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A HISTORY OF TAR DISTILLATION AT CREW'S HOLE, BRISTOL

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Foreword

It may come as a surprise to some of the younger members of the Gas Industry to learn that the former South Western Gas Board was the sole owner (100%) of Bristol & West Tar Distillers Ltd for eight years up to 1970 and the advent of Natural Gas.

Indeed, the Gas Board, under the Chairmanship of Mr CH Chester (Past President of the Institution of Gas Engineers) and Deputy Chairmanship of Mr J Carr, had owned twenty-five percent (25%) of Bristol & West Tar Distillers Ltd from 1952 – only five years after the Nationalisation of the Gas Industry.

This brief history of Tar Distillation at Crew's Hole, Bristol starts from John Bethell's patent No 7731 in 1838, the use of creosote for the preservation of wood. Isambard Kingdom Brunel, building miles of railway lines, needed a good preservative for his wooden sleepers. With the financial support of Roberts and Daines, Iron Masters in St Philips, and the lease & technical expertise of Bethell, he set up a Tar Works at Crew's Hole in 1843. He chose one of his employees, William Butler, who had been working on the construction of the Bristol & Exeter railway line to take charge of the works. The crude tar was purchased from the local Gas Works. By 1863 the works was owned by William Butler, and traded under the style of Wm Butler & Co (Bristol) Limited.

During the 1960s the replacement of the old town gas, by both gas produced from petroleum and North Sea gas, led to the demise of coal based gasworks and resulted in a large reduction in the availability of crude tar.

Finally on 1 April 1970 the ownership of Bristol & West Tar Distillers Ltd passed to the British Steel Corporation, Chemicals Division. The works continued but distilled only Coal Tar from BSC Coke Ovens in South Wales. In 1974 British Steel Corporation (Chemicals) Ltd was formed. The Crew's Hole Works finally closed down in 1981.

> ***Oil and ointment and wax and wine,***
> ***And the lovely colours called aniline,***
> ***You can make anything from a salve to a star,***
> ***(If you only know how) from black coal-tar.***
>
> *Punch*

Introduction

Crew's Hole is just over two miles up-river of Bristol Bridge. The Tar Works site was at the bottom of Troopers Hill, well known for its lone chimney. It was an industrial area from the 18th century. This is not surprising, for there was stone for quarrying, coal from both opencast mining and pits nearby in Conham and Hanham, and clay suitable for a fireclay works. It was east of Bristol, the traditional side of a city for a 'smelly' works, since the prevailing wind is from the Southwest.

The earliest known industrial works in the area was in about 1810, when copper smelting was started by the Bristol Brass Company. The flue up the hillside to the chimney at the top of the hill is believed to have been built later to give good draught conditions for the furnaces.

There were many works along the River Avon, such as the Netham Chemical Works, Bristol's largest Alkali Works, started in the 1840s. Next door was the Sheldon Bush Lead Works. The River provided the means for moving raw materials in from coastal and inland sites and finished products out. Clay from the Isle of Wight and from Poole was used by Anthony Ammatt to make pottery in Crew's Hole between 1812 and 1819. Another industry was barge building and there was a slipway near to the old Lamb Inn. Somewhere in Crew's Hole there was a bottle-glass works, for in the Bristol Journal of 4th October 1766 it was offered for sale by auction.

The 33rd Alkali Inspector's Report (1895) comments upon the close proximity of three works, (the Victorians tended to use the singular word 'Work'): Conham Chemical Company, an Alkali Work; Wm Butler's Tar Work and Stone and Tinson's Muriate of Ammonia Work.

