Recycling and re-using asphalt
24th March 2011

Dealing with tar bound arisings

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Cumbria County Council

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Introduction

- What is tar?
- The occurrence of tar
- The potential hazards
- The ADEPT guidance
- The current position

Tar - definition

- Two types of crude coal tar were produced with different compositions and properties:-
  - Coke Oven (High temperature) tar. Produced at around 1200ºC and have a high aromatic hydrocarbon content and a pitch content of around 50%
  - Low temperature tar. Produced at around 600 to 700ºC in gas works and is paraffinic with a pitch content of around 35%. Less viscous than high temperature tar

Tar - definition

- It can be difficult to define “coal tar” for identification purposes
- It can be similar in appearance to bitumen
- Testing is required for identification

Uses of tar in highway works

- Grouting (probably pre 1950/60)
- Asphalt (until the mid 1970's)
- Surface dressing (until the mid 1980's)
- Fuel resistant surfacing

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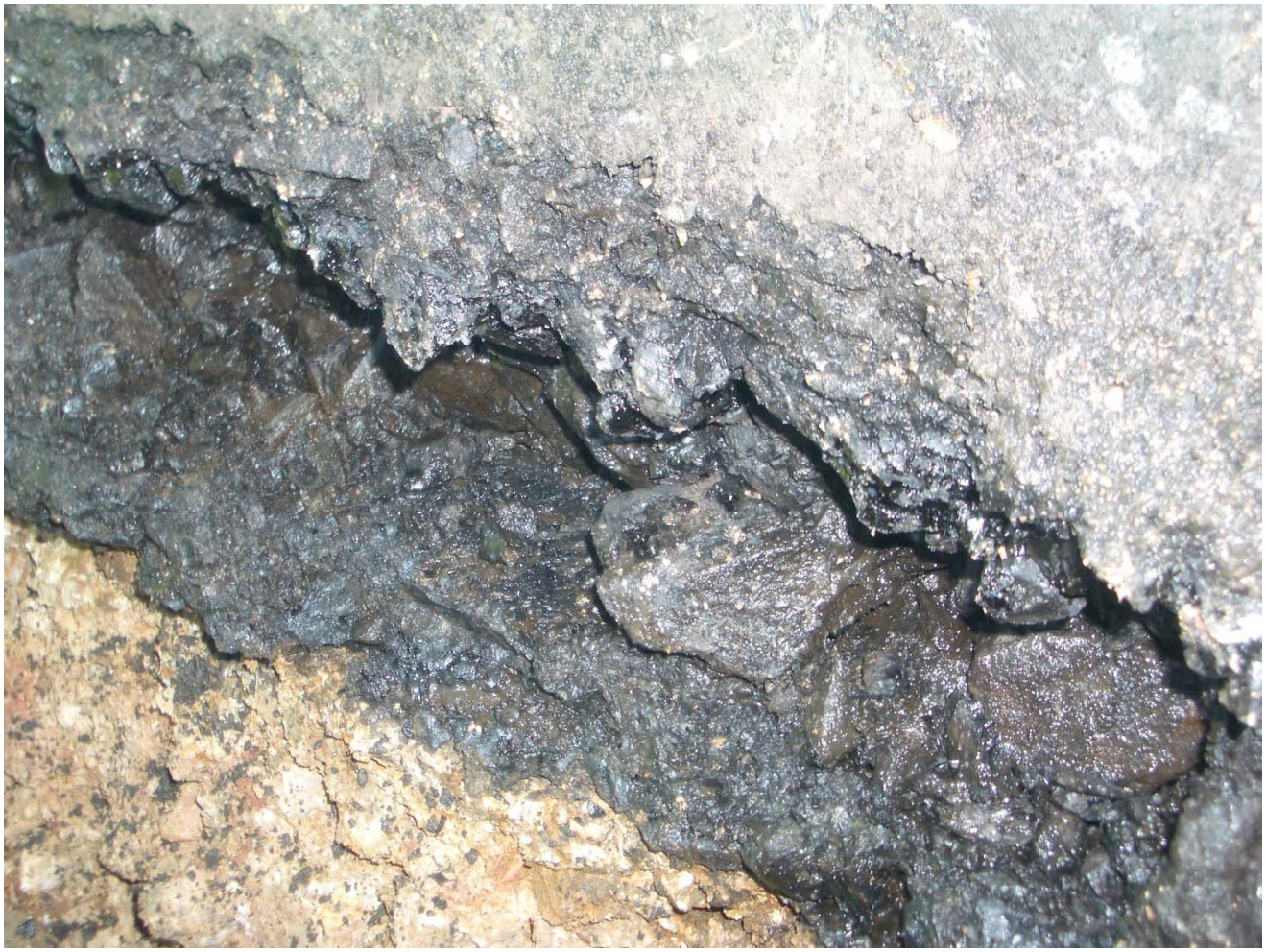

