STATEMENT OF PHILLIP ANTHONY PRICE

1. Background and qualifications

1.1 I am the Vice President – Integrated Planning for BHP Billiton Iron Ore (**BHPBIO**). I was appointed to that position on 1 March 2004.

1.2 I have had 20 years experience in the minerals industry. Before commencing in my current position, I had been employed with BHPBIO for about 10 years in a variety of site based operational roles, including Manager Port Operations and Planning and Technical Superintendent.

1.3 I have a Bachelor of Applied Science in Extractive Metallurgy and I am a Member of the Australasian Institute of Mining and Metallurgy.

2. BHP Billiton and BHP Billiton Iron Ore

Group structure

2.1 BHP Billiton is a dual listed company comprising BHP Billiton Limited (which is listed on the Australian Stock Exchange) and BHP Billiton Plc (which is listed on the London Stock Exchange). The 2 separate companies have identical boards of directors and are run by a unified management team so that they operate as a combined group known as BHP Billiton.

2.2 BHP Billiton is organised around what are termed Customer Sector Groups (**CSG**). These groups are focussed on customers rather than operations. Each group is supported by finance, development, legal and marketing (including transport and logistics) functions. The groups are: Aluminium, Base Metals, Carbon Steel Materials, Energy Coal, Stainless Steel Materials, Petroleum and Diamonds and Specialty Products.

Carbon Steel Materials

2.3 The Carbon Steel Materials CSG supplies core raw materials and services to the international steel industry. It produces a full range of steel making raw materials including iron ore.

2.4 BHPBIO is part of the Carbon Steel Materials CSG and acts as manager for the Mt Newman, Mt Goldsworthy, Yandi and POSMAC joint ventures and the Jimblebar mine, all located in the Pilbara region of Western Australia.

2.5 Iron ore products from these mines are marketed to customers principally located in Japan, South Korea, China, Taiwan, Australia, United Kingdom, Germany, Turkey, France and Romania.

2.6 BHPBIO's head office is located in Perth, Western Australia. BHPBIO has an office in Singapore which acts as a marketing centre for regional offices in Tokyo, Seoul, Shanghai and The Hague. Customers contact their closest regional office in the first instance.

3. BHPBIO's Mining Operations in WA

3.1 In July 2002 BHPBIO produced a promotional publication entitled "Our Quality Story" which explains BHPBIO's iron ore mining operations in the Pilbara region. A copy of that publication is annexed and marked with the letters "**PP1**".

Mines

3.2 BHPBIO currently operates 10 mines located in 4 mining areas in the Pilbara region of Western Australia. The mines are Mt Whaleback and nearby Marra Mamba Orebodies 29 and 30, Satellite Orebodies 25 and Jimblebar, Yandi 1, Yandi 2, Mining Area C, Nimingarra and Yarrie. The mining areas are Newman, Yandi, Area C and Yarrie. These mines currently produce a total of around 100 million wet tonnes of iron ore per annum.

A map of the Pilbara region showing the location of these mines appears on page 18 of the annexed copy of "Our Quality Story". Orebodies 23 and 35 which are included in the map at page 18 of "Our Quality Story" are not presently being mined.

3.3 Different mining techniques and equipment are used in different mines depending on factors including geological and geotechnical complexity, hydrogeology, pit geometry and desired extraction rates. However, in general terms, all mines are open pit operations and ore is typically extracted by blasting the rock face before being scooped up by loaders into haul trucks of up to 240 tonnes for delivery to crushers.

3.4 At Mt Whaleback, there is a primary and secondary crusher, beneficiation plant and train load-out facility. The ores mined from Mt Whaleback pit and Orebodies 29 and 30 are processed through the crushing and screening facility. Only Mt Whaleback ore is upgraded in the beneficiation plant. All ores are then combined onto the train load out.

3.5 Fixed plant infrastructure at the Yandi mines includes 3 tertiary crushing and screening plants , 1 located at Yandi 1 and 2 plants at Yandi 2 mine. The ores are crushed to finished particle size but do not meet final product quality specifications. Each mine has its own train load out facility.

3.6 At Mining Area C, there is a crushing and screening plant, stockyard with 2 stackers and 1 reclaimer and a train loading bin.

3.7 Yarrie and Nimingarra mines each have a primary crushing station and train loading facility.

Rail facilities

3.8 BHPBIO operates 2 heavy haulage single track rail lines to Port Hedland, one running 426 km from Newman and the Yandi and Mining Area C mines (known as the **Newman**

line), and the other running 210 km from the Yarrie and Nimingarra mines (known as the **Goldsworthy line**).

3.9 BHPBIO operates a rail fleet of approximately 68 locomotives and 3200 ore cars in total on these rail lines. Rotary dump ore cars are used on the Newman line while the Goldsworthy line uses bottom dump ore cars.

3.10 In the case of the Newman line, trains are made up of up to 3 rakes. A rake is comprised of approximately 104 ore cars and two locomotives. Each ore car holds approximately 117 tonnes of ore.