The report says:

> *In considering the question of vapours and smoke in this particular locality, we must not forget that there are at least 20 different chimneys at the various works. The coal burnt at the alkali work, the tar work, the muriate of ammonia work and the brick and tile work, together with the fires in the houses, would itself constitute a considerable volume of smoke.*
>
> *It is unfortunate that traces of ammoniacal vapours escape from the muriate of ammonia work as well as from the tar work. It is still more unfavourable that the alkali work is situated between them, for when the ammoniacal vapours meet the muriatic acid gas (Hydrochloric acid) in the air a white cloud is at once created and on a wet day this is very visible.*

Figure 1: 1954 Crew's Hole Tar Works from the air

When the Conham Chemical Works closed in 1904 and Stone and Timson's in 1924, both sites were incorporated into the Butler Works.

At the works, the Canteen building was always said to have been built on the Brilla heap. I didn't understand the meaning of 'Brilla', until I found out that 'Barilla' was the ash of seashore plants found in Spain and contained about 25% sodium carbonate. Alkali was made from Barilla but its use became replaced by the Leblanc soda process.

Historical development of the tar industry

Coal-tar, as the name suggests, is a by-product from the process of heating coal to produce gas and coke. The tar and ammoniacal liquor condense from the gas stream. Coal is of vegetable origin. Bitumen - 'the other black stuff' - is the residue from the distillation of crude oil, which is mainly of animal origin.

Before the 17th century no notice seems to have been taken of the emergence of tar during the heating of coal, though dry distillation of organic materials was the accepted method of alchemical research.

My maternal Grandfather, James Cochrane, was born at Port Patrick and was of the Dundonald clan, so I have been trying – without success – to find a family connection with Archibald Cochrane, Earl of Dundonald, who took out British Patent No 1291 in 1781. It was 'a method of extracting or making tar, pitch, oils and cinders from pit coal.' Dundonald's tar and pitch was marketed for shipyard use by the British Tar Co but the project faded with the introduction of copper sheathing for ships' bottoms.

The next and most important development associated with the production of tar was the introduction of coal-gas lighting. The first practical application was by William Murdoch in 1792 at Redruth. He needs no further introduction to the assembled company here tonight!

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Gas lighting companies were formed in many large towns and cities and the practice of carbonising coal developed rapidly.

The benefits of the lighting were rather dimmed by the massive pollution of the rivers by the black tarry by-product, which nobody wanted. I believe that Manchester claims to be the first gas works to use tar as a fuel, burning it under the retorts. The alternative, distillation, did not become common practice until uses had been found for the products of distillation: naphtha, creosote and pitch.

The first commercial use for crude tar was probably as a waterproof coating on wood or metals but it was not well adapted to this purpose. In 1815, Frederick Accum, chief chemist to the London and Westminster Chartered Gas Light and Coke Company, realised that it required to be 'evaporated to give it more consistence'. He carried out this evaporation in closed vessels or stills and thereby recovered the low boiling distillate, which he suggested could be used as a cheap substitute for turpentine.

In 1819 a Scot, named Macintosh, carried out experiments in Glasgow to produce a material that has made his name a household word, albeit mis-spelt 'Mackintosh'. He knew that coal tar naphtha dissolved rubber and he used the solution to join two pieces of fabric together to make the first waterproof material.

John Bethell, born in Bristol in 1804, became a Solicitor in London from 1825-54 and was a prolific inventor. In 1835 he patented a complete system of diving apparatus! He is best remembered for his patent AD 1838, BP 7731, which employed among other things coal tar thinned with 'dead oil', or creosote oil as it is known today, to preserve timber. Being unable to obtain the quality of creosote he required, he set up his own tar distillation works in the London area. In 1842 he had a works at Nine Elms, Vauxhall, in 1843 at Battersea Fields, in 1844 at both Battersea Fields and at Bow Common. At these works he carried out timber impregnation.

Prior to this timber was impregnated with soluble salts; Kyan used mercuric chloride and Margary used copper sulphate. These salts were leached out by the weather and, in particular, were not suitable for marine constructions, for which creosote became pre-eminent. After the Bethell process had been in operation for a few years, it gradually became the practice to use creosote alone.

