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TODAY'S BUSINESS TOMORROW'S WORLD

Landfill Leachate Treatment: The UK Approach

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Technical Director, Enviros Consulting


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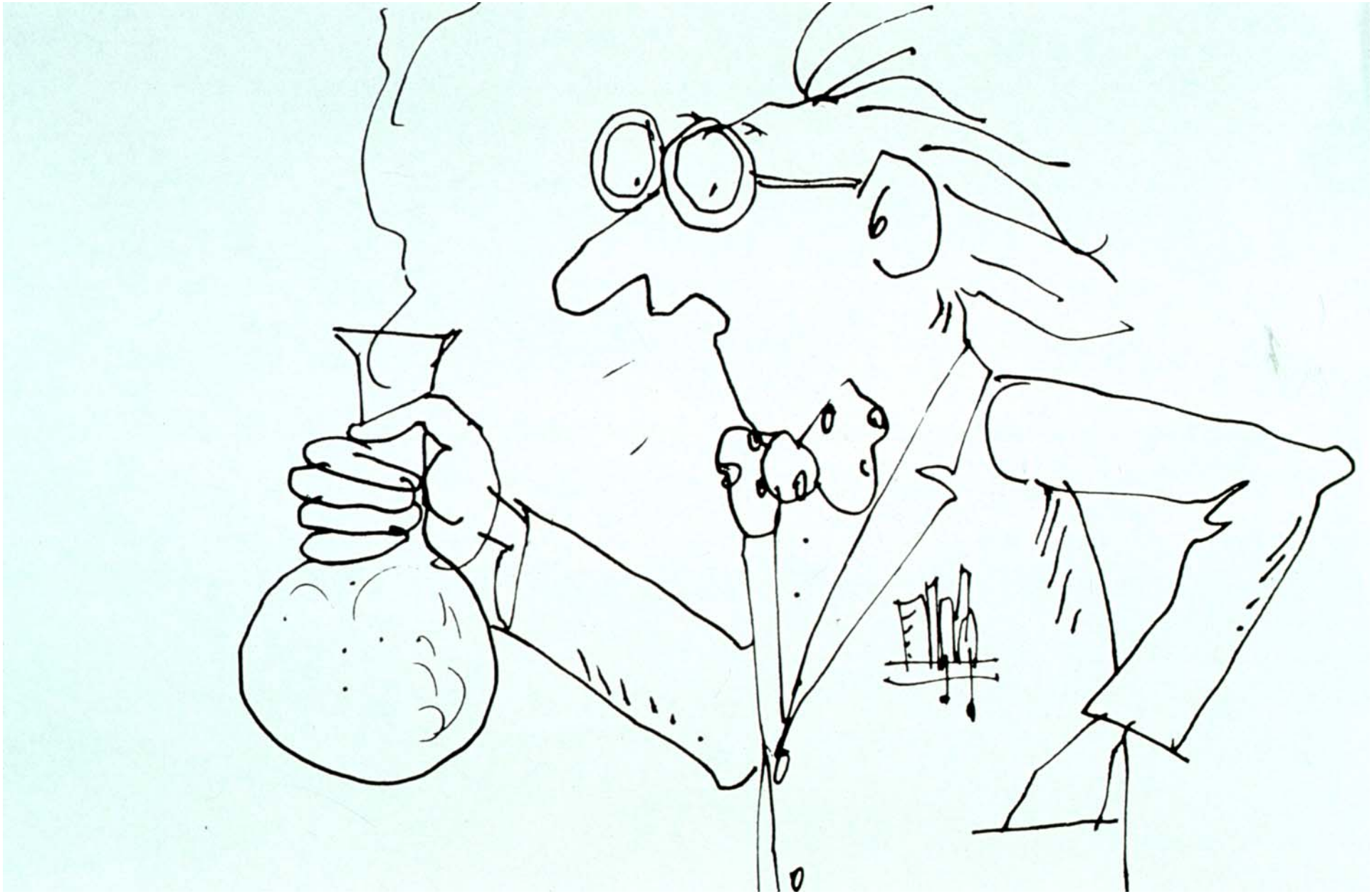
PRO★STAR
Mitre

