

Asphalt Institute's Re-refined Engine Oil Bottoms (REOB) Residue Task Force

for the Mix ETG
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Intended to Be An Objective Introduction to a “Slippery” and “Heated” Topic

- The Asphalt Institute supports the responsible modification of asphalt materials for improved performance and better life cycle costs, but does not endorse any specific or proprietary form of modification.
- Asphalt Institute currently has no official written guidance or information on the use of REOB.
- Asphalt Institute has developed information/guidance documents and reported on studies regarding some modification types.
 - PPA, Sulphur Extender Asphalt, PMA

Many Names in the Literature for Re-refined UEO Products as Asphalt Modifier

- Re-refined Vacuum Tower Bottoms (RVTB)
 - “non-distillable fraction from the re-refining of used engine oils” Heritage Research Group
- Waste Engine Oil Residue (WEOR), Waste Engine Oil (WEO) Residue, Engine Oil Residue (EOR)
 - Simon Hesp (Queens Univ.)
- Waste Oil Distillation Bottoms (WODB)
 - Herrington (1993)
- Re-Refined Heavy Vacuum Distillation Oil (RHVDO), Re-refined Heavy Vacuum Distillate Bottoms (RHVDB)
 - D’Angelo
- Asphalt Flux, Asphalt Extender, Asphalt Blowdown, Others Above, Vacuum Tower Asphalt Binder (VTAB)
 - National Oil Recyclers Association (NORA)

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Observation: Naming Choice Reflects Entity’s Interest

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Contributes to confusion

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AI Calls It REOB Residue

Research on Straight WEO or UMO (Not Re-refined) as an Asphalt Rejuvenator

- Referred to as
 - Waste Engine Oil (WEO)
 - DeDene et al (2011, 2014)
 - Used Motor Oil (UMO)
 - Oliveira et al (2013)
- Additional WEO Studies Referenced in the Literature
- Show that WEO or UMO can be used effectively as a “rejuvenator”
- Terms Used Interchangeably Muddy the Water Even More
 - “recycling agent” vs “rejuvenator” vs “softening agent”

- Background
 - Members
- Objectives
- Progress
- On-line Technical Library
- Questions around REOB

- REOB used as modifier for over 30 yrs, improves low-temp PG grade, generally increases UTI
 - i.e. modify a 64-22 to a 58-28 or even a 64-28
- Increased use of high RAP and RAS mixes
 - Greater demand for softer grades, rejuvenators
- Concern of premature cracking and overall low durability in Ontario, Northeast States
- Some placing blame on REOB
 - NH and ME recently banned REOB
 - Other States watching closely

- At AI's Spring Meeting, Canadian Committee asked Technical Advisory Committee (TAC) to develop information/guidance for the industry on use of REOB residue as additive for asphalt
- TAC formed our REOB Residue Task Force
 - John Brownie (ExxonMobil - Chair), Mike Anderson (AI), Sandy Brown (AI), Mark Buncher (AI), Greg Harder (AI), Gaylon Baumgardner (Ergon), Everett Crews (MeadWestvaco), Kevin Hardin (Associated Asphalt), Edgard Hitti (Paramount), Mark Homer (Ajax Terminal), Gerald Reinke (Mathy), Bob Hockman (TAMKO), Laurand Lewandowski (Owens Corning)
 - AI Member REOB suppliers (4) not part of TF, but available to provide information

- Learn more about REOB materials, processing, effects/benefits of use and best practices
- Recommend course of action for AI that could include:
 - sponsoring a symposium
 - conducting research
 - developing information/guidance on REOB residue modification that could be similar to our IS-220 for PPA modification
 - Synthesize the literature
 - laying out benefits, concerns, best practices
 - help agencies make educated decisions

- Met twice. 3rd meeting next week
- Initial focus learning about REOB residue
- Determined National Oil Recyclers Association (NORA) working for REOB suppliers on promotion
 - Asphalt Flux Working Group
- REOB suppliers need to define what product is/ is not
 - Specification around product!
 - Educate industry on their product
- Mark Bouldin (Safety-Kleen) spoke to TAC in Aug
 - addressing specific questions of TF
- Electronic repository of REOB literature on AI website