Isambard Kingdom Brunel heard about Bethell's patent and with the financial support of Roberts and Daines, Iron Masters in St Philips, Bristol and the lease & technical expertise of Bethell, he set up a Tar Works at Crew's Hole in 1843. He chose one of his employees, William Butler, who had been working on the construction of the Bristol & Exeter railway line to take charge of the works.

William Butler’s arrival at Crew’s Hole is somewhat debatable! Joan Eastwood discovered that William’s daughter, Sarah, was born on 21 September 1843 and christened on 21 October 1843 at Creech St Michael Parish Church. This raises the question was William Butler still working near to Taunton in 1843?

In the early days at the Bristol works, creosote and pitch were the only saleable products. All the other oils would have been burnt in a restricted airflow to make lampblack. The solid but fusible

coal-tar pitch found a market in South Wales as a binder for unusable coal and anthracite dust, producing a first-class fuel briquette. When in 1878 the Crown Preserved Coal Company of Cardiff fell on hard times, Wm Butler purchased the works, putting his second son, Samuel, in charge.

It was well known that Wm Butler set up a second tar works at Upper Parting, Gloucester in partnership with Charles Bird in 1860 on the site of a disused brickworks.

Only recently, Joan Eastwood and I discovered that William Butler was actually living in Gloucester, as confirmed by the 1861 census. Who looked after the Crew's Hole works while he was away, is an unsolved mystery. However, we do know that when he returned to Bristol in 1863 he left his brother, Samuel Stevens Butler, in charge of the Sandhurst works. This tar works was closed in 1972 and I handed it over to the Cleansing Services Group. It is the works, which has been in the news following an explosion and fire in November 2000.

What made Wm Butler return to Bristol? We may never know but in 1863 there was a great fire at the Crew's Hole Works. Roberts and Daines may have decided that financially the fire risk was too high, for they sold their interest to Wm Butler, who then owned and ran both the Bristol and Gloucester Works. Later, in 1871, Roberts and Daines leased to Wm Butler part of their Silverthorne Lane premises, which eventually became the railhead at Bristol, the storage depot and the Head Office.

Tar distillation

Crude Tar was transported to the early works at Bristol in horse drawn narrow boats from as far away as Reading. Similarly, tar for the Gloucester works was collected from as far away as Worcester. Later motorised barges were used. Bath was the last Gas works to send crude tar in barges, while Stapleton Road Gas works supplied it by rail tankers to Silverthorne Lane and then up river by barge to the Crew’s Hole works. Road transport did not play the major part until after the opening of the Severn Road Bridge in 1966, from that time large specially designed road tankers delivered Coke Oven tars from South Wales direct to Crew’s Hole, the barges were then redundant.

We used to get some wet crude tar, ie above 5% water, from Stapleton Road Gas works, in spite of what Lionel Bennett used to say to me when we agreed the weekly figure. When in 1975 the BSC Coke Ovens had problems, we had a major problem settling their tar, for they sometimes sent crude tar with greater than 20% water! We had to devise a crude tar circulation system to deal with these high water content tars, which solved the problem.

Up to 1898 at Crew's Hole all tar was distilled by the batch process in pot stills. The iron pot was set in a brick furnace with a swan neck and a worm condenser. The distillate was divided by collecting it in a number of receivers. The residue was pitch. This was discharged before repeating the cycle.

In 1898, Butlers set up a Lennard's patent continuous pipe still, only the second one in this country. The Lennard process was patented in 1891 and the first still was erected in 1893 at the Greenwich Works of Messrs Forbes, Abbott and Lennard, later taken over by the South

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Metropolitan Gas Co. This was on the Greenwich Peninsula, well known to all as the site of the 'Dome'!

The Wilton Tar Still was erected at Crew's Hole in 1951, again based on a continuous pipe furnace, it was the main distillation unit until 1973, when British Steel Corporation, Chemicals Division, replaced the furnace with a continuously wound upshot Beverley heater.