3.11 Trains on the Goldsworthy line are comprised of one locomotive and approximately 90 ore cars. Each ore car carries approximately 80 tonnes.

Port facilities

3.12 BHPBIO has 2 port facilities on opposite sides of Port Hedland harbour, Nelson Point and Finucane Island. The 2 facilities are connected by a 1.4 km under harbour tunnel conveyor belt.

3.13 Iron ore from Yandi, Area C and Newman mining areas is unloaded from trains at Nelson Point into one of 3 car dumpers.

3.14 At Nelson Point there are 2 crushing and screening plants, 2 stockyards comprising 6 stackers and 4 reclaimers and 1 lump re-screening plant.

3.15 The facilities at Nelson Point are serviced by 2 shiploaders, each rated at 10,000 tonnes per hour. The expected turnaround time on vessels is 64 hours, with an average loading time of approximately 32 hours.

3.16 Iron ore from the Yarrie mining area is unloaded on Finucane Island into a dedicated train unloader.

3.17 On Finucane Island there is a crushing and screening facility, a beneficiation plant and 2 stockyards, the Western stockyard and the Goldsworthy stockyard. The Western stockyard receives ore from Nelson Point via the under harbour tunnel and the Goldsworthy stockyard receives ore from the Goldsworthy facilities located on Finucane Island.

3.18 There are 2 shiploaders on Finucane Island. One loads at 4,500 tonnes per hour from the Goldsworthy stockyard. The other loads at 10,000 tonnes per hour from the Western stockyard. Ships at Finucane Island can be loaded with ore from Nelson Point using the under harbour tunnel.

3.19 Over 600 ships are loaded each year. The largest ships are up to 330 metres long and carry up to 225,000 tonnes of ore.

3.20 Approximately 80% of shipments from the port are on a free on board (FOB) basis, with the buyer responsible for freight and organising vessel arrival. The rest are shipped on a cost and freight basis, where BHPBIO is responsible for the shipping.

3.21 Support facilities at the port include sampling and sample preparation areas. They produce samples of ore for analysis in the quality control laboratory, where the measurements are used in process control and final product certification.

3.22 The mine, rail and port facilities are currently being expanded to increase capacity to 110 million tonnes per annum.

Iron ore types and products

3.23 The geology in the Pilbara region is complex and the quality of iron ore found in the area is variable.

3.24 The most significant differences in the various types of ore found in the Pilbara relate to the differing levels of iron, alumina, silica and phosphorous and the natural lump percentage. These variations can occur in ore within specific ore bodies, as well as between different mines.

3.25 The key types of ore mined by BHPBIO in the Pilbara are:

- **Brockman hematite (Brockman)**

  The lump of this ore contains high iron levels and moderate silica and alumina levels. The fines have excellent sintering properties.

- **Marra Mamba geothite-hematite (Marra Mamba)**

  This ore contains high levels of iron and low levels of silica and alumina.

- **Pisolitic geothite-hematite (Pisolites)**

  This ore is characterised by high calcined iron levels, low alumina and moderate phosphorous.

- **North Pilbara Hematite**

  The predominant characteristics of this ore are high iron content with low alumina and moderate phosphorous levels.

3.26 As each of BHPBIO's mining areas in the Pilbara produces different types of ore, the ore which is mined has different average grades. Other than Mining Area C, none produces an average grade at the mine that meets the saleable product grade specifications of BHPBIO's final products.

3.27 Each contract that BHPBIO has with its customers provides specifications for:

(a) the Fe content;

(b) the presence of impurities;

(c) the moisture content; and

(d) the physical size of the ore particles;

in relation to the iron ore to be supplied under the contract.

3.28 Iron ore with a certain Fe content, level of impurities, physical size of particles and metallurgical properties can be identified as a particular type of iron ore product.

3.29 BHBPIO produces 9 different saleable iron ore products from its operations in the Pilbara. These 9 products generally fall into 3 types: lump, fines and siliceous ore.

Newman mining area

3.30 The mines in the Newman area (comprising the mines at Mt Whaleback, Satellite Orebodies 25 and Jimblebar and Marra Mamba Orebodies 29 and 30) produce the type of iron ore known as Brockman hematite and Marra Mamba goethite-hematite. From these ores, BHPBIO produces:

(a) Newman High Grade Lump (**NHGL**); and

(b) Newman High Grade Fines (**NHGF**).

3.31 Annexed and marked with the letters "**PP2**" is a bundle of 3 diagrams showing the contribution of ores from the mines within the Newman mining area to each relevant rail head. These diagrams show each mine source, the typical chemical composition of the ore extracted from each mine source before crushing, beneficiation, stockpiling or blending, where primary and secondary crushing occurs, the stockpiling arrangements, and an example of the planned chemical composition of ore delivered to the rail head after stockpiling, crushing and blending.

