IN THE FEDERAL COURT OF AUSTRALIA)
VICTORIA DISTRICT REGISTRY)
GENERAL DIVISION)

No. VID 1641 of 2004

BHP BILLITON IRON ORE PTY LTD (ACN 008 700 981)

Applicant

and

THE NATIONAL COMPETITION COUNCIL

First Respondent

and

FORTESCUE METALS GROUP LIMITED (ABN 57 002 594 872)

Second Respondent

AFFIDAVIT

I, **RODNEY TYTLER HOARE**, of 19 Ferntree Place, Henley Brook, Perth, in the State of Western Australia, say on oath:

Introduction

1. I refer to my affidavit sworn on 14 July 2005 and filed in this proceeding (**July affidavit**).

2. As stated in my July affidavit, I have provided simulation modelling based consultancy services to BHPBIO in relation to BHPBIO's mine, rail and port operations in the Pilbara region of Western Australia over the last fourteen years, to assist BHPBIO with expansion planning studies and operational improvement studies. As a result of providing those services, I have considerable knowledge of, and experience relating to, the capability modelling and system dynamics of BHPBIO's mine, rail and port operations.

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Simulation Modelling

Why is there a need to model?

3. Simulation modelling can assist business decision making in respect of complex systems such as mining, manufacturing, logistical or transportation systems. It can be used for analysing and quantifying risks, analysing expansion options and system performance, optimising system operation and the handling of unplanned failures to any part of the system.

4. Modelling techniques provide a business with a rational and quantitative process for increasing the business' understanding of the potential consequences of a range of alternate proposals, from a change in operational philosophies through to the commissioning of new infrastructure and its interaction with existing infrastructure and operations. As in most complex systems, there is often a range of differing views as to the best way to solve any problem. Simulation modelling assists in decision making by allowing for the evaluation of a wide range of scenarios, together with providing reasons as to why some options performed better than others.

How does modelling work?

5. Simulation is the technique of building a computer model that imitates the behaviour of a real or proposed system to enable the study of the behaviour of the system under specific conditions and based on pre-determined assumptions. Simulation modelling is used to evaluate designs and analyse systems that are too complex for analysis using traditional methods. It is generally performed using specialised computer software that is programmed to represent the relevant activities, their interdependence, the operational rules and the performance data that together characterise how the system behaves.

6. Discrete event simulation works in the following way. Each physical item (truck, rake, reclaimer, ship, etc.) is modelled as a discrete entity, with its own uniquely defined set of properties or attributes (speed, material type, reliability, carrying capacity, etc.). These entities act out the operational activities that make up the processes being modelled. They consume discrete periods of time for each activity and incur delays that can be logically induced (eg. bin empty, no rake etc.) or randomly induced (eg. breakdown, failures, etc.) all of which are dependent on the data and rule settings that are defined for that process. This

combination of logical and random events is designed to reflect the most likely operational environment.

7. Simulation models can vary greatly in terms of their level of detail, from simple high level representations of a process down to very large and very detailed representations of all the activities that make up the process being studied. Typically they are built "fit for purpose" with enough detail to encapsulate the issues and emulate the behaviour of the process being modelled such that the end user gains sufficient insight to assist his decision making, taking into account the consequences of the decision.

8. Hence, dependent on the purposes for which the model is being used, varying degrees of work is undertaken across a range of activities, including:

(a) developing the study objective;

(b) identification of the key questions to be answered;

(c) scoping the extent and depth of the model boundaries;

(d) determining the model assumptions;

(e) agreeing on the approach to stochastic issues;

(f) defining and coding the operational rules and logic;

(g) gathering, analysing and agreeing on the data settings;

(h) defining and coding the output requirements;

(i) verifying and validating the model performance;

(j) exercising the model in a systematic analysis;

(k) communicating the results and developing the findings; and

(l) re-iterating the model with new questions to be answered.

Limitations of modelling

9. Simulation models are typically built with stochastic inputs, ie. random events such as breakdowns are programmed into simulation models using probability functions. As a result of these stochastic inputs, modelling outputs are also stochastic. Stochastic outputs are best represented as a distribution of predicted results, rather than a definitive or single point answer.

10. Simulation models can also have very different levels of detail in their calculations of predicted performance. High level models typically have many assumptions, and it may not be apparent to the decision maker just how much influence some of these assumptions may have on the outcome of the analysis. To assess the influence of different assumptions, a set of sensitivity cases can be run with a possible range of input values to see if the input has a large or small impact on the objective function. Where inputs are sensitive (i.e. a small change in the input leads to a large change in the output), then typically more work has to be done to prove up what will be achievable post implementation.

11. Ultimately, the accuracy of the model outputs is dependant on the quality of its inputs (including any underlying assumptions). This is commonly described by the acronym GIGO, meaning "garbage in, garbage out".

BHPBIO's mine, rail and port system

Visual representation of BHPBIO's mine, rail and port operations

12. In or about 2000, I was asked to assist BHPBIO in relation to a project that was studying the rail marshalling yard at Port Hedland. In connection with that project, I prepared a visual depiction of activity in the marshalling yard, and its operational interdependence with the whole of BHPBIO's mine, rail and port system. The visual depiction was a computer animation of the simulation model of BHPBIO's mine, rail and port system, with a particular visual focus on the marshalling yard. Annexure "**RTH-1**" is a computer CD containing a background summary in Microsoft PowerPoint™ format and an animation playback file, together with a short summary of the contents of the CD. This playback file was created by recording the images generated by the Arena™ Software running the

computer animation of the simulation model of BHPBIO's mine, rail and port system as they were modelled in the year 2000.

13. Preparing computer animations is a complex and time consuming task, and is not a necessary part of all of the modelling studies that I undertake on behalf of BHPBIO. Accordingly, the computer animation has not been updated since 2000. In contrast, the simulation model of BHPBIO's mine, rail and port operations has been regularly validated to reflect actual and proposed changes to those operations.

14. Although the computer animation is not up to date, it illustrates many features of the mine, rail and port operations that are reflected in the simulation model, including the following particular features:-

(a) *How approaching trains pass each other on the mainline*

As the main rail line (mainline) from the mines to the port is a single track, when trains approach each other, one train has to come to a stop in a passing siding to allow the other train to pass (this is called a "meet"). The more times trains are stopped, the lower the trip efficiency as measured in terms of tonnes delivered over time taken to transport the tonnes.

(b) *How the marshalling yard activities are constrained by resources*

When trains arrive at the port, they are split into individual rakes for dumping. Rakes typically contain around 100 cars that stay together while being dumped. Following the dumping 1, 2 or 3 rakes are put together to form a new train which is then tested prior to departure from the port. Compressor cars are required to be attached to each rake prior to dumping to maintain air pressure for the brakes as the cars are being indexed through the dumpers. All these activities take place in the marshalling yard, and require shunt locomotives to move the rakes and compressor cars around.