Figure 2: 1954 The modified Lennard continuous pipe still

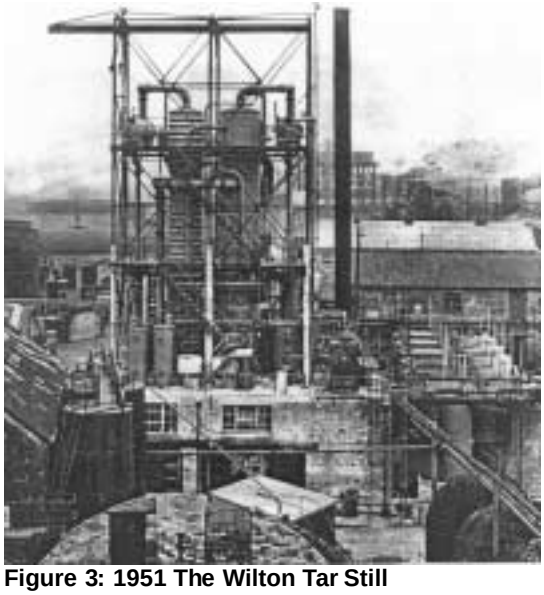

Figure 3: 1951 The Wilton Tar Still

Figure 4: 1973 The continuously wound upshot Beverley heater

This proved to be very efficient but much too fast for the rest of the system and resulted in many problems due to thermal cracking of the cast iron columns, until a slow warm-up technique was developed. One part of the improved system was that all the pumps were to be driven by electricity and not steam. Therefore an Emergency Generator was required. It proved to be very effective when we had power cuts during the 'winter of discontent'! The pitch circulation pumps were also fitted with creosote flushed glands. The other BSC Tar works thought we were mad. There were times when we thought so too!

By 1973 Gas Works crude tar was no longer available, so the modified Wilton Tar Still distilled tar from the South Wales BSC coke ovens at Port Talbot and Llanwern.

Tar acid extraction plant and refinery

Continuous tar acid extraction was commissioned in March 1956. This was a counter-current extraction of the Wilton distilled oils with 8% caustic soda solution. The final cresylate, containing approx 18% tar acids, was passed down a packed column, up which flue gas was blown. The carbon dioxide in the flue gas released the tar acids and produced sodium carbonate solution.

The washed tar acids were transferred to the Refinery, where they were dehydrated and distilled in a continuous process to separate the phenol from the rest of the tar acids. This was then purified by redistillation. The remaining tar acids were then depitched and the Cresols, Xylenols and heavy boiling tar acids separated for further purification by redistillation. Originally the majority of products were filled into and despatched in drums. Later, products were sold in bulk loads, with a saving of labour.

The sodium carbonate solution from the tar acids extraction plant was reacted with quick lime to give 8% caustic soda solution and a precipitate of calcium carbonate. This was filtered off using a Paxman filter.

On one occasion we contacted Paxman to obtain a spare part, only to be told that it was obsolete and no parts were available. However, they added, 'Please may we come and take a photograph of the filter?'

Limekilns were used to produce the Quick Lime on the Crew's Hole site. The last were built in 1951 but by 1961 Callow Rock lime was being purchased. Often it tended to be 'soft burnt' and caused difficulties with filtration, so Buxton 'hard burnt' lime was preferred.

Naphthalene plant

When I arrived at Crew's Hole in 1961, the Naphthalene process was very labour intensive. Washed oils were crystallised in 'open boats' (half a 30 x 9 Boiler cut in half lengthwise). After draining the uncrystallised oil, which was returned to creosote, the crystals were dug out and barrowed to the centrifuge. The 'whizzed' naphthalene (74 grade) was then stored ready for sale in hessian sacks. If bulk loads were required, it was necessary to re-melt the crystals.

In 1965, a new naphthalene plant was developed around a Simon Carves 'Magic Box', which was operated by two men on day work. The 74.0^{o}C Crystallising Point (74 grade) feedstock was made by crystallising the washed oils in long horizontal cylinders over a water bottom. After cooling, the water bottom was drained, followed by the uncrystallised oil. This left a space for further slow draining. After several days steam was passed through coils in the crystal mass and the low crystallising point naphthalene drained, leaving 74 grade crystals to be melted up and charged to the Magic Box.