3.32 Annexed and marked "**PP3**" is a diagram showing the blending of ores from the different mines within the Newman mining area that occurs during railing and at the port. As shown in this diagram, both NHGL and NHGF are products which are blended from ore from the mines at Whaleback, Satellite Orebodies 25 and Jimblebar and Marra Mamba Orebodies 29 and 30. The diagram shows the planned chemical composition for the ore from each mine as loaded into ore cars for rail to the port. It also shows tertiary crushing and screening, stockpiling and re-screening as well as the planned chemical composition for lump and fines ore after blending at the port but before re-screening. The diagram also shows the planned chemical composition of the High Grade Lump and High Grade Fines final product which is shipped.

Mining Area C

3.33 Ore from the mines in Mining Area C contain the type of iron ore known as Marra Mamba goethite-hematite. From that ore, BHPBIO produces:

(a) Mining Area C Lump (**MAC™ Lump**); and

(b) Mining Area C Fines (**MAC™ Fines**).

3.34 Annexed and marked "**PP4**" is a diagram showing the contribution of ores from the Mining Area C mines through to port stockpiles for shipping.

Yandi Mining Area

3.35 The two mines in the Yandi area contain a type of iron ore known as Pisolitic goethite-hematite. From that ore, BHPBIO produces:

(a) Yandi Lump; and

(b) Yandi Fines.

3.36 Annexed and marked "**PP5**" is a diagram showing the blending of ores from the different mines within the Yandi mining area that occurs during railing and at the port. As demonstrated in this diagram, the final Yandi Lump and Yandi Fines products shipped from the port are derived from blending lump and fines from the mines at Yandi 1 and Yandi 2 during railing and at the port. This diagram shows the planned chemical composition of the ore at various points as well as crushing and screening, stockpiling, re-screening and blending.

Yarrie Mining Area

3.37 The mines in the Yarrie mining area (comprising the mines at Yarrie and Nimingarra) contain the type of iron ore known as North Pilbara Hematite. From that ore, BHPBIO produces:

(a) Goldsworthy High Grade Lump (**GHGL**);

(b) Goldsworthy High Grade Fines (**GHGF**); and

(c) Goldsworthy Siliceous Ore Products (**GSO**).

3.38 Annexed and marked "**PP6**" is a diagram showing the blending of ores from the Goldsworthy mines during railing and at the port. As demonstrated in this diagram, GHGL, GHGF and GSO are all blended products created by blending ore from the Yarrie and Nimingarra mines at the port. This diagram shows the planned chemical composition of the ore at various points as well as crushing and screening, beneficiation, stockpiling and blending.

3.39 In addition to the products identified above, BHPBIO also produces Port Hedland Sinter Fines. These sinter fines are a blend of Newman High Grade Fines and Yandi fines, and are blended at Port Hedland.

3.40 Annexed and marked "**PP7**" is a bundle of tables which have been produced from monthly and daily mine production plans. These tables show the relevant grades of lump and fines planned to be produced from the above mines for the months of June or September 2004 Some of the tables show a comparison of the planned mine production grades against the target grades for the specific iron ore products.

3.41 As demonstrated by these diagrams and tables, all of BHPBIO's saleable fines iron ore products, other than ore from Mining Area C, are not finished products until after the various ore types making up those products have been blended into the stockpiles at the port. BHPIO's saleable lump iron ore products also require blending at the port but are not finished products until after re-screening during ship loading.

3.42 Final products are required to meet a grade specification acceptable to customers. Each month mine plans are developed such that 95% of final product shipments fall within the monthly upper and lower target range. The target range has been developed to ensure that product variability is maintained at levels acceptable to the customer. This range is relatively small when compared to the range of ore grades mined from the various mine sources.

3.43 Annexed and marked "**PP8**" is an example of the monthly target grades and acceptable ranges for Newman High Grade Lump and Fines and Yandi Fines final products.

3.44 Annexed and marked "**PP9**" is a table showing the planned annual tonnage of ore to be produced for each mine source and finished iron ore product.

4. Production of Saleable Iron Ore Products

4.1 To produce iron ore products within the specifications as to Fe content, level of impurities, moisture content and physical size and metallurgical properties required by customers involves selective mining, processing and blending of ore according to these specifications.

4.2 Processing occurs at a number of stages between mining of the ore and loading of the ore on ships at the port facilities. BHPBIO uses an integrated planning approach to processing that involves co-ordination of mining operations, rail scheduling, port operations and marketing.

4.3 The production of iron ore into an appropriate grade for sale and export involves the following basic steps:

(a) drilling and blasting;

(b) removal of waste;

(c) collection and hauling;

(d) pre-crusher stockpiling;

(e) crushing and screening;

(f) beneficiation (in some cases);

(g) post crusher stockpiling;

(h) train loading;

(i) railing to the port;

(j) unloading at the port;

(k) tertiary crushing and screening at the port;

(l) stockpiling and blending at the port;

(m) reclaiming;

(n) re-screening; and

(o) ship loading.

4.4 All of these steps are required to produce the saleable product. The following paragraphs provide detail of what is involved in each step.

