Health Quality Assurance Approaches for Bitumen Manufacture and Supply

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Background

- Bitumen produced from crude oil contains low levels of PAC
  - Residual from refining process
  - PAC may be carcinogenic
- Occupational settings / hot emissions are the primary health focus
  - Exposures continually reduced over time
- Product quality assurance: manage and control production and supply to assure no excessive exposures, comply with regulations
Bitumen Supply Chain QA Checkpoints

Bitumen Supply Chain

Process:
- Refining
- Supply
- Modification
- End Use

Manufacture & Supply

Potential Issues:
- On-Spec (includes health criteria)
- Contamination
- Additives, Modifiers
- Worker Safety

On-Spec (includes health criteria)
Contamination
Additives, Modifiers
Worker Safety
Asphalt, CAS# 8052-42-4/EINECS 232-490-4
A very complex combination of high molecular weight organic compounds containing a relatively high proportion of hydrocarbons having carbon numbers predominantly greater than C25 with high carbon to hydrogen ratios. It also contains a small amount of various metals such as nickel, iron or vanadium. It is obtained as the non-volatile residue from distillation of crude oil or by separation as the raffinate from a residual oil in a deasphalting or decarbonisation process.

Predominantly: 51% - 99%; is it important? 80/20 rule?
- Helps manage light-ends distribution…..including PAC
- Provide consistency across refinery streams
Residual Aromatic Extract (CASRN 64742-10-5, EC 265-110-5)

- Potential blend stream to SR asphalt, flux for air-blowing
- Aromatic oil derived from vacuum residuum, less toxic than distillate aromatic extract
Non-Carcinogenic RAE Quality Control

Correlation of MI with 5% GCD vaporization temperature

Use of GCD/MI correlation to set real-time cutoff criteria
Supply Issues

Bitumen Supply Chain

Process:
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- Return Supply

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GHS – Global Harmonized System

- Mixtures classified based upon components (e.g. CAS / EINECS #)
  - Generally, >0.1 for carcinogens
- Manufactured products comply; assure supplied products do
- Case for action – prior cargoes
  - HFO, Waste oil, crude, etc
  - How much remains? Can it be measured? >0.1%?
- Quality Assurance approaches include, but not limited to
  - Dedicated vessels
  - Cleaning vessels
  - Quantitative risk assessment
Summary

- Assure confidence and high level of safety performance
- Scenarios presented on approaches to quality assurance in manufacturing and supply
- Discussion topics – also Poster #338; please visit
- Further detail on the EM work on RAE was presented at the Society of Toxicology in San Diego (2014), a scientific paper for publication pending, and a US patent has been obtained
Thank You
References

Introduction

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Bitumen quality assurance: manage and control production and supply to:
Assure no excessive exposures, comply with regulations


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Manufactured products comply: do supplied products?

Case for action – prior cargoes
• HFO, Waste oil, crude, etc
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References