These, and other, yard resources constrain the performance of the yard's operation when concurrent jobs result in concurrent demand for the same resources, particularly where some of the jobs are on opposite sides of the yard, resulting in a demand for the resources that exceeds availability.

(c) *How train departures at the port are constrained waiting for rakes*

As illustrated in the animation, trains cannot depart the port until enough rakes have been unloaded and they become available to form new trains. In this way, any delays that occur prior to, and during, dumping operations will impact on the departure time of the next empty train out to the mines.

(d) *How dumping operations require stockpiles and shared equipment*

Even though a dumper may have received the next rake to dump, dumping cannot commence until both a suitable stockpile and a route (consisting of a set of conveyors linking a dumper to a stacker) that can reach the selected stockpile, are available.

A "suitable" stockpile is one that:

- contains the right product;
- is still in the process of being blended;
- has room for the contents of the rake; and
- is able to be reached by a stacker.

In the case of ore from the Newman mining area the process is more complex, as the ore carried from that area is run of mine (ROM) ore and as such has not yet been crushed or screened to separate lump from fines. Accordingly, for each rake of ore from the Newman mining area, at least two suitable stockpiles need to be identified – one for the lump and one for the fines that will be produced following crushing and screening at the port, as well as a route from the car dumper that enables the ROM ore to proceed to the crushing and screening plant and then on to the stockpiles.

Not all stackers can be serviced from all dumpers, and similarly not all stackers can be serviced from all crushing and screening plants. As there are three car dumpers, one car dumper may be using a conveyor that another car dumper may need in order to be able to reach a suitable stockpile. It is in this way that stockpile choices and conveyor choices induce delays in the unloading of rakes and further delay departures of empty trains.

A stacker may also be prevented from operating for a period of time because a reclaimer may be operating in a location that prevents the stacker from operating (they share the same rail). The potential for this type of interference between port equipment can be seen from Annexure "**RTH-2**" which is an illustration of the Nelson Point site layout. It can be seen from this illustration that reclaimer 3 and stacker 3 and reclaimer 4 and stacker 4 share the same rail. If, for example, stacker 3 is building the stockpile on the far left, then reclaimer 3 is not able to access any of the stockpiles in the top row in the illustration. Where a stacker is unavailable, this impacts on the ability of the car dumper to operate, which in turn leads to train queues building up.

(e) *How random events cause delays*

As well as these logically induced constraints in the model, such as suitable stockpiles and sharable conveyors causing delays, randomly induced constraints also cause delays. These random events simulate equipment breakdowns and operational delays such as blocked chutes and conveyor run-offs. These random events are modelled using Monte Carlo simulation techniques and they represent the actual historical equipment up times and down times as have been measured by BHPBIO's delay accounting systems.

(f) *How shiploading operations are impacted by uncompleted stockpiles*

Shiploading operations require suitable stockpiles and a route consisting of a set of conveyors starting with a reclaimer that can reach the suitable stockpile and ending with a shiploader. A pile that is suitable for reclaiming is one that:

- contains the right product; and
- has been fully blended and is ready for reclaiming or is already partly reclaimed.

It is only when reclaimable stockpiles are fully reclaimed that a footprint then becomes available to be stacked to. Further, footprints are usually allocated an ongoing product designation, so as to prevent any floorstock contamination of a new stockpile.

For the reasons discussed at paragraph 20 below, this process has a significant impact on shiploading operations. This is because low shipping demand means that there are fewer stockpiles available to be stacked, thereby impacting on dumping performance, and high shipping demand means that there are fewer stockpiles available to reclaim from, thereby impacting on shiploading performance.

15. Because there is a fixed fleet of rolling stock operating within the confines of the total system, the rail operations are physically contained inside a closed-loop system; ie. trains on route to the mines cannot depart the port until they are unloaded, and trains on route to the port cannot depart the mines until they are loaded.

16. Also due to the variable number of meets that can occur on each trip, the actual time it takes to travel from the port to the mines, and also from the mines to the port, is highly variable. In addition, train loading and unloading facilities are impacted by equipment performance and reliability issues, as well as stock levels and available yard space in which to unload the products. There is therefore a high level of unpredictability around when a train will arrive at a destination and also when it may depart again.

Why sub-system optimisation does not translate into total system optimisation

17. Use of the simulation model of BHPBIO's mine, rail and port system assists in demonstrating that optimisation of the operations of each of the sub-systems in isolation does not necessarily result in an optimised operation for the system as a whole. This is because of the integrated nature of all of the activities that comprise BHPBIO's system (being its mine, rail and port operations), and the constraints imposed by each sub-system on the other.

18. As such, the whole system is ultimately only as efficient as its least efficient component. This is illustrated by the diagrams set out at Annexure "**RTH-3**", which show a comparison of notional capacity per sub-system as contrasted with overall system capacity at different times.

19. This characteristics of BHPBIO's mine, rail and port system can be further illustrated by the following examples:

(a) Example 1

The car dumping operation at the port would theoretically operate most efficiently if there was always a train waiting to unload product into the stockpiles at the port, thereby ensuring 100% utilisation of the car dumpers. That is, optimal operation of the port sub-system would require a constant queue of loaded trains waiting at the port to unload iron ore. This, however, would be highly inefficient for the rail sub-system which, in order to achieve its most efficient method of operation, would seek to avoid any queuing of trains, and would prefer to always have an idle car dumper available so that its trains could be unloaded without any queuing delays. Given queuing conflicts such as this, a balance must be struck between the rail and port operations in order to maximise production for the system as a whole.

(b) Example 2

If the rail sub-system were to optimise its performance it may try to lower its costs by reducing resources that are under-utilised, while also seeking to maximise the utilisation of the remaining resources. However, even though some resources are under-utilised, they are sometimes required to be in multiple places at once. For example, marshalling yard shunt locomotives are required to move rakes into, and out of, multiple dumpers as well as cutting out cars from multiple rakes that require maintenance (as well as numerous other jobs). As there are times when a lot of these jobs need to be done at the same time (otherwise other activities are delayed and car dumpers become idle waiting for their next job to be delivered), total system efficiency dictates having these resources operate at a less than optimal rate, when considered in the context of the sub-system alone.

While shunt locomotives are used as an example here, this same issue applies to numerous other resources as well. Given concurrent task conflicts such as this, situations arise where excess under-utilised resources may be required to maximise total system production performance at the expense of sub-system optimisation. However, for the reasons discussed below, this principle of under-utilisation has not historically, and does not presently, apply to rail capability.

How variability and reliability directly impacts upon BHPBIO's integrated mine, rail and port system.

20. Drawing on my simulation modelling of BHPBIO's integrated mine, rail and port system, I have prepared the following diagram to represent a simplified process flow sheet of that system. Each sub-system within the overall system has its own performance variability and reliability features and characteristics. In addition, there are also external variable forces imposed on the overall system.