Drilling and blasting

4.5 Ore is drilled and blasted before it can be extracted by a loading unit. BHPBIO samples the blast holes at all its mine sites, with the sample results being used to generate a short term blast hole grade control model for the mine. The blasting pattern and quantity of explosive used is matched to the type of ore being blasted. This gives close control over the breakage and ensures that the blasting does not reduce the amount of lump generated by the blast.

4.6 Each blasthole is geologically logged and sampled as required. Using assay sample results and geological information, the blast hole is divided into blocks of common grades of ore or waste. The blocks of ore are designated as high grade or low grade. The remaining material is designed as waste. Where the ore is designated as low grade it is transported by truck to particular stockpiles. The ore is allocated to different stockpiles on the basis of the level of particular impurities in that ore. For example, ore with a high alumina content may be placed in one stockpile, while ore with a high silica grade may be placed in another.

Removal of waste

4.7 Most of BHPBIO's mines require, on average, approximately two tonnes of waste to be removed in order to obtain one tonne of ore. However, this ratio can be as high as 4 tonnes of waste per tonne of ore.

4.8 The waste is generally removed by loaders or shovels and placed into trucks which haul the waste up to 3 kilometres to waste storage areas.

Collection, Hauling and Pre-Crusher Stockpiling

4.9 At Mt Whaleback, Yandi and Mining Area C, high grade ore blocks are mined by loading units and placed into haul trucks. These haul trucks may carry up to 240 tonnes of ore each. Most high grade ore from these mines is taken directly to the primary crusher. The remaining high grade ore is placed into pre-crusher stockpiles. Mining is done under the careful supervision of quality control officers to ensure maximum recovery of high grade ore.

4.10 Low grade ore is sent to either the beneficiation plant or pre-crusher stockpiles. The use to which stockpiles of low grade ore is put depends on the mine site in question. For example, ore from a number of the stockpiles of low grade ore at the Whaleback mine is taken to the beneficiation plant for processing.

4.11 For Satellite Orebodies 25 and Jimblebar, all ore is placed into stockpiles before crushing.

Crushing and screening

4.12 All ore, whether taken directly from the pits or from pre-crusher stockpiles, is crushed before railing. Ore is first crushed at the primary crusher. In some cases it is screened prior to primary crushing (this is known as "scalping"). The primary crusher breaks the ore down to a size of less than 200mm. At some mines the trucks tip the ore directly into the crusher and at others the crushers are fed by front end loaders. Different types of crushers are used at different mines. Some use gyratory crushers and the others use jaw crushers.

4.13 For example, at Jimblebar and OB25 the crushers are smaller jaw type crushers and the ore is fed into the crusher by front end loaders which dump 20 tonnes at a time.

4.14 At most sites the primary crushed ore is further crushed to a size of less than 100mm in a second stage of crushing. Ore from the Yarrie mining area only undergoes primary crushing.

4.15 In the case of the mines at Mining Area C and the two Yandi mines (Yandi 1 and Yandi 2), ore is crushed and screened to final product size specifications (lump and fines) before it is transported by rail to Port Hedland.

Beneficiation

4.16 BHPBIO operates two beneficiation plants; one at Mt Whaleback and the other at Finucane Island.

4.17 Beneficiation is the process by which the ore is concentrated to increase the grade of iron by separating out waste material. In the case of low grade ore from Whaleback, beneficiation increases the iron content from approximately 57% to approximately 65%.

4.18 The beneficiation process at Mt Whaleback involves the treatment of the ore using heavy medium (ferrosilicon) drum, cyclone and spiral circuits. The process at Finucane Island involves the upgrading of ore through jigs, spirals and a wet high intensity magnetic separation circuit.

Post crusher Stockpiling and Train Loading

4.19 After the ore has been crushed, screened and, in the case of Whaleback beneficiated, at the mine, it is then stockpiled. Some of the stockpiles are located over automated train loadout facilities. The other stockpiles require loading onto trains by front end loaders. Stockpiling is essential to ensure that sufficient material is available to enable loading of trains to commence as soon as they arrive at the mine and for loading to be completed without delay. It is also required for blending and to ensure continuity of mining and processing operations.

Railing and Unloading at the Port

4.20 Ore is loaded into rakes from the post crusher stockpiles at each mine and then railed to Port Hedland. In the case of the Newman mining area, rakes are taken from the mines and combined at the Jimblebar rail junction, which is approximately 20 km from Newman, and from there railed to Port Hedland as trains.

4.21 The Newman trains typically take from 6 to 8 hours to cover the distance from the mines to Port Hedland. Trains on the Goldsworthy line generally take about 4 hours to travel to the Port.

4.22 All train movements are managed from the Traffic Control Centre at Port Hedland using a solid state interlocked control system. Specialised computer hardware and digital communications powered by solar technology support the signalling system. The systems control train movements and warn about unsafe conditions (overheated wheels and bearings, dragging equipment), as well as monitoring wheel impacts and weighing the rail cars as they pass.

4.23 The rail system and train scheduling are an integral part of the production process. This involves the sequencing of trains departing and arriving from particular mining areas as well as the quantity of ore transported from each mining area.

