



Cleaning up the Avenue Coking Works

Philip Norville, Business Development Manager
DEC UK
Greenstede House, 2nd Floor,
Wood Street, East Grinstead,
RH19 1UZ, UK
Email: Norville.Philip@deme.be
Web: www.decukltd.co.uk

In September 2009 the remediation of the Avenue Coking Works in Derbyshire, England, started in earnest. Within sight of Chesterfield's famous crooked spire is the former Avenue coking works often tagged as one of Europe's most contaminated sites. VSD – a consortia of Volker Stevin, Sita Remediation and specialist environmental contractor DEC – will tackle the many challenges its remediation poses and return the remediated site to the local community as a multi use facility.



The Avenue site is without argument a very heavily contaminated and very large parcel of land with many complex issues affecting it. The Derbyshire site covers over 98 hectares and is bounded by the river Rother, the Midland Mainline London to Sheffield high speed rail line and the A61.

During its working life the site was host to many industrial uses, primarily the coking works but also including a large chemical plant and liquor by products works. In addition to these ancillary facilities there was also a large rail head on site, a hazardous waste tip and two large contaminated silt lagoons.

The last operating industry on the site was the coking works which ceased production in 1992. The forerunners to the Homes and Community Agency (HCA) inherited the site following the closure and a lengthy process to return the site to the community began. Steve Collins of the HCA describes receiving the site as 'inheriting an abandoned site'. The works were handed over with the entire necessary infrastructure remaining in place. This included the buildings, the chemical tanks, pipework, sumps, gantries, waste tip and contaminated lagoons left as they were.

The reclamation and remediation is being funded by the HCA through the National Coalfields Program. The site remains owned by the East Midlands Development Agency (emda) who is acting as delivery agent for the project. This redevelopment process started as early as 1999 with the emptying of the above ground storage tanks and the dismantling and demolition of the above ground infrastructure and buildings. The site was razed but was left with a host of contamination problems below ground including the remaining sub surface infrastructure and contaminated soil and groundwater still needing to be remediated.

The remaining issues are still very substantial and complex. Steve Collins explains 'the experience gained by the HCA on other complex sites within the National Coalfield Program will be invaluable for the success of the Avenue'

Mike Fenton, project manager for emda, the site owner adds 'What we are trying to prevent here initially is the possibility that the soil and groundwater are still causing contamination to migrate from the site and affect the local amenity'.

The £82 million remediation of the site commenced in early September by VSD and is scheduled to take slightly over 4 years with all project specific construction works completed by mid 2014. The consortia specialists bring a wealth of expertise and knowledge to the project including DEC who are fresh from the remediation of Carcoke coking works one of the largest coking works in Belgium which utilised many of the techniques being used at the Avenue.

VSD and their retained consultants Entec have been on the site since 2006 undertaking treatability



trials on the soil and groundwater and refining the technical approach to the project. A planning application was submitted to Derbyshire County Council in late 2007 and planning permission for the project was received in 2008. The completed project will create a substantial development platform for high quality residential plots and employment space for light industry.

The remaining three quarters of the site once remediated will be returned to the community for various uses. The planned uses for this land include public open spaces, sports pitches and a significant nature reserve. The site abuts an existing nature reserve and the new reserve is being developed such that it seamlessly adds to the local environment by creating high quality habitats for a wide range of local flora and fauna including water voles, bats, butterflies, great crested newts and many other species.

VSD Project Director Marcus Foweather is not daunted by the complex challenges that lie ahead and is looking forward to deploying some exciting remediation technologies on what is undoubtedly one of the most multifaceted civil engineering remediation projects seen in the UK. Foweather adds 'Few sites offer challenges such as the ones posed by this one. The range of contaminants including hydrocarbons, heavy metals, cyanides and waste chemical product and the breadth of physical variation of the material call for a number of different remediation techniques and enhanced and refined existing techniques to be utilised. We also have space planning difficulties and material handling constraints on this project that add to the challenge'.

