Technical Report
On the Mineral Resources and Reserves of the Riotinto Copper Project

Located in Huelva Province, Spain

Prepared For

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7.2.4A Mineralization.................................................................A 2A
8A DEPOSIT/TYPES...............................................................A 1A
9A EXPLORATION.................................................................A 1A
9.1.1A Geophysics.................................................................A 3A
9.1.2A Northern Zone............................................................A 5A
9.1.3A FilonA surface (depth and east extension)..................A 6A
9.1.4A FilonA surface (east extension) and Masa Valley......A 6A
9.1.5A San Antonio...............................................................A 8A
9.1.6A San Dionisio/Atalaya..................................................A 9A
10A DRILLING.................................................................A 1A
10.1A Resource Drilling.........................................................A 1A
  10.1.1A Metallurgical Drilling Program..............................A 3A
  10.1.2A Infill Program........................................................A 5A
  10.1.3A Dehesa Lago.........................................................A 6A
  10.1.4A Inferred Program...................................................A 7A
  10.1.5A Argamasillas........................................................A 8A
  10.1.6A As, Sb Drilling Programs........................................A 9A
  10.1.7A San Lucas............................................................A 10A
  10.2A Exploration Drilling..................................................A 1A
11A SAMPLE PREPARATION, ANALYSIS, AND MINERALIZATION.............................A 1A
  11.1A Historical Drilling....................................................A 1A
  11.2A Atalaya Drilling.......................................................A 1A
  11.3A Site Preparation......................................................A 1A
  11.4A Logging and Sampling Procedures..........................A 1A
    11.4.1A RCA Samples....................................................A 2A
    11.4.2A Core Samples...................................................A 4A
    11.4.3A Labeling........................................................A 4A
  11.5A Density Measurements.............................................A 4A
  11.6A QA/QC.................................................................A 5A
    11.6.1A QC Charts.......................................................A 5A
    11.6.2A RCA Drilling Recovery Charts............................A 8A
12A DATA VERIFICATION....................................................A 1A
  12.1A Drill Hole Assays.....................................................A 1A
  12.2A Geologic Data........................................................A 1A
  12.3A Drill Hole Database................................................A 2A
  12.4A Density Data........................................................A 2A
  12.5A Topographic Data..................................................A 2A
13A MINERAL PROCESSING AND METALLURAL TESTING.....................................A 3A
  13.1A Summary..............................................................A 3A
  13.2A Comminution Energy/Consumption..........................A 3A
  13.3A Flotation Testwork..................................................A 3A
  13.4A Concentrate Rheology Testing.................................A 5A
  13.5A Concentrate Filtration...............................................A 6A
  13.6A Tailings Testing.....................................................A 6A
14A MINERAL RESOURCE ESTIMATES........................................A 1A
Figures

Figure 1.1 A Mines An Ahe Aberian P yrite Belt A (Atalaya 2016 from Google) A ......................................................... A’ 1 A
Figure 1.2 A Map R egional Geology A (GME 2013) A .................................................................................................................. A’ 4 A
Figure 1.3 A Mines An Ahe Aberian P yrite Belt A (Atalaya 2016 from Google) A ................................................................. A’ 1 A
Figure 1.4 A Location A nd A wnership Ahe Ahe Riotinto Aopper Project A (Atalaya 2016) A ............................................. A’ 3 A
Figure 2.1 A Cerro Colorado Mine A (EMED 2012) A ......................................................................................................................... A’ 8 A
Figure 2.2 A Cerro Colorado A open Pit A (EMED 2012) A ........................................................................................................... A’ 5 A
Figure 3.1 A Map Regional Geology A ........................................................................................................................................ R 1 A
Figure 3.2 A Stratigraphy Ahe Riotinto A...................................................................................................................................... R 4 A
Figure 3.3 A Geological Amap Ahe Riotinto Deposit A (GME 2013) A ....................................................................................... R 5 A
Figure 3.4 A Geological Asections A ............................................................................................................................................... R 1 A
Figure 3.5 A Schematic A cross section A through Ahe Cerro Colorado Deposit A (EMED 2012) A ...................................... R 4 A
Figure 3.6 A Exploration A nd Drilling Activities A (Atalaya 2016) ............................................................................................ R 2 A
Figure 3.7 A Areas Aurveyed Aby Geophysics A (AMT) A .................................................................................................................. R 4 A
Figure 3.8 A MT A cross section A .................................................................................................................................................... R 5 A
Figure 3.9 A 1400 EAhe Ilon Sur A and Masa Valle A ore A zones A ........................................................................................... R 7 A
Figure 3.10 A San Antonio Deposit A .............................................................................................................................................. R 8 A
Figure 3.11 A Resource Drilling Zones A ......................................................................................................................................... A0’ 2 A
Figure 3.12 A The Aoles Avere Alocated Next Ahe Amain Aminer Aized A bodies A ........................................................................ A0’ 4 A
Figure 3.13 A RC Drilling AA grid A ..................................................................................................................................................... A0’ 5 A
Figure 3.14 A Dehesa Lago ore zones A .......................................................................................................................................... A0’ 6 A
Figure 3.15 A Anferred Drilling Targets A .................................................................................................................................... A0’ 7 A
Figure 3.16 A Argamasillas Program A ............................................................................................................................................. A0’ 8 A
Figure 3.17 A C D Program A ............................................................................................................................................................ A0’ 9 A
Figure 3.18 A San Lucas Program A .................................................................................................................................................. A0’ 10 A
Figure 3.19 A Exploration Drilling Locations A ............................................................................................................................. A0’ 12 A
Figure 3.20 A Sampling Flow Chart A ................................................................................................................................................. A1’ 3 A
Figure 3.21 A Results ATR 072 Cu A ..................................................................................................................................................... A1’ 5 A
Figure 3.22 A Results ATR 076 Cu A ..................................................................................................................................................... A1’ 6 A
Figure 3.23 A Results ATR 078 Cu A ..................................................................................................................................................... A1’ 6 A
Figure 3.24 A Results ATR 084 Cu A ..................................................................................................................................................... A1’ 7 A
Figure 3.25 A Recovery Drilling Holes RT 244 RT 245 A (Atalaya 2016) A ...................................................................................... A1’ 8 A
Figure 3.26 A Recovery Drilling Holes RT 247 RT 248 A (Atalaya 2016) A ...................................................................................... A1’ 9 A
Figure 3.27 A Recovery Drilling Holes RT 250 RT 251 A (Atalaya 2016) A ...................................................................................... A1’ 10 A
Figure 3.28 A Recovery Drilling Holes RT 253 RT 254 A (Atalaya 2016) A ...................................................................................... A1’ 11 A
Figure 3.29 A Tails A (Golder 2015) A ................................................................. A3’ 7 A
Figure 3.30 A Acid Plot A (Atalaya 2016) A ................................................................. A4’ 2 A
Figure 3.31 A Specific Gravity A (Atalaya 2016) A ................................................................. A4’ 3 A
Figure 3.32 A Acid Plot A (Atalaya 2016) A ................................................................. A4’ 8 A
Figure 3.33 A Composite A High Grade Population A .................................................................................................................. A4’ 9 A
Figure 3.34 A Acid Plot A (Atalaya 2016) A ................................................................. A4’ 11 A
Figure 4.1 A Correlation A between A Specific Gravity A and Sulfur Grade A (2000) A ............................................................ A4’ 2 A
Figure 4.2 A Correlation A between A Specific Gravity A and Sulfur Grade A (2010) A ............................................................ A4’ 3 A
Figure 4.3 A A normal Probability A histogram A (Atalaya 2016) A ................................................................. A4’ 8 A
Figure 4.4 A A Probability Ahat A Composite A High Grade Population A ................................................................................ A4’ 9 A
Figure 4.5 A Acid Plot A (Atalaya 2016) A ................................................................. A4’ 11 A
Figure 4.6 A Variograms A for Acid Zone A (EMED) A ................................................................. A4’ 14 A
Figure 4.7 A Variograms A for Acid Zone A (EMED) A ................................................................. A4’ 15 A
Figure 4.8 A Variograms A for Acid Zone A (EMED) A ................................................................. A4’ 16 A
Figure 4.9 A Variograms A for Acid Zone A (EMED) A ................................................................. A4’ 17 A
Figure A4.10: Variograms for Acid Zone Cu Grade in Unfolded Coordinates – Low Grade Zone.
Figure A4.11: Variograms for Acid Zone Sulfur Grade in Unfolded Coordinates – No Grade Zones.
Figure A5.1: Price Sensitivity Tonnage and Cu Grade Curves.
Figure A5.2: Operating Cost Sensitivity Tonnage and Cu Grade Curves at $2.60/lb Cu.
Figure A5.3: Cerro Colorado Ultimate Pit Plan.
Figure A6.1: Mining Phase 1.
Figure A6.2: Mining Phase 2.
Figure A6.3: Mining Phase 3.
Figure A6.4: Mining Phase 4.
Figure A6.5: Mining Phase 5 (Filon Sur).
Figure A6.6: Mining Phase 6 (Ultimate Pit).
Figure A6.7: Optimum Cutoff Grade Analysis Results.
Figure A6.8: Ultimate AVRSF Plans.
Figure A7.1: Simplified Flowsheet (Atalaya 2016).
Figure A8.1: Layout of Tailings Management Facility.
Figure A9.1: Project Restoration Boundary.
Figure A2.1: Sensitivity Analyses.
Figure A3.1: Pozo Alfredo Underground Mine.
Figure A3.2: S-N Cross Section Through the Planes’ San Antonio Deposit.
Figure A3.3: Adjacent Properties.
### Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>Riotinto Project A Resource Summary A</td>
<td>A'6A</td>
</tr>
<tr>
<td>A.2</td>
<td>Riotinto Project A Resource Summary A Using Multiple Cutoffs AA</td>
<td>A'7A</td>
</tr>
<tr>
<td>A.3</td>
<td>Mine Production Schedule A</td>
<td>A'8A</td>
</tr>
<tr>
<td>A.4</td>
<td>Mineral Reserve Estimate A Reserve Classifications A</td>
<td>A'8A</td>
</tr>
<tr>
<td>A.5</td>
<td>Life of Mine Production (total) A</td>
<td>A'12A</td>
</tr>
<tr>
<td>A.6</td>
<td>Life of Mine Operating Costs A</td>
<td>A'14A</td>
</tr>
<tr>
<td>A.7</td>
<td>Historical Production At Filón Norte and Filón Sur Mines EMEC, 2007 A</td>
<td>A'6A</td>
</tr>
<tr>
<td>A.8</td>
<td>Riotinto Deposit Stratigraphic Units A</td>
<td>R'3A</td>
</tr>
<tr>
<td>A.9</td>
<td>Best Drill Intercepts A</td>
<td>R'6A</td>
</tr>
<tr>
<td>A.10</td>
<td>Drill Intercepts Aver 0.25% Cu A</td>
<td>R'9A</td>
</tr>
<tr>
<td>A.11</td>
<td>Resource Drilling Summary EMEC Technical Report February 2013 A</td>
<td>A0'1A</td>
</tr>
<tr>
<td>A.12</td>
<td>Resource Drilling Summary Atalaya Mining 2014 2016 A</td>
<td>A0'1A</td>
</tr>
<tr>
<td>A.13</td>
<td>Resource Drilling Aor 2014 2016 A</td>
<td>A0'2A</td>
</tr>
<tr>
<td>A.14</td>
<td>Exploration Drilling A</td>
<td>A0'11A</td>
</tr>
<tr>
<td>A.15</td>
<td>Concentrate Properties Aor Atalaya Mining Samples A</td>
<td>A3'5A</td>
</tr>
<tr>
<td>A.16</td>
<td>Plastic Viscosity Aor Yield Stress A</td>
<td>A3'5A</td>
</tr>
<tr>
<td>A.17</td>
<td>Concentrate Thickener Parameters A</td>
<td>A3'5A</td>
</tr>
<tr>
<td>A.18</td>
<td>Campaign Aor Filtration Tests A</td>
<td>A3'6A</td>
</tr>
<tr>
<td>A.19</td>
<td>Campaign Aor Filtration Tests A</td>
<td>A3'6A</td>
</tr>
<tr>
<td>A.20</td>
<td>Atalaya Tailings Aor A Size Distribution A</td>
<td>A3'7A</td>
</tr>
<tr>
<td>A.21</td>
<td>Geotechnical Parameters A</td>
<td>A3'8A</td>
</tr>
<tr>
<td>A.22</td>
<td>Resource Model Size And Location Parameters A</td>
<td>A4'1A</td>
</tr>
<tr>
<td>A.23</td>
<td>Summary Of Drilling Aor Resource Estimation A</td>
<td>A4'2A</td>
</tr>
<tr>
<td>A.24</td>
<td>Grade Zone Parameters Aor Block Model And Composites A</td>
<td>A4'10A</td>
</tr>
<tr>
<td>A.25</td>
<td>Grade Zone NN Search Ellipses A</td>
<td>A4'10A</td>
</tr>
<tr>
<td>A.26</td>
<td>Summary Of Aor Variogram Models A</td>
<td>A4'13A</td>
</tr>
<tr>
<td>A.27</td>
<td>Search Ellipses Parameters A</td>
<td>A4'20A</td>
</tr>
<tr>
<td>A.28</td>
<td>ADP Estimation Powers Aor Grade Zone A</td>
<td>A4'21A</td>
</tr>
<tr>
<td>A.29</td>
<td>Details Of Reconciliations Aor ADP, OK, and NN Models A</td>
<td>A4'22A</td>
</tr>
<tr>
<td>A.30</td>
<td>Comparison Of Unconstrained Measured And Indicated Resources A</td>
<td>A4'23A</td>
</tr>
<tr>
<td>A.31</td>
<td>Resource Classification Parameters A</td>
<td>A4'23A</td>
</tr>
<tr>
<td>A.32</td>
<td>Riotinto Project A Resource Summary A</td>
<td>A4'24A</td>
</tr>
<tr>
<td>A.33</td>
<td>Riotinto Project A Resource Summary Using Multiple Cutoffs A</td>
<td>A4'25A</td>
</tr>
<tr>
<td>A.34</td>
<td>Mine Definition Parameters A</td>
<td>A5'2A</td>
</tr>
<tr>
<td>A.35</td>
<td>Overall Slope Angles Used In Pit Limit Analyses A</td>
<td>A5'3A</td>
</tr>
<tr>
<td>A.36</td>
<td>Lechat's Grossman Cu Price Sensitivity Analyses A</td>
<td>A5'4A</td>
</tr>
<tr>
<td>A.37</td>
<td>AAG Operating Costs Sensitivity Analyses At $2.60/lb. Cu A</td>
<td>A5'6A</td>
</tr>
<tr>
<td>A.38</td>
<td>Undiscounted And Discounted Ag Results At $2.60/lb. Cu A</td>
<td>A5'7A</td>
</tr>
<tr>
<td>A.39</td>
<td>Basic Pit Design Parameters A</td>
<td>A5'8A</td>
</tr>
<tr>
<td>A.40</td>
<td>Pit Slope Design Parameters A</td>
<td>A5'8A</td>
</tr>
<tr>
<td>A.41</td>
<td>Cutoff Grades Aor Year A</td>
<td>A5'10A</td>
</tr>
<tr>
<td>A.42</td>
<td>Proven Mineral Reserve Estimate A</td>
<td>A5'11A</td>
</tr>
<tr>
<td>A.43</td>
<td>Probable Mineral Reserve Estimate A</td>
<td>A5'11A</td>
</tr>
<tr>
<td>A.44</td>
<td>Combined Proven And Probable Mineral Reserve Estimate A</td>
<td>A5'12A</td>
</tr>
<tr>
<td>A.45</td>
<td>Basic Pit Design Parameters A</td>
<td>A6'2A</td>
</tr>
<tr>
<td>A.46</td>
<td>Pit Slope Design Parameters A</td>
<td>A6'2A</td>
</tr>
</tbody>
</table>
1 EXECUTIVE SUMMARY

1.1 Project Overview and Introduction
Atalaya Mining Plc. is a European mining and development company producing copper concentrate from the Riotinto deposit in southern Spain. Following 18 months of refurbishment and commissioning, the processing plant is operating at the design capacity. An updated mineral reserves and resources estimate has been completed based on the mined surface of the open pit as of 30 April 2016 and the deposit model dated 3 May 2016.

1.2 Property Description and Location
The Riotinto Copper Project (6°35’W / 37°42’N) is located at the eastern end of the Spanish/Portuguese (Iberian) pyrite belt which extends about 230 km between Sevilla in the east (in southern Spain) and the Atlantic coast near Lisbon to the west (in Portugal). Within the pyrite belt there are eight major mining areas, each thought to contain more than 100 million tonnes of ore. These are from east to west: Aznalcollar, Los Frailes, Riotinto, Sotiel, Migollas, La Zarza, Tharsis, Masa Valverde, Neves/Corvo and Aljustrel. There are many other smaller deposits. The Riotinto Copper Project is the largest of these.

Figure 1.1 shows a map of mines in the Iberian pyrite belt (Atalaya 2016 from Google).
In Spain, there are typically different types of mining permits and concessions: A
- Exploration permits (Art. 40.2 Mining Law) granted for a period of 1 year, which may be extended for a maximum of 1 more year.
- Research permits (Art. 45 Mining Law) granted for the period requested, which may not be for more than 6 years and may be extended for a further 5 years.
- Operating concessions (Art. 62 Mining Law) also referred to as a mining permit, granted for a 30-year period and may be extended for 5 years for a maximum of 20 years.

1.3 Riotinto Copper Project Area

The Riotinto Copper Mine was operated in 2001 and was restarted in operations in 2015. Within the A Riotinto Mining District, Aife Amines operates the A Riotinto, Filón Norte, and Cerro Colorado. They are believed to have once been a single, continuous, mineralized zone, approximately 50 km wide and about 50 km thick, containing about 600 Mt A of pyritic ore, but natural erosion and past mining activity has reduced this to about 50 Mt A.

In May 2007, EMED M granted an option to acquire 51% of the Riotinto Copper Project assets located adjacent to Afe Amines' Filón Norte, 65 km northwest of Sevilla in Andalusia, Spain. In 2001, Amines had been placed on a care and maintenance basis due to the then-prevailing world copper price of $1.00/lb.

The main assets included at the mineral rights within the main tenements covering an area of 20 km². EMED M established rights to a subsidiary company, EMED M, to hold these assets. In October 2008, EMED M acquired the remaining 49% of EMED M from Mantosur Andevo S.L. (MSA).

The Riotinto Copper Project includes the Cerro Colorado, a pyrite deposit and open pit mining area, a certain satellite deposit, Atewaste dumps, parts of the Ataillings and a water treatment facility, and a general infrastructure. The A Riotinto Copper Project area covers approximately 2,224 hectares as shown in Figure A.2.

1.4 History

The A Riotinto Copper Project workings date back to at least 1,000 BC and have been operated by A Phoenicians, Romans, British (Riotinto Company and RTZ), Americans (Freeport's McMoRan), and finally, A in the 1990s by the Spanish workers' co-operative Amines de Riotinto (MRT). Since then, Amines have been operated by several open pit and underground mines. Before the arrival of the British Amines in 1873, mining activity mainly consisted of underground mining in the Filón Sur area.

A Underground mining in the Filón Norte zone commenced in 1880 but was abandoned in 1894. From A 1900 work focused on the open pit and mining of the Filón Norte zone, Amines in 1940 open stoping commenced in the Quebrantahueros zone and continued until 1970. Mining then switched to the exploration of Cu, Pb, and Ag from the Filón Norte zone, and the production of gold and silver from the Filón Norte zone.

A A A
The concentrate was transported to A (70 km by rail) to the Auelva smelter. After 1977, Riotinto and Patino Astoa (A "stsA shareholding in the mine") Spanish and English groups and Riotinto/Minera AS (RTM) were founded. A new processing plant was built in 1969 and extended in 1982. Riotinto then operating a company, Riotinto Minera AS.A.

In 2004, the mining rights and properties were acquired by a maintenance arrangement with the A general A del Sur, A Manta Sur and A Vale do A Sul A (MSA). The A management of which included former managers of A MRT. A MSA commenced restoration of the primary fishing and ore feed systems in anticipation of a restart. But A the group failed to secure the necessary approvals, and A the mine remained on care and maintenance. A With no grid, electric power available after 2004, a work focused on monitoring the tailings dams, filling A statutory reports, and maintaining pumping to avoid effluent discharges. A And A to protect the present A capital, works of de-agere are underway.

In November 2006, the Australian companies, A Oxiana A limited, and A Minotaur Exploration, entered into an A memorandum of understanding with A MSA, A to A invest in A MRT. A Both companies withdrew from the A project in December 2006. And the project was then introduced to A EMED + M A in which A Oxiana A is A a founding shareholder. A

In October 2008, EMED + M announced that it had completed the acquisition of EMED + T. The owner of A the project is A Riotinto A Copper Project, A and A As is as a result of this acquisition, A the company was A the sole owner. A EMED + received a permit, A and restoration and A plan A A approval in A January 2015. A And immediately, A commenced with construction, and except for A refurbishment operations. A In A October 2015, A the A shareholders approved A the A name A change to A Talaya A Mining A plc.

1.5 Geology and Reserves

The Riotinto massive sulfide deposits occur in the Spanish side of the Aherian A Pyrite Belt (APB), which is a part of the South Portuguese Zone (SPZ) of the Aherian Massif. The Aherian Massif resulted from the A collision A of three continental blocks originated from the fragmentation of the A late A Proterozoic A megacontinent A (Murphy and A Nance, A 1991). A The Aries of plates, A SPZ, A the AOMZ, and the A ensemble of the AClZ, A West A A Asturian-Leonesian A (WALZ), and A Cantabrian A (CZ) A zones A (Fig. A 2). A

The APB was formed as A series of A marine A basins that developed during the A Ekt A lateral A transcurrent A faulting A generated, A and the A subduction and A collision A of A Laurentia with A Gondwana during the A A A riscan A orogeny A A late A Devonian A (early A Carboniferous, A Silva et al., A 1990, A Oliveira, A 1990). A These A basins were A formed within the active A margin A of A Laurentia, and A now represented by A the A SPZ A and A adjacent A of A the A collision A. A A Martin A Lizard A et al., A 2015). A

The oldest rocks in the APB are A sequence of A quartzite A and A shales of the A Phyllite A Quartzite A Group. A Also A called A PQ A A Devonian A age, which are overlaid by A thick sequence of A volcano A sedimentary A rocks, A the A Volcanic A Sedimentary A Complex A (VSC), A that A host most of A the A mineralization A of A the A APB. A The A SC A A A highly A variable A unit, A up A to A 3.0 km A thick A of A uppermost A Devonian A to A Lower A Carboniferous A (ca. A 356–A 349 A Ma). A
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Ore Reserves Engineering

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The VSC is formed by dacitic–rhyolitic dome complexes, basaltic lava flows, mafic sills, and thick pumice- and crystal-rich felsic volcanoclastic units interbedded with detrital sedimentary rocks, mostly mudstone with some greywacke and sandstone. The depositional environment appears to be dominated by submarine mass-flow tuffs as indicated by Schermerhorn (1971).

The earliest Carboniferous (about 360 to 350 Ma) was a transitional period characterized by extension, forming different submarine basins and abundant bimodal volcanism causing the development of Volcanogenic Massive Sulfide (VMS) mineralization which were mainly hosted along the fracture zones limiting the different basins (Oliveira, 1990). Some of these basin-forming faults were reactivated as thrusts during the Variscan shortening (Oliveira, 1990; Gumiel et al., 2010a).

The IPB contains over 100 massive sulfide and stockwork VMS deposits. Over 10 giant (world class) VMS deposits, each with more than 50 million metric tons (Mt) of ore, are hosted by volcanic rocks or...
associated shales, and were formed as exhalative ores in brine pools. An area with no floor ArAs filled veins and replacement. A mineralization (e.g., Solomon et al., 2002; Ornors, 2006; Gumiel et al., 2010a). A Riotinto is the largest deposit in the APB and has been estimated to have more than 500 Mt of a massive pyrite, complex and stockwork types (Williams, 1934; Barriga, 1990; Boulter, 1993; Adamides, 2013). A

1.6 Deposit Types
According to the genetic, rock association and geodynamic setting, A Riotinto is a volcanic hosted pyrite-chalcopyrite mineralization as classified as a Hecialniclastic type at Kuroko type. At occurred as Aenses. A polymetallic massive sulfide, that took place at the seaward floor of an area submarine volcanic environment during the earlier Carboniferous. Aome 550 Ma. A

As the most significant VMS mining districts, the APB is defined by deposit clusters formed within oceanic rifts with the volcanic centers. A clustering is attributed to a common heat source that caused are large scale Aub's Sea floor fluid convection systems. A

1.7 Drilling and Exploration
Since 2014 Atpo date Atalaya Mining has completed a comprehensive exploration program at the A Riotinto project. Exploration has been carried out by Awo programs:

i. Resource Drilling: Expansion drilling alone or known areas to increase mineral reserves. A

ii. New Resource Exploration: Exploration alone around the deposit in known areas without known mineral resources. A

The drilling database of Atalaya Mining was reversed. Aup to April 2014, data from the historical drilling performed for almost a hundred years. These data were validated in 2008 and used for the A Resource Estimation. Published in the Technical Report (N43101, REMED, February 2013). A

2. A new drilling program started in April 2014. When Ati company was granted The Boming rights, and that was completed in February 2016. This drilling campaign was carried out at the main pit at Cerro Colorado. A new area was added to the main area. A new area was added to the new area. A new area was added to the new area. A new area was added to the new area. The program included a total of 1,701 meters. A

Most of the 2014-2016 resource drilling was reverse circulation (ARC) except at Cerro Colorado West Pit. A where the depth drilling was carried out by a combination of reverse circulation and diamond drilling (ARC + DD). A

All the exploration targets at the resource drilling were hosted in the At A stockwork associated with the A Northern A Fault and related basins (Cerro Colorado, A Salomon, A Dehesa, A Hago and Argamasilla). A The exploration targets are all defined by the general heat that occurred in the area. A following an area review at the extensive historical data, the available block model resource data and a geological interpretation. A

In parallel to the resource drilling, an exploration program to find new resources around the deposit commenced in January 2015. As Atillan progress, the new exploration as being carried out over the entire Riotinto concession, an area outside of the-mining plan, and mostly an area potentially mineralized. A areas in which no mineral resources are presently defined. A The comprehensive program included A work as follows: A
1.8 Mineral Resource

The copper resource was summarized using a Lerchs-Grossmann pit shell that was run to evaluate all resources, including inferred resources, using a copper price of $3.20/lb. All other slope and economic parameters are the same as those used for design of the open pit for reserve estimation. The resulting pit shell is considered to have reasonable prospects for economic extraction, assuming that the inferred resource as converted to measured and indicated by drilling and that the copper price returns to previous levels that were substantially above $3.20/lb. The resource estimate is summarized in Table 14.11 and Table 14.12.

<table>
<thead>
<tr>
<th>Resource Class/Zone</th>
<th>Cutoff (IDP)</th>
<th>%Cu (IDP)</th>
<th>%S (IDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Acid Zone</td>
<td>0.2A 67.8</td>
<td>0.46</td>
<td>6.27A</td>
</tr>
<tr>
<td>Measured Basic Zone</td>
<td>0.2A 22.2</td>
<td>0.35</td>
<td>3.27A</td>
</tr>
<tr>
<td>Total Measured</td>
<td>0.2A 90.0</td>
<td>0.43</td>
<td>5.53A</td>
</tr>
<tr>
<td>Indicated Acid Zone</td>
<td>0.2A 81.8</td>
<td>0.45</td>
<td>5.54A</td>
</tr>
<tr>
<td>Indicated Basic Zone</td>
<td>0.2A 21.0</td>
<td>0.34</td>
<td>2.62A</td>
</tr>
<tr>
<td>Total Indicated</td>
<td>0.2A 102.8</td>
<td>0.42</td>
<td>4.95A</td>
</tr>
<tr>
<td>Total M+I</td>
<td>0.2A 192.8</td>
<td>0.43</td>
<td>5.22A</td>
</tr>
<tr>
<td>Inferred Acid Zone</td>
<td>0.2A 20.1</td>
<td>0.49</td>
<td>6.69A</td>
</tr>
<tr>
<td>Inferred Basic Zone</td>
<td>0.2A 2.6</td>
<td>0.41</td>
<td>3.06A</td>
</tr>
<tr>
<td>Total Inferred</td>
<td>0.2A 22.7</td>
<td>0.48</td>
<td>6.28A</td>
</tr>
</tbody>
</table>
### Table A.2: Riotinto Project Resource Summary Using Multiple Cutoffs

<table>
<thead>
<tr>
<th>Cutoff (%Cu)</th>
<th>Measured</th>
<th>Indicated</th>
<th>M+I</th>
<th>Inferred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes (millions)</td>
<td>%Cu (IDP)</td>
<td>%S (IDP)</td>
<td>Tonnes (millions)</td>
</tr>
<tr>
<td>0.15A</td>
<td>115.3</td>
<td>0.374</td>
<td>5.37</td>
<td>122.4</td>
</tr>
<tr>
<td>0.20A</td>
<td>90.0</td>
<td>0.430</td>
<td>5.53</td>
<td>102.8</td>
</tr>
<tr>
<td>0.25A</td>
<td>72.8</td>
<td>0.479</td>
<td>5.76</td>
<td>87.3</td>
</tr>
<tr>
<td>0.30A</td>
<td>60.7</td>
<td>0.519</td>
<td>5.92</td>
<td>72.6</td>
</tr>
<tr>
<td>0.35A</td>
<td>49.8</td>
<td>0.562</td>
<td>6.08</td>
<td>58.7</td>
</tr>
<tr>
<td>0.40A</td>
<td>39.7</td>
<td>0.610</td>
<td>6.29</td>
<td>45.1</td>
</tr>
<tr>
<td>0.45A</td>
<td>31.5</td>
<td>0.658</td>
<td>6.61</td>
<td>34.2</td>
</tr>
<tr>
<td>0.50A</td>
<td>24.4</td>
<td>0.712</td>
<td>6.71</td>
<td>25.4</td>
</tr>
</tbody>
</table>

### 1.9 Mineral Reserves & Mining

Mining of the Cerro Colorado deposit uses conventional, open-pit methods working from 10-m high bench faces. Atalaya Mining is currently using mining contractors for all excavation work, including drilling and blasting, through the joint venture UTE Riotinto. Contractors' small-to-medium-scale mining equipment will be used to execute the development plan, including rock drills capable of drilling 102- to 127-mm diameter blastholes, hydraulic excavators with bucket capacities of 5.9-13 m³, off-highway trucks with 55- to 91-t payload capacities, and suitably sized support equipment.

Six mining phases were designed from which a production schedule was estimated using a declining cutoff grade strategy to maximize the present value of pre-tax profits at a Cu price of $2.60/lb. Atalaya Mining provided mill feed targets that include an ore processing ramp-up from 1 Mt per annum in May 2016 to 5.8 Mt and a uniform feed rate of 9.5 Mt per annum thereafter. The resulting mine production schedule is presented in Table A.3.
Table 1.3 - Mine Production Schedule

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Calendar Year</th>
<th>Cu% Cutoff</th>
<th>Mill Feed (Prov+Prob Mineral Reserves)</th>
<th>Waste, Ktonnes</th>
<th>Total Strip Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low/Grade</td>
<td>Rock</td>
<td>FS &amp; Backfill</td>
</tr>
<tr>
<td>1</td>
<td>2016</td>
<td>0.25</td>
<td>5,583</td>
<td>0.60</td>
<td>12.72</td>
</tr>
<tr>
<td>2</td>
<td>2017</td>
<td>0.25</td>
<td>9,500</td>
<td>0.52</td>
<td>5.92</td>
</tr>
<tr>
<td>3</td>
<td>2018</td>
<td>0.25</td>
<td>9,500</td>
<td>0.54</td>
<td>4.11</td>
</tr>
<tr>
<td>4</td>
<td>2019</td>
<td>0.25</td>
<td>9,500</td>
<td>0.53</td>
<td>3.94</td>
</tr>
<tr>
<td>5</td>
<td>2020</td>
<td>0.25</td>
<td>9,500</td>
<td>0.48</td>
<td>3.19</td>
</tr>
<tr>
<td>6</td>
<td>2021</td>
<td>0.24</td>
<td>9,500</td>
<td>0.46</td>
<td>3.04</td>
</tr>
<tr>
<td>7</td>
<td>2022</td>
<td>0.24</td>
<td>9,500</td>
<td>0.43</td>
<td>6.83</td>
</tr>
<tr>
<td>8</td>
<td>2023</td>
<td>0.23</td>
<td>9,500</td>
<td>0.47</td>
<td>3.44</td>
</tr>
<tr>
<td>9</td>
<td>2024</td>
<td>0.22</td>
<td>9,500</td>
<td>0.43</td>
<td>7.18</td>
</tr>
<tr>
<td>10</td>
<td>2025</td>
<td>0.21</td>
<td>9,500</td>
<td>0.50</td>
<td>9.84</td>
</tr>
<tr>
<td>11</td>
<td>2026</td>
<td>0.20</td>
<td>9,500</td>
<td>0.47</td>
<td>6.90</td>
</tr>
<tr>
<td>12</td>
<td>2027</td>
<td>0.19</td>
<td>9,500</td>
<td>0.41</td>
<td>4.46</td>
</tr>
<tr>
<td>13</td>
<td>2028</td>
<td>0.18</td>
<td>9,500</td>
<td>0.39</td>
<td>5.69</td>
</tr>
<tr>
<td>14</td>
<td>2029</td>
<td>0.17</td>
<td>9,500</td>
<td>0.33</td>
<td>3.51</td>
</tr>
<tr>
<td>15</td>
<td>2030</td>
<td>0.16</td>
<td>9,500</td>
<td>0.34</td>
<td>2.73</td>
</tr>
<tr>
<td>16</td>
<td>2031</td>
<td>0.16</td>
<td>9,500</td>
<td>0.38</td>
<td>2.44</td>
</tr>
<tr>
<td>17</td>
<td>2032</td>
<td>0.16</td>
<td>4,762</td>
<td>0.34</td>
<td>1.94</td>
</tr>
<tr>
<td>Total</td>
<td>var</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

1.10 Mineral Processing and Recovery Methods

The Riotinto concentrator processes copper sulfide ore using conventional froth flotation to produce copper concentrates. The plant employs a combination of existing equipment associated with the historical operations as well as expanded and upgraded facilities.

The ore mined from the Cerro Colorado open pit features different mineralogical characteristics depending on whether it is mined from the east (CCE) or the west (CCW) areas. The CCE ore has a higher copper content than the CCW ore, historically 0.63% and 0.40%, respectively. Likewise, the ore A...
from ACCE has a higher sulfur content at 2%, versus 1% from CCW. Basically because of pyrite content. Another difference between the two ore types is that ore from ACCE has a higher content of penalty elements such as arsenic and antimony. Historically, the CCE ore recovered less copper than the ACCWA ore. This fact was confirmed during the phase A period of the project. 

A

The CCE ore requires AA to fine primary grinding at 800 A to 1000 microns. As used to A float the ore, minerals containing a small percentage of silver content amorphous pyrite are produced. A concentrate must be ground to a relatively fine grain size of around 200 microns in order to increase the concentrate grade. 

A

Both ore types contain silver, but ore from ACCE has a higher silver content than ore from CCW. The silver content in the concentrates produced during phase A of the operation was between 62 and 150 g/t. 

A

During 1995 until 2001, the RIOTINTO ANINE concentrator plant processed ore with similar characteristics to what is processed today. An average of 40.9 Mt of ore at an average 0.54% Cu were processed. This generated information that was used to develop the design criteria and start the plan for the current operation. The able concentrator initially processed 0.5 Mt/year of ore and an expansion made the concentrator reach a processing capacity of 0.3 Mt/year in 1997; a peak annual throughput of 0.7 Mt/year was achieved in 1998. 

A

Metallurgical test work results and current plant performance indicate that RIOTINTO is as amenable to a conventional crushing, grinding, and flotation, dewatering and filtering process. 

A

The current operation as mined from difference zones (CCW, Asla, Salomon, Agado and QUEB) is different but acceptable. Metallurgical performance variability when processing a conventional flotation machine and a mixture of ditiophosphate and thionocarbamate based chemistry at a basic pH of 10.5. The optimum target is 800 A. 

A

1.11 Infrastructure

The property is well connected for road transportation via a high-quality national road system that was recently renovated. The site is located 15 km from the port and the industrial city of Huelva, and 28 km from the regional capital, Seville. 

A

Copper concentrate is transported by road to the Huelva port and stored for ocean transportation to various commercial destinations. 

A

The incoming main substation of 132/6.3 kV has been fully reconditioned and updated. The main substation consists of a 132/33 kV, 3.3 MVA, that was repaired and is currently operating. From the Dehesa ENDESA (an independent power supplier) using 3 outgoing lines on main transformers. 

A

Process water for the phase A stage was supplied from a Gossan Dam where it was pumped at a rate of approximately 1,000 m³/h. Into two steel tanks with capacities of 4,000 and 6,750 m³.
The 0.5 M t/y expansion project includes the installation of a new DN4500 process water pipe and a new pumping system located at the Gossan Dam. Two new pumps with a flow rate of 5.0 m³/h each, will pump water to an intermediate storage tank, with a capacity of approximately 800 m³, and a booster pumping system that pumps water to the process water tanks at a flow rate of 800 m³/h.

Fresh water is supplied from the Campofrio Dam by three pumps with a flow rate of 250 m³/h each, two operating and one standby. Water is delivered through an HDPE/DN355/ PN16 pipe to the fresh water tank, ensuring supply at any stage in production. A large warehouse is associated with this system.

There are two large warehouses on the mine property. Along with an outdoor storage area, the warehousing is for replacement parts and material deliveries. It has been separated and clearly defined. The warehouses feature sufficient shelving units to organize large size replacement parts and cabinets for small items. All warehouses have shelving units that are officially approved and newly installed. Two secure areas were approved within the warehouses to store inflammable products to comply with AAPQ laws.

1.12 Market Studies and Contracts
Atalaya has been actively marketing the copper concentrate product to global consumers. Currently, 100% of the concentrate production is committed to three companies through offtake agreements for a life of mine reserve that averages:

- Yanggu Xiangguang Copper Ltd (XGC) 9.12% A
- Orion Mining International (Trafigura) 19.34% A
- Orion Minerals Finance (Orion) 15.54% A

Copper as an internationally traded commodity and prices are set through trading on the major metals exchanges: the London Metal Exchange (LME), the New York Commodity Exchange (COMEX), and the Shanghai Futures Exchange (SHFE). Copper prices are not influenced by investment flows and a currency exchange rate.

1.13 Environmental Studies, Permitting, and Social or Community Impact
Mining and mineral processing activities have been taking place at Riotinto for many years. With the exception of some parts of the Corta Alatalaya Waste Dumps, no reclamation work has been conducted. As a result of this, the area is much of the waste material. As a high acid generating potential, the Riotinto project area is an environmentally degraded site with significant environmental legacy issues. The chief legacy issues, as a case of an Amcan mine sites that host a high acid generating materials, is a related to Acid Mine Drainage (AMD) A and the AMD mitigation and control as an environmentally, technically, and financially sustainable manner. Atalaya Mining’s environmental policy, environmental management system, and operating and financial plans are all sustainable and developed in order to address his, other legacy, and future issues in a sustainable manner.
In June 2008 an international mining environmental consultant conducted an ASO/14001 environmental audit for the Alva overall site (Thistle, 2008a). This report produced recommendations for the implementation and improvements to infrastructure, procedures, and practices to reflect European and World best available practices. Atalaya has been implementing some of these recommendations and improvements since this audit. It is envisaged that all recommendations will be completed shortly after production begins. As a result of the audit and in order to commence on the implementation of Atalaya’s environmental policy, AsetofA17A Environmental Management Plans (EMP’s) (Mineral Resources of the Riotinto Copper Project). The National Energy Conservation (EMED) Tartessus ASL. U. APRTA (Thistle, 2008a) feasibility study/report (2008b) to address known and potential environmental and community issues arising from operating larger mine areas have been developed. As these plans, when fully implemented, will reflect global best industry practice and are based on the AISO14001 system. As part of the Environmental Management System (EMS), these plans will be a regular check to monitor performance and to ensure that Atalaya’s environmental targets and objectives are being met. They will also be regularly reviewed by management to ensure that the objectives of the EMS are being met and to make recommendations for continual improvement of the Atalaya’s EMS. Continual improvement of the EMS will address three core dimensions related to the expansion, enrichment and upgrading of the EMS within Atalaya.