The Magic Box was a rectangular crystalliser packed with 13 banks of finned tubes, through which could be passed water and / or steam, and which could be automatically controlled to complete a cycle from 74^{o}C CPt to 77.5^{o}C CPt in 24 hours.

The cycle was Charge, Cool to crystallise, Open drain valve and start slow warm up to remove the low CPt naphthalene, **Close drain valve** and start fast melt, Sample and discharge. Needless to say, it was most important to close the drain valve or the day's production was lost! The final product was stored at temperature in tanks ready for sale in bulk tankers.

Sublimed naphthalene plant

Sublimed naphthalene was made to a minimum CPt of 79.5°C, by acid washing 77.5°C Cpt naphthalene and then blowing air through the hot liquid into a chamber, where the sublimate formed on the walls. After a run of a day or so, the chamber was vented and the sublimed crystals brushed from the walls and bagged in multi-walled paper sacks.

The 1951 schedule referred to an old church being used as a subliming chamber. This was in use up to 1971. When we had parties of visitors, they were told this was the source of 'pure' naphthalene!

A purpose built subliming plant was commissioned in 1971. Bristol was probably the last works in the UK making sublimed naphthalene but it was closed down as a potential explosion risk after the Flixborough disaster in 1974.

The Magic Box process was shown, in a trial at Bristol, to be capable of making 80°C CPt naphthalene but the method was never developed at Bristol.

Uses of coal tar products

Over many years, new uses were found for the products of tar distillation. In 1849, phenol was being extracted from creosote distillate and, when nitrated to make trinitro phenol (picric acid) this was used as a yellow dye for wool, cotton and silk. This was the first artificial dye.

In 1856, William Perkin, attempting to make quinine, oxidised aniline with potassium dichromate and obtained a black precipitate, which was soluble in alcohol giving a colour, which he called 'mauve'.

The American Section of the Society of Chemical Industry awarded William Perkin a Medal in 1906 to mark the 50th anniversary of his discovery. The Perkin Medal is now awarded annually at the Plaza Hotel in New York and by tradition, all the men wear Mauve bow-ties with their Dinner suits! I've attended two Perkin Dinners but I'm not brave enough to wear a mauve bow-tie tonight so I've brought one to show you.

Mauve was the first aniline dye. A year later Perkin set up the first dyestuffs factory in the world at Greenford Green, Middlesex. As aniline was obtained from benzene there was a rise in the demand for benzene from the tar industry. However in 1874 Perkin sold his works and the British dyestuff industry went into decline being unable to compete with the huge German artificial colour industry.

In 1865, phenol became prominent again when Lister introduced his antiseptic surgery. In 1877, Jeyes Ltd started production of a phenolic disinfectant. They used light creosote, with phenols

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present, mixed with rosin and caustic soda, which gave an homogenous fluid, which formed a white emulsion with water. This is still known as 'Jeyes Fluid'.

The artificial dye industry was becoming established when, in 1869, Caro, Graebe and Lieberman in Germany and Perkin in England, independently devised methods for producing the essential dye of madder, alizarin, from anthracene. Up to this time anthracene had been used as a cheap axle grease! It suddenly became very valuable and the tar industry extracted anthracene from its heavy creosote to meet the new demand. This resulted in the demise of the cultivation of madder, the natural source of Turkey Red dye, which had been in use from the time of the ancient Egyptians.

In 1880, Adolf von Baeyer synthesised indigo from naphthalene but it was not until 1897 that it was produced on a commercial scale in Germany. Tar distillers extracted the naphthalene from their oils and the growing of indigo plants in India ceased.

The effect of the two world wars

Both the 1914–1918 and the 1939–1945 wars brought the tar industry into considerable importance in the production of chemicals for wartime uses.

