



## Inside this issue:

Neurax update

Stress Corrosion Cracking

Toxoplasma Gondii

Barn Blarney

Staff Spotlight

## BIRTHS

Our ion chromatograph has had a heart transplant, guaranteed to keep the pressure up forcing anions through the column designed to separate those water based compounds such as nitrate, nitrite, carbonate, chlorides etc. It can find as little as 0.01 parts per million.

Heather has given birth to a bouncing boy, busting the myth she must have been carrying twins (at least!). Mum and baby Harry are doing well.

## MARRIAGES

We've paired up our automatic hand-held analyser with urine reagent strips to produce results automatically to your computer. Dip the strip, put it in the reader and the result pops up on your screen like magic.

## DEATHS

A genuine entry this time, we're sad to report that Mick Craven passed away suddenly at home. If you use SureScreen's medical screening products or Tesco's own brand pregnancy tests, chances are Mick had a hand in their production. Mick was a genuinely fantastic member of our team and his knowledge of pop music is legendary. He'll be sorely missed. We're very much a family oriented business; Mick's wife Lynne works in accounts, and his daughter Michaela has been working at SureScreen too. They both have our every support at this difficult time.

## EXPECTING

The SSD grounds have looked fantastic this year with thousands of daffodils, quinces and jasmine in bloom. We planted 200 daffs round our Butter Cross and they look super too. Also 350 wild flowers were planted in the wood, and are starting to grow; coupled with a selection of new species rhododendrons, we're expecting lots of colour whatever the season.

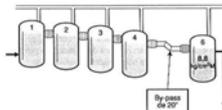
## FLIXBOROUGH CAUSED MAD COW DISEASE

Our latest SSD Technical Bulletin on stress corrosion cracking is full of valuable data but it's our ability to inject that 'well I never!' revelation that always brings our technical documents to life.

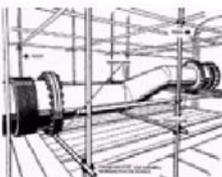
Here's a good example. Stress corrosion cracking (SCC) is a mechanism that requires three things; a sensitised material, a stress, and a corrosion mechanism. Only when conditions are just right will SCC begin, but once it starts it can grow quickly. This makes it unpredictable, so a component can sit quite happily for years, then fail in minutes. Scary.

Our SCC Bulletin covered Flixborough as an example of unintended consequences, so here we provide a bit more detail.

In 1974 Britain was in the midst of the miner's strike and the three day week so the Flixborough plant up near the Humber estuary saved energy by turning off the stirrers in its six 12mm thick ferritic steel / 3mm thick stainless clad cyclohexane vessels in contact with the product, something called caprolactam, the raw material for nylon. The plant was only two years old, representing state of the art design, but it had no safety containment valves, so if a major cyclohexane leak occurred there was no way of containing it.

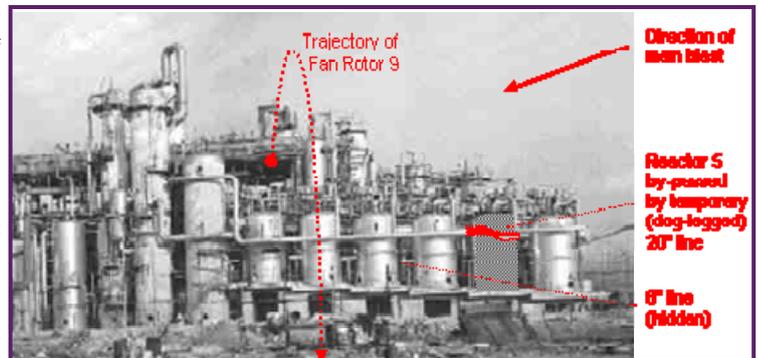


The valve between vessels 5 and 6 was in poor condition, requiring it to be sprayed with water from the local river to keep it cool. But ferritic steel (a susceptible material) plus heat (necessary to drive SCC stress) plus nitrate (providing a corrosion mechanism) is one of those potentially nasty SCC conditions mentioned above. Due to the combination of river water and heat, nitrates in the water from fertiliser run-off from agriculture concentrated up and caused stress corrosion cracking of vessel 5.



Fortunately, the early sign from the SCC was leakage through the cracks, which was noticed, and so vessel 5 was taken out of service. To continue manufacturing, vessel 4 was connected to vessel 6 with a temporary pipe shown in the sketch.