A Final restoration is an integral part of the Riotinto Copper Project and both the operating and final restoration plans (FRP) have been developed to make them compatible with each other and to ensure that the final restoration can be completed as soon as possible after the cessation of mining, processing and waste disposal operations. The objectives of Atalaya’s FRP are to:

- Protect the environment,
- Minimize any long-term adverse environmental impacts of the project,
- Guarantee the chemical stability of waters discharging from Riotinto,
- Ensure that the physical stability of any soils is maintained,
- Recover any soils that will be disturbed during a mining operation and reuse them appropriately,
- Recover the natural vegetation in a manner that is compatible with the surrounding habitat,
- Reduce the contamination of external areas by dust and other emissions,
- Conserve and maintain the mining heritage in the Riotinto area and,
- Minimize social impacts as a result of the mine closure at the end of its life.

In accordance with current applicable legislation, Atalaya has submitted for approval an FRP as part of the project approvals process. The AFPA (Eygema, 2012b) has submitted an FRP as part of the AAAU to the Conserjería de Medio Ambiente y Ordenación del Territorio for review and approval including a period of public consultation. After approval of the AAAU, the FRP, with any amendments brought about as a result of the approvals process, was submitted along with the final reclamation bonding and deposits to the Conserjería de Economía, Industria, Ciencia y Empleo for final approval. Again this process includes a period of public consultation.

A Occupational Risk Prevention Plan was established in 2014 as a tool to integrate the company’s risk prevention activities into the general management system. The Occupational Risk Prevention Plan was approved by the company’s management and was then assumed by the entire organizational structure, and as known by all workers.
The necessary resources to perform safety activities are organized as per company criteria through its own safety department. The internal safety service is a specific organizational unit that determines the safety activities to be developed and the means to implement them within the entire organization.

Atalaya Mining promotes the establishment of extensive communication channels and actively seeks opportunities for dialogue with its stakeholders. An order to ensure its business objectives are aligned with societal needs and expectations. The company aims to be transparent by providing relevant and accurate information on its activities. Fostering constructive dialogue and encouraging continuous improvement.

Since the project began, Atalaya has fostered a direct relationship and a proactive, aligned approach to communication with the groups, entities, government authorities, institutions, press, and the general public that are interested in its operations. This is based on an open-door policy with a view to being transparent about its activities.

The company has been effectively using all available channels to communicate its developments and explain its ideas using internal resources (website, social media, newsletters, e-mailing, etc.) as well as the press (press releases, interviews, participation in special editions, press visits, etc.).

### 1.14 Capital and Operating Costs

The capital and operating costs, expressed in US dollars, are discussed in Section 2.1.1.

In 2016, Atalaya completed an expansion from phase A1 to 5.0 Mt/y (phase A2 expansion) to 9.5 Mt/y. The reserve was discussed in Chapter 15 and estimates at 153 Mt Ag and 9.55 M tonnes averaging 0.45% Cu. Production over the life of mine as summarized in Table A.5A:

<table>
<thead>
<tr>
<th>Table A.5A Life of Mine Production (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Ag</td>
</tr>
<tr>
<td>Ore (Plant Feed) Ag</td>
</tr>
<tr>
<td>Copper Grade Ag</td>
</tr>
<tr>
<td>Low Grade Stockpile Ag</td>
</tr>
<tr>
<td>Copper Grade Ag</td>
</tr>
<tr>
<td>Contained Metal in Concentrate, Cu</td>
</tr>
<tr>
<td>Payable Metal, Cu Ag</td>
</tr>
</tbody>
</table>

### 1.15 Life of Mine Capital Costs

The life of mine capital costs for the overall capital program, including both phase A1 and A2 expansion, is estimated to be US$152.9M. Sustaining capital averages US$2.2M per annum with a total expenditure of US$36.7M. Development capital spent to date, at US$, by unit area as shown in Table A.6: 

---

Technical Report on the Mineral Resources and Reserves of the Riotinto Copper Project

Ore Reserves Engineering

September 2016
The estimated capital outlay for the phased development is USD$152.9 million of which USD$124.1 million was spent in 2015. Additional capital requirements are shown below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCCUPATIONAL HEALTH AND SAFETY</td>
<td>582.14A</td>
</tr>
<tr>
<td>EXPLORATION AND GEOLOGY</td>
<td>2,234.39A</td>
</tr>
<tr>
<td>MINING</td>
<td>4,030.34A</td>
</tr>
<tr>
<td>PROCESSING</td>
<td>74,577.63A</td>
</tr>
<tr>
<td>INFRASTRUCTURE</td>
<td>8,785.08A</td>
</tr>
<tr>
<td>PROJECT MANAGEMENT</td>
<td>3,577.28A</td>
</tr>
<tr>
<td>ENGINEERING</td>
<td>5,607.23A</td>
</tr>
<tr>
<td>CONSTRUCTION MANAGEMENT</td>
<td>18,363.12A</td>
</tr>
<tr>
<td>OWNERS' COSTS</td>
<td>5,963.81A</td>
</tr>
<tr>
<td>CONTINGENCY</td>
<td>1,726.75A</td>
</tr>
<tr>
<td>G&amp;A</td>
<td>16,882.12A</td>
</tr>
<tr>
<td><strong>CAPEX TOTAL</strong></td>
<td><strong>142,329.90A</strong></td>
</tr>
</tbody>
</table>

The sustaining capital outlay for the life of mine is $36.7 million. The development capital outlay for 2016 is $28.8 million, including expansion.
1.16 Life of Mine Operating Costs

The life of mine operating costs, in US dollars, are based on the current Riotinto operating budget for 2016. All fixed and variable costs have been estimated for life of mine operations and are summarized in Table 1.6.

Table 1.6: Life of Mine Operating Costs

<table>
<thead>
<tr>
<th>Site Operating Costs</th>
<th>Unit Cost ($/t ore)</th>
<th>Unit Cost ($/t Waste)</th>
<th>Unit Cost ($/t mined material)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH&amp;S</td>
<td>0.12</td>
<td>0.06</td>
<td>0.04A</td>
</tr>
<tr>
<td>Exploration &amp; GeologyA</td>
<td>0.23</td>
<td>0.12</td>
<td>0.08A</td>
</tr>
<tr>
<td>Fixed Mining</td>
<td>0.20</td>
<td>0.11</td>
<td>0.07A</td>
</tr>
<tr>
<td>Variable Mining</td>
<td>4.48</td>
<td>2.21</td>
<td>1.41A</td>
</tr>
<tr>
<td>Fixed Processing</td>
<td>1.88</td>
<td>1.00</td>
<td>0.64A</td>
</tr>
<tr>
<td>Variable Processing</td>
<td>4.11</td>
<td>2.19</td>
<td>1.39A</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0.22</td>
<td>0.12</td>
<td>0.08A</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0.09</td>
<td>0.05</td>
<td>0.03A</td>
</tr>
<tr>
<td>Technical Services</td>
<td>0.26</td>
<td>0.14</td>
<td>0.09A</td>
</tr>
<tr>
<td>Environmental</td>
<td>0.49</td>
<td>0.26</td>
<td>0.17A</td>
</tr>
<tr>
<td>HRA</td>
<td>0.11</td>
<td>0.06</td>
<td>0.04A</td>
</tr>
<tr>
<td>Administration</td>
<td>0.26</td>
<td>0.14</td>
<td>0.09A</td>
</tr>
<tr>
<td>Land Freight / Transport Cost</td>
<td>0.18</td>
<td>0.10</td>
<td>0.06A</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

TotalA $12.65 $6.55 $4.17A

Total per pound copper soldA $1.60

1.17 Economic Analysis

Atalaya has developed a financial model for the Riotinto Project that incorporates the updated reserve and resource estimates. The summary financial forecast for the project is shown in Chapter 22, Table 22.1. The assumptions for price and financial factors utilized in the financial model and resultant forecasts are as follows:

- All amounts are in constant 2016 US dollars (US$).
- Amounts in Euros (€) were converted to US$ at an average exchange rate of €1.00:US$1.15.
- Copper production is sold at an average life of mine copper price of US$2.88/lb.
- Income tax rate of 25%.

This financial forecast shows that after tax, net cash flows, inclusive of capital expenditures, and closure costs, will total $1,054.6M over the life of the project and an NPV of $445M at an 8% discount rate. The overall project cash costs (C1), net of silver credits as US$1.96 per pound of copper increasing to US$2.00 per pound of copper, net of silver credits, adjusting for the sustaining costs (AISC).
1.18 Conclusions and Recommendations

Atalaya Mining has successfully refurbished and expanded the Riotinto plant and infrastructure and as a presently mining the Cerro Colorado open pit through the JTEA joint venture. Mineral reserves are estimated to provide a project life of greater than 6.5 years. An additional AEC's Grossman analysis of a the mineral resource indicates that at with a $2.60/lb Cu, $3.00/lb Au could increase the reserve tonnage by approximately 20%.

While no major Arko programs are suggested, the recommendations that follow and that are further outlined in Chapter 9 are meant to improve operations and/or the economics of the Riotinto project. A most of these can be evaluated by Atalaya Mining's own house management and technical staff, and do not require expenditures outside the normal operating and capital budgets. A

- Continue to install a culture of safety and as a practice at both At work and at home. Make a environmental compliance a focal area for safety at production. A
- Develop a trade's off analysis to investigate possible capital expenditures versus operating costs. A savings when switching from 102' 107' Ann percussion drilling to 100' hole hammer (DHH) rigs. A The DHH are used wherever significant tonnages from 100' high benches are used. A Larger blasthole diameters allow a wider spacing. Are required fewer holes and the related number of A0A boosters and blasting accessories per shot. And thus, lowering operating costs for a drilling and a blasting. A Labor costs could also be reduced. A
- Evaluate 1 Mt to a low grade ore at an average of 0.22% Cu. What would be stockpiled for the next 10 years? Can an extend the mine life? A suitable place at both to stockpile this ore will be needed. A This scenario is viable. A
- Develop additional in-fill drilling on both San Dionisio and San Antonio deposits to confirm a historical estimation as they could contain unmined resources. Also, develop additional in-fill drilling at the northern flank of the Atalaya pit as it contains most stockwork mineralization. A
- Develop exploration drilling around the Filón Sur historical pit to assess if it contains a massive sulphide were unmined. A
- Continue to optimize processing operations to order to increase production rates and increase A production quality. A
- Setup automatic sampling of final concentrate and extend a sample exchange program with A external laboratories to improve analytical reliability. A
- Continue to look for opportunities to improve operating costs. Setup a detailed program to a monitor the higher cost/use consumables, such as reagents, mill steel, and energy. A
- Formalize a social and community development plan that incorporates both a company and A community issues. Need to develop post mine use plan. A
2 INTRODUCTION AND TERMS OF REFERENCE

2.1 Background Information and Terms of Reference

Ore Reserves Engineering was contacted by Atalaya Mining on January 2016 and was requested to prepare an updated resource estimate for Atalaya’s Project: Riotinto Anine in the Province of Huelva, Spain. This resource estimate was to be documented in an updated NI 43-101 compliant report.

Pursuant to accomplishing the above tasks, Mr. Alan C. Noble of Ore Reserves Engineering (ORE) along with Mr. Jaye T. Pickarts traveled to Spain in February 2016 and conducted a site visit over a period of five days. During the site visit, the following personal inspections were conducted:

Mr. Noble:
1) Reviewed the overall project status and history with project personnel.
2) Reviewed the geologic interpretation with project geologic personnel.
3) Reviewed drilling methods and exploration with project geologic personnel.
4) Visited the core logging facility and inspected a representative selection of core. Reviewed geologic logging procedures.
5) Visited the open pit mine and reviewed operational procedures and grade control.
6) Discussed current methods for resource estimation with mine technical staff.
7) Visited the assay lab and reviewed sample preparation and assaying procedures.

Mr. Pickarts:
1) Reviewed the overall project status and history with project personnel.
2) Visited the plant and reviewed project plans for updating the plant and expanding production.
3) Reviewed project infrastructure.
4) Reviewed marketing studies and contracts.
5) Reviewed operating cost, capital costs, and requirements for economic analysis.
6) Reviewed environmental permitting and compliance procedures.
7) Reviewed project safety procedures.

Mr. William Rose was not on the site visit and did not conduct a personal inspection of the property. The mine plans prepared by Mr. Rose were reviewed by Mr. Noble.

Mr. Juan Jose Rojas as an independent consultant contracted to Atalaya Mining to assist with a continuous improvement of the plant expansion. Mr. Rojas assisted in the collection and analysis of data and assisted in the preparation of Chapter 13, Mineral Processing, and Ametallurgical Testing. In addition, Mr. Rojas assisted in the preparation of Chapter 17, Recovery Methods, and Chapter 21, Capital and Operating Costs.

All of the above-listed professionals are independent qualified persons according to the definitions of NI 43-101 and have conducted this work as independent consulting engineers.

Ore Reserves Engineering

September 2016
2.2 Scope of Work

The scope of work for the project included:

1) Preparation of an updated resource estimate for copper.
2) Preparation of a complete open pit mine design including phasing, road access, annual production schedule, waste dump design, and periodic mine progress maps.
3) Review of the plant facility, plant operations, and plans for improvement of plant performance.
4) Review of environmental, safety, marketing, and costs.
5) Preparation of an updated NI 43-101 compliant report to document the above.

2.3 Sources of Information and Data

Electronic data files containing geologic interpretations, drill hole data, surface topography, and plant flowsheets were provided by project technical staff. Other data sources include a previous technical report, independent resource estimation reports, feasibility reports, and plant design documents.

2.4 Definitions and Units of Measure

Units of measure in this report are SI Units including meters, kilometers, kilograms, metric tonnes, liters, etc., unless explicitly stated. Currency units are in U.S. dollars, and copper prices are in $US/pound (454 grams).

This report has been prepared in accordance with Form 43-101F1 Technical Report and the CIM Definition Standards for Mineral Resources and Mineral Reserves adopted by the CIM Council in April, 2011.
3 RELIANCE ON OTHER EXPERTS

The authors used their experience to determine if the information from previous reports was suitable for inclusion in this Technical Report. Except where noted, the author has relied upon the information provided by Atalaya as being accurate, reliable, and suitable for use in the report. This Report includes technical information, which required subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the Consultants do not consider them to be material.
4 PROPERTY DESCRIPTION AND LOCATION

The Riotinto Copper Project (6°35'W / A 37°42'N), is located at the eastern end of the Spanish/Portuguese (Iberian) pyrite belt which extends about 230 km between Seville in the east (in southern Spain) and the Atlantic coast near Lisbon in the west (in Portugal). Within the pyrite belt there are eight major mining areas, each thought to contain more than 100 million tonnes of ore. These are from east to west: Aznalcollar – Los Frailes, Riotinto – Sotiel – Migollas, La Zarza, Tharsis, Masa Valverde, Neves Corvo and Aljustrel. There are many other smaller deposits. The Riotinto Copper Project is the largest of these. Figure 4.1 below is a map of mines in the Iberian Pyrite Belt.

In Spain, there are typically three different types of mining permits and concessions:

- Exploration permits (Art. 40.2 Mining Law) granted for a period of 1 year, may be extended for a maximum of one more year.
- Research permits (Art. 45 Mining Law) granted for the period requested, which may not be more than 3 years, but may be extended for an additional 3 years.
- Operating concessions (Art. 62 Mining Law) also referred to as Mining Permit, A granted for a 30-year period, and may be extended for equal periods up to a maximum of 90 years.

Figure 4.1 – Mines in the Iberian Pyrite Belt (Atalaya 2016 from Google)
4.1 Riotinto Copper Project Area
The Riotinto Copper Project was last operated in 2001 and restarted operations in 2015. Within the Riotinto Mining District, there are five main orebodies: Atalaya, Filon Norte, Filon Sir, Apes, and Cerro Colorado. They are believed to have once been a single, continuous mineralized zone approximately 750 m wide and about 400 m thick, containing about 500 Mt of pyritic ore, but natural erosion and past mining activity has reduced this to about 250 Mt. A continuous area of pyritic ore, but natural erosion and past mining activity has reduced this to about 250 Mt. A

In May 2007, EMED was granted an option to acquire 61% of the Riotinto Copper Project Assets located adjacent to the town of Minas de Riotinto, 65 km northwest of Seville in Andalucía, Spain. In 2008, EMED's subsidiary company, EMED T, acquired these assets. In October 2008, EMED M, acquired the remaining 39% of EMED T from Mantesur Andevalo S.L. (MSA). In October 2015, the shareholders approved the change of name to Atalaya Mining Plc.

The Riotinto Copper Project includes the Cerro Colorado Copper deposit and open pit mining area, certain satellite deposits, the Atalaya town and water facilities, Atalaya ownership assets, and other maintenance and general infrastructure. The RIotinto Copper Project area covers approximately 2,224 hectares as shown in Figure 4.2 A

4.2 Land Position at Riotinto
The historical mineral rights were sold by the Spanish Government to a Riotinto Limited Company in perpetuity under the private property regime (Law of 25 June 12, 1870, Act of December 26, 1870, Act of December 26, 1872 and Decree Law of February 14, 1873, to ratify the above, published in the A Gaceta de Madrid on February 16, 1873). A

These historical mineral rights are attached to a mining area covering the whole of the municipality of the town of Minas de Riotinto, where the Riotinto Copper Project is located, Atalaya as now the sole owner of the mining rights. Figure 4.2 below shows the location and ownership of the Riotinto Project.
Although there are a number of liens on the various land packages, the only one that is critical to the restart project is held by the Tesorería General de la Seguridad Social. In May 2010, EMEDA entered into an arrangement whereby Social Security would not exercise their lien in return for EMEDA repaying the total amount owed by a former owner of the mine, over a period of 5 years.

In August 2012, EMEDA acquired ownership of land options over all lands required for operations and a potential expansion. This removed the need for any land acquisition. All land required for the project for future expansion has been secured through acquisition or by options to purchase.

In May 2009, EMEDA submitted a request to the Government for Administrative Standing (pursuant to the provisions of Articles 95.2, 97.1 and the Second Transitional Provision of the current Mining Act) for the development of the Riotinto Copper Project.

This Administrative Standing request was accompanied by a supporting documentation (including relevant technical documentation) as well as contracts and title transfer deeds showing that EMEDA owned the mineral rights, including: the registered land plot 843 which incorporates the area of the Cerro Colorado pit, the facilities and the exclusive rights of operation and beneficiation of minerals from the soil and subsoil of the whole of the municipality of the town of Minas de Riotinto.
5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The Riotinto deposit is located in the Huelva Province of the Autonomous Community of Andalucía, an area in the southern part of Spain, about 500 km south of Madrid, 65 km north of Sevilla, and 70 km north-east of the port of Huelva. The Town of Seville (population about 700,000) is the administrative center of the Andalucía region, the Autonomous Community of Andalucía, and is governed by the Junta de Andalucía, which is the president and president of the Autonomous Communities of Spain, with a local parliament and president.

5.1 Accessibility

There are many international flights that connect the provincial cities of Seville and Malaga with Madrid and other major cities in Europe and North America. There is a high-speed train service linking the regional towns of Córdoba and Seville with the capital of Madrid. The Riotinto Copper Project is well-served by paved highways to Aracena, Huelva, and Seville. As a port near the Towns of Minas de Riotinto and Nerva, as well as several nearby villages, which represent potential sources of labor, accommodation, and general services.

5.2 Climate and Physiography

Due to the geographical location and a varied topography, the climate in Andalucía Province is diverse, with a Continental Mediterranean climate in the inland areas and an Atlantic Mediterranean climate along the coast. The average annual mean temperature is 18.7°C, and the daily temperature range is from 3°C in January to 40°C in July. The average annual precipitation is 795 mm. Operations are possible all year round.

5.2.1 Local Resources and Infrastructure

The modern Riotinto Amining Complex dates back to 1873, when a group of British businessmen purchased the Riotinto mines from the Spanish Government and established the Riotinto Company Ltd. At its peak, there were 40,000 workers, 150 km of railway track, and an 80 km road. A loading facility at the port of Huelva (70 km southwest of Riotinto), where copper and pyrite ore were loaded for export, had been established. An mining town of Minas de Riotinto (population 1,500) provides access to all the facilities required for mineral exploration and mining activity, and all other facilities are available nearby.

In 1970, a copper smelter and a refinery were built next to the port of Huelva. In 1993, Freeport McMoRan Copper & Gold Inc. acquired Riotinto Minera S.A. and decided to dispose of the Amining operation at its local interests and concentrate on the smelting and refining capacity.

5.2.2 Physiography

The Riotinto area consists of a low, sparsely wooded, E-W trending ridges, separated by wide valleys, that support a semi-rural population. The topographic relief is about 500 m from the valley to the highest ridge top.
6 HISTORY

The Riotinto Copper Project workings date back to at least 1900. A Phoenician, a Roman, a British, a Riotinto Company, and a Freeport-McMoRan, and finally, A in the 1990s, the Spanish workers Acoper and Silver ores have been mined from several open-pit and underground mines. Before the arrival of the British miners in 1873, mining activity mainly consisted of underground mining in the Filón-Sur area.

A Underground mining in the Filón-Norte zone commenced in 1880, but was abandoned in 1894. From 1900, it focused on the open pit. Mining of the Salomón, Lago, and Dehesa (Filón-Norte) zones began in 1940. Open-pit stoping commenced in the Quebrantahuéso zone, and continued until 1970. Mining then switched to the current grade sulfide stockwork ores of Cerro Colorado and production of gold and silver from the superficial gossan oxide.

A In 1954, the miners were taken over by the Spanish company, Compañía Española de Minas de Riotinto SA. An 1962, the Riotinto Company Limited merged with The Zine Corporation to form the London-based Riotinto Zinc Corporation (RTZ), which became a minority shareholder in the Riotinto Copper Mines. A Minas de Riotinto SA operated the mines, modernizing the facilities and improving working conditions.

A Over the years, the operating company changed its name successively to Riotinto Pátino and then to Riotinto Minera.

A Between 1964 and 1967, an exploration campaign resulted in the discovery of the Cerro Colorado copper deposit. An 1969, the Copper Concentrator started up with an initial capacity of 6 Mt/y. This was later expanded to a rate of 10 Mt/y. In 1971, a gold-leach plant was commenced. A operation was designed to an average throughput of 1.5 Mt/y of oxidized gossan ores. As was later expanded, an acceleration to a rate of 6.0 Mt/y. The gold-leach plant still exists but as not operational.

A Between 1975 and 1976, a total of 12.8 Mt was mined from the massive sulfide ores. The concentrator was transported to the huelva smelter. In 1977, the Riotinto Pátino gold and silver ownership in the mine passed to the Spanish and English groups, and Riotinto Minera SA (RMT) was founded. A The CerroColorado workings were then expanded, and the Alfredo shaft was modernized. A A new processing plant was built in 1969 and extended in 1982-1985, by then operating company, Riotinto Minera SA.

A Mining continued until 1987 when low copper prices forced the closure of the Copper Plant and all A reduction of mining operations. Work at the Alfredo shaft ceased, and the Cerro Colorado operation was restricted to the mining and treatment of gossans for gold and silver. At a rate of 90,000 A/month (2 Mt/y) of gossan material. All production was temporarily halted in 1990.

A In 1992, RMT sold its shares in the mine to McMoRan Anc. And Minas de Riotinto SALA (MRT) was founded. An 1995, McMoRan as the major shareholder in MRT decided to close the mine and focus its investment on the Almamelter at Huelva.
The mine was acquired by AMTRA and from 1995 AMTRA operated the mine as a workers' cooperative. A comprising former senior management and the unions. Between 1995 and 2001 AMTRA mined 25 Mt of A ore at an average grade of 0.57% Cu. During this period the annual production of 6.3 Mt was achieved in 1997. A peak annual throughput of 9 Mt/v was achieved in 1998. The mine was closed again in 2001 due to the low copper price. As a result of a closure more than 400 workers were made redundant. Of all these, 400 were retired and another 400 were placed by the Government onto temporary social welfare pending any employment.

In 2004, the mineral rights and properties were acquired by A Mantisur and Andevalo. SLA (MISA), the management of which included former managers of AMTRA. MISA commenced restoration of the primary crushing and feed systems. Anticipation of a restart but a group failed to secure the necessary approvals and the mine remained on care and maintenance. A With an grid electric power available since 2004, Avork was focused on monitoring the tailings dams, a filling system and maintaining pumping to avoid effluent discharges. In order to protect the Accent A capital works from deterioration.

In November 2006, the Australian companies, Oxiana Limited and Minotaur Exploration, entered into a memorandum of understanding with MISA to invest in AMTRA. Both companies withdrew from the project in December 2006 and the project was then introduced to EMEDE MA in which Oxiana was a founding shareholder.

In October 2008, EMEDE announced that at had completed the acquisition of EMEDE T. The owner of the Riotinto Copper Project, and, as a result of this acquisition, the company was to sole owner. A EMEDE received the mine permit and restoration plan approval in January 2015 and immediately commenced with construction and refurbishment operations. In October 2015, the shareholders approved the name change to Atalaya Mining Plc.

6.1 Mining Operations

In the 1980s, there were open pit mines, Corta Atalaya and Cerro Colorado, A and two underground mines, Pozo Alfredo (which at together with Corta Atalaya, Aexploited the San A Dionisio deposit) and the planes San Antonio mine.

6.1.1 Cerro Colorado Mine

The latest mining operations were those at the Cerro Colorado Salomon open pit and the adjacent San Lucas. At least one of the largest known concentrations of sulfides in the world, At has been estimated that there were originally about 600 Mt of massive sulfides. At which about 20% were leached to form gossans. The Cerro Colorado deposit has a potential to increase in size by investigation of the adjacent ancient workings at Filón A Sur, Filón Norte, Belén, Cerro Salomon, planes San Antonio, and Quebrantahuesos.

In the Cerro Colorado open pit, altered, grey, felsic volcanics host a major pyrite-chalcopyrite stockwork, a part of which extends below the felsites into mafic volcanics. Alteration closest to the stockworks is a chloritic passing to asericitic and felsic further away.

Cerro Colorado was opened in 1967 at A concentrator. The gold and silver from the gossans at the treatment plant. At the Cerro Colorado deposit contained one of the largest known concentrations of sulfides, and the whole world. At has been estimated that there were originally about 600 Mt of massive sulfides. At which about 20% were leached to form gossans. Cerro Colorado has a potential to increase in size by investigation of the adjacent ancient workings at Filón A Sur, Filón Norte, Belén, Cerro Salomon, planes San Antonio, and Quebrantahuesos.

Cerro Colorado was opened in 1967 at A concentrator. The gold and silver from the gossans at the treatment plant. At the concentrator's at a separate concentrator. And gold and silver recovery circuits. At the mine was developed as an open pit, with a planned production potential of 78 Mt at 0.8% Cu and 0.8% Mt of A gossans (oxide). At the gossans are averaging 2.4 g/t Au and 1.8 g/t Ag. At formed a open pit at Cerro Colorado. At the pit is...
1,560 m long, 850 m wide and 230 m deep and covers an area of about 200 ha. The benches were 10 m high and the ramps 20 m wide. Production was 13 Mt/y, of which 1.5 Mt was copper ore, 1.5 Mt was gold-silver ore and 8.5 Mt was waste-rock and marginal ore with < 0.28% Cu. The Cerro Colorado ore was treated in a copper concentration plant with a capacity of 10,000 t/day (3 Mt/y) and an gold-silver concentration plant with a capacity of 4,500 t/day (1.5 Mt/y). Ore from the gossan was crushed in the same plant as the copper ore, in similar units, but separately.

When MRT took over the mine in 1995 they elected to restart copper extraction from Cerro Colorado, starting at 4.5 Mt/y, and reduced the rate of processing the gossans to 2.3 Mt/y. Mining of the gossan ore ceased in 1998. Between 1995 and 2001, 23.9 Mt at 0.54% Cu was processed. Some 19 Mt was mined from Cerro Colorado West, with the remainder coming from Salomon (now known as Cerro Colorado East). Figure 6.1 is a photograph of the western part of the Cerro Colorado mine, looking south and Figure 6.2 shows the Cerro Colorado Pit in plan view.
6.1.2 The Filón Norte & Filón Sur Areas (1874–1973)

The areas known today as Cerro Colorado West and Cerro Colorado East (or “Salomon”) open pits were previously mined underground by the Riotinto Company Limited under the name of Filón Norte (North lode) and Filón Sur (South lode). At Filón Norte, 2.75 Mt of pyrite were mined by underground methods between 1881 and 1895. This was followed by 22.93 Mt mined by open cast methods between 1892 and 1937. At Filón Sur, 18.22 Mt of pyrite were mined by underground methods between 1873 and 1967. 24.2 Mt were mined by opencast methods between 1874 and 1949. A further 6.94 Mt of “chloritas” copper ore was mined from Filón Norte and Filón Sur between 1942 and 1973.
Table 6.1A: Historical Production of Filón Norte and Filón Sur Mines (EMED, 2007)

<table>
<thead>
<tr>
<th>Mine A</th>
<th>From</th>
<th>To</th>
<th>Tonnes mined A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filón Norte (underground)</td>
<td>1881</td>
<td>189</td>
<td>2,754,064 A</td>
</tr>
<tr>
<td>Filón Norte (open pit) A</td>
<td>1892</td>
<td>193</td>
<td>22,928,652 A</td>
</tr>
<tr>
<td>Filón Sur (underground) A</td>
<td>1873</td>
<td>196</td>
<td>18,225,642 A</td>
</tr>
<tr>
<td>Filón Sur (open pit) A</td>
<td>1874</td>
<td>194</td>
<td>24,201,495 A</td>
</tr>
<tr>
<td>Filón Norte/Sur (chloritas underground)</td>
<td>1942</td>
<td>197</td>
<td>6,937,820 A</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1873</td>
<td>197</td>
<td>75,047,673 A</td>
</tr>
</tbody>
</table>

Tunnels were used to transport the ore: one used for transporting ore from the Filón Norte area, referred to as the Filón Norte Tunnel, and another used to transport ore from the Mal Año or Retamar areas via an extension of Tunnel 11, referred to as the Central Tunnel.
7 GEOLOGICAL SETTING AND MINERALIZATION

This section was compiled by the Atalaya Mining Co. technical staff and reviewed by Alan Noble, one of the Qualified Persons for the purpose of NI 43-101, Standards of Disclosure for Mineral Projects.

7.1 Regional Geology

The Riotinto massive sulfide deposit occurs in the Spanish side of the Iberian Pyrite Belt (IPB), which is a part of the South Portuguese Zone (SPZ) of the Iberian Massif. The Iberian Massif resulted from three continental blocks originated from the fragmentation of a Late Proterozoic megacontinent (Murphy and Nance, 1991). A series of plates: the SPZ, the OMZ, and the ensemble of the CIZ, West Asturian–Leonese (WALZ) and Cantabrian (CZ) zones (Fig. 7.1). A

![Map of Regional Geology](image)

The IPB was formed as a series of marine basins that developed during the left-lateral transcurrent faulting generated by the subduction and collision of Laurentia with Gondwana during the Variscan...
The oldest rocks in the APB area are a sequence of quartzite and shales (the Phyllite-Quartzite Group, A also called PQ). These are overlain by a thick sequence of volcanic and sedimentary rocks (the Volcanic-Sedimentary Complex, VSC). These are mostly mudstone, and some greywacke and sandstone. The depositional environment appears to be dominated by submarine basaltic flows (as indicated by Schermerhorn, 1971).

The earliest Carboniferous (about 360 Ma at 350 Ma) was a transitional period characterized by a forming extension of submarine basins around abundant Abi-modal Volcanic Activity, causing the development of an anoxic basin. The development of an anoxic basin is favorable for the formation of VMS mineralization (e.g., Oliveira, 1990). Some of these basins formed in fractures that were reactivated as thrusts during a later orogenic shortening (Oliveira, 1990; Gumiel et al., 2010a).

The APB contains a large VMS deposit, which is hosted by volcanic rocks. The deposit is associated with anhydrite, complex, and stockwork types (Williams, 1934; Barriga, 1990; Boulter, 1993; Adamides, 2013).

### 7.2 Geology of the Riotinto Deposit

#### 7.2.1 Stratigraphy

The Riotinto deposit occurs in the volcano-sedimentary complex (VSC). The APB, which is regionally a mafic volcanic unit composed of basaltic and aplitic pillow lavas and dolerite sills, is intercalated with bands of slate and chert. This is a Carboniferous, and an overlying felsic volcanic unit composed of hydothermal lavas and pyroclastic rocks.

Based on historical drilling at Riotinto and available drill core, the Exploration Department of Atalaya Mining has identified eight main litho-stratigraphic units from the A/SC. Additional stratigraphic units are as follows (Table 7.1):

- A
- A
- A
- A
Table R. 1A: Riotinto Deposit Stratigraphic Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS1A</td>
<td>Lower Mafic/Volcanic Unit. Mostly formed by basaltic rocks and pillow lavas. Arom one Anterbedded black alutes and tuffaceous shales. Estimated thickness is about 50 m.</td>
</tr>
<tr>
<td>TSA</td>
<td>Transition Series. Mostly a sedimentary unit formed by black alutes, alutes with a radiolarian, Aconglomerates, and Mafic/Apyroclastic. Approximately 50 m.</td>
</tr>
<tr>
<td>VS2A</td>
<td>Felsic/Volcanic Unit. Rhyolitic lavas, Aphyric dolerite, and Aphanitic felsic pyroclastics. AlnA Cerro Colorado, And Aeastern prospects. Apyroclastics mostly dominate from the Mafic pyroclastics. Thickness is very variable. Apyroclastics range from 400 m to 650 m.</td>
</tr>
<tr>
<td>Stock Work</td>
<td>Occurs hosted in volcanic rocks from the VS1A and VS2A. A consists of irregular veins, fractures, and fissures filled with quartz and sulfides (mainly pyrite and a chalcopyrite).</td>
</tr>
<tr>
<td>Massive Sulfides A</td>
<td>The massive sulfide flows took place during the latest phases of the felsic volcanism. They occur as dismembered lenses underling stockworks and volcanic domes. Arom one side, they grade into the massive sulfides. They have been mined, and the largest lenses are in Cerro Colorado area. At Filon Sur, the area of Cerro Colorado closes at A Norte. A</td>
</tr>
<tr>
<td>VSA</td>
<td>Volcanic sedimentary unit consisting of green shales and tuffaceous shales. This unit represents the most A deposit of Arom one side, it grades into the pyroclastics. A thickness is very variable, depending on the distances from the feeders.</td>
</tr>
<tr>
<td>PJA</td>
<td>Purple shale, cinerites, and felsic rocks. A volcanic sedimentary unit formed by purple shales (Fe/Mn rich) with anterbedded alutes. Arom one side, these units grade into the pyroclastics. They are represented at the northern extension of the Late Tavolcanism. AThese levels are in Cerro Colorado area. A continuous stratigraphic guide. Aorizon An the VSC A.</td>
</tr>
<tr>
<td>VS3A</td>
<td>Felsic and intermediate volcanic alutes, cinerites, and felsic rocks. Arom one side, these units represent the latest volcanic event of the APB. A</td>
</tr>
<tr>
<td>CULMA</td>
<td>A sequence of shales, alutes, and cinerites with turbiditic features. The A Culm Group ranges from late Visan to middle Late Pennsylvanian. At A interpreted. Arom one side, these are synorogenic, flysch related to the Aariscan Aectonic event. At the sequence, is very thick. A drilling at Ariotinto indicated that the thickness of the A sequence is about 650 m. At Ahe A southern limb at A Filon Sur. At Arom one side, at 800 m. At Ahe A northern limb at A Dehesa. A</td>
</tr>
</tbody>
</table>

These stratigraphic units are represented in Fig. 7.2A and geological analysis at Ariotinto Deposit as presented in Fig. 7.3A.
Figure 7.2 – Stratigraphy of Riotinto
Figure 7.3A: Geological map of the Riotinto Deposit (IGME 2013)
Figure 7.4 – Geological Sections
7.2.2 Structure

The Riotinto deposit was formed in an extensional tectonic setting associated with volcanism that took a place in the late Devonian-earlier Carboniferous period. An oceanic seafloor environment. After the extensional period, a compressional event took over during the Variscan Hercynian orogeny that formed the Iberian Massif.

A Riotinto is characterized by having a high intensity of Variscan deformation that generated SW-NE SWA vergence folding structures. The Riotinto deposit forms an E-W trending anticline, with the northern flank dipping approximately 50 degrees to the south, and the southern flank nearly vertical. Another E-W syncline along occurs next to the anticline to the south, Figure 7.4A.

A Two major subparallel synsedimentary E-W faults that occur approximately 1 km apart at both flanks of the syncline are named the Northern Fault and Southern Fault. The Hercynian orogeny and the Iberian Massif.

A The anticline are closely associated to these two faults that represent the margins of the volcanic basin. At the two faults were first activated during the distension period above the Variscan orogeny, and they formed an extensional basin. A further tectonic movement of the faults caused a roll-over anticline and the development of two subbasins: A northern basin (Cerro Colorado, A Salomon and Dehesa) and the southern basin (Filon Sur, San Dionisio and Atalaya). These faults are also a major anatexic structure that controlled the mineralization.

A Another synsedimentary fault has been identified within the main anatexitic basin which has a name (Intermediate Fault). This fault also controls the deposition of the felsic volcanic and the massive sulfides.

A This faulting system is highly affected by the Variscan compression that changed the kinematic of the structures. So, the Southern Fault becoming a reverse fault that brings the felsic unit and massive sulfides over the Achaule from the Culm, and the Northern Fault remains as a normal fault.

A The fault system and the anticline are crosscut by the NW-SE trending Eduardo Fault zone, which A dissests the whole body into two sectors. To the east: A Cerro Colorado and Filon Sur areas. To the west: San Dionisio and Atalaya.

7.2.3 Metamorphism

The metamorphic grade in Riotinto is mostly of a very low grade, normally a-pyritite-pumpellyite facies. However, in the northern part of the ACP and near thrusts, deformation is more intense and the rocks are recrystallized within the green schist facies (Munhá, 1990).

7.2.4 Mineralization

Mineralization is typical of the A/M assay deposits and occurs as stockwork and massive sulfides. Beside these, oxidation and weathering of the A/C primary mineralization has developed agossans and enrichment zones in places.

A The stockworks occur as regular veins, fractures, and fissures filled with quartz and sulfides. Two main types of stockworks are identified: A pyritic (20% S content) and A copper (2% Cu content). These veins become thicker towards the surface. Close to the massive sulfides, most stockworks are made up of A veins with lesser amounts of strongly replaced volcanic rocks.

A
In the A Riotinto district, Amineralization, A hydrothermal alteration, and A secondary replacement A (i.e., A silicification, A chloritization, A sericitization, and A sulfidization) often occur associated A to some A stockwork A zones. A And A long A thin A fractures A and A veins, A the alteration A zone A is characterized by an inner core of A chlorite alteration associated with an envelope of A sericitic alteration. A Silicification, A and A pyrite, A and A carbonate alteration. A The A copper A rich A mineralization A is A most A closely A associated A with A the A chlorite A altered A zone. A

The A massive A sulfide A deposits A are A located A as A dismembered A lenses A of A pyrite A plus A chalcopyrite A emplaced A on A the A marine A basins A surface A as A a A result A of A black A smoker A flows. A They A occur A overlaying A the A Aesclis A volcanic A and A the A stockworks. A

The A primary A sulfide A mineralization A consists A mostly A of A pyrite, A with A minor A chalcopyrite, A sphalerite, A tetrahedrite, A and A sulfosalts A of A Sb A and A As. A Chalcopyrite A is A the A predominant A copper A mineral, A and A mostly A occurs A within A small A fractures A in A the A pyrite, A and A lesser A extent A it A occurs A in A isolation. A

The A massive A sulfide A deposits A are A located A as A dismembered A lenses A of A pyrite A plus A chalcopyrite A emplaced A on A the A marine A basins A surface A as A a A result A of A black A smoker A flows. A They A occur A overlaying A the A Aesclis A volcanic A and A the A stockworks. A

Nowadays, A massive A sulfides A remain A only A at A San A Dionisio A or A Atalaya, A At A Filon A Sur, A Filon A Norte, A Cerro A Colorado, A, A Dehesa, A ago A and A Salomon. A

Well A developed A stockwork A mineralization A occurs A in A the A volcanic A rocks A at A that A underlay A parts A of A the A massive A sulfides A were A mined. A In A the A core A of A the A anticline A at A Cerro A Colorado A or A Salomon A open A pit, A it A is A believed A that A the A deposits A originally A formed A an A almost A continuous A lens A of A massive A sulfides A of A about A 5 A km A long, A 750 A m wide A and A 40 A m thick, A containing A more A than A 5 A 500 A million A tonnes A of A sulfide A mineralization. A

Well A developed A stockwork A mineralization A occurs A in A the A volcanic A rocks A at A that A underlay A parts A of A the A massive A sulfides A were A mined. A In A the A core A of A the A anticline A at A Cerro A Colorado A or A Salomon A open A pit, A it A is A believed A that A the A deposits A originally A formed A an A almost A continuous A lens A of A massive A sulfides A of A about A 5 A km A long, A 750 A m wide A and A 40 A m thick, A containing A more A than A 5 A 500 A million A tonnes A of A sulfide A mineralization. A

Ore Reserves Engineering
Figure 7.5A: Schematic N-S cross-section through the Cerro Colorado deposit (EMED 2012)
8 DEPOSIT TYPES

Riotinto is a Volcanogenic Massive Sulfide (VMS) deposit, which are formed in extensional tectonic settings of oceanic seafloor, including spreading ridges, subductions zones, and arc environments.