The volumes associated with the project are also unparalleled previously in the UK remediation sector. Over 2 million cubic metres of material will have to be excavated with a significant volume of this having to be processed. Over 200,000m³ of contaminated sediments from the lagoons will need processing and excavating, this operation is not without problems. The lagoons were built either side of the River Rother which passes through the site and a waste tip has been formed above one of those lagoons. Careful planning and execution of this phase of the work will be paramount. VSD have worked closely with both emda and their retained consultants Jacobs to ensure the proposed methods for this work is acceptable.

Due to the contaminants present in the material to be removed from the lagoons and tip sites thermal desorption has been identified as the most appropriate treatment method and a bespoke thermal plant has been commissioned. The thermal desorption plant will be the largest ever used in the UK and utilises the most advanced 'off gas' treatment and filtration systems currently available to ensure compliance with the stringent emission criteria placed on the project. Due to the high temperatures associated with operating thermal desorption plants the plant will be operating 24 hours a day for around two years only stopping for maintenance.

A further process on site sees the bioremediation of a further 75000 m³ of hydrocarbon contaminated material. Two large aerated bio beds will operate for the majority of the project allowing suitable remediation of this material.

An innovative onsite water treatment facility employing a combination of chemical oxidation (by UV light and Fenton's chemistry) and biological treatment will treat the cocktail of phenols, thiocyanates, benzene and ammonia in the waters. These techniques are environmentally friendly and the best available for these highly contaminated waters. This will ensure that the contaminated waters that are collected on the site can be discharged safely.

Remediation

Other operations include a complex sift and sort of the tip materials 327,000 m³ followed by soil washing of the remaining material. The soil washing operation utilises the latest generation plants as commissioned by DEC for their operation of the soil treatment facility at the LONDON 2012 Olympic Games site. The soil washing process generally allows reuse of 70-85% of the contaminated soil as suitable fill material. This reuse in conjunction with the reuse on site of the material from the thermal desorption plant and the bioremediation treatments allows a very high percentage of all the excavated materials to be reused on site with only a very small fraction of material leaving the site for landfill. This reuse of material on site obviates the need for imported materials and saves many 10,000s of lorry movements and the associated emissions and congestion in the local environment associated with them and raises the sustainability of the project significantly.

The project has to operate with the recommendations of an environmental impact assessment which will minimise the residual impact of the clean up on the surrounding area. Noise for example will be kept to a minimum by all plant to being fitted with silencers and suitable noise containment measures being taken including strategically locating all fixed plant and installations of acoustic shields. Dust management is critical and is proactively managed with dust suppression being included at all stages of materials handling and transportation. As mentioned previously reduced vehicle movements from the site also limits any impact to the local traffic network and disruption to the local population.

The Avenue project was procured using a modified Early Contractor Involvement (ECI) type contract. Mike Fenton of emda says 'this procurement method ensured we were able to identify and select VSD as a result of their innovative approach, proven experience and the value for money their tender offered'. The contract submission has been subject to intensive independent review during the procurement process.

'The contractor is incentivised under this form of contract' Fenton continues 'there is a pain gain share mechanism which comes into play on completion of stage 3 works which have been let under the NEC 3 option C Target Cost contract conditions'.

Operations at the Avenue to clean up the former coking works demonstrates that there has been a shift in attitudes to former industrial sites in the 15 years since its closure. Brownfield land that had previously been considered derelict and irretrievable due to its former occupation by heavy industry and left in a very contaminated state is being regenerated allowing it again to have a positive value and make a positive contribution to the local community and economy.



Permanent Cleanup of Manufactured Gas Sites (MGP), Eliminates Coal Tar Migration

TerraTherm (USA) and **GTI** (USA) announce that they have reached agreement to commercialise GTI's patented In Situ Thermochemical Solidification (ISTS) technology exclusively through TerraTherm. The combination of TerraTherm's proprietary remediation technologies and GTI's ISTS has proven successful and cost-effective in MGP gasholder cleanup, demonstrating permanent prevention of coal tar migration without excavation. This synergy allows the two companies to provide a uniquely effective and attractive remediation package to owners of the estimated 7000 MGP sites, worldwide.

