	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89

According to the Life of Mine Plan (“LOM”), the mined zinc grades are constantly over 2% for the first 9 years, with the zinc grade dipping under 2% on Year 10, and with a slow decline in zinc grade for the next 5 years, with an expected life of mine end mined zinc grade of 1.63%. The expected mine lead grades are under 1% for the first 4 years of life of mine, with increased grades and constantly in the range of 1.18%-1.40% until Year 11 when grades briefly dip under 1% and finishing the last 3 years with mined grades between 1.14%-1.34%.

The same life of mine plan assumes zinc recoveries of 85% in Year 1, increasing slightly to 87.8% over the next 5 years, coming down to 85% on Years 7-9, 84.7% in Year 10, above 85% for the next two years and closing on Year 13 and Year 14 with expected zinc recoveries of 83% and 82% respectively. The zinc recovery is estimated at average 85.6% for LOM. See Table 19-6 above.

The lead recoveries as per the mine plan start at 87.8% in Year 1, they increase to 91% by Year 5 and stay above 90% mark for the remainder of the mine life (until Year 14). The lead recovery is estimated at average 90.7% for LOM.

Further references are made to Figure 19-3: Forecast Annual Production of Zinc Concentrate and Figure 19-4: Forecast Annual Production of Lead Concentrate.

### 19.3 Locked Cycle Test Results

The historical test work completed at ALS Metallurgy indicated that high recoveries of both zinc and lead can be expected from the material with high quality concentrates. A summary of the metallurgical performance of the ScoZinc mineralization, extracted from the ALS metallurgical report, is shown in table below:

**Table 19-7: Scotia Mine Metallurgical Performance Analysis**

Product	Mass (%)	Assay - percent			Distribution - percent		
		Pb	Zn	Fe	Pb	Zn	Fe
<b>Test 9 – Cycles IV and V</b>							
Flotation Feed	100	1.83	2.46	0.9	100	100	100
Lead 2 <sup>nd</sup> Clnr Con	2.4	71.7	3.00	0.5	93.5	2.9	1.4
Zn 3 <sup>rd</sup> Cleaner Con	3.4	0.78	61.3	0.5	1.5	86.0	1.7
Zn 1 <sup>st</sup> Cleaner Tail	3.7	0.76	2.75	1.5	1.5	4.1	5.9
Zn Rougher Tail	90.5	0.07	0.19	0.9	3.5	7.0	91.0
<b>Test 10 – Cycles IV and V</b>							
Flotation Feed	100	1.82	2.44	1.0	100	100	100
Lead 2 <sup>nd</sup> Clnr Con	2.5	68.9	3.71	0.6	94.3	3.8	1.6
Zn 3 <sup>rd</sup> Cleaner Con	3.6	0.72	59.0	0.5	1.4	86.9	1.8
Zn 1 <sup>st</sup> Cleaner Tail	4.7	0.40	1.82	1.3	1.1	3.5	6.6
Zn Rougher Tail	89.2	0.06	0.16	1.0	3.2	5.8	90.0

## 19.4 Offtake Agreements

On April 3, 2018, ScoZinc signed a Memorandum of Understanding (“MOU”) with MRI Trading AG for the sale of zinc and lead concentrates. The MOU sets out the intentions of ScoZinc and of MRI Trading AG (“MRI”) to enter into concentrate sales agreements for life of mine 333,000 wet metric tonnes (“wmt”) of zinc concentrate and 133,000 wet metric tonnes of lead concentrate from the Scotia Mine, under standard commercial terms, which are to be kept confidential. As a side note, mine production is usually quoted in terms of wmt, and the metal price is based on dry metric tonnes (“dmt”). To adjust from wet to dry tonnes, an 8% reduction is applied to the wet tonnes to adjust for moisture content. It is important to understand whether tonnages are being quoted in ‘dmt’ or ‘wmt’.

Material payability terms have been assumed as follows:

- Zinc Concentrate:
  - Zinc payable: 85% minimum deduction 8 units
- Lead Concentrate:
  - Lead payable: 95% minimum deduction 3 units

ScoZinc expects to establish additional concentrate purchase contracts with one or more metal trading companies under terms consistent with the current market terms. ScoZinc is engaged in negotiations with a number of additional off-takers but has not yet finalized an arrangement. ScoZinc is aiming to have the same of better commercial terms for the portion of its production which is not already covered by the MRI Trading MOU (i.e. better payment terms, better delivery options, faster payment on delivery, etc.)

This offtake arrangement with one of the pre-eminent trading houses in the world, confirms the marketability of Scotia Mine’s zinc and lead concentrates.

MRI Trading AG is a leader in trading, metals and minerals, petroleum products, bulk and freight. MRI specialize in non-ferrous ores, concentrates, refined and precious metals and their related by-products for a global smelting and processing customer base. Petroleum products integrates with the group’s strength in the mining sector and considerable expertise in stock management. MRI offers services including strategic mine equity investment, pre-export finance, structured commodity and project finance and risk management.

Built upon detailed market intelligence, over 20 years of success, with offices in 10 countries around the globe, MRI’s aim is to continue to grow with honesty and integrity proving to be an ethical and reliable partner. A strong balance sheet, corporate backing, a wealth of local and international knowledge, along with an experienced management team and entrepreneurial culture allows MRI to provide excellent service to its global client base.

MRI’s main contracting centres are located in Zug, Switzerland and Singapore, with local and representative offices located in Santiago, Chile; Lima, Peru; Mexico City, Mexico; Johannesburg, RSA; Melbourne, Australia; Beijing and Shanghai, PRC; Vancouver, Canada; and Seoul, South Korea.

The MOU with MRI Trading provides that treatment charges be set annually at the annual benchmark treatment charges and scales, as agreed between major smelters and major miners. Payables, penalties and quotational periods will be negotiated in good faith annually, including industry standard penalties based on indicative terms and agreed limits specified in each MOU. As discussed previously, ScoZinc concentrates are of high-quality and high-purity, with limited deleterious material, well sought by smelters worldwide and, therefore, with fewer expected penalties and discounts.



ScoZinc is planning on using lined disposable containers to transport all its zinc and lead concentrates to the Fairview Cove Container Terminal in Halifax, or have these containers loaded on rail stock at the Milford siding, or alternatively onto trucks and have them delivered to the agreed location for the off-takers. A number of these low-cost options are being evaluated by ScoZinc. For those shipments expected to be made from the Fairview Cove Container Terminal, the exact shipping schedule and lot sizes in each delivery would be mutually agreed.

## 19.5 Contracts

The following contracts are currently part of the proposed operations of the Scotia Mine:

- Memorandum of Understanding off-take agreement with MRI Trading AG for life of mine zinc and lead concentrates. This offtake agreement provides competitive terms for 333,000 wmt of zinc concentrate and 133,000 wmt of lead concentrate
- Leasing of major mining equipment. This is common practice in the industry as it reduces initial capital expenditures and it assists the Company in maintenance of the equipment, as leased equipment is also often subject to maintenance agreements. ScoZinc has received non-binding quotes from two mobile mining equipment suppliers and is expected to complete the selection process and enter into a supply and maintenance contract when ScoZinc has received the necessary project funding
- No contractual arrangements for concentrate trucking, port usage, shipping, smelting or refining currently exist. Although the Company has signed an MOU with MRI Trading AG for the sale of concentrates, no binding contractual arrangements have been made for the sale of zinc or lead concentrates at this time

## 19.6 Smelter Market

Currently, there are a number of operating zinc smelters around the world, including four in North America and many more overseas in Asia, Europe and Latin America.

### 19.6.1 North American Smelters

**Table 19-8: North American Smelters**

Company	Smelter Name	Location	Zinc Capacity (kt)
Glencore	Valleyfield	Valleyfield, Quebec	265
Nyrstar	Clarksville Zinc	Clarksville, Tennessee	124
Hudbay	Flin Flon Zinc	Flin Flon, Manitoba	115
Teck Resources	Trail Zinc Plant	Trail British, Colombia	290

Source: JDS Energy & Mining Inc. (2018)

## 19.6.2 Select International Zinc Smelters

**Table 19-9: Select International Smelters**

Company	Smelter Name	Location	Zinc Capacity (kt)
Glencore	San Juan de Nieve	Spain	486
Glencore	Nordenham	Germany	150
Nyrstar	Balen	Belgium	260
Nyrstar	Budel	Netherlands	294
Nyrstar	Auby	France	172
Nyrstar	Hobart	Australia	271
Boliden	Kokkola	Finland	290
Boliden	Odda	Norway	170
Korea Zinc	Onsan	South Korea	550
Hindustan Zinc	Chanderiya, Debari	India	747
Votorantim	Cajamarquilla	Peru	300
Shaanxi Nonferrous	Mianxian	China	340
China Minmetals	Zhuzhou	China	450

Source: JDS Energy & Mining Inc. (2018)

## 19.7 Metal Prices

There were no independent market studies completed specifically for ScoZinc or the Scotia Mine Project in support of the 2020 Pre-Feasibility Study.

A number of sources were reviewed to determine a market consensus for the long-term prices of zinc and lead, including Sell Side Mining Research published by different brokerage houses in Canada or internationally and studies by independent consultants such as Wood Mackenzie Ltd., Fastmarkets MB, S&P Global Market Intelligence and Open Mineral AG.

### 19.7.1 Macroeconomic Outlook

The following discussion on the long-term outlook for metal prices draws on the current market conditions and on publicly made information extracted from various sources including: Open Mineral AG, Fastmarkets MB, Glencore December 2019 Investor Presentation, Glencore 2019 Annual Report, Teck Corporation 2019 Annual Report, S&P Global Intelligence Ltd., and Wood Mackenzie Ltd.

Economic growth rates, particularly industrial production growth forecasts, impact the demand and behavior of metals prices. Until the arrival of the COVID-19 Pandemic, both worldwide real GDP growth and worldwide industrial production growth were on an upward trajectory, with certain countries benefiting from an economic expansion at full or close to full employment (eg. the United States).

Unfortunately, the arrival of COVID-19, first in China, then in Western Europe, then the United States and most of the rest of the world, resulted in many of the world's governments imposing severe 'stay at home' measures which will result in a potential double digit drop in GDP growth in Q2 and Q3 of 2020. Once the Pandemic is somewhat under control and especially if vaccine development efforts result in significant progress, it is expected that world economies will rebound at an accelerated pace. The massive fiscal stimulus with which various governments around the world initially responded to the crisis, should also help with the economic restart and hence the demand for metals, especially base metals (gold and precious metals have already experienced solid price appreciation). Furthermore, as many non-first world countries imposed drastic measures to contain the COVID-19 virus resulted in many mines across the world being placed under reduced schedules, temporarily shut down or entirely placed under care and maintenance. Until the supply side of base metals (zincs, lead) comes back online, it is expected that commodity prices will outperform the current levels once the economies restart (the demand side). It is also expected that the recovery in industrial production and in business activity in general, worldwide, shall continue in 2021 and beyond, which should translate into a wide commodity prices recovery.

Moreover, and specifically related to ScoZinc, the US dollar strengthened significantly against the majority of the world's currencies (including the Canadian dollar) during February – March 2020, largely due to the flight to safety around i) the current steep market correction, and ii) the current COVID-19 Pandemic. These two factors also resulted in a steep decline in the oil price, a key cost component of any mining operation, including the Scotia Mine. As the economies around the world recover and as the COVID-19 virus spread is contained, it is expected that both non-USD currencies and the oil price will recover with oil showing relative strength in May and June of 2020.

### **19.7.2 Zinc Producers & Markets**

Zinc is one of the most widely used base metals in the world, known for its ability to resist oxidation and corrosion. Zinc is mainly used to galvanise steel or iron – that is, to apply a zinc coating to stop or reduce it from corroding (or rusting). Galvanised steel is used in buildings, cars, white goods and electronics. The strength and flexibility of zinc alloys mean they are widely used to create die casts for industrial uses – for example, in the production of car or machine parts. Zinc is also used to make brass and bronze. Zinc oxide is mainly used in the production of rubber, while zinc sulphide has uses such as X-ray screens, in optics, and as a pigment. Hence, zinc's fundamentals remain largely underpinned by the industrial sector, with infrastructure development and emerging market considerations, particularly in China and India, being key to the metal's long-term outlook.

Recent developments in the Zinc Markets and their implication for the Zinc Markets in 2020 and beyond are as follows:

- Global concentrate market in surplus; smelter production returning to new normal
- Global mine production missed forecast in both 2018 and 2019
- Chinese zinc mine supply was down by 1% keeping production at 2015 levels
- 2019E global refined zinc supply was up by 1.9% 2019 versus the forecasted growth of 6.4% (which was expected at the end of 2018)
- LME refined zinc stocks decreased almost 80,000 tonnes in 2019
- 4<sup>th</sup> consecutive year of zinc metal market deficits, which have driven down stocks
- Smelter bottleneck in China restricted metal production, drawing down stocks

- Global visible zinc exchange inventory at the end of 2019 – well below long-term averages – just over 2 days of actual consumption, with only 50,000 tonnes of refined zinc remaining on LME
- High cost miners under pressure and closing due to low price and high treatment charges
- Although COVID-19 resulted in lower demand for base metals in general, robust expected growth in infrastructure, enhanced by massive government spending, will boost zinc demand from post-fabrication galvanizers, starting with 2020-2021
- Zinc price showed resilience since the COVID-19 Pandemic started. After hitting this year's low of US\$1,774/tonne on March 25, 2020 in the face of the Pandemic, zinc prices have recovered, crossing US\$2,000/tonne in early May 2020 and then crossing US\$2,200/tonne by July 2020
- The global construction sector stabilizes the need for zinc in 2020-2021, which is partially offset by a lower expected demand from the automotive sector and from other industries
- 2020 and beyond: higher smelter production mainly in Asia while in Europe a lower metal output is expected
- Low zinc prices will most likely result in mine closures in 2020 that will stay close for some time to come
- Cutbacks to drive turnaround – weak demand and failing profitability might accelerate cutbacks, and
- Global mine production capability is forecast at 14.0Mt in 2020, 15.0Mt in 2021 and 15.2Mt in 2022

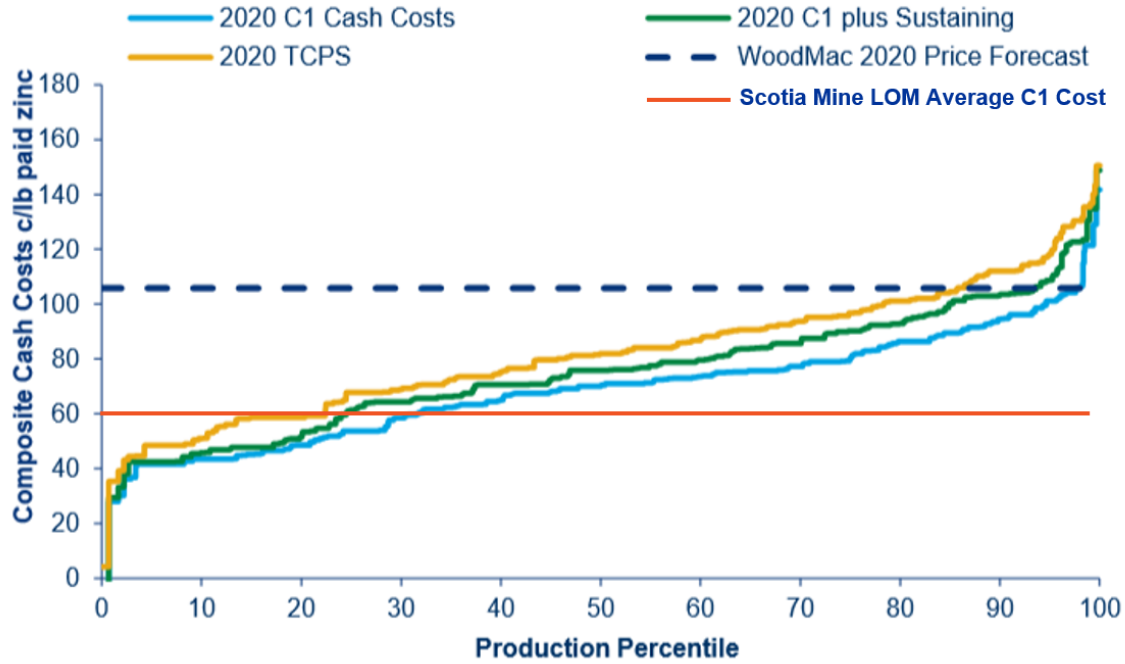
In addition, according to Glencore, a globally diversified natural resources company, the anticipation of large increases in both zinc concentrate and metal supply, plus the global macroeconomic uncertainty, weighed negatively on zinc market sentiment during 2019. Despite recording another metal deficit year in 2019, resulting in historically low visible zinc metal stocks, the zinc price averaged US\$2,549/tonne (US\$1.15/lb), 13% lower than 2018.

The zinc price peaked in April 2019 at US\$3,017/tonne (US\$1.36/lb) followed by a swift fall to US\$2,210/tonne (US\$1.00/lb) by September of the same year driven by trade wars and market uncertainty. The zinc price closed the year at US\$2,293/tonne (US\$1.04/lb), 7% down from the start. By March 2020, the zinc price had fallen to under US\$1,800/tonne (US\$0.81/lb).

The global average C1 cash cost is forecast to increase by 3.8% from US\$0.66/lb paid zinc in 2019 to US\$0.68/lb in 2020. The rise is mainly due to a forecast 24% year-on-year increase in the global annual realized treatment charge for 2020 to US\$300/tonne concentrate. This increase in the contract terms is expected to increase global C1 costs by 0.051/lb zinc, according to Wood Mackenzie.

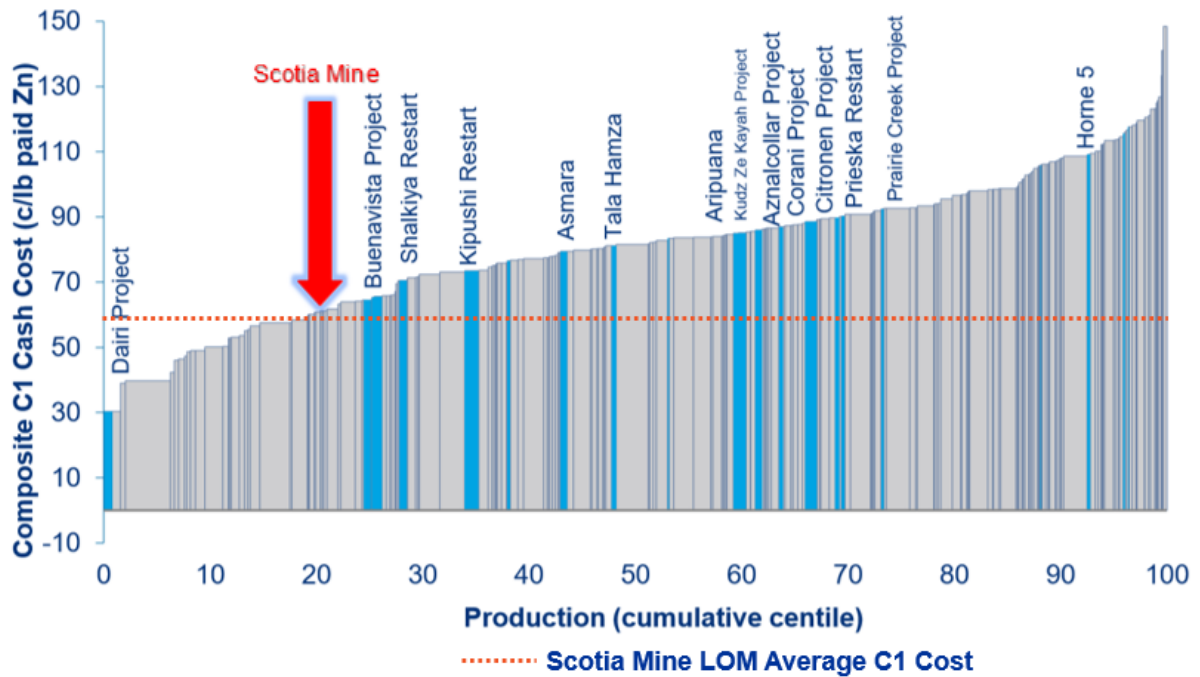
By comparison, Scotia Mine's expected LOM average C1 cash cost is expected to be US\$0.59/lb. See Figure 19-6 and Figure 19-7 overleaf.

Figure 19-6: Composite Cash Costs for Other Zinc Mines vs. Scotia Mine



Source: Wood Mackenzie, ScoZinc

Figure 19-7: C1 Cost Curve – Base Case & Probable Projects vs. Scotia Mine



Source: Wood Mackenzie, ScoZinc

Quoting Glencore: “Concentrates supply, ex China, grew year-over-year (YoY), but the effect was considerably lower than initially expected, increasing by only 150,000–200,000 tonnes. Delays in project ramp-ups, operational issues and labour strikes were the primary drivers of such underperformance. In China, per the National Bureau of Statistics (“NBS”), 2019 mine production decreased 1% on the prior year. Metal production in China (per NBS) did respond in H2 2019. Smelters resumed partially idled production, following additional environmental controls imposed in 2018, with such capacity filled with imported concentrates. Chinese metal production is reported to have grown by 526,000 tonnes (9.2%). In the rest of the world however, negative growth of 130,000 (-1.7% year on year) has been reported. Despite the increase in reported global metal production, visible zinc metal stocks continued to be drawn. Compared to December 2018, LME and SHFE stocks dropped by 60% and 40% respectively to 51,000 and 28,000 at December 2019, signaling that zinc demand was sufficient to absorb the additional units.”

China continues to dominate the zinc and lead mine output in the world. In 2020, China is expected to account for 35% and 44% of the world’s zinc and lead mine production, respectively. China’s share of total world production has been falling in the last few years, as in 2016 it accounted for 40% zinc and 58% lead production. This has been in response to a number of mines shuttering coinciding with increased environmental inspections. In 2020, the top ten producing countries are to account for 83% and 87% of zinc and lead mine production on the same basis.

In 2020, the top ten zinc mines are expected to account for over 20% of global output. Wood Mackenzie’s Q1 2020 long-term outlook forecasts that Rampura Agucha in India will regain its position as the world’s largest zinc producer in 2020 (after losing it in 2019 to Red Dog). Red Dog in the US is to have the second position in the world in 2020. The mines are expected to produce 540,000 zinc and 520,000 zinc in concentrate respectively in 2020. Rampura Agucha fully transitioned to be an underground mine in 2018 and in 2020 ore milled is expected to exceed 5 million tonnes per annum. Antamina mine in Peru entered third position during 2019 in a phase of processing a higher proportion of copper-zinc ores with higher zinc grades and consequently having a higher zinc production.

For the world lead producers, the top ten are expected to account for 20% of total lead production in 2020, with Mount Isa ranking number one followed by Doe Run, Sindesar Khurd, Cannington and Penasquito.

In 2020, ownership of the top ten zinc in concentrate producing companies is expected to account for 32% of world zinc mine production. The top three zinc mining companies are those companies which own the largest producing mines, Glencore, Hindustan Zinc and Teck.

Looking ahead, zinc mine supply is expected to continue growing, given the current project pipeline. Nevertheless, the current combination of low prices and high treatment charges is pressuring mining profitability, which may result in supply disruption in the short to medium term. Producers with low all in sustaining costs (i.e. ScoZinc) expected to remain profitable albeit at reduced levels. The increase in metal production is necessary for the market to restock from the current multi-year lows.

### **19.7.3 Zinc Prices – Short Term**

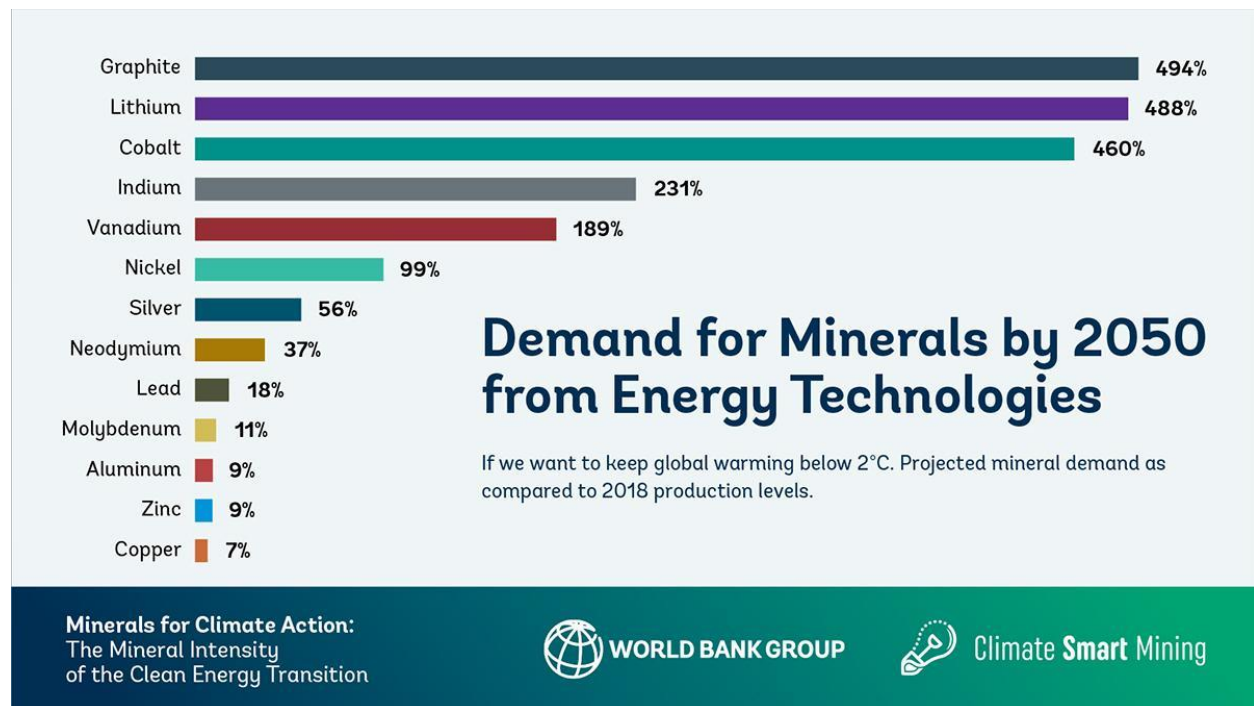
With the concentrate market still in surplus in 2020 and zinc demand likely to plunge in the coming months in the face of the global impact of the COVID-19 Pandemic, we are likely to see the pace of project development slow, if not stalled completely in the coming months.

However, according to Wood Mackenzie, over the long-term to 2030 global zinc consumption is forecast to grow at an average 1.5% per year. Albeit modest growth rates, this represents an average increase in zinc consumption of 225,000 tonnes per annum of zinc. Thus, new mine and smelter production of a similar order of magnitude are required.

For zinc mines, this is equivalent to the construction of one new large mine (or four medium-sized ones) every year. We expect this production to come from a combination of projects, expansions at operating mines and mine life extensions over the medium to long-term.

As of May 2020, a new World Bank Group report called “Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition”, finds that the production of minerals could significantly increase by 2050, to meet the growing demand for clean energy technologies. It estimates that over 3 billion tons of minerals and metals will be needed to deploy wind, solar and geothermal power, as well as energy storage, required for achieving a below 2°C future. Zinc and lead feature among those metal expected to benefit it from and significantly help with the development of clean energy technologies.

**Figure 19-8: Expected Demand for Minerals by 2050**



Source: The World Bank “Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition”, May 2020 report

The report makes specific reference to Zinc-air batteries: “Zinc-air batteries have become more prominent in the emerging storage sector because of their high specific energy density compared to other storage options, such as Li-ion batteries. Zinc-air batteries have emerged as the leading mineral-air battery type because they are safe, environmentally friendly, and potentially cheap and simple. The potential advantages of the technology can be seen in a comparison of the practical energy density of different battery technologies. Lithium-air batteries are possible and have even higher energy densities, but zinc is more attractive for a number of reasons, including safety, ease of recyclability, and greater global availability. Zinc-air batteries could potentially be used in both electric vehicles—either solely or, potentially

more practically, as a range extender in combination with a Li-ion battery—and stationary storage (Sherman et al. 2018)”. In addition, according to the same report, “98.1% of zinc demand from energy technologies comes from the wind industry, as the mineral is predominantly used for protecting wind turbines from corrosion.”

Wood Mackenzie, a leading natural resources research and consulting firm, publishes quarterly forecasts of metal prices and other economic assumptions used by different market participants in their long-term planning. The Q1 2020 market update assumes a 2020 zinc price of US\$1.05/lb (pound), a 2021 zinc price of US\$1.14/lb, a 2022 zinc price of US\$1.17/lb, and a 2023 zinc price of US\$1.17/lb.

Bloomberg Financial Markets and Refinitiv publish Street Consensus metal prices, pooled from research analysts at different investment banks, in Canada and internationally. The Consensus Average assumes a 2021 zinc price of US\$0.97/lb, a 2022 zinc price of US\$1.03/lb, and a 2023 zinc price of US\$1.05/lb. ScoZinc has considered these prices in determining which zinc price forecasts apply to its project year assumptions.

#### 19.7.4 Zinc Prices – Long Term

As discussed above and regardless of the current macro situation and elevated global uncertainty due to the COVID-19 Pandemic, the long-term outlook for global economy and for zinc is considered positive and these fundamentals, with the continuing Canadian-US dollar exchange rate which significantly improves metal prices expressed in Canadian dollars and with the current oil prices decline expected to continue in the medium term, impact favourably on the Scotia Mine Project.

As at March 2020, Wood Mackenzie’s long-term price forecast for zinc is US\$1.39/lb. As at May 2020, the Street Consensus High for long-term zinc prices is US\$1.20/lb (as quoted by Bloomberg Financial Markets).

Based on the evaluation of consensus forecasts and review of published information from various market studies, the short-term and long-term metal prices selected for the Base Case economics of the Scotia Mine are considered to be reasonable.

In conclusion, ScoZinc has used the following zinc prices in its financial analysis. See Table 19-10.

**Table 19-10: Zinc Prices Used in Financial Analysis**

Metal	Units	Year 1	Year 2	Year 3	Year 4	Long Term
Zinc	US\$/lb	\$1.16	\$1.17	\$1.19	\$1.20	\$1.20
	US\$/tonne	\$2,557	\$2,579	\$2,624	\$2,646	\$2,646

#### 19.7.5 Lead Prices – Short Term

Lead has a wide range of industrial uses including batteries, undersea cables, weights, solders and radiation protection. The price of lead, which is used mainly for batteries, can be related to that of zinc as the metals are usually co-produced. Lead has relatively low stocks and, as China barely trades the metal, sell-off shocks are rare. Official data shows that mine output has been falling in China as more stringent



environmental controls are applied and many closures have been enforced. China continues to be the leading producer and consumer of lead.

Wood Mackenzie, a leading natural resources research and consulting firm, publishes quarterly forecasts of metal prices and other economic assumptions used by different market participants in their long-term planning. The Q1 2020 market update assumes a 2020 lead price of US\$0.88/lb, a 2021 lead price of US\$0.84/lb, a 2022 lead price of US\$0.82/lb, and a 2023 lead price of US\$0.81/lb.

Bloomberg Financial Markets and Refinitiv also publish Street Consensus metal prices, pooled from research analysts at different investment banks, in Canada and internationally. The Consensus Average assumes a 2021 lead price of US\$0.87/lb, a 2022 lead price of US\$0.90/lb, and a 2023 lead price of US\$0.91/lb. ScoZinc has considered these prices in determining which lead price forecasts apply to its project year assumptions.

The similarity of zinc and lead metallogenesis (i.e. the formation of distinct metal ores) has resulted in the major producers of zinc being strongly represented in the ranking of lead producers. Similarly, the overwhelming majority of lead mines produce some zinc, leaving only a small number of primary lead mines in operation.

In 2020, Australia's Mount Isa is expected to produce the most paid lead, followed by Doe Run, Sindesar Khurd, Cannington and Penasquito. Penasquito lead in concentrate would increase 49% from 2019 to 2020 reaching 104kt zinc in concentrate as Penasquito is to have a full year of production. In 2019, operations were halted twice between March and October because of an illegal blockage. (Source: Wood Mackenzie).

Global average C1 composite cost for lead mines is estimated to be US\$0.51/lb lead in 2020, an 8% increase compared with US\$0.47/lb lead in 2019. The expected rise in the lead treatment charge will more than offset the reduction in costs due to the higher year on year lead price. A lead price of US\$0.81/lb (US\$1,788/tonne) in 2020 would intersect at the 96<sup>th</sup> percentile of the lead C1 cost curve.

The demand for lead metal is expected to be moderately strong, especially after a return to normalcy post COVID-19 and especially with expected increased usage in the automotive and industrial battery sectors in the near-term and continued decline in the world production of refined lead metal in the near to medium-term.

#### **19.7.6 Lead Prices – Long Term**

In 2019, the global lead market was balanced, with 2020 forecasted to have an oversupply of up to 100,000 tonnes. The 2020 mine supply to be lower than expected (although the lead disruptions to be smaller than those in zinc): a further decline in refined lead production in the Americas and in Europe, with a stable production in China is forecasted, scrap lead remains tight, mostly attributable to COVID-19, and lead prices are expected to rebound in a material way by late Q3, early Q4 2020.

For the medium to longer term, the demand for lead metal is expected to be moderately strong, especially after a return to normalcy post COVID-19 and especially with expected increased usage in the automotive and industrial battery sectors in the near-term and continued decline in the world production of refined lead metal in the near to medium-term.

In addition, the concerted efforts throughout the world to address climate change, will result in additional and steady demand for minerals, including base metals (i.e. lead, zinc). As per the May 2020 World Bank Group report called “Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition”, the production of minerals could significantly increase by 2050, to meet the growing demand for clean energy technologies. It estimates a steady growth of 9% p.a. for lead will be needed to deploy wind, solar and geothermal power, as well as energy storage, required for achieving a below 2°C future.

As at March 2020, Wood Mackenzie’s long-term forecast for the lead price is US\$0.88/lb. As at May 2020, the Street Consensus Average for the long-term lead price is US\$0.91/lb (as quoted by Bloomberg Financial Markets).

In conclusion, ScoZinc has used the following lead prices in its financial analysis. See Table 19-11.

**Table 19-11: Lead Prices Used in Financial Analysis**

Metal	Units	Year 1	Year 2	Year 3	Year 4	Long Term
Lead	US\$/lb	\$0.83	\$0.81	\$0.88	\$0.90	\$0.90
	US\$/tonne	\$1,830	\$1,786	\$1,940	\$1,984	\$1,984

### 19.7.7 Zinc & Lead Metal Prices Adopted

Based on the evaluation of consensus forecasts and review of published information from various market studies, the short-term and long-term metal prices selected for the Base Case economics of the Scotia Mine are considered to be reasonable. Accordingly, the metal prices used in the financial analysis in the 2020 Pre-Feasibility Study are shown in Table 19-12 below.

**Table 19-12: Prices of Zinc and Lead Used in Financial Analysis**

Metal	Units	Year 1	Year 2	Year 3	Year 4	Long Term
Zinc	US\$/lb	\$1.16	\$1.17	\$1.19	\$1.20	\$1.20
	US\$/tonne	\$2,557	\$2,579	\$2,624	\$2,646	\$2,646
Lead	US\$/lb	\$0.83	\$0.81	\$0.88	\$0.90	\$0.90
	US\$/tonne	\$1,830	\$1,786	\$1,940	\$1,984	\$1,984

## 19.8 Treatment Charges

### 19.8.1 Zinc Concentrate Treatment Charges

The price for concentrate, the Treatment Charge (“TC”), is set based on the supply and demand of concentrate. This is an annual negotiation and applies to all concentrates sold in that year. There are also smaller lots of concentrates traded on the spot market which are sold from mines to smelters based on production at the mine and requirement by the smelter. This often involves a third-party trading company, which in ScoZinc’s case is MRI.