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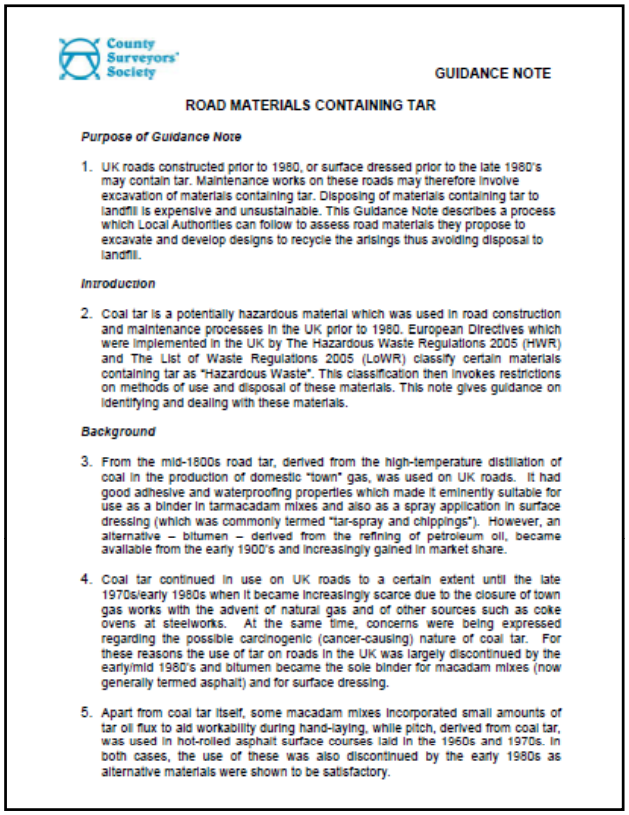
Potential hazard

- The potential hazard posed by coal tar arises from the levels of Polycyclic Aromatic Hydrocarbons (PAHs).
- Some PAHs are known to have carcinogenic effects and levels of these are very high in the case of tar (but extremely low in bitumen)
- Materials containing tar may be classified as Hazardous Waste
- Other constituents may be harmful to the environment



County Surveyors' Society

GUIDANCE NOTE

ROAD MATERIALS CONTAINING TAR

Purpose of Guidance Note

1. UK roads constructed prior to 1960, or surface dressed prior to the late 1960's may contain tar. Maintenance works on these roads may therefore involve excavation of materials containing tar. Disposing of materials containing tar to landfill is expensive and unsustainable. This Guidance Note describes a process which Local Authorities can follow to assess road materials they propose to excavate and develop designs to recycle the arisings thus avoiding disposal to landfill.

Introduction

2. Coal tar is a potentially hazardous material which was used in road construction and maintenance processes in the UK prior to 1980. European Directives which were implemented in the UK by The Hazardous Waste Regulations 2005 (HWR) and The List of Waste Regulations 2005 (LoWR) classify certain materials containing tar as "Hazardous Waste". This classification then invokes restrictions on methods of use and disposal of these materials. This note gives guidance on identifying and dealing with these materials.

Background

3. From the mid-1800s road tar, derived from the high-temperature distillation of coal in the production of domestic "town" gas, was used on UK roads. It had good adhesive and waterproofing properties which made it eminently suitable for use as a binder in tarmacadam mixes and also as a spray application in surface dressing (which was commonly termed "tar-spray and chippings"). However, an alternative – bitumen – derived from the refining of petroleum oil, became available from the early 1900's and increasingly gained in market share.

4. Coal tar continued in use on UK roads to a certain extent until the late 1970s/early 1980s when it became increasingly scarce due to the closure of town gas works with the advent of natural gas and of other sources such as coke ovens at steelworks. At the same time, concerns were being expressed regarding the possible carcinogenic (cancer-causing) nature of coal tar. For these reasons the use of tar on roads in the UK was largely discontinued by the early/mid 1980's and bitumen became the sole binder for macadam mixes (now generally termed asphalt) and for surface dressing.

5. Apart from coal tar itself, some macadam mixes incorporated small amounts of tar oil flux to aid workability during hand-laying, while pitch, derived from coal tar, was used in hot-rolled asphalt surface courses laid in the 1960s and 1970s. In both cases, the use of these was also discontinued by the early 1980s as alternative materials were shown to be satisfactory.