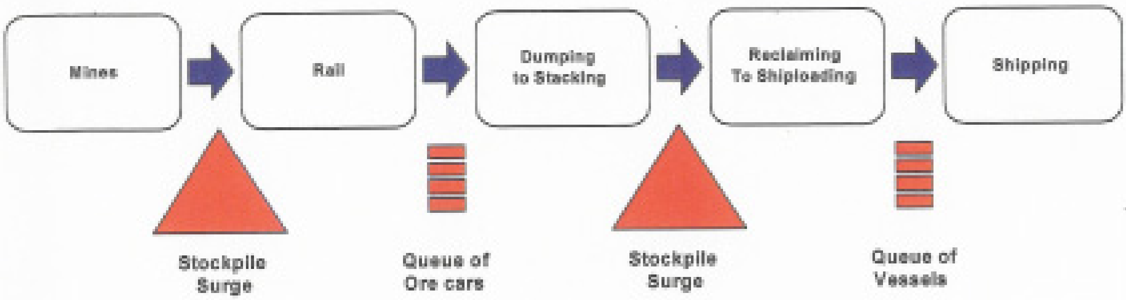

Figure 1 – Simplified Process Flow Sheet

21. There are many factors that cause variability to the operation of the mine, rail and port system, but some of the most significant are the following:-

(a) demand variability;

(b) ore type variability;

(c) component reliability; and

(d) resource sharing.

These are explained further below.

As a general observation however, BHPBIO's mine, rail and port operations exhibit a complex relationship between each of the sub-systems. Variability within any of the mine, rail or port sub-systems manifests itself in terms of operational performance impacts for the whole system. For example, variability in port operations affects both the rail sub-system (causing queues in entering or leaving the port) and the mine sub-system (causing delays in the ability to load trains, and potentially the sequence in which ores are railed). The points at which those impacts occur, and the extent to which they do so, depends on the contents and storage capacities of the buffering between the sub-systems, and the ability of each component in the overall system to absorb and account for sub-system variability at any given time.

Demand variability

22. If shipping arrivals and product demand at Port Hedland were constant, then port stockpiling and reclaiming operations would operate in the most efficient and predictable manner. However, variations to shipping arrivals and product demand directly impact on port stockpiling and reclaiming operations, as these operations are required to respond to that varying demand, rather than simply operating according to a pre-determined optimal operating pattern. An example of the way in which demand variability may impact these operations is identified at paragraph 15(d) above.

23. The effect of impacts on the port stockpiling and reclaiming operations can flow back as far as BHPBIO's mine operations, with the only mitigating factor on the impact of this demand variability being the extent to which stockpiles (either at the mine or the port) are large enough to absorb these impacts.

24. Figure 2 below shows the variability in ship arrivals at Port Hedland for BHPBIO iron ore for the period from July 2003 to July 2005. This figure has been prepared by TSG based on actual shipping data provided to TSG by BHPBIO over time from BHPBIO's shipping database.

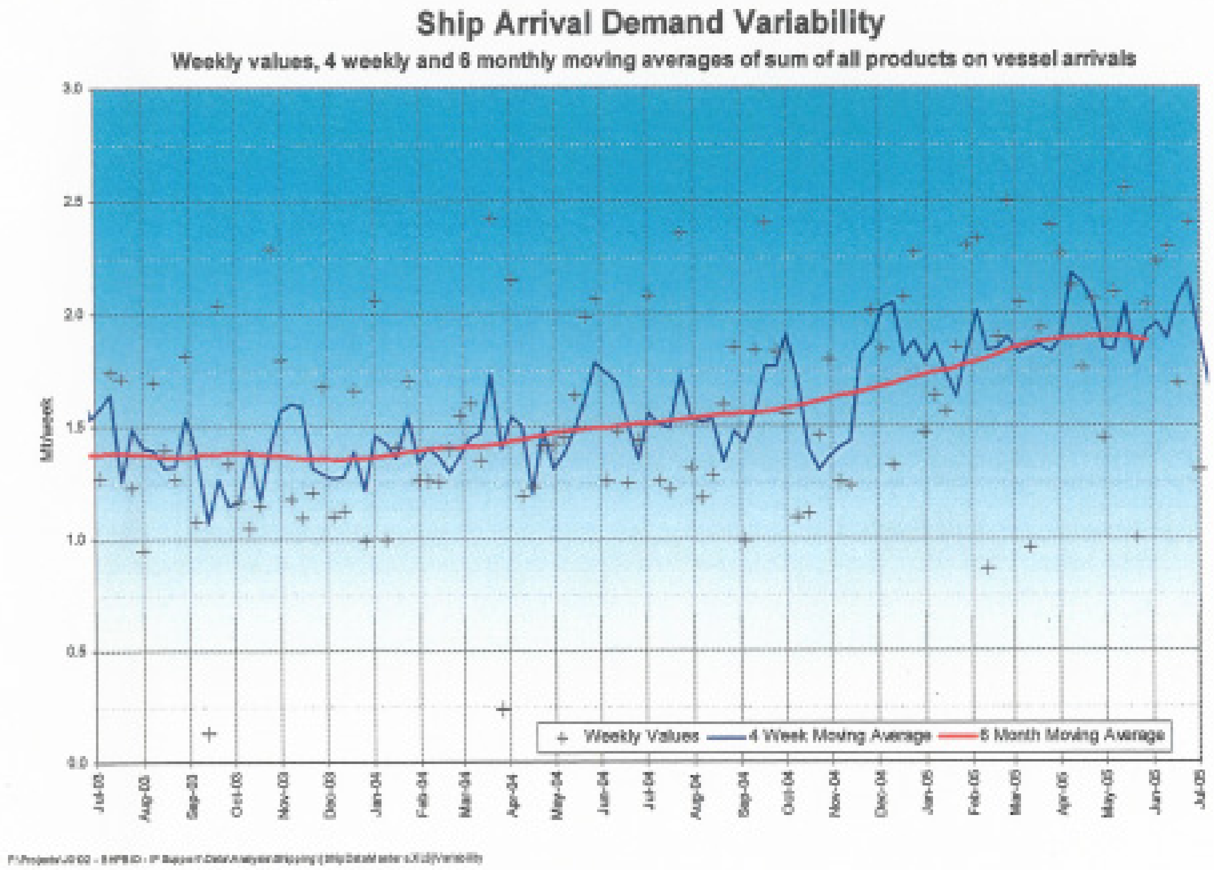

Figure 2 – Ship Arrival Demand Variability

25. As shown in figure 2, shipping demand is highly variable over time and occurs both in relation to total tonnes and specific products.