Given the difficulty of discovering new deposits and the many years then required to commission a new mine it is rare that world mine production matches smelter capacity in a given year and that the resulting refined production matches any demand for refined zinc. It is therefore common for both sequential markets to be either in surplus or in deficit with stocks of both providing some buffer of supply. (Source: Wood Mackenzie).

As of April 2020, according to Open Mineral AG and other market sources, the zinc TCs are dropping quickly, with certain contracts being quoted below US\$200/tonne. As of May 2020, contracts were quoted @ US\$140/tonne.

On the Chinese refined side, there is a good improvement in galvanizing demand as most of the construction and infrastructure projects have restarted. The die-casting and chemical industries, which are more linked to domestic consumer and export markets, are improving more modestly.

Zinc domestic mine supply is recovering slowly. Chinese miners came back late after Chinese New Year, and with the sharp recent price fall, some miners are reluctant to sell their concentrate. Domestic zinc concentrates are relatively tight now and port stocks are declining. Chinese smelters (with less issues to offload sulphuric acid) are raising utilization rates again and with the favourable arbitrage, smelters are actively trying to source imported material.

Mounting concern around COVID-19 Pandemic led disruptions at some key suppliers globally and in Latin America along with the recent metal price fall, will lead to falling spot TCs. The zinc mining sector is undoubtedly going to go through a difficult 3-6 months as estimates are for around 15-20% of all mines are burning cash on a total cash cost basis. In March of 2020, three zinc mines in Australia were being placed on care & maintenance.

In addition, the COVID-19 Pandemic is expected to erode metal demand which is likely to support high spot TCs and lower Chinese smelter utilization rates for 2020. According to Open Mineral AG, it is expected that the Ex-Chinese TCs could settle around ~US\$280/tonne conc @ US\$2,300/tonne zinc price.

Although at the time of writing this PFS, the quoted TCs were largely under US\$200/dmt, ScoZinc is being conservative in selecting higher TCs for the short-term (Year 1 – Year 3), but views the longer term/ remainder of Mine Life TCs to be around US\$250/dmt (as per the table below):

**Table 19-13: Zinc Concentrate Treatment Charges**

Commodity	Year 1	Year 2	Year 3	Remainder of Mine Life
Zinc (US\$ per dmt)	\$245	\$255	\$275	\$250

### 19.8.2 Lead Concentrate Treatment Charges

This PFS assumes that long-term treatment and refining charges (TC/RC) will be constant for Year 1 and Year 2 (at US\$175 per dmt), followed by a small escalation from Year 3 (at US\$185 per dmt), which, as shown in the table below, is assumed constant for the remainder of the Mine Life:

**Table 19-14: Lead Concentrate Treatment Charges**

Commodity	Year 1	Year 2	Year 3	Remainder of Mine Life
Lead (US\$ per dmt)	\$175	\$175	\$185	\$185

The three major components of the lead concentrate treatment contract are:

1. A Treatment Charge ("TC"), commonly expressed in US dollars per tonne of concentrate. The charge is tied to the lead price by way of an escalation clause (price participation). Price-participation clauses are expressed in one of two ways, either, for example, "the treatment charge shall be increased by US\$3.3/tonne concentrate for each cent (or part there-of) the price increases above the base price" (expressed in c/lb lead), or, "the treatment charge shall be increased by 15.0 cents/tonne concentrate for each dollar the price increases above the base price" (expressed in US\$/tonne lead). The two quoted rates are equivalent to each other. There were no de-escalation clauses until 2002, but these are now common in most contracts. In 2017 the price participation scales were set to zero. (Source: Wood Mackenzie)

The treatment charge can vary significantly from mine to mine since it is very much dependent on the quality of the concentrate. As for zinc, lead treatment charges are also subject to 'site' allowances where appropriate.

2. The percentage of lead metal content that will be paid by the smelter. The world-wide standard is payment for 95%, subject to a minimum deduction of 3 units.

3. Payment for by-product metals and penalties. By-product payments are usually made for silver and gold subject to minimum deductions which vary over a wide range. Penalties will be levied for elements such as arsenic, bismuth and antimony subject to minimum limits. ScoZinc has limited to no deleterious materials, which should result in no penalties for our lead concentrate.

For the above Treatment Charge forecasts, ScoZinc has relied on market studies and forecasts published by independent consultants such as Wood Mackenzie Ltd., S&P Global Market Intelligence, Fastmarkets MB and Open Mineral AG. Open Minerals' one-month TC/RC expectation survey conducted in early May 2020 suggested that the industry, on average, expected terms at around US\$130-170/tonne. According to Fastmarkets MB, depending on the silver content on a concentrate sample, the lead concentrate TCs benchmarks, for March 2020, were between US\$170 (low silver) to US\$180 (high silver). For April and May 2020, the lead TCs were between US\$135 (low silver) to US\$150 (high silver content).

Scotia Mine's lead concentrate is a low silver content concentrate and hence ScoZinc should benefit from the lower expected TCs for our lead concentrate.

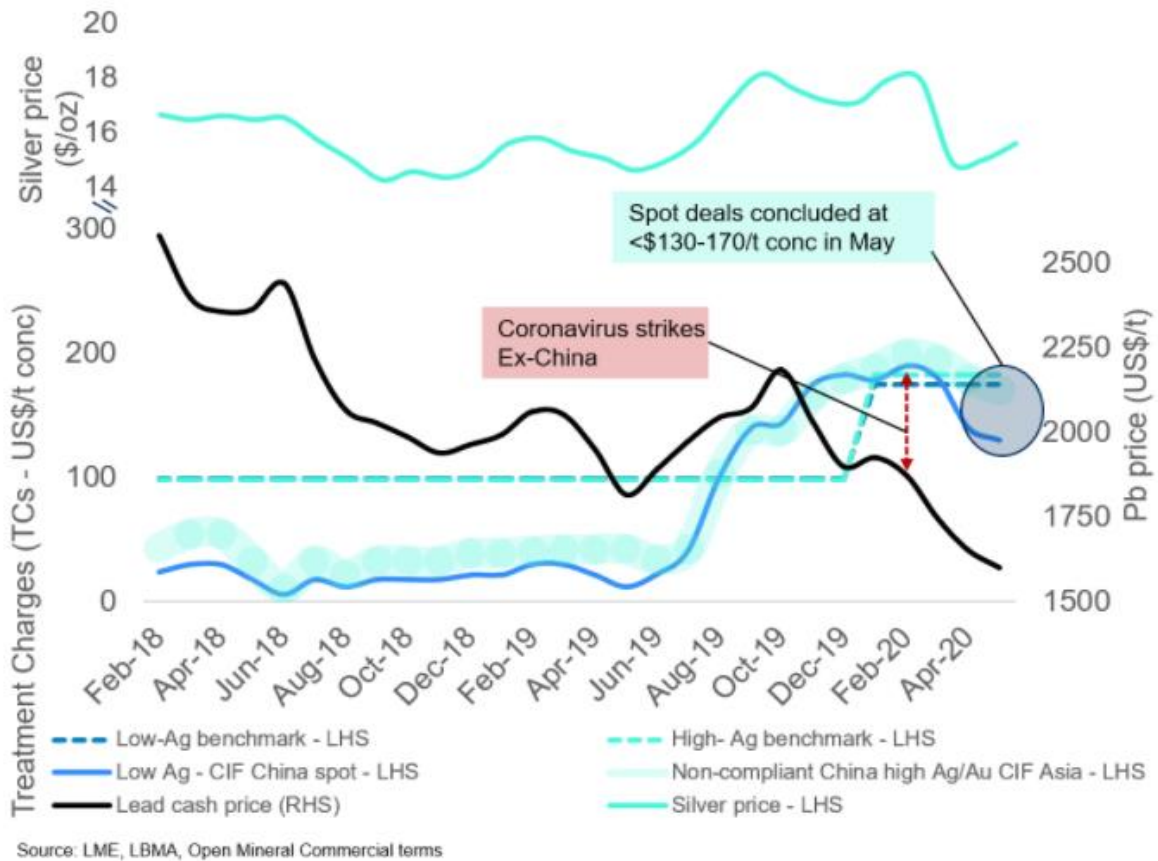
Against the backdrop of expected concentrate deficits during first half and Q3 2020, it is reasonable that spot TCs will fall further and perhaps faster than expected, in the coming months.

As of mid-April 2020, as per the below graph from Open Mineral, the Zinc spot charges are falling at faster rates than they shot up in 2018 Q3/Q4. In addition, as a result of the COVID-19 Pandemic in 2020 Q1/ Q2, the closure of zinc mines in Peru and other parts of the world is having a major impact on smelters

in China and the Chinese zinc smelters are fighting to buy zinc concentrates as mine supply falls, which should result in lower TCs for the short to medium term.

ScoZinc's concentrates are deemed highly desirable by smelters due to their high concentrate quality, historically grading 57% Zn and 71% Pb, and low levels of deleterious metals. These characteristics translate into premium prices for paid metals and, coupled with the decreasing trend in the TCs, are expected to result in improved economics for the Scotia Mine.

**Figure 19-9: Historical Lead Treatment Charges**



**19.9 Conclusions**

The Scotia Mine Project in the province of Nova Scotia, as evidenced by this PFS, demonstrates compelling economics both in the short-term (under weaker metal prices assumptions) as well as in the medium to long-term (under the expectation that metal prices will recover).

In addition, both the zinc and lead concentrates produced at the Scotia Mine are premium, high quality, low impurity concentrates well sought by smelters worldwide.

Furthermore, ScoZinc has already a favourable offtake agreement to market its high-quality non-deleterious concentrates for at least the first 10 years of the Life-Of-Mine production.

## 20 Environmental Studies, Permitting and Social or Community Impact

### 20.1 Scotia Mine Overview

The Scotia Mine is an existing operation on high-level Care & Maintenance with substantial environmental databases, operating history, and valid permits and licenses that allow for the mining, processing of resources, and the shipping of zinc and lead concentrates. Roughly half of the resources used in this economic analysis are already under permit and mining of those resources (Main Zone, Southwest Expansion) can begin immediately. The Scotia Mine has a Life of Mine (“LOM”) of approximately 14 years and, as currently planned, the re-establishment of the Scotia Mine involves:

- Development of an open-pit zinc-lead operation, mining approximately 39,000 tonnes per day, decreasing linearly, and processing approximately 2,700 tonnes per day
- Upgrading or replacing existing mine facilities
- Potential increase of the Tailings Storage Facility (“TSF”) capacity after year 8 of the LOM
- Construction of an additional water settling pond and discharge point

Another important aspect of the project status with respect to permits, environment and community is that regulators and the community have experience with the Scotia Mine and environmental baseline conditions are already well understood. In combination, these factors limit the overall permitting risk and anticipated timelines for permitting project expansions to include the entire mineral resource used in this analysis.

In addition, the risks and potential costs associated with environmental and community issues are well understood and based on operating experience and history of the project. As such, the financials for environment and community matters that are input to the cash flow model are accurate to a feasibility level.

### 20.2 Overview of Existing Information

There is information available on the Nova Scotia Environment website which includes the approvals for Environmental Assessments and the Industrial Approval. The Nova Scotia Environment (the permitting Regulator) registry of ScoZinc’s associated files can be viewed at <https://novascotia.ca/nse/>

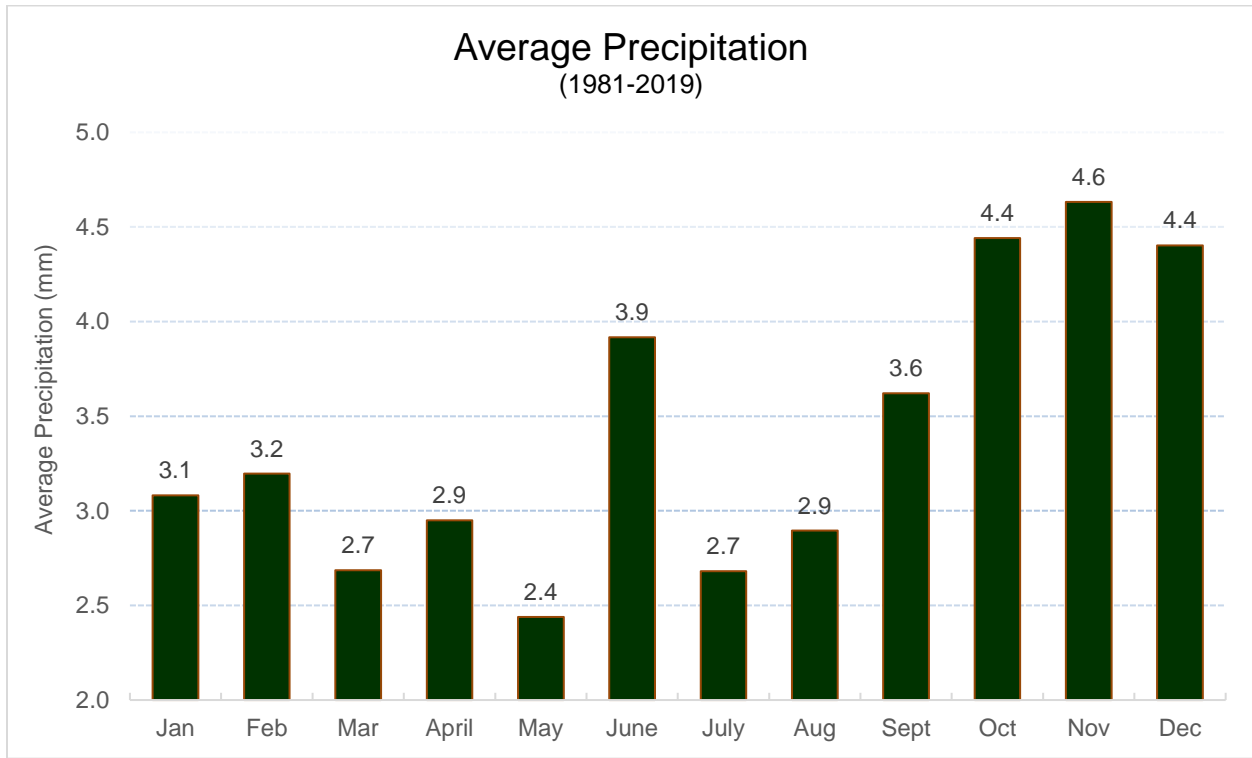
#### 20.2.1 Environmental Setting and Socio-Economic Setting

The climate conditions for the Scotia Mine are based on the nearest climate station with historical data. The Upper Stewiacke climate station (operated by the Meteorological Service of Canada; Government of Canada 2017) is located approximately 35 km northeast of Gays River at a similar elevation. Based on data collected between 1981 to 2019, the average total annual precipitation is 1,363.6 mm (water equivalent), which includes 248.1 cm of average snowfall per year and 1,115.5 mm of average rainfall per year.

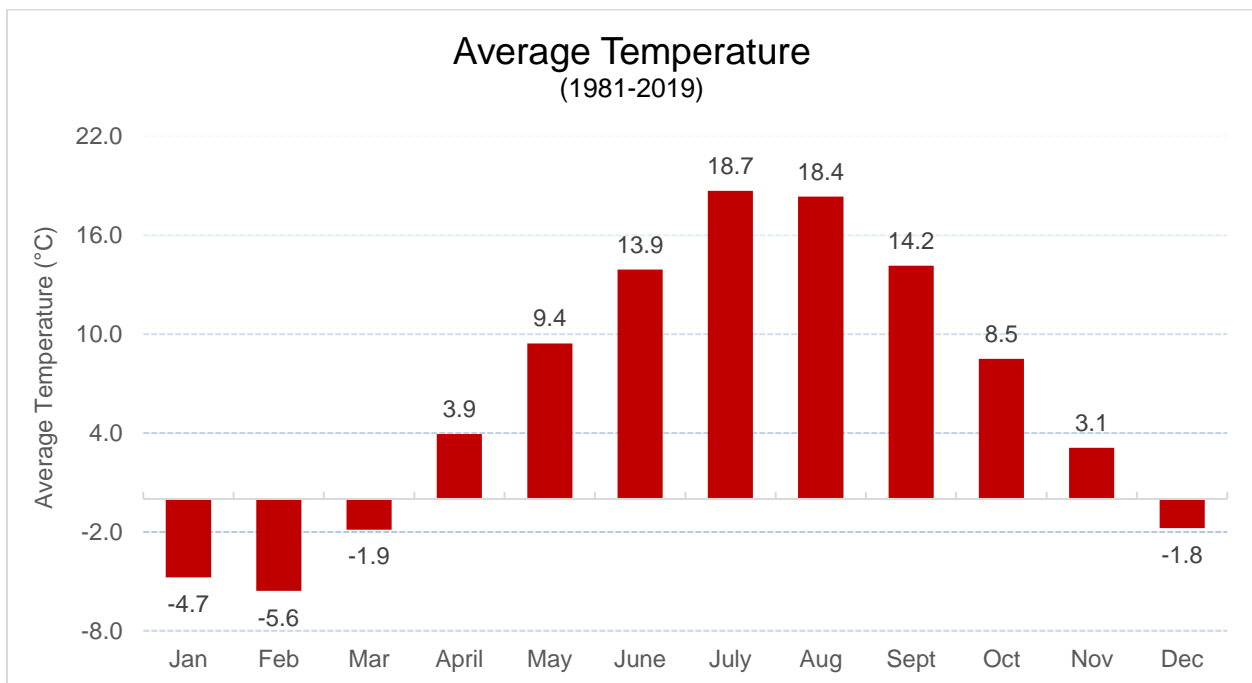
Monthly precipitation amounts remain fairly constant throughout the months of May to August, increasing through September through December. The average annual temperature is 6.2°C, with an average monthly range from -6.8°C in January to 18.4°C in July. On average, the Scotia Mine experiences relatively mild

winters with snowfalls regularly melting throughout the winter months to keep snowbanks at zero or very-low depths.

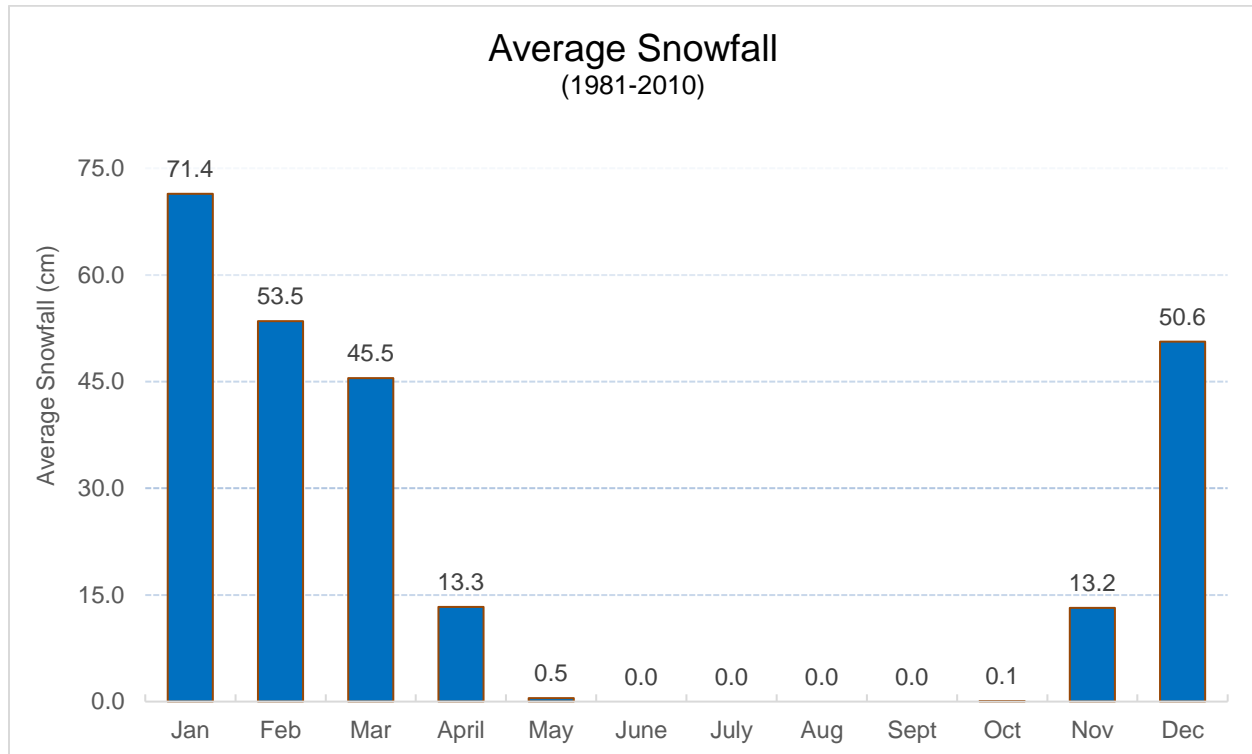
**Figure 20-1: Historical Average Monthly Rainfall**



**Figure 20-2: Historical Average Monthly Temperature**



**Figure 20-3: Historical Average Monthly Snowfall**



The physical geography of the area surrounding the Scotia Mine has been previously described (CRA 2011). Topography in this region of Nova Scotia is dominated by mainly Carboniferous rocks (shale, limestone, sandstone, gypsum) upon which deep soils derived mainly from glacial outwash have developed (Roland 1982 in CRA 2011). These central lowlands provide a topography that is variable in nature from lowland plains to rolling hills and rarely exceed 90 m above sea level (CRA 2011).

The local geology consists of a dominance of Lower Carboniferous (Mississippian Age) Windsor Group strata with occurrences of the Meguma mapped southwest and northeast of the Gays River/ Cooks Brook area.

The Scotia Mine area is well drained, with fine textured soil on hummocky terrain that lies in the southern extent of the Central Lowlands, adjacent to the Rawdon/ Wittenburg Hills and the Eastern Interior ecodistricts (Neily et al., 2005).

The hydrogeological regime in the Scotia Mine area is complex; controlled by a karst gypsum / carbonate contact which has been in-filled with Cretaceous-age sands and clays. Two overlying Pleistocene glacial cycles and recent deposition of the river alluvium adjacent to the meandering Gays River complicate the hydrogeology. Several sand units form aquifers that are separated by zones of permeable clays which are probably interconnected in the karst gypsum deposits overlapping the mineral deposit (CRA 2011).

The Gays River is the principal watercourse in the area, with its headwaters in Lake Egmont. The Main Branch of the Gays River flows north and west past the Scotia Mine, where it converges with the South Branch Gays River. Drainage for the Gays River sub-system of the Stewiacke-Shubenacadie River system



collects from the valley sides to the north and south of the emerging Cooks Brook and Gays River (CRA 2011). In the project area, the Gays River is a meandering channel with overall low gradient and limited riffles and abandoned pools. The substrate sediments are predominately silt with very minor boulders and cobbles. The active channel averages 10 metres in width with a range of water depths from several centimetres to several metres (CRA 2011).

There are several wetland complexes in the Scotia Mine. In Nova Scotia, wetlands are protected under the provincial Environment Act and an approval is required for their alteration. A wetland survey and compensation plan may be required as a component of the project development for areas not currently under Industrial Approval permit. Surveys of plants and animals have previously been completed for the general project area. Previous work has identified *Hepatica Nobilis* (Round-Lobed Hepatica), which is considered endangered in Nova Scotia by the Nova Scotia Department of Lands and Forestry (“NSDLF”); the Scotia Mine Environmental Assessment approval requires a monitoring program for this species and is outlined in the Wildlife and Vegetation Monitoring Plan. Other flora species of interest include two plant species and one lichen species. Canada Lily (*Lilium Canadense*), Canada Wood Nettle (*Laportea Canadensis*) and the lichen *Sticta Fuliginosa* are considered sensitive to human interaction by the NSDLF.

No fauna species of concern have been identified to date within the site footprint. However, Wood Turtles (*Glyptemys Insculpta*) have been observed within the local area. This species is categorized as threatened under both provincial and federal legislation. The Scotia Mine Environmental Assessment approval mandates the undertaking of an inventory and ongoing monitoring program for this species, and it is outlined in the Wildlife and Vegetation Monitoring Plan.

Additional wildlife surveys will be required prior to disturbance in the Southwest Expansion area as outlined in the Wildlife and Vegetation Monitoring Plan. New development areas contemplated by this report will be required to undergo an Environmental Assessment (and approval) and Industrial Approval.

#### **20.2.1.1 Socio-Economic Setting**

The Scotia Mine is located in Cooks Brook, a small, unincorporated community in the Halifax Regional Municipality (“HRM”) that borders the community of Gays River, Colchester County. This community lies between the larger communities of Middle Musquodoboit, Lantz and Shubenacadie. The population of the surrounding area is described by Nova Scotia Finance, Community Counts to fall within three “communities” namely Middle Musquodoboit, Lantz, and Wittenburg. The total population of these three areas is 6,816 (2006 Census; community-specific information is unavailable from the 2016 census). About 28% of the population is under 20 years of age and 13% is 65 years of age or older. Population growth between 1996 and 2006 was about 3%. English is spoken by over 99% of the population. The average family income for the three communities in the area ranges from \$56,500 to \$67,000 per annum (the more affluent area being Lantz) (CRA 2011).

In the local area there is a range of land uses focused on resource-based industries such as agriculture, forestry and mining. The mine site is in an agricultural area that extends from the Musquodoboit Valley north into Colchester County. Agricultural land use accounts for approximately 5% of the Gays River area.

The local area is primarily forested with mixed use (mainly residential and small business) located along the secondary roads. Sawmills and a wood pellet manufacturing plant are located near Middle Musquodoboit. Forested lands are primarily privately owned. Private woodlot owners are a significant source of supply to these facilities. ScoZinc owns about 50% of the property in the Gays River area.

The Scotia Mine permits currently require and mandate a Community Liaison Committee (“CLC”) composed of local residents and mine site staff. During mining operations, the committee meets on a regular basis to discuss issues from the community in regards to the mining operations. Past meetings have highlighted noise from the operations as a key issue for local residents, as well as concerns about dust and potential impacts to Gays River quality and flow. Employment and opportunities for local people is also an important issue. The operation expects to draw substantial numbers of its workforce from the nearby communities and as such employees will also provide a valuable source of communication on local issues. It is anticipated that the requirement for a CLC will continue to be a requirement of Industrial Authorizations for future project expansions.

Local residents rely on wells for water supply. Potential impacts to groundwater wells from localized dewatering of the aquifers through mining or changes to aquifers from blasting shocks have been identified as a possibility. Bonding of \$147,500 is in place with the Government of Nova Scotia for the purposes of supplementing water supply of local residents in the event of impacts to water supply wells. The bonding amount is based on residents within a certain proximity of the mine site. As the Scotia Mine expands, the requirement for bond will likely need to be increased to account for the greater number of residents that fall within that perimeter.

Archaeological studies of the Scotia Mine area have been undertaken for various phases of the Project’s development. Given the proximity to Gays River and the long post-colonial history of the area, several, mostly minor, pre-contact and post-contact archaeological sites have been identified within the Scotia Mine footprint. However, these previously identified sites have been studied, catalogued, and handled so that they require no additional action and will not inhibit mine development. Archaeological surveys of additional areas that may be disturbed as part of this Project may be required during the permitting process.

### **20.2.2 Summary of Environment and Socio-Economic Issues**

Environmental studies of the Scotia Mine area have identified several plant and animal species of interest, including two that require an ongoing monitoring program. A Wildlife and Vegetation Monitoring Plan will be implemented that will identify species of concern and monitoring measures to keep them safe. New footprint-specific surveys may be required for new areas of disturbance anticipated by the development scenario identified in this report.

Community communication and involvement is mandated to a CLC through existing Project permits. This committee is and will continue to be the primary tool for communicating with local residents regarding their concerns or issues with the Project. Noise, dust, and impacts to water wells have been identified as key community issues. Bonding requirements have been established as mitigation for impacts to water wells and it can be expected that the overall bond requirement will increase as the footprint of the Scotia Mine increases and the number of residences within the certain proximity of the Project increases.

Archaeological sites in the area of the Scotia Mine are not uncommon, and several minor sites have previously been identified within the Project's footprint; however, these sites have been assessed and will pose no obstacle to mine operation or development. Footprint-specific surveys will be required for new development areas and there is a possibility of identifying pre and post contact archaeological remains in the Scotia Mine area. Management of any such finds may require avoidance through adjustments in project plans or, if this is not possible, excavation of any identified sites prior to project disturbance.

### **20.3 Environmental Management Plans**

As a part of provincial and federal legislation and in order to minimize the potential environmental impacts a number of management plans will be developed and implemented.

The following documents have been or are currently in development for implementation:

- Community and Liaison Committee Program
- Final Design, Construction Drawings Waste Rock Pile
- Final Design, Construction Drawings Settling Reservoir
- Waste Management and Dangerous Goods Management Plan
- Waste Rock and Stockpile Stability Plan
- Explosives Management Plan
- Water Management Plan
- Annual NSE Report
- Environmental Effluent Monitoring Plan
- Spill Contingency Plan
- Closure and Reclamation Plan
- Surface Water Sampling Program
- Groundwater Sampling Program
- QA/QC program for Water Sampling
- Soil Erosion and Sediment Control Plan
- Wildlife and Vegetation Monitoring Plan
- Noise Monitoring Program
- Ambient Air Monitoring Program
- Water Supply Policy
- Technical Blast Design
- Blast Monitoring Program
- Pre-Blast Survey
- Pit wall Stability Monitoring Program
- Geotechnical Assessment
- Wetlands Protection and Monitoring Plan
- Wetlands Compensation Plan
- Complaint Response Plan
- Dam Safety Plan (dam safety inspections, dam safety reviews)
- Tailings Storage Facility Monitoring Plan

### 20.3.1 Tailings and Waste Rock Management

Tailings generated by the milling process will be pumped to the existing Tailings Storage Facility (“TSF”). A TSF causeway raise may be required to establish the needed catchment size to accommodate the additional tailings volume generated by the Scotia Mine expansions, although ScoZinc is reviewing alternatives such as in-pit tailings disposal. The costs to increase the capacity of the existing TSF are captured in the capital and operating budget for the operation. The tailings disposal plan will safely maximize usage of the existing storage area before raises occur.

Solid waste generated at the Scotia Mine site will consist of unusable rock, organics and other naturally occurring materials stripped from the areas. Waste rock will be used, as appropriate, for infrastructure development with the excess being stored in waste rock stockpiles near the pit or backfilled into the mined-out portion of the pits. Lower-grade mineral resources from the pits will be segregated and stockpiled for future processing. Gypsum excavated during pit stripping may be segregated and stockpiled for upgrading and shipping off site. For more information on Gypsum handling, please refer to Section 16.

All the administration, processing and support facilities will remain at the existing site location and are serviced by an existing on-site sewage treatment system.

### 20.3.2 Site Monitoring

Monitoring of the Scotia Mine site will be carried out by ScoZinc staff with the assistance of qualified consultants when necessary. The cost for support staff, lab analysis and supporting external resources has been incorporated into the General and Administration (“G&A”) costs of the PFS cash flow model.

Site environmental monitoring anticipated to be required for the operation include:

- Hydrogeology – Groundwater monitoring wells have been and will be established at appropriate locations in the vicinity of ScoZinc’s facilities. Groundwater will be monitored for level and quality through the operations and closure phases of the Scotia Mine. Precise locations and analysis parameters are set out in the current Industrial Approval
- Surface Water – Surface water quality and flow volume monitoring has been and will be carried out at environmental discharge locations, in the receiving environment upstream and downstream of the discharge location where appropriate, and in other locations as required. The precise locations and analysis parameters of the monitoring program are established in the Industrial Approval



- Noise – Ambient noise monitoring will be required during operations, so that sound levels do not exceed limits specified by the Industrial Approval. Managing noise issues will be dependent on complaints received from local residents via the CLC in communication with ScoZinc's General Manager. Noise issues are likely to be episodic and associated with specific activities, locations, residence proximity, and climate conditions. Management of noise complaints will be case specific and depend on those attributes of the perceived issue
- Archaeology – Personnel involved in all ground disturbances related to the construction and mining activities will be made aware of the potential for archaeological and/or cultural resources and the appropriate actions to take in identifying and reporting such features
- Flora & Fauna – The Wildlife and Vegetation monitoring plan will be implemented which includes, but is not limited to, monitoring of the plant *Hepatica Nobilis*, and a monitoring program for Wood Turtles. Site specific habitat surveys required for expansion areas may identify additional species requiring monitoring and/or mitigation. The precise nature and type of these monitoring and mitigation programs will be prescribed in consultation with NSDLF
- Socio-economic Parameters – The only socio-economic parameter likely to require future monitoring will be Traditional Land Use Surveys by First Nations. These surveys are typically done in advance of site disturbance to document plant and animal species in the area that are used by First Nations

### 20.3.3 ARD Management Plan

The Scotia Mine orebody is hosted by carbonate rock which is naturally acid reducing and therefore significantly eliminates any potential for the mine to exhibit acid rock drainage ("ARD"). Although there are no known instances of ARD at the Scotia Mine, ScoZinc has contingency measures in place to monitor and control any leachate.

As outlined in the Industrial Approval, every 100,000 tonnes of ore mined, samples will be analyzed for acid base accounting, total sulphur and percent sulphide. Should ARD be identified, measures in the Industrial Approval will be followed.

### 20.3.4 Water Management

Wastewater at the Scotia Mine occurs in four management streams; tailings supernatant, pit water from pit dewatering, contact water from the mill and ancillary buildings, and contact water from waste rock stockpiles and other disturbed mining areas.

A series of dewatering wells 10-40 metres deep will surround the perimeter of the open-pit creating a cone of depression around the pit and allowing for dry pit walls and increasing pit wall stability. The water from these wells is pumped to a lined settling reservoir to allow sediments to settle out resulting in clean water. Water will be used as dust suppressant from the settling reservoir on an as needed basis. Clean water from the settling reservoir is sent to the mill for process water, and eventual tailings supernatant will be discharged to the Tailings Storage Facility utilizing pumps and gravity. Depending on water quality, excess water from the settling reservoir will be directed to either the polishing pond or tailings pond and eventually

through the polishing pond discharge. Pit water from the northern wells that are drawn from the underground workings will be pumped to pit sumps which will be directed to the Tailings Storage Facility.

Tailings supernatant will be released to the existing tailings pond which is located as a component of the TSF at the toe of the tailings beach. Excess water in the tailings pond is discharged to the polishing pond. From the Polishing pond it is discharged to the environment via an outflow structure where it flows to Annand Brook and from there to the Gays River upstream of the mine. Discharge through this structure is monitored for quality and volume by onsite personnel through third party lab facilities and flow measuring devices. The water management process for the Project is consistent with the current operating parameters and permits for the Scotia Mine.