The UK approach to leachate management has for many years been based on:

- Applied and experimental research data
- Site-specific risk assessment
- Best Practical Environmental Option
- BATNEEC
- Principles of Sustainability




FRAGILE
HANDLE WITH CARE
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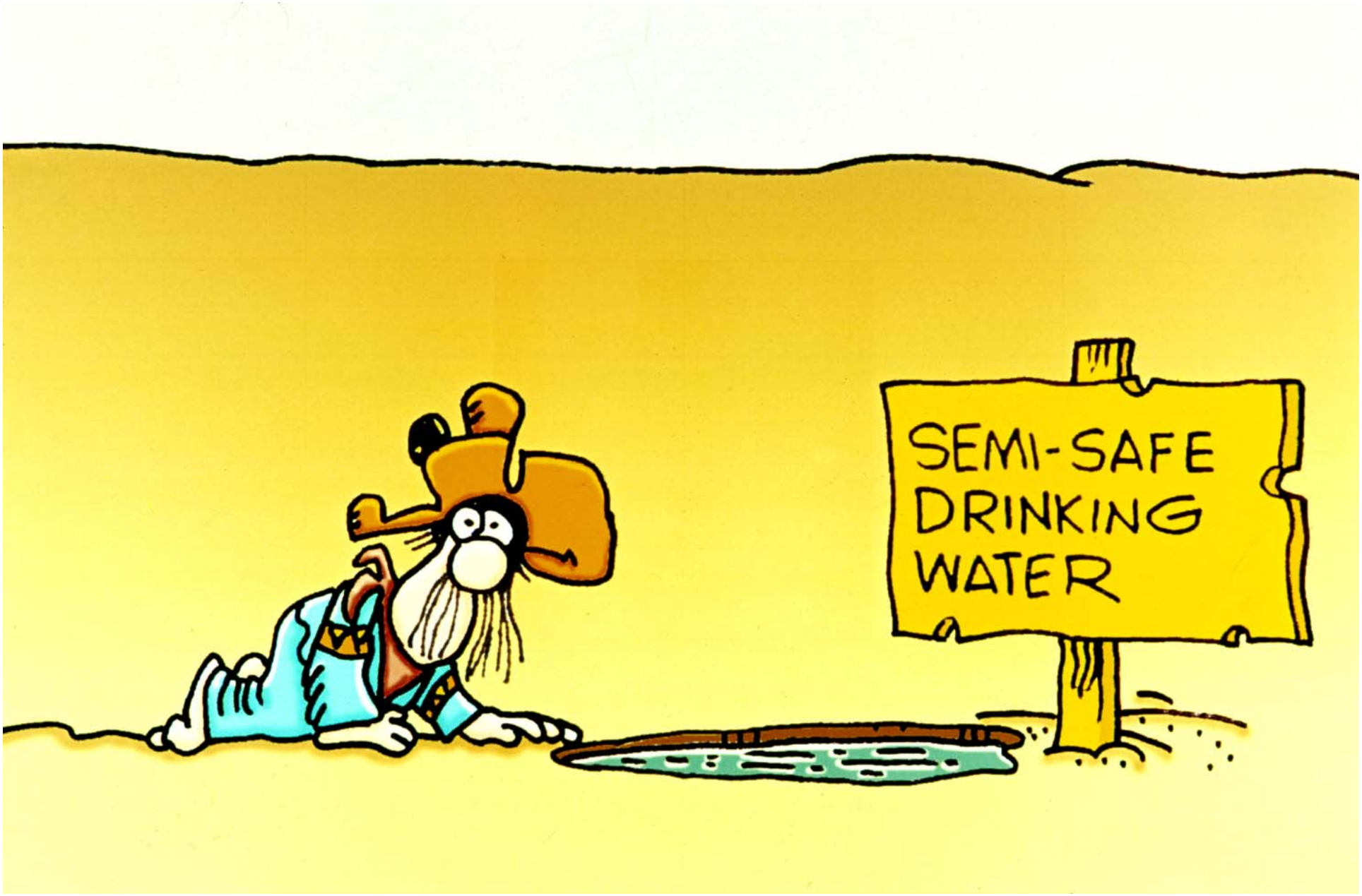
SEMI-SAFE
DRINKING
WATER

Loving husband in anniversary tragedy

Romantic Len, 86, crushed by dustcart

A MAN of 86 out shopping for a 35th wedding anniversary present for his wife was crushed by a dustcart.