According to the genetic, rock association and geodynamic setting, the Riotinto volcanic-hosted pyrite-chalcopyrite mineralization is classified as Felsic Siliciclastic of Kuroko type. It occurred as lenses of polymetallic massive sulfide that took place at the sea floor in a submarine volcanic environment during the earlier Carboniferous, some 350 Ma.

As with most significant VMS mining districts, the IPB is defined by deposit clusters formed within ocean rifts with volcanic centers. The clustering is attributed to a common heat source that caused large-scale sub-seafloor fluid convection systems.

As with most VMS deposits, Riotinto has two morphological and genetic components:

- A mound-shaped to tabular strata bound body composed mainly of massive sulfides.
- An underlying zone with development of a stockwork system of irregular veins filled by quartz and disseminated sulfides that represent the pipes of the volcanic feeders.

Furthermore, Riotinto is another VMS deposit, which is characterized by extensive zones of hydrothermal alteration as a result of subvolcanic intrusions and fluid convection systems, which define zones of discordant alteration in the immediate footwall and hanging wall of the deposit.
9 EXPLORATION
This section was compiled by the Atalaya Mining Co. technical staff and reviewed by Alan Noble, one of the Qualified Persons for the purpose of NI 43-101, Standards of Disclosure for Mineral Projects.
Since 2014, Atalaya Mining has completed a comprehensive exploration program at the Riotinto project, which has been developed in two programs:

i. Known Ore Zones Exploration: Expansion drilling has been performed on known ore zones to increase mineral resources and reserves and expand the mine production scenario over what is known to date.

ii. New Resource Exploration: Exploration has been performed around the current ore deposit in areas without known mineral resources.

A map showing the exploration activities is presented in the Figure 9.1.
Figure 9.1 - Exploration and Drilling Activities (Atalaya 2016)
In parallel to the Resource Drilling, an exploration program to find new resources around the current ore deposit commenced in January 2015 and is still in progress. The new exploration is being carried over the whole Riotinto Concession, in areas outside of the mining plan, where there is no defined mineral resource.

The compressive program includes the following:

- Compilation of all historical geological and mineral data.
- Detailed geological mapping of selected zones.
- Compilation of all historical geophysical data.
- Ground geophysical surveys over selected zones: MT and Gravimetric.
- Diamond drilling.

### 9.1.1 Geophysics

Atalaya Mining has compiled all the geophysical data from historical surveys carried out by different companies and programs in the IPB (Iberic Pyrite Belt) since 1980, including two regional gravimetric surveys (airborne), one magnetic survey (airborne) and a series of gravimetric and electromagnetic ground surveys. Also all available DTM, topographic and Landsat data has been compiled from diverse sources and databases. The geophysical data has been reprocessed and modeled in order to generate new exploration targets.

In addition, Atalaya Mining has conducted a ground geophysical survey in 2015 covering the northern and the southern flanks of the Riotinto Anticline. The survey included measurements of electrical resistivity by Audio Magnetotelluric (MT) and Gravimetric methods. The MT method is a passive ground electromagnetic technique that measures the resistivity and conductivity below surface. The MT data produced is still being processed.

The Figure 9.2 shows the areas covered by geophysical surveys and Figure 9.3 shows one MT section from the Magnetotelluric profiles completed at the southern flank of the Anticline, east of the Filon A Sur zone.
Figure 9.2 - Areas surveyed by Geophysics (AMT).
9.1.2 Northern Zone

Two holes were drilled in shales from the Culm unit at the northern flank of the anticline to test two gravimetric highs.

Hole ST1 reached 500 m in length and intersected 878 m of Culm, ending at 1,120 m in felsic cinerites. These widths of shale together with the data from the AMT survey suggest that the contact between the Culm and the CVS is dipping north and that the thickness of the Culm increases toward the north, thus reducing the potential for further mineral deposits in the northern zone.

A downhole TEM survey was done after drilling hole ST1. No conductor signal around the hole was detected.

A brief description of these prospect areas and results follows:

Figure 9.3: AMT cross section

(Atalaya 2016)
9.1.3 Filon Sur (depth and west extension)

Three holes were drilled in the western Filon Sur zone to determine if the massive sulfides would extend at depth. An electromagnetic downhole survey (TEM) conducted in the first hole at that depth showed some indication of massive sulfide mineralization. A second and a third hole intersected an En'sulfide mineralization in a shear zone in the Transition Series and Mafic Unit. Hole FS002D yielded an area of 0.95% Zn but Cu values were low. The zone was 634.0 m thick and the grade of Cu allowed it to be extended by drilling. A

The best drill intercepts are presented in Table 9.1A below.

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<thead>
<tr>
<th>Zone</th>
<th>Hole</th>
<th>From</th>
<th>To</th>
<th>drill'</th>
<th>Cu(%)</th>
<th>S(%)</th>
<th>Pb(%)</th>
<th>Zn(%)</th>
<th>Fe(%)</th>
<th>As(ppm)</th>
<th>Sb(ppm)</th>
<th>Bi(ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filon Sur</td>
<td>FS002D</td>
<td>702.0</td>
<td>703.0</td>
<td>1.0</td>
<td>0.46</td>
<td>2.97</td>
<td>0.35</td>
<td>3.94</td>
<td>3</td>
<td>144</td>
<td>&lt; 10</td>
<td>25</td>
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<td>766.0</td>
<td>767.0</td>
<td>1.0</td>
<td>0.51</td>
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<td>0.22</td>
<td>0.58</td>
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<td>283</td>
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<td>778.0</td>
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<td>6.0</td>
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<td>0.95</td>
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<td></td>
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<td></td>
<td>FS003D</td>
<td>634.0</td>
<td>635.0</td>
<td>1.0</td>
<td>0.43</td>
<td>7.01</td>
<td>0.02</td>
<td>0.22</td>
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<td>&lt; 10</td>
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<td></td>
<td>787.0</td>
<td>792.0</td>
<td>0.5</td>
<td>0.35</td>
<td>2.60</td>
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<td></td>
<td>787.0</td>
<td>788.0</td>
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<td>0.80</td>
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<td>&lt; 10</td>
<td>41</td>
<td>&lt; 10</td>
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</tr>
</tbody>
</table>

9.1.4 Filon Sur (east extension) and Masa Valle

The decision to explore the eastern extension of Filon Sur was based on the ground geophysical survey performed in 2015 (Gravimetric and MT) and on a geological framework since the area is an An extension of the southern fault and southern flank of the anticline. This area is located to the strike of the Masa Valle ore zone. A small orebody of massive sulfides located at Riotinto Village. A large part of this area was covered by talc and a small part located in the southern flank of Cerro Colorado. A

In total, eight diamond holes were drilled. One of the holes was surveyed by a downhole EM. Two holes intersected a thick horizon of amplites shale at the contact between the Culm and the Felsic Unit (VS2) with anninny antebbedded layers of exhalative pyrite, thus an encouraging indication of a possible large massive sulfide occurrence. Follow-up drilling did not confirm this hypothesis. A

Although the drilling did not add any mineral resources, it was very useful to improve the understanding of geology and the structure of the area. Drilling shows the occurrence of an anticline fold with slates from the Culm Unit in the axis of the fold as south. In the northern flank of the fold, which is also coincident with the southern fault, appears to be almost vertical, whereas at the southern flank dips approximately some 60 degrees to the north. The thickness of the Culm Unit in the axis of the fold is approximately 640 m. These ore zones are shown in Figure 9.4.

Ore Reserves Engineering
Figure 9.4A  Section 71400E: The Filon Sur and Masa Valle ore zones
9.1.5 San Antonio

San Antonio is a known deposit located at the eastern end of the Riotinto ore body. It represents the lateral east extension of the Planes deposit which was exploited by underground mining in the early part of the 20th century. Mineralization consists mostly of massive sulfides and lesser stockworks.

A database compiled by EMED (now Atalaya mining) in 2011 contained information on 833 drill holes, 188 galleries, and assays with 3,655 records for Cu, Zn, Pb, and S. The deposit dips approximately 25° to the East, and it occurs at depths between 120 m to 200 m, as shown on Figure 9.5.

A small resource was estimated for this deposit in 2011, but that resource is not included in this current resource and reserve. This deposit is not yet exploited and already has two vertical shafts, a ramp, and a series of underground galleries.

At the present time, the legal situation splits the deposit into two properties: the western as part of the Riotinto Concession that belongs to Atalaya mining, and the eastern area which is apart of the Tejonera Concession which is at present time under application by Atalaya mining, but not yet granted. The boundary between the two concessions is the Riotinto River.

Figure 9.5 – San Antonio Deposit

(Atalaya 2016)
In 2015, Atalaya Mining decided to perform limited drilling in the western part of the deposit, aiming to confirm grades and intercepts. Drilling included 8 diamond holes for 1,504 m. The orebody was intersected by most of the holes, however grades were a bit lower than expected. Drill intercepts over 0.25% Cu are as follows:

### Table 9.2: Drill Intercepts over 0.25% CuA

<table>
<thead>
<tr>
<th>Zone</th>
<th>Hole</th>
<th>From</th>
<th>To</th>
<th>drill' int</th>
<th>Cu(%)</th>
<th>S(%)</th>
<th>Pb(%)</th>
<th>Zn(%)</th>
<th>Fe(%)</th>
<th>As(%)</th>
<th>Sb(%)</th>
<th>Bi(%)</th>
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<tbody>
<tr>
<td>San Antonio</td>
<td>SAD’01</td>
<td>92.0</td>
<td>104.0</td>
<td>12.0</td>
<td>0.84</td>
<td>34.42</td>
<td>0.04</td>
<td>0.06</td>
<td>30</td>
<td>6632</td>
<td>277</td>
<td>118</td>
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<td>119.0</td>
<td>126.0</td>
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<td>9</td>
<td>604</td>
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<td>0.32</td>
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<td>455</td>
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### 9.1.6 San Dioniiso-Atalaya

San Dioniiso-Atalaya is one of the main Riotinto ore zones which was mined from the 60’s to the late 80’s. But it still contains unmined resources. According to the compiled historical data, mining was mostly focused on the massive sulfide ore, but the chlorite altered stockwork that is hosted on the northern flank of the orebody has not been mined out. The Atalaya Mining Exploration Department is currently undertaking a drilling program to evaluate these resources. Results from 4 diamond holes confirmed the occurrence of a subvertical chlorite altered stockwork zone overlaying the massive sulfides (already mined) in the northern flank of the orebody.
10 DRILLING

This section was compiled by the Atalaya Mining Co. technical staff and reviewed by Alan Noble, one of the Qualified Persons for the purpose of NI43-101, Standards of Disclosure for Mineral Projects.

10.1 Resource Drilling

The drill hole database of Atalaya Mining is made up of two different sets of data:

1. The historical drilling database, which consisted of data compilation from historical drilling performed for almost a hundred years. This data was validated in 2008 and used for the resource estimation published in the Technical Report NI43-101, EMED (February 2013).

2. A new drilling program started in April 2014 and completed in February 2016. This drilling campaign was carried out at the main pit at Cerro Colorado Salomon and its objective was to increase the Mineral Reserves over the 2012 figure of 123MT. The program included a total of 1,701m of drilling.

A summary table of these data sets is presented in the tables below.

**Table 10.1: Resource Drilling Summary EMED Technical Report February 2013**

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<thead>
<tr>
<th>Data Type</th>
<th>Drilling (m)</th>
<th>Sampling (m)</th>
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</thead>
<tbody>
<tr>
<td>Surface Diamond Drilling</td>
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</tr>
<tr>
<td>Surface Investigation RC and Percussion Drilling</td>
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<td>Underground Channel Samples</td>
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**Table 10.2: Resource Drilling Summary Atalaya Mining 2014-2016**

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</tbody>
</table>

Most of the 2014-2016 Resource Drilling was reverse circulation (RC) except at the Cerro Colorado West pit, where drilling was carried out by a combination of reverse circulation and diamond drilling (RC-DD). The details of this drilling by zones are displayed in the tables 10.3 and figure 10.1.
Table 10.3A: Resource Drilling for 2014’2016 A

<table>
<thead>
<tr>
<th>Year</th>
<th>Zone</th>
<th>Type</th>
<th>Average Depth</th>
<th>Drill Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>PROGRAMA METALURGIA</td>
<td>RC</td>
<td>55</td>
<td>664</td>
</tr>
<tr>
<td>2014-2015</td>
<td>PROGRAMA INFILL</td>
<td>RC</td>
<td>57</td>
<td>7,026</td>
</tr>
<tr>
<td>2014</td>
<td>DEHESA LAGO</td>
<td>RC</td>
<td>123</td>
<td>1,477</td>
</tr>
<tr>
<td>2015</td>
<td>PROGRAMA INFERIDOSA</td>
<td>RC</td>
<td>121</td>
<td>2,253</td>
</tr>
<tr>
<td>2015</td>
<td>ARGAMASILLA</td>
<td>RC</td>
<td>90</td>
<td>336</td>
</tr>
<tr>
<td>2015</td>
<td>PROGRAMA ZONA INTERMEDIA</td>
<td>RC</td>
<td>40</td>
<td>2,600</td>
</tr>
<tr>
<td>2015</td>
<td>PROGRAMA QUEBRANTAHUESOS</td>
<td>RC</td>
<td>45</td>
<td>2,626</td>
</tr>
<tr>
<td>2015</td>
<td>ARGAMASILLA</td>
<td>RC</td>
<td>90</td>
<td>803</td>
</tr>
<tr>
<td>2015</td>
<td>EXPLORACION CONASA BA</td>
<td>RC</td>
<td>62</td>
<td>1,879</td>
</tr>
<tr>
<td>2015</td>
<td>EXPLORACION ZONA SAN LUCAS</td>
<td>RC</td>
<td>155</td>
<td>2,332</td>
</tr>
<tr>
<td>2015-2016</td>
<td>RE. ANFERIDOS CERRO COLORADO</td>
<td>RC’DD</td>
<td>312</td>
<td>935</td>
</tr>
<tr>
<td>2016</td>
<td>EXPLORACION MINA CONASA</td>
<td>RC</td>
<td>50</td>
<td>700</td>
</tr>
</tbody>
</table>

Total: 31,701

Figure 10.1A: Resource Drilling Zones
All the exploration targets of the resource drilling were remaining resources that were not mined and hosted in the stockwork associated with the Northern Fault and related basins (Cerro Colorado, Salomon, Dehesa, Lago, and Argamasilla). The exploration targets and drill designs varied depending on the zone, but generally designed to follow a review of the extensive historical data, the available block model resource data, and geological interpretation.

Statistical analysis was completed to define the sampling interval for the resource drilling. Based on this data, it was decided to set a sampling interval of 5 m for the reverse circulation drilling (RC). However, since the volume of material produced by the 5 m interval was excessive, it was decided to sample every one meter and composite every 5 samples to make up one sample.

The individual sampling length was 1 m for the diamond drilling but if the hole was apart of the resource drilling program, then five samples of 1 m were blended to obtain a composite for a 5 m sample.

10.1.1 Metallurgical Drilling Program
The metallurgical drilling program was developed upon request of the Atalaya Mining Metallurgical Department and intended to collect samples for metallurgical testing. The location of this program is shown in Figure 10.2.

A total of 12 holes were located in Quebrantahuesos, Isla, Lago, and Salomon were drilled. The historical mining data indicated that the abundance of antimony, arsenic, and bismuth in those areas associated with high sulfur content and had caused a decrease in the Cu recovery. In addition, an increase in penalty elements in the final ore concentrate.

The program was conducted using a reverse circulation rig. The samples were collected every 1 meter, split and submitted to a specialized laboratory for the metallurgical testing. All of the holes were located next to the main mineralized bodies.
Figure 10.2A: The holes were located next to the main mineralized bodies.

Atalaya (2016)
10.1.2 Infill Program

The Infill program was designed to increase the category of the reserves for the two first years of mine production. The program consisted of 7,026m of RC drilling on a regular 20x20m grid (Figure 10.3).
10.1.3 Dehesa Lago

This drilling work was intended to better outline the orebody at Cerro Colorado, and particularly at the eastern extension, between the Dehesa and Lago ore zones. The aim was to define the continuity of the mineralization in between the two zones. See Figure 10.4A.
10.1.4 Inferred Program

The Inferred program (Inferidos) was intended to increase the resource and to upgrade the category of resources from Inferred to Proven or Measured. The program was carried out in two phases:

- First, overall zones that included RC holes up to 200 m in depth, and
- Second, specifically around the Cerro Colorado pit that consisted of a combination of RC-DDA drilling with holes up to 450 m in length to explore deep zones with a lack of information. Figure A10.5 shows the Inferred drilling targets.

![Inferred Drilling Targets](Atalaya2016)

Figure A10.5: Inferred Drilling Targets
10.1.5 Argamasillas

At Argamasillas, the drilling was also executed in two programs. See Figure 10.7.

- The first program was done at Argamasillas West (next to Lago), in an area mined using underground workings. The aim of that program was to confirm reserves within a small mining pit that Atalaya Mining specifically designed for such a zone.

- The second program was executed in the southern part of Argamasillas, next to the San Lucas hill and Quebrantahuéso zones. This area, whose geology was not well understood, had been explored in the past for gold.

Figure 10.6: Argamasillas Program

(Atalaya 2016)
10.1.6 As, Sb Drilling Programs

Following the start of the mining operation in June 2015, it was found that some areas have high contents of penalty elements such as As, Sb, and Bi. In the second half of 2015, some additional drilling was designed in order to better define these areas. One zone with elevated Sb was outlined at the southeastern end of the Cerro Colorado pit, next to Dehesa Lago. At the East of Quebrantahuesos and at Argamasillas South, some holes yielded high As. See Figure 10.8A.

Figure 10.7A: As, Sb Drilling Program

Atalaya (2016)
10.1.7 San Lucas

At San Lucas, the drilling was actually exploration drilling (rather than resource drilling) since the zone had not been sufficiently covered by historical drilling and did not contain any resources. Drilling conducted in 2015 confirmed that this zone did not contain significant mineralization. See Figure 10.9.

Figure 10.8 - San Lucas Program
10.2 Exploration Drilling

Five prospective areas were selected for exploration drilling based on data compilation and the completed geophysical surveys. An total of 25 diamond holes for 11,316 m were completed in 2015, and January and February of 2016. These data are presented in Table 10.4 and Figure 10.5 below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hole Id</th>
<th>Hole Length</th>
<th>ZONEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>FS001A</td>
<td>694.75</td>
<td>FilonSurAVA</td>
</tr>
<tr>
<td>2015</td>
<td>FS002A</td>
<td>991.30</td>
<td>FilonSurAVA</td>
</tr>
<tr>
<td>2015</td>
<td>FS003A</td>
<td>879.50</td>
<td>FilonSurAVA</td>
</tr>
<tr>
<td>2015</td>
<td>FS004A</td>
<td>804.70 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>FS005A</td>
<td>528.50 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>FS006A</td>
<td>431.90 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>FS007A</td>
<td>451.35 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>FS008A</td>
<td>391.7 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>ST3A</td>
<td>784.9 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>ST1A</td>
<td>500 Culm' cementaciónA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>ST2A</td>
<td>1151.3 Culm' DehesaA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD01A</td>
<td>182.15 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD02A</td>
<td>209.55 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD03A</td>
<td>142.95 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD03A bisA</td>
<td>206.25 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD04A</td>
<td>218.55 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD05A</td>
<td>143.55 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD06A</td>
<td>191.55 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>SAD07A</td>
<td>209.65 SANANTONIOA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>ATD^01A</td>
<td>378.2 SANDIONISIOA</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>ATD^02A</td>
<td>517.80 SANDIONISIOA</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>ATD^03A</td>
<td>391.5 SANDIONISIOA</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>ATD^04A</td>
<td>446.3 SANDIONISIOA</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>S09DA</td>
<td>256.5 FilonSurE M. Valle</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>S10DA</td>
<td>211.6 FilonSurE M. Valle</td>
<td></td>
</tr>
</tbody>
</table>

**Total DDH meters**: 1,316.00
11 SAMPLE PREPARATION, ANALYSIS, AND MINERALIZATION

This section was compiled by the Atalaya Mining Co. technical staff and reviewed by Alan Noble, one of the qualified persons for the purpose of NI 43-101, Standards of Disclosure for Mineral Projects.

11.1 Historical Drilling

Procedures for the historical drilling, much of which was completed in the 1960’s, as not currently available. That drilling was performed by RTZ, a major mining company, and as believed to have been conducted using the best available industry standards at that time.

11.2 Atalaya Drilling

Atalaya Mining has implemented a QA/QC program to ensure that all the drill samples are of high quality. The project geologist and the exploration manager are the persons responsible for implementing the protocol procedures and ensuring that all required QA/QC standards are accomplished.

A flowchart of the drill sampling procedures is presented in Figure 11.1 At the end of this chapter.

11.3 Site Preparation

The geologist marks the drill hole location with a wooden peg and fluorescent paint.

If the hole is inclined, the geologist marks the direction with a tape and paint. Once the rig is positioned, the geologist fine tunes the drill rig position with a compass.

11.4 Logging and Sampling Procedures

Atalaya Mining has two appropriate forms for logging the data from the drill samples produced by RC and diamond drilling.

For each drill sample, the following data are recorded:

- Location, including theasting, northing, coordinates, and elevation.
- Logs, including lithology, alteration, and other relevant information.
- Date of sampling.
- Weights, which are recorded twice; once from the bulk sample wet and a second weight after a oven-drying.
- Person responsible for collecting the samples (geologist, supervisor, assistant, etc.).
- Elements analyzed, including the method used (AA, ICP, etc.), laboratory, etc.
- Assay results.

RC chips are logged in an appropriate format that includes lithology, alteration, mineralization, and other notable characteristics. Every sampled interval is stored in the chip trays and photographed; the picture shows clearly the sample numbers and interval of sampling.

A
Diamond core is logged using a more detailed geological form that includes lithology, stratigraphy, a detailed structure, alteration, and mineralization. In addition to the geological logging, geotechnical features such as recovery and RQD are recorded in a separate form.

11.4.1 RC Samples

The sampling interval for RC samples for the Resource Drilling program was established at 5 meters. However, since the volume of material produced by drilling 5 meters was excessive, it was decided to sample every meter and composite every 5 samples to make a 5m composite sample.

The steps after the sample collection and before delivery to the lab are shown in the flow chart (Figure 11.1). A rifle splitter is directly connected to the cyclone of the rig to collect the bulk RC sample. In case the drilling occurs below the water table, the entire bulk sample is collected in a large polybag, dried for 24 hours, and then split.

The bulk sample is weighed, oven-dried, and split again to reduce the volume and weight of each 1m sample to approximately 750–1000 grams.

Five 1m samples are mixed to create a composite 5m sample.
Figure 11.1A - Sampling Flow Chart
11.4.2 Core Samples
The diamond core is collected from the drill rig by a trusted driller who is directly contracted by Atalaya Mining. The drilling is performed under the supervision of the Atalaya Mining geologist and charge. The core is placed by the driller in core boxes. Markers are placed in the core boxes clearly indicating the A drill depth at the end of each drill run. Each box is identified using a permanent marker with a box A number and from top to depths A.
The core is transported to the core shed by two workers from Atalaya Mining Exploration A Department using a pickup truck.
A digital photograph is taken of each core box. The core is inspected and logged by the Atalaya Mining project geologist. The typical sampling length is about an arbitrary according to lithological variation and program requirements. The drill core samples are split into two halves with one half placed in a new A plastic bag along with a sample tag and the other half placed back into the core box.
The core halves selected for sampling is crushed and split to get a sample of approximately 50-1000 grams. All the samples were from the resource drilling program. Five samples of all each are mixed and a split is generated to a composite 5m sample.

11.4.3 Labeling
Each sample is labeled according to a code bar system following his scheme: A
- CODE:000/EA
- CODE:000/AEA
- CODE:000/EBISA

Where: A
- CODE:000/ is the number of the sample.
- EA: indicates the laboratory that the sample is being sent for analysis.
- AEA: is the code that corresponds to the standard A or A blank.
- EBISA: indicates that the sample was repeat.

The drill samples are delivered to the Atalaya Mining Laboratory within batches that usually represent an individual A holes.

Density Measurements
Density measurements (DM) are performed directly on core samples by weighing the core samples out of water, and then when suspended in water, using a calibrated high precision scale. The DM reading (g/cm³) of each sample is obtained by dividing the weight of the dry sample by the apparent weight of a 750 g water sample.
The samples for DM determinations are selected by the project geologist. The DM is performed by a senior field assistant and supervised by the project geologist.
11.6 QA/QC
The Atalaya Mining Laboratory performs the sample preparation and analysis. The laboratory routinely conducts QA/QC checks using certified standards and duplicates. Check analyses of randomly selected samples are completed by independent laboratories. In addition, the Atalaya Mining Exploration department has implemented an internal QA/QC protocol consisting of the insertion of reference material, standards, blanks, and duplicates on a systematic basis. As a routine, one standard and one blank are inserted for each 25 samples submitted. One duplicate is inserted at the end of each hole.

The weighting of RC samples is also considered a QC issue, as it relates to drilling recovery and sampling. All of the QA/QC data were entered into spreadsheets for analysis and the generation of charts.

11.6.1 QC charts
For Cu, all of the QC results are generally acceptable. Examples of some of the QC charts produced for Cu are shown in Figures 11.2 to 11.5.

Figure 11.2A Results for standard ETR 072 Cu
Figure 11.3 Results for Standard ETR 076 Cu

Figure 11.4 Results for Standard ETR 078 Cu
Figure 11.5: Results for Standard ETR/68 Cu

(Atalaya 2016)
11.6.2 RC Drilling Recovery Charts

The recovery of the RC drilling was calculated for each hole using the weight of the bulk samples and the density of the samples, which varies depending on the sulfur content (S). The data were entered and processed into a spreadsheet, and the resulting recoveries were plotted as shown in Figure 11.6 to Figure 11.9. These charts indicate that the RC recovery is generally good to excellent, but that recovery frequently falls below 50% at the bottom of the holes. Since low RC recovery is an indicator of sampling problems, the cause of poor recovery should be examined and steps should be taken to improve recovery. It is noted that none of the regions of poor recovery in these charts are in areas that would significantly affect the resource estimate.

Figure 11.6: RC Recovery for Drill Holes RT244, RT245, and RT246 (Atalaya 2016)
Figure 11.7: Recoveries for Drill Holes RT247, RT248, and RT249 (Atalaya 2016)
Figure 11.8: Recovery for Drill Holes RT250, RT251, and RT252 (Atalaya 2016)
Figure 11.9. RC Recovery for Drill Holes RT253, RT254, and RT255 (Atalaya 2016)
12 DATA VERIFICATION

Alan A Noble and Aleya J Pickarts, both A Qualified A Persons for the purpose of NI 43-101, A Standards of A Mineral Projects, reviewed and observed various data collection procedures and are of A the opinion that they meet current industry standards and requirements. The Atalaya technical staff are very competent and consistently follow the procedures and protocols necessary to ensure that the A data being collected are of the highest quality.

A

12.1 Drill Hole Assays

As a typical with restarted mining operation, much of the detailed information on assaying QA/QC was either not part of any standard procedure when the work was done or has been lost over time. Nevertheless, there are some indications that the assay data is suitable for resource information, as follows:

A

1. There is an A very good A reconciliation between the reserve model and mill production for the A period from A 1995 to A 2001. This reconciliation includes an A nearly A 24 million tonnes A of A plant production. Estimated tonnage is 9% higher than the A plant, grade is 2% lower, and contained A copper A metal is 5% higher. This level of accuracy would be impossible if there were any significant problems with the assays.

A

2. Blasthole assays were paired with 40 m A drill hole composites that were within A 0.1 m A radius of the blastholes. There was no statistically significant difference between the A copper A grades at the A pairs.

A

3. A small set of data (119 assays) from A 2010 A study were available. There were historical core assays that were re-assayed at ALS Laboratory. Copper grade at ALS averaged 9% lower than the original A RTM historical A copper grade, but the difference was less than A 1% in the critical range from 0.15% A Cu to A 0.4% Cu. ALS sulfur grades averaged 8% higher than the A RTM historical sulfur grades at A 0.15% sulfur range. It was unclear what caused this difference, but it was not regarded as a critical factor for resource estimation, since at amplitudes only that density and tonnage may be slightly higher if the ALSA sulfur grades are correct.

A

4. Continued monitoring of the reconciliation, blasthole A drill hole assay A comparisons, and, if possible, re-assaying of the larger A quantity A of historical core A was recommended.

A

A tour of the A Proyecto A Riotinto A assay lab was conducted during the site visit and an example A preparation A and assaying procedures were reviewed. While all laboratory procedures appear to meet or exceed A industry A standards, no comparison assays were available from an external laboratory and is A recommended that outside laboratory testing be added to the A lab procedures.

A

12.2 Geologic Data

The A geologic A data and A interpretation A were updated by A project A geologists A in conjunction A with A Dr. A Daniel A Arias Prieto. The A geologic A model A was reviewed and was determined A to be reliable A for resource A and reserve estimation.

A
12.3 Drill Hole Database
The drill hole database started with historical electronic data files from historical mining. The historical data were extensively checked in conjunction with AMC mining consultants. During the review process, drill hole location, down hole surveys, geologic logging, and assays were checked against the original paper documents. A number of minor errors were corrected in the electronic data, which as a result was maintained in the RecMin resource estimation system. Data from newer drilling by EMED Tartessus/Atalaya are added using well established procedures that minimize data entry errors. The drill hole database is regarded as reliable for resource estimation.

12.4 Density Data
Density is estimated from sulfur data using a formula established by Riotinto. More details on density estimation are discussed in Section 14. The use of sulfur grades to estimate density is regarded as a reliable approach for resource estimation.

12.5 Topographic Data
The pre-mining topography was provided by Riotinto as an AutoCAD drawing that contained topographic contours and other elevation data. The topographic interpretation is based on aerial photogrammetry with a flight date of April 2010, and was prepared by INVAR, S.A. of Sevilla, Spain. As mining progressed, the mine survey department has conducted pit surveys and modified the topographic drawing. At the end of each month, end-of-month topographic data were provided for January 2016 and April 2016, for use in this report.
13 MINERAL PROCESSING AND METALLURGICAL TESTING

This section was compiled by Atalaya Mining Technical Staff and reviewed by Alaye Pickarts and Nuan Jose Mnes Rojas. Both are qualified persons for the purpose of NI 43-101. Standards of Disclosure for A Mineral Projects.

13.1 Summary

From A1995 to A2001 the Riotinto Concentrator processed ore with similar characteristics to what was a processed today. An assumption of linear Ato the A total of A23.9 A Mt of ore A at Aan average A0.54% Cu A were A processed. Which generated information that was used to develop the design criteria and start an Aplan for the current operation. The old concentrator initially processed A1.5 A Mt/y of ore and an expansion A increased the concentrator processing capacity to A7.3 A Mt/y in A1997. A peak annual throughput of A9 A Mt/y was achieved in A 1998.

Metallurgical testwork results and current plant performance indicate that Riotinto ore is amenable to A conventional crushing, grinding, froth flotation, aedewatering and flotation processes. The ore for the current operation is a mixture of different types of ore (CCW, Asla, Salomon, A ago and AUB). It is different from the previous ore. Metallurgical testwork results indicate that the current operation would have similar energy requirements, an assumption that was confirmed after the current operation started.

The overall plant energy consumption in the past, including crushing, grinding, flotation, filtering, and water treatment, was around 21 Ato 23 A kWh/t. Historical data shows that about 78% of the unit energy consumption was drawn by crushing and grinding stages, about 16.7 Ato 18.2 A kWh/t.

The projection considered a ball mill and rod mill work index between A4 and A6 A kWh/t, a A crushing work index of A2.5 Ato A3 A kWh/t, and an A Agasmet A work values between A5 Ato A6 A. In general, the A Riotinto project has an energy consumption that can be qualified as average. The copper ore A industry with a maximum and minimum values of 1.3 Aand 1.9 A kWh/t. which has been around as A be present. About 10% of the a total time. Ahe Aore types Athat Aexhibit high energy consumption are A handled using Aore Ablending Atechniques at Athe Amine Aand, hence, Aits Aimpact Aon Aprocessing Arate as A minimized.

13.2 Communion Energy Consumption

Specific energy consumption for different ores was gathered during the previous Riotinto Amine's operation. The ore milled would have similar energy requirements, an assumption that was confirmed after the current operation started. The overall plant energy consumption in the past, including crushing, grinding, flotation, filtering, and water treatment, was around 21 Ato 23 A kWh/t. Historical data shows that about 78% of the unit energy consumption was drawn by crushing and grinding stages, about 16.7 Ato 18.2 A kWh/t.

The projection considered a ball mill and rod mill work index between A4 and A6 A kWh/t, a A crushing work index of A2.5 Ato A3 A kWh/t, and an A Agasmet A work values between A5 Ato A6 A. In general, the A Riotinto project has an energy consumption that can be qualified as average. The copper ore A industry with a maximum and minimum values of 1.3 Aand 1.9 A kWh/t. which has been around as A be present. About 10% of the a total time. Ahe Aore types Athat Aexhibit high energy consumption are A handled using Aore Ablending Atechniques at Athe Amine Aand, hence, Aits Aimpact Aon Aprocessing Arate as A minimized.

13.3 Flotation Testwork

Extensive flotation optimization at testwork was carried out on Aore A samples from the Riotinto Amine during A2015. Five Aore A samples were tested (CCW, Asla, Salomon, A ago and AUB). Portions of Aore Asla, A Salomon, A ago and AUB were combined to form a composite A. While Aore Arom ACCW formed a composite A 1. Most of the flotation optimization at testwork was done on A composite A 2. and the best condition was A used as a basis for the optimization at testwork on A composite A.
Tests were performed on the individual samples to develop particle size distributions, mineralogical analyses, grindability indices, and locked cycle flotation tests. The main objective of the flotation testwork was to optimize the flotation conditions for maximum copper recovery at a concentrate grade greater than 20% Cu. Locked cycle testing of Composites 1 and 2 resulted in a Cu recovery between 85% and 90% at a concentrate grade between 22% and 26% Cu.

In addition to these external tests, Atalaya Mining undertook a comprehensive series of metallurgical tests at its laboratories from October 2014 to August 2015. These tests confirmed the results obtained by the external laboratory and also confirmed historical data and metallurgical parameters used at the former processing plant. Additional flotation testwork is ongoing to maintain optimal conditions in the plant.

Analysis of historical metallurgical performance and its comparison to current plant performance and current metallurgical testing confirms that the samples selected for metallurgical testing represent the ore body well.

The current phase I has been producing copper concentrates since early August 2015 and has been operating at a steady state at an equivalent processing rate of 4.8 Mt/y since November 2015. Metallurgical performance has been in line with the production indicated by historical records and with the testwork results. These results and the metallurgical testing have confirmed the decision of Atalaya Mining to process the Riotinto ore using froth flotation.

Current knowledge of the open pit zones allows the processing of selected ore zones to maintain deleterious elements in concentrates as per agreements with clients. Metallurgical testing specifically designed to depress Fe and As has shown positive results.

The design criteria and equipment specifications for the rehabilitated plant and for the expansion to a 9.5 Mt/y are based on historical performance, laboratory and pilot plant test work, and computer A simulations.
Concentrate Rheology Testing

During February 2015, slurry flow behavior and concentrate characterization tests for two composites were performed by specialized laboratories. Table 13.1 summarizes the results obtained.

### Table 13.1: Concentrate Properties for Atalaya Mining Samples

<table>
<thead>
<tr>
<th>Property Tested</th>
<th>Composit</th>
<th>Composit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solids density (gas pycnometer)</td>
<td>2851A</td>
<td>3435A</td>
</tr>
<tr>
<td>d90 particle size</td>
<td>28.0μm</td>
<td>28.5μm</td>
</tr>
<tr>
<td>d50 particle size</td>
<td>4.7μm</td>
<td>3.5μm</td>
</tr>
<tr>
<td>%&lt;75μm</td>
<td>2.2</td>
<td>3.7A</td>
</tr>
<tr>
<td>Average slurry pH at 25°C</td>
<td>9.2</td>
<td>9.1A</td>
</tr>
<tr>
<td>Average slurry temperature</td>
<td>21.5°C</td>
<td>21.6°C</td>
</tr>
<tr>
<td>Conductivity</td>
<td>0.4mS/cm</td>
<td>0.7mS/cm</td>
</tr>
<tr>
<td>Freely settled bed packing concentration, C_{bfree}</td>
<td>32.3%v or 57.7%m</td>
<td>22.6%v or 50.1%m</td>
</tr>
</tbody>
</table>

Table 13.2 shows the correlations used to calculate the plastic viscosity and the yield stress for the two slurries tested.

### Table 13.2: Plastic Viscosity and Yield Stress

<table>
<thead>
<tr>
<th>Slurry Name</th>
<th>Bingham Plastic Model</th>
<th>Plastic Viscosity</th>
<th>Yield Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite 1</td>
<td>Applicable mass solids concentration range: 48%&lt;C&lt;63%</td>
<td>( K_BP = \mu_w + 81.89 \times C^{13.12} )</td>
<td>( \tau_y = 225.1 \times 10^5 \times C^{15.64} )</td>
</tr>
<tr>
<td>Composite 2</td>
<td>Applicable mass solids concentration range: 46%&lt;C&lt;59%</td>
<td>( K_BP = \mu_w + 18.37 \times C^{9.38} )</td>
<td>( \tau_y = 103.68 \times 10^5 \times C^{12.68} )</td>
</tr>
</tbody>
</table>

Data from the previous operation were used to develop the project's design criteria. The concentrate thickener was designed to meet the following process parameters shown in Table 13.3.

### Table 13.3: Concentrate Thickener Parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design feed rate (t/h/m²)</td>
<td>0.25A</td>
</tr>
<tr>
<td>Feed rate (t/h)</td>
<td>31 (total for 2 thickeners)</td>
</tr>
<tr>
<td>Feed percent solids (%)</td>
<td>16A</td>
</tr>
<tr>
<td>Underflow percent solids (%)</td>
<td>58A</td>
</tr>
<tr>
<td>Number of thickeners</td>
<td>2</td>
</tr>
</tbody>
</table>
13.5 Concentrate Filtration

Concentrate filtration tests are summarized in Table 13.4 and Table 13.5.

<table>
<thead>
<tr>
<th>Pressure/Filter A</th>
<th>Composite A</th>
<th>Composite A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40mm cake</td>
<td>55mm cake</td>
</tr>
<tr>
<td>Form time@3bar (minutes) A</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Cake moisture@3bar (%m) A</td>
<td>26.4</td>
<td>26.2</td>
</tr>
<tr>
<td>Form time@6bar (minutes) A</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Cake moisture@6bar (%m) A</td>
<td>25.5</td>
<td>25.4</td>
</tr>
<tr>
<td>Dry cake bulk density (t/m³) A</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Number of presses A</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Number of plates per press A</td>
<td>110</td>
<td>110</td>
</tr>
</tbody>
</table>

Both campaigns found high cake moisture, but Atalaya believes this was due to poor laboratory filter performance. The filter presses at the plant are delivering consistent moisture content, within specifications, at around 9 to 10%.

13.6 Tailings Testing

Tailings settling tests were performed by laboratories in Spain. Laboratory results show that the solids compacted after 2 weeks reach about 67% solids, when settling slurries at 30% to 40%, as shown in Figure 13.1 below (Golder, July 8 2015, Technical Memo).
Figure 13.1A Settling curves and final compacted solids for Atalaya Tailings (Golder, 2015).

Table 13.6 shows the size distribution for tailings as per February 2015 tests (Golder, July 31, 2015, A Technical Memo).