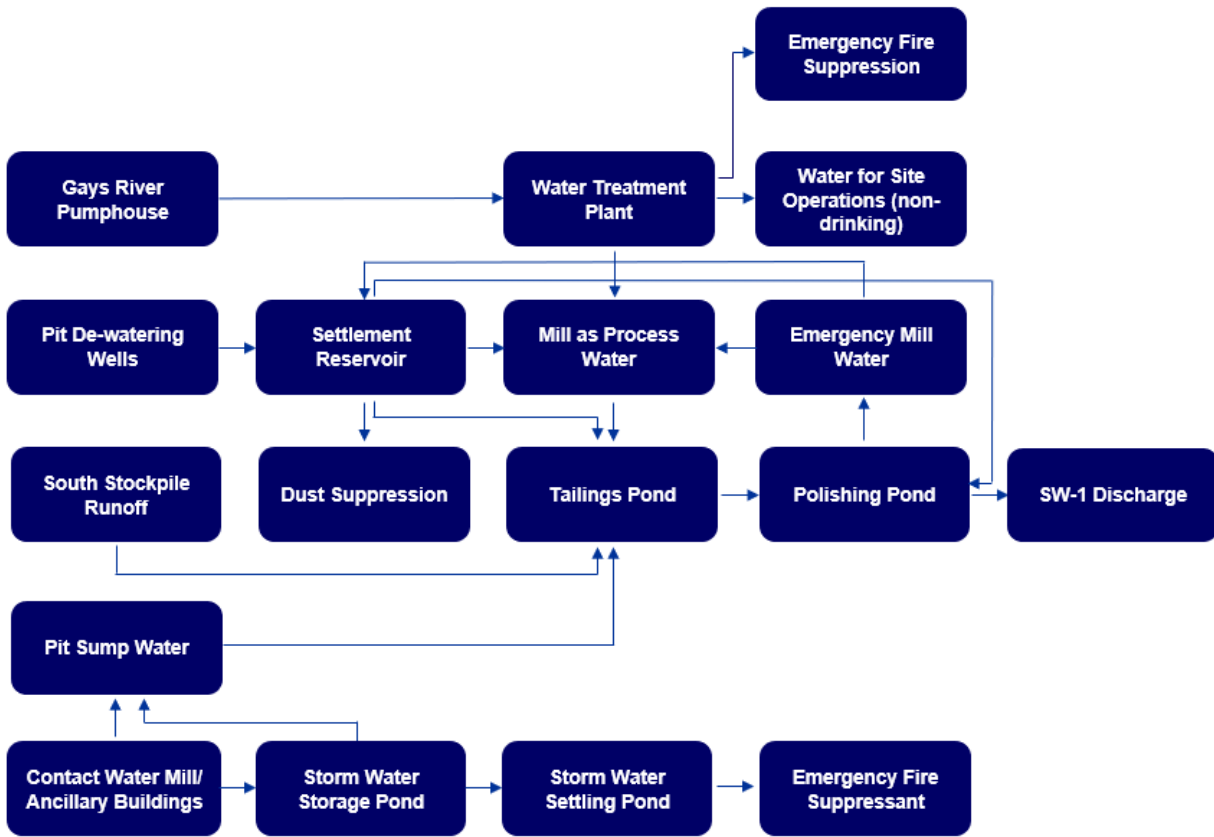
Contact water from the mill and ancillary facilities is controlled by ditching and naturally flows towards the Main Pit or to the storm water storage pond outside the mine office building that in turn flows back to the pit. Water directed to the pit will be managed with the pit water and directed to the TSF. The storm water storage pond outside the mine office is intended as back-up fire suppression water for the operation.

Contact water from the North Barrier Berm will be captured in settling ponds located at the base of the berm so that the overall drainage and flow patterns leading into the existing catchment areas are maintained. Water will be discharged directly to the environment via pond spillways following tests to confirm it is within water quality limits. Contact water from the South Stockpile is directed to the TSF. In addition to the ponds, straw bales, straw waddles, and other sediment controls are used.

Water will be withdrawn from the Gays River on an as needed basis and within the approved daily limit. Water will be sent to the water treatment facility and distributed as non potable water for site operations and to charge the Emergency Fire Suppression lines.

Water discharged from the tailings pond to the environment is currently subject to the Federal Metal and Diamond Mining Effluent Regulations (“MDMER”) approach and guidelines as well as some additional requirements from the Province via the existing Industrial Approval. Historically the operations discharges have met all requirements except minor copper exceedance that were properly reported, and corrective actions were successful.

**Figure 20-5: Scotia Mine Water Process Flow Chart**



**20.3.5 Chemicals, Fuel and Hazardous Material Management**

The majority of mine activities, and those associated with chemicals and hazardous material, will take place within the mill in clearly delineated areas. Specific chemicals will have their own dedicated containments with spill mitigation kits designed for those specific chemicals within the working area. Regulations outlined in the Industrial Approval for Dangerous Goods/ Waste Dangerous Goods/Reagent Handling will be adhered to. Bulk fuel storage will be contained in double walled tanks stored in an impermeable berm with a 110% capacity of total storage.

Concentrate will be stored in the container management facility in lined and sealed 20’ sea containers prior to shipment offsite. Consequently, dust should be minimal and any spills should be readily recovered.

The spill response plan will be updated to reflect changes to the mill process, storage of concentrate and bulk chemicals. An up-to-date inventory of dangerous goods and waste dangerous goods stored at the facility will be kept as is required by the Industrial Approval.

Non-hazardous waste produced on the mine site will be brought back to the existing facilities and trucked away for appropriate reuse or disposal to a provincially approved waste disposal facility. Recycling will be implemented where possible in accordance with HRM disposal requirements.



## 20.4 Permitting

The Province of Nova Scotia has a well-defined mine permitting process. The pre-development permitting process can be generalized into two stages, defined as Stage 1 or the Environmental Assessment (“EA”) stage and Stage 2 or Permits, Leases, and Approvals. Stage 1 is completed first, followed immediately by Stage 2, and once Stage 2 approvals are in place, mining activities can commence.

### 20.4.1 Overview of the Regulatory Process

#### 20.4.1.1 Stage 1 – Environmental Assessment

##### Provincial

The Environmental Assessment (“EA”) for a mine proposal normally occurs following advanced exploration, and a positive economic analysis to warrant mine development. The Environmental Assessment process in Nova Scotia is regulated under the provincial Environment Act and Environmental Assessment Regulations. Projects required to be registered for EA are divided into two categories: Class I and Class II undertakings. A facility that extracts or processes metallic or non-metallic minerals, coal, peat, peat moss, gypsum, limestone, bituminous shale or oil shale, is identified as a Class I undertaking thus requiring registration for EA. The provincial EA process begins with the proponent presenting an overview of the mining project at a “One Window” Committee meeting attended by Nova Scotia Environment (“NSE”), Nova Scotia Labour and Advanced Education, NSDLF and any other regulators the government determines to be relevant based on the project specifics (potentially including federal regulators such as DFO, Environment and Climate Change Canada, and Transport Canada). The meeting is designed to inform the regulators of the project and for the regulators to advise the proponent on any possible regulatory issues from their respective departments. At the end of the meeting, the Department of Environment will inform the proponent if the project must be registered under the Environmental Assessment Regulations.

Following the “One Window” Committee meeting but prior to registering the EA, the proponent will usually meet with members of the One Window Committee and hold a project open house for the public so that potential topics of concern are addressed in the registration document. Once the proponent is satisfied that topics have been addressed, a finalized registration document is submitted to NSE for Registration. Within seven days of the project’s registration, the proponent must publish a Notice of Registration to inform the public of the project, where copies of the EA Registration document can be reviewed, and to invite the submission of comments to the NSE EA Branch during the 30-day public review period. Copies of the document are also distributed by the Environmental Assessment Administrator to applicable regulators for review and comment. Following the public review and comment period, the Environmental Assessment Administrator summarizes comments received from the public and regulators, and submits to the Minister for an approval decision. From submission of the registration document to the Minister’s decision is approximately 57 days (i.e. seven days for the document to be registered following submission and 50 days for the public and regulatory review period and the Minister’s decision). However, the assessment may be extended if the Minister decides that more information, a focus report, or Environmental Assessment report is required. If it is an “Approval” decision, there are usually terms and conditions which must be addressed at Stage 2.

## Federal

The requirements for federal EA are defined by the Canadian Environmental Assessment Act (“CEAA”) 2012. CEAA 2012 applies to “Designated Projects,” which are physical activities listed under the Regulations Designating Physical Activities under CEAA 2012. A project not listed under the Regulations Designating Physical Activities can still be designated by the Minister, if, in the Minister’s opinion, the activity may result in adverse effects or public concern that may warrant the designation. Such a designation is unlikely for the Project.

The Regulations Designating Physical Activities identify 48 “Physical Activities” that constitute Designated Projects which would require federal EA under CEAA 2012. Items 16 and 17 of the Schedule to the Regulations Designating Physical Activities include:

- 16** *The construction, operation, decommissioning and abandonment of a new:*
- (a) metal mine, other than a rare earth element mine or gold mine, with an ore production capacity of 3 000 t/day or more;*
  - (b) metal mill with an ore input capacity of 4 000 t/day or more;*

- 17** *The expansion of an existing:*
- (a) metal mine, other than a rare earth element mine or gold mine, that would result in an increase in the area of mine operations of 50% or more and a total ore production capacity of 3 000 t/day or more;*
  - (b) metal mill that would result in an increase in the area of mine operations of 50% or more and a total ore input capacity of 4 000 t/day or more;*

Since the Scotia Mine will not exceed these thresholds, the Project is not considered a Designated Project under CEAA 2012, and a federal EA is not anticipated to be required. Further, as no aspect of the Scotia Mine will be built on federal land, it is not expected that the mine will require an Environmental Assessment under Section 67 of CEAA 2012.

### 20.4.1.2 Stage 2 – Permits, Leases and Approvals

Stage 2 follows an EA Approval decision and involves the steps to attain the Permits, Leases, and Approvals required for mining activities. The three generally required are a Mineral Lease, Land Access Agreements, and an Industrial Approval. A Mineral Lease grants exclusive rights (20-year term) to some or all of the mineral resources in a specified area but does not allow any field activity beyond exploration. The approval time for a new lease is generally 60 days or less if all required information has been submitted. Land Access Agreements are a legally binding agreement that provides the Proponent access to the project area. The length of time required to acquire these agreements is variable.

An Industrial Approval (10-year term) is to construct, operate, or reclaim an open-pit, milling facility, or bulk solids handling load out facility. The submission document is fairly substantial and if an Environmental Assessment was required, must address all of the terms and conditions outlined in the approval. Once the document has been submitted and determined to be “adequate” by the NSE, the approval process can take up to 60 days unless deficiencies are identified and the approval time period extended by the regulators.

## 20.4.2 Permits and Licences

ScoZinc has a number of permits and approvals in place for the Scotia Mine, as provided in the following table.

**Table 20-1: ScoZinc Permits and Approvals**

<b>SCOZINC PERMITS &amp; APPROVALS</b>						
<b>COMMON NAME</b>	<b>NUMBER (if applic.)</b>	<b>FUNCTION</b>	<b>GRANTING AUTHORITY</b>	<b>STATUS</b>	<b>DATE GRANTED</b>	<b>EXPIRY</b>
Environmental Assessment Approval - Main Mine Area	N/A	Environmental Review	Nova Scotia Environment (Then NS Dept. of Environment & Labour)	Approval in effect	2000-08-14	No Expiry
Environmental Assessment Approval - Southwest Expansion	N/A	Environmental Review	Nova Scotia Environment	Approval in effect	2011-10-07	2020-10-07* *date by which project (ie, the project within the SW Expansion Area) commencement is required
Industrial Approval - ScoZinc Scotia Mine	2006-055136-05	Operating Permit - Scotia Mine	Nova Scotia Environment	Approval in effect.	2017-02-23	2027-02-23
Industrial Approval - Sheet Harbour Bulk Solids Handling Facility	2007-057986-04	Operating Permit - Sheet Harbour Bulk Solids Handling Facility	Nova Scotia Environment	Approval in effect.	2017-11-01	2027-11-01
Mineral Lease 10-1	10-1	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2010-04-02	2030-04-02
Mineral Lease 12-1	12-1, ("40058" in NovaROC system)	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2013-10-02	2033-10-02
Mineral Lease 12-2	12-2, ("40059" in NovaROC system)	Required prior to the development of a mine	Nova Scotia Department of Energy and Mines (Then Department of Natural Resources)	In good standing	2013-10-02	2033-10-02

## 20.5 Indigenous Background

First Nations involvement with past operators of the mine and mill has been meaningful and as a result, to date the Scotia Mine has had no issues or incidents with Indigenous communities that could potentially be affected by the Project. Current management strives to continue that meaningful relationship through strong liaison and consultation with community leaders.

First Nations were involved in Mi'kmaq ecological knowledge gathering in the late 1990s, 2005, and again in 2012. In 2006, an archaeological site of significance (the Sinkhole Site) was mitigated using First Nations

involvement and staff in an area of Gays River. The site had been planned for disturbance by a previous mine plan. Contact has been made with representatives from the closest First Nations community of Sipekne'katik First Nation and preliminary discussions held about mutually beneficial programs. ScoZinc will pro-actively engage in further discussions and are cognizant of the "Mi'kmaq - Nova Scotia - Canada Consultation Terms of Reference".

## **20.6 Mine Closure**

The reclamation plan has been developed for the Scotia Mine in accordance with the Industrial Approval. The current plan is as of 2017 and is required to be updated during the annual review to indicate the current status of the site reclamation. It also includes the mine plan and progressive reclamation plans for the next three years. The current plan was most recently updated in 2017 and will be updated in 2020. A final reclamation plan will be submitted for approval within 6 months following cessation of production or 6 months before the commencement of final reclamation.

### **20.6.1 Temporary Closure**

Definition of Temporary Closure:

- Temporary Closure is defined as a mine ceasing operations with the intent to resume mining activities in the future. Temporary closures can last for periods of weeks, or for several years based on economic, environmental, political or social factors.

Definition of Care and Maintenance:

- Care and Maintenance ("C&M") is a term used in the mining industry to describe process and conditions on a closed mine site where there is a potential to recommence operations at a later date. During a care and maintenance phase, production is stopped but the site is managed to ensure it remains in a safe and stable condition.

### **Waste Rock Pile**

Activities planned for the waste rock pile during Temporary Closure or Care & Maintenance include monitoring for slope stability.

### **Underground**

Historical underground workings are flooded. ScoZinc has no intentions or plans to mine underground at the Scotia Mine. There are no underground mining operations included in the LOM for this Pre-Feasibility Study.

### **Mill Process Plant**

During Care and Maintenance, the Mill Process Plant will be shut down and all hazardous chemicals stored appropriately or shipped offsite. Process water will be sent to the Tailings Storage Management Facility (or TSF). All concentrates will be stored in shipping containers in the container management facility. Process infrastructure will be stored in a manner to prevent wear.

### **Tailings Storage Facility**

The Tailings Management Storage Facility will continue to receive surface water from runoff. Tailings pond and polishing pond will continue to treat as designed and water quality monitoring will continue at all surface water sites as per provincial and federal regulations.

### **Site Infrastructure**

Non-essential buildings during Care and Maintenance will be taken off-line. Only those buildings needed to support required personnel will remain active.

### **Monitoring**

Site monitoring will continue as required by provincially and federally mandated regulations.

## **20.6.2 Permanent Closure**

The needs and wishes of a community, as well as the mining process, may change as the Project proceeds resulting in the requirement for a “Final Reclamation Plan” to be submitted within six months following the end of the extraction phase of the mine life. This plan is prepared by the proponent in consultation with the CLC, NSE, NSDLF, local Indigenous Communities and potentially other stakeholders such as community groups or technical organizations.

This “Final Reclamation Plan” is then approved and the proponent begins the work. The plan often includes monitoring components for aspects such as surface water quality, groundwater quality, water levels, vegetation growth and wetlands health. When the proponent completes all of the requirements of the Environmental Assessment, Industrial Authorization and any other reclamation-related conditions, the proponent is able to get back the reclamation bond value in full. Nova Scotia also allows for portions of the bond to be released if progressive reclamation is part of the project. For example, if 20 percent of the area has been reclaimed to the goal in the “preliminary reclamation plan”, a portion of that bond may be released if NSE and NSDLF are satisfied with the work completed.

In accordance with the above noted process, no final reclamation plan for the Project has been prepared or submitted. The requirements noted here are inferred from the currently accepted Preliminary Reclamation Plan which covers the Main Pit, tailings storage facility, waste stockpiles, and mine buildings. The current Preliminary Reclamation Plan was approved in July 2017.

Reclamation for the entire Project will ultimately include the following:

- Removal of infrastructure and buildings
- Final rehabilitation of stockpiles
- Final surface contouring and sediment erosion control
- Assessment and remediation (if required) of any contaminated soils
- Rehabilitation of the former mining pits and tailings management area (including slope stabilization)
- Pit flooding
- Water level control
- Revegetation
- Monitoring

### **20.6.3 Post-Closure Monitoring, Maintenance and Reporting Program**

This Section outlines monitoring specific to reclamation activities. The current Environmental Assessment and Industrial Authorization for Site Operations prescribe required monitoring for the duration of site operations that includes a number of aspects as described above as well as surface water, groundwater, rare plants.

ScoZinc anticipates that in keeping with the currently approved reclamation plan, post-reclamation monitoring for the expanded Project will be carried out for a period of at least three years after final site reclamation. This includes monitoring of groundwater levels, surface water quality, vegetation, and aquatic habitat.

Key elements of the reclamation plan may include the following:

#### **Vegetative Cover**

Periodic inspections of the effectiveness of re-vegetation efforts will be needed. Areas identified as requiring additional effort will be noted, and a program to address the deficiencies in the re-vegetation will be developed and submitted to NSDLF and NSE for review.

#### **Slope and Shoreline Inspections**

Slopes on stockpiles and shorelines of the lakes created by reclamation activities will be inspected for issues of erosion on a routine basis during reclamation operations. Inspections on a quarterly basis are proposed for the various Pits for a period of three years after pit closure or less as agreed to by NSDLF, NSE and the CLC. ScoZinc recognizes that additional monitoring may be required after the reclamation program is complete, if so directed by NSDLF and/or NSE.

#### **Pit Water Quality**

Before decommissioning, the water being pumped from the Pits to the TSF will be monitored for general chemistry and metals according to stipulations set forth in the Industrial Approval. Upon cessation of dewatering operations in the Pits, this monitoring will be replaced by seasonal water quality measurements from two depths (0-1 m and 1 m from bottom) in a central location of the pit lake for general chemistry and metals. An in-situ water quality meter may be used to provide a suite of parameters such as temperature, conductivity, and pH. It is proposed that monitoring continue for three years after the water level in the pit has reached stabilization and then be re-assessed by ScoZinc and NSE to determine if refinements to the program are required or cessation of the program is approved.

#### **Groundwater Levels and Quality**

The site is well equipped with monitoring wells that are used to address the current Industrial Approval requirements for both water level and water quality monitoring. It can be expected that additional monitoring wells will be required to address the future phases of the Project beyond the currently permitted project footprint. Available wells in this network will be monitored on a monthly basis for water level and for general chemistry and metals after mine closure. Each year, ScoZinc will review the data and consult with NSE on any required refinements to the program.

A summary of the post-reclamation monitoring activities are provided below in Table 20-2.

**Table 20-2: ScoZinc Reclamation Plan**

Medium	Schedule	Parameters	Reporting	Maintenance	Comments
Surface Water	Monthly during reclamation. Quarterly post-reclamation for three years after quarry lake water level stabilization unless otherwise agreed upon with NSE and NSDLF	Surface water chemistry and field parameters data	Quarterly Summary  Yearly Report	Outflow structure may need minor repairs that will be completed when noted during monitoring sessions	Established monitoring locations. Locations added or removed as required
Drainage Control Structures	Monthly during reclamation then Quarterly for three years after quarry lake water level stabilisation	Inspection	Quarterly Summary  Yearly Report	As needed	Include all surface water drainage structures, including those that are part of the TMA
Groundwater	Monthly during reclamation/ Quarterly post reclamation for three years after quarry lake water level stabilisation unless otherwise agreed upon with NSE	Groundwater chemistry and field parameters data	Quarterly Summary  Yearly Report	Wells may need minor repairs that will be completed when noted during monitoring sessions	Existing wells will be used and possibly supplemented, if needed
Vegetation	Monthly during reclamation/ Quarterly post reclamation for three years after quarry lake water level stabilisation unless otherwise agreed upon with NSE and NSDLF	Vegetation population and community survey data	Quarterly Summary  Yearly Report	As required to establish vegetative cover	Approved seed mixes will be used. Monthly inspections will only be during the growing season
Wetlands	Monthly during reclamation/ Quarterly post reclamation for three years after quarry lake water level stabilisation unless otherwise agreed upon with NSE and NSDLF	Wetland plant community and hydrology data	Quarterly Summary  Yearly Report	As required to establish wetlands	Constructed wetlands will have a monitoring program specified in the wetlands compensation plan that is accepted by NSE
Erosion and Sediment Control (pit shore and stockpile slope stability)	As required during reclamation until stable conditions are reached. Monthly in year one post reclamation activities being completed and quarterly for three years after quarry lake water level stabilisation	Visual inspection. Develop metrics to measure success	Quarterly Summary  Yearly Report	As required to maintain slope stability and erosion control	Pit shoreline; Stockpile slopes. Inspections will be completed by qualified persons

Tailings Management Area Discharge	Monthly during reclamation then quarterly for three years after quarry lake water level stabilisation	Surface water quality and quantity data	Quarterly Summary  Yearly Report		SW1 is the only planned discharge point from the Tailings Management Area
TMA Dams (Causeway, Saddle & Polishing Pond)	Monthly during reclamation then quarterly for three years after quarry lake water level stabilisation	Inspection	Quarterly Summary  Yearly Report	As needed	
TMA Dam Safety Review (Causeway, Saddle & Polishing Pond)	At least once post active reclamation	Inspection and report	Once		
Pit (s) water	Monthly during reclamation and refilling; then quarterly after pit has reached steady state unless otherwise agreed upon with NSE and NSDLF to the end of the monitoring program (three years after quarry lake water stabilisation)	Surface water quality and quantity data	Quarterly Summary  Yearly Report		Two samples at one location: 0-1 m and 1 m from bottom
Quarry Lake, Western Wetland, & Gays River	Monthly during reclamation and refilling; then quarterly after pit has reached steady state unless otherwise agreed upon with NSE and NSDLF to the end of the monitoring program (three years after quarry lake water stabilisation)	Water Levels	Quarterly Summary  Yearly Report		

#### 20.6.4 Reclamation Bonding

ScoZinc currently has a cash performance bond for the protection of domestic water supplies (\$147,500) and a reclamation bond of \$2.89 million held with the Province of Nova Scotia.

The domestic water supply related bond has been implemented as part of the Industrial Approval and has never needed to be drawn from due to an unresolved water supply related issue.

The reclamation bond amount was calculated based on the Reclamation Plan submitted to and accepted by the Province in 2011. Bonding for the Southwest Expansion, permitted in 2012, is currently outstanding and payment will be required prior to any work commencing. The current bonding for the Southwest Expansion is estimated to be \$4.0 million, as the initial cost estimate by the Province for the reclamation of this additional area was \$3.7 million. No additional bonding for mining the Getty Deposit has been included in the current economic model of the Project as the current bonding in place of \$2.89 million plus the



Southwestern Expansion bonding of \$4.0 million is in total (\$6.89M) considerably larger areas than the proposed additional mining areas associated with the Getty Deposit.

It is expected that progressive reclamation of the historic project components (mined out pit areas and existing rock dumps and stockpiles) in conjunction with progressive bonding by the Government will allow the total bond requirements to be maintained (or potentially reduced for the Southwest Extension via progressive reclamation work) at the current estimate of \$6.89 million as the Project progresses through the Northeast Extension, Northeast Pit, and Southwest Extension Pit and Getty phases.

## 21 Capital and Operating Expenditure

### 21.1 Sources of Estimated Costs

The capital and operating expenditure estimates used in this Pre-Feasibility Study for re-starting the Scotia Mine (pre-commercial production period) were determined from a number of sources by ScoZinc and its consultants, including equipment purchase, leasing proposals and vendor quotations. See Table 21-1 overleaf.

Due to the brown-field nature of the Scotia Mine, and its high-level care & maintenance status, it is estimated that more than 50% of the capital cost estimates, excluding contingency, are based on firm pricing obtained through competitive quotations by qualified vendors and contractors.

Under the Life of Mine plan and cash flow model, the Scotia Mine commences re-start works 9 months before actual commercial production of zinc and lead concentrate begins. This period is referred to as the pre-commercial production period, or “pre-production” period of the mine. ScoZinc believes that due to the high-level care & maintenance status of the mine, plus the Scotia Mine staff already in place with its strong contractor and consultant base, a relatively short 9 to 12 months period is time enough to complete all necessary technical work, permitting notices, and supplier quotations in order to ensure the commercial production timetable is met.

Mine production therefore commences on Month 4 of the pre-production period (or 5 months before commercial production), and mineral processing commences on Month 10 of the pre-production period. The pre-production period is also referred to Year -1. Commercial production therefore occurs on Month 10 of the pre-production period, which is effectively Month 1 of the Scotia Mine production period. Year 1, also begins on Month 1, with the Life of Mine plan showing 14 Years of commercial production.

The majority of the quotes and work proposals have been received during the first quarter of 2020, and are considered to provide a relatively high-level of accuracy for the purposes of this Pre-Feasibility Study and the cash flow model.

Additional engineering designs are however planned to confirm layout and structural support aspects for new equipment in the mill processing plant particularly, including the new primary and secondary crushers, the new double deck vibrating screen, the Jameson flotation cells, the new concentrate filter presses and concentrate loadout facility.

**Table 21-1: Sources of Inputs to Capital and Operating Expenditure Estimates**

<b>Capital and Operating Estimate</b>	<b>Source</b>
Mining fleet costs and operating performance	Toromont/ Komatsu
Mining operations costs including dewatering & support	Terrane/ ScoZinc
Mining infrastructure costs	Suppliers/ ScoZinc
Processing Plant equipment upgrades	Ausenco
Processing operating costs	Ausenco/ ScoZinc
Site facilities improvements and operating costs	ScoZinc
Concentrate logistics	ScoZinc
Power requirements & costs	Ausenco/ ScoZinc
Owner's costs	ScoZinc
Reclamation estimate	Dept Mines/ Environment

## 21.2 Capital Cost Summary

Capital cost estimations for a 9 to 12 month pre-production period through to commercial production period have been estimated to total of \$26.9 million, which are based on mining equipment purchase or leasing costs, mill refurbishment and upgrade costs, plus all indirect capital costs during the pre-production period, excluding working capital, ownership costs and contingency.

Including all working capital and contingencies for the life of the mine, the estimated total LOM capital cost is \$38.3 million (See Table 21-2). Working capital includes all operating costs and indirect capital costs required until receipts from sales of concentrate are realized. Contingencies of between 5% and 15% were applied to each major cost centre to provide a standard Pre-Feasibility Study accuracy of between -20% to +20%. Ausenco have reported an accuracy of +/- 25% on certain refurbishment costs of the mill.

Following on from commercial production, capital costs have been developed for the life of mine to include sustaining capital requirements over the 14-year mine life. Estimations have been developed based on month-by-month forecasts over approximately 160 months.

**Table 21-2: Summary of Capital Costs**

<b>Capital Cost period</b>	<b>Duration</b>	<b>Total</b>
Pre-Commercial Production Cost	9 months	\$26.9 million
Sustaining Capital Cost	14 years	\$8.1 million
<b>Life of Mine Capital Cost</b>	<b>14.6 years</b>	<b>\$35.0 million</b>
Contingencies	2 years	\$3.3 million
<b>Total Life-of-Mine Capital Cost</b>	<b>14.6 years</b>	<b>\$38.3 million</b>

### 21.2.1 Pre-production Capital

During the pre-production period of 6 months, the capital costs forecast for each month are provided in the following table by major cost centre (See Table 21-3). The majority of the costs are associated the mill process plant refurbishment and upgrades, the mining fleet equipment purchases and leasing costs, and the mine operating costs for pre-stripping overburden to access the orebody for sustainable ore supply to the mill.

**Table 21-3: Pre-production Capital Costs**

Major Cost Centre	M-9 \$M	M-8 \$M	M-7 \$M	M-6 \$M	M-5 \$M	M-4 \$M	M-3 \$M	M-2 \$M	M-1 \$M	Total \$M
Mining	0.1	0.1	0.2	0.7	1.5	1.3	1.6	2.0	2.1	9.6
Processing	4.4	1.3	1.0	1.3	1.5	1.6	1.5	0.3	2.3	15.2
Site Infrastructure	0.0	0.0	0.1	0.4	0.4	0.1	0.1	0.0	0.0	1.1
Reclamation Bond	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.0	0.0
<b>Total Capital Cost</b>	<b>4.5</b>	<b>3.4</b>	<b>1.3</b>	<b>2.4</b>	<b>3.4</b>	<b>3.0</b>	<b>3.2</b>	<b>2.3</b>	<b>2.4</b>	<b>25.9</b>
Contingency	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.2	2.8
<b>Total Pre-production Capital</b>	<b>4.7</b>	<b>3.7</b>	<b>1.6</b>	<b>2.8</b>	<b>3.8</b>	<b>3.4</b>	<b>3.5</b>	<b>2.6</b>	<b>2.6</b>	<b>28.7</b>

A number of critical capital items will be ordered in advance during the procurement phase of the execution strategy, in particular certain processing equipment with long lead times.

During the pre-production phase, lease payments on any items, particularly mining equipment, has been included in the pre-production capital costs.

During the production period, the lease costs of such items after production commencement are included in Sustaining Capital costs for the life of mine.

### 21.2.2 Salvage Values

The Scotia Mine is currently on care & maintenance and holds a large real property portfolio and an extensive equipment asset register with a currently combined assessed value of over \$7 million. With the refurbishment and upgrades to the processing plant over the mine life, plus the purchase of additional mobile equipment, it is expected that the salvage value of the equipment at the end of the mine life would be in the order of \$8 million.

The table below presents a summary of the main equipment and salvage values after considering costs associated with disassembly and sale costs. See Table 21-4.

**Table 21-4: Salvage Value Capital Estimates**

Major Item for Salvage or Sale	Capital Cost/ Assessed Value	Residual Value	Salvage Value
Mining equipment	\$12M	15%	\$2M
Process plant equipment	\$10M	15%	\$2M
Site equipment (existing)	\$4M	15%	\$1M
Environmental bond (existing)	\$3M	0%	\$0
Real estate portfolio (existing)	\$2M	-3%	\$3M
<b>Total</b>	<b>\$31M</b>		<b>\$8M</b>

### 21.2.3 Pre-Production Capital Cost Inclusions and Exclusions

The following cost items have been included in the Pre-Production Capital Cost Estimate:

- Additional engineering design work and trade-off studies
- Project financing costs
- Additional environmental bonding requirements

The following cost items have not been included in the Pre-Production Capital Cost Estimate:

- Project sunk costs including Preliminary Economic Assessments or Pre-Feasibility Studies
- Additional diamond drilling costs
- Any scope changes
- Inflation or escalation during pre-production period
- Foreign exchange variations

Table illustrating the capital cost inclusions and exclusions are provided below. See Table 21-5 and Table 21-6.

**Table 21-5: Pre-production Capital Costs Inclusions and Exclusions**

Capital Expenditure	Inclusion	Exclusion	Total Cost
Engineering & IFC designs <sup>1</sup>	Yes		\$2,935,203
Hydrological study <sup>2</sup>	Yes		\$20,000
Ownership costs (deferred payment)	No	Yes	\$1,166,667

Note 1: Engineering designs for the process plant refurbishment upgrades, namely the primary crusher, secondary crusher, Jameson cell additions, concentrate filter press mezzanine deck, concentrate loadout conveyor bin and retractable conveyor system.

Note 2: Hydrological study on optimal water table pumping rates for pit slope stability

**Table 21-6: Recommended Pre-Production Cost Items**

Capital Cost	Inclusion	Exclusion	Total Cost
Metallurgical testing to increase throughput <sup>(1)</sup>		No	\$50,000

Note 1: Metallurgical test work to improve throughput beyond 2,700 tpd

#### 21.2.4 Pre-Production Direct Capital Costs – Mining

The Life of Mine plan requires that five months of high-strip ratio mine production occurs before sufficient ore stockpiles are built to enable optimal blending at the ROM and a sustained processing rate of 2,700 tonnes per day.

As the Scotia Mine is based on owner-mining fleet operations, mining equipment is scheduled to arrive to site at least six months before commercial concentrate production occurs. ScoZinc's strategy is to gradually build up monthly mine production rates ensuring that the equipment operators and supervisory personnel are appropriately trained and assessed for the operational targets required.

Due to the open-pit development sequences determined during the pre-production period, both ore and waste materials are mined from the Scotia deposit from the first month of mining operations. For this reason, there are no mine pre-development costs.

Total pre-production capital expenditure for mining is estimated to be \$1.48 million, with an additional contingency of \$0.22 million.

#### 21.2.5 Pre-Production Direct Capital Costs – Processing

In February 2020, Ausenco completed a mineral processing trade-off technical study which determined that ScoZinc's mill contained a number of production and maintenance bottlenecks whose removal will contribute to increasing the efficiency of the mill under a production. Such bottlenecks included, inadequate grizzly design, inability of primary and secondary crushers and screens to correctly reduce rock sizes for efficient grinding, excessive dust generation inside the mill, undersized screens and general crushing circuit throughput restrictions, Fine-Ore-Bin ore freezing and maintenance constraints, grinding circuit throughput and sizing constraints, re-grind mill disconnection, flotation circuit overload and poor particle separation and recovery, excessive concentrate moisture due to poor drying circuit system, insufficient and unreliable power supply, and insufficient and unreliable water supply. In evaluating the bottlenecks, Ausenco determined that a number of low-cost improvements could be made during a relatively short refurbishment period to significantly de-risk the processing operations. The main process flow improvements include the following:

- Addition of a two-stage crushing on the Run-Of-Mine ("ROM") pad to eliminate excessive dust and improve oversize handling, throughput and blending controls
- Upgrades to the Fine-Ore-Bin with knife gates, vibratory feeder conveyors and air canons to improve operations and maintenance controls, and also prevent ore freezing during periods of very low outside temperatures
- Replacement of the rod handlers and various chutes to improve operations and maintenance

- Incorporation of the re-grind mill to improve zinc grades
- Upgrades to the flotation circuits with more efficient pumps and agitators, inline sampling, and flotation cell level automation; and
- Upgrades to the concentrate drying circuit with efficient filter presses commonly used in colder climate operations and enable higher productivity with better moisture controls.

During the Pre-Feasibility Study process, ScoZinc and Ausenco applied considerable effort to determining the optimal equipment requirements and capital costs, whilst focusing on ScoZinc's strategy of a low-cost and low-risk full scale production model.

ScoZinc and Ausenco have completed preliminary layouts and designs for the refurbishment and upgrade of the mill and associated facilities. Capital costs have been forecast based on a range of quotations received from vendors and costings received on other similar projects.

Costs were received on the following major items:

- Primary crusher monthly rental charges
- Secondary crusher system supply and install
- Tertiary crusher refurbishment
- Vibrating double deck screen supply and installation
- Fine-Ore-Bin material handling upgrades
- Rod mill refurbishment
- Ball mill 1 refurbishment
- Ball mill 2 refurbishment (previous re-grind mill)
- Cyclone refurbishment
- Reagent systems upgrades
- Metallurgical laboratory upgrades
- Flotation cell refurbishment
- Jameson cell supply and installation
- Thickener tanks refurbishment
- Concentrate filter press supply and installation
- Concentrate load out facility upgrades
- Concentrate handling facility supply and installation
- Electrical system survey including load survey and MCC
- Instrumentation and control systems
- Water balance survey and system upgrades
- Conveyor systems maintenance and upgrade

Total pre-production capital expenditure for processing is estimated to be \$15.3 million, with an additional contingency of \$2.6 million.

### 21.2.6 Pre-Production Direct Capital Costs – Site Infrastructure

ScoZinc has completed designs for the relocation or upgrades to various infrastructure on site to support the mining and processing operations. Capital costs have been forecast based on a range of quotations received from vendors.

Costs were received on the following major infrastructure item costs:

- Powerline re-alignment from the northern wall to the southern wall
- Internet systems upgrades with fibre-optic connections
- Security systems upgrades with additional remote CCTV systems

Total pre-production capital expenditure for infrastructure is estimated to be \$1.1 million, with an additional contingency of \$0.15 million.

### 21.2.7 Reclamation Costs

The Scotia Mine currently has a cash bond of \$2.89 million with the Nova Scotia Department of Finance to cover the reclamation work of the Environmental Assessment of the main zone of the Scotia Deposit. This cash bond was provided to the Nova Scotia Government in 2006. ScoZinc plans to replace this cash bond with a surety bond, and has received preliminary premium quotations for that to occur just prior to commercial production.