4.24 Accordingly, generally each rake only carries ore from a particular mine or mining area. Ore from each of the Yandi 1, Yandi 2, Orebody 25, Jimblebar, Mining Area C, Yarrie and Nimingarra mines is carried in separate rakes. Ore from Mt Whaleback and Orebodies 29 and 30 is blended together at the mine and is then carried in a single rake separate to ore from other mines.

4.25 Weekly train scheduling is determined by mine output, shipping demand for different products, maintenance requirements and inventory levels at the mine and port. The number of rake departures and arrivals from each mining source is scheduled on a weekly basis to meet the production targets that have been set.

4.26 The number and sequence of rakes from different mines sources is then adjusted on a daily basis to ensure grade quality control and continuity of production. The role of the rail system in the production process is described in more detail below.

4.27 For trains on the Newman line the ore cars are unloaded at Nelson Point by three large rotary dumpers. The dumpers turn the whole ore car upside down and the ore is deposited into bins and fed onto conveyor belts from the bins.

4.28 On the Goldsworthy line the trains are unloaded at Finucane Island into a hopper system through openings in the bottom of the ore cars. From the hoppers ore is fed onto conveyor belts.

Tertiary Crushing and Screening at the Port

4.29 After unloading at Nelson Point, ore from Mt Whaleback, Jimblebar and Orebody 25 is screened and crushed again before being put onto stockpiles.

4.30 The conveyors take the ore to tertiary screens which separate the ore into 3 product streams – lump, fines and oversize.

4.31 The lump and fines are conveyed to separate blending stockpiles. The oversize is sent to tertiary crushers and recirculated to the tertiary screens.

4.32 Tertiary crushing is carried out by large cone crushers. There are 13 crushers located at Nelson Point.

Blending Stockpiles

4.33 The lump and fines products from the tertiary screens are sent to blending stockpiles. Each stockpile contains between 150,000 and 200,000 tonnes of ore and is between 150 and 200 metres long and approximately 15 metres high. Stockpiles are built up with stackers travelling slowly over the full distance of the stockpile length. The stacker speed varies so as to stack a constant volume of ore per metre of length on the stockpile.

4.34 The "building" method is known as the chevron-ply system of stacking and is designed to produce uniform grade slices in the stockpile when it is reclaimed. A graphic representation of the stacking method is set out at Annexure "**PP10**".

4.35 Stockpiles are built by selecting an empty "footprint" where a certain volume of ore can be stockpiled. As each rake is unloaded, the stacker spreads the ore along the whole length of that footprint.

4.36 A rake may take 2 to 3 hours to empty, and a stacker may make 4 to 6 passes along the stockpile length, adding a little to the height of the stockpile on each pass. The next rake is stacked on top in the same way. The method is called "chevron stacking", because a cross section of the different ore layers resembles a chevron.

4.37 This homogenising means that grade deviations from cross section to cross section of stockpiles are greatly decreased compared with the original ore stream when spread on the pile. For example, if a ship needs to be loaded with 80,000 tonnes of lump, it might be taken from a 200 kilotonne stockpile like the one just described. An 80 metre length might be removed from the end. The average grade of that length will equal the average grade of the whole stockpile.

Reclaiming ore

4.38 When the ore is required for shiploading, the ore is dug out of each stockpile by large bucket wheel reclaimers onto conveyors for transfer to ships at rates of around 8,000 tonnes per hour.

4.39 The stockpile is reclaimed in segments, as needed, at 90° (known as bench reclaiming). This ensures that each reclaimed part of a stockpile has a grade that closely matches the overall stockpile characteristics.

Re-screening

4.40 Lump ore is re-screened while being conveyed from the bucket wheel reclaimer to the shiploader. This is to remove any undersize material that has been produced in the handling and transportation process between the mines and the Port. A low level of undersize material in lump ore is particularly important to customers. The screened out undersize material is recycled to the fines product stockpiles.

5. **Management of BHPBIO's production process**

5.1 The overall objectives of BHPBIO's production process are to produce iron products loaded on board ships for export and to meet customers expectations as to product specifications, quantity and timeliness. To achieve this BHPBIO uses an integrated approach to mining, processing, rail carriage, port operations and marketing. Key management systems in this approach include sampling, blending plans and train scheduling.

Sampling

5.2 Sampling starts with blast hole sampling as described in section 4.6. Blast hole sampling is used to determine final mining ore block chemical content and estimate the lump and fines chemistry. Sampling also occurs at various other points in the production process.

5.3 There is continuous and regular monitoring of the grade quality of ore which is mined from the mining areas. Assay determinations are done every few hours and fed back into the system to monitor grade quality.

5.4 There are sample stations in all ore processing plants at the mines and ports. These generate important and continuous feedback for quality control of products. Many sample stations are also set up to allow sizing samples to be taken, as well as chemical ones.

5.5 There are sample stations on all ship loading circuits, at both Nelson Point and Finucane Island. All product cargoes are issued a physical and chemical quality certificate on the basis of the results of the assay. The certificate is sent to customers after their cargoes have been loaded.

