5. Alternatives

5.1 Introduction

Resource development projects are subject to a number of constraints:

- Physically, by the location of the orebody and the climatic, topographic and geotechnical constraints imposed by the project setting.
- Environmentally, by the environmental sensitivities of the project setting.
- Socially, by the expectations and concerns of stakeholders.
- Economically, by the need to obtain the requisite funding to establish the mining operation and subsequently to extract and process the ore profitably.

In particular, a fundamental constraint of all mineral resource developments is that they can only occur where a commercial deposit is found. The alternative to the development of the Browns Oxide Project is no development.

Notwithstanding these constraints, the project development concept contained in this PER represents the current optimisation of engineering, economic, environmental and social considerations. Further optimisation will occur during detailed design.

5.2 Not Proceeding with the Project

The direct consequences of not proceeding with the project can be summarised as follows:

- The social and economic benefits described in Section 7.10, e.g., wages, royalties and taxes, would be lost at all levels, i.e., local, regional, Northern Territory and national.
- In particular, up to 79 full-time jobs during operations would not be available.
- The land, water and air impacts (and associated physical, biological and social impacts) associated with the development of a well-managed small open pit mine located in a rural setting would not occur.

5.3 Alternatives Considered in Project Planning

5.3.1 Mining

In the 2001 Browns Polymetallic Project Notice of Intent (NSR, 2001), Compass presented two possible development options: the ‘small development option’ and the ‘large development option’. The small development option required extracting oxide and sulfide ores from the Browns deposit using an open pit excavated by conventional truck-and-shovel methods and later progressing to underground mining. The large

development option consisted of mining the Browns and Browns East deposits using a larger pit and underground mine than envisaged for the small development option. The larger pit would consume the Whites and Intermediate open pits of the historic Rum Jungle Mine.

The capital cost of the sulfide project was determined to be beyond the financial resources of Compass in its own right. However, the smaller and metallurgically simpler Browns Oxide Project (as detailed in Chapter 4 of this PER) is considered viable for Compass.

An underground mine is not required to access the oxide ore (nor is it feasible for such a shallow deposit). Compass considered a number of different open pit designs and extraction scenarios prior to settling on that described in Chapter 4.

Various mining schedules were considered prior to settling on the schedule discussed in sections 4.7 and 4.9. The preferred schedule represents an economic optimisation of ore production while still allowing for selective placement of PAF waste rock within the TSF embankment. Further refinement of the mine schedule and TSF design will allow closer links between these two aspects of the project, thereby minimising possible adverse impacts associated with the increased proportion of PAF material over the life of the mine.

5.3.2 Ore Processing

Ore processing will be undertaken on site using a hydrometallurgical circuit (see Section 4.8).

As with virtually all mining operations, project economics dictate that ore processing occurs as close to the mine as possible. The only economically viable alternative might involve transporting the ore via truck, rail or pipeline to a suitable processing plant that is already operational (i.e., is servicing other mine(s) in the area) and located relatively close to the mine. Such an alternative does not exist.

The production of copper sulfate as an alternative to copper cathode has been considered. This would involve production of some 40,000 t/a of copper sulfate, well in excess of the Australian useage of around 30,000 t/a. Marketing of copper cathode is simple, whereas marketing into a diverse copper sulfate market carries considerable market risk. The premium price of copper sulfate and slightly lower costs were not considered attractive enough to outweigh this market risk. Copper sulfate production could be attractive for a smaller scale project.

A variety of options for the production of cobalt and nickel remain. A chemical product will be produced, and this may be either a mixed cobalt-nickel hydroxide, a mixed cobalt-nickel sulfide, or separate cobalt and nickel hydroxides or sulfides. A final decision will be made during final project design, based largely on market acceptance of the product specifications. In all cases, the product will be bagged and placed in containers for shipment and transportation.

5.3.3 Environmental Management (Tailing and Waste Rock)

A major focus of environmental management at the site will be on tailing and waste rock, and the alternatives considered during project planning are discussed in this section.

Tailing will be stored in a TSF formed by embankments constructed from suitable waste rock (see Section 4.9), with PAF material being encapsulated within the embankments. One alternative would be to place waste rock and/or tailing in the existing Whites and Intermediate pits. These pits (particularly Whites pit) periodically discharge metal-rich, acidic water to the East Finniss River and existing knowledge does not allow the accurate prediction of the impact on pit water quality from the addition of Browns waste rock or tailing to these pits. In addition, the issue of potential liability is not likely to be easily resolved, given the current and ongoing contamination of the East Finniss River from the Rum Jungle pits. Therefore, this has been discounted as an option.

Another option that has been considered is placing the waste rock and/or tailing back in the Browns Oxide pit. In addition to sterilising the underlying resource, the proposed mining method is not conducive to the progressive back-filling of the pit, while the variable groundwater table could exacerbate the potential for acid formation from PAF material and/or provide a transport pathway for contaminants from the mine waste into the surrounding groundwater. This option has therefore been discounted.

Production of a centrally thickened tailing discharge was not considered viable due to the areal requirements of this system and the limited space available on the granted MLs.

5.3.4 Electricity

Three potential sources of electrical power have been evaluated:

- Electricity from the Northern Territory grid, as supplied by PAWC (see Section 4.12.1).
- On-site diesel generation.
- On-site gas generation.

On-site generation of electricity using diesel is likely to be the most expensive option (and will also incur the greatest economic risk due to possible future increases in oil prices), while there are potential supply issues with on-site electricity generation using gas. Therefore, the preferred option is for the project to source electricity from PAWC.

5.3.5 Transport Route

Copper cathode and cobalt and nickel product will be transported to Darwin along the Stuart Highway by road train (see Section 4.12.4). Two alternatives for accessing the Stuart Highway involve:

- Using existing roads via Batchelor.
- Using a mine access road constructed between the mine and the Stuart Highway north of the intersection of the Batchelor Road with the highway.

It was decided that the existing roads will be used for the Browns Oxide Project, thereby minimising the project's footprint and adverse impacts that might result from the construction of a dedicated mine access road.

5.3.6 Infrastructure Corridor

The small scale of the project makes it impractical to contemplate the building of new transport routes or a dedicated gas pipeline to the site. The proposed power line to the site is a 22-kV line connecting to the Manton substation. Numerous alternative routes for power line access to the project site were considered, and the proposed route was selected because it is largely along an existing track (requiring minimal clearing) and is shorter than the alternatives (with less power losses and a lower capital cost), thereby removing the need for an 'infrastructure corridor'. The final route (expected to be based on the proposed route) will be determined in consultation with the NLC and traditional owners.