

APPENDIX A

INDICATIONS OF METAL DUSTING IN OPERATING COAL GASIFICATION PLANTS

A.1. Shell Internationale Petroleum Maatschappij B.V.

Shell advised that they are aware of the phenomenon of metal dusting. In fact, Shell has focused a significant R&D effort into understanding this phenomenon since their hydrocarbon gasification/partial oxidation processes produce high carbon activity regimes. According to Shell, they have observed only a very few cases of metal dusting. By examination of the differences between process conditions along with the results of the Shell R&D, they identified the cause of the metal dusting and devised a mitigation technique. The specifics of the mitigation technique are proprietary, and the technique is not available for licensing.

A.2. British Coal Corporation Coal Technology Development Division

The Coal Technology Development (CTD) Division advised that they had experienced a possible example of metal dusting of aluminized type 310 stainless steel approximately ten years ago in a coal gasification test. Metal dusting is not considered, by CTD, to be a problem in actual coal gasification systems. Carbon deposition occurs in tests, even though hydrogen sulfide is present throughout the process. The extent of carbon deposition is alloy specific. Carbon dumping is also observed on ceramics, which raises the obvious concern of filter plugging for high-temperature filtration using ceramics.

A.3. British Gas plc

The British Gas experience is that metal dusting is not a problem in their gasification systems. British Gas advised that a form of metal dusting referred to as "green rot" was experienced with nickel-base alloys in processes developed by Imperial Chemical Industries (ICI). According to British Gas, a solution to this problem was identified by ICI.