5.6 Samples from all stages of the production process are prepared and analysed at analytical laboratories at BHPBIO's operational sites. BHPBIO operates quality control laboratories at Newman, Nelson Point and Yarrie.

Blending Plan

5.7 As discussed above, different grades of iron ore from the mines must be blended to achieve a target grade. The overall blending plan is determined by both:

(a) customer requirements; and

(b) optimisation of available resources.

5.8 The controlled blending of ore of different grades enables BHPBIO to extend the economic life of its mines by utilising more of the lower grade ores from a mine.

5.9 The blend plans set quality grade targets and are prepared by the mine planning personnel. These targets are set for the ore at different stages of the process to ensure that the final ore that is loaded onto the ships at the port meets the relevant product specifications.

Conventional batch grade control system

5.10 To control blending to meet final product specifications, BHPBIO formerly used what was commonly termed a conventional batch grade control system aimed at achieving

200 kilotonnes of ore "on-grade" (this means ore which meets the final product grade specifications").

5.11 The batch grade system worked on producing a stockpile of a pre-determined volume which met grade targets. This system allowed for a significant amount of variation in stockpile grade at different points in production of the stockpile.

5.12 This system proved to be adequate in the early years of the operations in the Pilbara. However, BHPBIO formed the view that the conventional batch system was not the most efficient product quality control tool because it was difficult to maintain consistent grade quality at higher production rates.

5.13 In about late 1999, BHPBIO replaced the conventional batch system with a new fully integrated Continuous Stockpile Management System (**CSMS**), which BHPBIO pioneered.

Continuous Stockpile Management System (CSMS)

5.14 The CSMS is a fully integrated production and grade control system from mine planning through to port reclaiming. The system is based on sophisticated software which provides a method of integrating a variety of mine and ore data to obtain the optimal balance of blending of different grades of ore.

5.15 The benefit of the system is to be able to balance adjustments of the presence of four different elements for 2 products simultaneously in a complex production process. Human judgment is unable to take into account the multitude of factors involved to make decisions which balance variation in those elements. The software is based on an Excel spreadsheet but incorporates a number of complicated mathematical formula.

5.16 As discussed above, different mining areas produce different grades of iron ore containing different amounts of particular elements in the ore. To ensure that grade quality and specifications are maintained, the CSMS determines how much ore from each mine source is required from a particular mining area and that, in turn, influences rail scheduling. A person assigned at each mine takes responsibility for this process. For example, at Newman, the Quality Co-ordinator would spend approximately half of each working day determining the daily rail schedule.

5.17 The system uses a mathematical approach to balance all measured elements in both lump and fines products with the aim of optimising the overall grade of the products. Annexed and marked "**PP11**" is a chart, which illustrates the mathematical calculations which determine the selection of the particular ore source for the next train to maintain the trend towards the target grade for the blending stockpiles at the port.

5.18 Central to the process is what is technically termed an "exponentially smoothed continuous stockpile flow" with no nominal starting or finishing point. The key objective is to continuously "smooth" the grade quality of ore stockpiles at the port by optimum blending from pits with diverse ore grades utilising a flexible mining system and a disciplined approach to railing, stacking and reclaiming.

5.19 In practical terms, targets for each mining area are set in accordance with annual mine and marketing plans. The targets set a prescribed blend for grade quality and quantity of ore for each mine source and mining area. The blend targets are influenced by a number of factors including customer demand, grade quality and characteristics of ore, costs, resources available, maintenance requirements and mine optimisation targets. However, the most significant factor is the need to meet customer specifications for final products.

5.20 The rail system and train scheduling are therefore critical to the operation and efficiency of the CSMS. The CSMS determines the proportion and influences the sequencing of trains departing and arriving from particular mining areas as well as the quantity of ore transported from each mining area. Train schedules are set to meet the production targets. Different numbers of trains are scheduled in each week from each mining source in a particular area to transport different quantities of ore. The number and order of train departures and arrivals from each mining source is scheduled to meet the targets that have been set and then adjusted (on a daily basis) to ensure grade quality control and to meet production targets.

5.21 An estimate is made of the quality of ore in each rake on the basis of sampling at the mine. Using this information the system suggests what proportion of rakes should come from particular mine sources over the next 24-hour period in order to build stockpiles at the port of product with the appropriate specification. This means scheduling a certain number of rakes from a particular mine source for each 24-hour period. The scheduling of rakes from different mining areas is therefore critical to the operation of the CSMS.

5.22 The system does not rely on individual rakes being on grade for final product specification. Instead, the system relies on rakes that have been selected to make a definite series, even though they may come from different ore sources with varying grade ranges. The aim is to keep the continuous stockpile grade for each element, for both lump and fines, within defined grade quality limits.

5.23 The CSMS integrates with 4 management review processes. They are:

(a) An integrated monthly meeting attended by senior operations management and marketing personnel to set tonnage and grade targets for the next month.