26. Periods of increased shipping demand appear in Figure 2 as the spikes in the 4 week moving average. During these periods, BHPBIO's operations experience:

(a) high vessel queuing, resulting in high demurrage bills;

(b) low port stocks (leading to minimal dumping delays due to increased stockpile choices); and

(c) reclaimers waiting to access completed piles as soon as they are finished.

27. Periods of decreased shipping demand appear in Figure 2 as troughs in the 4 week moving average. During these periods, BHPBIO's operations experience:

(a) high rake queuing;

(b) high port stock levels;

(c) dumping delays due lack of stockpile choices; and

(d) stackers waiting to access empty stockpiles as soon as they are emptied.

28. BHPBIO is able to some extent to 'smooth' the peaks and troughs of shipping demand through the buffering provided by stockpiles at the port and mine and the ability to use 'sprint' capacity of its rail system. Sprint capacity means the ability to alter the ordinary rail sequence to increase the trains per day of a specific ore product in order to satisfy the increased demand for that product.

29. Figure 3 below is a chart showing total shipping demand (tonnes per week) for BHPBIO's products between October 2003 and July 2005 and the total of BHPBIO's products shipped (sales) in the same period. This chart has been prepared by TSG based on actual shipping data provided to TSG by BHPBIO over time from BHPBIO's shipping database. It can be seen that the peaks and troughs of shipping demand are higher than for sales. To the extent that BHPBIO is unable to produce and ship products to satisfy the shipping demand, BHPBIO is required to pay demurrage fees for the ships that are waiting to be loaded. Accordingly, demurrage is a cost incurred as a result of BHPBIO's inability to 'stretch' or 'flex' its overall production sufficiently to match the variability of shipping demand.

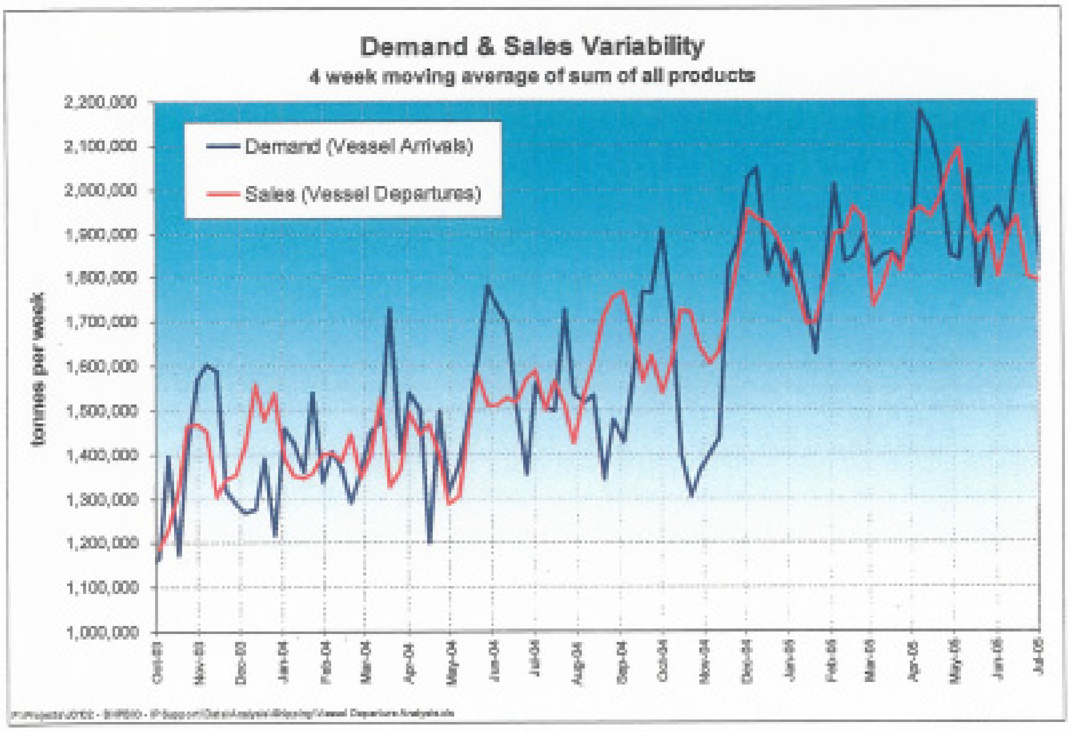

Figure 3 - Demand and Sales Variability

30. Figures 4 and 5 below illustrate the shipping demand variability and sales (shipped products) variability with respect to each of the products produced by BHPBIO for the period from July 2003 to July 2005 and September 2003 to June 2005 respectively. These charts have been prepared by TSG based on actual shipping data provided to TSG by BHPBIO over time from BHPBIO's shipping database.

