ATTACHMENT 1

ISSUES RE HUME COAL PROPOSAL FOR CPP REJECTS DISPOSAL

SUMMARY OF KEY QUESTIONS

ITEM	ISSUE	QUESTIONS	PERCEIVED HUME ACTION FOR EIS	LIKELY CONSEQUENCES
1.	Rejects Production	• What is the specification and volume of the reject production?	• ***No CPP process engineering demonstrated at this stage***	• Inability to design a fill system with any certainty
2.	"Temporary" Rejects Stockpile	• What is timing of U/G opening availability vs. reject production rate? • How will the rejects be stacked and reclaimed from the stockpile? • What drainage and stormwater management will be required?	• ***No schedules provided*** • ***No detailed stockpile management designs provided*** • ***No detailed bunding and pumping designs provided***	• Possible large stockpile may be required at an early stage. • May need noisy surface-based units with large footprint • Significant run-off management issues – particularly in big storm events
3	Fill Processing Plant	• What pieces of equipment and how many will be required to process 100% of the Rejects stream? • Will classification of the treated rejects be required to enable the fill to be pumped effectively?	• ***No detailed process designs provided*** • ***No indication that any test work has been done on this matter***	• May need a number of large and noisy processing units and associated infrastructure to handle rejects • Some sort of surface tailings facility may be necessary for disposal of unwanted size fractions
4	Fill Distribution	• What test work has been done to demonstrate that the proposed fill distribution system will work?	• ***No information provided on fill material sizing, water content of fill, pump type and capacity, pump numbers***	• The proposed system may not allow fill to be placed at all; or not at sufficiently high enough rates to meet overall

		• Will there be the ability to stop and start filling to allow pipe changes and repairs?	***(including standby), pipe size, pipe wear rates, maximum pumping distances.*** • ***No test work in this area is evident***	operational requirements. WHAT HAPPENS THEN – perhaps a tailings dam is needed? • Blockages may occur requiring diversion and handling of wet fill – how and where to?
5	Fill Placement	• How will the fill actually be placed in the headings and what does this mean for worker safety and operational efficiency and practicality?	• ***There has apparently been no pilot testing to establish the relevant procedures***	• May require earthmoving equipment and fill operators to be working in unsafe and/or unhealthy locations.
6	Water Recovery	• Can water be realistically recovered from the filled headings at the rate needed to make up any estimated shortfalls in process water requirements over LOM?	• ***No information provided***	• Water balances may not be achievable
7	Safety and Environment	• Is there a risk of groundwater contamination from the use of any additives to assist pump flows or from residual reagents from the CPP process? • Is there a risk of liquefaction and resulting fill outflow in the event of seismic activity?	• ***No process design or engineering information has been provided on this subject*** • ***This possibility appears to have been dismissed without much consideration***	• Leaching of deleterious elements into the groundwater system may occur • Bulkhead failures and underground mud rushes may occur

DISCUSSION

General Issues:

I have had limited exposure to coal processing over my 40+ years in the mining industry, but I have had exposure to a number of underground fill systems in various metalliferous mines in Queensland and NSW. Given that Hume Coal seems to be basing its proposal on something that "is common in metalliferous mining", I think that qualifies me to be able to make reasonable comments on, and raise questions about, the Hume Coal proposal.

I have been involved in a number of mine feasibility studies and project developments over the years, and I understand the importance of doing sufficient test work and engineering studies before adopting a "mission critical" part of the project (Attachment 2). The proposed continuous placement of 100% of rejects as underground fill to avoid surface waste piles and ponds, and to dispose of surplus water make from the mine, is surely such a critical element in this project.

On this point, it is worth noting that the only coal mine in NSW (and perhaps Australia) that I can find that has seriously contemplated co-placement of coarse and fine rejects into underground openings is Metropolitan Coal at its Helensburgh mine located between Wollongong and Sydney.

The University of Wollongong case study on this presented at the 2012 Coal Operators Conference (Attachment 3) highlighted the series of laboratory tests, surface pumping trials and underground pilot trials over a number of years that were considered necessary before committing to this process This was despite the fact that, unlike Hume Coal, they had existing well-defined reject streams of known properties and volumes. I see absolutely no evidence that Hume Coal has done any similar testing for their project.

I am also aware of an options study done by GHD (a highly-respected engineering firm) for Centennial Coal at their Airly mine near Lithgow (Attachment 4). They looked at 4 options for rejects placement, including one of co-placement of coarse and fine rejects underground. This underground option was rejected on a combination of safety, engineering complexity, operational difficulty, environmental risk and cost factors

Finally, in my experience, fill systems often do not work as planned from the outset, despite all the test work done ahead of time. They then require significant modification that results in an hiatus in the filling program. This is generally not a major problem in metalliferous mines as the fill is usually a bleed stream from the main waste management system, and therefore existing ponds and dams can be used while the fill system is upgraded. This would not be possible for Hume Coal and they would therefore have to find some interim storage arrangement for any wet rejects that did not negatively impact the environment. It would also mean an even larger "dry" storage stockpile than currently envisaged.