(b) A weekly review is held to set a more detailed weekly production and railing plan.

(c) A daily review of the continuous stockpile grades by the quality co-ordinators and mine schedulers required for establishing the rail schedule.

(d) A daily telephone conference call between senior operations management and key personnel from each of the mine, rail and port sites.

5.24 To implement continuous control, product variability throughout the process is classified as long term and short term.

5.25 Long term variability is controlled through the monthly mine planning process which determines monthly grade targets while taking into account optimum mine development.

5.26 Short term variability is controlled around a monthly mine grade target by daily mine production scheduling, train sequencing, stacking into port stockpiles of appropriate size and systematic stockpile reclaiming.

5.27 If a stockpile grade falls outside monthly tolerances, it is referred to senior operations management to determine appropriate action. The nature of the action taken depends on the degree to which an element is out of specification. For example, a decision may be made to blend two or more stockpiles into a single shipment.

5.28 Annexed and marked with the letters "**PP12**" is a copy of a paper entitled "Controlling Product Quality at High Production Rates as applied to BHP Billiton Iron Ore Yandi Fines" and was presented to the Iron Ore Conference in Perth, Western Australia in September 2002. The paper was prepared by BHP Billiton Iron Ore personnel together with a consultant from the University of Western Australia who jointly pioneered and developed the CSMS with BHPBIO. The paper discusses in greater detail the mathematical and technical aspects of the CSMS.

5.29 Each mining area has separate CSMS software. The software is run on desktop computers located at the offices for each mining area, which are Newman, Mining Area C, Yandi and Yarrie. In most cases, the assay data is entered automatically into the desktop computer from the laboratory information management system. However, some data is still entered manually.

Newman Mining Area

5.30 As discussed above, the NHGL and NHGF iron ore products are produced by blending ore from the different mines in the Newman area (which are Mt Whaleback, Satellite Orebodies 25 and Jimblebar and Marra Mamba Orebodies 29 and 30). Ore from each particular mine is sent in a separate rake. The blending of the ore from the different mines, to achieve the NHGL and NHGF product specifications, is controlled by the tonnage and proportion of rakes of ore from the different mines at the port.

5.31 Accordingly, for the Newman mining area the CSMS recommends the proportion of rakes from each of the mine sources, which need to be scheduled for any 24-hour period. The Quality Co-ordinator for the Newman mining area then determines the sequence of the rakes to make up the particular numbers of rakes required from each mine source. This sequence is based on consideration of a number of factors including train availability and mine inventory.

Yandi Mining Area

5.32 The determination of train scheduling for the Yandi mining area is conducted in a similar manner to the Newman mining area except that variation in the proportion of trains is less because of the need to meet high demand for Yandi products.

5.33 Train scheduling is very significant for grade control for Yandi products because of the relatively high tonnages generated by and railed from the Yandi mines and the narrow range around the grade targets that Yandi fines product must fall within to be acceptable by customers.

Yarrie Mining Area

5.34 In general, for the Goldsworthy rail line the sequence and number of trains of different ore types is determined in accordance with the monthly plan and generally does not vary significantly from that schedule. The usual schedule is four trains per day – two of Goldsworthy High Grade Ore and two of Goldsworthy Beneficiation Plant Ore, generally on an alternating basis.

5.35 However, where problems with grade control have emerged it may be necessary on some occasions to vary the schedule in order to return stockpile grade to target. For example, it may be necessary to run four Goldsworthy High Grade Ore trains consecutively instead of the scheduled two trains of High Grade Ore and two trains of Goldsworthy Beneficiation Plant Ore that are scheduled for that day.

5.36 The need for this variation partly arises because of the narrower ore bodies present at the Yarrie and Nimingarra mines, which makes grade control more difficult.

5.37 Goldsworthy Siliceous Ore is also railed on the Goldsworthy line. Loads of GSO are not run on a daily basis and are only run as necessary to meet shipping requirements. The usual method of railing GSO is that 4 train loads are sent on the one day. On average, this occurs only about one day per month.

5.38 Separate software is used for the CSMS for the Goldsworthy line. As with the other systems this software is based on an Excel spreadsheet with particular mathematical formulae included in the software to assist with the determination of the optimal sequence of mining operations. In some circumstances, as described above, it also affects decisions on the sequence of trains.

5.39 The CSMS software for Yarrie is operated by a Grade Controller who is based at the Yarrie mine. Grade information obtained from sampling at the Nimingarra mine is communicated by telephone from a Grade Controller at the Nimingarra mine.

Mining Area C

5.40 As there is no blending of ore types at the port for Mining Area C products, train scheduling is only significant for meeting demand for those products. The CSMS is used for Mining Area C to control grade quality of product stockpiles at the mine.

6. Maintaining Flexibility in the Rail Scheduling System

6.1 Flexibility in the rail schedule is a critical element of the CSMS. The weekly and daily rail schedules may be adjusted at any time in order to ensure that:

(a) the grade quality of the product stockpiles at the port are within the acceptable limits; and

(b) there is sufficient quantity of each product to meet customer demands based on ship arrivals at any given time.