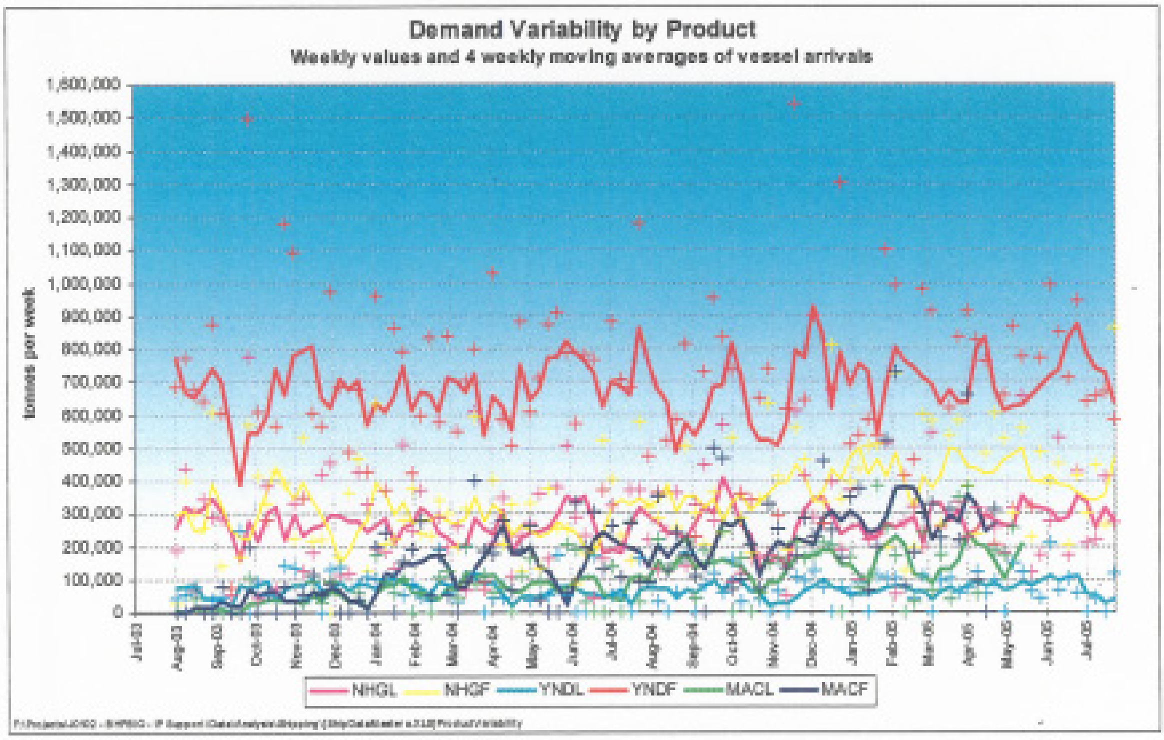

Figure 4 – Demand variability by product

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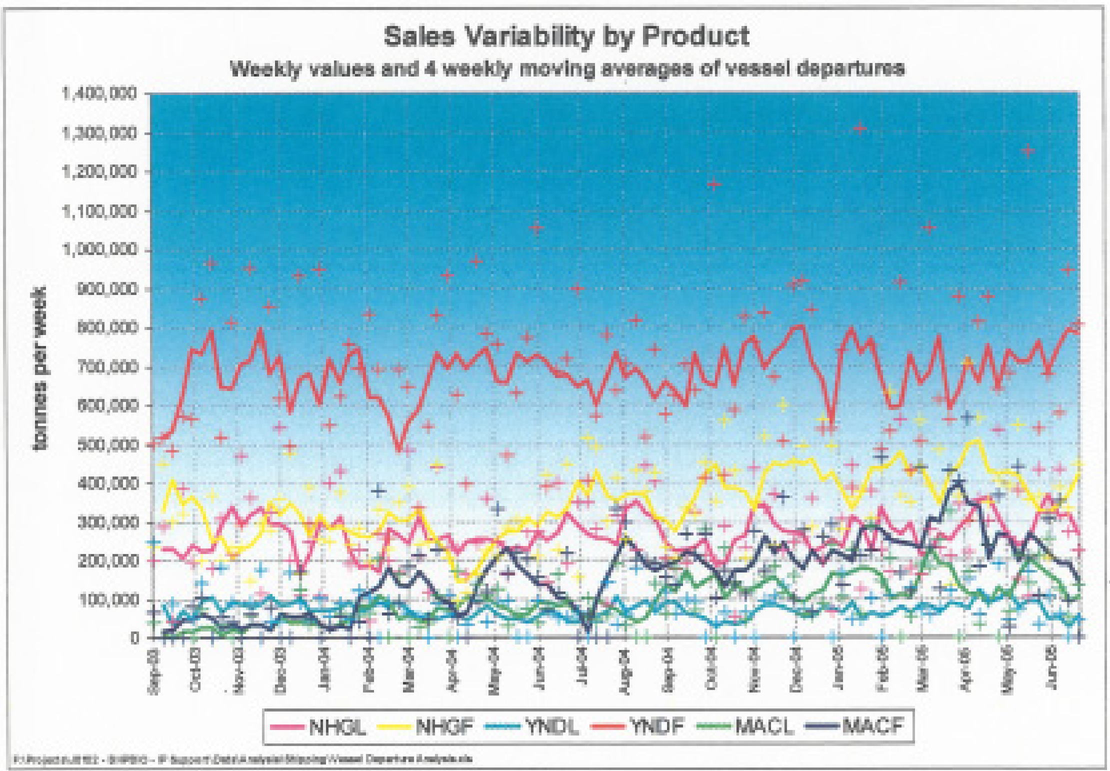

Figure 5 – Sales variability by product

31. No single sub-system can achieve a higher daily throughput than the throughput of the sub-system that is the "bottleneck" on any given day (as the capability of the system "bottleneck" – manifested in the lowest sub-system capability or a given day – determines the maximum daily capability of the system as a whole). As a result of the variable demand, the rail system requires the ability and flexibility to exercise rail sprint capacity on days of high shipping or customer demand.

Ore type variability

32. Ore grade characteristics can vary significantly both within, and across, pits in a given mining area. Hence, BHPBIO's production process requires different ores from within the same mining area to be blended together with the aim of ensuring that the grade and impurity variability between shipments to customers does not exceed a range that is acceptable to customers.

33. BHPBIO's production process requires the combination of the right proportions of each ore contributor into a blended stockpile. For grade variability management reasons, stockpiles are unable to be used for shiploading until they are fully blended. These rules for the right

ore contributions into each blending pile and the requirement that each pile be completed prior to reclaiming add activity delays and reduce stockpile choices, negatively impacting on the dumping performance of the trains at the port.

34. As well as grade variability, the different ore types also have physical characteristics that vary causing variable performance rates when being dumped and, in the case of ROM ore from the Newman mining area, crushed and screened. These physical characteristics include variable lump and fines percentages and moisture content.

Component reliability

35. Random failures of equipment interrupt activity performance, causing delays. These delays introduce a degree of unpredictability into the operations which in turn makes planning more difficult, and reactive to events. This in turn makes it very difficult to run trains on time and hence the rail operations are required to operate their trains whenever equipment is working and simply run when ready.

Resource sharing

36. Resources are shared to enable multiple tasks to be undertaken. When this occurs, some tasks are queued while waiting for the current task that is using the required resource to finish. There are many examples of resource sharing across BHPBIO's system. Some examples of these shared resources that impact on trains at the port include:

a) rakes waiting for shared shunt locomotives to move them to their next location;

b) rakes waiting for shared yard roads (tracks) to be able to move;

c) rakes waiting for shared compressor cars before entering a car dumper;

d) rakes waiting for shared car dumpers;

e) car dumpers waiting for shared conveyors;

f) car dumpers waiting for shared stackers;

g) car dumpers waiting for shared suitable stockpiles;

h) rakes waiting for shared inspectors to test ore cars;

i) rakes waiting for other rakes to form new trains;

j) rakes waiting for shared mainline locomotives to form new trains;

k) trains waiting for access to shared track in order to depart port.

37. Queuing introduces delays. Often the extent of these delays is unpredictable and this means that it is difficult for trains to depart on a schedule.

The capability of the rail sub-system is determined by the operation of the entire system.

38. It is apparent from the foregoing description of BHPBIO's mine, rail and port system that the rail capability is inextricably linked to the mines and port capability. Given the variability and reliability factors that are inherent in each part of the mine, rail and port system, the capability of the system as a whole is dependent on the ability of the rail sub-system to "flex" to meet both supply and demand variability, taking account of buffering capacity.

39. This fact is demonstrated by Figure 5 below which is a chart that reflects mainline movements (ie over the Newman rail line) over a 24 hour period from August 2004 to the end of June 2005. This table has been prepared by TSG using data extracted from BHPBIO's rail operations (RROPS) database.

40. The movements reflected in the chart set out at Figure 5 include both:

(a) port arrivals and departures within a 24 hour period (ie trains that both arrived at, and departed from, the port within that period);

(b) trains that arrived at the mine but which did not depart the port in the same 24 hour period; and

(c) trains that departed the mine but which did not arrive at the port the same 24 hour period.