<table>
<thead>
<tr>
<th>Malla (mm)</th>
<th>Retenido (gr)</th>
<th>% en Peso</th>
<th>% Retenido</th>
<th>% Retenido Acumulado</th>
<th>% Pasa Acumulado</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 16</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00%</td>
<td>98.40</td>
<td></td>
</tr>
<tr>
<td>+ 20</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>97.50</td>
<td></td>
</tr>
<tr>
<td>+ 30</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>95.00</td>
<td></td>
</tr>
<tr>
<td>+ 40</td>
<td>1.20</td>
<td>1.20</td>
<td>1.20%</td>
<td>95.70</td>
<td></td>
</tr>
<tr>
<td>+ 50</td>
<td>1.90</td>
<td>1.90</td>
<td>1.90%</td>
<td>94.10</td>
<td></td>
</tr>
<tr>
<td>+ 70</td>
<td>1.40</td>
<td>1.40</td>
<td>1.40%</td>
<td>92.70</td>
<td></td>
</tr>
<tr>
<td>+ 100</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10%</td>
<td>86.60</td>
<td></td>
</tr>
<tr>
<td>+ 200</td>
<td>11.00</td>
<td>11.00</td>
<td>11.00%</td>
<td>75.60</td>
<td></td>
</tr>
<tr>
<td>+ 300</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00%</td>
<td>60.60</td>
<td></td>
</tr>
<tr>
<td>+ 400</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00%</td>
<td>55.60</td>
<td></td>
</tr>
<tr>
<td>+ 600</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00%</td>
<td>54.60</td>
<td></td>
</tr>
<tr>
<td>&lt; 630</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00%</td>
<td>52.60</td>
<td></td>
</tr>
<tr>
<td>&lt; 450</td>
<td>30.00</td>
<td>30.00</td>
<td>30.00%</td>
<td>22.60</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>120.00</td>
<td>100.00</td>
<td>100.00%</td>
<td>120.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Golder, Applus, Eptisa and Atalaya have developed geotechnical tests and reviewed geotechnical conditions of the current tailings facility. Table A13.7 (Applus report with reference number C 15 2003 689 2/August 2015) presents a summary of the geotechnical parameters determined during 2014 and 2015, where \( \gamma \) is the tailings density, \( K_{\text{sat}} \) is the vertical hydraulic conductivity, \( C_v \) is the consolidation coefficient, \( \phi \) is the internal friction angle and \( C' \) is the cohesion.

Table A13.7 Geotechnical Parameters

<table>
<thead>
<tr>
<th>Location</th>
<th>( \gamma )</th>
<th>( K_{\text{sat}} )</th>
<th>( C_v )</th>
<th>( E_{\text{sat}} )</th>
<th>( \phi )</th>
<th>( C' )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arenas Cobre</td>
<td>21.00</td>
<td>( 10^{-2} )</td>
<td>1.2( \times )10^5</td>
<td>30( *\sigma )</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>Arenas Gossan</td>
<td>21.00</td>
<td>( 10^{-2} )</td>
<td>1.2( \times )10^5</td>
<td>40( *\sigma )</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Lamas Cobre</td>
<td>20.00</td>
<td>( 2.5-3.5 \times 10^{-8} )</td>
<td>1.5( \times )10^5</td>
<td>50( *\sigma )</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Lamas Gossan</td>
<td>20.00</td>
<td>( 2.5-3.5 \times 10^{-8} )</td>
<td>1.5( \times )10^5</td>
<td>50( *\sigma )</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Aguacatera</td>
<td>24.00</td>
<td>--</td>
<td>--</td>
<td>134</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Escollera</td>
<td>20.70</td>
<td>( 3 \times 10^{-8} )</td>
<td>1.94( \times )10^2</td>
<td>75</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Núcleo</td>
<td>19.90</td>
<td>( 3 \times 10^{-8} )</td>
<td>1.3( \times )10^3</td>
<td>50</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>Pizzarras</td>
<td>25.00</td>
<td>( 10^{-11} )</td>
<td>--</td>
<td>5800</td>
<td>40</td>
<td>200</td>
</tr>
</tbody>
</table>
### Table 13.7 (Cont.) Geotechnical Parameters

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>DENSIDAD (kN/m³)</th>
<th>CONDUCTIVIDAD HIDRÁULICA VERTICAL (Kvset/m/s)</th>
<th>ÁNGULO DE FRICCIÓN INTERNO [°]</th>
<th>COHESIÓN (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arenas Cobre</td>
<td>21</td>
<td>10³10⁻⁷</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>(21,00)</td>
<td></td>
<td></td>
<td>(32)</td>
<td>(0)</td>
</tr>
<tr>
<td>Lamas Cobre</td>
<td>20</td>
<td>310⁻⁸</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>(70,00)</td>
<td></td>
<td></td>
<td>(33)</td>
<td>(0)</td>
</tr>
<tr>
<td>Escollera</td>
<td>24</td>
<td>Muy permeable [&gt;10⁻⁷]</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>(74,00)</td>
<td></td>
<td></td>
<td>(33)</td>
<td>(0)</td>
</tr>
<tr>
<td>Material de núcleo y Gossan</td>
<td>20,3</td>
<td>310⁻¹¹</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>(Núcleo: 20,70)</td>
<td></td>
<td></td>
<td>(Núcleo: 35)</td>
<td>(Núcleo: 20)</td>
</tr>
<tr>
<td>(Gossan: 19,90)</td>
<td></td>
<td></td>
<td>(Gossan: 35)</td>
<td>(Gossan: 12)</td>
</tr>
<tr>
<td>Pizarras (cimentación)</td>
<td>26</td>
<td>10⁻¹⁰</td>
<td>40</td>
<td>200</td>
</tr>
<tr>
<td>(26,00)</td>
<td></td>
<td></td>
<td>(40)</td>
<td>(200)</td>
</tr>
<tr>
<td>Lodos alta densidad (proyectados)</td>
<td>20</td>
<td>310⁻⁸</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>(70,00)</td>
<td></td>
<td></td>
<td>(33)</td>
<td>(0)</td>
</tr>
</tbody>
</table>
14 MINERAL RESOURCE ESTIMATES

This resource estimate was prepared by Alan C. Noble, P.E., for the reserves engineering at the Riotinto Copper Project in Colorado, USA. Mr. Noble is a qualified professional engineer in Colorado, USA, and has over 16 years of experience with resource estimation. Over 150 mineral deposits throughout the world. Mr. Noble is independent of Atalaya Mining and A Proyecto Riotinto A. A.

14.1 Resource Block Model

The resource model was created using the grid unfolding software, Datamine Proyecto Studio A3A. The model size is 10x10x10 meters, which is consistent with the mining bench height and the estimated selective mining area. The horizontal extent of the model is defined to cover the area Cerro Colorado mineral deposit. A resource model size and location parameters are shown in Table 14.1A.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum (ETRS meters)</th>
<th>Maximum (ETRS meters)</th>
<th>Cell Size (meters)</th>
<th>Number Cells</th>
<th>Model Size (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easting (X)</td>
<td>711,900</td>
<td>714,750</td>
<td>10</td>
<td>285</td>
<td>2850</td>
</tr>
<tr>
<td>Northing (Y)</td>
<td>4,174,900</td>
<td>4,176,500</td>
<td>10</td>
<td>160</td>
<td>1600</td>
</tr>
<tr>
<td>Elevation (Z)</td>
<td>0</td>
<td>550</td>
<td>10</td>
<td>55</td>
<td>550</td>
</tr>
</tbody>
</table>

14.2 Drill Hole Sample Database

14.2.1 Database Content

The drill hole data were provided by the Riotinto Project Engineering and geology personnel as ASCII files containing assays, collar locations, down-hole surveys, and geologic logging. For all drilling at the resource area, only those core holes and reverse circulation holes drilled from the surface were used for this estimate. Drilling was for the resource estimate as summarized in Table 14.2. Underground drill hole data, underground channel samples, and shallow, close-sampled (investigatory) holes were available. But were not used for resource estimation because of concerns regarding the quality of A. A. those data. A.
### Table 14.2: Summary of Drilling Used for Resource Estimation

<table>
<thead>
<tr>
<th>Drill Series</th>
<th>Type</th>
<th>Year</th>
<th>Number of Holes</th>
<th>Number of Assays</th>
<th>Drilled Length</th>
<th>Average Hole Length</th>
<th>Average Interval Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbered (RTM) A</td>
<td>Core A</td>
<td>Historical A</td>
<td>682 A</td>
<td>67,285 A</td>
<td>142,214.5 A</td>
<td>208.5 A</td>
<td>2.11 A</td>
</tr>
<tr>
<td>CCR Series A</td>
<td>RCA</td>
<td>2014 A</td>
<td>12 A</td>
<td>1,438 A</td>
<td>1,438.0 A</td>
<td>119.8 A</td>
<td>1.00 A</td>
</tr>
<tr>
<td>ETR Series A</td>
<td>RCA</td>
<td>2015 A</td>
<td>106 A</td>
<td>6,692 A</td>
<td>6,796.0 A</td>
<td>64.1 A</td>
<td>1.02 A</td>
</tr>
<tr>
<td>RT Series A</td>
<td>RCA</td>
<td>2015 A</td>
<td>255 A</td>
<td>10,637 A</td>
<td>21,538.7 A</td>
<td>84.5 A</td>
<td>2.02 A</td>
</tr>
<tr>
<td>Total A</td>
<td></td>
<td></td>
<td>1,055 A</td>
<td>86,052 A</td>
<td>171,987.2 A</td>
<td>163.0 A</td>
<td>2.00 A</td>
</tr>
</tbody>
</table>

### 14.3 Bulk Density

#### 14.3.1 Density Studies

Bulk density is estimated using a formula correlating density and sulfur grade. Data for the correlation were sulfur assays and specific gravity measurements that were done on blasthole cuttings. The samples were taken from the Cerro Colorado (low sulfur) and Salomon (high sulfur) areas of the mine, primarily during 2000. These measurements, shown in Figure 14.1, demonstrate increasing specific gravity with increasing sulfur. While this correlation is significant, the correlation coefficient is only 0.629, so there is still significant variability around the trend.

![Figure 14.1: Correlation between Specific Gravity and Sulfur Grade – 2000 Data](image)
A second investigation of the correlation between specific gravity and sulfur grade was conducted in 2010 as part of a comparison between ALS check assays and historical Rio Tinto Mining assays. The results of this study, shown in Figure 14.2, show an excellent correlation between the ALS sulfur assays and the ALS measured specific gravity. These data also show an increasing relationship between S.G. and sulfur grade, but with much higher correlation coefficient of 0.845. The correlation is improved because the S.G. is measured on larger pieces of core compared to small pieces of blasthole cuttings in the 2000 study. Outliers shown as orange points on the chart were reported to be porous, weathered rock that is not representative of the copper resource.

(Noble 2016)

Figure 14.2 Correlation between Specific Gravity and Sulfur Grade – 2010 Data

The Riotinto Project density formula is based on the year 2000 data with a slight discount on the constant from 2.8 to 2.7 to account for void space and fracturing in situ rock. Density = 2.7 + (0.025 x %S)

The 2010 work suggests that the constant may be lower than indicated by the resource formula, but that the slope of the line may be steeper than the slope of the resource formula. Thus, low sulfur rock may be lighter than suggested by the Riotinto formula and high sulfur rock may be heavier. These differences are minor, however, and the effect on resources is negligible.

14.3.2 Resource Model Density

The Riotinto density formula and ADP sulfur estimates are used for estimation of a block model density. A default sulfur grade of zero (0.0) is used for density estimation where there is insufficient sulfur data for an estimated sulfur grade. The default density in waste is thus set to 2.7 t/m³. Density in fill is

Ore Reserves Engineering

Page 14 3

September 2016
material, particularly at the backfilled Filon Sur Open Pit. As assigned, a default density of 2.00 t/m³. Volumes mined out with underground stopes and other workings were assigned a density of 2.00 t/m³, which is an equivalent volume assuming that at the underground operations have either been aced or are backfilled during underground operations. An Awill be backfilled for safety during current open pit operations.

### 14.4 Topographic Model

Topographic contour data were provided by Riotinto as AutoCAD drawing files containing topographic A contours, breaklines, and various cultural features and buildings. These data are as follows:

1. Original Topo contains the pre-mining topographic surface as of 26 April 2010.
2. End Jan 2016 contains the modified topography including mining through the end of January 2016.
3. End April 2016 contains the modified topography including mining through the end of April 2016. This is the basis for the resource and reserve estimates.

Triangulated digital terrain models (DTMs) were prepared from the original data as follows:

1. Local mine coordinates were translated to ETRS, if required.
2. Buildings, conveyor belts, and other features are related to the topographic surface, were removed from the data.
3. Intermediate contour intervals at 10 m intervals were removed so that only the 5 m contours remained.
4. The topographic data were triangulated using the AutoCAD DTM creation tool.
5. The resulting DTM was cropped to the area of interest and is used to define the resource model limits.

### 14.5 Mined out Model

Mined out portions of the block model were defined as follows:

1. Underground workings: 3D wireframe models were provided by Riotinto to define the volumes mined during underground workings by previous operators. These wireframes were used to create a block model of the mined out volume. Asing 1 x 1 x 1 m sub-blocks, the volume at the 10 x 10 x 10 m resource model prototype. The vertical extent of the 1 x 1 x 1 m sub-blocks was set to the exact height of the wireframe volumes to maintain an exact inventory. All mined out blocks were defined as backfill.
2. Filon Sur Backfill: Contours of the mined out and backfilled surface are from the Filon Sur Open Pit. These contours were converted to a DTM surface, and a backfill model was created with the 10 x 10 x 10 m prototype that defined the volume between the April 2010 topography and the bottom of the Filon Sur Pit. All of these blocks are defined as backfill.
3. 1996 to 2001 Mining: Strings defining the outlines of material mined for the period from 1996 to 2001 were available from work previously done by AMC Mining Consultants. These outlines were used to define areas within the mined out perimeters by the year in which they were mined. Since the previous open pit mining was on 10 m benches and the current model is on 10 m benches, most of these mined blocks were defined as partial blocks on multiple 10 m benches.
4. 2015 Mining: A Current Amining From Auly 2015 through the Aend of January 2016 was Adefined A initially Aas A the Avolume Aabove Athe Aend AJan A2016 Atopography Aand Abelow Athe AApril A2010 A
topography. Where Athe AApril A2010 Atopography Awas Abelow Athe Aend AJan A2016 Atopography, those A
blocks Awere Adefined Aas A"FILL". AThe 2015 Amining Acode Awas Aused Aprimarily Afor A reconciliation Awith A
the Aend Aof AJan A2016 Amined Aproduction, Awhich Ais Athe Alatest Amined Aproduction Areport At that Awas A
available Afor Athis Astudy.

5. End AApril A2016: AFinal Aresources Aand Areserves Aare Acomputed Ausing Athe Aend Aof AApril A2016 Amining A
topography Aas Athe Areporting basis. AThe Asame Aprocedure Aas Athe A2015 Amining Awas Aused Ato Adefine A
the Aadditional Ablocks Amined Ain AFebruary Athrough AApril A2016.

14.6 Geologic Model

The AgeoAlogic Amodel Awas Aconstructed Ato Aprovide AgeoAlogic Acontrol Afor Agrade Aestimation And Ato Aprovide A
parameters Afor Amining Aplanning Ain Athe AAnon A' Aore A' Abearing AgeoAlogic Aunits. ARecent Ainterpretation Aof Athe A
Cerro Colorado Adeposit Ahad Abeen Acompleted Aby Dr. Daniel Arias AAn Aconjunction Awith Athe Atechnical A
staff. AReview Aof Athis Ainterpretation Ashowed Athat Athe Acurrent Aresources Awas Aconfined Ato Athe AAcid Aunit A
with Aa Asmaller Aportion Aon Athe Aunderlying ABasic AVolcanic AUnit. AIndividual Aore Azones "Aconforming Ato A
historical Adeposit Adesignations Aalso Awere Ainterpreted Aby Dr. Arias. ABut Awere Atoo Atightly Aconfined Ato A
assumed Agrade Aboundaries Aand Awere Anot Aused Afor Areserves Aestimation. A

14.6.1 Acid Zone

The Acid AZone Aiminer Aenvelope Awas Aconstructed Abased Aon Athe ADr. Arias AAcid AUnit Awireframe Awith Athe A
following Amodifications.

1. Cross Asections Awere Adrawn Aon A25 Aintervals Arather Athan Athe A50 Am Aspacing Aused Ain Athe Aoriginal A
interpretation. Asections Awere Aused Aon Athe Asame ANW Aorientation.
2. The Asection Astrings Afor Arevised Ainterpretation Awere Asnapped Ato Adrill A' Ahole AgeoAlogic Acontacts Ato A
provide Aa Abetter Aaccuracy Ato Athe Ainterpretation.
3. The Aportion Aof Athe Acid AZone Aon Anorth Aof Athe Anorthern Afault Aboundary Adid Anot Ahave Aa Asufficient A
mineralized Aintersections Afor Areserves Aestimation Aand Awas Aremoved Afrom Athe Aenvelope.
4. The Arevised Ainterpretation Awas Asnapped Ato Athe Atop Aof Athe A"Intermediate AUnit", Awhich Ais Aa A
consistent Amarker Ahorizon Abetween Athe AAcid Aand ABasic Aunits. A
5. The Arevised Ainterpretation Awas Asnapped Ato Athe Abottom Aof Agossan, Aand Aa Agossan, Aand Aleached A
material.

14.6.2 Basic Zone

The Basic AZone Awas Adefined Bby Absetting ADownward A120 Anorth Aparallel Ato Athe Afootwall Aof Athe AAcid Azone. A
Thus, Athe Basic AZone Acontains Athe Amineralization Aon Athe AIntermediate AUnit. Aplus Amineralization Aon Athe A
Basic AUnit. AThis Aamplified Amodel Aof Athe Basic AZone Aprovides Aa Acontrol Afor Areserves Aestimation. A
In Aaddition, Adrilling Aon Athe Basic AZone Awas Amuch Amore Awidely Aspaced Athan Aon Athe AAcid AZone Aand A
was Aless Aimportant Asource Aof Areserves. AAn Amore Adetailed Ainterpretation Ais Anot Ajustified.

14.6.3 Unfolding

The Datamine Aunfolding Atool Awas Aused Ato Aflatten Athe Aanticlinal Afold Ato Aits Ageometry Athat Ais Aclose Aas A
possible Ato Athe Aoriginal Ashape Aof Athe Adeposit. AThe Aprocedure Afor Aunfolding Awas Aas Afollows:

1. The Abottom Aof Athe Acid AZone Awas Aused Aas Athe Apriority Aindex Asurface Afootwall Afor Aunfolding Athe A
deposit. AFootwall Astrings Awere Adefined Ausing A25 A'm Aspacing Abetween Asections.
2. The bottom of the Acid Zone was expanded 800 m upwards, parallel to itself, to define the index A surface (hanging wall) or the top of the anticline. The expanded footwall was used as a reference to the top of the Acid Zone surface, because the top of the Acid Zone is an erosional surface. At A, parallel to the A trend, the copper mineralization was sufficient to define a hanging wall surface. But there are some minor instances where mineralization does not appear to follow a significant contour.

3. Tag strings were drawn between the footwall and the hanging wall to define the connection between the two surfaces. In general, the rest of the anticline was used as a reference for the tag strings. Tag strings also define the hanging wall and the anticline.

4. A final tag string was drawn to connect horizontally between the section strings. This string generally follows the rest of the anticline.

### 14.7 Compositing

Drill holes were composited at 10 m composites using the Astandard DAtamine Adownhole Acomposing routine, COMPDH. Before compositing, the drill holes were assigned a DOMAIN code based on the Acid and BASIC wireframe volumes. Composites outside of the A wireframe were assigned to a fault A “NOZN” A code. Composites were then computed with the Acompositing routine acet законом A nominal 10 m composites that started and ended on the DOMAIN boundaries. The resulting composites are as close as possible, while using all of the assay data within the defined zone intervals. A

Assays were composited using length-based averaging for this study. Density-weighted averaging should be evaluated for future studies.

### 14.8 Copper Grade Zone Models

#### 14.8.1 Copper Grade Distributions

Copper grades were declustered for analysis of the grade distribution using the Acid zone, nearest neighbor, block model, and only those blocks that were measured and indicated as a resource category. The resulting distribution of copper grade, presented in Figure 14.3 as a lognormal cumulative probability, and the lognormal histogram plots, indicate that copper grade is composed of several lognormal populations.

A set of four grade sub-populations were fitted to the raw data using an least squares fitting on both the histogram plot and on the histogram plot. The resulting distribution fits in included the A following component populations.

1. A spike at 0.01% Cu, which corresponds to assays rounded off to 0.010.
2. A low grade population averaging 0.062% Cu and containing about half of the total samples. This population is mostly waste, but contains a small fraction of ore.
3. A high grade distribution averaging 0.466% Cu. This population is the primary source of ore.
4. A very high grade distribution that averages over 4% Cu and is composed of high grade outliers.

A narrow vein structure with limited vertical and lateral extent.

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Ore Reserves Engineering

Page 14
There is significant overlap between the low-grade and high-grade distributions. As shown in Figure 14.4, there is a significant probability that a Cu composite could be in either the low-grade or high-grade population in the grade range between 0.025% Cu to 0.5% Cu.
Figure 14.3 Lognormal probability and histogram plots of Cu grade in the Acid Zone.
The large overlap between low-grade and high-grade is problematic for resource estimation, since there is no easy way to differentiate the populations. Accordingly, a simple strategy was developed to provide grade-zoning control as follows:

1. A simple nearest-neighbor (NN) model was created for copper grade, and preliminary grade zones were assigned using the grade-range parameters in Table 14.3. Search parameters for the NN model are documented in Table 14.4.

2. A very high-grade zone was defined using nearest-neighbor assignment and a more restricted search pattern. The blocks in the very high-grade zone were overprinted onto the initial grade zone model to form the complete model.

3. Interpolation was done using composites with overlapping grade ranges. The overlapping grade ranges are required to prevent polygonal edge effects on the boundaries of the grade zones. Composite grade zone parameters are shown in Table 14.3 along with the block model grade zone parameters. Composite grade-range parameters were optimized during grade.
Table 14.3 Grade Zone Parameters for Block Model and Composites

<table>
<thead>
<tr>
<th>Zone Code</th>
<th>Description</th>
<th>Block Model Grade Ranges</th>
<th>Composite Grade Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>1A</td>
<td>Low Grade</td>
<td>0.00</td>
<td>0.06</td>
</tr>
<tr>
<td>2A</td>
<td>Low/High Overlap</td>
<td>0.06</td>
<td>0.25</td>
</tr>
<tr>
<td>3A</td>
<td>High Grade</td>
<td>0.25</td>
<td>4.00</td>
</tr>
<tr>
<td>4A</td>
<td>Very High Grade</td>
<td>4.00</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 14.4 Grade Zone NN Search Ellipses

<table>
<thead>
<tr>
<th>Zone</th>
<th>X'</th>
<th>Y'</th>
<th>Z'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Grade</td>
<td>35</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Very High Grade</td>
<td>300</td>
<td>175</td>
<td>70</td>
</tr>
</tbody>
</table>

### 14.9 Sulfur Grade Distribution

The sulfur grade distribution, as shown in Figure 14.5, is dominated by a population of moderate sulfur grade that has an average sulfur grade of 4.7% sulfur and contains 73% of the total data. This population represents stockwork sulfide mineralization that is pervasive in the Acid Zone. Approximately 6% of the samples are massive sulfide mineralization averaging over 20% sulfur. A smaller 21% of the samples are represented by a low sulfur population that averages less than 1% sulfur. This population is difficult to model on the cumulative probability and histogram plots because of assay artifacts at the low sulfur end of the population.

Based on the above analysis of the sulfur grade distribution, a determination was made that sulfur grade zones were not required for the resource model. Sulfur grade zoning should be reviewed for the next model update, particularly with respect to massive sulfides.
Figure 14.5 - Sulfur Grade Distribution in the Acid Zone
14.10 Variograms

Variograms were computed for copper and sulfur using Sage 2001 variography software. Variograms were computed using normal transforms and the covariance computation option. Variograms were computed for copper and sulfur at the coordinate system. Sulfur variograms were only computed at the unfolded coordinate system. The results of variogram modeling are summarized in Table 14.5, and are shown graphically in Figure 14.7A through Figure 14.11. A traditional sill is high variability in the variance. It should be noted that Sage normalizes all variogram sills to a value of 1.00. A variogram structure except for sulfur, which was modeled with a single exponential variogram. A comparison of the overall (No Grade Zoning) copper variogram at the ETRS coordinate system and at the unfolded coordinate system shows that continuity along the East-West direction, along strike, as only slightly different. This is not unexpected, since the Cerro Colorado anticline plunges almost due west at a only about 30 degrees. In the north, South direction, however, the unfolded variogram has a significantly longer range than the ETRS variogram, confirming that copper mineralization is following a parallel to the fold. At the normal direction, however, the ETRS variogram has better continuity than at the unfolded variogram, which suggests that additional improvement could be achieved. At the unfolded process by making the hanging wall footwall links more vertical. A

When the variograms are computed with a grade zoned data, the immediately effect is that the overall variance is reduced by removing the effect of grade zone crossing from the variogram. The grade zone effect is also known as a zonal effect, as caused by the squaring of a large grade difference. When grade data from different grade zones are added to the general distribution within the zones, the relative variance is still of the grade zoned variograms. As a result, the relative variance of the ETRS variogram is higher than the overall estimate of the ETRS variogram without grade zones. The Relative Nugget Effect for the grade zoned variograms is also lower, even though the Sulfur's scaled nugget effect is higher. A variogram ranges are shorter at the mid grade and a high grade zone than for the overall variogram, while variability at the low grade zone is much more continuous, confirming that grade zones represent different types of mineralization. A

The Sulfur variogram, shown in Figure 14.12, has a much greater continuity than the copper variograms and is easily modeled with a single exponential variogram component. Sulfur grade continuity is best along the strike of the anticline, and as slightly better at the vertical axis than the north-south axis, A crossing the anticline. A
### Table 14.5: Summary of Variogram Models

<table>
<thead>
<tr>
<th>XYZ Variogram</th>
<th>Copper Grade</th>
<th>Sage Variograms Scaled to Sill = 1.00A</th>
<th>Exponential Structure 1A</th>
<th>Exponential Structure 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CuA</td>
<td>MaxA</td>
<td>Variance</td>
<td>Nugget</td>
</tr>
<tr>
<td>ETRS Cu No Zones</td>
<td>0.001A</td>
<td>100A</td>
<td>6.909A</td>
<td>0.691A</td>
</tr>
<tr>
<td>Unfolded Cu Low Zones</td>
<td>0.001A</td>
<td>100A</td>
<td>6.909A</td>
<td>0.691A</td>
</tr>
<tr>
<td></td>
<td>0.001A</td>
<td>0.14A</td>
<td>1.118A</td>
<td>0.224A</td>
</tr>
<tr>
<td></td>
<td>0.04A</td>
<td>0.30A</td>
<td>0.529A</td>
<td>0.143A</td>
</tr>
<tr>
<td></td>
<td>0.25A</td>
<td>4.00A</td>
<td>0.807A</td>
<td>0.283A</td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.01A</td>
<td>100A</td>
<td>3.993A</td>
<td>0.399A</td>
</tr>
</tbody>
</table>

*Cu Min* refers to the copper minimum grade, while *Cu Max* refers to the copper maximum grade.
Figure 14.6: Variograms for Acid Zone Cu Grade in ETRS Coordinates - All Data

Noble (2016)
Figure 14.7: Variograms for Acid Zone Cu Grade in Unfolded Coordinates for All Data (Noble 2016)
Figure 14.8: Variograms for Acid Zone Cu Grade in Unfolded Coordinates high-grade zone

\[
\gamma(h) = 0.3500000 + 0.3770000 \exp_{10.0}(h) + 0.2730000 \exp_{10.0}(h)
\]

Sample variogram points with less than 100 pairs have not been plotted.

\[
\gamma(h) = 0.3500000 + 0.3770000 \exp_{23.3}(h) + 0.2730000 \exp_{31.7}(h)
\]

Sample variogram points with less than 100 pairs have not been plotted.
AZIMUTH = 0  DIP = 0

\[ \gamma(h) = 0.270000 + 0.577808 \exp_{10.0}(h) + 0.152192 \exp_{62.4}(h) \]

Sample variogram points with less than 100 pairs have not been plotted.

AZIMUTH = 90  DIP = 0

\[ \gamma(h) = 0.270000 + 0.577808 \exp_{10.0}(h) + 0.152192 \exp_{101.5}(h) \]

Sample variogram points with less than 100 pairs have not been plotted.

AZIMUTH = 0  DIP = -90

\[ \gamma(h) = 0.270000 + 0.577808 \exp_{12.0}(h) + 0.152192 \exp_{79.9}(h) \]

Sample variogram points with less than 100 pairs have not been plotted.

Figure 14.9A Variograms for Acid Zone Cu Grade in Unfolded Coordinates (Noble 2016)
Figure 14.10: Variograms for Acid Zone Cu Grade in Unfolded Coordinates - Low Grade Zone

(Noble 2016)
Figure 14.11 Variograms for Acid Zone Sulfur Grade in Unfolded Coordinates. No^2 Grade Zones (Noble 2016)
14.11 Grade Models

Grade models were estimated for copper and sulfur grades using the unfolded coordinate space and a nearest neighbor (NN), an inverse distance power (IDP), and ordinary kriging. Sulfur was estimated as an average of single zone and copper was estimated both with and without grade zones. The boundary between the acid and basic zones was treated as a hard boundary for both copper and sulfur.

14.11.1 Search Ellipse Parameters

Search ellipse parameters were developed for each zone based on the variograms and as a general assessment of the continuity of grades. All search ellipses are relative to the unfolded coordinate system and are not rotated, except for sulfur, which was rotated 11 degrees clockwise around the A + Z axis. The data points for each ellipse are fixed to expand an initial search ellipse until the desired number of composites were located inside the search ellipse. The primary objective of the search ellipse expansion was to keep the search as localized as possible, subject to finding sufficient samples for a reliable estimation. The final search ellipse expansion was set to provide estimates in areas with widely spaced drilling. Search ellipse parameters are summarized in Table 14.6.

<table>
<thead>
<tr>
<th>Estimation Case</th>
<th>Rotation A</th>
<th>Search Ellipse Parameters</th>
<th># Composites A</th>
<th>Expand A Factor A</th>
<th># Composites A</th>
<th>Expand A Factor A</th>
</tr>
</thead>
<tbody>
<tr>
<td>NN Sulfur A</td>
<td>1/1/1</td>
<td>X'A = 150 A, Y'A = 70 A, Z'A = 10 A</td>
<td>5 A, 10 A</td>
<td>1.5 A</td>
<td>5 A, 10 A</td>
<td>2 A, 1 A, 10 A</td>
</tr>
<tr>
<td>IDP/OK Sulfur A</td>
<td>1/1/1</td>
<td>X'A = 150 A, Y'A = 70 A, Z'A = 10 A</td>
<td>5 A, 10 A</td>
<td>1.5 A</td>
<td>5 A, 10 A</td>
<td>2 A, 1 A, 10 A</td>
</tr>
<tr>
<td>Grid Flag A</td>
<td>0/0/0</td>
<td>X'A = 160 A, Y'A = 65 A, Z'A = 10 A</td>
<td>5 A, 10 A</td>
<td>1.5 A</td>
<td>5 A, 10 A</td>
<td>2 A, 1 A, 10 A</td>
</tr>
<tr>
<td>NN Cu, GZONE A</td>
<td>0/0/0</td>
<td>X'A = 300 A, Y'A = 175 A, Z'A = 70 A</td>
<td>8 A, 10 A</td>
<td>1.5 A</td>
<td>8 A, 10 A</td>
<td>2 A, 5 A, 10 A</td>
</tr>
<tr>
<td>NN Cu H, GZONE A</td>
<td>0/0/0</td>
<td>X'A = 35 A, Y'A = 10 A, Z'A = 15 A</td>
<td>1 A, 1 A</td>
<td>0 A</td>
<td>1 A, 20 A</td>
<td>0 A, 1 A, 20 A</td>
</tr>
<tr>
<td>IDP/OK Cu H A</td>
<td>0/0/0</td>
<td>X'A = 150 A, Y'A = 80 A, Z'A = 50 A</td>
<td>8 A, 10 A</td>
<td>1.5 A</td>
<td>8 A, 10 A</td>
<td>2 A, 5 A, 10 A</td>
</tr>
<tr>
<td>GZONE A</td>
<td>0/0/0</td>
<td>X'A = 60 A, Y'A = 15 A, Z'A = 30 A</td>
<td>5 A, 10 A</td>
<td>2 A</td>
<td>5 A, 10 A</td>
<td>3 A, 1 A, 10 A</td>
</tr>
</tbody>
</table>

14.11.2 Copper Grade Estimation

Copper grade estimation was done using a nearest neighbor (NN), an inverse distance power (IDP), and ordinary kriging with grade zone control. The ADP model was optimized relative to the NN model and through reconciliation with production. As follows:

1. The average copper grade of the ADP model should be as close as possible to the average grade of the NN model to ensure that the overall estimates are unbiased.
2. The mined copper grade from the ADP model should be as close as possible to historical mined grades for the period from April 1995 through 2001.
3. The mined copper grade from the ADP model should be as close as possible to the mined copper grade for the Initial Startup period from April 2015 through January 2016. (Note, a cutoff of A...
0.23% Cu rather than the actual 0.25% Cu was used for this reconciliation to account for excess dilution in current grade control practice. The parameters were also adjusted to provide an overall grade distribution that matched the blasthole model grade distribution as closely as possible.

4. The optimized ADP powers are shown in Table A.4. The ADP anisotropies are the same as the search ellipse radii.

Table A.4. ADP Estimation Powers by Grade Zone

<table>
<thead>
<tr>
<th>Cu Grade Zone</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Grade</td>
<td>1.5A</td>
</tr>
<tr>
<td>Mid Grade</td>
<td>2.0A</td>
</tr>
<tr>
<td>High Grade</td>
<td>1.2A</td>
</tr>
<tr>
<td>Very High Grade</td>
<td>1.0A</td>
</tr>
</tbody>
</table>

The reconciliation comparison for the ADP, OK, and NN estimates in Table A.4.8 shows that copper grade is very well estimated for the 1995-2001 period with only a 2% error. Tonnage is slightly overestimated with a 7% error, and total contained copper content is underestimated by 5%. In addition, the overall grade at 0.0% Cu cutoff is less than 2% higher than the NN grade, which confirms that the estimates are unbiased on an overall basis.

The tonnage estimate is almost exact for the 2015 mining, but copper grade is overestimated by 17% resulting in an 17% overestimation of contained metal. The reconciliation to 2015 production could be improved with greater restrictions to the Very High Grade Zone. However, that localized improvement comes with a greater error in the 1995-2001 period and a bias in the overall grade at a zero cutoff. An additional error of this magnitude are not atypical with respect to the 1995 to 2001 annual production and are likely just a typical estimation error in this high variability deposit.

Comparing the OK model to the ADP model, the ADP model performs better than the OK model for every measure except for the 2015 copper grade. Even so, the greater against for this model results in a larger error in the estimated contained copper. The measured and indicated ADP, OK, and ANNA resources are compared at multiple cutoff grades in Table A.4.9.
### Table A4.8A: Reconciliations for ADPA, OK, and IDP Models

(Constrained, Measured, and Indicated Resource)

<table>
<thead>
<tr>
<th>YEARA</th>
<th>CutoffA</th>
<th>Measured and Indicated</th>
<th>PlantA</th>
<th>%DiffA (Model) PlantA/PlantA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TonnesA (MillionsA) CuA IDPA</td>
<td>TonnesA (MillionsA) %CuA SulfurA</td>
<td>CuA GradeA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TonnesA</td>
<td>CuA</td>
<td>S_IDPA</td>
</tr>
<tr>
<td>1995A</td>
<td>0.25A</td>
<td>1.737A</td>
<td>0.479A</td>
<td>3.87A</td>
</tr>
<tr>
<td>1996A</td>
<td>0.28A</td>
<td>6.041A</td>
<td>0.518A</td>
<td>4.04A</td>
</tr>
<tr>
<td>1997A</td>
<td>0.28A</td>
<td>7.421A</td>
<td>0.485A</td>
<td>3.38A</td>
</tr>
<tr>
<td>1998A</td>
<td>0.30A</td>
<td>7.137A</td>
<td>0.538A</td>
<td>7.08A</td>
</tr>
<tr>
<td>1999A</td>
<td>0.30A</td>
<td>0.079A</td>
<td>0.564A</td>
<td>22.26A</td>
</tr>
<tr>
<td>2000A</td>
<td>0.35A</td>
<td>2.909A</td>
<td>0.628A</td>
<td>16.45A</td>
</tr>
<tr>
<td>2001A</td>
<td>0.35A</td>
<td>0.269A</td>
<td>0.747A</td>
<td>13.25A</td>
</tr>
<tr>
<td>Total A995'-2001A</td>
<td>25.594A</td>
<td>0.526A</td>
<td>6.25A</td>
<td>23.864A</td>
</tr>
<tr>
<td>2015A</td>
<td>0.23A</td>
<td>1.940A</td>
<td>0.633A</td>
<td>9.13A</td>
</tr>
</tbody>
</table>

### Table A4.9A: Reconciliations for ADPA OKA

<table>
<thead>
<tr>
<th>YEARA</th>
<th>CutoffA</th>
<th>Measured and Indicated</th>
<th>PlantA</th>
<th>%DiffA (Model) PlantA/PlantA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TonnesA (MillionsA) CuA IDPA</td>
<td>TonnesA (MillionsA) %CuA SulfurA</td>
<td>CuA GradeA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TonnesA</td>
<td>CuA</td>
<td>S_IDPA</td>
</tr>
<tr>
<td>1995A</td>
<td>0.25A</td>
<td>1.901A</td>
<td>0.462A</td>
<td>3.80A</td>
</tr>
<tr>
<td>1996A</td>
<td>0.28A</td>
<td>6.473A</td>
<td>0.490A</td>
<td>3.93A</td>
</tr>
<tr>
<td>1997A</td>
<td>0.28A</td>
<td>7.985A</td>
<td>0.459A</td>
<td>3.27A</td>
</tr>
<tr>
<td>1998A</td>
<td>0.30A</td>
<td>7.501A</td>
<td>0.518A</td>
<td>6.59A</td>
</tr>
<tr>
<td>1999A</td>
<td>0.30A</td>
<td>0.100A</td>
<td>0.537A</td>
<td>20.19A</td>
</tr>
<tr>
<td>2000A</td>
<td>0.35A</td>
<td>3.099A</td>
<td>0.611A</td>
<td>16.30A</td>
</tr>
<tr>
<td>2001A</td>
<td>0.35A</td>
<td>0.293A</td>
<td>0.699A</td>
<td>12.34A</td>
</tr>
<tr>
<td>Total A995'-2001A</td>
<td>27.260A</td>
<td>0.502A</td>
<td>5.98A</td>
<td>23.864A</td>
</tr>
<tr>
<td>2015A</td>
<td>0.23A</td>
<td>2.052A</td>
<td>0.608A</td>
<td>8.79A</td>
</tr>
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</table>

### Table A4.10A: Reconciliations for ADPA OKNA

<table>
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<th>CutoffA</th>
<th>Measured and Indicated</th>
<th>PlantA</th>
<th>%DiffA (Model) PlantA/PlantA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TonnesA (MillionsA) CuA IDPA</td>
<td>TonnesA (MillionsA) %CuA SulfurA</td>
<td>CuA GradeA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TonnesA</td>
<td>CuA</td>
<td>S_IDPA</td>
</tr>
<tr>
<td>1995A</td>
<td>0.25A</td>
<td>1.314A</td>
<td>0.600A</td>
<td>4.01A</td>
</tr>
<tr>
<td>1996A</td>
<td>0.28A</td>
<td>4.733A</td>
<td>0.697A</td>
<td>4.41A</td>
</tr>
<tr>
<td>1997A</td>
<td>0.28A</td>
<td>5.635A</td>
<td>0.646A</td>
<td>3.64A</td>
</tr>
<tr>
<td>1998A</td>
<td>0.30A</td>
<td>5.809A</td>
<td>0.707A</td>
<td>7.75A</td>
</tr>
<tr>
<td>1999A</td>
<td>0.30A</td>
<td>0.070A</td>
<td>0.749A</td>
<td>18.90A</td>
</tr>
<tr>
<td>2000A</td>
<td>0.35A</td>
<td>2.045A</td>
<td>0.928A</td>
<td>16.05A</td>
</tr>
<tr>
<td>2001A</td>
<td>0.35A</td>
<td>0.203A</td>
<td>1.393A</td>
<td>14.07A</td>
</tr>
<tr>
<td>Total A995'-2001A</td>
<td>19.808A</td>
<td>0.710A</td>
<td>6.50A</td>
<td>23.864A</td>
</tr>
<tr>
<td>2015A</td>
<td>0.23A</td>
<td>1.442A</td>
<td>0.914A</td>
<td>10.44A</td>
</tr>
</tbody>
</table>
### 14.12 Resource Classification

Classification of resources into measured, indicated, and inferred resource classes is based on drillhole spacing and the number of drillholes selected for estimation. Drillhole spacing is measured based on the kriging variance from a point kriging estimate using a "FLAG" variable that is set to 1.0 for a composite with copper values and absent for a composite with insufficient sampling to make a composite. A linear, zero-nugget variogram with an approximate slope of 0.5 was used for this kriging run. The kriging variance for a block at the center of a grid point is approximately equal to 8% of the drillhole spacing. If the block is outside the drilling pattern (extrapolated), the kriging variance is equal to the distance to the nearest drillhole. The resource classification parameters are summarized in Table A4.10.