The ADEPT (CSS) Guidance Note

Published November 2008

*www.cssnet.org.uk/documents/**RoadMaterialsContainingTar**.pdf*

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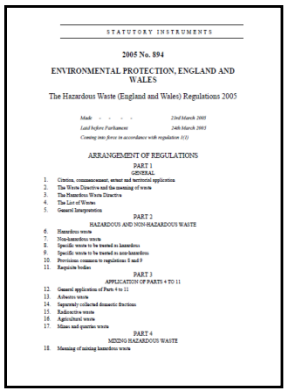
The Guidance Note

- Developed in response to queries about arisings following the introduction of the Hazardous Waste Regulations 2005
- Any excavated material is considered to be waste
- Emphasis on assessing materials prior to commencing work and if tar is found, developing solutions that avoid disposal to landfill



STATUTORY INSTRUMENTS

2005 No. 894

ENVIRONMENTAL PROTECTION, ENGLAND AND WALES

The Hazardous Waste (England and Wales) Regulations 2005

ARRANGEMENT OF REGULATIONS

PART 1
GENERAL

1. Citation, commencement, extent and territorial application
2. The Waste Directive and the meaning of waste
3. The Hazardous Waste Directive
4. The List of Wastes
5. General interpretation

PART 2
HAZARDOUS AND NON-HAZARDOUS WASTE

6. Hazardous waste
7. Non-hazardous waste
8. Specific waste to be treated as hazardous
9. Specific waste to be treated as non-hazardous
10. Provisions common to regulations 8 and 9
11. Requisite bodies

PART 3
APPLICATION OF PARTS 4 TO 11

12. General application of Parts 4 to 11
13. Asbestos waste
14. Separately collected domestic fractions
15. Radioactive waste
16. Agricultural waste
17. Mines and quarries waste

PART 4
MIXING HAZARDOUS WASTE

18. Meaning of mixing hazardous waste

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Definitions of waste

- Waste is defined in the European Waste Catalogue
- Section 17 03 defines bituminous mixtures, coal tar and tarred products. There are 3 sub-groups:-
  - 17 03 01* bituminous mixtures containing coal tar M
  - 17 03 02 bituminous mixtures other than those mentioned in 17 03 01
  - 17 03 03* coal tar and tarred products A

Investigation and testing

- Check maintenance history and records
- Cores or trial pits at design stage
- Examine each layer in the construction
- More likely to be an issue for Utility works

Investigation and testing

- Further guidance on sample preparation is needed
- Test for PAH and phenol concentration
- Testing at an analytical laboratory
- There are 17 PAH components
- There are some indicator tests which may identify where detailed analysis is required

Investigation and testing

Indicator tests:

- White spray paint (goes brown in the presence of tar, little affected by bitumen)
- Adding a drop of Methylene Chloride to a fragment of material on a filter paper. Tar gives yellow-brown stain; bitumen gives dark brown stain)
- Use of PAK marker (available from www.interlab-bv.nl). Marker is sprayed on the material and left to dry. If the white spray discolours to a light brown/yellow, PAH level exceeds 150 ppm. PAK marker gives an indication of PAH presence, but does not give a measurement.
- Use of a UV lamp. Interlab recommend the use of a UV lamp in cases of doubt after using PAK marker. Under UV light material the discoloured PAK spray lightens and becomes yellow/ green.

PAH components

Acenaphthene
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Anthracene
Benz(a)anthracene
Benzo(a)pyrene
Benzo(b)flouranthene
Benzo(g,h,i)perylene
Benzo(k)flouranthene
Chrysene
Coronene
Dibenzo(ah)anthracene
Flouranthene
Flourene
Indeno(1,2,3-c,d)pyrene
Naphthalene
Phenanthrene
Pyrene

(US EPA PAH16 plus Coronene)

Interpretation of results

- If the total concentration of the 17 PAH components is > 25ppm, then the material cannot be recycled via a hot mix asphalt process
- For use as an unbound material these criteria apply:-
  - The concentration of Benzo(a)pyrene is below 100 ppm.
  - The concentration of all other components of PAH17 is below 1,000 ppm.
  - The concentration of phenol in the leachate of a liquid to solid ratio of 10 litres per kg is below 1 mg/kg.

options

- Look at alternative designs which would allow the material to remain in place
- Examine methods of working to segregate (minimise) tar bound layers
- Excavate and treat the tar bound material using a cold process

