Asphalt pavement has a limited lifespan due to the effects of traffic loading and environmental factors such as sun and rain. This pavement deterioration results in it needing to be replaced approximately every 12-15 years due to moisture penetration and oxidation of the bitumen binder. The oxidation causes embrittlement and cracking, ultimately resulting in the need to replace the pavement.

Continual replacement of asphalt pavement surfacing is costly and time consuming; however, there are ways to extend the life of pavement surfacing. One such method is by the application of bituminous emulsions, also known as Surface Enrichment Spray Treatments (SEST). The airport has 820,000m² of pavement surfacing, comprising 66% of the total surfacing area. The AECOM team believed that the oxidation-resistant properties of Gilsonite would provide significant benefits to the pavement preservation. The advanced solutions for achieving this were via application of a Gilsonite-based emulsion to the pavement surface; similar to a coating of sunscreen. Before committing to the application of Gilsonite, AECOM’s New Zealand-based engineers undertook extensive research into the performance of Gilsonite as an emulsion product. This involved attending the American Society of Civil Engineers’ May 2013 conference, which included presentations on Gilsonite emulsions by the Federal Aviation Authority.

Gilsonite can be used in SEST products to help the longevity of asphalt surfaces. Gilsonite, or North American Asphaltite, is a natural, resinous hydrocarbon. This natural asphalt is similar to hard petroleum asphalt and is often called Asphaltite, Uintaite, or Asphaltum. Gilsonite is a shiny, black substance similar in appearance to the mineral Obsidian. It is brittle and can be easily crushed into a dark brown powder. A unique feature of Gilsonite is its high nitrogen content. The low oxygen content relative to nitrogen suggests that Gilsonite is more resistant to free radical oxidation.

Over the past year, Gilsonite-based SEST has been applied to almost 400,000m² of pavement surfacing at Christchurch International Airport. Extending pavement surfacing life will result in:

- Reduced maintenance cycles and costs
- Reduced raw material usage
- Enhanced qualities of existing surfacing materials
- Improved liveability of our end users

The Christchurch International Airport has undergone a full life-cycle assessment and is the first emulsion to gain Green Circle Certification.

Extending pavement surfacing life will result in:

- Improved liveability of our end users
- Enhanced qualities of existing surfacing materials
- Reduced raw material usage
- Reduced maintenance cycles and costs
- Increased safety and reliability for airline passengers and airport construction workers

Operational constraints exist as the Gilsonite-based SEST requires some time to cure off to an acceptable level for operations to recommence (circa 1 week). However with a managed approach and appropriate planning, the effects on operations can be mitigated.

With the success of Gilsonite-based emulsion is there scope to broaden the horizons? Could Gilsonite be a viable option to extend the life of pavement surfacing within New Zealand’s road network?