Together, these movements reflect the total train activity on the Newman rail line within each 24 hour period.

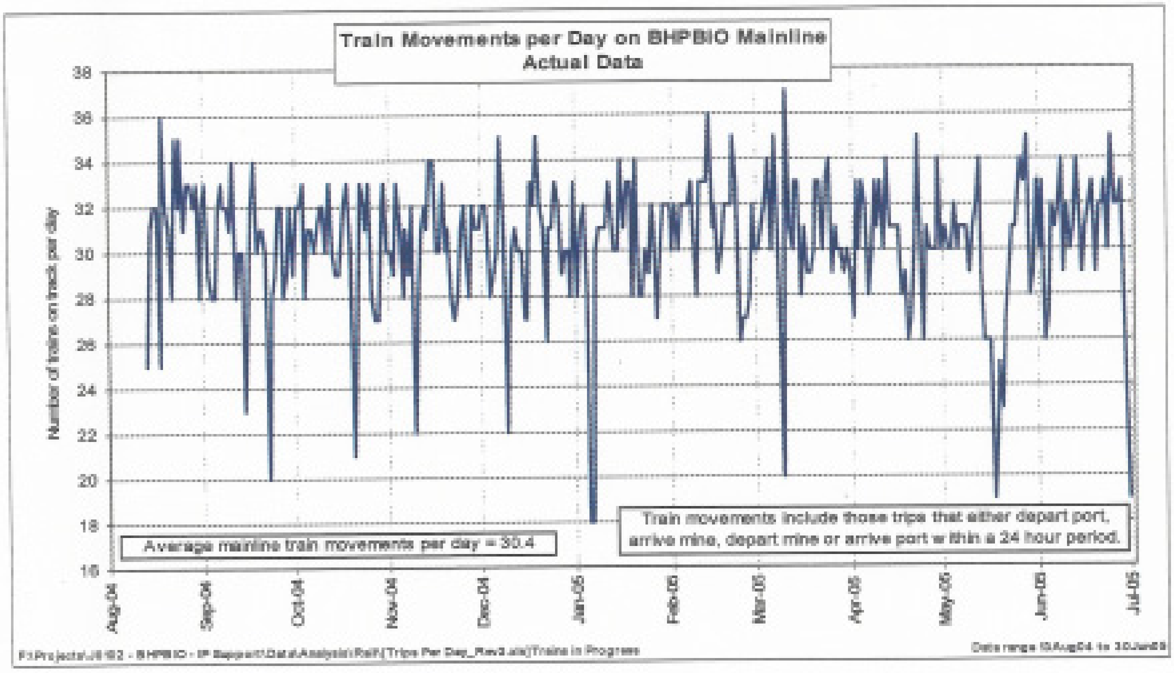

Figure 5 - Train movements per day on BHPBIO mainline

Trips/Movements

41. While rail capability and usage intensity can be described by reference to either trips per day or movements per day, the more meaningful reflection of the actual rail line usage intensity over a 24 hour period is obtained from assessing the number of movements per day.

42. This is because, for the reasons described at paragraph 40 above, the term "trips" refers to a completed journey, and given that many trains do not complete a journey in any given 24 hour period, their activity would not be reflected in the number of trips for that period, and simply assessing the number of trips during that period would understate rail usage intensity during that period.

43. Accordingly, the more accurate picture of rail usage intensity over a 24 hour period is obtained through an examination of the movements during that period.

44. To convert movements per day into trips per day, the average number of movements per day needs to be divided by the average trip cycle duration and then multiplied by 24 hours in a day to give the average trips per day.

Eg. During the period from August 2004 to June 2005,

Average movements per day = 30.4

Average trip cycle duration = 31.7 hrs

Therefore, Average trips per day = 30.4 / 31.7 x 24 = 23.0

However, as can be seen in Figure 5, there was considerable variance from day to day around this average.

45. TSG's modelling has indicated that:

(a) where the number of movements on a given day exceeds approximately 32, there is little opportunity to perform necessary maintenance on the rail infrastructure, as there are insufficient windows to undertake that maintenance. Accordingly, maintenance must be deferred;

(b) on days on which the number of movements is less than approximately 32, both deferred maintenance (ie maintenance that had been unable to be undertaken on other days due to the high level of movement on those days) and scheduled maintenance would be carried out; and

(c) where the average train movements over the course of a year exceed approximately 32 movements per day, insufficient windows exist to allow for required maintenance to be completed.

I have been informed by Bob Ridley that the outcomes predicted by the model have been experienced by BHPBIO in its day to day operations.

46. The manner in which BHPBIO operates its rail line may be contrasted with a rail line that is used to transport persons or freight, particularly in a multi-user environment. A rail line that is used to transport persons or freight in a multi-user environment is generally operated in accordance with a fixed schedule, in which train slots or paths are allocated to the track users. In such an environment, efficiency and performance are assessed by compliance with the scheduled timetable for departures and arrivals.

47. In contrast, the efficiency and performance of BHPBIO's rail line is determined by its ability to co-ordinate with the operations of the mine and the port to deliver the required quantities of the required ores to enable BHPBIO to produce and ship finished products. In that environment, trains are not required to run in accordance with a pre-determined schedule. Rather, trains are required to run in a sequence that will enable BHPBIO to produce finished products to meet customer demand, and to run in a manner that responds to all the factors that lead to variability in the mine, rail and port operations, as discussed above. In particular, it will often be more efficient for a train to run 'early' or 'late', to meet BHPBIO's production requirements.

BHPBIO's rail sub-system currently operating at maximum capability

48. As discussed above, rail capability and usage intensity can be described by reference to either trips or movements.

49. I agree with the statements made by Bob Ridley at paragraphs 4 to 24 of his affidavit, describing the practical constraints that affect the capability of BHPBIO's single track rail line. Those practical constraints are reflected in TSG's simulation model of BHPBIO's mine, rail and port operations.

50. Having regard to those constraints, the maximum current capability of BHPBIO's single track rail line is determined by the number of trips (or movements) able to be undertaken on the line. Primarily, this is because the number of trips (or movements) directly impacts on the nature, scope and quantity of required maintenance and on the opportunity to undertake that maintenance, on both a planned and opportunistic (unplanned) basis.

51. Track maintenance activities are typically performed in the time windows between trains passing the location on the track requiring maintenance. As the line becomes busier, ie more trips (or movements) per day in both directions, these time windows to undertake maintenance become smaller until there is not enough time left to do the tasks required.

52. Accordingly, the maximum tonnage capability of BHPBIO's rail sub-system is determined by the maximum tonnage obtainable from a given number of trips, given the requirement for adequate maintenance windows to be preserved. The precise output of this analysis also depends on the configuration of the trains for each of those trips.