According to the additional EA for the SW & NE expansion, ScoZinc must provide an extra environmental security bond in the amount of \$4 million to cover the reclamation work which was based on ScoZinc's preliminary economic assessment ("PEA"). A new bond estimation is required based upon the PFS study and new life of mine plan. Due to very different life of mine strategies including the opportunity to progressively perform reclamation and deposit significant amounts of waste in the mine out pits, ScoZinc estimates that the additional environmental bond for the SW expansion may be consequently reduced to an additional bond of \$2 million. ScoZinc also plans to provide a surety bond for this amount, and has received preliminary premium quotations for that to occur just prior to commercial production in connection with the conversion of the existing \$2.89 million cash bond. See Table 21-7 overleaf.

For future mining areas requiring environmental approval and bonding after the Year 6 of the life of mine plan, namely the Getty Deposit, ScoZinc has assumed that a surety bond would be in place of \$2 million to cover the reclamation bond for the Getty area at the end of the mine life.

Reclamation costs for the current Environmental Assessment Approvals have been determined by the Nova Scotia Department of Environment and are tabulated as follows. All bond estimates have been included in the cash flow model under the sustaining capital costs.



**Table 21-7: Reclamation Bond Requirements**

<b>Development Area</b>	<b>Bond Required</b>	<b>Trigger</b>
Main zone	\$2.89 million	Bond in place
SW and NE zones	To be re-assessed	Prior to disturbance
Getty zone	Not determined	Prior to Year 6 of the LOM
<b>Total Bond</b>	<b>\$7.89 million</b>	
Bond currently remitted	\$2.90 million	
Bond remaining	To be re-assessed	Prior to disturbance

### 21.2.8 Pre-Production Indirect Costs

ScoZinc has planned for its own qualified personnel to actively supervise the implementation of certain engineering, procurement and refurbishment works on the mine site, including those of the processing plant.

However, in respect of specialist expertise required for refurbishment of the Plant within the 5 to 6-month timeframe planned, ScoZinc intends to secure the services of an Engineering, Procurement and Construction Management (“EPCM”) for a proportion of the process plant upgrades. The cash flow model has allowed for EPCM costs where necessary.

ScoZinc has also allowed for an increase to its spare parts inventory and for key equipment tenders. Prior to the pre-production period, the Scotia Mine will employ experienced warehouse and logistics personnel to manage inventory controls and bidding processes.

Total pre-production indirect costs are estimated to be \$2.9 million.

### 21.2.9 Pre-Production Contingency

Contingency allowances were estimated by ScoZinc, Ausenco and MineTech for each major cost centre based on the level of engineering definition required and the method of pricing sourced for various equipment.

The general basis of contingency levels are as follows:

- 5% - new mining equipment
- 5% - new mechanical equipment
- 10% - freight from source to site
- 25% - refurbishment of existing mill

Total pre-production contingency allowances are estimated to be \$2.9 million.

### 21.2.10 Production Sustaining Capital

During the 14-year period of commercial production under the life of mine plan, sustaining capital costs have been determined on a month by month basis, to match the level of scheduling detail completed during the mine planning process. Sustaining capital costs are not escalated or inflated.

The life of mine sustaining capital costs have been developed as follows:

- For mining equipment and activities, including the purchase and rebuild of mobile equipment, \$2.54 million is required over the mine life, including vehicles, dewatering equipment, replacement mining equipment, studies, support equipment, rockbreaker and a north protection berm. Costs for mining equipment used in this estimate were sourced from a variety of equipment suppliers, including Toromont, Komatsu, Dyno Nobel, and Archibald Drill & Blast
- Mining equipment leasing and rental costs \$51.57 million are included in sustaining capital costs over the life of the mine
- Processing equipment leasing or rental costs of \$6.68 million are included in sustaining capital costs over the life of the mine and processing equipment upgrades or replacements of \$0.9 million.
- Infrastructure costs of \$0.9 million
- Reclamation costs of \$1.35 million are included in sustaining capital costs over the life of the mine
- Salvage value of \$8.0 million has been estimated and is a reduction of sustaining capital taken at the end of the mine life

Overall, sustaining costs are an estimated \$5.29 per tonne of ore processed over the life of the mine. See Table 21-8.

**Table 21-8: Total Sustaining Capital Costs**

Sustaining Capital Costs	Life of Mine (\$/tonne Processed)	Life of Mine (\$M)
Mining	\$3.97	\$54.24
Processing	\$0.56	\$7.58
Infrastructure	\$0.07	\$0.90
Reclamation	\$0.10	\$1.35
Salvage Value	\$0.59	\$8.00
<b>Total</b>	<b>\$5.29</b>	<b>\$72.07</b>

Rounding note: Rounding of numbers may influence statistic totals

### 21.2.11 Working Capital

Working capital includes the accumulation of operating expenses between the period of commercial production and the receipt of revenue from sales. All pre-production expenditure is classed as capital expenditure.

Due to the Scotia Mine's relatively short gap period determined by its planned efficient concentrate handling and transport system, the working capital requirement is estimated at \$5 million.

## 21.3 Operating Expenditure Estimate

### 21.3.1 Total Operating Expenses

The Scotia Mine total operating expenditure (“OPEX”) estimate is \$740.1 million over the life of the mine. This equates to \$53.72 per tonne of ore processed (or milled), which is equivalent to a US\$0.59/lb C1 Cash Cost average (See Table 21-9).

Compared to the other current zinc producers, this average C1 Cash Cost potentially places the Scotia Mine in the 25% lowest cost producers in the world. See Figure 21-1: Scotia Mine Average C1 Cash Cost overleaf.

The operating expenditure table below provides a summary of the life of mine operating costs for the total LOM processed tonnage of 13.6M.

**Table 21-9: Total Operating Expenditure Summary**

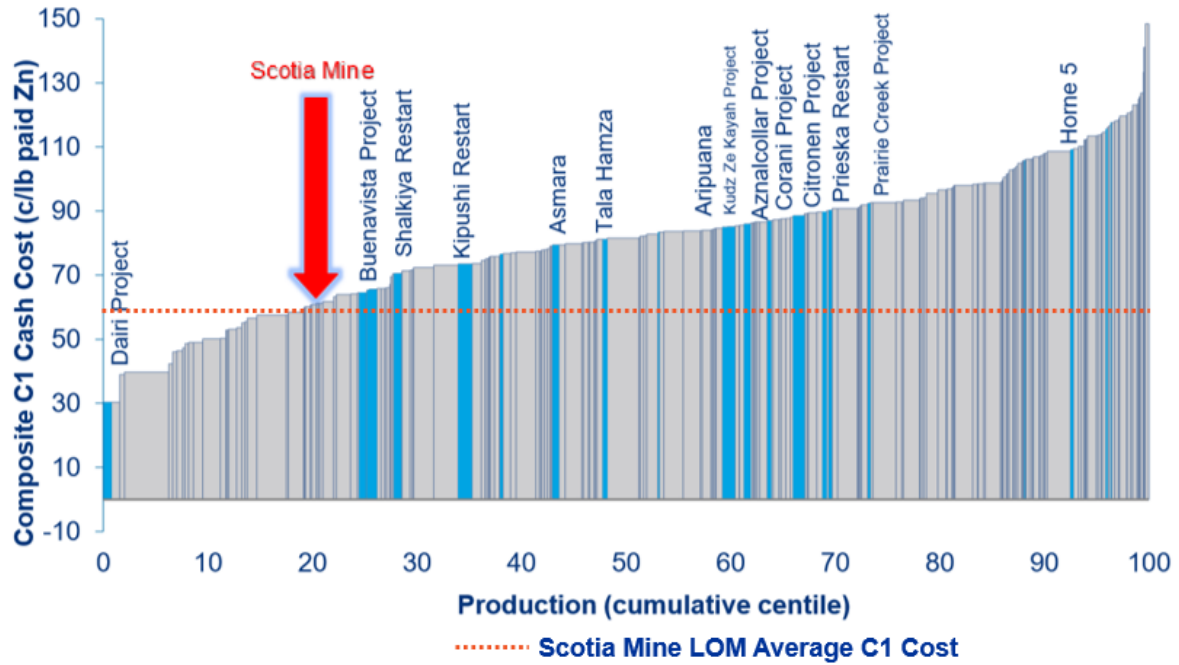
Major Cost Centre	Life of Mine Total Cost	Life of Mine Unit cost
Mining	\$276.7M	\$20.26
Processing	\$154.1M	\$11.29
SG&A	\$31.0M	\$2.27
TC & Freight	\$271.6M	\$19.89
<b>Total</b>	<b>\$733.4M</b>	<b>\$53.72/t milled</b>
	<b>C1 Cash Cost</b>	<b>US\$0.59/lb</b>

Rounding note: Rounding of numbers may influence statistic totals

The detailed life of mine plan indicates that mine operating expenses will vary from year to year due to the initial high stripping ratios and shallow pits, versus low stripping costs and deeper pits past the mid-way point of the mine life.

In contrast, processing costs over the life of the mine are fairly constant due to the steady-state processing throughput of 2,700 tonnes per day for the life of the mine. ScoZinc however expects processing improvements to be made in due course, such that the total unit operating costs may be reduced as the orebody is developed over the 14-year mine life.

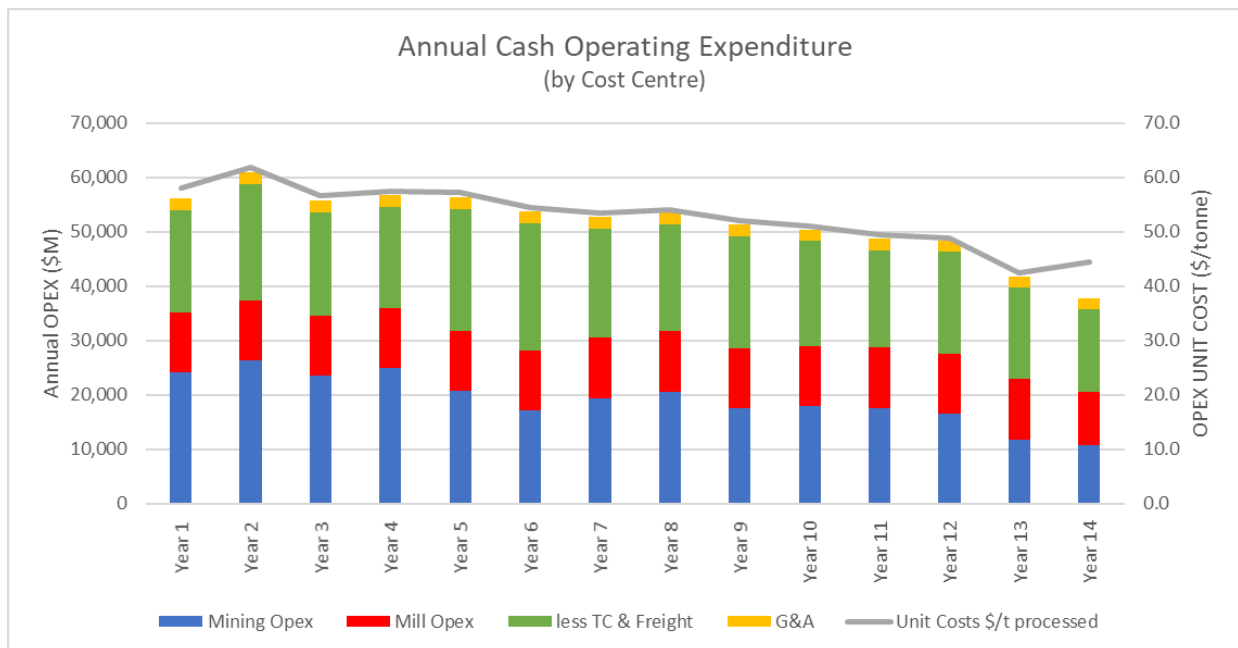
**Figure 21-1: Scotia Mine Average C1 Cash Cost**



Source: Wood Mackenzie, ScoZinc Mining Ltd.

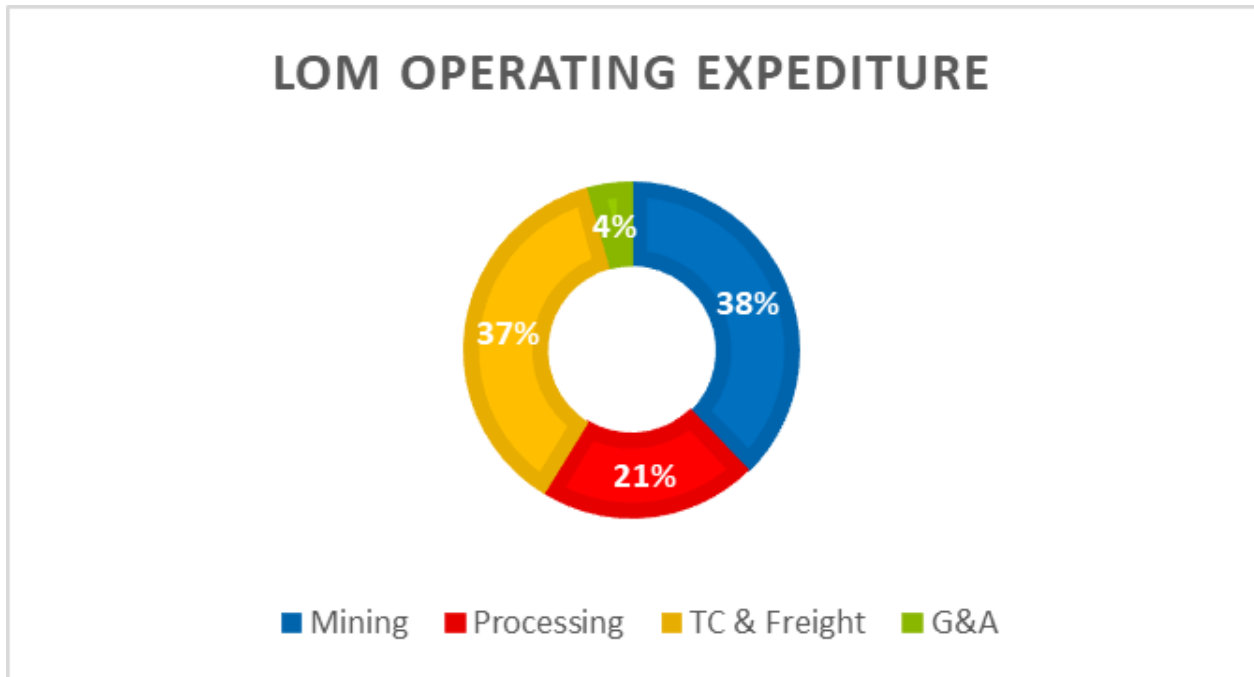
For an annual operating cost perspective, the following figure illustrates the changes in cash operating expenditure over the mine life.

**Figure 21-2: Annual Cash Operating Expenditure**

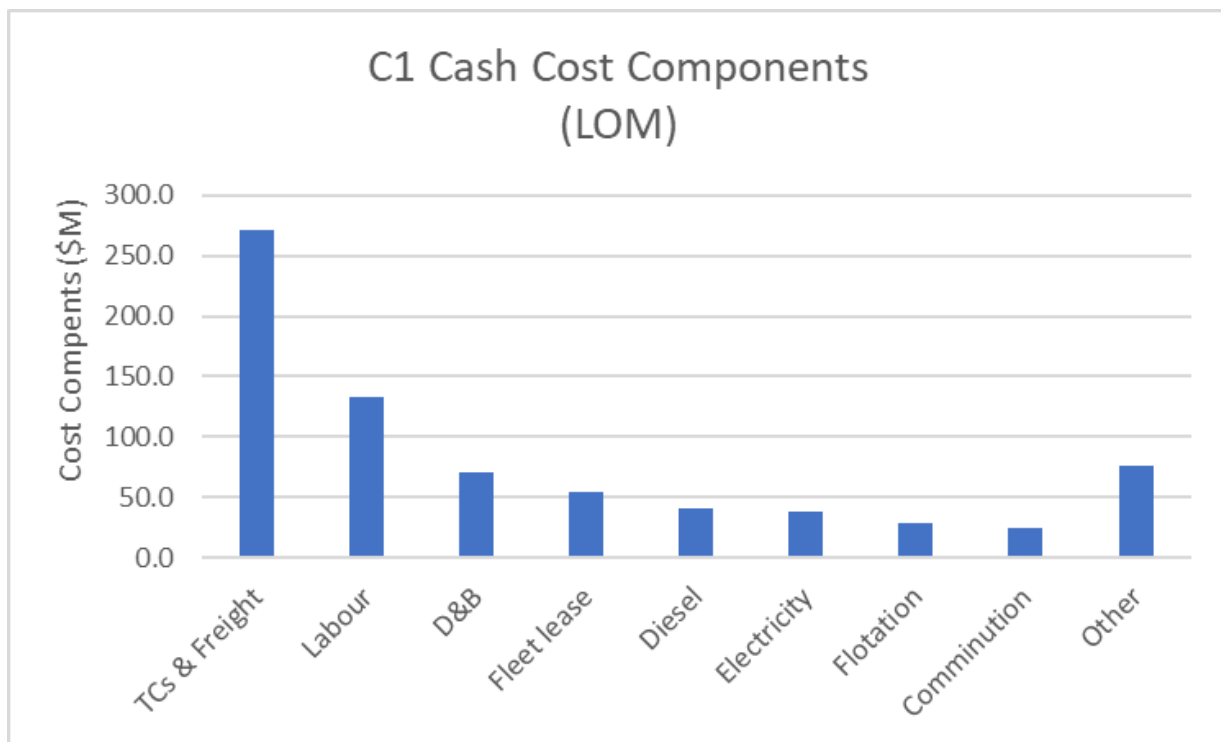


The following figures illustrate Operating Expenditure by Cost Centre over the LOM, and the C1 Cash Costs for major cost components over the mine life. See Figure 21-3 and Figure 21-4.

**Figure 21-3: Annual Cash Operating Expenses by Cost Centre**



**Figure 21-4: Annual Cash Operating Expenses by Cash Cost Component (LOM)**



### 21.3.2 Mine Operating Expenditure

The Scotia Mine is developed using conventional open-pit mining practices and equipment with plans and designs prepared in conformance with regulatory requirements and industry best practices. These plans include detailed operational designs and schedules developed and optimized using the most recent mineral reserve estimates and state of the art mine planning software. The life of mine (“LOM”) plans provide detailed pit designs, access ramps, haulage routes, waste rock storage dumps, pit wall dewatering controls measures, design steps to address the old underground workings, pit slope stability measures, and dewatering models in order to achieve the best mining performance possible.

Drilling and blasting will be conducted by a licenced specialist contractor, and the load and haul operation will be conducted by ScoZinc. Mobile mining equipment will be provided to the mine under a 60-month maintenance and repair contract (“MARC”) to ensure the equipment meets and maintains the best performance specifications throughout at least the first five years of its life span. Following that five-year period, ScoZinc intends to have sufficient maintenance personnel trained and in place to perform its own maintenance on its mobile fleet. All operations will be under the supervision of ScoZinc management teams.

Mine site infrastructure such as technical facilities, equipment workshops, fueling bays, and operations area are predominantly in place to provide the essential support to mining operations. ScoZinc has included additional costs for improving support, such as a new diesel fuel bay and an additional workshop for large mobile mining equipment maintenance.

The mine will be operated on two 12-hour shifts per day, 365 days per year basis with 4 panel rotating crews. Labour supply within the province is more than ample to supply the needs of the operation. Labour rates used in the cash flow model are comparable other mining operations in the region.

The mine operating cost components include:

- Operating labour costs
- Mobile equipment operating costs
- Mobile equipment diesel fuel and tire costs
- Dewatering power and equipment
- Project costs
- Supervisory operating costs
- Indirect operating costs.

The estimated annual mine cash operating expenses (“Mine OPEX”) varies across the life of the mine due to pit development sequences necessary for maintaining the constant ore supply to the ROM stockpiles for mineral processing.

The distribution of operating costs within the mining operation are provided in the charts below. See Figure 21-5 and Figure 21-6. Drill and Blast, Labour, Equipment Leasing, Fuel and MARC costs are the major costs for the mine.

Figure 21-5: LOM Mine Cash Operating Expenditure

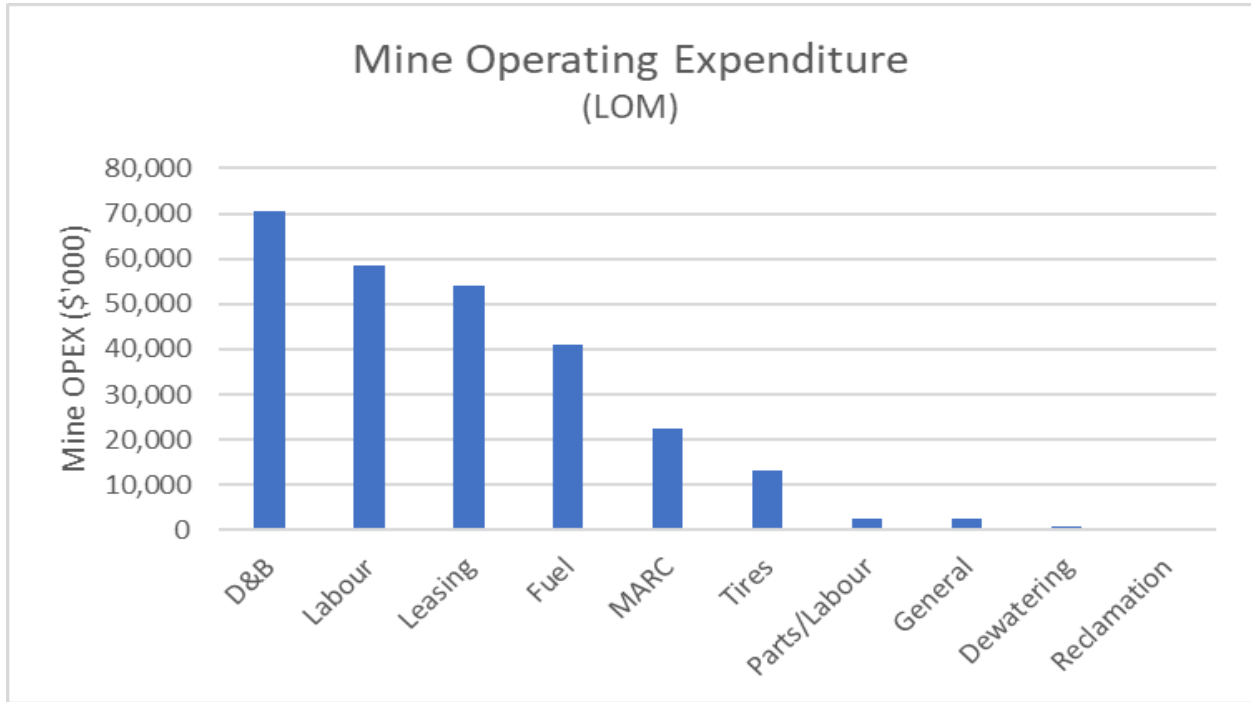
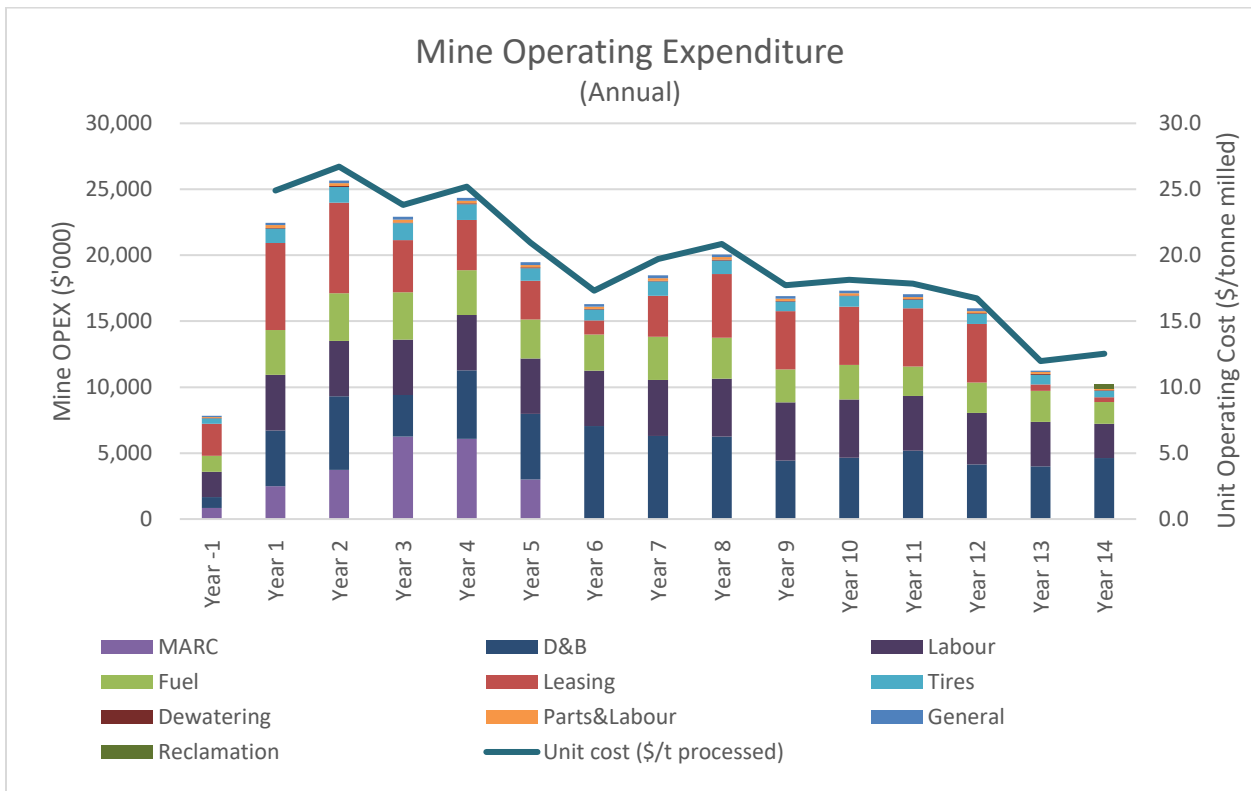


Figure 21-6: Annual Mine Cash Operating Expenditure



### 21.3.3 Mill Operating Expenditure

ScoZinc's mineral processing operations at the Scotia Mine use conventional crushing, grinding, flotation and filtration processes to recover both zinc and lead concentrates. The mill operating expenditure (or "Mill OPEX") has been developed based upon using the existing refurbished infrastructure, labour costs and process consumables for a 2,700 tonnes per day throughput.

ScoZinc and Ausenco analysed and examined a number of alternative throughput levels, ranging between 2,200 and 3,000 tonnes per day, with an additional alternative of 4,500 tonnes per day throughput. Under varying capital and operating expenditure costs, the 2,700 tonnes per day throughput was determined as the most optimal throughput for maximum recoveries, lowest capital costs and lowest risk operating performance.

Mill operating expenditures were developed for a 2,700 tonne per day life-of-mine throughput which included detailed planning and performance analysis of all processing circuits, including comminution, flotation, reagents, consumables, inventories, water and power costs. Historical operating costs were also reviewed as a basis of comparison.

All processing operations will be under the supervision of ScoZinc management teams. Mill site infrastructure such as technical facilities, equipment workshops, and operations area are predominantly in place inside the Mill Building to provide the essential support to processing operations. ScoZinc has included additional costs for processing support, including an additional backup transformer and concentrate handling operations.

The mill will be operated on two 12-hour shifts per day, 365 days per year basis with 4 panel rotating crews. Labour supply within the province is more than ample to provide the needs of the processing operation. Labour rates used in the cash flow model are comparable to other processing operations in the region.

The mill operating cost components include:

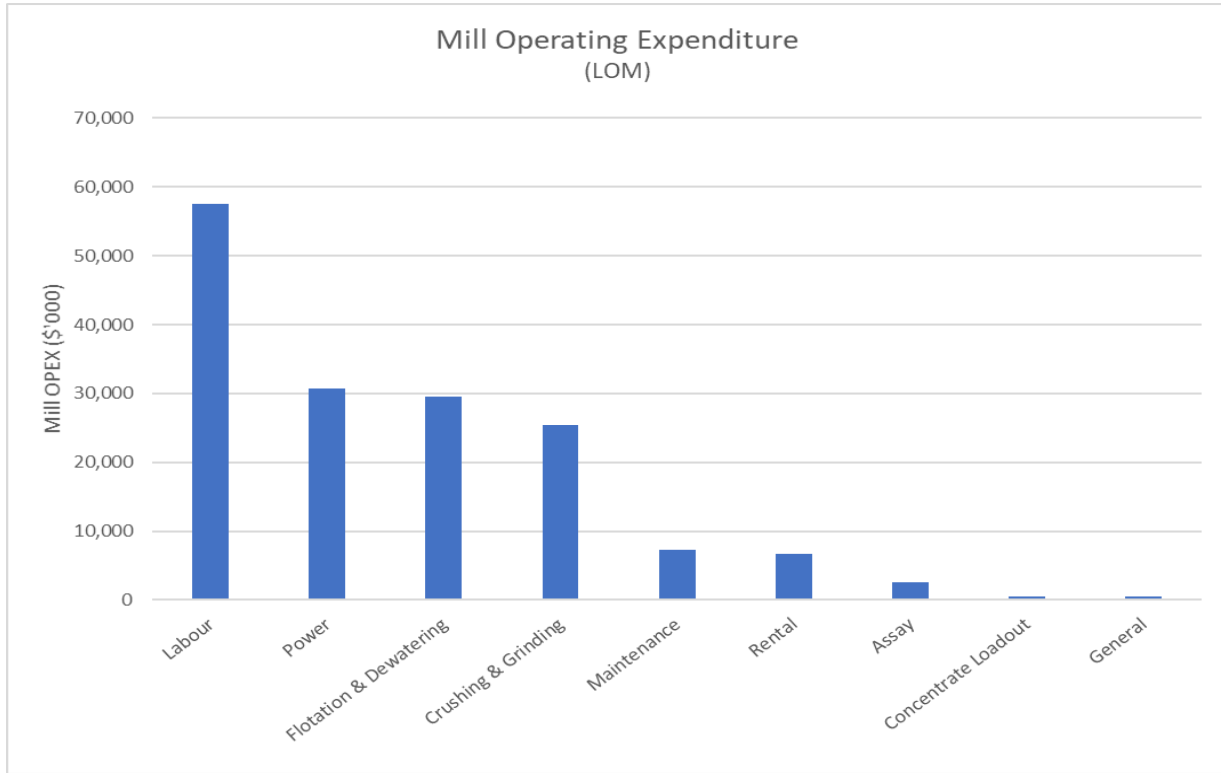
- Operating labour costs
- Fixed plant equipment operating costs
- Mobile equipment diesel fuel and tire costs
- Water supply power and equipment
- Project costs
- Supervisory operating costs
- Indirect operating costs

The estimated annual mill operating expenditure ("Mill OPEX") is very constant across the life of the mine due to the steady processing throughput of 2,700 tonnes per day. The distribution of mill costs within the processing operation are provided in the charts overleaf on both a major cost component and annual expenditure basis.

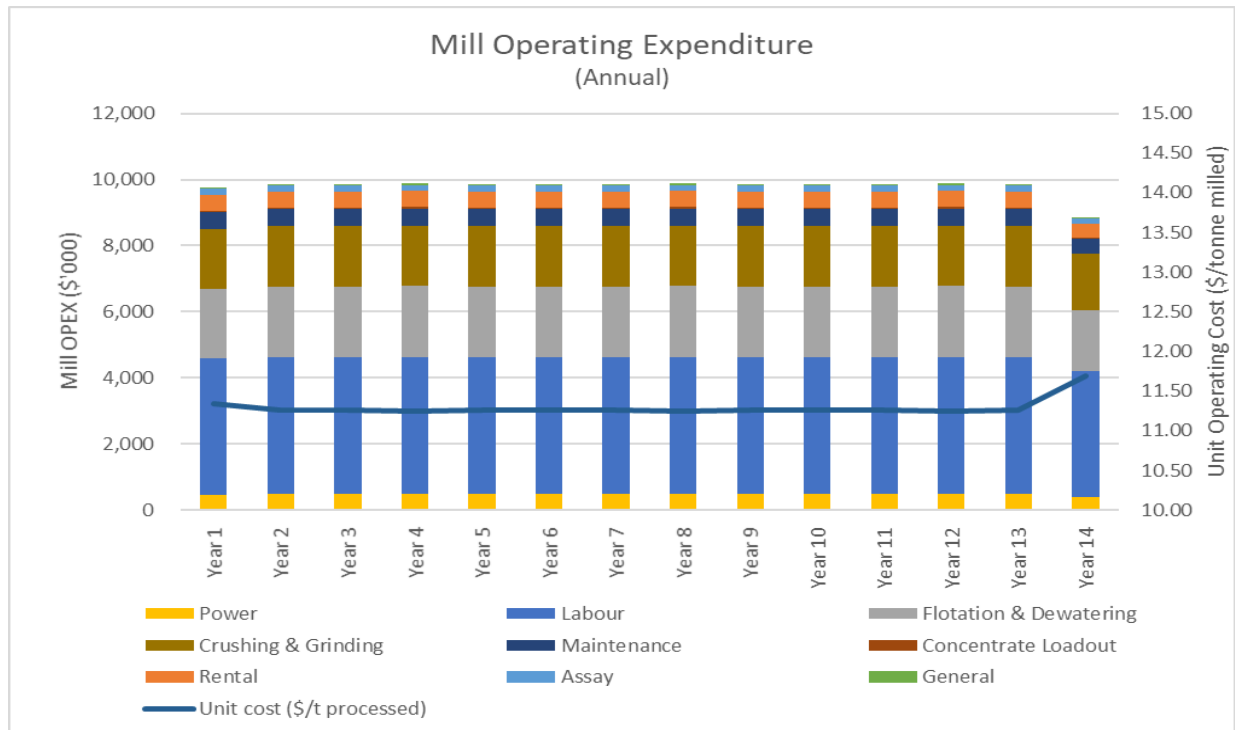
The distribution of operating costs within the processing operation are provided in the charts below. See Figure 21-7 and Figure 21-8. Labour, Power, Flotation & Dewatering, Crushing & Grinding are the major costs for the mill.