### 14.13 Resource Summary

The copper resource was summarized using Aghari's Grossmann pit shell that was run using the copper price of $3.20/lb. Cu. All resources including inferred resources are other slope and economic copper parameters are the same as those used for design of the open pit. An economic estimation was done with a pit shell that was considered to have reasonable prospective for economic extraction. Assuming that the inferred resource was converted to measured and indicated by drilling and that the copper price and returns to previous levels, that were substantially above $3.20/lb. Cu. The resource estimate as summarized in Table A4.11 and Table A4.12.
### Table 14.11: Riotinto Project - Resource Summary

Constrained by the $3.20/lb. Cu cut-off and the end of April 2016 Topography.

<table>
<thead>
<tr>
<th>Resource Class/Zone</th>
<th>Cutoff</th>
<th>Tonnes (millions)</th>
<th>Cu_IDPA</th>
<th>S_IDPA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measured</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid Zone</td>
<td>0.2A</td>
<td>67.8A</td>
<td>0.46A</td>
<td>6.27A</td>
</tr>
<tr>
<td>Basic Zone</td>
<td>0.2A</td>
<td>22.2A</td>
<td>0.35A</td>
<td>3.27A</td>
</tr>
<tr>
<td>Total Measured</td>
<td>0.2A</td>
<td>90.0A</td>
<td>0.43A</td>
<td>5.53A</td>
</tr>
<tr>
<td><strong>Indicated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid Zone</td>
<td>0.2A</td>
<td>81.8A</td>
<td>0.45A</td>
<td>5.54A</td>
</tr>
<tr>
<td>Basic Zone</td>
<td>0.2A</td>
<td>21.0A</td>
<td>0.34A</td>
<td>2.62A</td>
</tr>
<tr>
<td>Total Indicated</td>
<td>0.2A</td>
<td>102.8A</td>
<td>0.42A</td>
<td>4.95A</td>
</tr>
<tr>
<td><strong>Total M+I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid Zone</td>
<td>0.2A</td>
<td>20.1A</td>
<td>0.49A</td>
<td>6.69A</td>
</tr>
<tr>
<td>Basic Zone</td>
<td>0.2A</td>
<td>2.6A</td>
<td>0.41A</td>
<td>3.06A</td>
</tr>
<tr>
<td>Total Inferred</td>
<td>0.2A</td>
<td>22.7A</td>
<td>0.48A</td>
<td>6.28A</td>
</tr>
</tbody>
</table>
Table A4.12 Riotinto Project Resource Summary Using Multiple Cutoffs A
Constrained by the $3.20/lb. Cu Pit and the End April 2016 Topography A

<table>
<thead>
<tr>
<th>Cutoff % (Cu)</th>
<th>Measured</th>
<th>Indicated</th>
<th>M+I</th>
<th>Inferred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes (millions)</td>
<td>Cu_IDP</td>
<td>S_IDP</td>
<td>Tonnes (millions)</td>
</tr>
<tr>
<td>0.15 A</td>
<td>115.3 A</td>
<td>0.374 A</td>
<td>5.37 A</td>
<td>122.4 A</td>
</tr>
<tr>
<td>0.2 A</td>
<td>90.0 A</td>
<td>0.430 A</td>
<td>5.53 A</td>
<td>102.8 A</td>
</tr>
<tr>
<td>0.25 A</td>
<td>72.8 A</td>
<td>0.479 A</td>
<td>5.76 A</td>
<td>87.3 A</td>
</tr>
<tr>
<td>0.3 A</td>
<td>60.7 A</td>
<td>0.519 A</td>
<td>5.92 A</td>
<td>72.6 A</td>
</tr>
<tr>
<td>0.35 A</td>
<td>49.8 A</td>
<td>0.562 A</td>
<td>6.08 A</td>
<td>58.7 A</td>
</tr>
<tr>
<td>0.4 A</td>
<td>39.7 A</td>
<td>0.610 A</td>
<td>6.29 A</td>
<td>45.1 A</td>
</tr>
<tr>
<td>0.45 A</td>
<td>31.5 A</td>
<td>0.658 A</td>
<td>6.61 A</td>
<td>34.2 A</td>
</tr>
<tr>
<td>0.5 A</td>
<td>24.4 A</td>
<td>0.712 A</td>
<td>7.00 A</td>
<td>25.4 A</td>
</tr>
</tbody>
</table>

14.14 Discussion of Factors Affecting Resources

There are no known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that would materially affect the resource estimate. Copper price is currently at historically low levels, however, and the return of higher copper prices as needed to achieve the full resource potential.
15 MINERAL RESERVE ESTIMATES

The mineral reserve estimates are based on open pit development of the Cerro Colorado deposit and are derived from the same May 2016 deposit model that was used to estimate mineral resources as described in Section A.14. Open pit mining progress through August 2016 was incorporated into this model.

A range of economic open pit shells were generated using the Lerches’ Grossmann algorithm to help define the likely extents of the open pit and the most favorable development sequence. An optimized open pit shell based on a copper price of $2.60/lb was then used to guide the design of the open pit.

15.1 Definitions

Canadian National Instrument 43-101A (CIM) references the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards on Mineral Resources and Mineral Reserves. The mineral reserve estimates reported in this section follow the CIM Definition Standards. The following definitions are from those standards:

A Mineral Reserve is the economically amineable part of a measured or indicated mineral resource demonstrated by at least a preliminary feasibility study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified.

A *Proven* Mineral Reserve is the economically amineable part of a measured mineral resource demonstrated by at least a preliminary feasibility study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified.

A *Probable* Mineral Reserve is the economically amineable part of an indicated and some measured mineral resource demonstrated by at least a preliminary feasibility study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified.

In this study, a mineral reserve is defined as the measured and indicated mineral resource that would be extracted by the mine design and which can then be processed at a profit. All measured resources at a meeting that standard are herein classified as proven mineral reserves, while all indicated resources at a meeting that standard are classified as probable mineral reserves.
15.2 Reserve Estimation Parameters

15.2.1 Metallurgical Recoveries

Historical ore processing data indicate that copper (Cu) recovery is reduced with a higher sulfur (S) content. The following formula was applied when computing recoverable copper (RCu) grades for each interpolated block in the deposit model:

If $S\% \leq 15.128$, 
\[
Cu\text{Recovery}\% = -0.9998 \times S\% + 90.125; 
\]

If $S\% > 15.128$, 
\[
Cu\text{Recovery} = 75\%. 
\]

Cu recoveries range from 75 to 90%. Sulfur grades for ore grade mineralization in the open pit average about 5.1%, resulting in an average copper recovery of 85%. No other metals contribute to revenues.

All backfilled zones in the deposit model were treated as waste with no copper recovery.

15.2.2 Royalties, Payables and Operating Costs

Table 15.1 lists the base economic parameters used in the pit limit analyses and cutoff grades, both internal and breakeven. All costs are in U.S. dollars. Conversions from Euro currency were based on a factor of US$1.12 per €1.00. Mining costs were provided by Atalaya Mining and are derived from the terms of the current contract mining agreements. Atalaya Mining also provided ore processing, maintenance, general/admin, and laboratory costs that are based on recent operating experience.

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Cu price</td>
<td>$/lb. Cu payable</td>
<td>2.60</td>
</tr>
<tr>
<td>Freight, melting &amp; refining (FSR) cost</td>
<td>$/lb. Cu payable</td>
<td>0.44</td>
</tr>
<tr>
<td>Royalties (NSR basis)</td>
<td>%</td>
<td>98.8</td>
</tr>
<tr>
<td>Royalties (NSR basis)</td>
<td>%</td>
<td>0.00</td>
</tr>
<tr>
<td>Ore mining cost (contractor)</td>
<td>$/t mined</td>
<td>1.23</td>
</tr>
<tr>
<td>Waste mining cost (contractor)</td>
<td>$/t mined</td>
<td>1.50</td>
</tr>
<tr>
<td>Incremental haulage per 10 m bench below 30 m</td>
<td>$/t mined</td>
<td>0.0134</td>
</tr>
<tr>
<td>Ore processing &amp; maintenance cost</td>
<td>$/t ore</td>
<td>5.89</td>
</tr>
<tr>
<td>General/admin laboratory cost</td>
<td>$/t ore</td>
<td>0.74</td>
</tr>
<tr>
<td>Internal NSR cutoff</td>
<td>NSR$/t</td>
<td>6.36</td>
</tr>
<tr>
<td>Breakeven NSR cutoff at 20 Anid</td>
<td>NSR$/t</td>
<td>8.01</td>
</tr>
<tr>
<td>Internal Cu cutoff</td>
<td>%Cu</td>
<td>0.16</td>
</tr>
<tr>
<td>Breakeven Cu cutoff at 20 Anid</td>
<td>%Cu</td>
<td>0.20</td>
</tr>
<tr>
<td>Internal RCu cutoff</td>
<td>%RCu</td>
<td>0.14</td>
</tr>
<tr>
<td>Breakeven RCu cutoff at 20 Anid</td>
<td>%RCu</td>
<td>0.17</td>
</tr>
</tbody>
</table>

NSR refers to Net Smelter Return. At the FSR and on-site operating costs, these are derived from Atalaya Mining's historical figures and current contract mining terms. At the internal cutoff grades, they include differential ore mining (i.e., ore mining less waste mining costs, which can result in a credit), plus ore processing, plant maintenance, and general/administration costs. At the breakeven cutoff grades, they include...
the full are mining cost, plus ore processing, plant maintenance, and general/administration costs. The 320 elevation referenced by the Breakeven cutoffs represents the approximate mean elevation of all tonnage mined in the planned open pit. Breakeven cutoffs increase with pit depth when using the incremental haulage costs. Cutoffs for Cu% values are based on an average recovery of 85%. A

Net revenue is computed by subtracting At the AF$R A$ cost from At the ACu price and then applying the metallurgical recovery and Cu payable factors to the result. No royalty or severance obligations are known at the time of this writing.

15.2.3 Overall Slope Angles

Blocks in the deposit model were tagged with codes to control the overall slope angles (OSAs) used in the economic pit limit evaluations. The OSAs are derived from Atalaya Mining's operating experience and inter-ramp slope angle (IRA) recommendations from Atalaya's geotechnical consultants and contain provisions for one to two 26° wide haul roads in the pit walls. Five zones were identified and are summarized in Table 15.2.4 below.

Table 15.2.4 Overall Slope Angles Used in Pit Limit Analyses

<table>
<thead>
<tr>
<th>Slope Code</th>
<th>Zone Description</th>
<th>Pit Walls</th>
<th>OSA, Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Fresh Rock, Acid Leached</td>
<td>SE &amp; S (az 90° - 230°)</td>
<td>46°</td>
</tr>
<tr>
<td>2A</td>
<td>Fresh Felsic Rock</td>
<td>W, NW &amp; EA (az 230° - 90°)</td>
<td>44°</td>
</tr>
<tr>
<td>3A</td>
<td>Filon Sur, Rock A</td>
<td>S W Quadrant</td>
<td>45°</td>
</tr>
<tr>
<td>4A</td>
<td>Filon Sur, Backfill A</td>
<td>S W Quadrant A</td>
<td>33°</td>
</tr>
<tr>
<td>5A</td>
<td>Weathered, Ao 20° An below surface</td>
<td>All, near surface</td>
<td>30°</td>
</tr>
</tbody>
</table>

15.2.4 Bulk Densities

In the deposit model, each block contains values for rock tonnage, rock volume, fill tonnage, and fill volume. Most non-air blocks are entirely rock, except for the Filon Sur and backfill area and a few isolated blocks intersecting underground workings. The rock tonnages are based on an interpolated bulk densities, which can reach up to 2.86 t/m³. All fill zones were assigned an bulk density of 2.00 t/m³. The average bulk material density, rock and fill, along the planned open pit is 2.75 t/m³.

15.2.5 Dilution and Ore Loss

The deposit model was carefully constructed to reflect the selectivity of anticipated mining equipment and adjusted through numerous trials to best reconcile with past production from the Cerro Colorado pit. Consequently, no additional provisions outside of the block model have been made for mining dilution and are loss.

15.3 Economic Pit Limit Analyses

The Arch's Grossmann (LG) algorithm was used to analyze economic pit limits based on the recoveries and other parameters previously discussed. In all cases, only mineral resources classified as measured and indicated (M & I) were considered as potential ore; all inferred mineral resources were treated as waste.
15.3.1 Price Sensitivities

The sensitivities of economic pit limits to copper price were analyzed for a range of Cu prices from $1.00/lb. to $4.00/lb. in $0.25/lb. increments. A run was also made at the projected long-term Cu price of $2.60/lb. Recoveries, payables, FSR costs, and operating costs are as described in Sections 15.2.1A and 15.2.2. Table 15.3 summarizes the results of the LG price sensitivity evaluations. Figure 15.1A illustrates the corresponding tonnage and grade curves.

Table 15.3 $\text{Lerchs'} \text{Grossmann} \text{Cu Price Sensitivity Analyses}$

<table>
<thead>
<tr>
<th>Price CuA $/\text{lb.} \text{A}$</th>
<th>Ore Grade &amp; I&amp;I Resources $\geq$ 6.36/t NSRA</th>
<th>Waste A</th>
<th>Total A</th>
<th>Strip A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ktones A</td>
<td>$/t A$</td>
<td>CuA %</td>
<td>S A %</td>
<td>Ktones A</td>
</tr>
<tr>
<td>4.00A</td>
<td>294,546A</td>
<td>22.13A</td>
<td>0.335A</td>
<td>4.88A</td>
</tr>
<tr>
<td>3.75A</td>
<td>283,616A</td>
<td>20.99A</td>
<td>0.342A</td>
<td>4.91A</td>
</tr>
<tr>
<td>3.50A</td>
<td>271,361A</td>
<td>19.83A</td>
<td>0.350A</td>
<td>4.92A</td>
</tr>
<tr>
<td>3.25A</td>
<td>249,877A</td>
<td>18.84A</td>
<td>0.362A</td>
<td>4.99A</td>
</tr>
<tr>
<td>3.00A</td>
<td>229,880A</td>
<td>17.83A</td>
<td>0.376A</td>
<td>5.04A</td>
</tr>
<tr>
<td>2.75A</td>
<td>204,531A</td>
<td>16.90A</td>
<td>0.395A</td>
<td>5.05A</td>
</tr>
<tr>
<td>2.60A</td>
<td>189,684A</td>
<td>16.34A</td>
<td>0.409A</td>
<td>5.08A</td>
</tr>
<tr>
<td>2.50A</td>
<td>179,762A</td>
<td>15.90A</td>
<td>0.417A</td>
<td>5.12A</td>
</tr>
<tr>
<td>2.25A</td>
<td>145,183A</td>
<td>15.06A</td>
<td>0.450A</td>
<td>5.05A</td>
</tr>
<tr>
<td>2.00A</td>
<td>104,524A</td>
<td>14.21A</td>
<td>0.493A</td>
<td>5.21A</td>
</tr>
<tr>
<td>1.75A</td>
<td>74,681A</td>
<td>13.06A</td>
<td>0.540A</td>
<td>5.34A</td>
</tr>
<tr>
<td>1.50A</td>
<td>31,902A</td>
<td>12.46A</td>
<td>0.640A</td>
<td>5.91A</td>
</tr>
<tr>
<td>1.25A</td>
<td>11,199A</td>
<td>11.63A</td>
<td>0.788A</td>
<td>7.45A</td>
</tr>
<tr>
<td>1.00A</td>
<td>826A</td>
<td>10.08A</td>
<td>1.016A</td>
<td>12.43A</td>
</tr>
</tbody>
</table>
15.3.2 Operating Cost Sensitivities

Operating cost sensitivities were evaluated at a Cu price of AUS$2.60/lb. and using the recoveries, payables, and FSR costs described in Sections 15.2.1 and 15.2.2. Mining, ore processing, maintenance, general/administration, and laboratory costs were varied in 5% increments between ±25% of the base costs presented in Table 15.1. The results of the operating cost sensitivity analyses are summarized in Table 15.4. Figure 15.2 shows the tonnage and Cu grade curves for the operating cost sensitivity.
Table 15.4 A Operating Cost Sensitivity Analyses at $2.60/lb. Cu

<table>
<thead>
<tr>
<th>Cost Sensitivity</th>
<th>ICOG* A</th>
<th>Ore Grade M&amp;I Resources A = ICOG* A</th>
<th>Waste A</th>
<th>Total A</th>
<th>Strip A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity A</td>
<td>NSRA $/tA</td>
<td>Ktonnes A</td>
<td>MSRA $/tA</td>
<td>Cu% A</td>
<td>S% A</td>
</tr>
<tr>
<td>25% A</td>
<td>7.95 A</td>
<td>127,533 A</td>
<td>18.59 A</td>
<td>0.466 A</td>
<td>5.19 A</td>
</tr>
<tr>
<td>20% A</td>
<td>7.63 A</td>
<td>144,311 A</td>
<td>18.02 A</td>
<td>0.451 A</td>
<td>5.04 A</td>
</tr>
<tr>
<td>15% A</td>
<td>7.31 A</td>
<td>155,281 A</td>
<td>17.60 A</td>
<td>0.441 A</td>
<td>5.16 A</td>
</tr>
<tr>
<td>10% A</td>
<td>7.00 A</td>
<td>164,684 A</td>
<td>17.19 A</td>
<td>0.431 A</td>
<td>5.10 A</td>
</tr>
<tr>
<td>5% A</td>
<td>6.68 A</td>
<td>179,707 A</td>
<td>16.67 A</td>
<td>0.417 A</td>
<td>5.12 A</td>
</tr>
<tr>
<td>0% A</td>
<td>6.36 A</td>
<td>189,684 A</td>
<td>16.34 A</td>
<td>0.409 A</td>
<td>5.08 A</td>
</tr>
<tr>
<td>*5% A</td>
<td>6.04 A</td>
<td>201,852 A</td>
<td>15.90 A</td>
<td>0.398 A</td>
<td>5.05 A</td>
</tr>
<tr>
<td>*10% A</td>
<td>5.72 A</td>
<td>214,292 A</td>
<td>15.50 A</td>
<td>0.388 A</td>
<td>5.06 A</td>
</tr>
<tr>
<td>*15% A</td>
<td>5.41 A</td>
<td>228,387 A</td>
<td>15.10 A</td>
<td>0.378 A</td>
<td>5.05 A</td>
</tr>
<tr>
<td>*20% A</td>
<td>5.09 A</td>
<td>239,647 A</td>
<td>14.76 A</td>
<td>0.369 A</td>
<td>5.04 A</td>
</tr>
<tr>
<td>*25% A</td>
<td>4.77 A</td>
<td>254,293 A</td>
<td>14.37 A</td>
<td>0.359 A</td>
<td>4.99 A</td>
</tr>
</tbody>
</table>

* Internal cutoff grade
15.3.3 Present Value Optimized Case for Open Pit Design

A couple of variations of the base price case at $2.60/lb. Cu were evaluated. First, a contract ore and waste mining costs were increased by $0.10/t to account for owner management and technical services. Personnel costs related to mining operations are the second case. In addition to the $0.10/t mining cost adjustment, a discount factor of 1.5% per bench was applied to the block net values to incorporate the time value of money into the pit limit analysis. With a sinking rate of 1.7 benches per year, this is approximately equivalent to discounting ore production relative to overlying waste stripping by 9% per annum. This improves the present value (PV) of the generated pit shell by eliminating areas of high incremental waste stripping and/or marginal ore.

Table A5.5A summarizes the results of these two LGA evaluations. The recoveries described in the Appendix A were applied when calculating block net values. The internal NSR cutoff, which excludes mining costs, remains at $6.36/t.

Table A5.5A

<table>
<thead>
<tr>
<th>Case</th>
<th>Ore Grade &amp; Resource &gt;= $6.36/t NSR</th>
<th>Waste Strip</th>
<th>Total Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K tonnes</td>
<td>NSR $/t</td>
<td>Cu%</td>
</tr>
<tr>
<td>No Discount A</td>
<td>185.680</td>
<td>16.39</td>
<td>0.410</td>
</tr>
<tr>
<td>1.5%/bench A</td>
<td>181.394</td>
<td>16.43</td>
<td>0.411</td>
</tr>
</tbody>
</table>

The LGA shell generated at a price of $2.60/lb. Cu with a discount factor of 1.5% per bench was used as a basis for the Cerro Colorado ultimate pit design.

15.4 Open Pit Designs

The ultimate pit and internal phases for the Cerro Colorado pit were designed to accommodate a contractors’ asymmetric medium-scale mining equipment operating on 10.4 m bench intervals. This equipment includesRock drills capable of drilling blast holes of up to 12 m in diameter, hydraulic excavators with bucket capacities of 5.9 m³, off-highway trucks with 55 t payloads, and appropriately sized support equipment.

15.4.1 Design Parameters

Pit walls were smooth and from the basis at $2.60/lb. Cu. An LGA shell generated with a 1.5% per bench discounting as discussed in Section 15.3.3. The smoothing minimizes adverse elimination. Where possible, A nosing and notches that could affect slope stability. Internal slope angle ramps were included to allow for truck access at an angle. A level. The basic parameters used in the design of the internal mining phases and ultimate pit were summarized in Table A5.6A.
Table 15.6: Basic Pit Design Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench Height</td>
<td>mA</td>
<td>10A</td>
</tr>
<tr>
<td>Haul Road Width (including ditch &amp; safety berm)</td>
<td>mA</td>
<td>26A</td>
</tr>
<tr>
<td>Internal Ramp Gradient</td>
<td>%A</td>
<td>10A</td>
</tr>
<tr>
<td>Minimum Pushback Width</td>
<td>mA</td>
<td>40A</td>
</tr>
</tbody>
</table>

In some cases, short-term haulage roads near pit bottoms and A ‘goodbye’ cuts were steepened to gradients of 12°-15°. Payloads for trucks operating from these areas will need to be reduced in order for the equipment to safely manage the steeper gradients. These areas, however, do not entail significant tonnages.

Table 15.7 lists the design parameters for pit slopes in the Cerro Colorado pit. IRA refers to inter-ramp angle, BFA refers to bench face angle, CBI refers to catch bench interval (vertical) and CBW refers to catch bench width. Maximum stack heights (i.e., between step-outs or haulage ramps) are 200 m. Fresh felsic rock and areas with leached rock are not designed for operating at these height. These areas, however, entail significant tonnages.

Table 15.7: Pit Slope Design Parameters

<table>
<thead>
<tr>
<th>Zone Description</th>
<th>Pit Walls</th>
<th>Angles in Degrees</th>
<th>CBI (mA)</th>
<th>CBW (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Rock, Acid Leached</td>
<td>SE, SA (az 90°-230°)</td>
<td>50A, 70A</td>
<td>20A, 9.5A</td>
<td></td>
</tr>
<tr>
<td>Fresh Felsic Rock</td>
<td>W, NW, AZ (az 230°-90°)</td>
<td>48A, 70A</td>
<td>20A, 10.7A</td>
<td></td>
</tr>
<tr>
<td>Filon Sur, Rock</td>
<td>SW, W, quadrant</td>
<td>50A, 70A</td>
<td>20A, 10.7A</td>
<td></td>
</tr>
<tr>
<td>Filon Sur, Backfill</td>
<td>SW, W, quadrant</td>
<td>38A, 50A</td>
<td>20A, 8.8A</td>
<td></td>
</tr>
<tr>
<td>Weathered Above 20 m below topo</td>
<td>All, near surface</td>
<td>34A, 45A</td>
<td>10A, 5.0A</td>
<td></td>
</tr>
</tbody>
</table>
15.4.2 Ultimate Pit

The Cerro Colorado Ultimate Pit is illustrated in Figure 15.3. The planned open pit is approximately 2400 m long E–W, 1250 m wide N–S, and 335 m deep along the SE wall. The highest pit elevation is about 475 m in the SE wall and the pit bottom in the NW quadrant reaches an elevation of 130 m. Grid lines are shown on 500 m intervals. Total material (ore and waste) contained within the ultimate pit limits is estimated at about 452 Mt.

(Rose 2016)

Figure 15.3 - Cerro Colorado Ultimate Pit Plan

15.5 Mineral Reserve Statement

Mineral reserve estimates for the Cerro Colorado pit are based on the designed ultimate pit limits described in the previous section and a mine production schedule developed from the internal mining phases. This schedule targets 6.58 Mt of mill feed in 2016 (1 May through 31 Dec) and 9.5 Mt per annum thereafter. Variable cutoff grades were used to maximize the present value of pre-tax profits over a mine life of 16.5 years. The production scheduling and cutoff optimization analyses are further discussed in Section 16 (Mining Methods).

15.5.1 Cutoff Grades

Until this point, cutoffs for estimating contained mineral resources in the LG pit shells were based on a NSR$/t value, incorporating a variable copper recovery as a function of sulfur content. Atalaya Mining has historically used cutoffs based on Cu% grades, assuming an average metallurgical recovery. At Alasino and Awidesh, Cu% cutoffs in the updated mineral reserve estimates. Table 15.8 summarizes the A
mill feed Cu% cutoffs used to develop the mine production schedule and the mineral reserve estimate. The calculated internal cutoff grade of 0.16% Cu (see Table 15.1) is used during the last three years of planned pit operations.

### Table 15.8 Cutoff Grades by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Time</th>
<th>Cu% Cutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016A</td>
<td>1A</td>
<td>0.25A</td>
</tr>
<tr>
<td>2017A</td>
<td>2A</td>
<td>0.25A</td>
</tr>
<tr>
<td>2018A</td>
<td>3A</td>
<td>0.25A</td>
</tr>
<tr>
<td>2019A</td>
<td>4A</td>
<td>0.25A</td>
</tr>
<tr>
<td>2020A</td>
<td>5A</td>
<td>0.25A</td>
</tr>
<tr>
<td>2021A</td>
<td>6A</td>
<td>0.24A</td>
</tr>
<tr>
<td>2022A</td>
<td>7A</td>
<td>0.24A</td>
</tr>
<tr>
<td>2023A</td>
<td>8A</td>
<td>0.23A</td>
</tr>
<tr>
<td>2024A</td>
<td>9A</td>
<td>0.22A</td>
</tr>
</tbody>
</table>

#### 15.5.2 Mineral Reserve Estimate

Mineral reserves are defined as the measured and indicated mineral resource that would be extracted by the mine design and can then be processed at a profit, which is estimated from the mine production schedule. All measured resources meeting the standard are classified as proven mineral reserves, while all indicated resources meeting the standard are classified as probable mineral reserves. All inferred resources and unclassified material are treated as waste.

Tables 15.9 and 15.10 present the estimates of proven and probable mineral reserves, respectively, taken from the mine production schedule. Table 15.11 summarizes the estimates of combined proven plus probable mineral reserves, along with low-grade, waste rock, and Filon Sur backfill materials.
### Table 15.9 Proven Mineral Reserve Estimate

<table>
<thead>
<tr>
<th>Year</th>
<th>Time Period</th>
<th>Cu% Cutoff</th>
<th>Proven Mineral Reserve Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ktonnes</td>
<td>Cu%</td>
</tr>
<tr>
<td>2016A</td>
<td>1A</td>
<td>3,975</td>
<td>0.59</td>
</tr>
<tr>
<td>2017A</td>
<td>2A</td>
<td>6,893</td>
<td>0.51</td>
</tr>
<tr>
<td>2018A</td>
<td>3A</td>
<td>6,008</td>
<td>0.55</td>
</tr>
<tr>
<td>2019A</td>
<td>4A</td>
<td>5,873</td>
<td>0.53</td>
</tr>
<tr>
<td>2020A</td>
<td>5A</td>
<td>6,035</td>
<td>0.49</td>
</tr>
<tr>
<td>2021A</td>
<td>6A</td>
<td>4,583</td>
<td>0.48</td>
</tr>
<tr>
<td>2022A</td>
<td>7A</td>
<td>3,265</td>
<td>0.42</td>
</tr>
<tr>
<td>2023A</td>
<td>8A</td>
<td>4,462</td>
<td>0.42</td>
</tr>
<tr>
<td>2024A</td>
<td>9A</td>
<td>5,572</td>
<td>0.40</td>
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<tr>
<td>2025A</td>
<td>10A</td>
<td>4,461</td>
<td>0.51</td>
</tr>
<tr>
<td>2026A</td>
<td>11A</td>
<td>5,086</td>
<td>0.45</td>
</tr>
<tr>
<td>2027A</td>
<td>12A</td>
<td>5,741</td>
<td>0.37</td>
</tr>
<tr>
<td>2028A</td>
<td>13A</td>
<td>5,086</td>
<td>0.35</td>
</tr>
<tr>
<td>2029A</td>
<td>14A</td>
<td>3,997</td>
<td>0.28</td>
</tr>
<tr>
<td>2030A</td>
<td>15A</td>
<td>3,631</td>
<td>0.32</td>
</tr>
<tr>
<td>2031A</td>
<td>16A</td>
<td>2,770</td>
<td>0.42</td>
</tr>
<tr>
<td>2032A</td>
<td>17A</td>
<td>5,039</td>
<td>0.32</td>
</tr>
<tr>
<td>Total</td>
<td>varies</td>
<td>78,376</td>
<td>0.45</td>
</tr>
</tbody>
</table>

### Table 15.10 Probable Mineral Reserve Estimate

<table>
<thead>
<tr>
<th>Year</th>
<th>Time Period</th>
<th>Cu% Cutoff</th>
<th>Probable Mineral Reserve Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ktonnes</td>
<td>Cu%</td>
</tr>
<tr>
<td>2016A</td>
<td>1A</td>
<td>1,608</td>
<td>0.63</td>
</tr>
<tr>
<td>2017A</td>
<td>2A</td>
<td>2,608</td>
<td>0.55</td>
</tr>
<tr>
<td>2018A</td>
<td>3A</td>
<td>3,492</td>
<td>0.52</td>
</tr>
<tr>
<td>2019A</td>
<td>4A</td>
<td>3,627</td>
<td>0.52</td>
</tr>
<tr>
<td>2020A</td>
<td>5A</td>
<td>3,465</td>
<td>0.47</td>
</tr>
<tr>
<td>2021A</td>
<td>6A</td>
<td>4,917</td>
<td>0.44</td>
</tr>
<tr>
<td>2022A</td>
<td>7A</td>
<td>6,236</td>
<td>0.43</td>
</tr>
<tr>
<td>2023A</td>
<td>8A</td>
<td>5,038</td>
<td>0.51</td>
</tr>
<tr>
<td>2024A</td>
<td>9A</td>
<td>3,928</td>
<td>0.47</td>
</tr>
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<td>10A</td>
<td>5,039</td>
<td>0.48</td>
</tr>
<tr>
<td>2026A</td>
<td>11A</td>
<td>4,414</td>
<td>0.49</td>
</tr>
<tr>
<td>2027A</td>
<td>12A</td>
<td>3,759</td>
<td>0.48</td>
</tr>
<tr>
<td>2028A</td>
<td>13A</td>
<td>4,414</td>
<td>0.43</td>
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<tr>
<td>2029A</td>
<td>14A</td>
<td>5,503</td>
<td>0.36</td>
</tr>
<tr>
<td>2030A</td>
<td>15A</td>
<td>5,869</td>
<td>0.35</td>
</tr>
<tr>
<td>2031A</td>
<td>16A</td>
<td>6,730</td>
<td>0.36</td>
</tr>
<tr>
<td>2032A</td>
<td>17A</td>
<td>3,823</td>
<td>0.34</td>
</tr>
<tr>
<td>Total</td>
<td>varies</td>
<td>74,469</td>
<td>0.44</td>
</tr>
</tbody>
</table>
Similarly, this be 461.

Table A15.11A Combined Proven and Probable Mineral Reserve Estimate

<table>
<thead>
<tr>
<th>Year</th>
<th>Period</th>
<th>Cu% Cutoff</th>
<th>Proven+Probable Mineral Reserves Ktonnes</th>
<th>Waste, Ktonnes</th>
<th>Total Ktonnes</th>
<th>Strip Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>1</td>
<td>0.25</td>
<td>5,583</td>
<td>0.60</td>
<td>12.72</td>
<td>13,730</td>
</tr>
<tr>
<td>2017</td>
<td>2</td>
<td>0.25</td>
<td>9,500</td>
<td>0.52</td>
<td>5.92</td>
<td>21,986</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
<td>0.25</td>
<td>9,500</td>
<td>0.54</td>
<td>4.11</td>
<td>21,985</td>
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<tr>
<td>2019</td>
<td>4</td>
<td>0.25</td>
<td>9,500</td>
<td>0.53</td>
<td>3.94</td>
<td>20,024</td>
</tr>
<tr>
<td>2020</td>
<td>5</td>
<td>0.25</td>
<td>9,500</td>
<td>0.48</td>
<td>3.19</td>
<td>19,922</td>
</tr>
<tr>
<td>2021</td>
<td>6</td>
<td>0.24</td>
<td>9,500</td>
<td>0.46</td>
<td>3.04</td>
<td>21,909</td>
</tr>
<tr>
<td>2022</td>
<td>7</td>
<td>0.24</td>
<td>9,500</td>
<td>0.43</td>
<td>6.83</td>
<td>22,293</td>
</tr>
<tr>
<td>2023</td>
<td>8</td>
<td>0.23</td>
<td>9,500</td>
<td>0.47</td>
<td>3.44</td>
<td>19,890</td>
</tr>
<tr>
<td>2024</td>
<td>9</td>
<td>0.22</td>
<td>9,500</td>
<td>0.43</td>
<td>7.18</td>
<td>17,276</td>
</tr>
<tr>
<td>2025</td>
<td>10</td>
<td>0.21</td>
<td>9,500</td>
<td>0.50</td>
<td>9.84</td>
<td>18,400</td>
</tr>
<tr>
<td>2026</td>
<td>11</td>
<td>0.20</td>
<td>9,500</td>
<td>0.47</td>
<td>6.90</td>
<td>20,080</td>
</tr>
<tr>
<td>2027</td>
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<td>0.19</td>
<td>9,500</td>
<td>0.41</td>
<td>4.46</td>
<td>21,995</td>
</tr>
<tr>
<td>2028</td>
<td>13</td>
<td>0.18</td>
<td>9,500</td>
<td>0.39</td>
<td>5.69</td>
<td>14,081</td>
</tr>
<tr>
<td>2029</td>
<td>14</td>
<td>0.17</td>
<td>9,500</td>
<td>0.33</td>
<td>3.51</td>
<td>11,213</td>
</tr>
<tr>
<td>2030</td>
<td>15</td>
<td>0.16</td>
<td>9,500</td>
<td>0.34</td>
<td>2.73</td>
<td>6,879</td>
</tr>
<tr>
<td>2031</td>
<td>16</td>
<td>0.16</td>
<td>9,500</td>
<td>0.38</td>
<td>2.44</td>
<td>4,842</td>
</tr>
<tr>
<td>2032</td>
<td>17</td>
<td>0.16</td>
<td>4,762</td>
<td>0.34</td>
<td>1.94</td>
<td>2,046</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>var</td>
<td>152,845</td>
<td>0.45</td>
<td>5.08</td>
<td>278,550</td>
</tr>
</tbody>
</table>

Total Aproven Aand Aprobable Amaterial Areserves Aare Aestimated At Anearly A153 AAt Agrading A0.45% ACu. AContained Acopper Ais Aestimated At A1681,000 Atonnes. AWaste Arock Aand Abackfill Aare Aprojected At About A299 A Mt, Aresulting Ain Astripping Aratio Aof A95. All Aof Athe Amaterial Areserves Aare Areported In ATables A15.9 A15.10, Aand A15.11 Aare Acontained Awithin Athe Amaterial Aresources Areported In ASection A4. A

The Amaterial Areserve Aestimates An Ahis Areport Aare Aeffective As Of A01 April 2016.

15.5.3 Sensitivity of Reserves to other Factors

Potential Amaterial Areserve Aestimates Ato Avariations Aon Acopper Aprice Aand Aoperating Acosts Aare Aindicated Ain ASections A15.3.1 Aand A15.3.2, Arespectively. AOther Apotential Arisks Ato Amaterial Areserves Ainclude Aroman Asettlement Aarcheological Asite Ajust Aoutside Athe ANorthern Amost Aextent Aof Athe APhase A1 pit Awall Aand Athe Aexisting Alocation Aof Anational AHighway A461 Athat Alimits Athe Awestern Amost Aextent Aof APhase A2 A

Mining APhase A1 Awas Adesigned Ato Aavoid Adisturbance Aof Aan Aroman Aarcheological Asite A, Adelaying Amining AAn Athis Aarea Auntil APhase A4 Astripping Acommences Ain A2021 A(Year A6). AAtalaya AMining Ahas Aindicated Athat Adevelopment Aof Athis Asite Awill Abe Apermitted Aonce Aarcheological Asurveys Ahave Abeen Acompleted. AAn Aanalysis Aof Arestricting Aexpansion Anto Athis Asite Aindicates Athat A5% Aof Athe Amaterial Areserves Awould Abe Aat Arisk Ashould Athe Anecessary Adevelopment Apermit Afor Athis Aarea Abe Adenied.

Similarly, Athe Adesign Aof APhase A2 Awas Adesired Aon Athe Awestern Aside Ato Aavoid Aearly Arelocation Aof Ahighway A461. AThis Ahighway Amust Abe Arelocated Aoutside Athe Aultimate Apit Alimits ABefore APhase A5 Astripping Acommences Ain A2022 A(Year A7) Ato Aprevent Ainterruptions Aof Athe Amining Aproduction Aschedule. AAn Aengineered Abackfill Aof Aan Aeastern Aextension Aof Athe Atalaya Aopen Apit, Atotaling Aapproximately A4 Mt, Awould Aprovide Aa
new alignment of the highway that allows development of Phases 5 and 6. Atalaya Mining has indicated that the highway relocation can be achieved in a timely manner through standard engineering and permitting processes. An LG analysis was performed such that pit development could not encroach on the existing highway location, which indicated that about 7.8% of the mineral reserves would be at risk if the highway relocation cannot be permitted.

Standing water at the bottom of the Cerro Colorado pit must be removed prior to mining below these water levels. Excessive rainfall or unexpected groundwater inflows could possibly cause short- to medium-term delays in the development of some areas, but is not expected to significantly impact the mineral reserve estimate.

No other mining, metallurgical, infrastructure, or permitting factors are presently known that may materially affect the mineral reserve estimate.
16 MINING METHODS
Mining has been conducted in the Riotinto area episodically since Roman times, and possibly earlier. A The Riotinto Company (a British firm) gained mineral rights and surface ownership in 1874 and aando operated A Riotinto A Minera until it began divesting its interests in 1954. A Operations in the Cerro A Colorado open pit, which is the foundation of the Riotinto project, began in 1968. A The Riotinto mine has five properties with an area of ownership of a local cooperative by the end of the 1990s. A Mining activities ended at the Cerro A Colorado A open pit in the 2001 due to deteriorating economic conditions. A Mining operations at the Riotinto project site were restarted in June 2015. The Cerro A Colorado A pit is completely open and in good condition, except for an accumulation of water. A The lowest levels of the pit are A.

Continued exploitation of the Cerro A Colorado deposit will use conventional, open pit mining methods. A Mining will be able to accommodate A.

16.1 Mining Phase Designs
The ultimate pit and mining phase designs were created using Hexagon's MineSight® software. A This includes a three-dimensional Leech's Grossmann (LG) algorithm for pit optimization and a surface topography analysis. A The Cerro A Colorado deposit block model was developed by ORE in May 2016 for a mineral resource estimate. (See Section A14) A The use of CAE Studio G software and then converted into a format readable by MineSight. A Surface topography reflects mining progress as of April 2016.

16.1.1 Phase Design Parameters
The same metallurgical recoveries, A Cu A payable, A operating costs, A overall A slope, A and A bulk A densities A used to evaluate the ultimate pit limits were also used in the analysis of the mining phase A development sequence. (See Sections A15.2.1, A15.2.2, A15.2.3, and A15.2.4) Similarly, A A adjustments for mining A dilution and ore A loss were deemed necessary A.