6.2 At any stage of the production cycle, unforeseen delays may require adjustment of the rail schedule. For example, there may be faults with signals or queuing at port dumpers due to material handling delays.

6.3 For the above reasons the train scheduling on the Newman and Goldsworthy lines is unlike a passenger rail system. Actual departure and arrival times and slots do not necessarily exactly match the daily plans which are prepared.

6.4 There are 12 departure/arrival slots in any 24 hour period. Annexed and marked with the letters "**PP13**" is a copy of a recent weekly and a daily railing schedule for the Newman line. The daily schedule shows train departures from each rail load out facility from the Newman, Yandi and Mining Area C mines as well as the sequence and make up of the rakes for each departure slot.

6.5 There are quarterly, monthly, weekly and daily meetings between the relevant personnel at the mines, rail, port facilities and marketing in order to determine the quarterly, and monthly plans and weekly and daily schedules respectively. The quarterly and monthly meetings are in person and the other meetings are held by a telephone conference. A weekly and daily rail schedule is produced. Representatives from each of the mining areas, rail and port are present at the meetings.

6.6 At the meetings, a weekly rail schedule is set to ensure that sufficient amounts of particular products are available to meet the demands from ships arriving that week, taking into account factors such as stockpile levels and maintenance requirements.

6.7 That weekly schedule is continuously reviewed and, as part of the CSMS, is adjusted daily to ensure that grade quality control is met.

Base loading

6.8 Base loading involves the blending of ores from different mines in order to control the moisture content in the iron ore that is extracted from the mines. Ore is difficult to handle at the port if it contains high moisture levels. From time to time, it is very important that, in order to reduce handling difficulties, moisture levels in ore are controlled.

6.9 To do this, ore from a particular mine that contains high moisture levels will be blended or mixed in the ore cars with ore that is produced or extracted from mines which are producing ore of a lower moisture level. This method of base loading significantly reduces difficulties encountered with handling ore of high or low moisture levels.

6.10 The monitoring of moisture levels is conducted daily for each rake and is factored into the monthly grade and production plans as well as the weekly and daily rail scheduling plans.

6.11 The importance of base loading in certain conditions, such as heavy rainfall, means that flexibility in rail scheduling is a key part of the production process.

Maintenance and repairs

6.12 Flexibility in the rail schedule is also important for maintenance. For example particular mining processing plants or load out facilities must be shut down for maintenance from time to time. When that happens, the rail schedule needs to be adjusted so that slots in the rail schedule are filled by rakes departing from other mining areas and load out facilities that are not undergoing maintenance.

6.13 Adjustments to the weekly and daily rail schedules also need to be made when there are unforeseen events such as materials handling problems or equipment breakdowns. If an event like these occurs, the number of rakes, the slots and the destinations to meet tonnage and quality requirements at the port may be altered to compensate for the disruption.

Meeting market/customer demands

6.14 Customer demands for each product type can vary significantly from week to week. The production process has to respond to meet swings in demand and "demand spikes".

6.15 Generally speaking, BHPBIO uses the product stockpiles at the port facilities to buffer between variability in demand (the shipping schedule) and production (the rail schedule). However, in times of high demand, the stockpiles are run down and this means the rail schedule will need to be adjusted to match demand according to the shipping schedules.

6.16 The ability to vary the number of trains or rakes from each mining area to meet production and demand is critical. Under supply contracts, customers are only required to give 10 days notice of the arrival date of ships at the port facilities. In the event there is a very short term demand for one particular product, the rail schedule may need to be adjusted so that there are sufficient quantities of that particular product to meet the orders that are to be filled by the particular ships arriving at the port facilities.

6.17 On an annual and quarterly basis, the management group at BHPBIO will agree with its customers production requirements for each quarter.

6.18 While this enables a high level of planning to be done, BHPBIO still needs to deal with demands imposed by the dynamic nature of ship scheduling. Some of these ships carry single, dual and even triple product types and BHPBIO needs to ensure that there are sufficient quantities of different product types in stockpiles at the port facilities in order to meet the demand from these ships as they arrive.

6.19 The arrival schedule of ships at the port facilities is continuously updated. Whilst a schedule is prepared for each month, practically the schedule is only reasonably accurate up to 10 days.

6.20 The Senior Process Control Officer (based at Port Hedland) works closely with the Superintendent Shipping to review inventory levels for each of the products at the port and provide feedback on these levels to assist with rail scheduling.

6.21 In summary, rail scheduling plays an integral role in the iron ore production process, in that it:

(a) maintains grade quality of ore products as part of the CSMS;

(b) maintains lump and fine ratios;

(c) permits efficient base loading;

(d) helps optimise the economic life of each mine;

(e) ensures that market demands and variability in that demand will be met in the production process; and

(f) permits maintenance work to be carried out on parts of the mining operations, rail track infrastructure and port facilities with minimal effect on production or efficiency.

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PHILLIP ANTHONY PRICE

6 September 2004