**Figure 21-7: LOM Mill Cash Operating Expenditure**



**Figure 21-8: Annual Mill Cash Operating Expenditure**



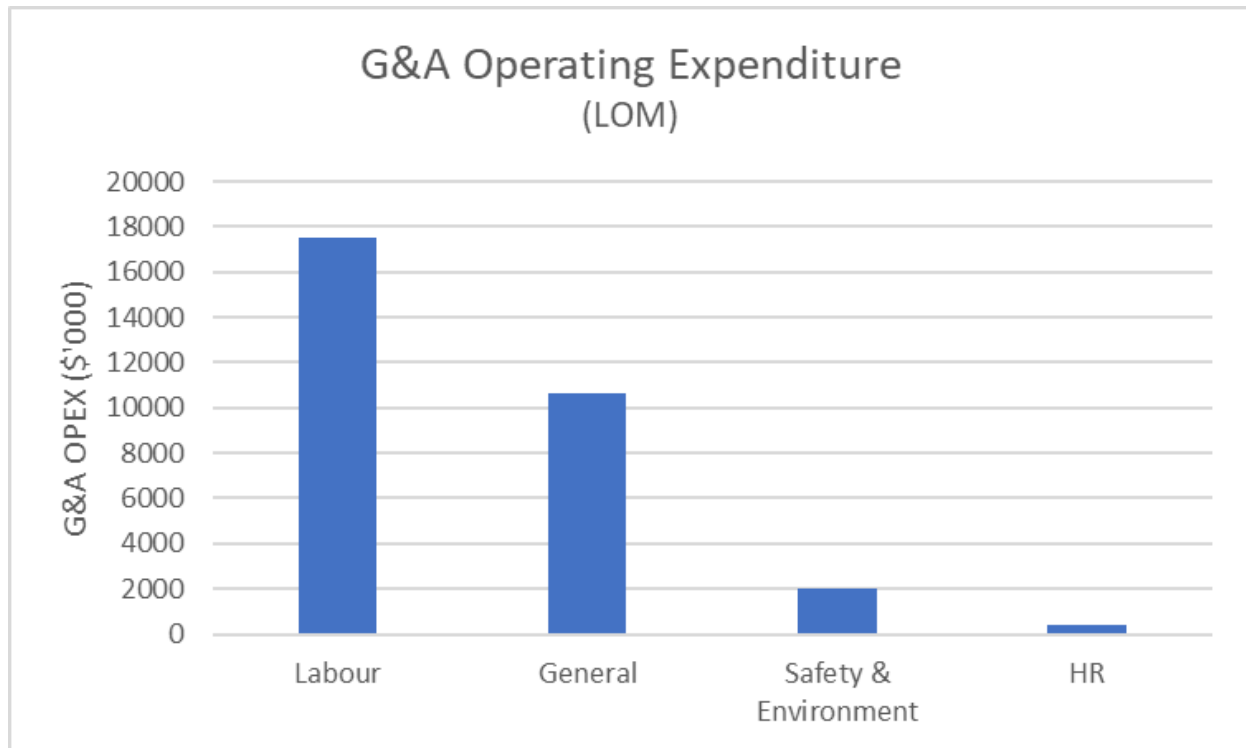
**21.3.4 General and Administrative Costs**

The Scotia Mine general and administrative (“G&A”) expenditures required to support both the mine and mill operations consists of management, administration, environment, community, human resources, safety, training, logistics, warehouse, security, IT, projects, support services, and all forecast mine site insurance, bonding, taxes and other overheads.

Management and administrative staff will be engaged on a regular 5-day working week, on a 7.00 AM to 5.00 PM basis. For the majority of the administration requirements, the labour supply within Nova Scotia, are considered very good, particularly due to the mine’s location within the Halifax Regional Municipality (“HRM”). Labour rates used in the cash flow model are comparable other mining and industrial operations in the region.

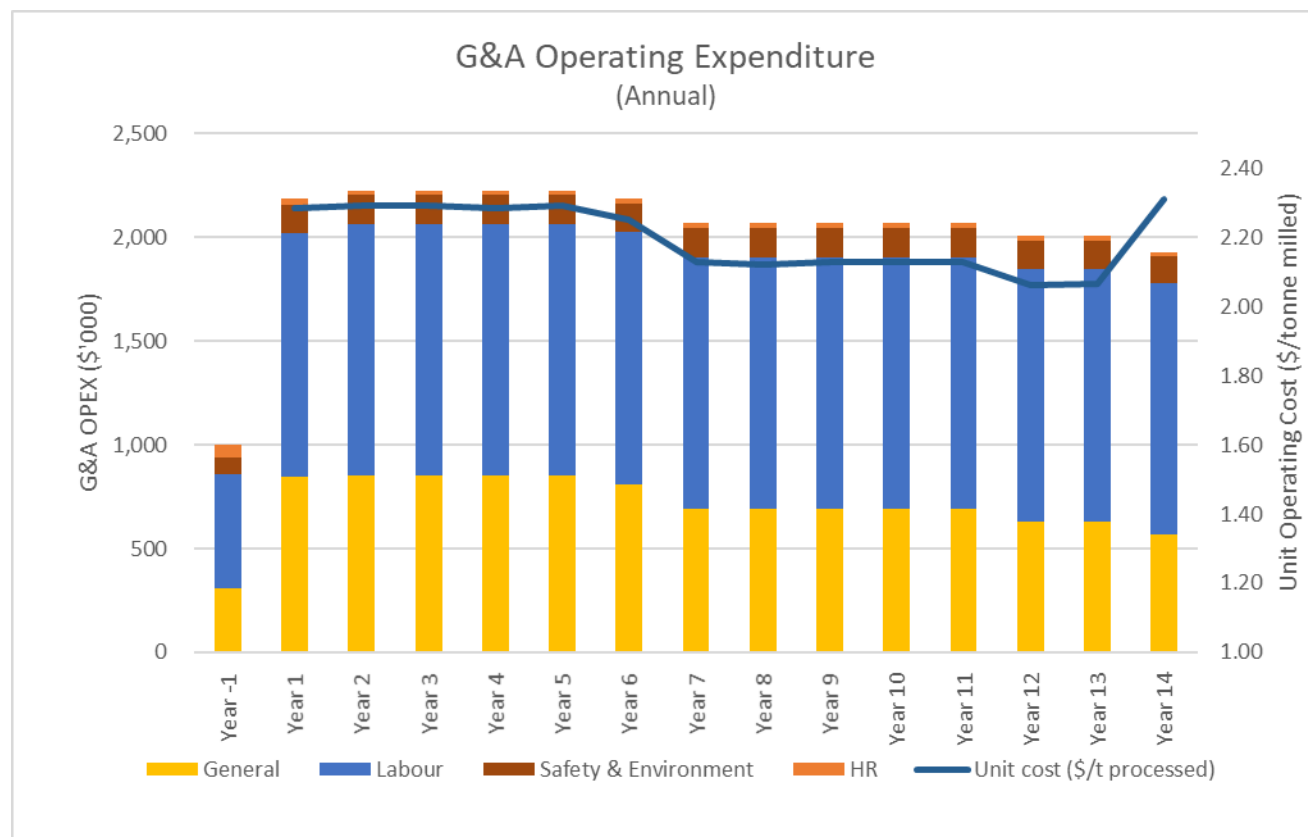
The figure below illustrates the G&A expenditure by major cost centre for the life of mine.

**Figure 21-9: LOM G&A Cash Operating Expenditure**



The figure overleaf illustrates the G&A expenditure by major cost centre by year. See Figure 21-10. Labour and General administrative costs (insurance etc) are the major G&A costs for the mine.

**Figure 21-10: Annual G&A Cash Operating Expenditure**



**21.3.5 Workforce Costs**

The labour costs applied in the cash flow model for all Scotia Mine personnel are based on both salaried and hourly wage rates typically used in the Nova Scotia region for mining and industrial labour. An additional labour burden of 20% has been applied to the wages and 15% to salaried employees, which ScoZinc considers reasonable due to present burden calculations and the Scotia Mine’s location in the Halifax Regional Municipality (“HRM”).

The table below shows the workforce labour levels over the life of the mine. See Table 21-10.

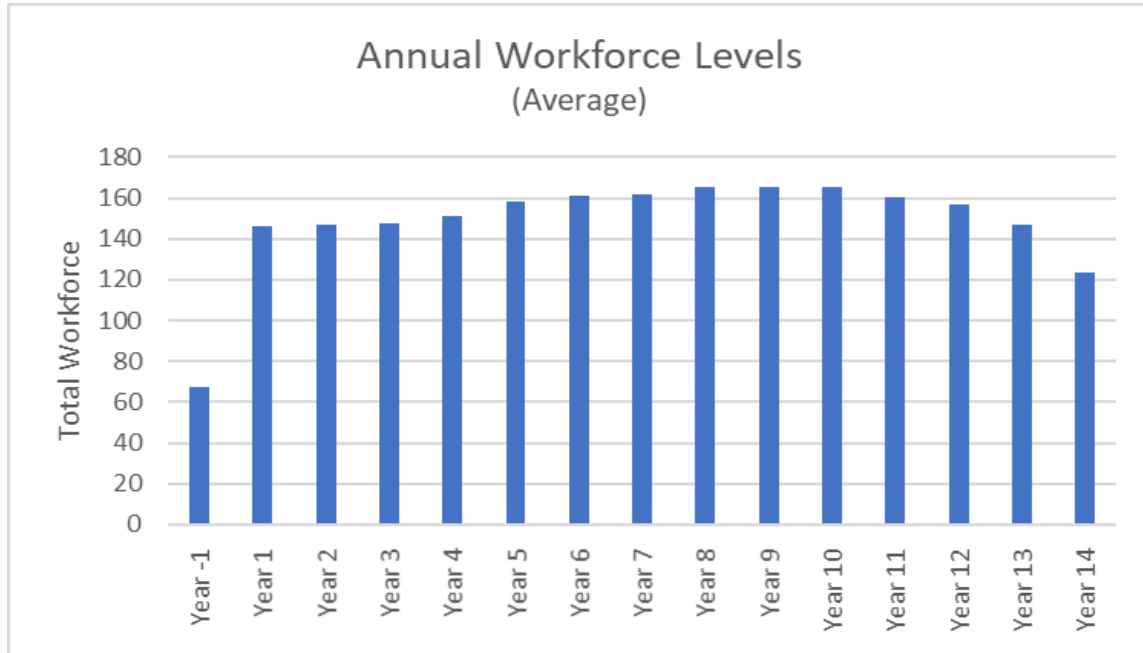
**Table 21-10: Scotia Mine Workforce Labour Levels**

Year	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mine	40	68	68	68	68	68	68	69	72	72	72	68	64	54	41
Mill	12	54	54	54	54	54	54	54	54	54	54	54	54	54	50
Site Services	5	9	9	9	13	20	23	23	23	23	23	23	23	23	18
Administration	10	15	16	16	16	16	16	16	16	16	16	16	16	16	16
<b>Total Mine Site</b>	<b>67</b>	<b>146</b>	<b>147</b>	<b>147</b>	<b>151</b>	<b>158</b>	<b>161</b>	<b>162</b>	<b>165</b>	<b>165</b>	<b>165</b>	<b>161</b>	<b>157</b>	<b>147</b>	<b>125</b>

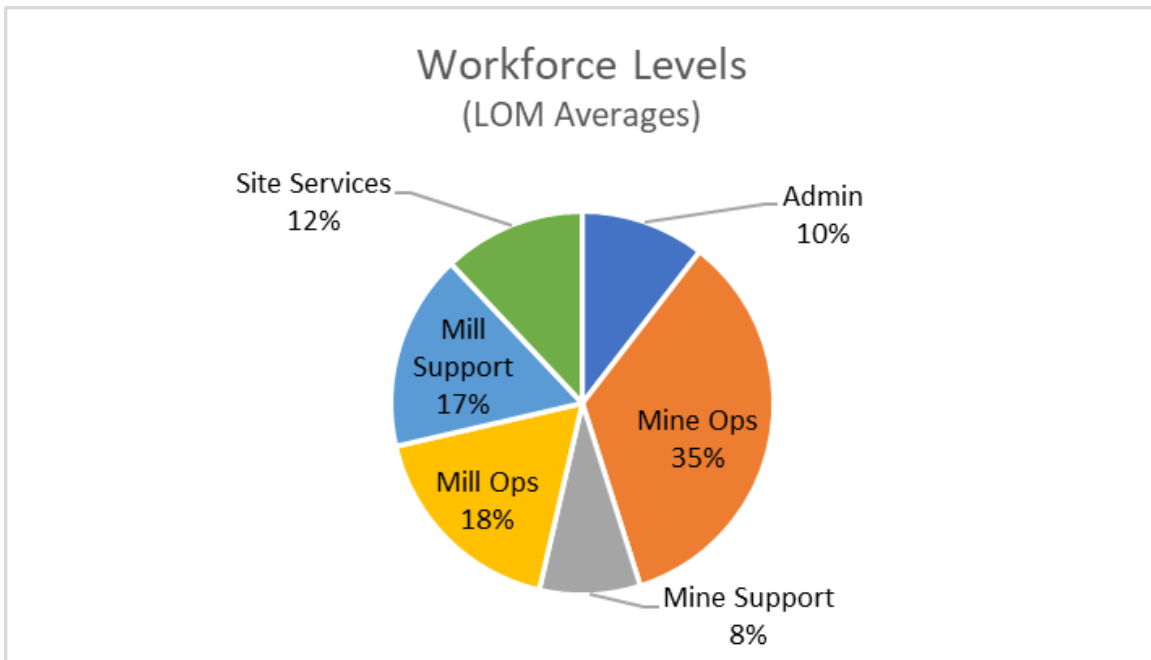
Labour costs for ScoZinc’s head office positions in Halifax are excluded from the workforce costs.

Additional figures showing the workforce levels by year and by cost centre are provided overleaf. The Mine and Mill Departments hold the majority of the workforce requirements. See Figure 21-11 and Figure 21-12.

**Figure 21-11: Annual Workforce Levels**



**Figure 21-12: Workforce Levels by Cost Centre**



### 21.3.6 General Consumables and Supplies Costs

#### General Operations Costs

The Scotia Mine's location near Halifax, Nova Scotia, enables lower inventory levels of consumables and supplies to be stored on site before use, and importantly the purchase of a large majority of items at regular prices without the added on costs and logistics of remote freight transport costs. The mine's year-round access to permanent highways, ports and rail facilities ensures that the majority of supplies can be received reliably.

ScoZinc warehouse is approximately 80% full of a range of consumables and supplies.

For mining operations, the major consumables and supplies required include mobile equipment parts and tires, drilling & blasting, dewatering supplies, and general planning consumables for ScoZinc's technical and supervisory controls. ScoZinc will contract the mobile mining equipment supplier to also supply the necessary parts (as needed) for their equipment under a defined maintenance and repair contract (or "MARC"). For drilling and blasting operations, the Drill & Blast contract will provide the consumables necessary to complete their work on site also under a services cost agreement.

For processing operations, mill consumables and supplies are determined largely by a steady-state processing throughput rate of 2,700 tonnes per day. ScoZinc and Ausenco have determined the requirements and costs on this basis for the mill including power, grinding media, equipment wear parts, water treatment, reagent chemicals, plus additional general processing supplies.

#### 21.3.7 Power Costs

Electrical 25kV grid power is the predominant source of power on site, consumed primarily by the mill for all its processing requirements. Mining operations also use a limited amount of power for pit dewatering and pit perimeter wells. The mine site currently uses grid power for its administration and support services buildings, although ScoZinc are planning on installing a 40KW Photo-voltaic ("PV") system to provide those energy requirements in the future.

All electrical power is currently provided by Nova Scotia Power on a range of Industrial Tariff rates. ScoZinc is currently on a Small Industrial Tariff during care & maintenance, but will return to the Large Industrial Tariffs rate (Rate Code 23) during the production phase of operations. All power costs for ScoZinc are based on Rate Code 23 onwards which include both a Demand Charge (\$0.11675/kWh) and an Energy Charge (\$0.8987/kWh).

Life of Mine site power distribution for mining and processing operations and LOM site power costs are provided below. See Figure 21-13 and Figure 21-14.

With advances in electrical power energy sources, ScoZinc is investigating a range of alternatives to potentially reduce its overall power costs. Such energy investigations include Compress Natural Gas power stations, Wind power and Solar power green energy alternatives, which may all suit the Scotia Mine's potential long mine life.

Figure 21-13: Annual Power Distribution

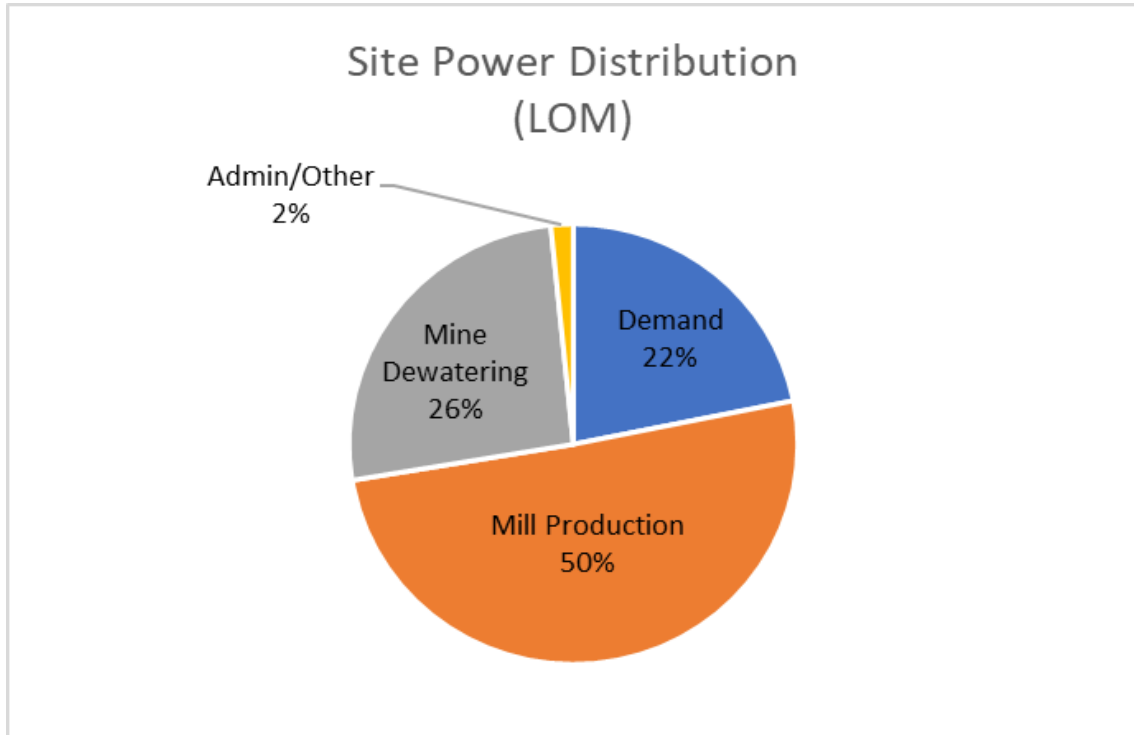
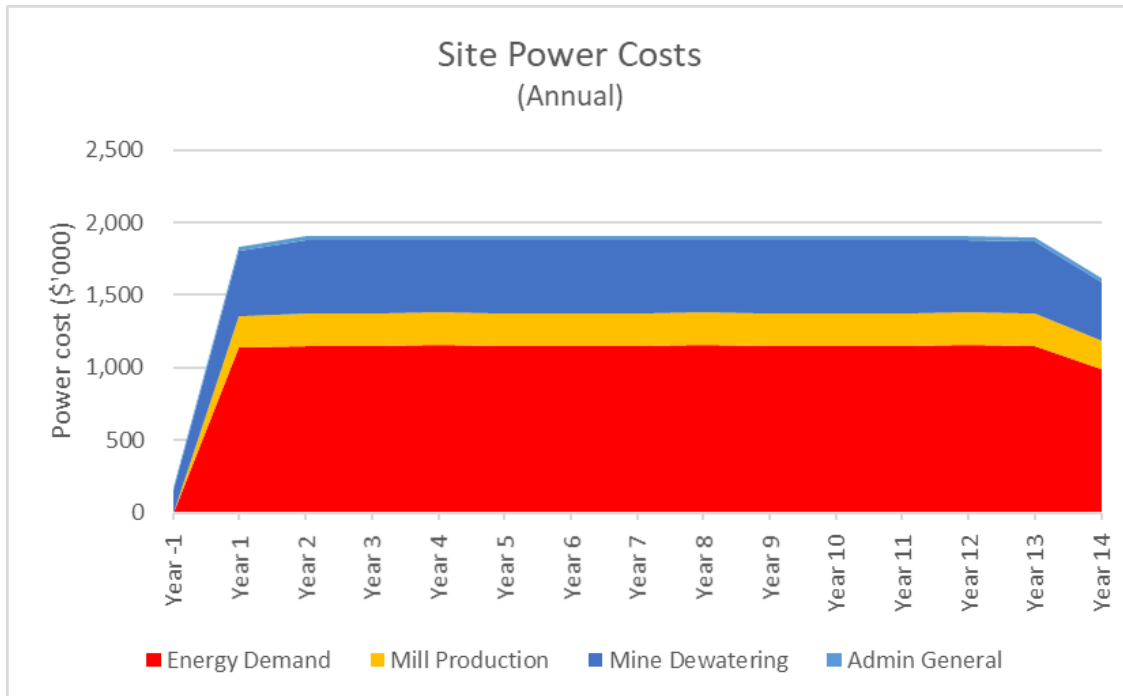


Figure 21-14: Annual Site Power Costs

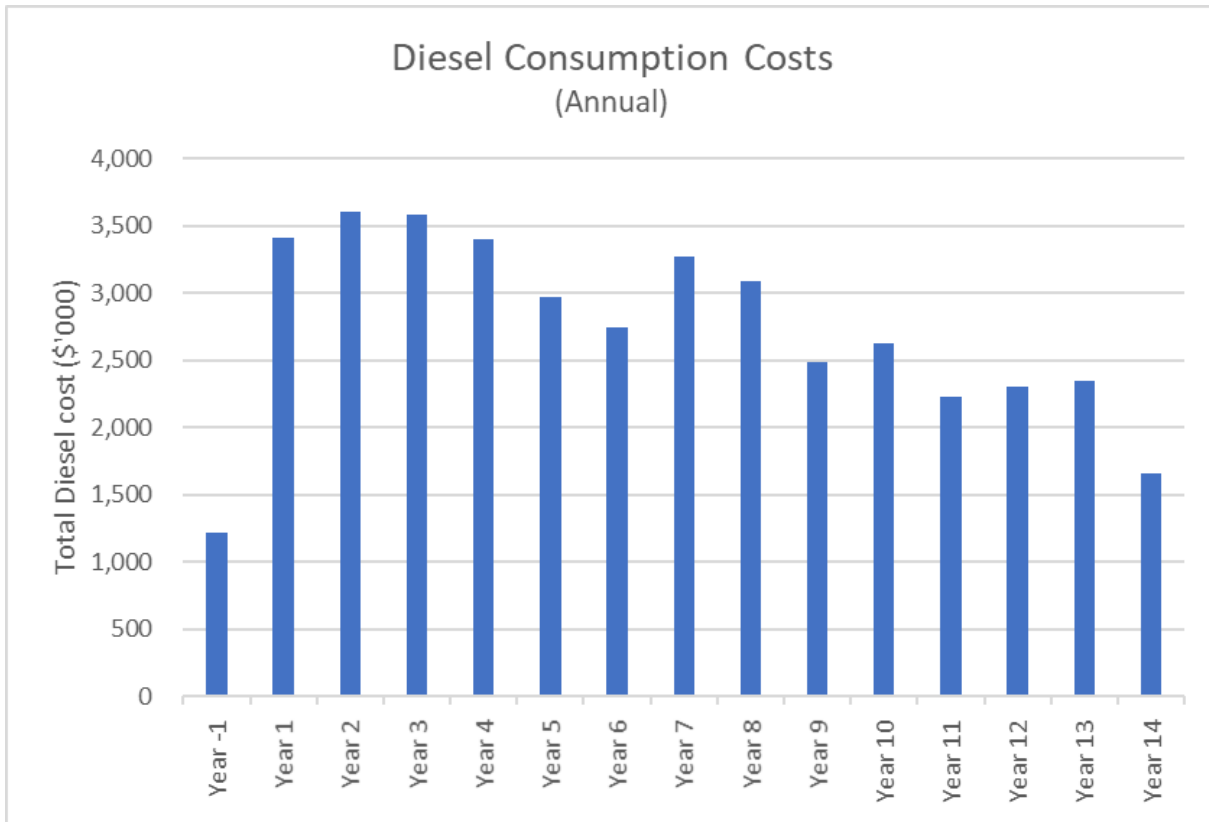


**21.3.8 Diesel Fuel Costs**

Mining operations will demand that the majority of the diesel fuel needed on site is to be utilized by the mobile mining fleet. Diesel fuel consumption has been determined for all mobile equipment throughout the mine life, with diesel rack rates and delivery to site provided by Imperial Oil. ScoZinc have used a delivered price of \$1.00 per litre of diesel, less a Nova Scotia provincial rebate of 15 cents per litre.

Annual diesel consumption costs for the life of mine production needs are provided in the figure below. Year -1 represents only 5 months of the year which attracts a lower diesel consumption cost.

**Figure 21-15: Annual Diesel Consumption Costs**



**21.3.9 Concentrate Transport Costs**

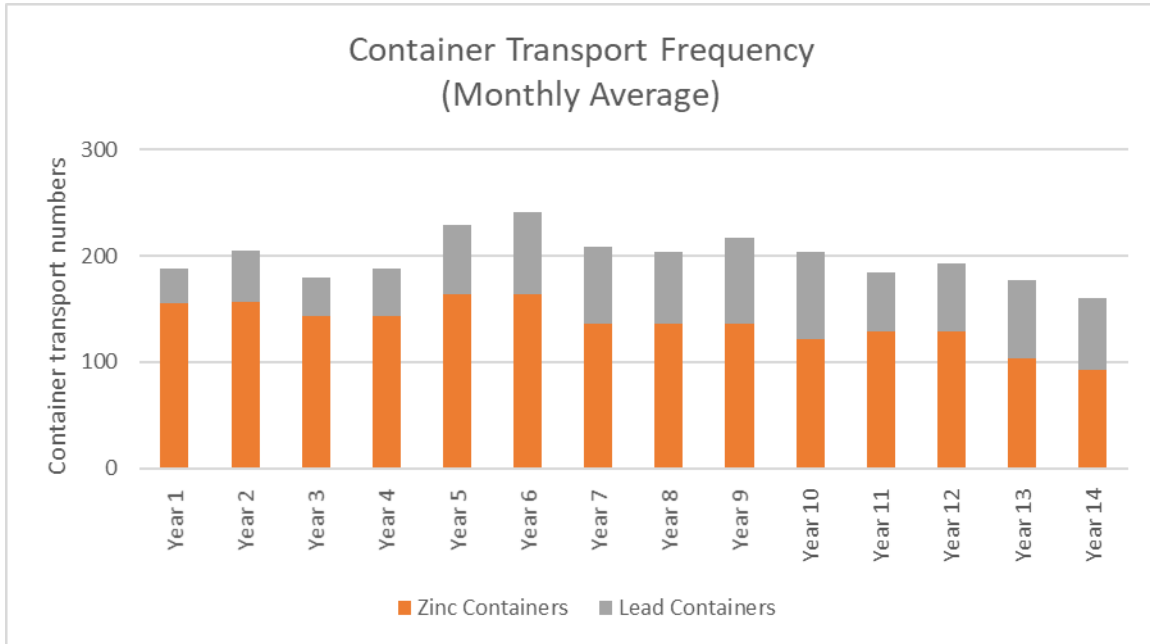
The cost of transporting the ScoZinc concentrates from the Scotia Mine to the Fairview Cove Container Terminal in Halifax (“Fairview Cove”) is calculated to have a unit cost of \$7.50 per wet metric tonne (“wmt”) of zinc or lead concentrate. This transport unit cost includes the round-trip distance of approximately 130 kilometres, by highway, between the mine gate and the Fairview Cove, road fees, insurance, fuel and labour costs.

ScoZinc will purchase, maintain and manage a flat-bed container transport truck capable of carrying up to a 25-tonne payload of concentrate, which will transport concentrate both laden and un-laden containers directly to and from the Fairview Cove, or alternative locations.

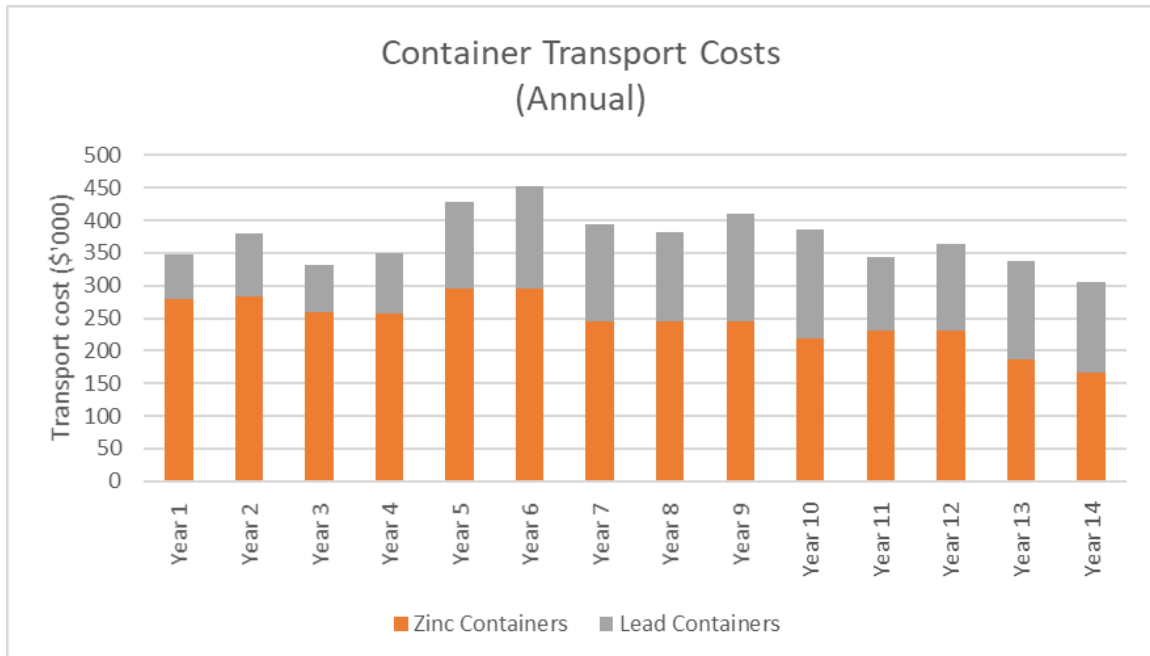
Zinc and Lead concentrate production rates forecast that a total of 200 containers are nominally required for transport each month on average for the mine life. With a round-trip journey time of 1.5 hours (average), 10 containers will only need to be transported per day, 5-days per week.

The container transport monthly frequency and transport costs are provided in the two figures below.

**Figure 21-16: Monthly Container Transport Frequency**



**Figure 21-17: Annual Container Transport Costs**





For shipping costs of the containers to the potential concentrate buyers, ScoZinc has allowed European ocean freight and Fairview Cove charges (berthage, wharfage, load out and assay charges) of \$69 per wet metric tonne of zinc or lead concentrate.

Depending upon alternative concentrate buyer requirements, the containerized concentrates may also be transported a shorter distance to the CN Railway Milford siding (11 kilometres from the mine gate). The Milford siding would enable container loading onto a train for cost effective rail transport to the buyer on the North American railway network.

ScoZinc has not determined these railway network transport costs, however, it is very likely that the costs will generally be lower than the forecast total transport and shipping costs to European concentrate buyers.

## 22 Economic Analysis

### 22.1 Summary of Economic Results

The economic viability of the Scotia Mine was evaluated using industry standard discounted cash flow analysis, by month, for the life of mine. Inflation and escalation variables were not applied in the cash flow modelling process. All amounts are expressed in Canadian Dollars, except where noted.

The key parameters and assumptions applied in the Base Case cash flow model and a summary of the economic results are provided in the following table. See Table 22-1.

**Table 22-1: Economic Results Summary**

<b>Mine and Mill Parameters</b>						
Total ore mined (million tonnes)	13.66	Milling rate (tonnes per day)	2,700			
Mining rate (tonnes per day)	33,000	Zinc concentrate (tonnes per year) 5Yr avg	33,313			
Life of Mine (years)	14.25	Lead concentrate (tonnes per year) 5Yr avg	10,189			
<b>Life of Mine Statistics</b>						
Metal Production	Ore Grade (First 5 Years)	Ore Grade (LOM)	Concentrate Grade	Recoveries (LOM)	Annual Metal Production (5Yr avg)	Metal Payability
Zinc	2.25%	2.03%	57%	86%	35M lbs <sup>1</sup>	85%
Lead	0.82%	1.10%	71%	89%	15M lbs <sup>1</sup>	95%
<b>Project Assumptions Base Case</b>						
Zinc price (Year 1 avg)	US\$1.16/lb	All proven and probable mineral reserves				
Zinc price (LOM avg)	US\$1.19/lb	Exchange Rate (USD:CAD)				0.71
Lead price (Year 1 avg)	US\$0.83/lb	Discount Rate (base-case)				8%
Lead price (LOM avg)	US\$0.89/lb	Discount Rate (alternative)				5%
<b>Operating and Capital Costs</b>						
Operating Costs <sup>2</sup>	LOM	Capital Costs				LOM
Mining	\$1.81/t mined	Pre-production Capital Expenditure				\$28.1M
Mining	\$20.26/t milled	Contingency				\$2.7M
Processing	\$11.29/t milled	Total				\$30.8M
G&A	\$2.27/t milled	Working Capital (including Ownership Costs)				\$5.0M
TC & Freight <sup>3</sup>	\$19.89/t milled	Sustaining Capital				\$12.8M
Total	\$53.72/t milled	C1 Cash Cost <sup>4</sup>				US\$0.59/lb
Note 1: Metals contained in both lead and zinc concentrates						
Note 2: Includes concentrate trucking, port and ocean shipping charges						
Note 3: Includes all treatment charges and royalties						
Note 4: After lead credits deducted						
<b>Economic Results</b>					<b>Pre-Tax</b>	<b>Post-Tax</b>
Net Present Value @ 8% discount rate					\$156.4M	\$114.5M
Net Present Value @ 5% discount rate					\$205.8M	\$150.4M
Internal Rate of Return					52.3%	48.6%
Ownership/ Financing Costs					\$4.6M	
Payback Period (from First Revenue)					2.4 years	
Average Annual EBITDA					\$17.1M	

Rounding note: Rounding of numbers may influence statistic totals

## 22.2 Cash Flow Model Cost Sources

This NI 43-101 Technical Report contains forward-looking information regarding projected mine production rates, pre-production schedules and forecasts of resulting cash flows. Although ScoZinc has completed considerable planning and cost estimation and independent quotations from a number of equipment and labour suppliers for the brown-fields Scotia Mine, some factors such as the ability to obtain major equipment or skilled labour on a timely basis, or to achieve the planned mine production rates at the assumed grades, or to achieve the forecast capital and operating costs, may cause actual results to differ materially from those presented in this Pre-Feasibility Study economic analysis.

Capital and operating expenditures for the Scotia Mine have been developed in detail, by month, for the 14-year life of the Project, and are provided as annual summaries in the previous section of this Report (Section 21). Inputs from ScoZinc, Ausenco, and MineTech were all included in the cash flow model under the expertise of the relevant Qualified Persons.

## 22.3 Cash Flow Model Assumptions

### 22.3.1 Unit of Currency

All capital and operating expenditures in the cash flow model are expressed in Canadian Dollars (“\$C” or “CAD”) and as of May 2020, unless noted otherwise. Costs have not been inflated or escalated.

### 22.3.2 Metal Prices

Forecast Zinc and Lead metal prices applied in the base-case economic analysis are discussed in Section 19 (Market Studies) with summaries of the applied prices provided below. See Table 22-2.

**Table 22-2: Forecast Metal Prices by Project Year**

Metal	Units	Year 1	Year 2	Year 3	Year 4	Long Term
Zinc	US\$/lb	\$1.16	\$1.17	\$1.19	\$1.20	\$1.20
	US\$/tonne	\$2,557	\$2,579	\$2,624	\$2,646	\$2,646
Lead	US\$/lb	\$0.83	\$0.81	\$0.88	\$0.90	\$0.90
	US\$/tonne	\$1,830	\$1,786	\$1,940	\$1,984	\$1,984

### 22.3.3 Currency Exchange Rates

Forecast currency exchange rates between the Canadian and United States dollars were used at CAD 1.00 to USD 0.71, or CAD 1.41 to USD 1.00. The basis for this forecast is discussed in Section 19 (Market Studies).

### 22.3.4 Discount Rates

The base-case cash flow applied an 8 percent discount rate to the calculation of the Scotia Mine’s Net Present Value (“NPV”). A discount rate of 5 percent was also provided for comparative purposes, with additional exchange rate sensitivities evaluated.

### **22.3.5 Revenue Timing**

The sale of ScoZinc's concentrates are forecast to begin during the first month of commercial production due to the concentrate container handling process, however, ScoZinc has allowed for a lag in actual revenue of up to 6 weeks.