Prior to 1914 the tar industry had a thriving export trade sending creosote to the USA and pitch for briquetting to Europe. The 1914-18 war put an end to that and so the surplus was made into Coal Tar Fuel (CTF). That war also re-established the dyestuff industry in the UK and so when the UK entered the 1939-45 war it had a self-contained dyestuffs industry ready to meet all demands.

Motor Benzole was produced for fuel – the famous National Benzole Mixture. **Toluene** gave trinitro toluene (TNT) and the first intense sweetener, saccharin. **Refined tar acids** (phenol and cresols) gave synthetic resins, weed-killers and disinfectants. In particular phenol gave acetyl salicylic acid (aspirin). It also gave picric acid, which as well as being used as a dye was an explosive known as 'Lyddite' (the name taken from a testing site at Lydd in Kent).

Pyridine, a tar base, which was used to denature alcohol, became, in the Second World War, a starting point for the sulfanilamide drugs. **Road tar** was diverted to making aerodrome runways and perimeter tracks, while **pitch and creosote** were blended to make Coal Tar Fuel (CTF) at a time when the fuel oil supply to this country was in grave danger.

During the 1930s ICI at Billingham had been making petrol from coal by hydrogenation. From 1939 they changed to the dehydrogenation of heavy creosote to produce aviation spirit. After the war the Billingham process ceased, being uneconomic compared with petrol from petroleum.
In 1947 the gas industry was nationalised and following protracted negotiations, a long term contract led to the formation on 1 January 1952 of Bristol & West Tar Distillers Ltd, owned 75% by Butlers and 25% by the South West Gas Board. In 1962 Butlers sold their share to the Gas Board, so that Bristol & West Tar Distillers Ltd became a private company wholly owned by the Gas Board. Butlers moved all the non-tar side of their business to the new Rockingham Works at Avonmouth between 1962 and 1965.

During the 1960s the replacement of the old town gas by both gas produced from petroleum and North Sea gas, led to the demise of coal based gasworks and resulted in a large reduction in the availability of crude tar. Finally on 1 April 1970 the ownership of Bristol & West Tar Distillers Ltd passed to the British Steel Corporation, Chemicals Division. In 1974 British Steel Corporation (Chemicals) Ltd was formed.

WILLIAM BUTLER

Let's digress from the works and think about the main character in the Crew's Hole story, William Butler.

He was in charge of the Crew's Hole, Bristol and the Upper Parting, Gloucester Works until his retirement in 1889. Local Government had attracted his attention quite early and with his natural ability, he was soon in the forefront of the attempt to establish representative Government in St George. As a result he became Chairman of the Local Government Board from its commencement in 1874 and was elected to this office annually for 14 years to 1889.

He presented a Fountain and Horse Trough to the Parish of St George in 1890 to commemorate this achievement. He also became the Chairman of the Highway Board, was elected a Guardian, became a member of the Gloucestershire County Council and was a Gloucestershire County Magistrate.

Figure 5: From an oil painting of William Butler

He was the first Chairman of the Bristol Tramway Company, a position he held until his death on 6 October 1900. As a token of respect all the Bristol Trams were stationary and observed a one minute silence at the time his coffin was lowered into the family grave in Avon View Cemetery.

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One of my guests tonight is Joan Eastwood, who is preparing a history of the Butler family. To mark the centenary of William Butler's death, she organised a luncheon on 6 October 2000, at which seven direct descendants of William Butler were present, one from as far away as Manila! It was held at Emmaus House, Clifton, which was formerly 'Clifton Grove', William's own house!

It is said that William Butler chose the site of the family grave at Avon View Cemetery so that he could continue to watch over his works! Now, in 2001, his view is of a housing estate! The Butler name lives on in the area, for a block of flats in Summerhill Road is known as 'Butler House'. Also in the new housing estate, off Blackswarth Road, is ‘Butlers Close’.