A

Ore Reserves Engineering A

Page 161 September 2016 A
Table 16.1A: Basic Pit/Design Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench Height A</td>
<td>mA</td>
<td>10A</td>
</tr>
<tr>
<td>Haul Road Width A (including ditch &amp; safety berm) A</td>
<td>mA</td>
<td>26A</td>
</tr>
<tr>
<td>Internal Ramp Gradient A</td>
<td>%A</td>
<td>10A</td>
</tr>
<tr>
<td>Minimum Pushback Width A</td>
<td>mA</td>
<td>40A</td>
</tr>
</tbody>
</table>

Table 16.2A: Pit Slope/Design Parameters

<table>
<thead>
<tr>
<th>Zone/Description A</th>
<th>Pit Walls A</th>
<th>Angles A</th>
<th>CBIA</th>
<th>CBWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Rock, Acid Leached A</td>
<td>SE&amp;(az:90°-230°)A</td>
<td>50A</td>
<td>20A</td>
<td>9.5A</td>
</tr>
<tr>
<td>Fresh Felsic Rock A</td>
<td>W&amp;(az:230°-90°)A</td>
<td>48A</td>
<td>20A</td>
<td>10.7A</td>
</tr>
<tr>
<td>Filon Sur, Rock A</td>
<td>SW Quadrant A</td>
<td>50A</td>
<td>20A</td>
<td>10.7A</td>
</tr>
<tr>
<td>Filon Sur, Backfill A</td>
<td>SW Quadrant A</td>
<td>33A</td>
<td>20A</td>
<td>8.8A</td>
</tr>
<tr>
<td>Weathered, Ao&amp;20m below A@opop A</td>
<td>All, Aear Aurface A</td>
<td>34A</td>
<td>10A</td>
<td>5.0A</td>
</tr>
</tbody>
</table>

16.1.2 Internal Mining Phases

The LG price sensitivity analyses as described in Section 15.3.1 provided guidance on the design of six internal mining phases. Phase 1 was derived from the $1.25 : 1.50 Cu/Shell ratio. Phase 2 is from the $1.75A Cu Shell along the north wall. Phases 3 and 4 are from the $2.25 : 2.60 Cu Shell. Phases 5 and 6 are from the discounted $2.60 Cu Shell. The intent is to mine the highest grade and lowest stripping ratio material in the initial phase and progress to the next best material in subsequent pushbacks, subject to a working room and access considerations. A

Figures 16.1A through 16.6A illustrate the phase development sequence for the Cerro Colorado pit. Grid A lines are shown on 500 m intervals. The planned ultimate pit is approximately 4,750 m long, 1,250 m wide, 455 m deep, and the SE wall. At the highest pit elevation is about 1,750 m above the SE wall. Phases 8 and 9 are the pit bottom in Phase 10. The NW quadrant reaches a minimum elevation of 1,300 m. A
Figure 16.3 - Mining Phase 3
(Rose 2016)

Figure 16.4 - Mining Phase 4
(Rose 2016)
Figure 16.5 – Mining Phase 5 (Filon Sur) (Rose 2016)

Figure 16.6 – Mining Phase 6 (Ultimate Pit) (Rose 2016)
16.1.3 Estimation of Contained Mineral Resources by Phase

Consistent with current operating practices in the Cerro Colorado pit, cutoff grades based on Cu% values were used to estimate potential mill feed quantities, i.e., contained M&I mineral resources, for each mining phase. Tonnages and grades above cutoff were estimated by bench for Cu cutoffs ranging from 0.16% (internal cutoff) to 0.35% in 0.01% increments. These phase resource estimates were then used in a cutoff grade optimization analysis and the generation of a mine production schedule.

16.2 Mine Production Schedule

A proprietary open pit mining simulation program was used to generate production schedules to meet mill feed targets based on user specified cutoff grades and the mining phases described in the previous section. Mill feed targets and cutoff grades can both be varied by time period (i.e., year). The program, through additional user controls, computes advanced stripping requirements to ensure sufficient ore exposure throughout the schedule.

16.2.1 Optimum Cutoff Grade Analysis

A series of production schedules were generated for a range of Cu% cutoff grades that were fixed for the life of the open pit. In the analysis, the mill feed was set at 6.75 Mt in Year 1, reflecting a preliminary mill ramp-up, and at 9.5 Mt per annum thereafter. Advanced stripping requirements varied with each schedule due to the effects of higher cutoff grades (which translate to less ore and more waste). The economic parameters used to estimate the present value of pre-tax profits for each schedule are summarized in Table 16.3. All prices and costs are expressed in U.S. dollars.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu price</td>
<td>$/lb. Cu payable</td>
<td>2.60A</td>
</tr>
<tr>
<td>FSR cost</td>
<td>$/lb. Cu payable</td>
<td>0.44A</td>
</tr>
<tr>
<td>Cu recovery, average</td>
<td>%</td>
<td>85.0A</td>
</tr>
<tr>
<td>Cu payable</td>
<td>%</td>
<td>98.8A</td>
</tr>
<tr>
<td>Mining cost, average</td>
<td>$/t mined</td>
<td>1.60A</td>
</tr>
<tr>
<td>Ore processing &amp; maintenance cost</td>
<td>$/tore</td>
<td>5.89A</td>
</tr>
<tr>
<td>General/admin &amp; laboratory cost</td>
<td>$/tore</td>
<td>0.74A</td>
</tr>
<tr>
<td>Discount rate</td>
<td>%/annum</td>
<td>12.0A</td>
</tr>
</tbody>
</table>

Fixed cutoff grade policies were examined from 0.16% Cu (internal cutoff) to 0.32% Cu in 0.02% Cu increments. Two additional runs were made at 0.23% Cu and 0.25% Cu in the vicinity of maximum present values. Figure 16.7 illustrates the results of this analysis.
The above analysis indicates that fixed cutoffs in the range of 0.24%-0.25% Cu would generate the maximum present value of pre-tax profits. The bulk of this present value is determined by the first few years of operation as discounting increasingly erodes the present values of profits in later years. Extensive experience on other projects has shown that a declining cutoff strategy, starting at the best fixed cutoff grade, can further improve present values by reducing waste stripping rates as cutoff grades decrease in later years. Exact mathematical optimizations are not guaranteed, but these declining cutoff schedules are practical solutions that achieve very similar results.
16.2.2 Production Scheduling Parameters

After the optimum cutoff grade analysis was completed, a new topographic surface became available and was loaded into the deposit model reflecting mining progress through 30 April 2016. Atalaya Mining then supplied updated ramp-up and long-term milling rates that are summarized in Table 16.4.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Year</th>
<th>Mill Feed Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>2016 (1 May 31 Dec)</td>
<td>5.583 Mt/a</td>
</tr>
<tr>
<td>2+A</td>
<td>2017+</td>
<td>9.50 Mt/a</td>
</tr>
</tbody>
</table>

A declining cutoff grade strategy was implemented in the production scheduling analyses, starting at 0.25% Cu for the first five years, declining to 0.24% Cu in years 6 and 7, and then decreasing by 0.01% Cu per year until reaching the internal cutoff of 0.16% Cu in year 15, where it remained thereafter.

Sinking rates in each mining phase were limited to about 6-7 benches (60–70 m) per year. Pit bottoms generally did not sink more than three benches per year to allow time for sump construction and pit water removal.

16.2.3 Mine Production Schedule Summary

Numerous production scheduling trials were conducted to smooth long-term stripping rates while meeting mill feed targets for each time period. The final production schedule is presented in Table 16.5 and is also the basis of the mineral reserve estimate described in Section 15.
The first mining phase, developed in 2016 (Year 1), largely extends prior mining areas and access roads. A downward pit in the existing Cerro Colorado pit is consequently little preproduction stripping. As required, and can be performed concurrently with the bottom ore mining during 2016. Advanced stripping commences at the start of Phase 2, at the end of 2017, in Phase 3, and in 2021. At the end of Phase 4, there is uniform stripping at the bottom of the pit, located at 1,650 meters (m) depth.

Mill feed grades during the first five years of operation are projected to average 0.51% Cu, a which is nearly 50% higher than the average. This is attributable to both the mining phase sequence and the cutoff grade policy. The total contained copper in the schedule is estimated at 681,000 tonnes.

As of the end of May 2016, Atalaya Mining estimates that about 22.3 Mt of waste remains at the bottom of the Cerro Colorado pit at an average elevation of 825 m. The estimated amount of waste, which is nearly 16 months of time, will be needed to pump this acidic water to a treatment plant for eventual reuse. As ore is processed, this water is discharged. At this pumping rate, Atalaya Mining projects that the pit will be completely dewatered by mid-September 2017. After this date, pit dewatering rates are projected to decline to 5.5 m³ per day.

The bottom bench of Phase 1 will reach an elevation of 830 m by the end of 2016, well above the projected pit lake elevation of 817 m. Mining on the 810 m bench will commence by mid-2017.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Calendar Year</th>
<th>Cu% Cutoff</th>
<th>Mill Feed Proven+Prob. Mineral Reserves Ktonnes</th>
<th>Waste Ktonnes</th>
<th>Total Ktonnes</th>
<th>Strip Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2016</td>
<td>0.25</td>
<td>5,583</td>
<td>0.60</td>
<td>12.72</td>
<td>825</td>
</tr>
<tr>
<td>2</td>
<td>2017</td>
<td>0.25</td>
<td>9,500</td>
<td>0.52</td>
<td>5.92</td>
<td>1,356</td>
</tr>
<tr>
<td>3</td>
<td>2018</td>
<td>0.25</td>
<td>9,500</td>
<td>0.54</td>
<td>4.11</td>
<td>1,451</td>
</tr>
<tr>
<td>4</td>
<td>2019</td>
<td>0.25</td>
<td>9,500</td>
<td>0.53</td>
<td>3.94</td>
<td>1,598</td>
</tr>
<tr>
<td>5</td>
<td>2020</td>
<td>0.25</td>
<td>9,500</td>
<td>0.48</td>
<td>3.19</td>
<td>1,612</td>
</tr>
<tr>
<td>6</td>
<td>2021</td>
<td>0.24</td>
<td>9,500</td>
<td>0.46</td>
<td>3.04</td>
<td>1,327</td>
</tr>
<tr>
<td>7</td>
<td>2022</td>
<td>0.24</td>
<td>9,500</td>
<td>0.43</td>
<td>6.83</td>
<td>1,254</td>
</tr>
<tr>
<td>8</td>
<td>2023</td>
<td>0.23</td>
<td>9,500</td>
<td>0.47</td>
<td>3.44</td>
<td>1,080</td>
</tr>
<tr>
<td>9</td>
<td>2024</td>
<td>0.22</td>
<td>9,500</td>
<td>0.43</td>
<td>7.18</td>
<td>629</td>
</tr>
<tr>
<td>10</td>
<td>2025</td>
<td>0.21</td>
<td>9,500</td>
<td>0.50</td>
<td>9.84</td>
<td>269</td>
</tr>
<tr>
<td>11</td>
<td>2026</td>
<td>0.20</td>
<td>9,500</td>
<td>0.47</td>
<td>6.90</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>2027</td>
<td>0.19</td>
<td>9,500</td>
<td>0.41</td>
<td>4.46</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>2028</td>
<td>0.18</td>
<td>9,500</td>
<td>0.39</td>
<td>5.69</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>2029</td>
<td>0.17</td>
<td>9,500</td>
<td>0.33</td>
<td>3.51</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>2030</td>
<td>0.16</td>
<td>9,500</td>
<td>0.34</td>
<td>2.73</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>2031</td>
<td>0.16</td>
<td>9,500</td>
<td>0.38</td>
<td>2.44</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>2032</td>
<td>0.16</td>
<td>4,762</td>
<td>0.34</td>
<td>1.94</td>
<td>0</td>
</tr>
</tbody>
</table>

Total variance 152,845 0.45 5.08 11,400 267,150 20,194 451,589 1.95
and been mined about August. Atalaya Mining's planned pit dewatering rates may just barely allow a development of the 110 m bench. It may require water resistant emulsion by blasting agents and/or blasthole dewatering. Pit dewatering may also impede advancing to the 300 m bench. During August and September of 2017, as water cut at 300 m bench begins in August. Additional pit dewatering and hydrologic evaluations are recommended to ensure uninterrupted ore supplies to the mill. In the second and third quarters of 2017, higher pumping rates may be required.

Approximately 11.4 Mt of low grade material indicated and a mineral resource averaging 0.22% Cu at a hypothetical cut-off of 0.20% Cu. A site at that level is located at that 300 m bench. A low grade pit stockpile at the west of the highway A1461, which would require AA crossing near the northwest pit exit. At the moment, it is uncertain whether this potential stockpile could be economically recovered due to possible mining and development activity of the highway A300 crossing. As a result, the low grade material has been excluded from the mineral reserves and is treated as waste rock in this study.

16.2.4 Projected Mine Life
The life of the mine is projected at 6.5 years.

16.3 Waste Rock Storage Facilities
Prospective pit waste rock storage areas located to the northeast, east, and southeast of the Cerro Colorado open pit. An additional pit backfill is located to the west of the pit. It will provide supplemental waste storage. Nearly 999 Mt of waste rock, Filon Sur backfill, and low grade material are estimated to be mined in the projected schedule.

16.3.1 WRSF Design Parameters
Ex pit WRSF systems will be constructed from the bottom to the top, up to 20 m high lifts. A drainage area system will be constructed on the foundations of the new WRSF areas prior to waste rock placement. Atalaya Mining envisages encapsulating the final WRSF surfaces with an impermeable layer of aschist to reduce permeability and maximize surface runoff. Water infiltration. A drainage area from the WRSF system will be channeled to an interception and water treatment pond. WRSF design parameters, excluding pit backfills, are summarized in a Table 16.6. A WRSF base will be regraded to 2:1 slopes. As backfills are extended to their ultimate limits, small catchment benches were designed for the 860, 1420, and 1480 m elevations. Some limited sedimentation control within each WRSF.
The in-pit backfills will be constructed from the 200, 250, 270, 300, 340, and 370 m elevations – connecting to haul roads on the south and east walls of the ultimate pit. No regrading of the dump faces, at a 37° angle of repose, is presently planned within the pit limits. The overall angle of the western backfill slope is approximately 28°.

16.3.2 Ultimate WRSF Plan

Waste rock will be placed into three locations: the main external WRSF around the northeast, east, and southeast sides of the Cerro Colorado pit; an in-pit backfill area that becomes available after completion of mining Phase 4 in the last half of Year 12 (2027); and a backfill area an at the eastern extension of the old Atalaya open pit that must be completed before the end of Year 7 (2022) for the relocation of Highway A-461.

The WRSF designs with respect to the ultimate pit are shown in Figure 16.8 and are highlighted in brown. Grid lines are on 500 m intervals. The main external WRSF forms an approximately 4 km long arc around the eastern half of the pit. The highest elevation is 520 m in the north area and the lowest is 325 m on the southeast toe. This WRSF has a surface area about 260 ha and a storage capacity of 120 Mm³.

The in-pit backfill as shown in Figure 16.8 has a crest elevation of 870 m and a minimum toe elevation of about 200 m. The backfilled Phase 4 benches between the 140 and 200 m elevations are obscured. The storage capacity of the backfill is estimated at 26 Mm³. The lift at a crest elevation of 870 m could be easily expanded for additional storage capacity if needed. The surface area of the in-pit backfill is about 40 ha.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net swell factor</td>
<td>%</td>
<td>35</td>
</tr>
<tr>
<td>WRSF average density</td>
<td>t/m³</td>
<td>2.04</td>
</tr>
<tr>
<td>Lift height</td>
<td>mA</td>
<td>10'20A</td>
</tr>
<tr>
<td>Regraded profile angle</td>
<td>degrees</td>
<td>26.5A</td>
</tr>
<tr>
<td>Maximum overall profile angle</td>
<td>degrees</td>
<td>25A</td>
</tr>
<tr>
<td>Catch bench profile angle</td>
<td>mA</td>
<td>60A</td>
</tr>
<tr>
<td>Catch bench profile width</td>
<td>mA</td>
<td>10A</td>
</tr>
<tr>
<td>Haul road profile width</td>
<td>mA</td>
<td>30A</td>
</tr>
<tr>
<td>Maximum profile gradient</td>
<td>%</td>
<td>10A</td>
</tr>
</tbody>
</table>

The in-pit backfills will be constructed from the 200, 250, 270, 300, 340, and 370 m elevations. The haul roads on the south and east walls of the ultimate pit. No regrading of the dump faces, at a 37° angle of repose, is presently planned within the pit limits. The overall angle of the western backfill profile angle is approximately 28°.
The top elevations for the highway relocation backfill range between 436 and 445 m, and the lowest toe elevation is 344 m. The length of the roadway platform is about 415 m, and the width is 40 m. The graded slopes of this backfill are at 28°. The highway backfill has a storage capacity of nearly 2 Mm³ and a surface area of just over 7 ha.

(Rose 2016)

16.3.3 WRSF Capacity Estimate
The estimated storage capacities for the pit and backfills are summarized in Table 16.7. An average density (net of swell) of 2.04 t/m³ was used to calculate tonnages. The total storage capacity is estimated at 302 Mt, just exceeding the required 299 Mt. As mentioned in Section 16.3.2, some additional storage capacity exists atop the pit backfill if needed.
16.4 Mining Equipment

Peak mining rates are projected at 81.8 Mt/a, which equates to just over 88,300 t/d if 360 working days per year are worked by the mining contractors. Presently, contractors’ operating crews work five days per week, for a total of 260 days per year. The mining contractors will provide all of the primary and auxiliary equipment fleets to meet the mine production schedule. They will also build and maintain all roads, suppress dust from haul roads and muckpiles, construct and maintain all WRSFs, perform equipment repairs and maintenance, and conduct all other activities normally associated with mine operations. Contractor equipment fleets and manning levels will be adjusted as necessary to meet mine production targets.

Tables 16.8 and 16.9 summarize the mining contractors’ current primary and auxiliary mining equipment fleets, respectively, dedicated to Cerro Colorado pit operations. Depending on equipment performance and availability, the joint venture may consider drill rigs capable of larger diameter blastholes, say up to 71 mm, to reduce drilling and blasting costs.

### Table 16.7A Estimated WRSF Capacities

<table>
<thead>
<tr>
<th>Waste Rock Storage Facility</th>
<th>Volume, M³</th>
<th>Tonnage, MAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-pit WRSF</td>
<td>120A</td>
<td>245A</td>
</tr>
<tr>
<td>In-pit backfill</td>
<td>26A</td>
<td>53A</td>
</tr>
<tr>
<td>Highway A relocation/backfill</td>
<td>2A</td>
<td>4A</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>148A</strong></td>
<td><strong>302A</strong></td>
</tr>
</tbody>
</table>

### Table 16.8A Primary Mining Fleet

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Capacity</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drills:</td>
<td>A</td>
<td>4A</td>
</tr>
<tr>
<td>Sandvik 1500A</td>
<td>114'127 mm</td>
<td>1A</td>
</tr>
<tr>
<td>Sandvik Pantera 100A</td>
<td>102'000 mm</td>
<td>1A</td>
</tr>
<tr>
<td>Hydraulic Excavators:</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Komatsu 2000A</td>
<td>13 M³</td>
<td>1A</td>
</tr>
<tr>
<td>Komatsu 1250A</td>
<td>8.2'000 M³</td>
<td>2A</td>
</tr>
<tr>
<td>Hitachi 1200A</td>
<td>7.5'800 M³</td>
<td>1A</td>
</tr>
<tr>
<td>Hitachi 870A</td>
<td>5.9'600 M³</td>
<td>1A</td>
</tr>
<tr>
<td>Haul Trucks:</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Komatsu 85A</td>
<td>91AA</td>
<td>12A</td>
</tr>
<tr>
<td>Komatsu 66A</td>
<td>55AA</td>
<td>10A</td>
</tr>
</tbody>
</table>
16.5 Mining Personnel

Mining contractor personnel will be devoted to supervision and craft labor—i.e., mine operations and equipment maintenance. The work of Atalaya Mining’s mine department employees will be limited to contract management, safety and supervision tasks, and most technical services (engineering, geology, etc.). Table 16.10 summarizes the estimated levels of mining-related personnel.

<table>
<thead>
<tr>
<th>Worker Type</th>
<th>Quantity A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor supervision A</td>
<td>20 A</td>
</tr>
<tr>
<td>Contractor craft labor A</td>
<td>102 A</td>
</tr>
<tr>
<td>Subtotal contractor personnel A</td>
<td>122 A</td>
</tr>
<tr>
<td>Owner (Atalaya Mining) personnel A</td>
<td>15 A</td>
</tr>
<tr>
<td>Total mining personnel A</td>
<td>137 A</td>
</tr>
</tbody>
</table>

16.6 Old Workings

There are old galleries and waste fill zones, as well as some other underground workings that were created by prior mining operations at the Cerro Colorado deposit. Although the locations of many of these workings are known, procedures will be developed to drill from operating benches of the pit to locate all voids left by previous operations. These old workings may be filled if necessary to ensure the safety of proximate operations and personnel.

---

16.9 Auxiliary Mining Fleet

<table>
<thead>
<tr>
<th>Equipment A</th>
<th>Quantity A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillar 624 wheel dozer A</td>
<td>2 A</td>
</tr>
<tr>
<td>Caterpillar D8T track dozer A</td>
<td>1 A</td>
</tr>
<tr>
<td>Caterpillar 845 hydraulic backhoe A</td>
<td>1 A</td>
</tr>
<tr>
<td>Hitachi 210 hydraulic backhoe A</td>
<td>1 A</td>
</tr>
<tr>
<td>Caterpillar 144 motor grader A</td>
<td>2 A</td>
</tr>
<tr>
<td>Caterpillar 83A vibratory roller A</td>
<td>1 A</td>
</tr>
<tr>
<td>Water truck A</td>
<td>4 A</td>
</tr>
<tr>
<td>Volvo M40 articulated truck A</td>
<td>2 A</td>
</tr>
<tr>
<td>Volvo M25 articulated truck A</td>
<td>1 A</td>
</tr>
</tbody>
</table>
17 RECOVERY METHODS

17.1 Process Summary

The Riotinto concentrator processes copper sulfide ore using conventional froth flotation to produce copper concentrates. The plant employs a combination of existing equipment associated with the historical operations as well as expanded and upgraded facilities.

The ore mined from the Cerro Colorado open pit features different mineralogical characteristics depending on whether it is mined from the east (CCE) or the west (CCW) areas. The CCE ore has a higher copper content than the CCW ore, historically 0.63% and 0.40% respectively. Likewise, the ore from CCE has a higher sulfur content at 12%, versus 4% from CCW basically because of pyrite content. Another difference between the two ore types is that ore from CCE has a higher content of penalty elements such as arsenic and antimony. Historically, the CCE ore recovered less copper than the CCW ore. This fact was confirmed during the phase 1 period of the project.

The ore from CCE requires a finer primary grind than the ore from CCW to achieve the same metallurgical recovery. Also, the CCE ore requires less energy to obtain the same particle size as the ore from CCW.

Relatively coarse primary and secondary grinding, at a P80 of approximately 160 microns, is used to float the minerals containing chalcopyrite and pyrite to produce a rougher concentrate. This concentrate must then be re-ground to a relatively fine grain size of around 40 to 20 microns in order to increase the concentrate grade.

Both ore types contain silver but the CCE ore has a higher silver content than the CCW ore. The silver content in the concentrates produced during phase 1 of the operation is between 62 and 150 g/t.

The different properties of the ore are summarized in Table 17.1 below and are based on the historical plant operating records.
Table 17.1: Summary of CCW and CCE Ore Characteristics (EMED 2013)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CCW</th>
<th>CCEA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mineralogy</strong></td>
<td>6.5% FeS₂, Pyrite</td>
<td>21% FeS₂, Pyrite</td>
</tr>
<tr>
<td></td>
<td>1.2% CuFeS₂, Chalcopyrite</td>
<td>1.8% CuFeS₂, Chalcopyrite</td>
</tr>
<tr>
<td></td>
<td>0.2% ZnS, Sphalerite</td>
<td>0.3% ZnS, Sphalerite</td>
</tr>
<tr>
<td></td>
<td>91.9% Gangue</td>
<td>76% Gangue</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
<td>4% S</td>
<td>12% S</td>
</tr>
<tr>
<td></td>
<td>0.4% Cu</td>
<td>0.63% Cu</td>
</tr>
<tr>
<td></td>
<td>0.13% Zn</td>
<td>0.19% Zn</td>
</tr>
<tr>
<td></td>
<td>0.4 gpt Ag</td>
<td>0.8 gpt Ag</td>
</tr>
<tr>
<td></td>
<td>205 ppm As</td>
<td>500 ppm As</td>
</tr>
<tr>
<td></td>
<td>20 ppm Sb</td>
<td>61 ppm Sb</td>
</tr>
<tr>
<td></td>
<td>11 ppm Bi</td>
<td>29 ppm Bi</td>
</tr>
<tr>
<td><strong>Design/Alta</strong></td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Bond Work Hardness</td>
<td>16 kWh/t</td>
<td>14 kWh/t</td>
</tr>
<tr>
<td>SG, dry ore</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Flotation Feed target</td>
<td>210 microns</td>
<td>160 microns</td>
</tr>
<tr>
<td>Con Regrind P80</td>
<td>~45 microns</td>
<td>~40 microns</td>
</tr>
<tr>
<td>Rougher Residence time for phase 1</td>
<td>~23 mins</td>
<td>~24 mins</td>
</tr>
<tr>
<td>Rougher Residence time for phase 2</td>
<td>~19 mins</td>
<td>~19 mins</td>
</tr>
<tr>
<td>Cu Recovery</td>
<td>87.0%</td>
<td>81.00%</td>
</tr>
<tr>
<td>Copper Concentrator Grade</td>
<td>~23% Cu, (58 g/t Ag)</td>
<td>~21% Cu, (132 g/t Ag)</td>
</tr>
</tbody>
</table>

The Filon Sur Zone (FSUR) located in the Southwest area of Cerro Colorado is considered to be analogous to the CCW ore and requires the same processing parameters.

The processing department staff consists of 79 people, 10 of whom work in management and supervisory positions and the balance occupy positions assigned to middle management and operating personnel. The concentrator is being managed through an ongoing improvement system which aims to maintain or improve the historical metallurgy results.

The unitary operating costs have decreased since the start of phase 1 as the production rate has increased and also as a result of the economies of scale.
The energy and water requirements for processing have been achieved without any problems for phase 1. The water, electricity, and the consumables required to process 9.5 million tonnes of ore per year are shown in section 18.

17.2 Riotinto Phase 1

The existing concentrator, consisting of crushing, grinding, and flotation, that was designed and built in the 1990’s, has been refurbished to process ores from the current mine operations. Atalaya Mining has been working since June 2014 with engineering firms that are specialized in detailed engineering, construction, and commissioning, to develop the phase 1 project of the Riotinto plant. Reconditioning of the existing equipment and infrastructure, as well as the installation of new equipment and systems for phase 1, was successfully completed on schedule in June 2015. The commissioning and ramp-up of phase 1 was accomplished in seven months, reaching a nominal milling rate of 5 Mt/y in February 2016.

17.3 Riotinto Phase 2

The basic engineering design to increase the plant production rate from 5 Mt/y (phase 1) to 9.5 Mt/y (phase 2) began in March 2015. Similar to phase 1, engineering firms that are specialized in the design of processing plants, were hired for detailed engineering and construction. The phase 2A plant has been undergoing commissioning and ramp-up since March 2016, and the target processing rate of 9.5 Mt/y is expected to be reached by year-end 2016. The phase 2A design criteria are shown in Table 17.2.
### 17.4 Process Description

The existing crushing/plant equipment has been refurbished and some new equipment has been added in order to achieve the expansion production rate of 9.5 Mt/y.

The process features three crushing stages, two grinding stages, one rougher/concentrate re-grinding stage, and a three-stage cleaner circuit. The process ends with a thickening and filtering stage to obtain a final copper concentrate product. Figure 17.1 shows a simplified flow diagram.

### 17.5 Crushing

Three stage crushing as used to produce a nominal minus 22 Amm size feed to the grinding circuit. A run of mine ore, at an average size of approximately 480 Amm, as fed to an 80” x 89” gyratory crusher with a maximum capacity of 3200 Amm/h, which reduces the ore to an Amm minus 165 Amm product which is stockpiled.

This primary crushed ore is then fed to a secondary and tertiary crushing and screening circuit. A new reclaim feeders and an new double deck primary screen have been added to increase the capacity of the primary crushing circuit.
The crushed ore is stockpiled as reclaimed by four variable speed apron feeders, four fixed speed vibrating feeders, and two conveyors. Each conveyor is fed by two variable speed apron feeders and two fixed speed vibrating feeders. The reclaimed crushed ore is screened using two double-deck vibrating screens. The screen top deck oversize is fed to an 87" ft standard secondary cone crusher while the screen bottom deck oversize is fed to a three tertiary short head cone crushers. These crushers produce a nominal minus 22 mm ore that is conveyed to an ore stockpile. A

A The discharge from both secondary and tertiary cone crushers is fed to three single-deck screens. A screen/undersize is cycled to the tertiary cone crushers, and the screen/oversize is combined with the undersize from the double-deck vibrating screens and conveyed to the fine ore stockpile. A

A The fine ore stockpile is reclaimed using eight belt feeders and two reclaim conveyors. Each reclaim conveyor is fed by two variable speed belt feeders and two fixed speed belt feeders. The reclaim conveyors discharge onto an mill feed conveyor that an turn needs as a primary ball mill. A

17.6 Grinding

The phase 1/4 grinding circuit operated one 53 x 7.8 m ball mill and two 3.3 x 4.5 m ball mills to process 5.5 Mt/y. The phase 2 expansion added a new 24' x 24' primary ball mill with an 8,600 kW motor to an open circuit, and a new 20' x 30' secondary ball mill, also equipped with an 8,600 kW motor that is an closed circuit with new hydrocyclones. A

A The phase 1/4 x 20' rod mill, equipped with an 8,400 kW motor, has been reconfigured to an ball mill, and is now operating in an open circuit. Two existing 15.5' x 21' ball mills, equipped with 2,473 kW motors each, operate in an closed circuit with their respective hydrocyclones. The grinding circuit A is expected to produce a ground mineral slurry with a P80 of 120 µm when processing ore from Cerro Colorado West (CCW) and ground mineral slurry with a P80 of 60 µm when ore is fed from Cerro Colorado East (CCE). A

A The cyclone overflow, from the phase 1/4 grinding circuit, and the expansion circuit ore are combined into a common conditioning distributor and fed into the rougher flotation circuits. A primary flotation reagents, consisting of a dithiophosphate and a thionocarbamate based chemistry collector, a frother and a lime, are fed into the conditioning distributor. An secondary collector and azinc depressant can be added as needed. The cyclone overflow is sampled by an automatic sampler and as the mill head sample. A

17.7 Flotation

Similar to the grinding and crushing circuits, all of the flotation equipment from Phase 1/4 is being used in Phase 2. This circuit has been expanded with new equipment to achieve the designed residence times and processing capacity. A

A The flotation circuit receives the ground slurry containing between 48-50% solids by weight from a conditioning tank, where at/As is sent to a primary roughing circuit consisting of three new A cylindrical cells, each measuring 100 m². Each cell is equipped with a collector, a depressant, and a frother. The tailings produced at this primary rougher circuit are fed to a distributor where the pulp is divided into four flows to feed the A
rougher→circuit. This scavenger circuit consists of four flotation lines with 600 cubic feet (14 m³) of flotation cells. These four lines of flotation cells are arranged in three parallel flotation lines, each with one cell with 1,470 cubic feet (420 m³) per cell. Another circuit with dedicated hydrocyclones consists of two stage × 5.2 m³ per cell. An existing flotation line has a capacity of 800 cubic feet (154 m³) per cell. This circuit consists of four flotation lines with a capacity of 800 cubic feet (154 m³) per cell. The total circuit has a volume of 6,000 cubic feet (172 m³). A

The primary rougher concentrate and the rougher→circuit are arranged in a collection box to feed into the first cleaning circuit, which consists of a two new cylindrical cells with a capacity of 8,000 cubic feet (160 m³) per cell. The tailings from this stage feed the first cleaning→circuit. This circuit consists of eight flotation lines with a capacity of 800 cubic feet (154 m³) per cell. This circuit has a volume of 600 cubic feet (172 m³). A

The first cleaner→circuit consists of two new existing flotation lines with a capacity of 1,470 cubic feet (420 m³) per cell. The total available volume of each flotation line is 6,000 cubic feet (172 m³). A

The second cleaner→circuit consists of two existing flotation lines with a capacity of 400 cubic feet (68 m³) per cell. The total available volume of each flotation line is 4,000 cubic feet (114 m³). A

The third cleaner→circuit consists of two existing flotation lines with a capacity of 200 cubic feet (60 m³) per cell. The total available volume of each flotation line is 2,000 cubic feet (120 m³). A

The final cleaner→circuit consists of a new flotation line with a capacity of 1,470 cubic feet (420 m³) per cell. The total available volume of the flotation line is 6,000 cubic feet (172 m³). A

17.8 Concentrate Thickening and Filtration

The final cleaner→concentrate, at approximately 15% solids by weight, is pumped to a two, 100 m diameter concentrator thickener working in parallel. Where the slurry is thickened to 65% solids, by weight. Each thickener has an underflow pump at its end, thickened concentrate to a filtering system. This filter has two press filters with a capacity of 52,000 cubic feet (1,450 m³). A The final copper concentrate product contains approximately 6.6% 10% moisture. The filtered concentrate is transported to the A
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### Ore Reserve Engineering

Table A.7.3: YTD Production

<table>
<thead>
<tr>
<th>PRODUCTION</th>
<th>Jan-16</th>
<th>Feb-16</th>
<th>Mar-16</th>
<th>Apr-16</th>
<th>May-16</th>
<th>Jun-16</th>
<th>Jul-16</th>
<th>2016</th>
</tr>
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<tbody>
<tr>
<td><strong>Grinding</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Dry Ore t</td>
<td>391,787</td>
<td>332,271</td>
<td>409,890</td>
<td>264,567</td>
<td>478,934</td>
<td>565,279</td>
<td>637,396</td>
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<td>Plant Utilization %</td>
<td>95.84</td>
<td>88.87</td>
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<td>789</td>
<td>65.54</td>
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<td>Processing Rate t/h</td>
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<td>537</td>
<td>562</td>
<td>561</td>
<td>789</td>
<td>910</td>
<td>989</td>
<td>689</td>
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<td>D80 in Flotation Feed µm</td>
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<td>207</td>
<td>230</td>
<td>213</td>
<td>197</td>
<td>148</td>
<td>156</td>
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<tr>
<td>Cu %</td>
<td>0.46</td>
<td>0.39</td>
<td>0.43</td>
<td>0.61</td>
<td>0.36</td>
<td>0.38</td>
<td>0.46</td>
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<td>Zn %</td>
<td>0.13</td>
<td>0.11</td>
<td>0.09</td>
<td>0.12</td>
<td>0.09</td>
<td>0.08</td>
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<td>Pb %</td>
<td>0.04</td>
<td>0.01</td>
<td>0.02</td>
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<tr>
<td>As ppm</td>
<td>595</td>
<td>281</td>
<td>342</td>
<td>494</td>
<td>255</td>
<td>278</td>
<td>274</td>
<td>342</td>
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<tr>
<td>Sb ppm</td>
<td>49</td>
<td>34</td>
<td>35</td>
<td>37</td>
<td>75</td>
<td>74</td>
<td>87</td>
<td>61</td>
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<tr>
<td>Bi ppm</td>
<td>24</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>15</td>
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<td><strong>Final Concentrate Grades</strong></td>
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<tr>
<td>Zn %</td>
<td>5.28</td>
<td>4.66</td>
<td>4.22</td>
<td>3.93</td>
<td>4.62</td>
<td>4.22</td>
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<tr>
<td>Pb %</td>
<td>0.61</td>
<td>0.28</td>
<td>0.40</td>
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<td>As ppm</td>
<td>6,696</td>
<td>5,042</td>
<td>5,376</td>
<td>5,902</td>
<td>2,336</td>
<td>2,336</td>
<td>2,282</td>
<td>4,070</td>
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<tr>
<td>Sb ppm</td>
<td>1,054</td>
<td>972</td>
<td>700</td>
<td>575</td>
<td>2,334</td>
<td>2,271</td>
<td>2,639</td>
<td>1,631</td>
</tr>
<tr>
<td>Bi ppm</td>
<td>545</td>
<td>405</td>
<td>460</td>
<td>471</td>
<td>437</td>
<td>338</td>
<td>333</td>
<td>418</td>
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<tr>
<td><strong>Concentrate Production</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Concentrate Produced t</td>
<td>7,101</td>
<td>5,182</td>
<td>6,701</td>
<td>6,581</td>
<td>6,134</td>
<td>8,012</td>
<td>11,153</td>
<td>50,864</td>
</tr>
<tr>
<td>Cu content in Concentrate t</td>
<td>1,496</td>
<td>1,087</td>
<td>1,465</td>
<td>1,373</td>
<td>1,361</td>
<td>1,708</td>
<td>2,441</td>
<td>10,931</td>
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<tr>
<td><strong>Cu Recovery</strong></td>
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<td></td>
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<tr>
<td>Global Cu Recovery %</td>
<td>83.33</td>
<td>82.87</td>
<td>82.48</td>
<td>84.96</td>
<td>78.26</td>
<td>78.69</td>
<td>83.52</td>
<td>81.99</td>
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</tbody>
</table>

*Production values are indicative and have not been reconciled.*
Figure 17.1 – Simplified Flowsheet (Atalaya 2016)
17.10 Control Philosophy

The system architecture contains 3 main PLCs: the first one controls the dry area (primary, secondary and tertiary crushing), another controls the phase A equipment and the third one controls the phase A 2 equipment. These PLCs are receiving information from equipment in the field (via optical link modules OLMs). All this information is routed to the server room where plant servers, a web server, and a historian server are allocated. The system is protected with firewalls. The information from the server room is routed via Ethernet to the control room where there are 2 WinCC clients. The supervisory room engineering system and the video surveillance clients are located.

The engineering firm is in charge of the detailed engineering of this project to create a comprehensive process control strategy. An agreement with what is needed for a 260 kt/d plant. This philosophy is based on installing equipment and on programming the process control computers. Proper training was provided to the personnel in charge of these activities.

All conveyors are fitted with emergency trips and low-speed detection sensors. Belt lift/降幅 switches and belt lift detectors are installed along the conveyors. Belt lift switches activate an alarm for an area. The alarm condition persists. If the alarm condition persists, the respective conveyor will be stopped. Blocked chutes detectors are installed along the conveyor to transfer chutes. Critical bins, ore stockpiles, and tanks are fitted with level indication and control.

Where necessary, valves and variable speed drives are used as control valves for critical bins and tanks. The two thickener rake mechanisms are fitted with an oil motion and high torque detection devices. A high torque switch activates an audible alarm and flashing light. The high torque mechanism will be tripped on activation of the associated high/high torque alarm.

Pressure gauges are installed on critical centrifugal pumps discharge lines. Most slurry centrifugal pumps employ gland water seals. The gland water pressure is measured by gauges and controlled by valves on individual gland water lines to each pump. Centrifugal pumps with gland water seals are tripped on low or grand water level or pressure.

Each spillage collection pump is fitted with an alarm and a level switch that will stop the respective pump on alarm. A pump alarm. Positive displacement pumps are equipped with pressure relief valves installed on the discharge lines.

Pumps and feeders will generally be tripped on activation of an LOW/LOW level alarm on the vessel. They are withdrawing material from. Pumps and feeders are tripped on activation of an HIGH/HIGH level alarm on the vessel. They are transferring material to.
Mill and conveyor motors have time delayed starts of approximately 10 seconds as well as audible warning sirens that are activated on start-up.

Electrically powered fans and hoists are equipped with hand and control keypads. A dedicated audible siren sounds when the respective fan or hoist is travelling.

A level transmitter together with one or two level control valve(s) are installed at the end of each step along each flotation bank and on each flotation tank/cell. The level transmitter and level control valve(s) are used to control the flotation cells' pulp levels (froth depths).

Each safety shower is fitted with a flow alarm that will activate an audible siren when flow to the safety shower is detected. This is done for safety reasons.

Instrumentation and control philosophy for the new phase/2 primary ball mill and the secondary ball mill together with the associated lubrication and grease systems was provided by the equipment supplier as part of the vendor package.

Diverse control loops exist in crushing, grinding, flotation, thickening and filtration to protect the equipment and to control the process.