### **22.3.6 Working Capital**

Due to the concentrate revenue lag, ScoZinc has estimated that a working capital allowance of \$5 million is sufficient to meet the Scotia Mine's cash flow requirements.

### **22.3.7 Project Finance**

Due to the \$30.8M forecast capital requirement (including contingency) to commence commercial production and a working capital allowance of \$5.0M until the first concentrate sales are received, ScoZinc has assumed that the majority of its capital funding needs of \$30.8M will be provided by project finance mechanisms.

Ownership costs for a revolving credit facility have been included in the cash flow model at a nominal interest rate of 8 percent per annum.

### **22.3.8 Other Assumptions**

Other economic assumptions used in the cash flow model include the following:

- ScoZinc's labour costs are paid within the month of occurrence
- Suppliers and contractors are paid within 30 days of invoicing
- Federal and Provincial value added sales taxes are not included
- All pre-development and sunk costs are excluded

## **22.4 Capital Expenditure**

The capital expenditures determined to advance the Scotia Mine to commercial production within 9 to 12 months of project financing are estimated to be \$28.1 million, excluding contingency of \$2.7 million.

This includes all pre-production capital and contingencies but excludes working capital.

The table overleaf provides the capital expenditure requirements. See Table 22-3.

**Table 22-3: Capital Expenditure Summary**

<b>Expenditure</b>	<b>Year -1</b>
Mining pre-stripping	\$8.1M
Mining capital costs	\$1.5M
Mill refurbishment	\$3.8M
Mill capital costs	\$8.5M
G&A equipment	\$1.1M
G&A capital costs	\$1.0M
Direct & Indirect capital costs	\$2.9M
Ownership costs	\$1.2M
<b>Sub-Total</b>	<b>\$28.1M</b>
Contingency	\$2.7M
<b>Total</b>	<b>\$30.8M</b>

Rounding note: Rounding of numbers may influence statistic totals

Additional capital expenditure details are provided in Section 21 (Capital and Operating Expenditure).

## 22.5 Sustaining Capital Expenditure

The Scotia Mine's sustaining capital expenditure from the commercial production date (Month 1, Year 1) for the remainder of the mine life (Month 166, Year 14) is forecast in the cash flow model to be \$7.6M including contingency and equipment salvage at the end of the mine life. The table below shows the sustaining capital costs by key cost centre. See Table 22-4.

**Table 22-4: Sustaining Capital Expenditure Summary**

<b>Expenditure</b>	<b>LOM</b>
Mining capital costs	\$2.5M
Mill capital costs	\$1.6M
G&A capital costs	\$0.7M
Direct & Indirect costs	\$0.8M
Ownership costs	\$3.4M
<b>Sub-Total</b>	<b>\$9.0M</b>
Contingency	\$0.6M
Salvage	(\$2.0M)
<b>Total</b>	<b>\$7.6M</b>

Rounding note: Rounding of numbers may influence statistic totals

Additional sustaining capital expenditure details are provided in Section 21 (Capital and Operating Expenditure).

## 22.6 Operating Expenditure

The Scotia Mine's unit operating costs are expressed in the following table for the Life of Mine. See Table 22-5.

**Table 22-5: Unit Operating Expenditure**

<b>Production Statistics</b>	<b>LOM</b>
Total Tonnes Mined	153,211,226
Total Tonnes Milled (or Processed)	13,653,761
<b>Expenditure</b>	<b>LOM</b>
Mining	\$1.81/t mined
Mining	\$20.26/t processed
Processing	\$11.29/t processed
G&A	\$2.27/t processed
TC & Freight	\$19.89/t processed
<b>Total Unit Operating cost</b>	<b>\$53.72/t processed</b>
<b>C1 Cash Cost</b>	<b>US\$0.59/lb Zinc</b>

Rounding note: Rounding of numbers may influence statistic totals

Additional operating expenditure details are provided in Section 21 (Capital and Operating Expenditure).

## 22.7 Concentrate Sale Terms

ScoZinc has a concentrate sales agreement with MRI for the sale of ScoZinc's zinc and lead concentrates. The sales agreement establishes confidential commercial terms for the majority of ScoZinc's annual production. ScoZinc is also able to negotiate other sales agreements for the balance of its concentrate production.

In general, concentrate sale agreements will account for all of the planned production of both zinc and lead concentrate for at least the first five years of operations. The sales agreements will also include treatment charges, as agreed between major smelters and major miners. ScoZinc has applied current and forecast treatment charges to its cash flow model as provided in Section 19 of this report (Market Studies & Contracts).

In addition, payables, penalties (if any) and quotational periods will be negotiated in good faith annually, including industry standard penalties based on the terms and agreed limits specified in ScoZinc's sales agreements.

Treatment and refining charges, including deductibles and penalties, are expected to vary with each smelter location as well as each individual smelter terms and conditions. ScoZinc believes it is unnecessary to include any significant penalties for ScoZinc's zinc and lead concentrate in the cash flow model in this Pre-Feasibility Study since past production from the Scotia Mine has proven the high-quality nature of ScoZinc's carbonate hosted zinc and lead concentrates to be substantially free of any deleterious minerals. As such,

ScoZinc's concentrate is considered to be high-ranking and therefore capable of being blended with lower-ranking concentrates from other mining operations at particular smelters. As a result, ScoZinc's concentrate is expected to attract lower treatment charges.

The following concentrate marketing assumptions have been applied in the cash flow model:

- Concentrates will be loaded on site directly into standard 20' lined shipping containers;
- Each shipping container will be transported from the mine site by road to the Fairview Cove Container Terminal a distance of 62 kilometres, or alternatively, to the Milford CN Railway Siding, a distance of 11 kilometres from the mine site;
- Smelters are located in North America or Europe; and
- Each container shall hold approximately 20 tonnes (wmt) of either zinc or lead concentrate.

In order to develop indicative smelter terms for the Pre-Feasibility Study cash flow model, ScoZinc has used past production statistics and offtake agreements for both its Zinc and Lead concentrates.

Other than a small potential penalty for the amount of Cadmium in the Zinc concentrate, the Scotia Mine's Zinc and Lead concentrates are free of any smelter charge penalties.

A summary of the indicative smelter terms and charges for the Scotia Mine producing concentrate from Year 1 are tabled below to demonstrate the high-quality, clean nature of ScoZinc's concentrates. See Table 22-6 and Table 22-7.

**Table 22-6: Zinc Concentrate Indicative Smelter Charges**

<b>Payables</b>	<b>Life of Mine</b>			
Zinc	Pay for 85% of the Final Zinc Content			
<b>Deductions</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Mine Life Remainder</b>
Treatment Charges	US\$245/dmt	US\$255/dmt	US\$275/dmt	US\$250/dmt
<b>Penalties</b>	<b>Life of Mine Industry</b>			<b>ScoZinc</b>
Antimony	US\$1.50 for each 0.1% dmt above 0.3%			No Penalty
Arsenic	US\$1.50 for each 0.1% dmt above 0.3%			No Penalty (0.02%)
Cadmium	US\$2.00 for each 0.1% dmt above 0.25%			<b>0.38%</b>
Fluorine & Chlorine	US\$1.50 for each 100 ppm above 200 ppm			No Penalty (<5)
Mercury	US\$1.75 for each 100 ppm above 100 ppm			No Penalty (<5)
Lead	US\$1.50 for each 1% dmt above 3%			No Penalty (1.43%)
Silica	US\$1.50 for each 1% dmt above 3%			No Penalty (0.75%)

**Table 22-7: Lead Concentrate Indicative Smelter Charges**

<b>Payables</b>	<b>Life of Mine</b>			
Lead	Pay for 95% of the Final Lead Content			
<b>Deductions</b>	Year 1	Year 2	Year 3	Mine Life Remainder
Treatment Charges	US\$175/dmt	US\$175/dmt	US\$185/dmt	US\$185/dmt
<b>Penalties</b>	<b>Life of Mine Industry</b>			<b>ScoZinc</b>
Antimony	US\$1.50 for each 0.1% dmt above 0.3%			No Penalty
Arsenic	US\$1.50 for each 0.1% dmt above 0.3%			No Penalty
Cadmium	US\$2.00 for each 0.1% dmt above 0.25%			No Penalty
Fluorine & Chlorine	US\$1.50 for each 100 ppm above 200 ppm			No Penalty
Mercury	US\$1.75 for each 100 ppm above 100 ppm			No Penalty
Silica	US\$1.50 for each 1% dmt above 3%			No Penalty
Zinc	US\$1.50 for each 1% dmt above 5%			7.60%

## 22.8 Taxation and Royalties

The Scotia Mine is owned and operated by ScoZinc Limited, a Nova Scotian incorporated company. ScoZinc is therefore subject to the three-tiered Canadian taxation system of Federal income taxation, Provincial income taxation, and Provincial mining taxation. The Scotia Mine is also subject to a Nova Scotian royalty system. ScoZinc Limited is owned by ScoZinc Mining Ltd., a British Columbia incorporated company.

A list of applicable taxations and royalty rates is provided below effective January 1, 2020:

- Federal income tax: 15.0% of taxable income
- Provincial income tax: 16.0% of taxable income
- Provincial royalty: 2.0% net revenue

### 22.8.1 Federal Taxation

A Canadian Federal income tax rate of 15.0% was used to calculate income taxes in the cash flow model.

### 22.8.2 Provincial Taxes

A Nova Scotia income tax rate of 16.0% was used to calculate provincial income taxes in the cash flow model.

### 22.8.3 Property Taxes

ScoZinc owns the lands and surface rights for the Scotia Mine consisting of 22 separate real property titles. Taxes paid in 2019 total approximately \$50,000.



#### **22.8.4 Mineral Property Tax Pools**

Canadian Exploration Expense (“CEE”) and Canadian Development Expense (“CDE”) tax pools were used with applicable opening balances to calculate income taxes.

#### **22.8.5 Federal Investment Tax Credits**

ScoZinc applied Federal Investment Taxation Credits on its opening balances for the first month of commercial concentrate production. The Federal Investment tax credits apply to the pre-production capital costs of the Scotia Mine.

#### **22.8.6 Capital Cost Allowance**

The Canadian Federal Capital Cost Allowance (“CCA”) yearly deduction rates were used to calculate the applicable CCA deduction amount ScoZinc can claim during the mine life.

#### **22.8.7 Provincial Royalties**

A Nova Scotian Provincial royalty of 2% net revenue applies to the life of mine.

#### **22.8.8 Landowner Royalties**

For the Scotia Deposit, ScoZinc owns the real property covering all the defined mineral resources on the mining leases, so no royalty to any landowner is applicable. However, there is a small 25-acre portion on ScoZinc’s real property that is subject to a sand, gravel and fill royalty of \$1.00 per metric tonne, payable to Gallant Aggregates. This royalty does not impact the Scotia Mine’s Pre-Feasibility Study.

For the Getty deposit, ScoZinc has a 1% Gross Metal Return Royalty (“GMR”) payable to Globex Resources Ltd. (“Globex”), which provides Globex a royalty interest in the associated claims. Agreement terms also allow ScoZinc to purchase 50% of the GMR for \$300,000. ScoZinc’s Life of Mine plan indicates that such a royalty would only be applicable in the last few years of the 14-year mine life.

#### **22.8.9 Workforce Burden**

ScoZinc plans to implement a health insurance plan for the permanent employees at the Scotia Mine. Accordingly, ScoZinc has allowed for up to \$2,800 per annum for employees with dependents, and up to \$1,500 per annum for employees without dependents. The budgeted allowance is estimated to be \$350,000 per annum.

The Scotia Mine is also able to obtain the Nova Scotia Workers’ Compensation insurance, which has an average assessment rate of \$2.65 per \$100 of monthly payroll. The budgeted allowance is estimated to be \$365,000 per annum.

Based upon the total annualized workforce numbers, payroll taxes are estimated to be \$3.2 million per annum.

Including additional amounts for potential incentive plans and overtime, the total annual workforce burden is estimated to be \$4.0 million, which equates to a workforce burden of approximately 44.5% per employee.

## 22.9 Cash Flow Financial Results

A summary of the cash flow financial results is provided in the table below for both before taxation (or Pre-Tax) and after taxation (or Post-Tax) is paid (See Table 22-8). A detailed summary of the cash flow model is also provided below in Table 22-11. This model is referred to as the cash flow model for the selected LOM plan, or base case (or “Base Case”).

The cash flow model averages annual production of approximately 33,313 tonnes of zinc concentrate (35 million pounds) and 10,189 tonnes of lead concentrate (15 million pounds), yielding an average annual earnings before interest, taxes, depreciation and amortization (“EBITDA”) of \$17.1 million per year and cumulative EBITDA earnings of \$360 million over a mine life of 14 years.

Due to the Scotia Mine’s potential for commercial production in the short-term, both short-term and long-term metal price forecasts have been applied.

**Table 22-8: Cash Flow Financial Results**

<b>Financial Analysis</b>	<b>Before-Tax</b>	<b>After-Tax</b>
NPV (8% discount rate)	\$156M	\$115M
NPV (5% discount rate)	\$206M	\$150M
IRR	52%	49%
EBITDA (annual average)	\$17.1M	
Payback period	2.4 years	

## 22.10 Economic Analysis

The Base Case cash flow model has been developed using both short-term metal price assumptions of US\$1.16/lb zinc and US\$0.88/lb lead, plus and long-term metal price assumptions of US\$1.20/lb zinc, US\$0.90/lb lead. Year 1 metal pricing averages US\$1.16/lb zinc and US\$0.83/lb lead. Year 2 metal pricing is on average US\$1.17/lb for zinc and US\$0.81/lb for lead. Year 3 metal pricing is on average US\$1.19/lb for zinc and US\$0.88/lb for lead. The short-term metal pricing is based on present market conditions anticipated for the first few years of production which naturally reduces the potential earnings of the Project, however ScoZinc is of the view that this approach represents a realistic approach since the Scotia Mine has the potential of commercial production within the short-term. Longer term metal price assumptions are US\$1.20/lb for zinc and US\$0.90/lb for lead.

The metal price assumptions used in this economic analysis are based on market consensus for the long-term prices of zinc and lead, including Sell-Side Mining Research, published by different investment banks, in Canada and internationally, and studies by independent consultants such as Wood Mackenzie Ltd., Fastmarkets MB, S&P Global Market Intelligence and Open Mineral AG, among others, as discussed on Section 19.

A sensitivity analysis was conducted on the Project’s Base Case cash flow model to evaluate its robustness against variations in financial parameters that contribute the most to economics of the Project. Key financial

parameters varied for the Base Case were metal prices and the exchange rate to the United States dollar. Results of the analyses are provided in the tables below. See Table 22-9 and Table 22-10.

**Table 22-9: Metal Price Sensitivities Analysis**

Zinc/ Lead Price US\$/lb	NPV Pre-Tax		NPV After-Tax		IRR		Payback Period	Average Annual EBITDA
	8% discount	5% discount	8% discount	5% discount	Pre- Tax	After- Tax		
0.95/0.75	\$45M	\$67M	\$35M	\$53M	20.9%	19.9%	5.3yrs	\$7.3M
1.00/0.80	\$72M	\$101M	\$55M	\$77M	28.8%	26.9%	4.8yrs	\$9.7M
1.05/0.85	\$100M	\$136M	\$75M	\$101M	36.8%	34.3%	4.0yrs	\$12.1M
<b>Base Case</b>	<b>\$156M</b>	<b>\$206M</b>	<b>\$115M</b>	<b>\$150M</b>	<b>52.3%</b>	<b>48.6%</b>	<b>2.4yrs</b>	<b>\$17.1M</b>
1.20/0.90	\$162M	\$212M	\$119M	\$155M	57.1%	53.1%	1.9yrs	\$17.5M
1.25/0.95	\$190M	\$246M	\$138M	\$179M	66.1%	61.1%	1.7yrs	\$19.9M
1.30/1.00	\$217M	\$280M	\$157M	\$202M	75.3%	69.1%	1.4yrs	\$22.3M

\* Scotia Mine Base Case: Year 1 average (US\$1.16/lb Zn, US\$0.83/lb Pb), LOM average (US\$1.19/lb Zn, US\$0.89/lb Pb)

**Table 22-10: Exchange Rate Sensitivities Analysis**

Exchange Rate CAD: USD	NPV Pre-Tax		NPV After-Tax		IRR		Payback Period	Average Annual EBITDA
	8% discount	5% discount	8% discount	5% discount	Pre- Tax	After- Tax		
0.55	\$295M	\$377M	\$211M	\$269M	96.8%	86.7%	1.2yrs	\$29.3M
0.60	\$244M	\$314M	\$176M	\$226M	79.7%	72.8%	1.4yrs	\$24.8M
0.65	\$200M	\$260M	\$145M	\$188M	65.8%	60.7%	1.8yrs	\$20.1M
<b>0.71*</b>	<b>\$156M</b>	<b>\$206M</b>	<b>\$115M</b>	<b>\$150M</b>	<b>52.3%</b>	<b>48.6%</b>	<b>2.4yrs</b>	<b>\$17.1M</b>
0.75	\$131M	\$174M	\$97M	\$128M	44.8%	41.6%	3.1yrs	\$14.9M
0.80	\$103M	\$139M	\$77M	\$104M	36.7%	34.1%	4.0yrs	\$12.5M
0.85	\$78M	\$109M	\$59M	\$82M	29.7%	27.7%	4.8yrs	\$10.3M

\* Scotia Mine Base Case

A spider sensitivity diagram showing the Project's IRR sensitivities to metal prices, foreign exchange rate, metallurgical recoveries, capital cost and operating cost is provided below on an after-taxation basis. See Figure 22-1.

The sensitivity indicates that the Project is most sensitive to Exchange Rates, Zinc Metal Prices, and Zinc Head Grades. Conversely, the Project is less sensitive to Zinc Treatment Charges, Operating Costs, Capital Costs, and Lead Metal Prices.

**Figure 22-1: Project Economics Sensitivity Diagram**

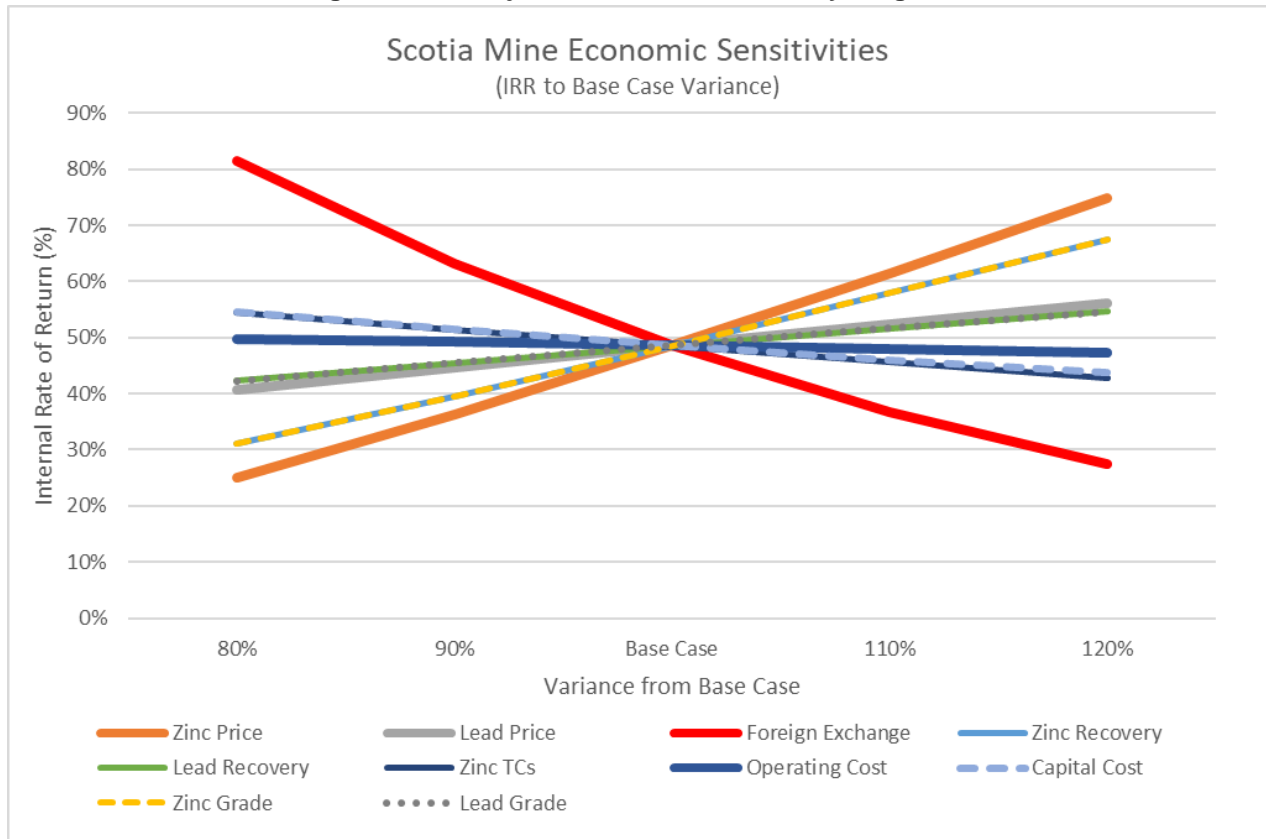


Table 22-11: Cash Flow Model

MINING																	
Material Mined	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	TOTAL	
SHG Ore	tonnes	1,464	6,249	0	1,146	8,855	10,437	13,698	1,454	8,761	5,719	7,460	1,448	8,828	0	0	75,519
Zn% grade		5.26	3.91	0.00	11.69	12.17	9.75	6.31	2.27	3.56	4.54	1.05	6.48	6.46	0.00	0.00	6.31
Pb% grade		0.00	10.00	0.00	8.57	8.84	6.13	5.57	8.34	8.61	6.70	12.58	4.91	7.21	0.00	0.00	7.84
HG Ore	tonnes	20,577	187,952	195,185	94,076	153,577	257,980	405,561	163,323	265,020	203,483	137,156	202,986	217,106	64,693	154,551	2,723,227
Zn% grade		3.48	3.98	3.36	3.33	3.59	3.49	3.35	2.61	3.18	3.08	2.56	3.41	3.87	2.61	2.43	3.28
Pb% grade		0.00	1.44	1.88	1.57	1.75	2.06	2.42	2.61	2.41	2.87	3.26	2.06	2.05	2.24	2.92	2.26
MG Ore	tonnes	98,887	498,649	570,902	512,584	571,976	390,314	588,654	504,904	468,701	506,900	519,024	381,874	519,728	536,699	402,066	7,071,863
Zn% grade		2.43	2.23	2.08	2.16	2.02	2.09	1.96	1.87	1.93	1.69	1.70	1.93	1.65	1.42	1.67	1.89
Pb% grade		0.00	0.53	0.73	0.61	0.83	0.92	0.93	0.93	0.97	1.18	1.00	1.03	1.04	1.23	1.20	0.92
LG Ore	tonnes	61,642	264,664	257,202	370,274	344,475	117,166	265,572	187,026	276,669	308,778	353,397	144,648	272,616	391,320	167,704	3,783,153
Zn% grade		1.63	1.48	1.48	1.49	1.35	1.28	1.34	1.25	1.25	1.30	1.25	1.25	1.15	0.96	1.07	1.29
Pb% grade		0.00	0.27	0.29	0.26	0.40	0.50	0.42	0.54	0.50	0.46	0.50	0.49	0.61	0.81	0.67	0.47
<b>Total Ore</b>	<b>tonnes</b>	<b>182,570</b>	<b>957,515</b>	<b>1,023,289</b>	<b>978,080</b>	<b>1,078,883</b>	<b>775,897</b>	<b>1,273,484</b>	<b>856,706</b>	<b>1,019,150</b>	<b>1,024,880</b>	<b>1,017,038</b>	<b>730,956</b>	<b>1,018,279</b>	<b>992,712</b>	<b>724,321</b>	<b>13,683,761</b>
Zn% grade		2.30	2.38	2.18	2.03	2.11	2.54	2.32	1.88	2.09	1.86	1.66	2.22	2.03	1.32	1.69	2.03
Pb% grade		0.00	0.70	0.84	0.58	0.89	1.30	1.35	1.17	1.28	1.33	1.22	1.22	1.20	1.13	1.45	1.10
Overburden	tonnes	4,055,012	10,422,451	8,994,179	11,022,075	8,846,942	7,832,946	5,448,424	6,757,227	6,104,887	4,869,946	5,587,802	3,451,941	3,533,442	2,706,248	490,752	90,124,277
Gypsum	tonnes	207,378	1,699,040	2,732,543	164,119	1,623,181	2,835,011	3,400,032	2,971,662	3,014,604	1,936,094	1,992,826	2,899,818	1,887,474	1,082,202	2,406,352	30,852,336
Carbonate	tonnes	347,826	988,672	774,064	1,520,388	1,692,535	455,919	919,940	1,431,601	1,199,939	730,244	996,972	261,185	653,599	1,513,192	485,090	13,971,167
Meguma	tonnes	0	167,321	437,925	222,506	252,457	327,725	699,620	296,398	311,419	313,366	167,170	686,100	182,472	34,646	510,559	4,609,685
<b>Total Mine Production</b>	<b>tonnes</b>	<b>4,792,786</b>	<b>14,235,000</b>	<b>13,962,000</b>	<b>13,907,169</b>	<b>13,494,000</b>	<b>12,227,500</b>	<b>11,741,500</b>	<b>12,313,594</b>	<b>11,650,000</b>	<b>8,874,529</b>	<b>9,761,808</b>	<b>8,030,000</b>	<b>7,275,267</b>	<b>6,329,000</b>	<b>4,617,075</b>	<b>153,211,226</b>
Total Ore	tonnes	182,570	957,515	1,023,289	978,080	1,078,883	775,897	1,273,484	856,706	1,019,150	1,024,880	1,017,038	730,956	1,018,279	992,712	724,321	13,683,761
Total Waste	tonnes	4,610,216	13,277,485	12,938,711	12,929,089	12,415,116	11,451,602	10,468,016	11,456,888	10,630,849	7,849,649	8,744,771	7,299,044	6,256,988	5,336,288	3,892,754	139,557,465
<b>Total Strip Ratio</b>	<b>ratio</b>	<b>25.25</b>	<b>13.87</b>	<b>12.64</b>	<b>13.22</b>	<b>11.51</b>	<b>14.76</b>	<b>8.22</b>	<b>13.37</b>	<b>10.43</b>	<b>7.66</b>	<b>8.60</b>	<b>9.99</b>	<b>6.14</b>	<b>5.38</b>	<b>5.37</b>	<b>10.22</b>

PROCESSING																	
Minerals Processed	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	TOTAL	
Ore Processed	tonnes	0	970,500	985,500	985,500	988,200	985,500	985,500	985,500	988,200	985,500	985,500	988,200	985,500	849,161	13,683,761	
Zn Grade	grade	0.00	2.31	2.27	2.10	2.09	2.35	2.35	2.00	2.00	1.82	1.91	1.90	1.58	1.63	2.03	
Zn tonnes	tonnes	0	22,403	22,409	20,696	20,693	23,153	23,177	19,710	19,764	19,710	17,911	18,812	18,776	15,543	13,848	276,603
Pb Grade	grade	0.00	0.61	0.86	0.66	0.80	1.18	1.37	1.27	1.18	1.40	1.42	0.99	1.14	1.28	1.34	1.10
Pb tonnes	tonnes	0	5,952	8,498	6,521	7,907	11,447	13,225	12,549	11,703	13,808	13,870	9,698	11,300	12,627	11,360	150,467

SALES																	
Metal production	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	TOTAL	
Zinc Concentrate	tonnes	0	33,903	34,327	31,330	31,294	35,714	35,785	29,635	29,716	29,635	26,612	28,115	28,040	22,728	20,311	417,144
Lead Concentrate	tonnes	0	7,461	10,696	8,104	9,953	14,732	17,210	16,279	15,072	18,035	18,248	12,349	14,495	16,356	15,014	194,004
Zinc Recovery	percentage	0.0%	85.4%	87.3%	86.3%	86.2%	87.8%	87.8%	85.7%	85.7%	85.7%	84.7%	85.2%	85.1%	83.3%	82.8%	
Lead Recovery	percentage	0.0%	87.8%	89.3%	88.1%	88.9%	91.1%	92.2%	91.8%	91.2%	92.5%	92.6%	90.0%	91.0%	91.8%	91.9%	
Recovered Zinc	tonnes	0	19,165	19,566	17,858	17,838	20,357	20,397	16,892	16,938	16,892	15,169	16,026	15,983	12,955	11,577	237,612
Recovered Lead	tonnes	0	5,252	7,594	5,754	7,066	10,460	12,219	11,558	10,701	12,805	12,956	8,768	10,291	11,613	10,660	137,698
Zn Metal Payable from Smelter	percentage	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	
Pb metal Payable from Smelter	percentage	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	
Payable Zinc	pounds	0	35,913,565	36,665,508	33,464,519	33,426,254	38,147,472	38,223,052	31,654,271	31,740,996	31,654,271	28,424,984	30,030,826	29,950,704	24,276,566	21,695,116	445,268,105
Payable Lead	pounds	0	10,999,854	15,905,653	12,051,222	14,799,865	21,907,125	25,591,225	24,206,862	22,411,600	26,818,554	27,135,145	18,363,071	21,554,146	24,321,622	22,326,395	288,392,337
Payable Zinc	tonnes	0	16,290	16,631	15,179	15,162	17,303	17,338	14,358	14,397	14,358	12,893	13,622	13,585	11,012	9,841	201,970
Payable Lead	tonnes	0	4,989	7,215	5,466	6,713	9,937	11,608	10,980	10,166	12,165	12,308	8,329	9,777	11,032	10,127	130,813
Zinc Price	C\$/pound	1.61	1.64	1.65	1.68	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.68
Lead Price	C\$/pound	1.22	1.16	1.14	1.24	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.25
Zinc Price	US\$/pound	1.14	1.16	1.17	1.19	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.19
Lead Price	US\$/pound	0.87	0.83	0.81	0.88	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89

FINANCIALS																	
Revenue	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	TOTAL	
Zinc Revenue	C\$'000	0	58,884	60,479	56,215	56,495	64,475	64,602	53,500	53,647	53,500	48,042	50,756	50,621	41,031	36,668	748,916
Lead Revenue	C\$'000	0	12,756	18,197	14,851	18,760	27,770	32,440	30,685	28,409	33,995	34,397	27,322	30,830	28,301	361,990	361,990
Metal Sales Revenue	C\$'000	0	71,640	78,677	71,066	75,255	92,244	97,042	84,185	82,056	87,496	82,439	74,033	77,943	71,861	64,969	1,110,906
less TC & Freight	C\$'000	0	18,878	21,259	18,971	18,524	22,380	23,324	20,706	19,655	20,706	19,348	17,894	18,647	16,808	15,166	271,620
<b>Gross Revenue</b>	<b>C\$'000</b>	<b>0</b>	<b>52,762</b>	<b>57,418</b>	<b>52,095</b>	<b>56,732</b>	<b>69,864</b>	<b>73,718</b>	<b>64,125</b>	<b>62,400</b>	<b>66,790</b>	<b>63,091</b>	<b>56,139</b>	<b>59,296</b>	<b>55,054</b>	<b>49,803</b>	<b>839,286</b>
Royalties	C\$'000	0	1,055	1,148	1,042	1,135	1,397	1,474	1,282	1,248	1,336	1,262	1,123	1,186	1,629	1,097	17,415
<b>Net Revenue</b>	<b>C\$'000</b>	<b>0</b>	<b>51,707</b>	<b>56,269</b>	<b>51,053</b>	<b>55,597</b>	<b>68,467</b>	<b>72,244</b>	<b>62,843</b>	<b>61,152</b>	<b>65,454</b>	<b>61,829</b>	<b>55,016</b>	<b>58,110</b>	<b>53,424</b>	<b>48,705</b>	<b>821,871</b>
Mining Opex	C\$'000	8,107	24,166	26,331	23,477	24,904	20,655	17,073	19,436	20,618	17,464	17,878	17,600	16,532	11,805	10,640	276,686
Mill Opex	C\$'000	0	11,005	11,095	11,095	11,111	11,095	11,095									

## 23 Adjacent Properties

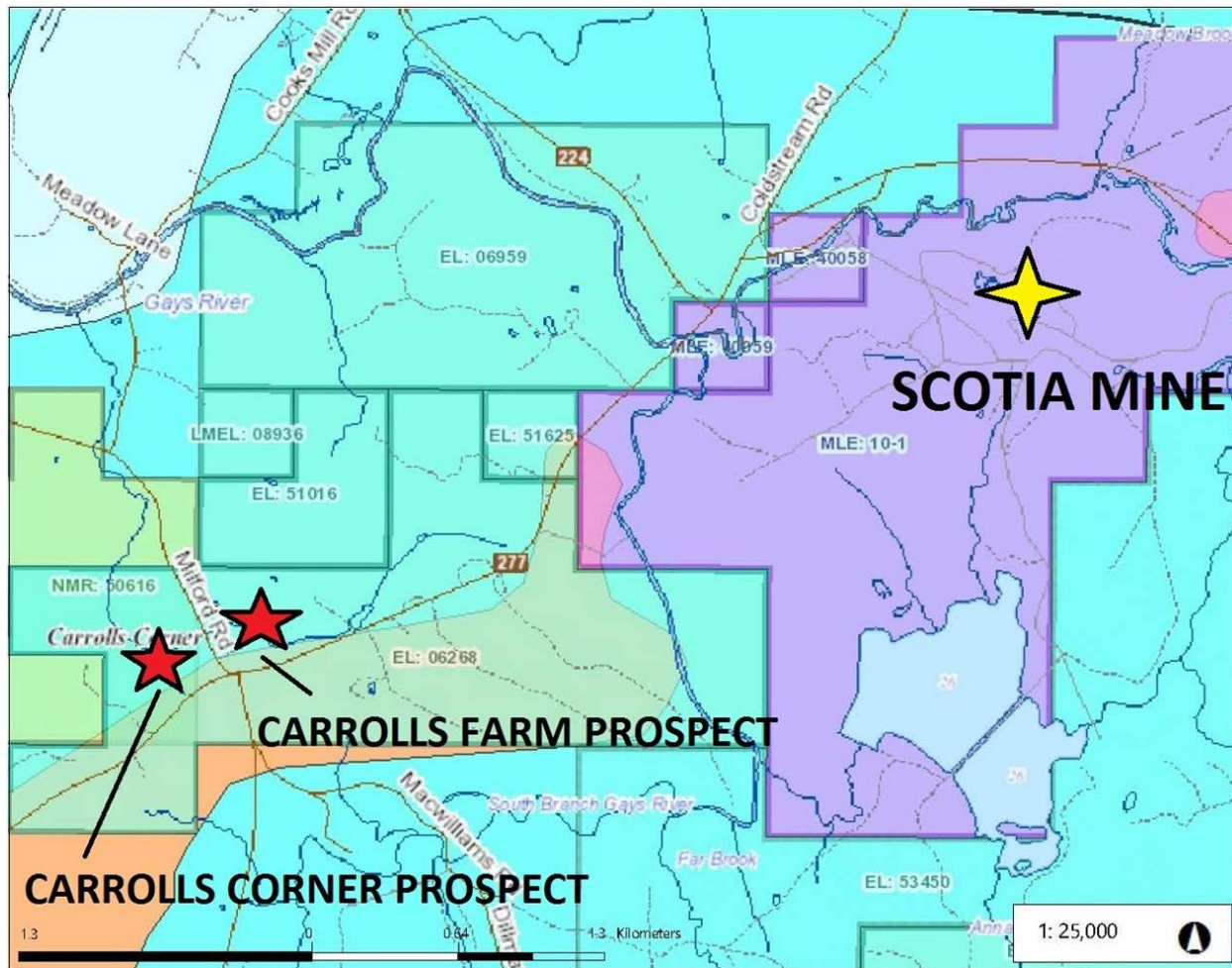
ScoZinc holds a number of adjacent exploration claims surrounding the Scotia Mine, including two prospects known as the Carrolls Farm prospect and the Carrolls Corner prospect. Both prospects have been explored and are known to host zinc and lead mineralization. See Figure 23-1.