Re-refined Engine Oil Bottom Residue

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Research & Lab

Engineering

Education

Re-refined Engine Oil Bottom Residue Information

Published Papers and Reports

- [1993 - RTR paper on WODB as extender, by Herrington et al](#) (PDF 2.2.mb)
- [2009 - CTA paper, Validation of DENT and ExBBR, Hesp et al](#) (PDF 871 kb)
- [2009 - TRB paper, AC Loss Tangent as Performance Indicator for Thermal Cracking - Soleimani, Hesp et al](#) (PDF 386 kb)
- [2010 - IJPE paper - X Ray Fluorescence of WEOR in asphalt and its effect on cracking - Hesp Shurvell](#) (PDF 383 kb)
- [2011 - CTA paper, Effects of EOR on AC - Rubab, Hesp et al](#) (PDF 72 kb)
- [2012 - MAIREPAV paper - Waste Engine Oil Residue in Asphalt Cement - Hesp Shurvell](#) (PDF 621 kb)
- [2012 - CTA paper - Asphalt Binder Modified with RVHDO, by D'Angelo et al](#) (PDF 783 kb)
- [2013 - CTA paper - Performance Properties of Mixes Modified with RHVDB, by D'Angelo et al](#) (PDF 463 kb)
- [2013 IJPRT paper on UMO as rejuvenator additiive, by Oliveira et al](#) (PDF 1.2 mb)
- [2014 - TRB paper on Effects of WEO, 14-0529, Hesp](#) (PDF 529 kb)
- [2014 - CTA paper on AC Acceptance Methodologies in Ontario, by Brown](#) (PDF 753 kb)
- [2014 - Heritage RG Report to ILDOT on Chemical Analysis of AC with RVTB and Effect on Mix Performance](#) (PDF 628 kb)
- [2014 - IJPRT paper on WEO as additive, by DeDene et al](#) (PDF 420 kb)
- [Draft NCHRP Problem Statement on Modification of PG Asphalts to Enhance Low-Temp Properties](#) (PDF 24 kb)

Presentations at Public Industry Meetings

- [2012 - Hesp ppt, WEO residue detection in asphalt](#) (PDF 661 kb)
- [2013 - DAngelo ppt, Asphalt Modification with Re-refined Heavy Vacuum Distillate](#) (PDF 1.6 mb)
- [2014 - Grzybowski and Bouldin PowerPoint, Re-Refined Oils in Asphalt](#) (PDF 373 kb)

REOB Manufacturers Info

- [2014-03 - EcoAddz MSDS](#) (PDF 83 kb)
- [Safety-Kleen Refining of Asphalts](#) (PDF 442 kb)
- [Safety-Kleen VDB Eco ADDZ Michigan DOT](#) (PDF 3 mb)
- [2014 NORA 2-pg brochure responding to Assault on REOB](#) (PDF 1.2 mb)

Ontario - MTO Cracking Issue

- [2006 - MTO Report by Hesp - Development of an Improved Binder Spec and Testing Approach](#) (PDF 1.6 mb)
- [2009 - Final Report by Huber for MTO on Hwy 655, Eval of Low-Temp Cracking in Ontario](#) (PDF 4.5 mb)
- [2009 - Commentary by Brown \(OHMPA\) on draft Huber Report for MTO on HWY 655](#) (PDF 93 kb)
- [2009 - OHMPA's Modified Fig 1 v2 of Hwy 655 Report for MTO by Huber](#) (PDF 126 kb)
- [2013 - PowerPoint by Bahia to MTO AC committee - DENT and Ductility Tests and other Options](#) (PDF 2 mb)
- [2014 - MTO's Road Talk - Better Asphalt Cement Initiative - RT20-1](#) (PDF 689 kb)
- [2014 - Ontario Draft Language for MGAC](#) (PDF 334 kb)
- [2014 - PowerPoint by Manolis - Engineering Properties of AC Binders and Relation to Pavement Performance](#) (PDF 2.9 mb)
- [2014 - PowerPoint by Manolis - Understanding Asphalt Binder Cracking Specifications](#) (PDF 550 kb)
- [2014 - CTA paper on AC Acceptance Methodologies in Ontario, by Brown](#) (PDF 753 kb)
- [2014-07-01 - Presentation to Municipalities](#) (PDF 3.1 mb)

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- Can REOB be defined in a standard?
- Different manufacturing processes? Equal?
 - Does an agency need to be concerned with the type or quality of REOB product being used?
- Are other materials present (i.e. surfactants, chemical additives, metals, glycols, solvents, etc.)?
- Are there guidelines in terms of max limits?
 - either by weight of binder or by drop of grade
- Any interactions with common additives?

- No position at this time
 - Pending Task Force findings and recommendations
- Guidance from IS-220, “Polyphosphoric Acid Modification of Asphalt” (2005) still valid
 - “The Asphalt Institute supports the responsible modification of asphalt materials for improved performance and better life cycle costs, but does not endorse any specific or proprietary form of modification. Furthermore, the Asphalt Institute encourages the continuing development of performance-related specifications to replace recipe-type binder specifications wherever feasible.”