A last generation on-line analyzer system was installed to sample and determine on-line metals concentrations at control at the flotation circuit. This information is used to create a dynamic copper recovery equation and to concentrate a mass pull equation for the operators to make decisions about the process control.

There is a plant sampling system that generates samples to measure and control a shift performance. These samples are sent to the analytical lab on site from where shift data are sent to key personnel to have the shift by shift and daily metallurgical balance generated.

Closed circuit television cameras were installed to monitor various critical locations throughout the plant, including several cameras in primary, secondary and tertiary crushing. Cameras are also located at several conveyor belts and transfer chutes in the grinding area.

### 17.11 Production Support

Riotinto has a well equipped analytical and metallurgical laboratories on site. These laboratories are delivering daily results to the metallurgical and to the process team. State of the art equipment and a well trained personnel deliver excellent results that go through routine quality controls to ensure accuracy and that all processes are performing with design specifications.

Riotinto has a water supply system consisting of a fresh water make up system and a process water system. Where water recovered from the tailings area is recirculated back to the concentrator. The technical services area operates the water system and the tailings management system. This group makes sure that the system is operated with higher than 99% availability and that at the same time, operational information is gathered to comply with operation and legal standards as indicated in all the permits. Atalaya Mining has been granted to operate the mine.
Process water is a product of the thickened concentrate and of the tailings settling system. Water coming from the concentrate thickeners is returned to the flotation area, which is a short distance away. The process water from the tailings management system is collected in areas where pumps are located to pump process water back to the process water tank in the plant, prior to adjusting pH using lime milk.

The plant has two air supply systems; one is a high pressure compressed air system located throughout the plant. The other system is a low pressure air system that mainly feeds the air needs of the rougher and cleaner flotation cells.

### 17.11.1 Manpower

The plant team is headed by a Plant Superintendent and has 5 crews of operators and supervisors which work an 8-hour shift. There are 2 operating crews off site every day taking their breaks or vacations.

The analytical laboratory crew reports directly to the site General Manager. The concentrators also have a Metallurgy team with its own Superintendent. The maintenance team has millwrights and electricians working on all shifts, but most of the maintenance team work on day shift.

The unitary operating costs have evolved downwards since the start of Phase 1 as the rate of treatment increases. The Process Plant Manpower is shown in Table 17.4.

**Table 17.4: Process Plant Manpower**

<table>
<thead>
<tr>
<th>Description</th>
<th>Manpower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Manager</td>
<td>1</td>
</tr>
<tr>
<td>Process Engineer</td>
<td>1</td>
</tr>
<tr>
<td>Metallurgy Team</td>
<td>6</td>
</tr>
<tr>
<td>Plant Operations Superintendent/Supervisor</td>
<td>2</td>
</tr>
<tr>
<td>Concentrate Shipment</td>
<td>5</td>
</tr>
<tr>
<td>Operations Crew</td>
<td>79</td>
</tr>
<tr>
<td>Maintenance Manager</td>
<td>1</td>
</tr>
<tr>
<td>Maintenance Staff (Supervisors and Millwrights)</td>
<td>57</td>
</tr>
<tr>
<td>Electrical and Instrumentation Staff</td>
<td>19</td>
</tr>
</tbody>
</table>
18 INFRASTRUCTURE

18.1 Access by Road

The property is well connected for road transportation via a high-quality national road system that is recently renovated. The site is located 5 km from the port and the industrial city of Huelva, and 88 km from the regional capital, Seville. A Copper concentrate is transported by road to Huelva port where it is stored for ocean transport to various commercial destinations. A fleet of 10, 125-tonne capacity trucks transport the concentrate three times per day. This fleet can be expanded to an maximum of 80 trucks to accommodate variability in production rates. A local company that specializes in this type of service has been contracted to transport the concentrate to the port.

The project also uses other nearby ports such as Algeciras and Cadiz, and international airports in Seville, Madrid, and Faro.

18.2 Electrical Supply A

The incoming A main substation of an 132/6.3 kV has been fully reconditioned and updated. The main substation consists of an 132 kV, 4.3 km line that has been repaired and is currently operating from a new Dehesa ENDESA independent power supplier. Using 8 outgoing lines on the main transformers:
- Transformer 1 with 26.7 MVA
- Transformer 2 with 20 MVA
- Transformer 3 with 20 MVA

These transformers have been completely repaired and checked with the corresponding electrical tests including a dielectric oil analysis as per the regulations. The site also contains a condenser battery system to correct the power factor, which has been repaired and updated with an capacity of 8 MVA. It is currently working at 0.999.4 phase A. The goal is to work at 0.96. A for the expansion phase A, 9.5 MVA.

The 132 kV protective frames have been changed and designed for the current facility as well as all outlet protection cabinets and apparatuses for distribution in an 6.3 kV area. Transformer 1 and 2.

Several 6, 300/400 A transformers are located at the main substation serving the different operating areas. Due to current PCBA regulations, all transformers in the different mine operation areas and the motor control center have been changed to a latest generation water protection and the communication systems.

A Phase A production of 5.0 Mt/y utilizes Transformer 1 and requires 15 MW of power. While an additional 24 MW from both Transformer 1 and 2 is available for testing new equipment for the expansion Phase A.

18.3 Water Systems

Process water is supplied from the Gossan Dam where it is pumped at a rate of approximately 1,200 m³/h. Two steel tanks with capacities of 6,000 m³ are used.
The 18.5 Mt/y expansion project includes the installation of a new/DR 800 process water pipe and a new pumping system located at the Gossan Dam. Two new pumps, with an allowable flow of 500 m³/h, are located at the Gossan Dam, with a capacity of approximately 1,000 m³/h. A booster pumping system that pumps water to the process water tank at a flow rate of 8,000 m³/h. A fresh water as supplied from the Campofrio Dam by three pumps with a flow rate of 250 m³/h each, are two operating and one standby. A water is delivered through an HDPE DN 355 PN 16 pipe to the fresh water tank, ensuring supply at any stage in production. A water from the Campofrio Dam is supplied by the utility company (GIASA) that manages the water system for the municipality of the Riotinto Mines. A stored in a new 50 Mm³ polythene tank located next to the fresh water tank, are distributed to the dining hall, changing rooms, contractor huts, and mines shops via polyethylene pipes. A potable water is supplied by the utility company (GIASA) that manages the water system for the municipality of the Riotinto Mines. A fresh water tank has a capacity of 900 Mm³ and has been repaired along with all the valves and distribution systems. A distribution tanks are situated between the road and the current office block. Water is distributed to the entire operation via a pipeline system made of high density polyethylene as well as carbon steel. A Before commissioning, the existing tanks were conditioned with an appropriate surface treatment. A thickness of 70 mm was checked, and worn piping and valves were replaced or repaired. A acidic water, coming from the Cerro Colorado pit drainage and waste heap leachates, is pumped through a new piping and pumping systems to the new water treatment plant and onto the storage tank. A Five Pachuca tanks from the old gold processing plant were rehabilitated for the new water treatment plant. In addition, one of the existing thickeners was rehabilitated, and a new pumping equipment, a pipeline, electrical wiring, and instrumentation were installed. All of the old non-useable equipment were dismantled and removed. A water treatment plant has a capacity of 200 m³/h and the treated water is reused as process water. A

18.4 Tailings Management Facility
The tailings management facility (TMF) consists of three adjacent impoundments referred to as Cobre, Aguzadera and the Gossan facilities. The Cobre and Gossan facilities were first constructed in the early 1970's to contain 0.5 Mt of tailings and later, the Aguzadera facility was constructed in the late 1980's to provide a total of 0.6 Mt of tailings storage. A

Currently there are two tailings facilities operating, Ahe/Cobre and the Aguzadera and both facilities have available storage capacity below the original design level of 381.8 m asl and 374.8 m asl, respectively. The Gossan facility has been partly rehabilitated and acts as an contact water reservoir where the tailings water from the Cobre and Aguzadera are treated and pumped back to the plant site. A

The tailings facilities have been constructed from a starter Dam comprising of a core of Gossan. Gossan is mine waste material consisting of a variety of particle sizes ranging from boulders and gravels to sands and clayey silts, with an average maximum size of 200 mm to 400 mm. The facility has been A
The tailings are raised by cyclone tailings using the upstream method. The coarse tailings (sands) are separated by a cycloning and deposited as underflow to form the Adam Walls, while the overflow consisting of the fine tailings fraction (slimes) is deposited within the basin area. The ponded water is also located away from the Adam Walls.

The Adam Walls are currently supported by a substantial downstream buttress consisting of rock fill/mine waste which has resulted in a substantial width of berm that is in some places in excess of 50 m wide and the external walls.

Stability assessments based on extensive geotechnical characterization and monitoring carried out by Eptisa show a current safe and stable condition for the Cobre and Aguzadera dams. Typical factors of safety are between 1.5 and 1.7 for static and pseudo-static stability analysis. Seismicity in the area is low with a design base earthquake characterized by a peak ground acceleration of 0.07 g and a maximum credible earthquake characterized by a peak ground acceleration of 0.14 g. This follows the Spanish code NCSE-02 for seismic design of structures.

Dam instrumentation installed in the Cobre and Aguzadera includes survey monuments (34), inclinometers (6) and piezometers (35). Monitoring of the instrumentation is carried out by Atalaya Mining on a regular basis and the results indicate some vertical and lateral movements within the accuracy of the measurements. Four sections of the dams were observed with elevated phreatic levels (3.4 m AGL). A rock fill buttress with drainage has subsequently been constructed as discussed previously. The tailings management facility is shown in Figure 18.1.
The facilities are located on a low permeability shale formation with extremely low hydraulic conductivities. The Eduardo fault which traverses in a NW-SE direction was studied by Eptisa and it was determined that it also possessed a low hydraulic conductivity and does not represent a potential seepage path from the facility. Seepage is controlled at four seepage collection ponds (two for each dam) located within the main valleys, and is continuously pumped back to the impoundment.

As part of the submissions for the integrated environmental permit (AAU), a detailed design study was carried out by Eptisa (the company responsible for the original design of the facility), which has included the raising of the existing Aguzadera and Cobre facilities to the original design elevation, which provides additional capacity of 32.8 Mt in years 1-4 of operation, followed by an additional upstream raise of the Cobre facility to store the total production of 123 Mt for an estimated life of 40 years. Additional studies are underway to increase the capacity to 60 Mt.

Figure 18.1: Layout of tailings management facility

(Golder 2016)
18.5 Fire Protection
The fire protection system was completely renovated as required by the Spanish Royal Decree 1389/1997, of September 1997, which approves the minimum provisions for protecting workers' health and safety at mines.

A new detection, signage and alarm system, with direct communication to the control room, was installed for all electrical rooms, conveyor belts, and buildings. The system was equipped with automatic detectors, alarm push buttons, and optical and acoustic alarms. A new extinguishing system includes:

- A complete pumping station dedicated to fire extinguishing, including an electric pump, diesel and jockey pump to guarantee sufficient water flow. There are 850 liters of reserve water in the system storage tank.
- Automatic sprinklers for all systems in underground tunnels.
- Fire hydrants equipped with hoses for all conveyor belts in outdoor areas, including optical signage.
- HFC227ea Agas extinguishing systems for all electrical rooms and the main substation, including optical signages.
- ABCA and CO2 powder extinguishers located in all areas, and a plant building equipped with the corresponding optical signage to protect equipment, systems, and electric motors.
- An extinguishing hydrant system connected by an aboveground HDPE line, including connections, cabinets, and the necessary hoses.

18.6 Other Environmental Aspects
Roofs and walls containing asbestos on industrial buildings and office buildings that were in poor condition were repaired or replaced with new corrosion-resistant aluminum plates.

18.7 Warehouses
There are two large warehouses on the mine property along with an outdoor storage area. The locations for replacement parts and material deliveries have been separated and clearly defined.

The warehouses feature sufficient shelving units to organize large size replacement parts and cabinets for small items. All warehouses were installed with newly approved and newly installed. A secure area was prepared within the warehouses to store inflammable products to comply with AQPA laws.

A low voltage power and lighting system was replaced to comply with current laws. An aow voltage electrical system, a computer control system was also installed for incoming and outgoing materials, with computer connections to the general administration system.

18.8 Maintenance Facilities
The maintenance warehouse was conditioned and rehabilitated. All of the necessary equipment, such as bridge cranes (20t and 5t), vertical drills, etc., was certified as required by the Spanish Royal Decree 1215/1997, of July 18, 1997, establishing the minimum health and safety provisions for use by workers.

All changing rooms, toilet and office facilities next to the mechanical and electrical repair shop as well as the main offices and facility access control were restored and modernized.
18.9 Rehabilitation Program

The following rehabilitation activities were performed for commissioning of the processing plant:

Equipment rehabilitation, including restoration, repair and certification as required by current laws for commissioning of the primary crusher, conveyor belts, secondary screens, tertiary screens, feeders, secondary crushers, tertiary crushers, mills, and flotation cells.

Rehabilitation of buildings and facilities, including roofs and walls, reinforcement and consolidation of building structures such as fine ore storage, concentrate storage, filter house, water treatment plant, distribution pumps and water storage tanks, piping distribution systems, and lime preparation and storage plant.

New equipment, including a primary screen, reagents warehouse and make-up, lime preparation and storage plant, compressed air, concentrate thickeners, and filter presses.

New systems, including: power distribution and supply systems, instrumentation and control systems, fire protection system, compressed air system, water pumping stations, distribution pipes, and dust collection system.

18.10 Expansion Program

This program includes the acquisition of new equipment and the expansion of facilities to increase processing capacity to 9.5 Mt/y. The newly installed equipment is discussed in Chapter 17, Recovery Methods.
19 MARKET STUDIES AND CONTRACTS

19.1 Introduction
Atalaya has been actively marketing the copper concentrate product to global consumers. Currently, a 100% of the concentrate production is committed to three companies through offtake agreements for a life of mine reserves at an average:

- Yanggu/Xiangguang Copper Co., Ltd. (XGC) at 9.12%
- Orion Mining International (Trafigura) at 19.34%
- Orion Mining Finance (Orion) at 1.54%

Copper is an internationally traded commodity and prices are set through trading on the major metals exchanges: the London Metal Exchange (LME), the New York Commodity Exchange (COMEX) and the Shanghai Futures Exchange (SHFE). Copper prices on these exchanges generally reflect the worldwide balance of copper supply and demand, but are also influenced significantly by investment flows and currency exchange rates.

19.2 Supply and Demand
It is expected that a short-term global supplies of copper will continue to be an oversupply in 2016 and that a surplus will continue to impact pricing for the remainder of the year. Estimates indicate that the global copper demand projections should remain at 2.3% to 2.4% for the remainder of 2016 and into 2017. Copper prices are pressured by many years of surpluses and should trigger a more short-term autarky in production. These lower prices will also slow the growth of new projects and the start of projects with lower copper grades. A deficit in copper supplies is likely to occur toward the end of the decade and will likely push copper pricing to peak levels early in the 2020’s. Estimates suggest that pricing forecasts for the next six years and longer term are consistent with this supply/demand projection. A rise in price should average 2.9% through 2018 and increasing to 8% by the end of 2020’s (World Bank 2016) A

Cu demand is expected to remain soft due to a struggling economies in Brazil, Japan and Russia. Regional consumption in China, however, will likely see some growth and as a result exceed any increases in Chinese consumption by the end of the decade. A

19.3 Sales of Concentrates
The typical copper concentrate specification as shown below in Table 9.1. This specification is based on the actual production by MRT/SAL during the years 1996 to 2001. As based on processing of both the Cerro Colorado and West (CCW) and the Cerro Colorado East (CCE) ores. A
The mine plan contemplates mining both CCW and CCE ore concurrently, effectively creating a blend of the two in the produced concentrate. The Life of Mine (LOM) predicted grades of the concentrate for the initial two years and remaining LOM thereafter reflect a weighted average according to the ore contributions.

The copper concentrate is a complex material containing elevated levels of some penalty elements including, mercury, antimony, arsenic and bismuth. These elements will limit the quantities of concentrates which can be taken by certain smelters. The concentrates from the mine have traditionally been delivered to the Atlantic Copper smelter in Huelva and other smelters within Europe.

<table>
<thead>
<tr>
<th>Element</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CuA</td>
<td>%A</td>
<td>20A–23A</td>
</tr>
<tr>
<td>PbA</td>
<td>%A</td>
<td>0.5A–0.7A</td>
</tr>
<tr>
<td>ZnA</td>
<td>%A</td>
<td>4.6A–4.8A</td>
</tr>
<tr>
<td>SbA</td>
<td>%A</td>
<td>36A–88A</td>
</tr>
<tr>
<td>FeA</td>
<td>%A</td>
<td>30A–83A</td>
</tr>
<tr>
<td>AsA</td>
<td>ppmA</td>
<td>1500A–500A</td>
</tr>
<tr>
<td>SbA</td>
<td>ppmA</td>
<td>1000A–2500A</td>
</tr>
<tr>
<td>BiA</td>
<td>ppmA</td>
<td>200A–400A</td>
</tr>
<tr>
<td>SeA</td>
<td>ppmA</td>
<td>150A–400A</td>
</tr>
<tr>
<td>HgA</td>
<td>ppmA</td>
<td>30A–60A</td>
</tr>
<tr>
<td>SiO2A</td>
<td>%A</td>
<td>1.5A–5A</td>
</tr>
<tr>
<td>Al203A</td>
<td>%A</td>
<td>0.6A–1A</td>
</tr>
<tr>
<td>CoA</td>
<td>ppmA</td>
<td>300A–900A</td>
</tr>
<tr>
<td>AuA</td>
<td>ppmA</td>
<td>0.7A–1.5A</td>
</tr>
<tr>
<td>AgA</td>
<td>ppmA</td>
<td>100A–130A</td>
</tr>
</tbody>
</table>

The ore contributions.
20 ENVIRONMENTAL STUDIES, PERMITTING, SOCIAL AND COMMUNITY IMPACTS

20.1 Environmental Status & Legacy
Mining and mineral processing activities have been taking place at Riotinto for many years. With the exception of some parts of the Corta Medio, Otalaya and Alimentación mineral material has a high acid generating potential. Several sites are classified as acidogenic and have been extensively studied over the years. The Riotinto project area is an environmentally degraded site with significant environmental legacy issues. These issues include acid mine drainage, soil erosion, and loss of biodiversity. The main issues affecting the project are the disposal of acid mine drainage and the need for significant rehabilitation work at the sites.

20.2 Environmental Management System
In June 2008, a national environmental consultant conducted a national ISO 14001 audit of the project area. This report recommended the implementation of a new management system to address environmental issues. The plan was developed and implemented as a result of the audit. The project has now been registered with the national environmental authority, and the relevant permits have been obtained.

20.3 Applicable Legislation
At the national level, the environment is administered by the Ministry of Agriculture, Food, and Environment. The regional government is responsible for setting up and enforcing environmental legislation. The project is subject to national and regional environmental legislation, including the Water, Air Quality, Biodiversity, Protected Spaces, Forests, Wastes, and Restoration laws.
at a Riotinto A during A refurbishment, A operations, A final A restoration A and A post A closure A including A the A development A of A final A restoration A plans. A

A list of the general environmental laws as shown below. There are also many federal and regional laws regulating water, air, quality, biodiversity, protected areas, forests, wastes and hazardous substances and restoration.

A Generic Legislation

- Order AAAAA A/1601 A/A/2012 A/26 A January, which dictates A instructions A on A the A application A on A the A Department A of A the A law A/27 A/2006 A/8 A July, which regulates A the A rights A of A access A to A the A information A on A participation A of A public A and A access A to A the A justice A on A matters A of A environment.
- Real Decreto A de A/17 A/2012 A/4 A May, which measures A the A environmental A arms.
- Royal A Decree A 2494 A/2011 A/24 A October, which regulates A the A fund A for A carbon A for A a sustainable A economy.
- Royal A legislative A Decree A 41 A/2008 A/1 A January, which approves A the A revised A text A of A the A law A on A evaluation A of A environmental A impact A of A projects.
- Royal A Decree A 509 A/2007 A/4 A April, which approves A the A provision A of A information A on A emissions A of A the A PRTR A regulation A and A the A integrated A environmental A permits.
- Law A/27 A/2006 A/18 A July, which regulates A the A rights A of A access A to A the A information, A public A participation A on A access A to A the A justice A on A matters A.
- Law A/9 A/2006 A/28 A April, which approves A the A assessment A on A the A effects A on A certain A plans A and A programs A on A the A environment A.

20.4 Environmental & Cultural Approvals

In order to start the planned refurbishment, mining, processing and waste disposal activities, Alatalaya has received the following approvals:

- The Autorización Ambiental Unificada (AAU) or Unified Environmental Authorization.
- The Final Restoration Plan (FRP) and A
- Cultural Approvals.

20.5 Autorización Ambiental Unificada (AAU)

The AAU as the main environmental process/approval that was completed prior to the start of the A refurbishment, mining, processing and waste disposal activities. At the AAU was approved by the A Consejería de Medio Ambiente de Ordenación del Territorio de la Junta de Andalucía.

Applicable legislation with regards to the AAU as follows:

- Ley 7/2007, de julio, de Gestión Integrada de la Calidad Ambiental.
- Decreto 56/2010, de agosto, por la que se regula la Autorización Ambiental Unificada.
The AAUA has incorporated all relevant documentation required for a project of this type into a unified document for submission and regulatory approval. In the case of Atalaya Riotinto, this includes the following:

- An Environmental Impact Study (EIA).
- Reports from each of the municipalities affected by Riotinto. In this instance, the municipalities of Minas de Riotinto, Nerva, and El Campillo confirm that the project is compatible with their respective Air and Water plans.
- An application for authorization to produce mining hazardous wastes in Aisil, Aires, etc.
- An application for authorization to discharge to the atmosphere, including proposed measures in order to meet discharge standards.
- A study on the dispersion and prevention of atmospheric contaminants (dust).
- A light contamination/prevention study.
- A noise contamination/prevention study.
- An application for authorization to discharge water to the public domain and meeting proposed measures in order to meet discharge standards.
- A study of the impacts on the protected species Erica and Arvalenis (a type of heath endemic to the area) and bats.
- A final restoration plan.
- Plans for the management and final closure of the waste storage facilities at Riotinto specifically for the waste dumps and the tailings storage facilities (TSF).

Atalaya has submitted all relevant documentation and applications for processing and approval.

### 20.6 Monitoring

Atalaya has developed a comprehensive monitoring program involving a combination of routine visual observations, physical inspections, sampling, and analyses of air and water quality, and measurements of noise and vibration. The environmental staff has the responsibility of providing a continual observation and compliance with environmental regulations. The entire mine workforce has an shared responsibility for environmental compliance and undergoes environmental training. AAAs are responsible for the completion of monitoring programs. These programs have been in place since 2008 to assess baseline conditions and monitor seepage from the tailings dam and existing waste dumps. The monitoring program will continually be updated to comply with any regulatory requirements and address operational changes.

### 20.7 Waste Rock Storage Facilities

The waste rock storage facilities (WRSF) are described in detail in Chapter 16. An addition, there are old waste rock material deposited in several areas inside and outside the Atalaya area, and some areas specifically designated as waste dumps. While others have been temporarily stockpiled adjacent to the excavations.

Although some waste rock faces have been listed by Culture and Heritage as protected, they will be covered as part of the final restoration plan. An order to meet environmental requirements, current sampling, and analysis show that drainage from these old dumps as potentially acidic and that could be a source of discharge to the atmosphere. To assess the geochemical stability of the waste rock, grab samples were analyzed to determine which areas of the existing dumps were responsible for acidic seepage. Surprisingly, all samples had a pH of less than 2%.
A Prospective AEx' pit Avaste Rock Storage Facility (WRSF) A sites are located at the Anortheast, A east, and A southeast of the Cerro Colorado open pit. An pit backfills An the eastern portion of the pit will provide a supplemental Avaste storage. Nearly 299 Mt of Avaste Rock, Filon, Surf backfill, and A low grade A material A are estimated An the mine A production schedule A.

A Waste Rock will be placed into three A locations: Ahe main A external A VRSF around Ahe northeast, A east, and A southeast. A sides of Ahe Cerro Colorado A pit; AAn A pit backfill A area A that becomes available A after A completion of A mining A Phase A in Ahe A east A half of Ahe year A 2027; and A backfill A area A in Ahe eastern A extension of Ahe Aold A Atalaya open pit A that A must be A completed A before Ahe end of Ahe year A 2022 A for Ahe A relocation A of A he Highway A 461. Ahe A combined A capacity A of Ahe A designed A waste A dumps A provides A enough A storage A space A for A planned A operations A.

A A new A dumps A are A to A be A constructed A using A a bottom A up A method. A An outer A berm A will A contain A the A first A 20 m lift A that A will A be A stepped A back A for A maximum A overall A slope A of A about A 27° (2:1:1) A and A ach A lift A face A will A be A covered A with A suitable A material A after A final A contouring. A An A此次 A way, A ech A lift A can A be A progressively A rehabilitated. A Ahe Afinal A landform A will A have A whatever A topsoil A is A available A spread A to A cover A the A slope A to A acid A re A vegetation A with A mixed A local A species. A reduce A infiltration A and A prevent A erosion A.

A Ahe Aoriginal A waste A dump A studies A and A design A proposals A required A separation A of A waste A materials A by A sulfur A content A. A higher A acid A generating A wastes A being A encapsulated A with A lower A sulfur A material A to A reduce A acid A mine A drainage A (AMD) A impacts. A Ahe Ageochemical A stability A study A included A sampling A at A he A various A geological A units A contributing A to A waste A materials A at Ahe A Rio A Tinto A Copper A project A. A Ahe A sulfur A content A and A acid A base A accounting A (ABA) A analyses A were A used A to A identify A rock A types A suitable A for A encapsulating A material A to A Acid A mine A waste A scheduling. A sulfur A content A was A therefore A to A be A part A of Ahe A pit A grade A control A system. A Ahe A design A required A a final A cover A and A progressive A re A vegetation A.

A Ahe A studies A and A material A characterizations A have A also A been A undertaken A. A Some A he changes A have A been A required A by Ahe Spanish A regulators A who A preferred A complete A and A continuous A covering A of A waste A rock A with A suitable A material A rather A than A separation A of A waste A rock A by A sulfur A content A and A encapsulation. A Subsequently A availability A and A volumes A of A suitable A material A have A been identified A and A the A costs A factored A in A including A possible A processing A requirements A for A the A capping A. A Some A he characterizations A and A material A traversing A have A also A been A undertaken A or A are A underway.

A Drainage A channels A are A incorporated A into Ahe A VRSF A designs A to A reduce A the A amount A of A water A that A can A infiltrate A the A dumps A and A minimize A AMD. Ahe A Atalaya A operational A and A end A of A mine A plan A for A waste A dump A drainage A and A toe A seepage A as A for A collection A and A treatment, A and A he A wetland A remediation A to A raise A water A quality A above A that A of A the A receiving A waters A prior A to A discharge A to Ahe A Rio A Tinto. A however, A this A subject A to A on A going A debate A (see A below). A Studies A have A looked A at A the A long A term A stability A of Ahe A waste A dump A facilities A and A the A development A of A suitable A emergency A management A plans A.

A Atalaya A in A negotiations A for A rehabilitation A of Ather Aold A waste A rock A dumps A at A Rio A tinto A including A those A not A covered A by Ahe A mining A right A areas A. Ahe A restoration A commitment A does A not A include A ny A liabilities A. Ahe A proposed A restoration A work A will A largely A be A composed A of A toe A contouring A covering A and A vegetation A which A requires A an A light A modification A to Ahe A overall A restoration A design A and A increase A of Ahe A project A footprint. A however, A this A approach A will A result A in A an A improved A outcome A after A final A site A restoration A at A closure A.
20.8 Tailings Management Facility
The Tailings Management Facility (TMF), as previously described in Chapter 18, consists of three adjacent impoundments referred to as Cobre, Aguzadera, and the Gossan facilities. The Cobre and A Gossan facilities were first constructed in the early 1970’s to contain up to 1.5 million cubic meters of tailings and later, the A Aguzadera facility, was constructed in the late 1980’s. A total of about 66 million cubic meters of tailings have been contained.

Currently there are two tailings facilities in operation, the Cobre and the Aguzadera and both facilities have available storage capacity below the original design elevation of 381.8 m Aasl. and 374.8 m Aasl respectively. The Gossan has been partly rehabilitated but acts as a contact area to keep water in the reservoir where the A tailings from the Cobre and Aguzadera are treated and pumped back to the plant site.

All tailings water and catchment rainfall accumulating on the surface of the TMF will be recycled back to the processing plant to reduce water requirements, and keep water levels at the TMF at a minimum. Any seepage from the dam will be collected and pumped to the tailings dam. A minimum beach distance from the tailings wall is maintained during production. Manual breach points are designated and controlled. If the tailings water in the tailings dam is not prevented from breaching, an event of extreme emergency conditions, an emergency plan is implemented.

20.9 Other Wastes
The Atalaya Environmental Management system incorporates procedures for collecting, segregating, handling, and disposing of all industrial and domestic waste materials. The system includes non-hazardous waste such as paper, glass, aluminum, timber, and all other construction materials. Specific areas have been designated for the storage of all recyclables. Procedures are also in place for the disposal of metal and electrical equipment. There are also procedures for hazardous materials such as oils and grease, laboratory reagents and solvents, and all other waste is covered by the appropriate EMP.

20.10 Water Systems
The water distribution system as previously discussed in Chapter 18, the Rio Tinto Copper Project site is a boundary as it flows through the Rio Tinto River, which has been impacted by the long history of mining in the area, and the Rio Odela to the west, where water quality is higher. Water demand will vary with a long-term supply from within the mine site recycling system, which will be supplemented with a fresh water from the Campofrioh watershed. A small all-positive water balance, but various civil works will allow a new water system to be delivered and increase storage at the site.

All of the water systems are regulated by both regional and federal government agencies. The operational plans maximize water recycling throughout the mine site, returning all decanted tailings water and accumulated at the impoundments to the processing plant. Fresh surface water at that area is not contacted, except at works at the exposed mine workings or as waste material is diverted away from the site. To either or the river systems. A perimeter channel surrounding the site is designed to collect all fresh surface water on the off. An emergency plan has been implemented, and it is activated if water is diverted away from the site. The site is also equipped with adequate pumping and alternative storage capacity. An emergency discharge policy for the alumina systems is threatened. A
Atalaya has assumed that waste dump and water treatment plant are to be treated and recycled. The specific discharge requirements are defined in the permits. But Atalaya has taken a pragmatic approach to this problem by constructing a water treatment system, including a dosing and pumping solution. A piping infrastructure and a water treatment plant.

### 20.11 Air, Noise, and Vibration

Areas and activities of noise generation have been identified and are monitored. Noise reduction methods are implemented. Blasting, milling operations, and haulage, have strict timing. Areas of dust generation have also been identified. The optimal locations and suppressant methods are adopted. These include strictly enforced dust limits for all unpaved haul roads, access roads, dust control approaches, and tree screening for suppression and management. Blast vibration monitoring is included in the EMP and timing and operational practices are employed to reduce the impacts on the community and residents. Monitoring and amitigation of blasting impacts have been incorporated into the mine operations and contracts.

### 20.12 Ecology

Fauna, flora, and habitats have been identified. Species occurring in the area are described. At the site, issues of feral cats and introduced species were also addressed, with eucalyptus and Scandinavian pine. Feral cats being the focus of a study. Eucalyptus grows very well and rapidly in the area. As an easy and often effective revegetation species for erosion control and visual, noise, and dust screening. But at often out competes and indigenous trees and shrubs. Similarly, an aggressive and robust grass naturally colonizes inhospitable locations. At the site, including the surface of the mine's tailings, and on waste rock material, a slowly competing local species and potentially restricting diversity.

### 20.13 Cultural Heritage

Any activity at the site must be approved by the Department of Culture and Heritage. The Department holds a pragmatic view of the mine operation. Understanding the balance between the sometimes conflicting heritage, environmental, and operational requirements and have raised awareness of significant issues. General requirements for the preservation of cultural heritage at the site have been set out, and include:

- A restriction of the vegetation of the old waste dumps to preserve certain historic vistas;
- A prior inspection and documentation of heritage items and authorization by the Department before any extension of the open pit and waste dumps;
- A preservation of the Roman ruins outside the planned mining area and next to the pit;
- A reassembly of the dismantled Alfredo Mine head frame;
- A building of a large scale model of the disused gold processing plant.
There are an understanding with the Riotinto Mining Museum regarding the donation of any artifacts encountered during a restart, refurbishment and operations.

There are historical and archaeological value of the area, with important examples of industrial and a Victorian infrastructure, and evidence of a medieval occupation going back through a Roman, a Carthaginian, and a Punic occupation. Atalaya recognizes its responsibility and duty of care while operating at the Riotinto Copper Project.

A Comprehensive management plans for the protection of cultural heritage and around the site have been implemented. Any activities affecting items listed in the heritage register are required to be detailed in documentation and prior authorization from the Department of Culture and Heritage. In addition, at 100% fenced exclusion zone must be put in place around all conservation sites.

20.14 Final Restoration Plan (FRP)

Final restoration is an integral part of the Riotinto Project and both the operating and final restoration plans (FRP) have been developed to make them compatible with each other and to ensure that the final restoration can be completed as soon as possible after the cessation of mining, processing and waste disposal operations. The objectives of Atalaya’s FRP are to:

- Protect the environment,
- Minimize any long-term negative environmental impacts of the project,
- Guarantee the chemical stability of waters discharging from the Riotinto area,
- Ensure that the physical stability of any soils is maintained,
- Recover any soils that will be disturbed during mining operations and re-use them appropriately,
- Recover the natural vegetation in a manner that is compatible with the surrounding habitat,
- Reduce the contamination to external areas by dust or other emissions,
- Conserve and maintain the mining heritage in the Riotinto area and,
- Minimize social impacts as a result of the mine closure at the end of its life.

In accordance with current applicable legislation, Atalaya has submitted for approval an FRP as part of a project approval process. The FRP is submitted as part of the AAU to the Consejería de Medio Ambiente y Ordenación del Territorio for review and approval including in a period of public consultation. After approval of the AAU, the FRP, with any amendments brought about as a result of the approvals process, is submitted along with the final reclamation bonding deposits to the Consejería de Economía, Innovación, Ciencia y Empleo for final approval. Again, this process includes a period of public consultation.

One year prior to the completion of mining, a tailings deposition activates, Atalaya must submit, for a approval, an application for the authorization to abandon the mine, waste dumps, TSF, and site infrastructure. Currently these applications must be made to the Consejería de Economía, Innovación, Ciencia y Empleo. If approval is not given,

A
20.14.1 Scope

The Riotinto project boundary encompasses the following areas, as shown in Figure 20.1:

- Areas that will be disturbed as a result of the planned Project that Atalaya is responsible for rehabilitating (for example, the planned waste dumps).
- Areas already disturbed that are required for the planned Project that Atalaya is responsible for rehabilitating (for example, the TSF, plant area, etc.).
- Areas already disturbed not required for the planned Project which Atalaya is responsible for rehabilitating (for example, the Marginal Waste Dump).
- Areas already disturbed and which Atalaya is not responsible for rehabilitating (for example, the eastern section of the Corta Atalaya Waste Dumps).
- Areas already disturbed not required for the planned Project and a third party is responsible for rehabilitating (for example, the western section of the Corta Atalaya Waste Dumps).

In addition to rehabilitating the areas that Atalaya is responsible for, as part of its commitments made to the Junta de Andalucía, Atalaya has opened negotiations with respect to rehabilitating some of the areas that they are not responsible for rehabilitating (for example, the Corta Atalaya Waste Dumps).
Atalaya has not committed to rehabilitating areas that third parties are responsible for. Atalaya is in negotiations with third parties with respect to the costs associated with rehabilitating these areas. Although Atalaya has not committed to rehabilitating these areas, they have been included in the water management and final restoration plans. Atalaya’s FRP covers the following areas:

- Cerro Colorado Open Pit, A
- Corta Atalaya Open Pit, A
- Cerro Colorado North and South Waste Dumps, A
- Vacie Marginal and Filon Sur Waste Dumps, A
- Corta Atalaya Waste Dumps, A
- Plant site and general infrastructure, and A
- The TSF, A
This FRP has been developed an order to ensure the preservation and promotion of cultural heritage, and minimize the social impact as a result of mine closure upon the completion of the planned project. The AFPRAs is abandoned and will initially be used to create a 14.2-year mine life. The mine includes a post-closure monitoring and reporting framework to ensure compliance with current regulatory requirements and EU best available techniques for management and closure of waste disposal facilities. (European Commission, 2009). This FRP will be updated before the end of the 14th year of mining. It includes the requirement of a new 17-year mine closure plan was discussed in this report. Years through 14 have already been approved. A

### 20.15 Reclamation plan

Atalaya will ensure that its approach to mine closure complies with the full regulatory requirements that are an order to achieve an eventual closure. To this end, Atalaya has:

- Adopted a policy of progressive rehabilitation of four operational areas of the site. An order to reduce both environmental impacts and the costs associated with mine closure.
- Regularly reviewed and revised the closure plans in accordance with changes to the regulatory framework and any changes to the O&M operating plan.
- Consulted with the regulatory authorities and other stakeholders on matters relating to the post-mining land and use, conservation of valuable assets and preservation of the unique landscape.
- Made an appropriate financial commitment to ensure that sufficient funds are available to cover the expected cost of closure and rehabilitation.

The key areas covered by the reclamation plan are the Cerro Colorado and Corta Atalaya open pits, the waste dumps, the Corta Atalaya waste adumps, the TSF, the plan area and all associated infrastructure.

Atalaya operations will leave the Cerro Colorado open pit in an ageotectonically stable condition and an order to allow it to become uninundated through rainfall and runoff, and will also take excess surface water and treated seepage from the tailings dam. A perimeter drains will divert uncontaminated surface runoff and water balances for the post-closure pit have been modelled.

The waste adumps will be constructed to ensure physical and geochemical stability, and minimize the effects of AMD. Progressive rehabilitation and revegetation during mining operations will allow the reduction of post-closure requirements.

Operational design and closure plans for the TSF ensure their physical stability, capacity to withstand extreme flood events, prevent the escape of seepage from the site, and include capping and revegetation of the surface. Storm water diversion and channels will prevent lean water from entering the TSF, and the only water entering the tailings dam after closure will be directly from run off. With a natural evaporation rate, this will maintain sufficient freeboard and the walls. Rock armoring of the outer dams will increase strength and reduce erosion.

Wherever possible, the AFPRAs separate fresh water from contact water, allowing fresh water to a discharge off site. While any potentially contact run off will be redirected to the open pit. Seepage from both the TSF and waste adumps will be treated through appropriate systems to increase pH and reduce entrained metals before discharge to the river systems.
Monitoring of the site post-closure will concentrate on the tailings Adams, a general site awareness management, and maintenance. Dust monitoring below the tailings Adams will continue until a suitable vegetation cover has been established. The progress of site revegetation will be monitored, and maintenance continued until vegetation has been established. Provisions for this are included in the closure budget.

With the exception of buildings and structures that have cultural or heritage values, all other buildings, structures and general infrastructure will be removed and disposed of appropriately. A structure remaining on site will be decontaminated and left in a physically stable condition. The plan also provides for the dismantling, removal or preservation of roads, foundations, structures and fittings as required, as well as industrial waste and rubbish lumps.

Social and labor impacts have only been superficially addressed. An at the AFRP, an abortive asset is still. A required to develop robust post-mining sustainability for the area, on-going studies and discussions with local communities are being undertaken throughout the operating life of the mine to A to investigate various possibilities for the pre-closure of or for final closure. These include expanding tourism through mining history and archaeology and diversification to recycling enterprises and agricultural developments.

In Andalusia, there is a strong emphasis on maintaining the perceived historical and cultural aspects of the post-closure landscape, with access to education and tourism. The management of a neighboring restored mine site has been previously undertaken by the RioTinto Foundation (RTF), funded by the government. Other mining operations and tourism income. An compliance with requirements of the A Ministry of Culture and Heritage post-closure. A use will be used primarily to maintain the areas of a mining heritage for developing the tourism potential of the site. The plan provides for the physical and chemical stability of all land surfaces and structures remaining after closure, to protect visitors and adjacent communities. Geochemical and stability are considered within the contexts of the legacy of a past mining operation, the current and required water quality of the receiving environment. A current and official regulations. The unique aquatic fauna and flora that have evolved in the area. pH and a high-dissolved metal content of local rivers due to mining are now protected by the Ministry of Environment legislation.

The Atalaya project, with its associated environmental Management and a final restoration plan, will leave the Riotinto project area an a much better state.

### 20.16 Health and Safety

Occupational risk prevention, as an activity that is performed within the company, as being included in a general management system, which includes all of the activities as well as all of the hierarchical levels with the implementation and application of a new occupational risk prevention plan.