Located approximately 1.5 kilometres and 2.2 kilometres, respectively, along the south-western strike of the Scotia Mine, exploration program results have indicated that these two prospects reflect a continuously mineralized trend of the Gays River Formation (“GRFM”) carbonate bank complex at or near to surface.

Although further extensions to the west have not been evaluated to date, both prospects have potential economic value as supplementary zinc and lead ore feed to the Scotia Mine.

ScoZinc plans to conduct further exploration programs on these prospects for future mineral resource delineation.

**Figure 23-1: Carrolls Farm and Carrolls Corner Prospects**



## 24 Other Relevant Data

### 24.1 Mine Site Organization

The Scotia Mine organization structure has been established for a residential open-pit mining and concentrate processing operation in Canada. ScoZinc’s ownership and management organizational structure for the mine is provided in the chart overleaf, which shows key management positions and their operational business centres on the mine site (See Figure 24-2). Offices, meeting rooms, work spaces and security access measures are currently in place for the workforce.

#### 24.1.1 Workforce Organization

The Scotia Mine workforce will be organized into three conventional departments, namely: Mine, Mill and Administration. The major functions for each department are listed in the table below, as well as the pie chart of the workforce organization by department. See Table 24-1 and Figure 24-1.

**Table 24-1: Scotia Mine Departments**

Department	Key Functions
Mine	Mining operations Mobile equipment maintenance Mine technical services Exploration
Mill	Mill operations Mill maintenance Metallurgy and laboratories
Administration	Finance & general administration Safety & training Human resources Procurement & Logistics

**Figure 24-1: LOM Average Workforce Levels**

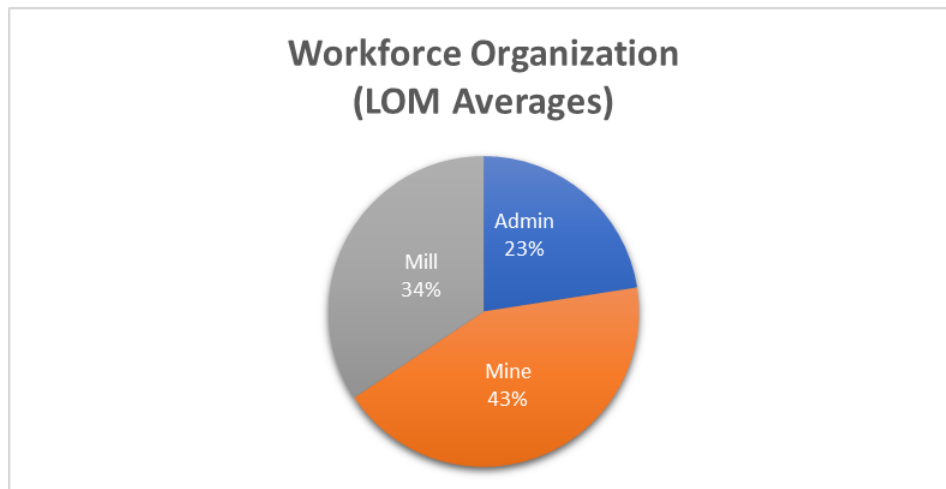
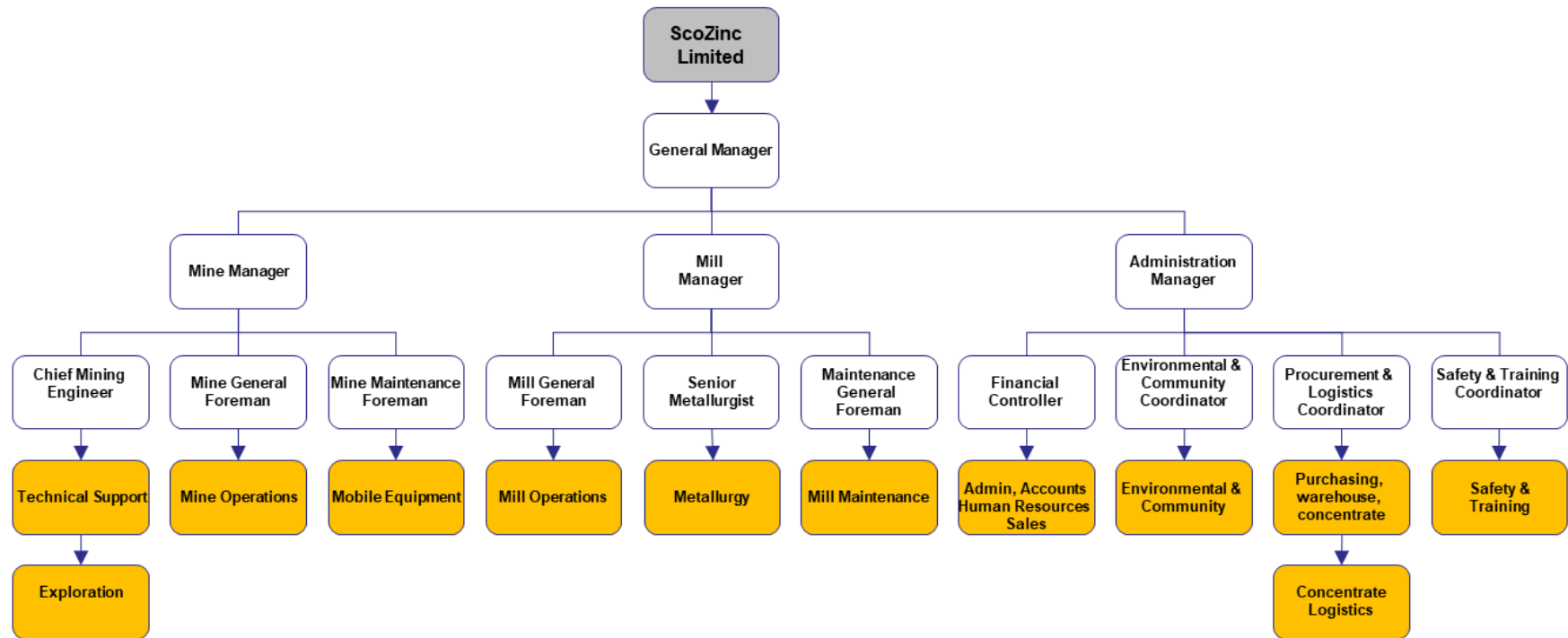


Figure 24-2: Ownership and Management Organizational Structure

# Scotia Mine

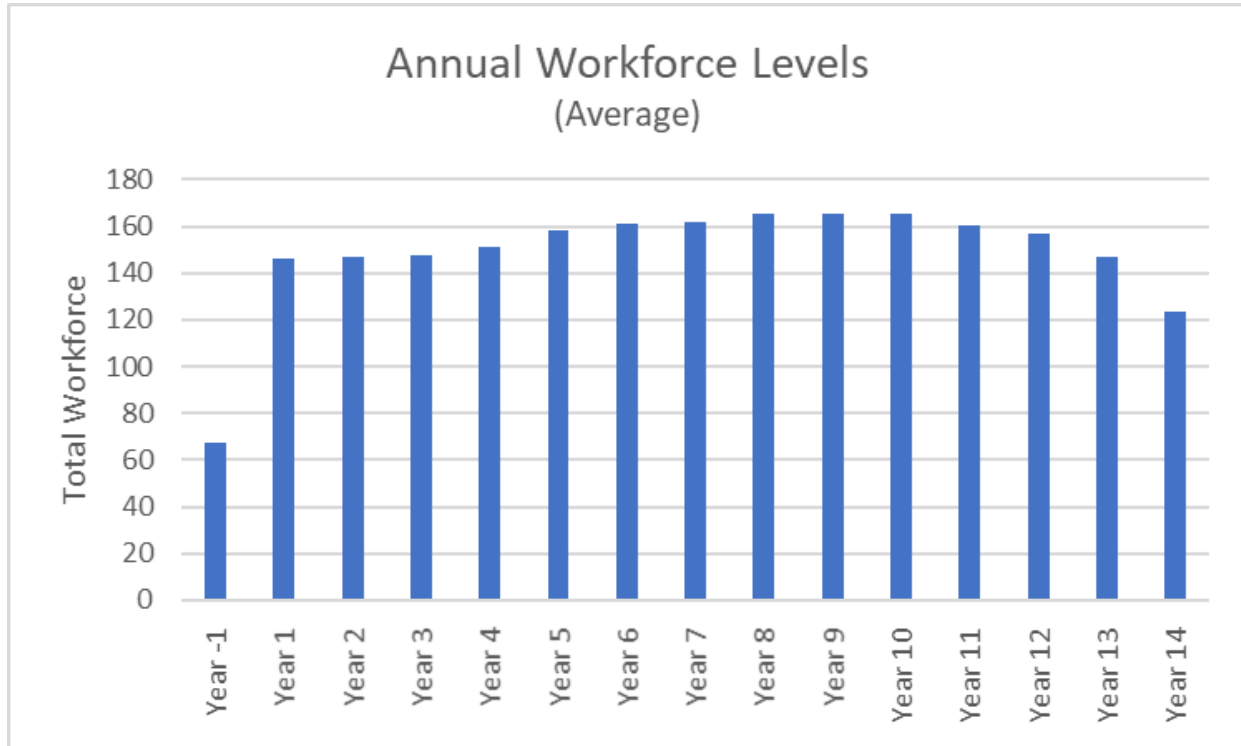




**24.1.2 Workforce Levels**

Due to its convenient location in the Halifax Regional Municipality (“HRM”), ScoZinc will operate the mine on a relatively lean and highly skilled workforce model. The Scotia Mine annual average workforce levels are provided in the figure below, with all personnel based within the HRM region. See Figure 24-3.

**Figure 24-3: Annual Average Workforce Levels**



From Year 1 onwards, the individual skilled and semi-skills positions within each Department are relatively stable starting at approximately 146. This number gradually increases to 165 after Year 4 due to additional equipment requirements for mining development.

The table overleaf shows the personnel numbers for role for each department for the first year of full commercial production. See Table 24-2.

**Table 24-2: Scotia Mine Workforce Positions (Year 1)**

<b>Department</b>	<b>Positions</b>	<b>Numbers</b>
Mine	Mine Manager	1
	Mine Superintendent	1
	Mobile Equipment Supervisor	1
	Chief Mining Engineer	1
	Senior Geologist	1
	Supervisors	4
	Trainers	1
	Surveyors	1
	General labourers	2
	Operators	51
	Utility/dewatering	2
	Samplers	2
	Mill	Mill Manager
Mill Foreman		4
Senior Metallurgist		1
Senior Assayer		1
Operators		28
Process Water/Utility		0
Technicians		4
Sample Prep		4
Trainer/Planner		1
Millwrights		6
Electricians		3
Apprentices		1
Administration		General Manager
	Administration Manager	1
	Financial Controller	1
	Health & Safety Coordinator	1
	Environmental & Community Coordinator	1
	Procurement & Logistics Coordinator	1
	Accounts, HR, Clerks & Assistants	6
	Security Guards	3
	Site Services	9
<b>Total</b>		<b>146</b>

### 24.1.3 Recruitment

ScoZinc intends to source the necessary skills and labour for its workforce from the Halifax Regional Municipality (“HRM”) where the mine is located.

Scotia Mine’s administration department personnel will advertise and perform most of the recruitment processes, including the determination of salary and wage levels. External recruitment consultants may be engaged to recruit for positions that require certain skill sets not found locally.

## 24.2 Project Execution Strategy

ScoZinc personnel have completed preliminary plans and costings during the development of the Scotia Mine's life of mine plans as a detailed component to this Pre-Feasibility Study. Accordingly, ScoZinc has determined that a number of project execution phases are required for a successful commencement of commercial production, namely, a procurement phase, pre-commercial production phase, and a commercial production phase. During all project execution phases, ScoZinc has planned to conduct formal community meetings and engage regularly with its other stakeholders.

Due to ScoZinc's existing Environmental Assessment Approvals and Industrial Approvals, and high-level care and maintenance status, the Scotia Mine has, however, a relatively short time-frame to commercial production of between 9 to 12 months within these existing Approvals. As such, the Scotia Mine is considered a near-term producer.

### 24.2.1 Procurement Phase

ScoZinc's Procurement Phase is the first phase of the Scotia Mine's re-start strategy, designed to provide final designs and pricing on a range of pre-production requirements. Prices will be obtained via usual negotiation or formal fixed-price tenders.

Procurement items include the following:

- Jameson Cells and Filter Presses
- Primary 8 mVA transformer
- Mobile mining fleet and support equipment
- Pit dewatering equipment
- Primary and Secondary crusher engineering and support equipment
- Crushing and grinding circuit equipment
- Cyclones system equipment
- Flotation circuit equipment
- Thickener tank equipment
- Concentrate handling facility equipment
- Air Compressors, Reagent systems, pumps, pipework and equipment
- Laboratory and sample preparation facility equipment

Ausenco has determined that the Jameson Cells (36 week lead time) and the Filter Presses (30 to 34 week lead time) are the major lead items that extend the whole processing implementation schedule to between 11 and 12 months, from just 4 months. ScoZinc however expects to reduce that time frame by upwards of 3 months by pre-ordering immediately project financing has been committed, or alternatively, on the sale of certain current surplus processing equipment not required under the new optimal processing systems determined in this Pre-Feasibility Study.

ScoZinc anticipates that the advance lead item ordering would reduce the processing implementation schedule to between 7 and 9 months, and the overall execution time period to between 7 and 9 months.

Furthermore, ScoZinc has engaged a number of Nova Scotian equipment and labour suppliers, plus two international engineering companies to provide direct (or indirect) assistance with completing the

procurement process over a 3 to 4 month timeframe. With the quantity of review and analysis on the Scotia Mine completed over the past 3 years, ScoZinc is of the view that a maximum procurement timeframe of 4 to 5 months is therefore highly plausible.

#### **24.2.2 Pre-Commercial Production Phase**

According to the life of mine plan, mining operations are scheduled to commence 5 months prior to commercial concentrate production in Year -1. The primary purpose of this lead time is to mine sufficient material from the pits to build a Run-of-Mine (“ROM”) ore stockpile to enable optimal ore grade blending and a sustained processing throughput of 2,700 tonnes per day after the 5<sup>th</sup> month. During this period, the mill refurbishment is also completed.

During the Pre-Production Phase, the Mine Department is scheduled to complete the following:

- Final commission of remaining mining equipment (1<sup>st</sup> Month)
- Recruitment and training of all mining personnel
- Full mining production operations by the 4<sup>th</sup> month of mine production

During the Pre-Production Phase of the plant, Ausenco has recommended and included in the PFS cash flow model that an engineering firm be engaged on an EPCM contract model basis to install the new equipment upgrades, with a Construction Management team (“CM”) to self-perform the construction, i.e. the engineering firm will hire or subcontract specific contractors to undertake the installation of the equipment upgrades as part of the EPCM team.

For the refurbishment and replacement of existing plant equipment, Ausenco recommends that an engineering firm provide an Engineering & Procurement (“EP”) service for the planning and equipment purchasing requirements, and ScoZinc will self-execute the installation work.

In summary, Ausenco estimates that the entire implementation schedule will take between 11 to 12 months, which includes a 3 to 4 months period of pre-engineering work and the completion of the following major items:

- Recruitment and training of processing plant personnel
- Installation of mobile Primary crusher
- Installation of Secondary crusher and crushing infrastructure
- Installation of other crushing and grinding circuit upgrades
- Installation of the Jameson Cells
- Flotation circuit upgrades
- Installation of concentrate filter presses
- Completion of the concentrate load-out and concentration handling facility
- Installation of air compressors, reagent systems, and pumps
- Upgrade of laboratory and sample preparation equipment
- Soft commissioning

### 24.2.3 Commercial Production Phase

The Commercial concentrate Production Phase marks the 9<sup>th</sup> month planned completion of all preliminary and pre-production works to enable a consistent throughput of 2,700 tonnes per day.

During the initial Commercial Production phase, the Scotia Mine is scheduled to complete the following over a 3-month period:

- Ramp up mill processing throughput and recoveries over a 3-month period
- Complete operational improvements to maintain 2,700 tonnes per day average throughput

During the 14-year mine life, it is expected that additional mill equipment and operational upgrades will be implemented to improve both throughput and recoveries.

However, under the current Life-Of-Mine plan and schedules, such potential improvements have not been included for the purposes of this Pre-Feasibility Study.

## 25 Interpretations and Conclusions

### 25.1 SRK Conclusions

The December 2019 mineral resource update includes a total Measured and Indicated mineral resource of 25.4Mt at a Zn-equivalent grade of 2.84% (1.89% Zn and 0.99% Pb), at a cut-off grade of 0.9% Zn-equivalent. An additional Inferred mineral resource of 5.0Mt at a Zn-equivalent grade of 2.13% (1.55% Zn and 0.66% Pb) is included.

Previous resource estimates were domained using a mineralized envelope (solid) within the carbonate material. Any mineralized carbonate material outside the domain was treated as zero grade carbonate waste. This had a negative impact on mine dilution. Previous production records show that most of the carbonate material from the hanging wall to the footwall contains mineralization to some degree. As a result, the approach taken with the new mineral resource was to domain the mineralization by lithology, where all composited assays inside the carbonate material were used in the block model grade interpolation. An optimized pit was then used to determine the reasonable prospects of eventual economic extraction of the new mineralized domain based on lithology.

Drill holes with missing intervals in between existing assay data in the same hole were assigned a background Pb & Zn % value, determined by statistical analysis, instead of being assigned a value of 0% as in previous estimates. This allows for a more realistic interpolation as it is known, from positive production reconciliation in zones with missing data, core examination and review drillhole logging information, that most of the carbonate material is mineralized. In the case of drill holes that contained lithology information to construct the new mineralized domain but were missing all assay data, the grade interpolation was carried through over the missing intervals, but the affected volumes were classified as inferred resources.

There were 40 holes, located mostly in the North East zone, that were missing from the database that was used in previous mineral resource estimates. ScoZinc and SRK have found no reasoning as to why these holes were omitted. The 40 missing holes correspond well to the current geological model used in the new mineral resource estimate. Therefore, SRK used them in the new mineral resource estimate.

The topographic model (“topo”) used to estimate the previous mineral resources in the main zone was re-calculated. There was a portion of the current pit that was backfilled in 2009/ 2010 and the topo contains this backfill. When the previous mineral resource was calculated, this topo was used resulting in added mineralized tonnes as the backfill was occupying the same space that the in-situ carbonate mineralization once did. This has been corrected and an updated topo was used for the new mineral resource that accounts for the current carbonate mineralization conditions.

The area of carbonate reef between the Main Zone and the Getty Zone, now named Getty South, was not modelled in previous resource estimates despite a large amount of historic drilling in the area with mineralized intersects. The Getty South area carbonate is shallow with a horizontal orientation and a significantly lesser amount of overburden compared to the Main Zone with an average overburden thickness of 4 metres which has potential to support a low tonnage/low grade open-pit. The Getty South area has been included in the new mineral resource estimate.

## 25.2 Ausenco Conclusions

Historical metallurgical test data and plant operating data were reviewed to support the engineering for the reopening of the ScoZinc operation. The data shows that high grade lead and zinc concentrates can be produced at high recoveries. The process plant design criteria have been selected according to the metallurgical data available and are appropriate for a PFS level study. The process plant has been redesigned for a throughput of 0.99Mt/a.

Throughout the development of the 2,700t/d PFS, several opportunities and risks have been identified that are material to the Project's outcomes.

### 25.2.1 Processing Opportunities

- Conduct further testwork to identify ideal grind size for maximum flotation recovery performance. There is potential to increase grind size therefore increase throughput with little to no capital expenditure
- Conduct further financial simulations with varying life of mine and throughputs. There is an opportunity to further refine the economics of the Project
- Conduct a full refurbishment/ replacement assessment on the existing mill equipment. There is potential to save money on current high-level scoping cost assessment
- Complete concentrate filtration tests to determine the optimal equipment selections. At the expected zinc and lead concentrate production rates, the use of one shared filter press is possible
- Current market conditions in the process equipment sector have slowed down dramatically during the COVID-19 Pandemic. There is an opportunity to reduce lead times on the long lead equipment. Namely the Jameson cells and the filter presses
- There is an opportunity to procure a second-hand transformer. ScoZinc has identified suppliers with an 8 mVA transformer
- There is an opportunity to defer the mechanical refurbishment and replacement costs over the first year of operations. Further investigation of equipment condition is required to understand which cost can be deferred
- Reduce the schedule by procuring certified information for long lead equipment at the beginning of the Project

### 25.2.2 Mill Risks

- Full assessment required for refurbishment/ replacement costs. Current scoping estimate is based on high level review and ScoZinc quotations from vendors. In particular, it is recommended that a full detailed refurbishment/ replacement inspection be conducted to ensure that the three mills (one rod mill and 2 ball mills) have no hidden issues. Due to the lack of power supply to the mills, the mills were not turned to complete a full inspection program
- Lack of available skilled operators may prolong Mill ramp up. Development of training programs in advance of start-up is required to ensure production ramp up proceeds in an orderly manner

### **25.3 Terrane Conclusions**

The Scotia Mine site is geotechnically and hydrogeologically challenging; however, with sufficient data collection, design, monitoring and maintenance, Terrane is of the opinion these challenges can be addressed.

Overburden slopes on the site (up to 50 metres in height) are substantive and, without proper care and maintenance, could greatly affect open-pit development. Similarly, the gypsum and anhydrite are susceptible to ongoing weathering and erosion which could lead to rock mass instability with time.

From a hydrogeological perspective, ensuring drained conditions on-site in both the overburden and bedrock pit faces and waste pile will be important in maintaining the integrity of the pit slopes. Additionally, more work is required to address the location of Gays River in relation to open-pit development.

There are numerous historical underground workings present on site which would likely pose a hazard to the proposed open-pit development. Terrane's current assessment did not evaluate the effect of these workings on the proposed open-pit developments.

This study did not evaluate stable waste pile slopes and Terrane cautions using the overburden design herein. Overburden slopes around the open-pit will be largely undisturbed and waste piles will be disturbed. As a result, they will have very different material properties.

Based on our assessment of the data and site experience from historical open-pit mining, we consider the slope design parameters herein adequate for a Pre-Feasibility level Study.

### **25.4 MineTech Conclusions**

The Scotia Mine carbonate hosted lead-zinc deposits are ready for development. ScoZinc has completed much of the engineering work and has obtained supplier quotes for mining equipment and estimates for mill equipment upgrades. Drawings for development and mining have been completed. An economic analysis has confirmed that the Scotia Mine Project is feasible at US\$1.20/ pound zinc and US\$0.90/ pound lead, over the life of the mine. The area has been explored sufficiently to provide good data for this Pre-Feasibility level Study.

The plan calls for a stockpiling of low, medium and high-grade ore before starting the mill. Pre-production overburden stripping and stockpile building is also necessary prior to production. The proposed budget is sufficient to employ this strategy.

The estimated Proven and Probable Reserves are 13.66 million tonnes at 2.03% zinc and 1.10% lead, which has a zinc equivalent grade of 3.09%. There are also 5 million tonnes of Inferred Resources.

There is enough operational information available about the deposit to make informed decisions regarding operations. Additional drilling and sampling are not required to come to a decision to fund the Project.



## 26 Recommendations

### 26.1 SRK Recommendations

SRK provides the following recommendations based upon the outcome of this PFS on the Scotia Mine and the 2019 Mineral Resource Estimate:

- Additional drilling is recommended in areas of Inferred mineral resources to assess the potential for upgrading these areas to Indicated or Measured mineral resource categories
- Infill drilling is recommended in areas of historical drilling where sampling focused only on higher grade intervals to support underground mining. Additional drilling and sampling in these areas will be required to confirm the continuity of lower grade mineralization to support potential open-pit mining
- Recommendations provided in previous Technical Reports and economic studies should be reviewed within the context of this PFS on the Scotia Mine Deposit

### 26.2 Ausenco Recommendations

The following scopes of work are recommended in order to investigate potential opportunities, mitigate risks, and further define project requirements:

- Complete additional or deferred metallurgical test work, including: flotation testing of representative samples from the most recent mine production schedule to confirm recoveries and concentrate grades, and specific testing to support the selection of the proposed Jameson cell in the zinc flotation circuit
- Lead and zinc concentrate filtration tests to provide equipment selection parameters
- Testwork on Gypsum. Potential to add to revenue stream
- Continue engineering work to reduce EPCM costs and equipment lead times
- Secure long lead time equipment to reduce the procurement execution phase

Perform additional studies to evaluate:

- Compressed Natural Gas (“CNG”) Power Generators vs. NS Power provider. There is a strong opportunity to reduce operating costs by using CNG generators for ScoZinc operations
- Grind size and impact on flotation kinetics. There is potential to marginally increase the throughput through the existing mill without increasing current equipment capacity

## 26.3 Terrane Recommendations

Terrane highlights some common operational considerations below.

**Controlled Blasting** – Rock strength can be greatly affected by blast disturbance which may influence the bench to overall pit scale stability. At the bench to inter-ramp scale, in bedrock, slope stabilities are often driven by on-going deterioration of the wall face. This deterioration or raveling is generally initiated by small, discontinuity bounded, rock blocks known as key blocks. To achieve the steepest possible bench faces it is imperative that such on-going deterioration be limited during blasting activities. As a result, we recommend controlled blasting be used at the Scotia Mine site.

**Bench Maintenance** – Soil Bench faces in overburden will be susceptible to erosion/gullyng and surficial (<0.5 m) slumping. Overburden slopes should be seeded after excavation to limit deterioration. Further maintenance may be required to fix small scale slumping and/or gullyng so it does not become a larger operational issue.

**Bench Maintenance** – Bedrock Bench faces should be regularly maintained during mining operations and where possible kept clear of debris to ensure they function as designed. Scaling is an important component of a bench face maintenance program and is generally conducted after blasting has occurred in areas where safe access is possible. A trough bench scaling program may present an opportunity to minimize bench widths due to the reduced volume of material to be controlled by the catch bench.

**Groundwater and Slope Depressurization** – Drainage control measures should be implemented so that any surface water is prevented from flowing into the pit during mining operations and saturating the pit slopes. Further, ponding of water within the pit and on catch benches should be controlled. Additionally, vibrating wire piezometers should be installed at regular intervals around each pit perimeter to allow for detailed monitoring of groundwater levels and pore-water pressures. If high pore-water pressures are encountered during mining, slope depressurization measures may need to be implemented. These typically consist of horizontal drains drilled into the slope allow for drainage of the slope.

**Geotechnical Monitoring** – Geotechnical monitoring and field data collection of the open-pit walls is recommended throughout the life of the open-pits. The following is recommended as part of a geotechnical monitoring program:

- Geotechnical mapping and regular inspection of benches (overburden and rock). This should include tension crack mapping along the crest of bedrock benches
- Geological and major structures mapping
- Maintain an up-to-date lithological and structural model
- Implement a testing program (overburden and bedrock) to confirm all design values
- Complete regular 3<sup>rd</sup> party inspections and slope stability audits

Terrane recommends the following future geotechnical and hydrogeological assessments:

### **Overburden**

- A detailed overburden subsurface investigation to collect further data for a Level 3 to Level 4 design. This investigation should include overburden drilling, sample collection (traditional and undisturbed), and field testing (e.g. standard penetration tests, cone penetration tests)
- Advanced laboratory soils testing (e.g. triaxial testing, liquid/plastic limit, direct shear, etc.)
- Developing a 3D overburden stratigraphy model
- Further, limit-equilibrium modelling (2D and 3D) and/or finite-element modelling with updated material properties
- Liquefaction analysis of sensitive soils
- Complete additional design work
- A detailed evaluation of overburden slopes within 30 m of Gays River, and
- Complete a waste dump assessment and design

### **Bedrock**

- Oriented, geotechnical drilling to access the structural fabrics in the pit walls, this drilling should focus on the three main lithologies that underlie the Scotia Mine site
- Optical and acoustic televiewer surveying
- Evaluate the effects that historical underground workings may have on development
- Perform a suite of geomechanical testing on representative rock samples. This testing should include direct shear, triaxial, and additional UCS testing
- Develop a 3D structural geology model (persistent fabrics and major structures) for the site
- Perform a kinematic analysis on bench faces and inter-ramp angles
- Complete 3D limit-equilibrium modelling

### **Hydrogeology**

- As part of the overburden subsurface investigation, field hydrogeological testing should be completed, including falling head tests and constant head tests (i.e. Packer testing)
- Laboratory analysis
- Piezometer and groundwater well installation in overburden
- Develop a 3D hydrogeological model
- Complete design specifications for pumping wells & any waste dumps
- Complete a geotechnical investigation of the proposed waste dump
- Index testing of the overburden stratigraphy underlying the waste dump
- Further numerical modelling and analysis to confirm the recommended waste dump design
- Develop a geotechnical instrumentation and monitoring program for the waste dump

## 26.4 MineTech Recommendations

A study should be done to determine if the tailings pond can be redesigned to allow water to flow to the South Gays River. The cost of this study would be in the order of \$15,000.

A 100 tonne bulk sample was sent by Esso to Lakefield in 1975 for metallurgical work and the design of the mill, which was done by Kilborn Engineering Limited. A record of this testwork should be available at the mine site. A thorough search of the Scotia Mine data records could save a lot of needless repeat of past work. The cost of such a search and a report on what is available would be approximately \$15,000.

Firm dealer quotes should be obtained and compiled, along with delivery times. This might take a month or more. The results should be reported in a final feasibility study report, which would take approximately 3 months and cost approximately \$50,000.

Additional sensitivity analysis should be included in the report mentioned above.

## 27 References

- Akande, S.O., Zentilli, M., 1983, "Genesis of the lead-zinc mineralisation at Gay River, Nova Scotia, Canada", International Conference on MVT Lead-Zinc Deposits, University of Missouri-Rolla, Rolla, Mo., USA.
- Aston, T., Lamb, T., 1993, "An evaluation of groundwater at the Gays River Mine, Halifax County, Nova Scotia", CIM Bulletin, Vol. 86, No. 975.
- Baker, J., 2011, "Block Model Validation", MineTech International Limited, internal report prepared for Selwyn Resources Limited.
- Brown, J.D., 1981, "Geotechnical investigation, Gays River Mine," Jacques, Whitford and Associates, Project No. 2192, for Canada Wide Mines.
- CBCL, 1999, "Geotechnical investigation and preliminary design, proposed river diversion dyke on Gays River for Open-Pit Mine", Prepared for Savage Resources.
- CRA, 2006, "Phase I environmental site assessment update, Scotia Mine and mill facility", prepared for Acadian Gold Corp by Conestoga-Rovers & Associates.
- Campbell, J., Thomas, D., Hudgins, B., 1992, "Gays River Pb/Zn Deposit, Nova Scotia, Canada Resource Calculations", Westminer Canada Limited, Seabright Operations.
- Carew, T. J., 1998, "Scotia Mine, Deposit Modelling and Open-Pit Reserve Evaluation", Savage Resources Canada Co.
- Comeau, R.L. and Kuehnbaum, R.M., 2004, "Project Summary, Scotia Mine Zn+Pb deposit, Nova Scotia for OntZinc Corporation", A.C.A. Howe International Limited, Report No. 878.
- Cullen, M. P., Kennedy, C., Harrington, M., 2011, "Technical Report on a mineral resource estimate, Getty Deposit", for Selwyn Resources Ltd.
- Exploration and Mining Division Ireland, 2004, "Zinc and Lead in Ireland", Information brochure by Department of Communications, Marine and Natural Resources, Dublin.
- Fallara, F., and Savard, M., 1998, "A structural, petrographic, and geochemical study of the Jubilee Zn-Pb deposit, Nova Scotia, Canada, and a new metallogenic model", *Economic Geology*, vol. 93, pp. 757-778.
- Flint, I., 2011, "Scotia Mine Performance Predictions Based on Historical Processing Analysis", MineTech International Limited, internal report prepared for Selwyn Resources Limited.
- MacLead, R., Burnsey, G.G., Gale JE, 1992, "Numerical investigation of groundwater inflow, Gays river Mine, N.S.", for Westminer Canada Ltd. by Fracflow Consultants Inc.

Fralick, P.W. and Schenk, P.E., 1981, "*Molasse deposition and basin evolution in a wrench tectonic setting, the late Paleozoic, eastern Cumberland Basin, Maritime Canada; in Sedimentation and Tectonics; in Alluvial Basins*", ed. A.D. Miall; Geological Association of Canada Paper 23, p. 77-98.

Giles, P.S., Boehner, R.C., 1982, "*Geologic map of the Shubenacadie and Musquodoboit Basins, Central Nova Scotia*", Nova Scotia Department of Mines and energy Map 82-4, scale 1:50,000.

Hale, W.E., Adams, K.D., 1985, "*Ore Reserves Estimates, Gays River Mine Property*", Ecological and Resources Consultants Limited.

Hardy, S., 1998, "*Report on Scotia Pit Design*", Internal Memo to Dennis Fischer, Savage Resources Canada Company by Mine Development Associates.

Kilborn Engineering Services, 1974, "*Ore Reserves (Mineable Reserves) Gays River – 3<sup>rd</sup> Revision*", Memo to File; Imperial Oil.

Hannon, P., Roy W.D., 2005, "*ScoZinc Limited, Scotia Mine, 2004 Exploration*", Internal Memo.

Hudgins, B., & Lamb, T., 1992, "*Assessment report: Special License 1-90 – Gays River: Getty Deposit*", for Westminer Canada Limited.

Kontak, D.J., 1992, "*A preliminary report on geological, geochemical, fluid inclusion and isotopic studies of the Gays River Zn-Pb deposit, Nova Scotia*", Nova Scotia Department of Natural Resources, Open File Report 92-014.

Kontak, D.J., 1998, "*A study of fluid inclusions in sulfide and nonsulfide mineral phases from a carbonate-hosted Zn-Pb deposit, Gays River, Nova Scotia, Canada*", *Economic Geology*, vol. 93, pp. 793-817.

Kontak, D.J., 2000, "*The role of hydrocarbons in the formation of Pb-Zn deposits in the basal Windsor Group of the Maritimes Basin of Nova Scotia, Canada: evidence from the Gays River (Pb-Zn) and Walton (Ba-Pb-Zn-Cu-Ag) deposits*", Abstract for the 2000 convention of the Canadian Society of Exploration Geophysicists, posted on CSEG website.

MGI Limited, 1999, "*Environmental registration document for the proposed Scotia open-pit mine and river diversion project*".

McKee, D.M., Hannon, P.J., 1985, "*The hydrogeological environment at the Gays River Mine*", *International Journal of Mine Water*, Vol. 4.

MacEachern, S.B., Hannon, 1974, "*The Gays River discovery-a Mississippi valley type lead-zinc deposit in Nova Scotia*", *Canadian Institute of Mining and Metallurgy Bulletin*, October 1974, pp 61-66.

Murray, D.A., 2017, "*Limestones and dolomites of Nova Scotia. Pat 3, Colchester and Halifax Counties*", Nova Scotia Department of Natural Resources, Mineral Resources Branch, Open File Report ME200-3, with general geology summary by R.C. Boehner, December 10, 2017.

Roy, W.D., Dunning J., Carew T., 2012, "*Updated Mineral Resource Report for the Gays River Zinc-Lead Deposit, Including the Getty Deposit, Nova Scotia, Canada*", MineTech International Limited.

Nesbitt Thompson Inc., 1991, "*Sale of the Gays River lead-zinc mine, Nova Scotia*", Document prepared for Westminer Canada Ltd.