53. The assumptions that BHPBIO has provided to me for the purposes of TSG's simulation model lead to the conclusion that at an average of approximately 32 movements per day (which equates to approximately 24 trips per day), track maintenance was only just able to keep up with the required tasks that had to be completed. In other words, based on BHPBIO's current operation of the rail sub-system, BHPBIO's rail operations have already reached the capability limit of the single track rail line.

54. In the normal course of events, this means that BHPBIO could only increase the capability of its rail sub-system through either incurring significant capital expenditure to expand that infrastructure (for example, adding additional passing loops or building a second track), or in altering its operations in such a manner that it can increase the tonnes being railed without increasing trips or negatively impacting on maintenance requirements.

55. In October 2005, I assisted BHPBIO in a project to evaluate the idea of running the trains on the rail line as a sequence to the mines instead of running to a departure schedule. This was called the Benefits of Sequential versus Scheduled (or BOSS) study. The study objective was to see if increased production could be achieved by departing trains from the port as soon as the rakes became available from the dumper, rather than waiting for a scheduled departure time. I was informed by Bob Ridley and Phil Price that the reason for undertaking the project was because the capability of the rail line had fallen behind the capability of the mine and port operations, causing a lower rate of production than BHPBIO had forecast for this financial year (ie. the rail had become the system bottleneck).

56. This proposed operational change was tested by TSG via the simulation modelling process to help gain an understanding of what the impacts would be. One of the main outcomes of this study was the observation that time previously spent by rakes waiting to depart the port empty was transferred into the loaded rakes waiting to dump, thereby taking the queue that was occurring post dumping (but pre-departure) and adding it to the queue in front of the car dumpers.

57. The modeling demonstrated that "moving" this queue to before the car dumpers resulted in greater efficiencies, as the queued rakes were able to more fully utilise dumper capacity than had previously been the case (two of the three dumpers had been under-utilised (idle) as a result of periods of time where no rakes were present for dumping).

58. Accordingly, by making this operational change to abandon scheduled departure times, most of these "idle" hours were turned into production hours resulting in an overall increase in system capability. This finding has resulted in BHPBIO now undertaking a practical trial of this alternate way of operating its trains. The outcome of this practical trial is not yet known.

59. By planning and managing its mine, rail and port operations as an integrated system, BHPBIO was able to identify and trial an operational change that may increase the productive capability of the overall system without incurring capital expenditure. The BOSS study is a good illustration of the efficiencies that BHPBIO is able to obtain from planning and managing its mine, rail and port operations as an integrated system. If BHPBIO was required to operate its rail system as an independent operation, catering for the needs of third party users of the rail system and considering the potential impacts on third parties from operational changes, BHPBIO may not have been able to implement an operational change of the type modelled through the BOSS study.

Potential operational impacts of third party access

60. In my opinion, based on the simulation modelling of BHPBIO's mine, rail and port operations that I have carried out, third party access to BHPBIO's rail line is likely to cause delays to the rail sub-system, which will have a flow on effect to the whole of BHPBIO's production system. This is because in a production process where the train loaders and train unloaders are working 24 hours a day, 7 days a week, any delays imposed on the trains reduces production. In a rail context, delays can be observed whenever the wheels on the trains are not turning for whatever reason. In my opinion, third party access to BHPBIO's rail line would be likely to cause additional delays to the BHPBIO trains in the areas discussed below.

Delays on track

61. On a single track rail line, there is an non-linear relationship between the number of trips per day and the total number of meets per day. This means that the number of meets per trip increases as the number of trips per day increases. The addition of one more train on the rail line will cause additional meets for all the other trains that cross paths with this additional train, both when this train is travelling out to the mines and also when it returns to the port. One additional trip could add as many as 12 to 14 additional meets for the day.

As each meet is an additional delay imposed on a train, any increase in the number of meets will impose additional delays.

62. In addition to meets, other delays that occur on track are due to incidents or failures. Train failures include both locomotive and ore car reliability. Problems occur on a random basis with both locomotives and ore cars and the frequency and duration of these problems is related to a variety of factors, including:

- the maintenance programs;
- the age of the equipment;
- the state of the track;
- the power to weight ratio;
- the uniformity of the axle loadings;
- the experience of the drivers; and
- the length of the trains.

If, as a result of an incident or failure, a train cannot reach a passing siding, then all traffic comes to a stop and all affected trains have to wait until the failed train is cleared from the track. Trains quickly bank up when this occurs. Even when the failure is cleared, the delays caused by the resulting congestion are not cleared from the system for a long time.

63. If a failed train can make it to a passing siding, then this passing siding is effectively removed from service, and all meets that would have used this passing bay have to occur at a prior siding resulting in a meet duration that is typically twice as long as it would have been without the failed train blocking the siding.

64. Additional trains increase the number of failures on track as the rate of incidents occurring is in proportion to the number of trips that are running. If a third party has different maintenance standards or reliability targets, then they are likely to be responsible for a disproportionate ratio of failures, resulting in a disproportionate impact on production.

Delays entering/exiting shared track

65. Wherever two or more rail lines converge, merging must take place. This occurs when empty trains depart their respective ports and require access to shared track, or when loaded trains depart their spur lines from each mine and require access to the shared track.

66. Merging trains have to wait for each other and also have to wait for any sequence of on coming trains that may be approaching the merging point. Depending on the number of trains running at any point in time, and how closely spaced they are, merging delays are increased by additional traffic. This time spent queuing to enter the shared track is lost production time.

67. Exiting trains can also cause delays to other trains. This can come about when there is insufficient room to accommodate the train wishing to exit the shared track. Although random failures can occur on the track, they are more common at the loading and unloading facilities, due to the complexity of the loading and unloading infrastructure. When a delay occurs at dumping for example, the next train waiting to dump has nowhere to go. If this dumping delay is not able to be repaired quickly enough, then subsequent trains that were already on their way will bank up and block the passing siding nearest the exit that that train would have taken. This can cause considerable delays to other trains wanting to use this siding. This is especially serious when this siding is feeding multiple ports, as it will impact on the empty merging trains departing the ports as well as the loaded trains arriving at the port.

Diminished flexibility

68. As mentioned previously, demand variability impacts on BHPBIO's production process.

69. For the rail sub-system to be able to capitalise on days of high demand, it requires the ability and flexibility to exercise rail sprint capacity to deliver as many loaded rakes as possible back to the port while these conditions exist.

70. The presence of any third party on the rail line is likely to reduce the magnitude of the system capacity achievable on days of high demand, through imposing a cap on the maximum rail sprint capacity that can be achieved on any given day. This is as a result of the additional delays on track and the additional delays on entering and exiting the shared track.