The current position

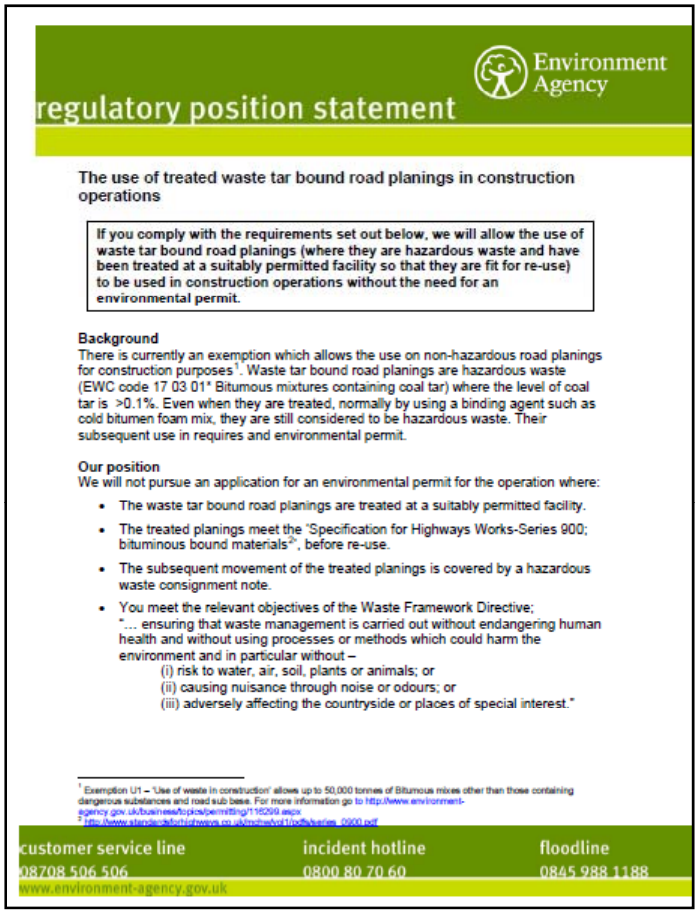
- The 2008 guidance has been used by many local authorities and some revisions have been proposed based on its use
- These included
  - Guidance on sample preparation
  - Clarification of some of the testing requirements
  - Guidance on environmental limits where re-use is proposed

The current position

- During 2010 a working group was set up including EA, MPA, HTMCA and ADEPT to review the ADEPT guidance
- A Technical Advisory Group (TAG) has very recently been established by EA under the European Pathway to Zero Waste project
- The group's objective is to develop an End of Waste Quality Protocol for tar covered road materials. A key desire is for the TAG to agree a measurable and practical definition for "Coal Tar" that can classify coal tar above or below 0.1%.

The current position

- A proposed revised version of the Guidance Note has been sent to EA for comment and will hopefully be issued as an interim until the protocol is available
- A Regulatory Position Statement was published by EA in December 2010
- This Regulatory Position Statement will be reviewed by 30 April 2011



Environment Agency

regulatory position statement

The use of treated waste tar bound road planings in construction operations

If you comply with the requirements set out below, we will allow the use of waste tar bound road planings (where they are hazardous waste and have been treated at a suitably permitted facility so that they are fit for re-use) to be used in construction operations without the need for an environmental permit.

Background

There is currently an exemption which allows the use on non-hazardous road planings for construction purposes[1]. Waste tar bound road planings are hazardous waste (EWC code 17 03 01* Bitumous mixtures containing coal tar) where the level of coal tar is >0.1%. Even when they are treated, normally by using a binding agent such as cold bitumen foam mix, they are still considered to be hazardous waste. Their subsequent use in requires and environmental permit.

Our position

We will not pursue an application for an environmental permit for the operation where:

- The waste tar bound road planings are treated at a suitably permitted facility.
- The treated planings meet the 'Specification for Highways Works-Series 900; bituminous bound materials[2]', before re-use.
- The subsequent movement of the treated planings is covered by a hazardous waste consignment note.
- You meet the relevant objectives of the Waste Framework Directive;
  "… ensuring that waste management is carried out without endangering human health and without using processes or methods which could harm the environment and in particular without –
  (i) risk to water, air, soil, plants or animals; or
  (ii) causing nuisance through noise or odours; or
  (iii) adversely affecting the countryside or places of special interest."

[1] Exemption U1 – 'Use of waste in construction' allows up to 50,000 tonnes of Bitumous mixes other than those containing dangerous substances and road sub base. For more information go to http://www.environment-agency.gov.uk/business/topics/permitting/116269.aspx

[2] http://www.standardsforhighways.co.uk/tmrf/ed11/pdfs/series_0900.pdf

customer service line 08708 506 506 | incident hotline 0800 80 70 60 | floodline 0845 988 1188

www.environment-agency.gov.uk

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The Regulatory Position Statement

- If you comply with the requirements set out, EA will allow the use of waste tar bound road planings (where they are hazardous waste and have been treated at a suitably permitted facility so that they are fit for re-use) to be used in construction operations without the need for an environmental permit.
- EA defines these materials as hazardous waste where the coal tar content >0.1%

The next steps

- Leachate testing is being carried out on tar bound materials coated with foamed bitumen and hydraulically bound material
- Further discussion needed on the definition of tar to determine what constituents make up the 0.1% coal tar

Thank you for listening

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