

## **Evaluation of Sulfur-Asphalt Technology for Local Applications**

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**Abstract:** King Fahd University of Petroleum and Minerals has conducted major sulfur research in the late 70's and early 80's in cooperation with Ministry of Transport where sulfur was incorporated in the construction of major road sections, some of which are still functioning. Sulfur is added to asphalt to overcome temperature susceptibility (dependency) of local binders, thereby reducing or eliminating rutting tendency of local mixes. By mid 1980's, sulfur research had been stopped due to the disadvantages of sulfur mixes. Several agencies such as The Sulfur Institute (TSI), Devco Company and others have continued to improve sulfur mixes to eliminate their disadvantages. Research on development of new construction materials such as sulfur polymer cement concrete, plasticized sulfur and polymer asphalt extender/replacement may be found to be fruitful.

This research work was planned with the objective of exploring the possibility of utilizing sulfur as a binder for making sulfur-asphalt in light of the new developments in this area in recent years. The study on sulfur-asphalt concrete consist of testing Devco sulfur-extended asphalt modifier (SEAM), with local asphalt-concrete mixes and to assess the effect of sulfur and modified sulfur materials by comparing with the performance of local plain and sulfur extended asphalt-concrete mixes. Results indicated that SEAM modified asphalt concrete can be produced, hauled, placed and compacted easily with conventional methods and equipment. There will be no constructability problem with the use of SEAM binder. SEAM additive has provided asphalt concrete mixes a superior stability compared to the conventional asphalt mix. Also, it was noted that the stability result (14.4 kN) obtained with sulfur 30/70 mix is higher than the value (11.1 kN) reported in previous local studies for the same type of mix with 1% cement added. Use of SEAM material at the volume replacement ratio of R=1.5 proved to be economical as compared to regular asphalt as the amount of required asphalt reduced in proportion to the SEAM percentages added. The tests on assessing the environmental impact of this sulfur-asphalt technology show that there is no long term hazard for mixes as indicated by acceptable values of emission of hazardous gases such as H<sub>2</sub>S and SO<sub>2</sub> (<1 PPM at 76°C). However, precautions must be used during preparation of mixes at 145°C.

**Key words:** *Sulfur asphalt, SEAM, Sulfur asphalt mixes, Environmental impact.*