Potential operational impacts of third party access - conclusion

71. The likely consequence of each of the above impacts of third party access to BHPBIO's rail line is to constrain BHPBIO's production capacity. This is because, as explained above, BHPBIO's rail sub-system is already being used by BHPBIO at its maximum capability. Accordingly, any delays caused to the rail sub-system will have a direct impact on, and reduce, BHPBIO's overall production.

72. In order to measure the likely annual reduction in productive capability arising from third party access, it is necessary to make detailed assumptions about the proposed use of the rail line by the third party, and particularly the performance data of the third party's trains, mine and port operations.

73. To some extent, the rules and procedures that would be put in place to govern a third party's use of the rail line would also be relevant in measuring the likely annual reduction in productive capability arising from third party access. However, for the following reasons, such rules and procedures could not fully remove the adverse effects of third party access on BHPBIO's production.

74. I am not able to comment on impacts of third party access to BHPBIO's rail line other than those of an operational nature, as described above.

Response to recent propositions by the NCC and FMG in relation to third party usage

Priority 1 situations

75. I have been provided with a copy of the Draft Recommendation of the National Competition Council dated 4 November 2005 (**Draft Recommendation**). The Draft Recommendation comments in paragraph 6.107(a) on modelling work performed by TSG. The Draft Recommendation argues that the costs imposed on BHPBIO by reason of third party access to the rail line may be reduced if BHPBIO trains take precedence at meets in Priority 1 conditions.

76. A Priority 1 condition is an internal designation applied by BHPBIO to situations in which a vessel is ready to load finished iron ore products at the port and where an insufficient tonnage of those iron ore products exist at the port to satisfy this vessel's required tonnage.

77. In my opinion, it is not practicable to impose a rule of access to the effect that BHPBIO's trains always have priority over the third party's trains. This is because if a third party's train was on a single piece of track with no rail sidings and a Priority 1 condition occurs, BHPBIO's trains will still have to wait until the third party train has passed through the relevant section and can run into a passing siding. Accordingly, delays (and therefore reduction in productive capacity) are not able to be avoided by such a rule.

78. In addition to the foregoing, if BHPBIO trains had precedence at meets for Priority 1 situations, it may be that a third party's trains will be prevented from running on the Newman line for a significant period of time, or at all, having regard to the extent of BHPBIO's current use of the rail line.

Equivalent flexibility

79. I have also been provided with a copy of the recent submission made by Fortescue Metals Group Ltd (**FMG**) dated 5 December 2005 in response to the Draft Recommendation.

80. I note that at paragraph 7.13 of that submission, FMG states that an access seeker would not wish to be allocated a fixed schedule within which it must operate, but rather, that most access seekers would seek the same flexibility that BHPBIO requires to run its own operations.

81. The flexibility that BHPBIO possesses arises as a result of its sole control of it mine, rail and port operations. If a third party were to operate trains on BHPBIO's rail line, then this flexibility would be severely retarded. This impact would be compounded for every additional level of access sought (whether by a single access seeker or subsequent access seekers).

82. Further, because flexibility is a function of the ability to respond to demand and system variabilities, it is not possible for two or more rail users to obtain an equivalent level of flexibility. This is illustrated by the example discussed above in relation to Priority 1 conditions. If both BHPBIO and FMG have a Priority 1 condition at the same time (which is likely to occur regularly, given that peaks in demand generally manifest themselves across a market, rather in relation to specific producers), then neither BHPBIO nor FMG are able to obtain the requisite degree of flexibility without overriding the other's

flexibility. In essence, the desire to provide equal flexibility would result in a stalemate, with neither party able to obtain flexibility.

83. In order to resolve this impasse, it would be necessary to implement a fixed schedule, guaranteeing access to third parties at certain times. However, the existence of this necessarily impacts on BHPBIO's ability to manage its operations in the most flexible and optimal manner, thereby negatively impacting on total system throughput capability.

84. With sufficiently detailed assumptions, it is possible to use TSG's simulation model to estimate the likely reduction in BHPBIO's production caused by third party access. However, without detailed assumptions about such matters, it is not possible to make a meaningful estimate of lost production.

SWORN by the said deponent at Perth, in	)	
the State of Western Australia, this 22nd	)	
day of December 2005	)	....

Before me:

CHRISTOPHER MICHAEL EVANS
Blake Dawson Waldron
101 Collins Street, Melbourne Vic. 3000
An Australian practitioner within the
meaning of the Legal Profession Act 2004

Form 20A

(Order 14, rule 5A)

IN THE FEDERAL COURT OF AUSTRALIA	)	
VICTORIA DISTRICT REGISTRY	)	No VID 1641 of 2004
GENERAL DIVISION	)	

BHP BILLITON IRON ORE PTY LTD (ACN 008 700 981)

Applicant

and

THE NATIONAL COMPETITION COUNCIL

First Respondent

and

FORTESCUE METALS GROUP LIMITED (ABN 57 002 594 872)

Second Respondent

AFFIDAVIT - CERTIFICATE OF COMPLIANCE

I, **CHRISTOPHER EVANS**, certify to the Court that the affidavit of **RODNEY TYTLER HOARE,** sworn on 22 December 2005 filed on behalf of the Applicant, complies with Order 14, rule 2 of the Federal Court Rules.

Date: 22 December 2005

CHRISTOPHER MICHAEL EVANS
Blake Dawson Waldron
101 Collins Street, Melbourne Vic. 3000
An Australian practitioner within the meaning of the Legal Profession Act 2004

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IN THE FEDERAL COURT OF AUSTRALIA)
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BHP BILLITON IRON ORE PTY LTD (ACN 008 700 981)

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First Respondent

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FORTESCUE METALS GROUP LIMITED (ABN 57 002 594 872)

Second Respondent

This and the attached CD-ROM and index is the annexure marked "**RTH-1**" referred to in the affidavit of **RODNEY TYTLER HOARE** sworn at Perth in the State of Western Australia this 22nd day of December 2005.

Before me:

CHRISTOPHER MICHAEL EVANS
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"RTH-1"

1. The attached CD contains the following two files:

   (a) BHPBIO Pilbara Rail Operations Annimation.ppt; and

   (b) BHPBIO Movie Complete Rev 3.avi

2. The PowerPoint file should be launched first, and when running as a presentation, the picture of the animation contained on the third slide should be selected and double clicked, thereby launching the animation.

3. The animation covers a range of different activities undertaken as part of BHPBIO's integrated operations, and the table below sets out the point in the animation at which the various activities are depicted.

Activity	**Time**
Overview of the rail activity on the Newman rail line	0 – 4m 37s
Interface of rail line and the Yandi, Area C and Newman mining areas	4m 38s – 6m 44s
Movements along various specific lengths of the Newman rail line	6m 45s – 7m 49s
Nelson Point marshalling yard	7m 50s – 14m 21s
Stacking, reclaiming and shiploading operations	14m 22s – 21m 32s
Review of the above activities	21m 33s – 28m 09s