A couple of months later, a pipe flange started leaking cyclohexane because two of its flange bolts had not been tightened. This hot cyclohexane caught fire, melting the



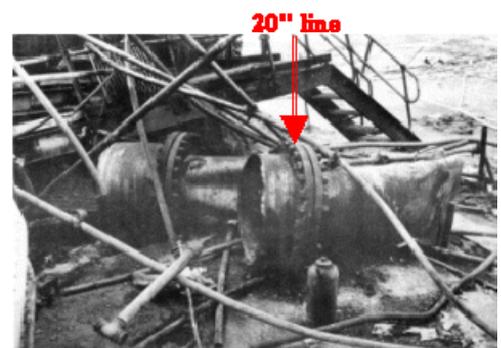
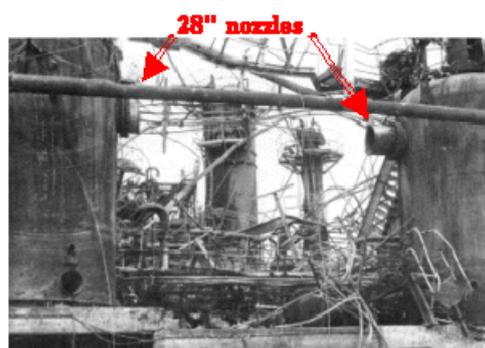
galvanising zinc on nearby components (some reports state the zinc came from lagging wire, others say it was from a galvanised walkway—either could be true). This molten zinc dripped onto a hot stainless pipe, embrittling it and causing it to fail catastrophically. (You'll be able to read about liquid metal embrittlement in a later Bulletin). This caused a main valve to become vapour locked—overheating it and causing a rapid stress rupture.

The resulting small explosion destroyed the bypass pipe, resulting in spillage of a large quantity of cyclohexane. This would have been bad enough, but recent evidence suggests that water which had accumulated in the reaction vessels because of the lack of stirring, flashed off to steam as soon as pressure was released. This steam rapidly expelled 40 tonnes of cyclohexane into the immediate area resulting in a massive explosion equivalent to 15 tonnes of TNT that killed 28 people and destroyed the plant and 1800 buildings in the vicinity.

The incident led to a world shortage of caprolactam, Amongst other things, caprolactam had been used to render animal offal. so, unable to do this, Britain fed offal back to cattle via an alternative inferior rendering process, resulting in Mad Cow Disease which cost British taxpayers £4 billion.

Ironically, the whole Flixborough episode was initiated by nitrates from agricultural fertilisers that had contaminated the river. The disaster tribunal wrongly focussed on the bypass pipe as there seemed to be a desire to avoid adverse publicity from living near a chemical plant. Piecing together the various reports makes an interesting challenge for those with a forensic mind and an hour or two to spare. If you've never heard of caprolactam before, you'll be surprised to hear you probably have a stick of it in your office right now. The non sticky, sticky stuff in Pritt Stick is actually caprolactam.

Not seen our SCC bulletin? No problem, just email [andy.penny@surescreen.com](mailto:andy.penny@surescreen.com) for a copy sent by return.





SureScreen Life Sciences at the 18th Century Morley Retreat, just north of Derby, houses our clinical chemistry labs, conference facilities, & consulting and treatment rooms.

There are three luxuriously appointed hotels close by, all with excellent golf courses, making this a wonderful location in beautiful countryside close to the Derwent Valley World Heritage Sites, which our clients can enjoy while the underlying cause of their illness is diagnosed.

Church Lane is part of The Portway, a 4,000 year old portage route across England from the Port of Nottingham to Liverpool.



SureScreen Diagnostics Ltd is based in a modern manufacturing unit close to Derby city centre and near the River Derwent and The Silk Mill - the world's first factory. John Lombe constructed the mill and a large weir to generate power for spinning silk.

The building is now the gateway to the UNESCO World Heritage Site that includes Joseph Arkwright's Masson Mill, the world's first metal framed building. Famous for its innovation, Derby is also the home of Lara Croft and is a centre for computer game design.

In 1772 John Lombe died in mysterious circumstances and it is thought he was targeted by traditional Italian silk manufacturers who were being undercut by The Silk Mill's factory methods.

In May 2013 the weir was opened as a 1.3MkW/yr hydro-electric scheme for Derby.

The city is world renowned for Crown Derby China, Rolls Royce Aero & pre war Rolls Royce cars, and is the home of many of the UK rail industry's Headquarters.