NAPHTHA REFINERY

Back to the works. With the invention of the internal combustion engine and the horseless carriage, the tar industry started separating motor benzole from the light distillate as a fuel. The Crew's Hole works was at the forefront of this development as a benzole distillation plant had been purchased from Germany and installed in 1890.

The stills were originally coal fired, quite a fire hazard! In their spare time the operators were reputed to have cultivated vegetables in an adjacent plot of land, which even when it became a tank farm, was still known as ‘The Garden’. Today, in 2001, there is a house built in ‘The Garden’.

In 1903, William Butler & Co (Bristol) Ltd formed a subsidiary called The British Refined Motor Spirit Co. (Eat your heart out, they sold 2 gallon cans of Benzole for motor purposes at 1s 1d per gallon!).

The Motor Benzole was stored on the other side of the road in the hillside Quarry Compound. Due to spillages this site was contaminated with Benzole. Today the Quarry contains a large house, best described as a pseudo Victorian Folly! It is called Joycewood House. I wonder if it is a non-smoking household?

Did you know that the name 'Petrol' was coined by Carless, Capel and Leonard in 1893?

When the 1904 Motor Act came into force, Butlers’ registered the first motorcar in Bristol. Its number was ‘AE 1’. Who knows the present owner of this number-plate? Yes, it is the Lord Mayor of Bristol.

The Naphtha Refinery shut down in the 1960s.

Figure 6: The first registered motorcar in Bristol. AE 1 in 1904

ROAD TAR

Bristol had the first 'macadamised' roads in the country, for in 1815, John Louden Macadam was appointed General Supervisor of Bristol Roads belonging to the Turnpike Trust. He gave his name to a new method of road making, when he evolved the idea of using graded stones to make the foundations. He is commemorated by the plaque outside 22 Berkeley Square, where he lived.

By the turn of the century and the advent of the motor car, all roads were dusty when it was dry and often slippery or even very muddy when it was wet. Some attempts were made to lay the dust with gas-works tar but it probably caused more problems than it solved. The first improvement was to dehydrate the tar, then in 1907 the Road Improvement Association sponsored a competition to determine the most suitable kind of tar for road use. The outcome was to dehydrate and distill tar to a point before it became a soft pitch. This was called 'prepared tar'.

In 1911 the Road Board issued a general specification. Grade No 1 was for surface dressing and No 2 for making tarmacadam. The specification was amended many times and by 1943 British Standard specification No 76 'Tars for road purposes' became the industry's 'Bible'. It defined limits for viscosity, the type of oil used to thin road tar, as well as limiting the phenol and naphthalene content. This suited the tar distillers very well for if road tar was its 'bread and butter' then the extracted chemicals, phenol and naphthalene, were the 'jam'.

During the 1960s both creosote and refined tar were exported. They were loaded into barges (the last three were the Jolly, Isabelle and Carbolate) and carried down river to be discharged into a small French tanker, the Cap Coz. My memory of sampling those cargoes is of a French crewman, following me round the deck carrying a can of naphtha and a rag to clean up any drips of tar. His complete knowledge of the English language seemed to be the two words ‘Dirty Bugger’.

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The modern tar works from 1973 to 1981

The tar distillation plant at Crew's Hole became one of the most modern in Europe following renewals and modifications under BSC ownership between 1970 and 1981. Two men on a 3-shift rota operated the plant continuously, 24 hours a day, 7 days a week. It only shut down for overhaul and repair. There were three subsidiary plants – Naphthalene, Creosote and Pitch, these were manned by day-workers.

77.5°C CPt naphthalene was transferred to another BSC (Chemicals) Ltd works at Totton, near Southampton, where phthalic anhydride was made.
Creosote was blended for sale as a wood preservative, as flux oil for road tars and as a feedstock for carbon black production.
Light anthracene oil was transferred to BSC (Chemicals) Ltd works at either Scunthorpe or Orgreave, near Sheffield, for anthracene extraction.
Pitch was blended with creosote to produce various grades of road tar to meet BS76.
Medium soft pitch was sent to the Phurnacite works at Aberdare to make smokeless fuel.
Hard pitch was sent to Anglesey Aluminium to make their carbon anodes.