ISTS, specifically designed for MGP sites, leverages TerraTherm's Thermal Conduction Heating technology to remove organic components of the contaminants, then permanently solidify remaining coal tar in place, forming an immobile, stable substance similar to asphalt pavement. "Use of ISTS stops liquid coal tar from migrating beyond property boundaries or contaminating public water supplies. This is an issue that is critically important to the owners of the sites and a major public health issue confronting communities. In developing ISTS, GTI has engineered a simple and effective way to eliminate the risks of contaminant migration, reduce liability and return many of these potentially valuable urban properties to the positive side of the balance sheet. We are delighted to partner with GTI to bring this technology and service package to market," says Dr. Ralph Baker, CEO of TerraTherm, Inc.

Baker's observations about the value of this remediation market are reinforced by the significant scope of the MGP pollution problem, and the urban location of the former manufactured gas plants. An estimated 3000 MGP plants dot the U.S. landscape. Built long ago on the outskirts of towns and cities, these locations are now in today's urban core. In situ remediation is a far more attractive option than excavation because these plants often lie in close proximity to, and sometimes underlie, infrastructure, commercial buildings and residential areas.

"We're very excited about this agreement because it represents the kind of synergy between two organisations that makes excellent business sense," observes Quinton Ford, Director, Commercialisation for the Gas Technology Institute. "GTI's years of R&D experience and our focus give us a unique understanding of the needs of the utility industry and of MGP remediation. TerraTherm brings extensive field experience and know-how in cleaning up hazardous wastes using in situ techniques. They also have the equipment and proven field teams to deliver the ISTS technology in a cost-effective manner. This combination allows us to deliver the consistent, predictable results that the utility industry demands," adds Ford.

Reader Reply Card No 105

U.S. Air Force Sustainable Remediation

AECOM (USA) has been awarded a follow-on 12 month contract with the United States Air Force Center for Engineering and the Environment (AFCEE) to further develop AFCEE's publicly available Sustainable Remediation Tool (SRT™), which AECOM first developed in 2008.

According to Erica Becvar, head of the AFCEE Technology Transfer Outreach Office, "the SRT serves three vital purposes: 1) optimising existing remediation technology systems, 2) planning for future remediation technologies, and 3) comparing remediation approaches based on sustainability metrics." Doug Ruppel, AECOM's SRT project manager, added, "Our continuing efforts with the SRT and development of Green and Sustainable Remediation (GSR) guidance will greatly assist the Air Force with its important sustainability goals and leadership."

AECOM's SRT team, including sub-consultants GSI Environmental and CH2M Hill, will update the functionality of the SRT™, train users, and develop an interface between the SRT and AECOM's proprietary Remedial Action Cost Engineering and Requirements (RACER™) software solution for estimating costs of environmental projects. This will allow RACER users to benefit from the SRT's sustainability metrics calculations.

Under executive order 13514 issued by President Obama October 19, 2009, U.S. federal agencies must continuously improve the sustainability of their environmental-and energy-related operations. This includes setting a target for reducing greenhouse gas emissions by 2020; increasing energy efficiency, water conservation, and waste reduction; reducing fleet petroleum consumption; supporting sustainable communities; and leveraging purchasing power to promote environmentally responsible products and technologies.

Reader Reply Card No 106



Member of the DEME Group

For further information contact Philip Norville:
DEME Environmental Contractors UK Ltd.
Greenstede House, 2nd Floor,
Wood Street, East Grinstead,
RH19 1UZ West Sussex, United Kingdom
T +44 (0)1342 323 000
F +44 (0)1342 326 000
info@decukltd.co.uk
www.decukltd.co.uk

Turnkey solutions for global environmental needs

Activities:

- Clean-up and rehabilitation of contaminated sites and brownfields.
- In-situ and ex-situ treatment and recycling of contaminated soils.
- Treatment of contaminated groundwater.
- Dredging, stabilisation and treatment of contaminated sediments and sludges.
- Mobile soil washing plants: the most up-to-date soil washing technologies combined with a compact and modular design.
- Fixed soil treatment center Terramundo at Port Clarence, Middlesbrough.

DEME: creating land for the future

Reader Reply Card No 107

Do you receive your own copy of **Pollution Solutions?** If not request your copy today. IT'S FREE!

info@ps-pub.com