FIELD PERFORMANCE OF LOW ENERGY HOT ROLLED ASPHALT

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SUMMARY

As part of the initiative towards energy conservation and waste product encapsulation, this project has been conducted to demonstrate the feasibility of using Pulverised Fuel Ash (PFA), a by product of coal fired power stations, as a replacement to conventional limestone as a filler in Hot Rolled Asphalt (HRA) wearing courses. PFA from four power stations was used in combination with four types of Limestone aggregtes, sands and filler. The coarse aggregates and fines were especially selected, to cover a large proportion of the U.K. quarrying production.

Extensive laboratory work at the Civil Engineering Materials Unit of Leeds University to optimise a bituminous mix for each aggregate combination preceded the full scale trial. Eight mixes were designed (using the Leeds Design Method) at various mixing and compaction temperatures (eight temperature combinations ranging from 140 - 125 up to 110 - 85 °C mixing and compaction respectively), and each mix was then analysed for workability and strength characteristics. Laboratory results demonstrated that all PFA mixes exhibited much greater workabilities at very low mixing and compaction temperatures.

Cleveland County Council provided a suitable location to test the new material on a full scale trial. The trial comprised 320m of Hot Rolled Asphalt laid in April 1991, as an overlay to a part of the A689 Wolviston to Billingham road. One PFA mix was selected with the aggregate and filler combination most suitable to the geographic location of the trial. The mix was laid in alternate sections with conventional HRA and was successfully placed even at the lowest

compaction temperature of 88 °C. Therefore this material was named Low Energy Hot Rolled Asphalt (LEHRA).

The trial section was then monitored by assessing : strength, density and porosity of cored samples, deflectograph analysis, texture depth measurements and rut depth measurements.

As part of the project, a Rut Depth Measuring Device was developed at Leeds University in an attempt to eliminate the significant human error factor associated with the conventional technique of rut depth measurement.

Monitoring of the trial sections to date have shown that the sections containing LEHRA exhibited similar performance to the conventional sections.

The project has confirmed that in addition to savings in total energy consumption and overall cost, the incorporation of PFA into HRA is a beneficial way of disposing of an industrial waste material and that the ability to lay asphalts at much lower temperatures is extremely useful in cold weather and in cases where delay in the hot asphalt delivery to site is expected.