## LIPOSOMAL VITAMIN C PREVENTS HEART DISEASE, AND CAN REVERSE IT

**Scientists dedicate their work to the advancement of understanding**, so there is nothing worse than discovering a revelation that could save humanity from suffering and a shortened life only for their work to be ignored.

Imagine you discover the mechanism of heart disease, and a simple, cheap and plentiful remedy, only to find that your advice falls on deaf ears. That's what happened to two eminent doctors, Mattias Rath and Linus Pauling.

We've written recently about Liposomal Vitamin C—the latest 'Trojan horse' for tackling cancer. Our sister company Surescreen Life Sciences make this wonderful antioxidant product for zapping diseases.

**It has been known for a long time that high-dose Vit C can also reverse cardiovascular disease.** So why isn't everyone taking a daily dose of liposomal vitamin C?

Rath and Pauling published their ground breaking discoveries on the primary cause of heart disease in 1992. Long term vitamin C deficiency weakens vein and artery walls by preventing the maintenance of the collagen from which they are made. This condition they called 'pre-scurvy' triggers preventive thickening of the arteries through deposition of 'bad cholesterol' as a sort of human-acquired defence mechanism that was life-saving in times of famine, or during an ice age.

Vitamin C, (one of the 'vital amines' from which the term vitamin is derived) or ascorbic acid to give it its chemical name, is the catalyst for making collagen, a type of protein used to construct the body's cell walls that is often thought of as the glue that holds the body together. Collagen is found in fibrous tissues such as skin, ligaments and tendons, as well as in the bones, blood vessels, the cornea of the eye, as well as in the gut. Collagen is vital for strengthening blood vessels and giving skin its elasticity and strength. We cannot make vitamin C ourselves—it has to be in the diet. We know that vitamin C in the form of fruit and vegetables, as well as face cream, helps prevent facial wrinkles, so it's perfectly logical that veins and arteries develop wrinkles too and weaken if our diet doesn't contain enough Vitamin C. As a result, collagen is one of the most popular supplements among the elderly - because of its skin healing properties, but no-one has told them they should be taking Vitamin C so they can make their own.

We've not found evidence for or against, but our forensic way of thinking suggests that varicose veins could be the result of a Vitamin C deficient diet over many years.

The problem is that Vitamin C is relatively low cost, while synthetic collagen, statin drugs, special spreads and a host of other products provide much better profit margins.

So it's true that an apple a day keeps the doctor away, but vitamin C is poorly absorbed in the gut, with less than 7% being absorbed. Liposomal Vitamin C has nano-particles of the vitamin encapsulated in a lipid—so it travels through the gut wall undamaged, and is released just where the body needs it. At the site of a tumour, the cells strip off the lipid to make more cells but are killed by the powerful antioxidant properties of Vitamin C. When released at the site of collagen building, the lipid makes the cell walls and the Vitamin C acts as the catalyst for the reaction. Simple really but then most proper science is fairly simple stuff.

Pauling, the founder of modern chemistry, became the holder of 48 honorary Ph.D.s, and the world's only 2-time unshared Nobel prize laureate. Dr Rath went on committed to telling people about his discovery, in fact he gave Surescreen a free book about his discoveries many years ago at Medica. He continues to campaign, sometimes controversially fighting the establishment.

Their 1992 paper on the abolition of cardiovascular disease contained a quote that explains how they felt at being ignored. We reproduce it here:

***"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents. What does happen is that its opponents gradually die out and that growing generation is familiar with the idea from the beginning"***  
Max Planck.

Read their paper on preventing and reversing heart disease here: <http://orthomolecular.org/library/jom/1992/pdf/1992-v07n01-p005.pdf>

**YOU CAN PURCHASE LIPOSOMAL VITAMIN C FROM SURESCREEN. A 500ml BOTTLE LASTS A MONTH AND COSTS £28 INC POSTAGE.**

## - REACH FOR THE SKIES - HOW REGULATION MAKES AIR CLEANER

REACH (the Registration, Evaluation, Authorisation and Chemicals restrictions have put hexavalent chrome on the restricted substances list, affecting many corrosion protection processes such as aluminium oxide dichromating, strontium chromate in paints and hard chrome plating. These processes can only be authorised if an alternative process is not available after a 'sunset' date of 17th September 2017. While these are good systems, legislation of this kind is the trigger for research into better and safer alternatives.

