BORE CORE SAMPLING
DESIGN & OBJECTIVES

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If we could foretell where the best **value** lay in a coal deposit, bore core sampling would be optimised
AGENDA

1. Describe where value is generated
2. Present sampling objectives
3. Provide examples of various sampling practice
4. Provide examples of lost or unrealised value
5. Emphasise the need for standardized guidelines and evolving sampling practice as resource knowledge advances
- Value is created and realised by Feasibility Stage
- Value is expressed in Resources, Reserves, Financial Model
- Reserves demonstrated by a positive return
On the road to reserves (value), we explore:

- Structure, Quality, Tonnes, Geological environment
- Method of Mining, Optionality
- Along the same path, Resource Knowledge grows and needs to be founded on sound sampling and data to establish value
Bore core sampling should aim to be:
• Mostly recovered
• Unbiased
  • Unbiased in the sampling methodology, but also unbiased by preconceived assumptions on mining method (e.g. assumed working section)
• Representative of the whole seam (inclusive of stone)
• Preserved as close to the *in situ* state
• Sufficient sample mass
AS 2617-1996 * Sampling from coal seams
- sampling of higher rank coal seams in bore cores, drill cuttings, open-cut faces, pillars, channel samples and strip samples
- provides general guidelines for sampling from bore cores

AS2519-1993 * Guide to the technical evaluation of higher rank coal deposits
- describes the process of evaluation of coal by various exploration techniques
- a useful reference for understanding the context of sampling, and has a section dedicated to handling of coal and non-coal core

AS4264.1 Part 1 ^ Higher rank coal – sampling procedures
- describes the methods for sampling from moving streams, stopped belts, stockpiles and transport, such as rail wagons and barges

* reconfirmed 2013 ^ replaced by ISO13909 series
SAMPLING SCHEMES FOR COALS

- A – strict measured interval
- B - variable measured interval
- C - no interval
- D - whole seam
- E - bench sampling
- F - lithological sampling

Modified from ASTM Manual Series : MNL 11, 1992
• Underground deposit in Turkey
• Government drilled > 600 fully cored PQ holes for tender area
• No samples of internal stone bands taken
• Consequently, new owner needed to undertake a confirmatory drilling program
• Stone bands dominated by clays with lower ash fusion temperatures than surrounding coals

• Effect on value
  • Rethink of processing options (washing vs crush/screen)
  • Change in power station design
EXAMPLE – BOWEN BASIN PROJECT

- Open cut project
- Structurally complex: steep dips and thrust faults
- Main target seam ~ 5m thickness dominated by low ash content (<10%) with high ash roof and floor plies
- High value product (low vol. PCI)
- Plan to wash all coal seams, based on sampling and analysis
- Vendor’s financial model assumed 90% yield

Sampling issues and resultant analyses lead to incorrect assumptions and unrealised value
Sampling issues:
- Ash results from the single whole seam samples suggest that seam needs washing
- Finer granularity of samples shows potential bypass for major part of seam

Effect on value:
- Sampling did not allow recognition of possible bypass intervals vs those requiring washing
- Yield loss, increased product moisture
- Incorrect assumptions resulted in lost potential value
EXAMPLE – THICK LIGNITE

- Underground prospect overseas
- Very thick lignite seams
- Government tender drilling
- Sampling issues
  - Coarse sampling intervals (5 metres)
  - No stone sampling
- New exploration undertaken to address previous sampling/assay concerns

- Effect on value
  - Insufficient granularity to determine best mining options for recovery
  - Significant rework (exploration) undertaken to demonstrate options
• Primary criterion for selecting samples should be changes in coal type or lithology
• Geophysical logs provide the ultimate guidance in the field
• Sampling units should not be too small (insufficient mass) or too large (insufficient granularity)
• Do not ignore sampling of important non-coal units (internal/external dilution)
• “If in doubt, break it out”; subsamples can also be combined
• Granularity of samples is very important
• Sampling methodology should evolve with advancing resource knowledge, inclusive of ply definition
• Variability of the coal seam should be well understood
• Plies have been identified
  • sampling strategy may be governed by defined plies
• Mining methods and alternatives have been identified
  • Sampled units provide representation of working sections and alternatives
• Geotechnical considerations may influence sample selection
  • e.g. need to leave beams of coal in roof or floor

Sample strategies must align with defining the value of a project
THANK YOU

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