Patterson, J.M., 1993, "*Metalliferous environments of Nova Scotia – base metals*", Nova Scotia Department of Natural Resources, Mineral Resources Branch, Information Series ME 22.

Pasminco, approx. 2000, "*Executive Summary, Scotia Mine*", Savage Resources Canada Company, Internal Memo.

Poulin, C., 1998 (1), "*Scotia Mine, Mineral Resource Status*", Internal Memorandum; Claude Poulin, Senior Geologist, Savage Resources Canada Company.

Poulin, C., 1998 (2), "*Scotia Mine, Mineral Reserve Status*", Internal Memorandum; Claude Poulin, Senior Geologist, Savage Resources Canada Company.

RBC, 2005, "*Metal prospects, 2006 zinc market outlook*", December 6, 2005.

Rajeev, S., 2006, "*Fundamental Metals Monthly – July*", Fundamental Research Corp, July 11, 2006.

Ravenhurst, W.R., 1987, "*Stirling, Richmond County, Nova Scotia, Report on geology, drilling, drill core geochemistry and downhole Em and ground EM surveys*", Crone Geophysics for Wilco Mining; Nova Scotia Department of Natural Resources, Assessment Report 87-061.

Roberts, H., 2006, "*Recent developments in global lead and zinc markets and outlook to 2012*", Internal Report Prepared for MineTech International Limited.

Roy, W. D., Carew, T, Comeau, R., 2006, "*Resource, Reserve and Pre-Feasibility Report for the Purchase and Operation of Scotia Mine*", MineTech International Limited, prepared for Acadian Gold Corp.

Roy, W. D., 2011, "*Scotia Mine Reclamation Plan*", MineTech International Limited, prepared for ScoZinc Limited, March 25, 2011.

Sangster, D.F., Savard, M.M., Kontak, D.J., 1998, "*A generic model for mineralisation of Lower Windsor (Viséan) carbonate rocks of Nova Scotia*", *Economic Geology*, vol. 93, pp. 932-952.

Savard, M.M., Chi, G., 1998, "*Cation study of fluid inclusion decrepitates in the Jubilee and Gays River (Canada) Zn-Pb deposits – characterization of ore-forming brines*", *Economic Geology*, vol. 93, pp. 920-931.

Selwyn Resources, 2011, "*Selwyn's ScoZinc (Restart) Project Delivers Robust Economic Results*", Press Release, August 30, 2011.

Thornton, E., 2006 (1), "*Past Mill Superintendent for Scotia Mine*", personal communication.

WMC International Limited, 1995, "*Sale of the Gays River Lead-Zinc Mine, Nova Scotia, Canada*".

## 28 Certificates

### CERTIFICATE OF TIMOTHY CAREW

To accompany the report entitled: “NI 43-101 Technical Report Scotia Mine Pre-Feasibility Study Technical Report” prepared for ScoZinc Limited dated July 6, 2020 with effective date July 6, 2020 (the “Technical Report”).

I, Timothy J. Carew, residing in Reno, NV, USA do hereby certify that:

1. I am an Associate Consultant with SRK Consulting (U.S.), Inc. (“SRK”) with an office at Suite 300, 5250 Neil Road, Reno, NV 89502.
2. I am a graduate of the University of Rhodesia, with a BSc (Hons) in Geology in 1976. In addition, I have obtained MSc degree in Mineral Production Management from University of London, UK in 1982. I have worked in mining geology and engineering for over 35 years since my graduation from the University of Rhodesia, including experience in resource estimation of precious and base metal deposits of various types located in West Africa, Suriname, Asia and the North America.
3. I am a Professional Geoscientist registered with the Association of Professional Engineers & Geoscientists of British Columbia (APEGBC #19706) and a member of the Canadian Institute of Mining, Metallurgy and Exploration.
4. I last visited the Scotia Mine property on September 16, 2012.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of National Instrument 43-101 and this Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.
6. I, as a qualified person, am an independent of the issuer as defined in Section 1.5 of National Instrument 43-101.
7. I am responsible for Sections 4–12, and Section 14, of the Report, and the relevant sections described in the Executive Summary.
8. I have had prior involvement with the subject property.
9. I have read NI 43–101 and those portions of the Technical Report for which I am responsible have been prepared in compliance therewith. That, as of the date of this certificate, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.



Dated 6<sup>th</sup> July 2020, Reno, USA.

["signed and sealed"]

Timothy J. Carew, P.Geo.

Associate Consultant

SRK Consulting (U.S.), Inc.

**CERTIFICATE OF TONY GILMAN**

I, Tony L. Gilman, P.Eng, of the City of Halifax, Province of Nova Scotia, Canada, do certify that:

1. I am a senior rock mechanics engineer and a principal of Terrane Geoscience Inc. with a business address at 100-5435 Portland Place, Halifax, Nova Scotia, B3K 2Y7.
2. This certificate applies of the NI 43-101 Technical Report titled “Scotia Mine Pre-Feasibility Study Technical Report, for ScoZinc Limited, Nova Scotia, Canada”.
3. I am a graduate of the University of New Brunswick with a Bachelor of Science in Geological Engineering (2000).
4. I am a graduate of the Pennsylvania State University with a Master of Science degree in Geology (2006).
5. I have been practicing my profession continuously since 2000 in the field of rock mechanics engineering for open-pit and underground mines.
6. I am a member in good standing of Engineers Nova Scotia (License #10495).
7. I have read the definition of “Qualified Person” as set out in National Instrument 43-101 Standards of Disclosure for Mineral Properties (NI 43-101) and certify that by reason of my experience, education, and professional affiliation that I fulfill the requirement to be a “Qualified Person” for the purposes of NI 43-101.
8. I visited the Scotia Mine site on February 24, 2020.
9. I am responsible for Section 16.2.3, 16.2.4, 16.2.7, and 16.2.11 of the Technical Report.
10. I am independent of ScoZinc Mining Ltd. as defined by Section 1.5 of NI 43-101.
11. As of the date of this certificate, to the best of my knowledge, based on available data, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 6<sup>th</sup> day of July 2020 at Halifax, Nova Scotia.

[“signed and sealed”]

Tony Gilman, M.Sc., P. Eng.

Terrane Geoscience Inc.

**CERTIFICATE OF TOMMASO ROBERTO RAPONI**

I, Tommaso Roberto Raponi, P.Eng. of Oakville, Ontario, Canada, do certify that:

1. I am a Principal Metallurgist with Ausenco Engineering Canada Inc., with a business address at 11 King Street West, Suite 1550, Toronto, ON, M5H 4C7, Canada.
2. This certificate applies of the NI 43-101 Technical Report titled “Scotia Mine Pre-Feasibility Study Technical Report, for ScoZinc Limited, Nova Scotia, Canada”.
3. I am a graduate of the University of Toronto with a Bachelor of Applied Science in Geological Engineering (1994).
4. I have been practicing my profession continuously since 1984, in the field of development, design, operation, and commissioning of mineral processing plants.
5. I am registered as a Professional Engineer in the Province of Ontario (Reg. No. 902259970) and the Association of Professional Engineers and Geoscientists of BC (Reg. No. 23536).
6. I have read the definition of “Qualified Person” as set out in National Instrument 43-101 Standards of Disclosure for Mineral Properties (NI 43-101) and certify that by reason of my experience, education, and professional affiliation that I fulfill the requirement to be a “Qualified Person” for the purposes of NI 43-101.
7. I have not personally inspected the property.
8. I am responsible for Sections 13, 17 and parts of 1, 2, 18, 21, 25 and 26 of the Technical Report.
9. I am independent of ScoZinc Mining Ltd. as defined by Section 1.5 of NI 43-101.
10. As of the date of this certificate, to the best of my knowledge, based on available data, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 6<sup>th</sup> day of July 2020 at Oakville, Ontario.

["signed and sealed"]

Tommaso Roberto Raponi, P. Eng.

Ausenco Engineering Canada Inc.

**CERTIFICATE OF PATRICK HANNON****MINE TECH INTERNATIONAL LIMITED**  
**CONSULTANT ENGINEERS & GEOLOGISTS**  
HALIFAX, CANADA**1161 HOLLIS ST., SUITE 211, HALIFAX, NOVA SCOTIA, B3H 2P6****PHONE: 902-492-4049****FACIMILE: 902-492-9302****[WWW.MINETECHINT.COM](http://WWW.MINETECHINT.COM)**

Certificate of Co-Author: Patrick J.F. Hannon, M.A.Sc., P.Eng.

I, Patrick James Francis Hannon, of the Province of Nova Scotia, do hereby certify that:

1. I live at 1152 Cartaret Street, Halifax, Nova Scotia, and I am a Professional Engineer (Mining and Geological) employed by MineTech International Limited.
2. This certificate applies to the report titled "NI 43-101 Technical Report Scotia Mine Pre-Feasibility Study Technical Report, for ScoZinc Limited, Nova Scotia, Canada" by co-authors: Tim Carew, P.Geo. (SRK), Tony Gilman, M.Sc., P.Eng. (Terrane Geoscience), Tommaso Roberto Raponi, P.Eng. (Ausenco), and Patrick Hannon, M.A.Sc., P.Eng. (MineTech), dated July 6, 2020.
3. I am a graduate of the Dalhousie University, Halifax, Nova Scotia (M.A.Sc., Mining Engineering), Queen's University, Kingston, Ontario (B.Sc. Geological Engineering), and the Haileybury School of Mines (Senior Mining Technician).
4. I am a Licensed Professional Engineer in the Province of Nova Scotia, (registration No. 2734), in the Province of Newfoundland and Labrador (registration No. 06025) and in the Province of Ontario, (registration No. 18260018). I am a Fellow of the Canadian Institute of Mining and Metallurgy and a member of the Society of Mining Engineers, AIME.
5. I have worked as an engineer for over 40 years, in Canada, USA, SE Asia, Central Asia, FSU and West Africa. Between 1972 and 1983, I was employed with Imperial Oil Limited as senior geologist, chief mine geologist and mine superintendent at the Gays River Mine. I was Manager of Mining Engineering for the NSDME 1983-1987. I was chief engineer with ACA Howe 1987-1989 and mining engineer, geological engineer with MineTech International Limited since 1989.
6. My most recent visit and tour of the property was on June 18<sup>th</sup>, 2020. I know the property well, having worked at the site in 1972-76, 1980-82 and 2004-2007.
7. I have reviewed the mine scheduling work, the production schedule, mining method, geotechnical and hydrological sections, environmental studies, overburden stripping plans, mining and backfilling plans, the proposed equipment fleet, completed a site visit, completed a critical review of the Project infrastructure, a critical review of the market studies and possible contracts, a critical review of the environmental studies, a critical review of the capital and operating costs, the overall mining methodology and environmental situation as presented in Sections 1, 2, 3, 15, 16, 18, 19, 20, 21, 22,

23, 24, 25, 26, 27 and 28 and accept that these Sections are adequate for a Pre-Feasibility Study. I am responsible for Sections 25.4 and 26.4 of this Technical Report.

8. I neither own nor control a beneficial interest in the ScoZinc property nor any adjacent or nearby deposits. I am independent of the issuer applying all the tests in Section 1.5 of National Instrument 43-101, Standards of Disclosure for Mineral Projects (NI 43-101).
9. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”). I certify that, by reason of my education, affiliation with a Professional Association (as defined by NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
10. The aforementioned Sections of this Technical Report for which I am responsible have been prepared in compliance with National Instrument 43-101 Form F1.
11. As of July 6<sup>th</sup>, 2020, to the best of my knowledge, information, and belief, Sections 16 and 20 contain all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading. I am not aware of any material fact not in the report that would make the report misleading.

Dated this 6<sup>th</sup> day of July 2020.

["signed and sealed"]

Patrick James Francis Hannon, M.A.Sc., P. Eng.

MineTech International Limited

## 29 Glossary

Many of the defined geological terms below are from Jennifer Bates's "Gold in Nova Scotia" (Bates, 1987) and from "A Dictionary of Earth Sciences, third edition, 2008" published by the Oxford University Press, edited by Michael Allaby, 654 pages. The definitions have been edited slightly in that extraneous material that is not relevant to this assessment report, has been left out. Mineral Resource and Reserve terms are from "CIM DEFINITION STANDARDS - For Mineral Resources and Mineral Reserve's", Prepared by the CIM Standing Committee on Reserve Definitions Adopted by CIM Council on May 10, 2014. Mining terms are mainly from the Underground Mining Methods Handbook, W.A. Hustrulid, Ed., Society of Mining Engineers of the American Institute of Mining, Metallurgy, and Petroleum Engineers, Inc. New York, 1982.


Word	Definition
<i>Adjacent Property</i>	Means a property: (a) in which the issuer does not have an interest; (b) that has a boundary reasonably proximate to the property being reported on; and (c) that has geological characteristics similar to those of the property being reported on.
<i>Adsorption</i>	Physical adherence of chemicals to substrates without chemical reaction, in this case soluble gold complexes to activated carbon.
<i>Advanced Property</i>	A property that either has mineral reserves, or has mineral resources with potential economic viability as supported by a preliminary economic assessment, a pre-feasibility study, or a feasibility study.
<i>Agglomerate (vb.)</i>	The act of binding fine particles together to create coarse particles as part of a mineral processing activity.
<i>Anticline</i>	A fold, generally convex upward, whose core contains the stratigraphically older rocks. Antonym of Syncline.
<i>Arenite</i>	A general name for sedimentary rocks composed of sand-sized fragments irrespective of composition; e.g., sandstone, graywacke, arkose, and calcarenite.
<i>Assay Laboratory</i>	A facility in which the proportions of metal in rocks or concentrates are determined using analytical techniques.
<i>Auriferous</i>	Containing gold; gold-bearing.
<i>Back</i>	The roof or overhead rock surface of an underground opening.
<i>Bed</i>	The smallest distinctive division of a stratified series, marked by a more or less well-defined surface or plane from its neighbours above and below; a layer or stratum.
<i>Bias</i>	A measurement procedure or estimator is said to be biased if, on the average, it gives an answer that differs from the truth. The bias is the average (expected) difference between the measurement and the truth. For example, if you get on the scale with clothes on, that biases the measurement to be larger than your true weight (this would be a positive bias). The design of an experiment or of a survey can also lead to bias. Bias can be deliberate, but it is not necessarily so (Glossary of Statistical Terms).
<i>Billion</i>	One thousand million (10 <sup>9</sup> ).
<i>Breast</i>	The vertical end or face of a horizontal cut. The breast is a mining face that is generally as wide as the mineralized rock body and as high as the cut height.
<i>Bouma Sequence</i>	Idealized sequence of sedimentary structures observed in *turbidity current deposits. It is named after the geologist, Arnold H. Bouma, who first emphasized its generality (Sedimentology of Some Flysch Deposits, Elsevier, Amsterdam, 1962). The lowest unit, A, a massive or graded sand, is overlain progressively by the B (lower division of parallel lamination), C (ripple or convolute laminations), D (upper division of plane parallel laminations), and E (pelagic shale)

	units. Examples showing the entire sequence are not common. The sequence can be interpreted in terms of deposition under waning current conditions.
<i>Cambro-Ordovician</i>	Geological timeframe; between the Cambrian and Ordovician periods (approximately 560 million and 440 million years ago).
<i>Caps</i>	Round or square timbers generally greater than 200mm in diameter, placed perpendicular to the vein for wall and back support. Caps are part of a timber set.
<i>Carbonate Rocks</i>	Sedimentary rocks composed mainly of calcium carbonate. USGS OFR 97-536-A.
<i>Carbonic Acid</i>	A mild acid formed when water and carbon dioxide chemically combine in the atmosphere and soil. USGS OFR 97-536-A.
<i>Cash Cost</i>	A measure of the average cost of producing an ounce of gold, calculated by dividing the total working costs in a period by the total gold production over the same period. Working costs represent total operating cost less depreciation and amortization and other non-cash items. In determining the cash cost of different elements of the operations, it is necessary to allocated overheads.
<i>Cave</i>	A natural opening in rock large enough to be entered by man and extending to points where daylight does not penetrate. USGS OFR 97-536-A.
<i>Cave System</i>	A cave or caves having a complex network of interconnected chambers and passages that constitute an underground drainage system. USGS OFR 97-536-A.
<i>Dissolution</i>	(Also called chemical solution) - The process of chemical weathering of bedrock in which the combination of water and acid slowly removes mineral compounds from solid bedrock and carries them away in liquid solution. USGS OFR 97-536-A.
<i>Centrifugal Separation</i>	The separation of different particles by centrifugal action as used in cyclone separators and centrifuges.
<i>Chute</i>	The loading arrangement that utilizes gravity flow in moving broken rock from a higher elevation to a lower elevation. A gate is used to control the flow. Chute is often used for the wooden tube extending upward into the stope.
<i>Concentrate</i>	A powdery product containing the valuable mineralized rock mineral from which most of the waste material has been eliminated.
<i>Concentrate</i>	The clean product recovered in froth flotation.
<i>Contained Ounces</i>	Represents ounces in the ground without the reduction of ounces not recovered by the applicable metallurgical process.
<i>Cross Section</i>	A diagram or drawing that shows features transected by a vertical plane drawn at right angles to the longer of the axis of a geologic feature.
<i>Crosscut</i>	A nominally horizontal tunnel, generally driven at right angles to the strike of the vein.
<i>Crown Land</i>	Land held by the state; synonymous with Public Land. Formally, land held by the monarch acting as the head of state.
<i>Cut</i>	The volume of the orebody that is mined and filled in one cut and fill cycle.
<i>Cut-off or Cut Off Grade</i>	The lowest grade of mineralized material considered economic to extract that returns the highest net present value; the cutoff grade is used in the calculation of the mineralized rock volume and quality of a given deposit. The cutoff grade is adjusted to present conditions as costs are sunk and opportunities arise.
<i>Decline</i>	A sloping underground opening for machine access from level to level or from surface; also called a ramp.
<i>Deposit</i>	A natural occurrence of a useful mineral, or an ore, in sufficient extent and degree of concentration to invite exploitation.

<i>Development</i>	The initial stages of opening up a new mine.
<i>Diamond Drilling</i>	Drilling with a hollow bit with a diamond cutting rim to produce a cylindrical core that is used for geological study and assays. Used in mine exploration. Infill diamond drilling at shorter intervals between existing holes, used to provide greater geological detail and to help establish reserve estimates.
<i>Dilution</i>	The contamination of mineralized rock with waste rock during mining, decreasing the overall grade of the ore.
<i>Dip</i>	The angle that a structural surface, i.e. a bedding or a fault plane, makes with the horizontal measured perpendicular to the strike of a structure.
<i>Disseminated</i>	Said of a mineral deposit (esp. of metals) in which the desired minerals occur as scattered particles in the rock, but in sufficient quantity to make the deposit an ore. Some disseminated deposits are very large.
<i>Dissolution</i>	(also called chemical solution) - The process of chemical weathering of bedrock in which the combination of water and acid slowly removes mineral compounds from solid bedrock and carries them away in liquid solution. USGS OFR 97-536-A.
<i>Down Dip</i>	Down from the point of dip as described above.
<i>Drift</i>	A nominally horizontal tunnel, generally driven parallel to or coincident with a vein.
<i>Estimate</i>	(verb) "to judge or approximate the value, worth, or significance of; to determine the size, extent, or nature of". (noun) "an approximate calculation; a numerical value obtained from a statistical sample and assigned to a population parameter".
<i>Exploration</i>	Prospecting, sampling, mapping, diamond drilling and other work involved in searching for ore.
<i>Faulting</i>	The process of fracturing that produces a displacement in the rock strata.
<i>Feasibility Study</i>	A Feasibility Study is a comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Modifying Factors together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate, at the time of reporting, that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.
<i>Feldspar</i>	A group of common rock-forming minerals that includes microcline, orthoclase, plagioclase and others.
<i>Flotation</i>	A process by which some mineral particles are induced to become attached to bubbles and float, and other particles to sink, so that the valuable minerals are concentrated and separated from the worthless gangue or waste.
<i>Flowsheet</i>	A diagram showing the progress of material through a preparation or treatment plant. It shows the crushing, screening, cleaning, or refining processes to which the material is subjected from the run-of-mine state to the clean and sized products. The size range at the various stages may be shown.
<i>Fluvial</i>	Pertaining to a river or rivers. USGS OFR 97-536-A.
<i>Footwall</i>	The underlying side of a fault, an orebody, or mine workings.
<i>Froth Flotation</i>	A flotation process in which the minerals floated gather in and on the surface of bubbles of air or gas driven into or generated in the liquid in some convenient manner.
<i>G&amp;A</i>	General & Administrative Costs.
<i>Gangue</i>	Waste material that is mixed or associated with a desired mineral.
<i>Geophysics</i>	A branch of physics dealing with the Earth, including its atmosphere and hydrosphere. It includes the use of seismic, gravitational, electrical, thermal, radiometric, and magnetic phenomena to elucidate processes of dynamical geology and physical geography, and makes use of geodesy, geology, seismology, meteorology, oceanography, magnetism, and other Earth sciences in collecting and interpreting Earth data.



<i>Gold</i>	A chemical element with the symbol Au (from its Latin name aurum) and atomic number 79. It is a highly sought-after precious metal which has been used as money, a store of value and in jewelry since the beginning of recorded history. The metal occurs as nuggets or grains in rocks, underground "veins" and in alluvial deposits. It is one of the coinage metals. Gold is dense, soft, shiny and the most malleable and ductile substance known.
<i>Grab Sample</i>	A sample taken from a particular area at a particular time without undue reference to any specific sampling program.
<i>Grade</i>	The amount of valuable mineral in each ton of ore, expressed as troy ounces per ton or grams per tonne for precious metals and as a percentage for other metals.
<i>Gram</i>	Metric system unit of mass. 1/1000 kg = 1 gram.
<i>Gravity Separation</i>	The use of differential specific gravities to separate denser material (e.g. gold) from lighter material (waste).
<i>Graywacke (Greywacke)</i>	An old rock name that has been variously defined but is now generally applied to a dark gray, firmly indurated, coarse-grained sandstone that consists of poorly sorted, angular to subangular grains of quartz and feldspar, with a variety of dark rock and mineral fragments embedded in a compact clayey matrix having the general composition of slate and containing an abundance of very fine-grained illite, sericite, and chloritic minerals.
<i>Ground Water</i>	Water below the levels at which all voids in the rock are completely filled with water. USGS OFR 97-536-A.
<i>Hanging Wall</i>	The overlying side of a fault, an orebody or mine workings.
<i>Haul Truck</i>	A self-propelled vehicle used to transport material.
<i>Heading</i>	The working face of a drift, crosscut or ramp. In timber sets, a heading is a bundle of wooden boards placed between a cap and the wall rock.
<i>Hectare</i>	Metric system unit of area. Equal to 10,000 square metres.
<i>Hinge</i>	The locus of maximum curvature or bending in a folded surface, usually a line.
<i>Historical Estimate</i>	Means an estimate of the quantity, grade, or metal or mineral content of a deposit that an issuer has not verified as a current mineral resource or mineral reserve, and which was prepared before the issuer acquiring, or entering into an agreement to acquire, an interest in the property that contains the deposit.
<i>In Situ</i>	In place, i.e. within unbroken rock.
<i>Indicated Mineral Resource</i>	<p>An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.</p> <p>Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.</p> <p>An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.</p>
<i>Induced Polarization</i>	The production of a double layer of charge at a mineral interface, or production of changes in double-layer density of charge, brought about by application of an electric or magnetic field (induced electrical or magnetic polarization). Induced electrical polarization is manifested either by a decay of voltage in the Earth following the cessation of an excitation current phase, or by a frequency dependence of the apparent resistivity of the Earth.
<i>Indurated</i>	Said of rock or soil hardened or consolidated by pressure, cementation, or heat.

<p><i>Inferred Mineral Resource</i></p>	<p>An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.</p> <p>An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.</p>
<p><i>Interbedded</i></p>	<p>Occurring between beds or lying in a bed parallel to other beds of different material.</p>
<p><i>Karst</i></p>	<p>A distinctive topography that indicates dissolution of underlying soluble rocks by surface water or ground water. ... The development of all karst landforms requires the presence of rock which is capable of being dissolved by surface water or ground water. The term karst describes a distinctive topography that indicates dissolution (also called chemical solution) of underlying soluble rocks by surface water or ground water. ... The degree of development of karst landforms varies greatly from region to region. Large drainage systems in karst areas are likely to have both fluvial (surface) and karst (underground) drainage components. USGS OFR 97-536-A</p>  <p>Figure 29-1: Karst Development in Limestone</p>
<p><i>Kilograms</i></p>	<p>Base unit of mass in the metric system. 1 kg = 1,000 grams = 2.2046 pounds.</p>
<p><i>Kilometre</i></p>	<p>One thousand metres.</p>
<p><i>Level</i></p>	<p>The workings of a mine which are on the same horizontal place.</p>
<p><i>Ligneous</i></p>	<p>Rocks solidified from molten material often produced as result of volcanic activity.</p>
<p><i>Lode</i></p>	<p>A mineral deposit consisting of a zone of veins.</p>
<p><i>London Price (or Fixing)</i></p>	<p>The twice daily (a.m. or p.m.) gold price fixing determined by the London Gold Market.</p>
<p><i>Matrix</i></p>	<p>The rock material in which a fossil, crystal, or mineral is embedded.</p>
<p><i>Measured Mineral Resource</i></p>	<p>A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.</p> <p>Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.</p>
<p><i>Meta-</i></p>	<p>A prefix that, when used with the name of sedimentary or igneous rock, indicates that the rock has been metamorphosed, e.g. metabasalt.</p>
<p><i>Metallurgical Recovery</i></p>	<p>Proportion of metal in mill feed which is recovered by a metallurgical process or processes.</p>

<i>Metallurgy</i>	The science and art of separating metals and metallic minerals from their ores by mechanical and chemical processes; the preparation of metalliferous materials from raw ore.
<i>Metamorphism</i>	The mineralogical, chemical, and structural adjustment of solid rocks to physical and chemical conditions that have generally been imposed at depth below the surface zones of weathering and cementation, and that differ from the conditions under which the rocks in question originated.
<i>Metre</i>	Base unit of length in the metric system. 1 m = 3.28084 feet.
<i>Mil</i>	One thousandth of an inch.
<i>Mill</i>	A mineral treatment plant in which crushing, wet grinding, and further treatment of mineralized rock is conducted. Also, separate components, such as ball mill, hammer mill, and rod mill.
<i>Mineable</i>	That portion of a resource for which extraction is technically and economically feasible.
<i>Mineralized</i>	Rock which has undergone mineralization.
<i>Mineral Claim</i>	Title issued by the Government concerned to an individual or group, which grants that individual or group the right to explore for or exploit mineral wealth in a specified area by approved methods in accordance with the ruling laws and regulations.
<i>Mineral Reserve</i>	<p>A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.</p> <p>The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.</p> <p>The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study.</p>
<i>Mineral Resource</i>	<p>A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.</p> <p>The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.</p>
<i>Mineralization</i>	The process or processes by which a mineral or minerals are introduced into a rock, resulting, in a valuable or potentially valuable deposit.
<i>Mineralized Zone</i>	Any mass of host rock in which minerals of potential commercial value occur.
<i>NI 43-101</i>	National Instrument 43-101 Standards of Disclosure for Mineral Projects.
<i>NSR</i>	Net Smelter Royalty or Net Smelter Return, a royalty based on the price of metal (gold) realized after deducting the cost of refining.
<i>Open-Pit/ Open-Cut</i>	Surface mining in which the mineralized rock is extracted from a pit. The geometry of the pit may vary with the characteristics of the orebody.
<i>Ore</i>	Rock that contains one or more minerals or metals, at least one of which has commercial value, and which can be recovered at a profit.
<i>Orebody</i>	A continuous well-defined mass of mineralized rock of sufficient volume to make extraction economically feasible.
<i>Permeability</i>	The property of rock or soil that permits water to pass by flowing through interconnected voids (spaces). Permeable bedrock makes a good aquifer, a rock layer that yields water to wells. USGS OFR 97-536-A.

<i>Porosity</i>	The volume of void space (space filled with air or water) in soil or bedrock. When these voids are interconnected, water or air (or other fluids) can migrate from void to void. Thus interconnected pores make the soil or bedrock permeable. USGS OFR 97-536-A.
<i>Percussion Drilling</i>	A drilling method which involves advancing the hole by means of a pneumatically operated hammer.
<i>Pound</i>	Avoirdupois pound. An imperial system unit of mass, commonly referred to as the 'pound'. 1 pound = 0.45359237 kg.
<i>Precambrian</i>	All geological time and the corresponding rocks before the beginning of the Paleozoic Era (i.e. older than approximately 570 million years).
<i>Preliminary Economic Assessment</i>	Means a study, other than a Pre-Feasibility or Feasibility Study, that includes an economic analysis of the potential viability of mineral resources.
<i>Preliminary Feasibility Study</i>	A Pre-Feasibility Study is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open-pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Modifying Factors and the evaluation of any other relevant factors which are sufficient for a Qualified Person, acting reasonably, to determine if all or part of the Mineral Resource may be converted to a Mineral Reserve at the time of reporting. A Pre-Feasibility Study is at a lower confidence level than a Feasibility Study.
<i>Pre-stripping</i>	Removal of overburden in advance of beginning operations to remove mineralized rock in an open-pit operation.
<i>Probable Mineral Reserve</i>	A Probable Mineral Reserve is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.
<i>Proven Mineral Reserve</i>	A Proven Mineral Reserve is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.
<i>Qualified Person</i>	Means an individual who (a) is an engineer or geoscientist with a university degree, or equivalent accreditation, in an area of geoscience, or engineering, relating to mineral exploration or mining; (b) has at least five years of experience in mineral exploration, mine development or operation, or mineral project assessment, or any combination of these, that is relevant to his or her professional degree or area of practice; (c) has experience relevant to the subject matter of the mineral project and the technical report; (d) is in good standing with a professional association; and (e) in the case of a professional association in a foreign jurisdiction, has a membership designation that (i) requires attainment of a position of responsibility in their profession that requires the exercise of independent judgment; and (ii) requires A. a favourable confidential peer evaluation of the individual's character, professional judgement, experience, and ethical fitness; or B. a recommendation for membership by at least two peers and demonstrated prominence or expertise in the field of mineral exploration or mining.
<i>Quotational Period</i>	The "quotational period" or the period during which the metal prices are established is usually stated in the metal payment clause. The quotational period may vary from calendar month prior to shipment to third or fourth calendar month following date of delivery.
<i>Reagent</i>	A chemical substance used to induce a chemical reaction.
<i>Reclamation</i>	The process by which lands disturbed as a result of mining activity are reclaimed back to a beneficial land use. Reclamation activity includes the removal of buildings, equipment, machinery and other physical remnants of mining, closure of tailings impoundments, leach pads and other mine features, and contouring, covering and revegetation of waste rock piles and other disturbed areas.

<i>Recovery Rate</i>	A term used in process metallurgy to indicate the proportion of valuable material obtained in the processing of an ore. It is generally stated as a percentage of the material recovered compared to the total material present.
<i>Refining</i>	The final stage of metal production in which final impurities are removed from the molten metal by introducing air and fluxes. The impurities are removed as gases or slag.
<i>Refractory Ore</i>	Any mineralized rock that does not respond to conventional mineral processing (cyanidation) to produce acceptable product recoveries without an intermediate step to address its refractory attributes (usually, but not always, some form of oxidation).
<i>Reverse Circulation Drilling</i>	A drilling method employing double walled drill rods. The drilling fluid (usually air or water) is pushed down the annulus between the rods. The cuttings are blown up in the middle.
<i>Run-of-the-Mine (ROM)</i>	Rock of various sizes resulting from blasting activities within the stone before any further processing is undertaken on it.
<i>Saddle Reef</i>	A mineral deposit associated with the crest of an anticlinal fold and following the bedding planes, usually found in vertical succession, esp. the gold-bearing quartz veins of Australia.
<i>Sampling</i>	Samples of soils, stream sediments or rock chips taken to determine the quantities of trace and minor elements.
<i>Sedimentary</i>	Formed by the deposition of solid fragmental material that originates from weathering of rocks and is transported from its source to a site of deposition.
<i>Settling Pond</i>	A pond, natural or artificial, for recovering the solids from a washery effluent.
<i>Shaft</i>	A vertical or inclined excavation in rock for the purpose of providing access to an orebody. Usually equipped with a hoist at the top, which lowers and raises a conveyance for handling workers and materials.
<i>Sinkholes</i>	(also known as dolines) - A closed surface depression draining underground in karst landscape. Sinkholes are often "bowl-shaped" and can be a few to many hundreds of metres in diameter. USGS OFR 97-536-A.
<i>Siltstone</i>	An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which the silt predominates over the lay; a nofissile silt shale.
<i>Slate</i>	A compact, fine-grained metamorphic rock that possesses slaty cleavage and hence can be split into slabs and thin plates. Most slate was formed from shale.
<i>Slime</i>	Extremely fine sediment (0 mesh), produced in the processing of mineralized rock or rock, especially phosphate rock, which remains suspended in water indefinitely. Consists chiefly of clay.
<i>Slurry</i>	A fluid comprising fine solids suspended in a solution (generally water containing additives).
<i>Smelter</i>	An establishment where ores are smelted to produce metal.
<i>Smelting</i>	Thermal process whereby molten metal is liberated from a concentrate, with impurities separating into a lighter slag.
<i>Soil sampling</i>	Samples of soils taken to explore for mineral deposits.
<i>Stockpile</i>	A store of unprocessed mineralized material or marginal grade material.
<i>Stratigraphic</i>	Pertaining to the composition, sequence, and correlation of stratified rocks.
<i>Strike Length</i>	Horizontal distance along the direction that a structural surface takes as it intersects the horizontal.
<i>Sump</i>	Reservoir to collect fluids for pumping.
<i>Syncline</i>	A fold in which the core contains the stratigraphically younger rocks; it is generally concave upward. Antonym of Anticline.

<i>Tailings</i>	The gangue and other refuse material resulting from the washing, concentration, or treatment of ground ore.
<i>Tailings Pond</i>	Area closed at lower end by constraining wall or dam to which mill effluents are run. Clear water may be returned after settlement in a dam, via penstock(s) and piping.
<i>Technical Report</i>	Means a report prepared and filed in accordance with this Instrument [NI 43-101] and Form 43-101F1 Technical Report that includes, in summary form, all material scientific and technical information in respect of the subject property as of the effective date of the technical report
<i>Ton</i>	Short ton. An imperial system unit of mass, commonly referred to as the 'ton'. 1 ton = 2,000 pounds = 907.18474 kg.
<i>Tonne</i>	Also called the 'metric tonne'. 1 tonne = 1,000 kilograms = 2,204.6 pounds.
<i>Total Cash Cost per Ounce (TCC)</i>	A measure of the average cost of producing an ounce of gold, calculated by dividing the total operating costs in a period by the total gold production over the same period.
<i>Thermal Stress</i>	Temperature changes cause the body to expand or contract. The amount of linear change depends upon the material and the constraints to movement.
<i>Turbidite</i>	A sediment or rock deposited from, or inferred to have been deposited from, a turbidity current. It is characterized by graded bedding, moderate sorting, and well-developed primary structures.
<i>Turbidity Current</i>	A density current in water, air, or other fluid, caused by different amounts of matter in suspension, such as dry-snow avalanche or a descending cloud of volcanic dust; specifically, a bottom-flowing current laden with suspended sediment, moving swiftly (under the influence of gravity) down a subaqueous slope and spreading horizontally on the floor of the body of water.
<i>VLF-EM</i>	Very Low Frequency Electromagnetics. A geophysical technique that relies on VLF broadcasts inducing secondary responses in rock.
<i>Waste</i>	Rock lacking sufficient grade and/or other characteristics of mineralized rock to be economic.
<i>Water Table</i>	The surface between the zone of pure saturation and zone of pure aeration underground. USGS OFR 97-536-A.