The aerospace industry uses a lot of these processes and has formed a consortium called the Highly Innovative Technology Enablers for Aerospace (HITEA) to provide test and performance criteria, information sharing and methodologies. Of particular concern is the absence of historical data for new systems, which make long term guarantees of performance quite challenging. But some of us at Scientifics were around carrying out stack testing for volatile organic compounds when the Environmental Protection Act forced coatings manufacturers to change their formulations, with the birth of water based coatings. At the time many people in the industry were sceptical that a water based coating would perform as well as the solvent based epoxies and cellulosic paints on vehicles, but manufacturers rose to the occasion and produced good quality, chip-resistant coating that have stood the test of time.

REACH has extended far and wide. One common substance in engineering is trichloroethylene used to degrease and clean components. This is also being controlled by REACH with a sunset date of April 2016. Suppliers will provide the nearest alternative provided the original specification is still met. We can probably expect an increase in the use of natural substances such as orange peel oil which has stupendous solvent capability.

## BARN BLARNEY



You'd think that working in a Grade 2 listed building would put enough restrictions on our business, but there are many benefits to working in an old country vicarage. We have a wide variety of specimen trees that include the first Monkey Puzzle tree and Cedar into Britain, a host of golden daffodils, and a walled garden in which to contemplate those difficult failure investigations you send us.

Not content with a Georgian premises from the 1700's, we're embarking on expansion into the adjacent threshing barn which dates from the 1600's. This building has three bays and an open structure, lending itself well to a laboratory environment (if you have imagination!!).

But like many derelict agricultural properties, it has a few residents, namely six bats. Now, you may not know, but no work can commence on a project without surveys, reports, consultation and a scheme of mitigation to provide a suitable home for protected species. As a consequence, before we can touch the barn we've had to develop our ramshackle garages into a workshop and car ports with a roof that would do Westminster Hall proud. And as a result of unintended consequences, this has turned into something rather splendid. We'll be able to accommodate bigger and heavier jobs here, with room for additional storage and a good excuse to buy another classic car or two to fill the car port.

The Neurax system of needles and syringes for anaesthesia is a good example of SureScreen's ability to network with leaders in their profession.

Following several deaths from syringes filled with chemotherapy drug that were mistaken for anaesthetic, the NHS dictated that the 'Luer' shape of a syringe and needle that made everything compatible with everything else must change for anaesthetic applications. SureScreen got to know medical technologist Alan Wagstaff and senior anaesthetist Dr Philip Bickford Smith who had already developed a non-compatible connection system but were unsure how they could approach the NHS and get the product commercialised.

SureScreen struck a deal that allowed them to develop the product, expand the range and look at commercial outlets for the product. Although take-up in the UK has been very slow because the system is coming under the ISO Standards Committee, the new standard is being based around the Neurax system, hopefully ensuring a good future for the products.

## Fine Refinement

We have had many components from the Automotive Industry over the years; from broken wheels, to pedal boxes, from wish bones to fuel tanks.

One thing is for sure, and that's progress and refinement in materials, manufacturing and electronics. Many mechanical components have been replaced with sensors and motors which drastically reduce weight and use less fuel. Its been fascinating watching components evolve from an engineer's perspective.

The number of cars on the road between 1958 and 2008 increased by a whopping 520%, and so has the length of road available. 28 million cars stretch an estimated 115,360,000 meters, so it's not surprising that today the roads feel congested.

As technology has marched on, the safety of motor travel has improved drastically, and that is due to the skill of designers, and the competition within the industry.



1958	2008
4.5 million cars	28 million cars
5970 people killed in road accidents	2946 people killed in road accidents
191,146 miles of road	246,000 miles of road including 2,200 miles of motorway
£500 million paid in motoring taxes	£45 billion paid in motoring taxes
100+ motorway breakdowns dealt with by the AA	175,000 motorway breakdowns dealt with by the AA

## - STAFF SPOTLIGHT - SARAH WALLIS

Skilled though they are in all matters technical, scientists are generally a pretty introvert bunch, so Sarah Wallis is often the voice of the company when you first make contact with us. Sarah is knowledgeable in all aspects of our diverse business, and she's often the voice at the end of the phone when making appointments for meetings and conferences.



Customers tell us they receive such a warm and friendly welcome from Sarah on the phone, praise indeed for someone rarely allowed out in case she talks people to death. Just joking, Sarah, it's just the perspective seen from one of those introverts you work with.

You're sure to like Sarah, she's a valuable member of the team. Nothing is too much trouble for her and you can be confident she'll follow things through for you. One thing you won't know about Sarah is the impeccable attention she puts into clothes and

appearance in order to talk to you on the phone. We've asked her a few more personal questions on your behalf.