An occupational risk prevention plan was established in 2014 as a tool to integrate the company’s risk prevention activities into the general management system. The occupational risk prevention plan was approved by the company management and was then assumed by the entire organizational structure, and as known by all workers.
The necessary resources to perform safety activities are organized as per company criteria through its own safety department. The internal safety service as a specific organizational unit that determines the safety activities to be developed and the means to implement them within the entire organization. A

For the purposes of determining the necessary capacities and skills to evaluate the risks and perform prevention activities, there are three specialty areas or prevention disciplines within the prevention service (workplace safety, industrial hygiene, and applied ergonomics and psychology). They are implemented by experts with the appropriate skills for the required tasks, with an external and occupational medicine service and contract. A

Prevention services offer guidance and support needed based on the types of risk, specifically design, a implementation and application of a prevention plan that makes it possible to include prevention activities within the company. Evaluate the risk factors that may affect the workers’ safety and health; a plan prevention activities and determine the priorities when adopting prevention measures and monitoring their efficiency; employee information and training; the provision of first aid (an airway and an ambulance are available on site) and emergency plans. It is coordinated with fire fighters, police and the emergency hotline). An addition to surveillance of employee health and related to the risks deriving from their jobs. A

The safety and health coordinator supervises different activities at the worksite. In particular, when a safety and health coordinator creates risks classified as serious or very serious or when activities are performed at the worksite that are incompatible with each other due to the implications for workers’ health and safety. A

The aim is also to balance risks that exist at the worksite, which may affect workers at the various companies, and the measures applied for their prevention. In addition, necessary measures are adopted so that only the companies and personnel authorized may access the facilities. A

As a company with a prevention service, external audits and evaluations occur. These audits include an analysis of how the initial and periodic risk assessments are alone, an analysis of the results and verifications, when there are doubts. The type of prevention activities and their planning is within the company’s general regulations as well as specific risk-related regulations that are applicable, considering the results of assessments. Based on all of the above, the integration of prevention within the company’s management system aims at all activities as well as at all hierarchical levels are assessed with the implementation and application of the occupational risk prevention plan. A

The effectiveness of the prevention system is preventing, identifying, evaluating, correcting and controlling occupational risks in all phases of company activities as evaluated. A

The objective is to establish an integrated system based on AOSHA 18001, which validates the company’s management system. A

## 20.17 Human Resources

Employment as one of the main drivers behind the support and promotion for the starting activities at the Riotinto mine. Unemployment is approximately 63% in Huelva, and more than 40% in the areas near the mine. A

The workforce needed for the project is approximately 120 people. Approximately 80% of which will be Atalaya Mining employees and the remaining 20% will be contractors. At the contractors, include mining and service companies, which will all be under the management of Atalaya. A
The personnel needed to start up and operate at 0.5 Mt/y are currently covered, less a few exceptions. The breakdown as follows:

A A General and Administration A A 44 A
A A Technical personnel A A A 50 A
A A Operational personnel A A A 214 A
A A TOTAL A A A 308 A

20.18 Contracting and Training
Atalaya has developed policies and procedures related to selecting and hiring personnel. The objective of preferentially hiring personnel from the area near the project aims to guarantee that the local communities benefit from the economic activity. This objective has been developed through a collaboration program between the company and the local municipalities in the area. A local personnel currently represents 65% of the staff at this time. The technical and specialized personnel also operate from other areas in Spain, however, at AsA worth noting that nearly 100% of the personnel are Spanish nationals.

Emigration following the previous closure of the mines has caused a lack of specialists and qualified labor. This situation has been resolved by attracting mining personnel to the area and with internal training. Thus, the most pressing training needs are mainly related to mine safety and machinery operation as well as specific training in different operational areas.

At the same time, a collaboration program has been implemented with various educational institutions to foster internships within the company. Therefore, programs have been developed with public secondary centers and at the University of Huelva as subjects related to the project, i.e., A Electromechanics, Industrial Engineering, Chemistry, and Mining Engineering.

Contractors require qualifications as established by the law.

20.19 Labor Relations
The Spanish statute establishes a law outlining minimum requirements in any sector in Spain. A company’s employee relations are governed by a collective bargaining agreement that will be sector-related or internal to the company. Companies with more than 50 workers shall choose an wording council or body that represents all workers at the company. Although union membership is not mandatory, at least 50% of the workers shall belong to one. The Spanish mining sector is strongly connected to the regions.

Atalaya is currently governed by a sector agreement. Works Council is expected to be elected by and from among the workers.

20.20 Public Relations
Atalaya mining promotes the establishment of extensive communication channels and actively seeks opportunities for dialogue with its stakeholders. An order to ensure its business objectives are aligned with the needs of the society and societal expectations. The company aims to be transparent by providing relevant and accurate information to its stakeholders, fostering constructive dialogue and encouraging continuous improvement.
Since the Project began, the company has fostered a direct relationship and proactive line of communication with the groups, entities, government authorities, institutions, press and general public that are interested in its operations. This is based on an open-door policy with a view to being transparent about its activities.

Members of the organization have also participated in internal, public sector, technical and general events when there is an opportunity to communicate its values and explain its operations and activities. Moreover, as a member of different business and social organizations with which it shares goals and which are used as a platform for its business and communication policies.

Finally, the company has been effectively using all available channels to communicate new developments and explain its ideas using internal resources (website, social media, newsletters, e-mailing, etc.) as well as press (press releases, interviews, participation in special editions, press visits, etc.).

To this end, the hope is that this policy continues to be successful in earning a positive reputation for Atalaya Mining as an excellent and trustworthy mine operator that is integrated within its environment.

This is based on maintaining excellent relations with the media and institutions which lead public opinion through transparency and proactivity, on the one hand, and, on the other, the availability of information and opening of direct communication channels with any member of the public through the extensive circulation of communication materials issued.

Finally, Atalaya Mining has implemented social responsibility programs through its foundation in order to cover the company objectives beyond its business, leading to a positive reputation for the company.
21 CAPITAL AND OPERATING COSTS

The capital and operating costs given in the following tables were extracted from the financial analysis prepared by Atalaya which is referenced in Section 21. All Euro-based costs have been converted to USA dollars at an average life-of-mine exchange rate of €1:$1.15. Quantities and values are presented using U.S. Customary units unless otherwise specified. No escalation has been applied to capital or operating costs. All costs are before inflation.

21.1 Assumptions
The parameters used in the analysis are shown in Table 21.1. These parameters are based upon current market conditions, vendor quotes, design criteria developed by Atalaya personnel, and benchmarks against similar existing projects.

<table>
<thead>
<tr>
<th>Table 21.1 Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>General Assumptions</strong></td>
</tr>
<tr>
<td>Mine Life</td>
</tr>
<tr>
<td>Operating Days</td>
</tr>
<tr>
<td>Production</td>
</tr>
<tr>
<td><strong>Market Assumptions</strong></td>
</tr>
<tr>
<td>Cu</td>
</tr>
<tr>
<td>Ag</td>
</tr>
<tr>
<td><strong>Concentrate Production (Dry)</strong></td>
</tr>
<tr>
<td>Weight, total life of mine</td>
</tr>
<tr>
<td>Cu Grade</td>
</tr>
<tr>
<td>Ag Grade</td>
</tr>
<tr>
<td><strong>Treatment Charge</strong></td>
</tr>
<tr>
<td>Cu</td>
</tr>
<tr>
<td><strong>Refinery Charge</strong></td>
</tr>
<tr>
<td>Cu</td>
</tr>
<tr>
<td>Ag</td>
</tr>
<tr>
<td>Smelter Losses</td>
</tr>
<tr>
<td>Freight</td>
</tr>
<tr>
<td><strong>Penalties</strong></td>
</tr>
<tr>
<td>Financial Assumptions</td>
</tr>
<tr>
<td>Discount Rate</td>
</tr>
<tr>
<td>Mining Tax, Net Deduction</td>
</tr>
<tr>
<td><strong>Technical Assumptions</strong></td>
</tr>
<tr>
<td>Diesel Fuel</td>
</tr>
<tr>
<td>Power Cost</td>
</tr>
<tr>
<td>Recovery</td>
</tr>
<tr>
<td>Cu</td>
</tr>
</tbody>
</table>

The revenues from the sale of a copper concentrate containing silver credits are based on an average life-of-mine copper price of $2.88 per pound and an average life-of-mine silver price of $17.90 per ounce. As discussed previously in Chapter 19, Atalaya has committed 100% of concentrate production to three customers. After deducting all refining and treatment charges, penalties, and freight and other smelter deductions, Atalaya will realize a net smelter return of approximately $19.60 per ton.
21.2 Life of Mine Production

In 2016, Atalaya completed an expansion from phase 1 (5.0 Mt/y) to phase 1 + expansion (9.5 Mt/y). The ore reserve discussed in Chapter 15 is estimated at 153 Mt averaging 0.45% Cu. Production over the life of mine is summarized in Table 21.2A.

| Wastestore | 287.3 Mt |
| Ore | 152.8 Mt |
| Low-grade stockpile | 0.45% Cu |
| Grade Cu | 11.4 Mt |
| Low-grade stockpile | 0.22% Cu |
| Contained metal in concentrate, Cu | 574.0 kT |
| Payable metal, Cu | 547.4 kT |

21.3 Life of Mine Capital Costs

Life of mine capital costs for the overall capital program, including both phases 1 and expansion, are estimated to be $152.9 million. Sustaining capital averages $2.2 million per annum with a total expenditure of $36.7 million. Development capital spent to date, in US$, by unit area as shown in Table 21.3A.

| OCCUPATIONAL HEALTH AND SAFETY | 582.14 |
| EXPLORATION AND GEOLOGY | 2,234.39 |
| MINING | 4,030.34 |
| PROCESSING | 74,577.63 |
| INFRASTRUCTURE | 8,785.08 |
| PROJECT MANAGEMENT | 3,577.28 |
| ENGINEERING | 5,607.23 |
| CONSTRUCTION AND MANAGEMENT | 18,363.12 |
| OWNERS COSTS | 5,963.81 |
| CONTINGENCY | 1,726.75 |
| G&A | 16,882.12 |
| CAPEX TOTAL | 142,329.90 |

The estimated capital outlay for the phased development is USD$152.9 million of which USD$124.1 million was spent in 2015. Additional capital requirements are shown below:

| Sustaining Capital | $36.7M |
| Development Capital (2016) | $28.8M |

Total, life of mine

Total, including expansion
21.4 Life of Mine Operating Costs
The life of mine operating costs are based on the current Riotinto operating budget for 2016. Both fixed and variable costs have been estimated for the life of mine operating and are summarized in Table 21.4A.

<table>
<thead>
<tr>
<th>Site</th>
<th>Operating CostsA</th>
<th>UnitCost ($/t'ore)</th>
<th>UnitCost ($/t'Waste)</th>
<th>UnitCostA ($/t mined material)A</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH&amp;S A</td>
<td>0.12</td>
<td>0.06</td>
<td>0.04A</td>
<td></td>
</tr>
<tr>
<td>Exploration &amp; Geology A</td>
<td>0.23</td>
<td>0.12</td>
<td>0.08A</td>
<td></td>
</tr>
<tr>
<td>Fixed Mining A</td>
<td>4.48</td>
<td>2.21</td>
<td>1.41A</td>
<td></td>
</tr>
<tr>
<td>Variable Mining A</td>
<td>1.88</td>
<td>1.00</td>
<td>0.64A</td>
<td></td>
</tr>
<tr>
<td>Variable Processing A</td>
<td>4.11</td>
<td>2.19</td>
<td>1.39A</td>
<td></td>
</tr>
<tr>
<td>Laboratory A</td>
<td>0.22</td>
<td>0.12</td>
<td>0.08A</td>
<td></td>
</tr>
<tr>
<td>Maintenance A</td>
<td>0.09</td>
<td>0.05</td>
<td>0.03A</td>
<td></td>
</tr>
<tr>
<td>Technical Services A</td>
<td>0.26</td>
<td>0.14</td>
<td>0.09A</td>
<td></td>
</tr>
<tr>
<td>Environmental A</td>
<td>0.49</td>
<td>0.26</td>
<td>0.17A</td>
<td></td>
</tr>
<tr>
<td>HRA A</td>
<td>0.11</td>
<td>0.06</td>
<td>0.04A</td>
<td></td>
</tr>
<tr>
<td>Administration A</td>
<td>0.26</td>
<td>0.14</td>
<td>0.09A</td>
<td></td>
</tr>
<tr>
<td>Land &amp; Freight &amp; Transport A</td>
<td>0.18</td>
<td>0.10</td>
<td>0.06A</td>
<td></td>
</tr>
<tr>
<td>Total A</td>
<td>$12.65</td>
<td>$6.55</td>
<td>$4.17A</td>
<td></td>
</tr>
<tr>
<td>Total per pound A.</td>
<td>$1.60</td>
<td>A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mining costs, inclusive of those capitalized, are equivalent to an average unit cost of USD $4.68 per tonne of ore. The average unit milling cost is $6.36 per tonne of ore. Silver by-product credits assume 7.6 M oz. As sold at $17.9/oz. Life of mine site operating costs average the equivalent of $1.60 per pound A. of copper sold.

21.5 Taxes and Royalties
21.5.1 Royalties
There are payable royalties applied to this project.

21.5.2 Taxes
Regular tax as computed by subtracting all allowable operating expenses, overhead, depreciation, amortization and depletion from current year revenues to arrive at taxable income. The tax rate as a then determined from the published progressive tax schedule. An operating loss may be used to offset taxable income, thereby reducing taxes owed.

As of January 2015, the general rate of Company A tax in Spain has been reduced from 80% to 75% in 2015 and further reduced to 72.5% in 2016. Tax losses are allowed to be carried forward; up to 60% of a previous year’s losses could be offset against the current year taxable profit.

Specifically, the mining industry in Spain has certain tax benefits, such as freedom of amortization and a depletion factor. The depletion factor as a tax figure, established in Spain with the aim of promoting geological research and mining of non-renewable resources. By means of this tax, companies have the ability to deduct from their tax base an amount which contributes to a fund which subsequently performs research works in order to permit the continuity of the mining activity.
22 ECONOMIC ANALYSIS

Atalaya has developed a financial model for the Riotinto Project that incorporates the updated reserve and resources. On the basis of the latest update of that model, the summary financial forecast for the project is shown in Table 22.1 below. The assumptions for price and financial factors utilized in the financial model and resultant forecasts are as follows:

- All amounts are in constant 2016 US dollars (US$).
- Amounts in Euros (€) were converted to US$ at an average life of mine exchange rate of €1.00:US$1.14.
- Copper production is sold at an average life of mine copper price of US$2.88/lb.
- Income tax rate of 25%.

This financial forecast shows that after tax, net cash flows, inclusive of capital expenditures, and closure costs, will total $1,004.6M over the life of the project for an NPV of $445M at an 8% discount rate. The overall project cash costs (C1), net of silver credits, is US$1.96 per pound of copper, increasing to US$2.00 per pound of copper, net of silver credits, adjusting for the sustaining costs (AISC).
<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>2019</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>2020</td>
<td>$30,000,000</td>
</tr>
</tbody>
</table>

*Table 22.1: Cash Flow Forecast*
22.1 Forecast Results and Sensitivities

Table 23.1 shows that the net cash flow for the life of the project of $781M and an NPV of $445M at a discount rate of 8%. The project's key economic performance parameters are presented below in Table 22.2.

Table 22.2A Key Performance Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Attributable Production</td>
<td>tCu in concentrate</td>
<td>574,000</td>
</tr>
<tr>
<td>Mine Life</td>
<td>Years</td>
<td>17</td>
</tr>
<tr>
<td>Operating Cash Cost</td>
<td>US$/lb.</td>
<td>1.60</td>
</tr>
<tr>
<td>NPV after Tax @ 8%</td>
<td>US$M</td>
<td>445</td>
</tr>
<tr>
<td>Copper Price</td>
<td>US$/lb.</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Sensitivity analyses on the project's NPV were performed using a 5% and 10% variation of operating costs, copper pricing, and the exchange rate for the Euro: US dollar. As expected, the copper price variation has the greatest impact on the project's NPV, positive and negative. However, the project's NPV remains positive regardless of the decreased copper price or increase in operating costs and exchange rate differential. (see Figure 22.1).
23 ADJACENT PROPERTIES

23.1 Other Deposits within the Riotinto Concession

There are mineral deposits other than the Cerro Colorado deposit within the Riotinto concession area. Atalaya Mining has completed a thorough data review and has identified exploration potential for a mineralization, recoverable by open pit and underground mining methods, in four locations:

- San Dionisio A
- Filón Sureño
- Fromán Pozo Alfonso A
- The Southern Waste Dump A

23.1.1 San Dionisio Deposit

The San Dionisio deposit, located about 15 km west of the Cerro Colorado pit, was exploited by the Atalaya Mining A (Alfredo) underground mine, which worked two different types of a mineralization.

The San Dionisio deposit occurs as a massive sulfide lens within the aureole of a syncline with a copper-rich stockwork zone along the eastern footwall portion of the syncline (the Alfredo/Cloritas Zone). The San Dionisio massive sulfide was mined for sulfur by underground and open pit methods from the Atalaya pit in 1986-1992.

From 1977 to 1986, the Riotinto/Minas A (RTMSA) undertook considerable exploration drilling (1,080 underground drill holes) and feasibility studies for bulk mining both the massive sulfides and the Alfredo/Cloritas Aby underground methods at A (Alfredo) A combined rate of 1.2 Mt/y. That work was discontinued in 1986 due to the prevailing low metal prices.

Cortes Atalaya was one of the largest open pit mines in Europe at 1.2 km long, 0.6 km wide, and 0.3 km deep. The Cortes Atalaya open pit was started in 1997 to mine the upper stratiform massive sulfide zone (pyrite) apart from the San Dionisio orebody, which at 1.2 km long and 0.6 km thick. The mine contained 48% Cu and 0.8% Ag, with a marginal grade material averaging 0.15% Cu and 0.25% Ag. The ore was loaded at a rate of 500,000 t/y.

The ore was processed at the Atalaya concentrator, with the ore containing about 0.06% Mt at 0.85% Cu and 0.5% Ag. A

At the Atalaya pit, a connecting tunnel and access ramp were added to the workings of the Pozo A Alfredo underground mine, which mined the underlying stockwork ore, which at 1.2 km thick and 0.6 km deep. A yearly production from the Pozo A Alfredo was about 250,000 t Mt/Ag/0.35% Cu. Primary crushing was done at the 200-mm pit, allowing a single concentrator. The underground mine was closed in 1997.

The deposit is shown in Figure 23.1A.
23.1.2 Filón Sur deposit

The Filón Sur massive sulfide was mined for sulfur by both underground and open-cut methods. Underground production from 1873 to 1967 was 18.2 Mt of ore and open-cut production between 1874 and 1949 was 24.2 Mt of ore. As all of this material was mined for sulfur; the base metal and precious metal contents were not systematically recorded. As the Filón Sur pit is developed, unmined portions of the Filón Sur massive sulfide will become exposed. Atalaya Mining is evaluating whether to carry out an investigation of the Filón Sur massive sulfide deposit in conjunction with the proposed Cerro Colorado pit expansion in the Filón Sur Area.

23.1.3 Planes San Antonio Deposit

The Planes' San Antonio deposit is located at the eastern end of Cerro Salomon (CCE). The Planes mine was worked intermittently from Roman times up to 1950, when mining became uneconomic. In 1962, a geophysical survey and exploratory drilling program located an extension of the mineralization 600 m to the east of Planes, which was named San Antonio.

The Planes vein-stockwork mineralization appears to have been a feeder pipe underlying the layered (stratiform) pyrite of the San Antonio deposit that was precipitated on the sea floor. The brecciation of the colloform pyrite, the presence of slumping structures and the redeposited pyrite material in the San Antonio deposit, all point to intra-formational erosion and transport of a large part of the massive sulfides for several hundred meters from the top of the source feeder pipe at Planes down a slope of the volcano into a depression on the sea floor.

The San Antonio massive sulfide deposit is shallow (150 m to 800 m below surface), lenticular in shape, A dipper at an angle of 80 degrees and as large as 500 m in length and 20 m thick. Exploration of this deposit was A
Undertaken in the mid-1960s to the mid-1970s by the sinking of a shaft, the development of 2 levels from this shaft and the drilling of 183 underground drill holes. Other than exploratory development, no mining has been carried out on this deposit. Figure 23.2 is an S-N drill cross-section through the western side of the Planes’ San Antonio deposit.

**23.2 Adjacent Properties**

Beside the Riotinto permit which is an Exploitation Concession (CE), Atalaya Mining owns other Exploration and Exploitation Permits (API) near the Riotinto Project area. The status of the CET is currently under ownership change. These are presented in Table 23.1 below.
There are 3 major deposits nearby the Atalaya Mining properties. These are Agua Teñidas, Magdalena and Concepcion, which belongs to MATSA (Trafigura). The locations of these and the Atalaya Mining Properties are presented in Figure 23.3 below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proyecto Riotinto</td>
<td>CEA</td>
<td>Active</td>
</tr>
<tr>
<td>Peña del Hierro</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>Chaparrita</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>Grupo Riotinto</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>Corralejos</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>Chaparrita</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>Poderosa</td>
<td>CEA</td>
<td>Under Ownership Change</td>
</tr>
<tr>
<td>El Villar</td>
<td>PIA</td>
<td>Active</td>
</tr>
<tr>
<td>Valle Redondo</td>
<td>PIA</td>
<td>Active</td>
</tr>
<tr>
<td>Socavón</td>
<td>PI</td>
<td>Under Application</td>
</tr>
</tbody>
</table>
Adjacent Properties

Figure 23.3A: Adjacent Properties
24 OTHER RELEVANT DATA AND INFORMATION

Atalaya Mining plc (AIM: ATYM, TSX: AYM) announced its unaudited quarterly and interim results for the three and six months to June 30, 2016, together with the unaudited, condensed interim consolidated financial statements on September 7, 2016.

The complete unaudited, condensed half-yearly financial statements are available under the Company’s profile on SEDAR at www.sedar.com and on the Company’s website at www.atalayamining.com.
25 INTERPRETATIONS AND CONCLUSIONS

25.1 Resource Estimation

The three most significant factors for estimation of the Cerro Colorado resource are high variability of copper grades, highly overlapping zones of low and higher grade mineralization, and folding of the deposit. An plunge in anticlinal shape. The effect of the overlapping grade zones as minimized by assigning grade zones codes as resource model blocks. A

Many years of mining on the Riotinto Project have established that a significant copper resource is present and can be extracted by open pit mining methods. This conclusion has been confirmed by a current mining during 2015 and 2016. Riotinto Copper mineralization, however, has high variability, and a much more Alike as gold deposit. While the high variability does not preclude estimating the overall resource with a level of accuracy suitable for measured and indicated resources, the mine is likely to experience annual differences in copper grade that are as much as 15% higher or lower than the predicted grade. A

25.1.1 Resource Risks and Opportunities

The primary resource risk is that the mine must be prepared for annual production that is significantly worse or better than planned production. The high variability of copper grade also means that grade control practice must be of the highest quality to minimize dilution and maximize extraction of ore. A

The primary opportunity is that significant blocks of an inferred mineralization are included inside the ultimate pit. All those blocks of an inferred mineralization are upgraded to measured and a indicated resource. The proven and probable reserve would automatically increase, and a waste mining would decrease by the tonnage upgrade from inferred. In addition, small blocks of an resource are present outside the Northern and Southern Fault Boundaries of the mineralized zone, where resources are not estimated because of lack of drilling. Previous mining has demonstrated that mineralization as a present outside the Ault Limits, which could increase ore tonnage slightly. A

25.2 Mining

The exploitation plan for the Riotinto Project utilizes conventional truck and excavator open pit mining methods for the Cerro Colorado deposit. A decline in cutoff strategy, ranging from 0.25 to 0.16% Cu, A will be employed to maximize the present value of the mining and schedule based on an average ore A processing rate of 5.5 Mt/a. A Cu price of $2.60/lb. Total proven and probable mineral reserves are estimated at nearly 653 Mt grading 0.45% Cu and containing about 681,000 tonnes of Cu metal. A waste A rock, including backfill and old workings, totals about 299 Mt for an average stripping ratio of 1.95. The mine’s life as estimated at 16.5 years. A

25.2.1 Risks

Typical of many base metal projects, mineral reserves at Cerro Colorado are sensitive to commodity price and operating costs. A. Acher’s Grossmann (1971) analysis of economic pit limits, see Section 15.3.2, indicates that lowering the Cu price nearly 14% from $2.60/lb. to $2.25/lb. would lower the amount of potentially economic measured and indicated (M&I) resources by about 10%. An increase in ore tonnage above A an internal cutoff. Similarly, a 15% increase in operating costs would reduce economic M&I resource tonnages by about 18%. A
A Roman Archeological site located immediately north of mining phase 1A could potentially reduce mineral resources by 15%. Should Atalaya Mining be denied permission to develop the site, this would impact phase 4, stripping for which is scheduled to commence in 2021 (Year 6). Atalaya Mining plans to conduct an Archeological Survey and does not anticipate any problems with securing the necessary permits.

National Highway #461 presently lies along the western edge of the Cerro Colorado pit and potentially impacts the development of phases 5 and 6. Initial stripping in these phases is scheduled for 2022 and 2025, respectively. One possible realignment of this road would traverse an alluvial fill and backfill of an eastern extension of the old Atalaya Open Pit. There are engineering and permitting processes that must be completed prior to moving the highway and Atalaya Mining believes permission can be obtained in a timely manner. Failure to relocate the highway would likely reduce mineral reserves by 8%, based on an AGA study in which mining that disturbs the existing highway corridor was prohibited.

Atalaya Mining’s current pit dewatering states may impact mill feed in the second and third quarters of a 2017 underground proposed mine production schedule. The anticipated acceding water levels will be very close to the bottom working levels of phase 1A in May through September. Mineral reserves should not be affected in the long term, but a short-term delay in an mill feed could affect cash flows. Adhering to a revenue and slightly lower ing present values.

The current tailings management facility has the capacity to store 123 Mt of tailings for an estimated life of 10 years. Based on the current reserve presented in this report, the quantity of tailings generated will increase to approximately 52.2 Mt, leaving the TMF 20% short of the required capacity. Atalaya is currently conducting additional studies to increase this capacity to 60 Mt.

### 25.2.2 Opportunities

Higher commodity prices could increase mineral reserves through both lower cutoff grades and a potentially larger pit limits. An AGA analysis indicates that a 15% increase in Cu price from $2.60/lb. to $3.00/lb. could increase mineral reserves on grades above an internal cutoff by 12%. A

Infill drilling could convert inferred mineral resources to a higher classification. Approximately 10.9 Mt of inferred mineral resources grading 0.54% Cu above a decline in cutoffs are presently estimated and a treated as waste within the designed ultimate pit. It should be remembered, however, that inferred mineral resources are too speculative to have economic considerations applied to them. That this would enable them to be categorized as mineral reserves. At this As an uncertainty that inferred mineral resources will be upgraded to a higher classification.

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**Ore Reserves Engineering**

September 2016
26 RECOMMENDATIONS

Atalaya Mining has successfully refurbished and expanded the Riotinto Plant and infrastructure and as a result, is now a low-cost producer. Ore reserves at a projected life of greater than 10 years are estimated to provide a project at an average grade of 0.30%. A technical evaluation of the mineral resource indicates that with an increase in copper price, from the base case of $2.60/lb to $3.00/lb, could increase the reserve tonnage by approximately 20%.

While no major work programs are suggested, the recommendations that follow and that are further outlined in Chapter 26 are meant to improve operations and/or the economics of the project. A most of these can be evaluated by Atalaya Mining's own house management and technical staff and do not require expenditures outside the normal operating and capital budgets.

- Pit bottom sinking rates in the mining phase. A study should be conducted to determine whether additional water levels are necessary to avoid possible interruptions in mill feed during this time period.
- The Amining operation has historically used a cutoff grade of 0.2% Cu. Assuming an average metallurgical recovery, the data supporting this cutoff grade has been used. Atalaya Mining should consider, at a minimum, switching cutoffs to a recoverable copper (RCu) basis. Additional investigation of this correlation is warranted, including the effect of rock to types A and B. Characteristically, cutoff grades are recommended, which could account for both variable Cu recoveries and charges associated with deleterious metals.
- The percussion drilling operation is presently used by the Amining contractors. A large blasthole diameters of 1.02 to 1.27 mm have been used. These diameters are efficient for blasting, with a significant tonnage of 1.0 m³ blast holes. A typical blast design, using a large blasthole diameter, may require 1.0 m³ of explosive per shot. The related number of blast holes and drilling accessories are lower as blast holes and drilling at a lower cost for drilling and blasting. Labor costs could also be reduced. The Amining contractors may also require a new, suitable DHH blasthole rigs. A trade-off analysis is recommended to investigate possible capital expenditures versus operating cost savings.
- The Amining production schedule indicates that a year at A1 may affect the overall grade measured and indicated. A mineral resource averaging 0.22% Cu may be acceptable. A production schedule for the next 10 years is a significant factor in the decision. While this material is currently being extracted, a waste shear is at the current mine. Although the company has identified another ore body at the project's site, there is a large area suitable for additional stope development. The likely areas are at the west of Highway M 461, which would require crossing near the northwest pit exit. An evaluation should be conducted to determine the processing value of this material at the end of mining (in 2032). Accounting for possible reduced recovery and ore oxidation, a new cost of A1 production is recommended to A1 at the A1 mine.

A
• Inferred Resources should be converted to measured and/or indicated classifications with an additional drilling. Approximately 1.0 Mt of inferred mineral resources grading 0.54% Cu above an AEC cutoff is estimated and rated as waste within the designed ultimate pit. Another 1.0 Mt of inferred mineral resources are at too speculative a geologically to have economic considerations applied to them, that would enable them to be categorized as mineral reserves. There is no certainty that inferred mineral resources will be upgraded to a higher classification.

The estimated cost to complete the drilling is US$840k.

• Additional infill drilling on both San Dionisio and San Antonio polymetallic deposits should confirm historical estimates. These deposits were previously discussed in Chapter 9. San Dionisio is a zone of the main Riotinto ore zones which was mined from the 1960's to the late 1980's but still contains unmined resources. According to the compiled historical data, mining was mostly focused on the massive sulfide ore, but the chlorite altered stockwork that hosts the northern flank at an elevation of 100 m above sea level has not been mined out.

The Atalaya Mining Exploration Department should continue with an infill drilling program to evaluate the resources at the San Antonio deposit. Results from all diamond holes confirmed the occurrence of a subvertical chlorite altered stockwork zone overlaying the massive sulfides at (already mined) an elevation of the northern flank of the orebody. The estimation of total resources determined by the EMeda in 2011, using a Cu cut-off of 0.5% Cu, is estimated at 0.6 Mta at 1.34% Cu. This deposit is not yet exploited and has already at two vertical shafts, a ramp, and a series of open underground galleries. The estimated cost of US$605k to complete the program.

• Exploration drilling around the Filon Sur historical pit may prove a stockwork and a massive sulfide ore were unmined. The estimated cost is US$370k to complete the program.

• The northern flank of the Atalaya pit is known to host stockwork mineralization which requires further infill drilling. The estimated cost is US$320k to complete the program.

• Continue to optimize processing operations to order to increase production rates and increase product quality. This can be accomplished by conducting a debottleneck analysis to increase throughput and installing additional grinding and flotation lines. Install the ability to add a new mill to the project.

• A study should be undertaken to correlate the crusher head analysis with the mine blast holes and understand the relationship between the mine assay and the primary mill head analysis.

• Set up an automatic sampling of final concentrate and extend a sample exchange program with external laboratories to improve analytical reliability.

• Continue to look for opportunities to improve operating costs. Set up a detailed program to monitor the higher cost/tonnage consumables, such as reagents and steel, and energy.

• Formalize and incorporate into the community development plan that includes both the company and the community issues. Need to develop a post mine use plan.
Continue to instill a culture of safety and safe practices both at work and at home. Make environmental compliance equal to safety and production.

Additional costs to complete these recommendations total $2,117k for exploration and development drilling outside of the normal operating and capital budgets.
27 REFERENCES

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A AtalayaDepartmentofGeology2016, GeologicalFiguresA
28 QUALIFIED PERSONS

The Consultants preparing this Technical Report are specialists in the fields of geology, mineral resource and reserve estimation and classification, environmental engineering, permitting, metallurgical testing, mineral processing design, capital and operating cost estimation, and mineral economics.

None of the Consultants employed in the preparation of this report has any beneficial interest in Atalaya. The results of this Technical Report are not dependent on any prior agreements regarding the conclusions that are reached. There are also no undisclosed agreements concerning any future business between the Consultants and Atalaya.

The following Consultants, by virtue of their education, experience and professional associations, are considered Qualified Persons (QP) as defined by the NI 43-101 standards and are members in good standing of the appropriate professional institutions.
CERTIFICATE OF AUTHORSHIP

Alan C. Noble, R.E.A
Ore & Reserves Engineering
12254 Applewood Knolls Drive
Lakewood, Colorado 80215

Telephone: +1 303 837 271A
Email: a.noble@comcast.net

I, Alan C. Noble, hereby certify that:


2. I have practiced as a mining engineer continuously since 1970, for a total of 46 years. At that time, I was a professional engineer in Colorado, USA, P.E. 26122A

3. I am a registered professional engineer in the State of Colorado, USA, P.E. 26122A

4. I have read the definition of a qualified person “as outlined in the National Instrument 43-101 (‘NI 43-101’)” and certify that by reason of my education, registration as a professional engineer, and past relevant work experience, I fulfill the requirements of a qualified person “for the purposes of NI 43-101”.

5. I am responsible for the overall review of the report and for its preparation of Chapters 7 through 13 of the Technical Report. I have prepared the technical report estimate at that time as the subject of Chapter 14. An addition, I have reviewed and approved the mine planning and design work in Chapters 15 and 16.

6. I have visited the property from February 19 through February 26, 2016.

7. I have an advisor involvement with the property that is the subject of the Technical Report.

8. I am independent of the issuer, Atalaya Mining Plc, applying all of the above as of Section 4.5 of NI 43-101 A

9. I have read all of Chapters 7 through 16 of the Technical Report and have been a prepared for compliance with theInstrument and Form A

10. At the Effective Date of the Technical Report, to the best of my information, knowledge and belief, a Chapters 7 through 16 of the Technical Report contain all scientific and technical information that is required to be disclosed in the Technical Report and not misleading.

I consent to the filing of the Technical Report with any Canadian stock exchange and consent other securities regulatory authority and any publication by them for regulatory purposes of the Technical Report.

Dated this 27th day of September 2016.

Signed and sealed, Alan C. Noble, R.E. A
Alan C. Noble, R.E. 26122A
CERTIFICATE OF AUTHORA

WILLIAM A. ROSE, P.E. A

I, William A. Rose, P.E. A, hereby certify that:

1. I am the Principal Mining Engineer at A.

WLR Consulting, A.C.
9386 18th Avenue
Lakewood, Colorado 80232, USA

1. I graduated from the Colorado School of Mines with a Bachelor of Science degree in Mining and Metallurgy Engineering in 1977.

2. I am a Registered Professional Engineer in the State of Alabama (No. 1A19296), a Registered Professional Engineer in the State of Arizona (No. 1A5055), and a Registered Member of the Society for Mining, Metallurgy, and Exploration, A.C. No. 1762350RM (all at good standing).

3. I have practiced as a mining engineer continuously for 40 years since my graduation from a college. I have been involved in open pit mining operations at both the management and engineering positions, and I have extensive experience in mine design and planning. I have conducted estimations of mineral resources, reserves, mine production schedules, equipment, workforce, and capital costs for numerous projects in North, Central, and South America, Europe, Africa, and Asia.

4. I have read the definition of a qualified person as set out in the National Instrument 43-101A (NI 43-101A) and certify that by reason of my education, affiliation with a professional association as defined in NI 43-101A and my past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101A.


6. I have not visited the subject property. My work on this project was performed under the direction of Alan C. Nobel, P.E. A., who has stated that he was visited the subject property.

7. I have had no prior involvement with the subject property that has affected the completion of the Technical Report.

8. As of the effective date of the Technical Report, I am the best of my knowledge, information, and belief, item A 15 and portions of item A 16 as sections 6.1, 6.2, and 6.3 of the Technical Report contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer, Atalaya Mining Plc, applying all of the Aesthetic Section A.5 of NI 43-101A.

10. I have read NI 43-101A and Form 43-101F1, and the Technical Report has been prepared in compliance with all Instrument and form A.

Dated this 27th day of September, 2016.

Original Signed and sealed by:

Signed, William A. Rose, P.E. A. 9296A

Lakewood, Colorado 80232, USA

Page 28/4 September 2016
CERTIFICATE OF QUALIFIED PERSON

Jaye T. Pickarts, P.E.
9792 West Unser Avenue
Littleton, Colorado 80128

Telephone: A 720-370-3700
Email: A jtpick2@msn.com

I, Jaye T. Pickarts, hereby certify that:

1. I am self-employed as a Metallurgical and Environmental Engineer, 9792 West Unser Avenue, Littleton, Colorado 80128.

2. I have practiced as a metallurgical and environmental engineer continuously since 1982, and have been involved in mineral processing, and a metallurgical and environmental engineer for a total of 4 years.

3. I have completed an Associate degree in Mineral Science and Technology, Butte, Montana, with a Bachelor of Science degree in Mineral Processing, Engineering, 1982.

4. I have graduated from the Montana College of Mineral Science and Technology, Butte, Montana, with a Bachelor of Science degree in Mineral Science and Technology, 1982.

5. I have been licensed as a Professional Engineer in the State of Colorado, USA, APE 37268, at the age of 43, and licensed in the State of Wyoming, USA, PE 000893. I am a member of the Society for Mining, Metallurgy, and Exploration (SME) No. 543360 and a Qualified Person member of the Society for Mining, Metallurgy, and Exploration (SME) No. 543360.

6. I have been responsible for the preparation of Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 of the Technical Report.

7. I have visited the property from February 19 through February 26, 2016.

8. I have not had prior involvement with the property that was subject of the Technical Report.

9. I am an independent of the Assuer as described in Section 3.5 of NI 43-101.

10. I have read all of NI 43-101 and Form A3'101F1 and Chapter 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 of the Technical Report, and I have been prepared in compliance with the Instrument and form A.

11. At the Effective Date of the Technical Report, I am aware of all information, knowledge, and belief, Chapters 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 of the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 27th day of September 2016.

A

“Signed and sealed, Jaye T. Pickarts, P.E.

Jaye T. Pickarts, P.E.
CERTIFICATE OF QUALIFIED PERSON
Juan J Anes, B.Sc., M.Sc., P.Eng.
409A/66A
Delta, BC, Canada, A4LA75
Telephone: 787/85/8676 A  Email: Juan.Anes@em2po.com A

I, Juan J Anes, do hereby certify that:


2. I am an A graduate of the Universidad de Atacama University, located in Copiapó, Atacama, Chile with a Bachelor of Engineering in Metallurgical Engineering Sciences in 1996 and a Master of Engineering in Metallurgy in 2001.

3. I am an A registered member of the Society for Mining, Metallurgy, and Exploration (SME) No. 04179444.

4. I have practiced my profession continuously since 1992, and have been involved in mineral processing and metallurgical engineering for a total of 24 years.

5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, registration as a professional engineer, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be an "Qualified Person" for the purposes of NI 43-101.

6. I am responsible for the collection and analysis of the metallurgical data and the preparation of Chapter 4.3, A Mineral Processing and Metallurgical Testing. In addition, I assisted in the preparation of Chapter 4.7, A Recovery Methods, and Chapter 21, A Capital and Operating Costs.

7. I have visited the property several times in 2015 and 2016 and worked together with the rest of the QP's as mentioned herein in preparing this Technical Report on site from February 19 through February 26, 2016. My most recent visit to the property was July 81st, 2016.

8. I am an independent consultant contracted to Atalaya Mining to assist with the continuous improvement of a plant expansion and I have not had prior involvement with the property at that as the subject of the Technical Report.

9. I am independent of the assessor as described in Section 1.5 of NI 43-101.

10. I have read NI 43-101 and Form 43-101F1, and I am aware that Chapters 4, 13 and 17 of the Technical Report have been prepared in compliance with the instrument and form.

11. At the effective date of the Technical Report, to the best of my knowledge and belief, Chapters 4, 13 and 17 of the Technical Report contain all scientific and technical information as required to be disclosed and none of the Technical Report is misleading.

Dated his 27th day of September 2016.

"Signed and sealed, Juan J Anes, P. Eng.

Juan J Anes, P. Eng. 00118632/04179444