Rejects Stockpile Issues:

There is little detail regarding the Coal Preparation Plant (CPP) flowsheet, but the norm would be to have one or two coarse reject streams and a fine reject stream. These would have to be dewatered to a larger extent before stockpiling to make sure there was no escape of contaminated water from the stockpile. There would also have to be some allowance for 100 year storm events at the stockpile.

While there is an indicative production schedule available, there is no fill schedule. Therefore, there is no concept of how big the stockpile would get over the life of the mine – particularly in the early years where the ash content appears to be highest and the void spaces will be lowest. If the stockpile gets too big, some sort of stacking arrangement would be required. There seems to be no allowance for this in the site plan

To feed the fill plant, there will need to be a reclaim process of some sort so that the coarse and fine rejects can be recovered from the pile and mixed suitably before processing. Hume Coal gives no indication of how this would be done and what that would mean for the environmental impacts.

Fill Process Plant Issues:

Again in the absence of CPP process information, there is little guidance on the type and size distribution of the various reject streams. However, it is reasonable to assume that some sort of comminution will be necessary to ensure a reasonable overall sizing for any pumping system that might be used. This could involve crushing and/or grinding of the coarse rejects to provide a suitable top size and this would need storage bins, mixing tanks, conveyors, water management systems, etc. Depending on the volumes envisaged, there also may be a need for multiple units which would further expand the plant size.

Again there seems to be no allowance for such units in the process description or the plant footprint. What does this mean for the noise, dust and risk management requirements surrounding such a plant?

Without knowing the reject specifications or the pumping system proposed, it is hard to comment on what other components might be required in such a plant. However, fill plants often need a classification step to make sure that the feed is a suitable match for the pump capability range. If this is so, there would be a bleed stream of reject materials from this classification step. How would this be disposed of without a tailings pond of some sort?

Pumping Issues:

No matter whether a paste fill or a hydraulic fill option is chosen, the pumping of large quantities of material over distances of up to 10km would be a significant challenge. There would need to be a clear understanding of the flow properties of the selected fill material and the resistance that would be encountered in the pipework – particularly if the piping route has to go around sharp corners on the way to the emplacement point.

Again there is no evidence of any test work by Hume Coal on the specification and resulting pumpability of the fill. Care also has to be taken that the fill does not settle out and compact at any point in the delivery system, as this can cause blockages and even require replacement of sections of the pipework. Such disruptions to filling have a number of impacts on the operation of the system and can require the disposal of surplus fill somehow.

Finally, there seems to be no assessment of the size and type of piping required to meet volume and distance objectives and to minimise pipe wear and avoid possible underground blow outs.

Placement Issues:

The headings can be in excess of 150 metres long and are relatively small in profile (3.5mH X 4.0mW). Given the expected slump angles of the various types of fill, there is no way that fill introduced at the entrance to each heading will flow all the way to the end of the heading and then fill it up. As a result, the volume filled via this approach would be minimal. There are two ways to get over this problem:

1. Bulldoze the fill from the end of the pipeline (i.e., from the entrance to the heading) to the end of the heading. This would require regular stoppages to the filling and entry of men and diesel equipment into poorly ventilated and potentially unsupported headings.
2. Extend the pipeline to end of the heading and remove sections progressively back to the entrance as the heading fills up. This again would expose workers to unventilated and potentially unsupported headings, and would require them to work in areas with large standing water occurrences.

Either approach raises real questions about fill water management – particularly in headings that slope up from the access point wherein large ponds would start to form at the entrance and would require half bulkheads and/or sumps and pumps to manage the water. Any such pumping would presumably have to be back to surface which would defeat the objective of locking up surplus mine water make in the fill.

Water Recovery Issues:

It is my understanding that Hume Coal intends to recover water from behind the bulkheads from time to time to make up for any shortfall in water requitements during particularly dry climatic periods. Given that percolation rates through fill with high fines and clay content would be very slow and that water would tend to pond at the far end of each heading (both due to the beach effect of filling and any downward slope in the floor), recovery of any quantity at a reasonable rate is questionable.

Again some sort of engineering study on this issue by Hume Coal would have been appropriate to underpin their assumptions on water balances.

Water Contamination Issues:

Given that most CPP processes use some sort of heavy media separation and possibly flotation, there is likely to be residual reagents in the reject material. What impact might this have on groundwater water quality?

It is also highly likely that special friction reduction additives will be required to aid the fill pumping processes over long distances. What is their impact on groundwater quality?

Liquefaction Issues:

Where there is any possibility of fill liquefaction during seismic events (and the resulting risk of bulkhead failures), many mines add a portion of cement or equivalent to the fill to ensure it maintains its integrity in such circumstances. I understand that significant seismic disturbances have been recorded in the Southern Highlands in relatively recent times (1960s?). Has Hume Coal made any allowance for this and, if so, what impact does that have on groundwater quality?