Thus from small beginnings in 1843, starting with a simple pot still, tar distillation at Crew's Hole had developed by 1981 to a modern continuous distillation plant but economic considerations led to its closure.

There had been a flourishing tar acids business based on the high phenols content of gasworks tar. When the gasworks closed and a change was made to coke oven tar, with a low phenols content, the refining of tar acids was not viable.

On the other hand, the naphthalene content of coke oven tar was much higher than that of gasworks tar. Naphthalene production increased but it was never so profitable as tar acids. Bristol works had a virtual monopoly in sublimed naphthalene, until, following the Flixborough disaster, a hazard survey closed the plant.

Figure 7: 1954 Tar Spraybars on parade!

The tremendous road tar business built up over many years at Bristol, mainly tar spraying, was discouraged by BSC. All the other works sold their distillation residue as pitch, so why shouldn't Bristol? Bristol works therefore became a primary distillation unit with pitch as its main product.

Eventually, the reduction in demand for British made cars closed the works. Less sheet steel was made at Llanwern and Port Talbot for the motor industry. Less steel required less coke, and so less by-product tar was produced. BSC Chemicals then had excess distillation capacity. First the works at Whitehaven, followed by the works at Falkirk and then Crew's Hole works at Bristol were shut down. All the crude tar from South Wales was diverted to the two large BSC (Chemicals) Ltd works at Sheffield and Middlesbrough

The Crew's Hole site was cleared by 1982 and lay desolate until planning permission was granted and work started to build a prestigious housing estate known as 'Quayside Village'.

Quayside Village

There were two main problems to be solved by the developers, the risk of flooding and the contaminated site. It was always said that if houses were built on the site, someone would dig a creosote well in their garden!

Let's examine the major floods.

I was at the works on 10 July 1968, when it was flooded to 6 inches below the highest recorded floods in 1894 and 1960. In my office, only the telephone was visible on my desk! Believe me, that much water sorts out your filing system!

The river in flood often provided unexpected treasures. During one flood, the naphthalene plant charge hand, Jimmy White, was claiming a table, only to be told by Bill Rogers, the boiler house charge hand, 'Hands off, that's come from my boiler house upstream!'

Before I came to Bristol, on the 5 December 1960 the works was flooded to the 1894 mark. The Company Secretary, Stanley Thomas, had an oil-drum raft made to 'sail' into his office to rescue some confidential papers. I'm told that it caused some mirth when he capsized!

Figure 8: The 1894 Flood level marker

A proposal to build 900 houses on the Board Mill site across the river from the tar works, was published on 22 August 1989. This was part of the Bristol Development Corporation plan. Now in 2001 there are new housing estates on both sides of the river.

At the foot of Troopers Hill there was a Free Methodist Chapel built in 1853. William Butler was a Lay Preacher and he looked after this Chapel. He installed electricity and paid for their usage - even BSC continued to pay! Now in 2001, both the Chapel and the adjacent Schoolroom have been converted into houses.

When I visited the show houses in July 1989, I found that they were neat little town houses, very convenient for anyone working in Bristol but I didn't fancy the exclusive ones that were to be built against the towpath. Had the calculations taken into account the worst scenario, the major flooding experienced in 1894, 1960 & 1968? Time has shown that the decision taken to solve both the flooding and the garden contamination by raising the site level some five feet was correct. The site was piled and then back-filled. The metal piles were faced with decorative stonework and the exclusive riverside houses have been built.

Sadly, the Butler's tar works has gone and has been replaced by the Quayside Village.

Figure 9: 1996 Quayside Village. Exclusive riverside houses

Perhaps *Punch* might now say:

If you only know how, you can do it right;
Even build houses on a black coal-tar site.

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