### SARAH WALLIS FACT FILE

**FAMILY:** Two sons, Harvey 10 and Max, 12; and Lilly, a Cockapoo dog that comes to work sometimes but hasn't yet learnt to answer the phone.  
**FAVOURITE FILM:** Shawshank Redemption.  
**FAVOURITE FOOD:** Anything from the SureScreen Tearooms!  
**HOBBIES:** Swimming, playing Badminton, Socialising.  
**HAIR COLOUR:** Three variations that we know about.  
**MUSIC:** Like anything and everything.  
**FAVOURITE PLACE:** Egypt.  
**SHOE COUNT:** Not that many actually, Lilly eats most of them.  
**VITAL STATISTICS:** Been with SureScreen since February 4th 2013. Handles some 400 clients and usually makes around 50 phone calls a day, making everyone's life easy and more pleasant. Well done Sarah!



SureScreen is a family owned and run organisation, applying many years of experience in forensics, material science, rapid diagnostics and chronic disease through innovative products and services, to deliver the best diagnostic tools and approaches.



**SureScreen Diagnostics Limited**  
 1 Prime Parkway, Derby DE1 3QB UK  
 T: +44 (0)1332 365318 F: +44 (0)1332 292230  
 E: sales@surescreen.com

**SureScreen Life Sciences**  
 Morley Retreat, Church Lane, Morley, Derbyshire. DE7 6DE UK  
 T: +44 (0)1332 830990 F: +44 (0)1332 292230  
 E: alex.campbell@surescreen.com

**SureScreen Scientifics Division**  
 Morley Retreat, Church Lane, Morley, Derbyshire. DE7 6DE UK  
 T: +44 (0)1332 292003 F: +44 (0)1332 292230  
 E: troy.whyte@surescreen.com

## HIS NIBS UPDATE

### NEWS IN BRIEF SUMMARY - 3D PRINTING.

Remember last issue's article on 3-D printing, now more commonly known as additive manufacturing? Now Southampton University's Laser Sintered Aircraft - or SULSA for short - uses 3-D printing. It's lightness is thanks to bouncing-bomb pioneer Barnes Wallis (any relation Sarah?) who also developed the geodesic frame geometry that made the Wellington Bomber so light and successful. This drone can fly at 100 mph and could be made at a theatre of war. Barnes Wallis tested his bomb at the Ladybower Dams in the Peak District, not far from SSD's laboratory in Derby. Of course 3D printing is not new, it started out over 20 years ago as stereolithography. What is new is the lower cost, both in printers and in new materials, enabling it to become competitive. We'll see it tumble in the next few years too, just like other computer technologies.

Need advice on materials, or on functionality testing of components? We are here to help check properties, strength, and advice on the right material for your application. We predict a big upsurge in special materials for 3D printing soon.

## PEAK POSITION

Win a week at our cottage in Miller's Dale, in the heart of the Derbyshire Peak District. This well appointed cosy cottage sleeps 5 and is literally on the doorstep to the Wye Valley and Litton, the Tissington Trail and Chee Dale, and close to Tideswell and Buxton, so there is something to keep everyone happy.

You and your colleagues are welcome to apply, and we have three prizes of a week at the cottage to give away, and two weekend prizes. The first out of the hat gets date priority.



Email Andy at:  
[andy.penny@surescreen.com](mailto:andy.penny@surescreen.com)  
 with your particulars for your chance to win.



## DID I HEAR RIGHT?

Think you've heard of SureScreen before? Chances are you probably use our medical products somewhere in your life. We supply drugs and alcohol tests to a wide range of organisations for their safety screening, and your gate-house probably has one of our Alcometers for site incidents. We supply medical products such as pregnancy tests through the supermarkets too. And SureScreen Life Sciences look after people's health and analyse samples for occupational health, keeping Britain safe and healthy.

## Have your say...

Diagnostics form an important part of the puzzle, whether it be caring for patients with chronic illness, helping an individual with drug dependencies, or designing the latest and greatest component. We strive to provide you with all the tools you need to do the best job, so please drop us a line if you are looking for something specific - we'll do our utmost to assist you.  
 Alastair Campbell, Marketing Director, Surescreen.

### Sahara Force India F1 Team

"We have been using SSD for a number of years for our material failure analysis. They provide a very quick and helpful service, often giving initial feedback within 24hrs which is vital within our industry."

### Bell Equipment UK

"The turn around time that you managed to do the investigation and report was by far some of the best service we have seen for a long time, so we were able to react swiftly and identify the problem at our casting supplier."