But the accident could not stop Leonard Redfern, of Warwick Road, Thorpe Bay, handing to his wife Olive a pink coral necklace he had bought as he lay in Southend Hospital with two broken hips, a broken ankle, a fractured pelvis and a broken thumb.

The old romantic had his accident with the dustcart in a service road behind Marks and Spencer, in Southend High Street.

Transport

He was walking to catch a bus after buying the present. He was pinned under the cart, and police say he is lucky not to have lost his legs.

Olive, 64, had to make a mad dash from the Chelsea Flower Show to be by his side.

She said last night: "They called me over the loudspeaker and even tried to arrange transport across London.

"But he's OK, a little shocked and with quite a few broken bones, but he's tough.

"I told him a few days ago our 35th anniversary on June 7 is our coral or jade one. He must have gone out specially to buy the necklace.

"When I arrived at the hospital, he held it out and just said: 'Here's your coral'."

"Now we won't be able to celebrate because he'll be in traction for about six weeks."

Active

Olive said of her husband: "He is still a very active man for his age.

"We're all hoping this doesn't slow him down too much."

The dustcart was driven by Mr Dennis Henderson, 30, of Cunningham Close, Shoebury.

Health service faces cutback

A Review of the Composition of Leachates from Domestic Wastes in Landfill Sites

Research and Development

Technical Report
CWM 072/95

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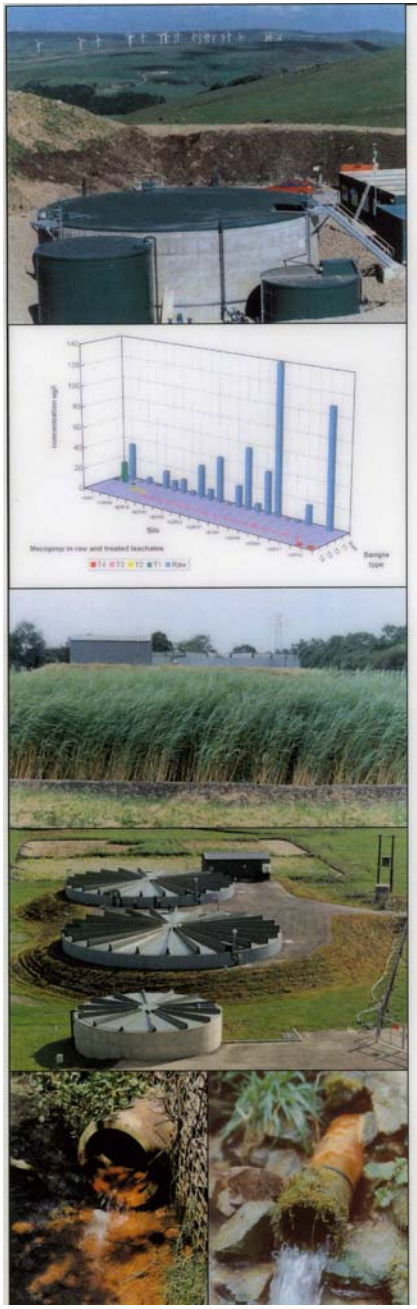

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FINAL REPORT

Pollution Inventory discharges to sewer or surface waters from landfill leachates

Ref: REGCON 70 May 2001

Enviros Aspinwall
Walford Manor
Baschurch
Shrewsbury
Shropshire
SY4 2HH

Knox Associates
Barnston Lodge
50 Lucknow Avenue
Mapperley Park
Nottingham
NG3 5BB

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In the UK, the EU Landfill Directive is causing huge changes in the way that we manage wastes

Greenhouse gas concerns

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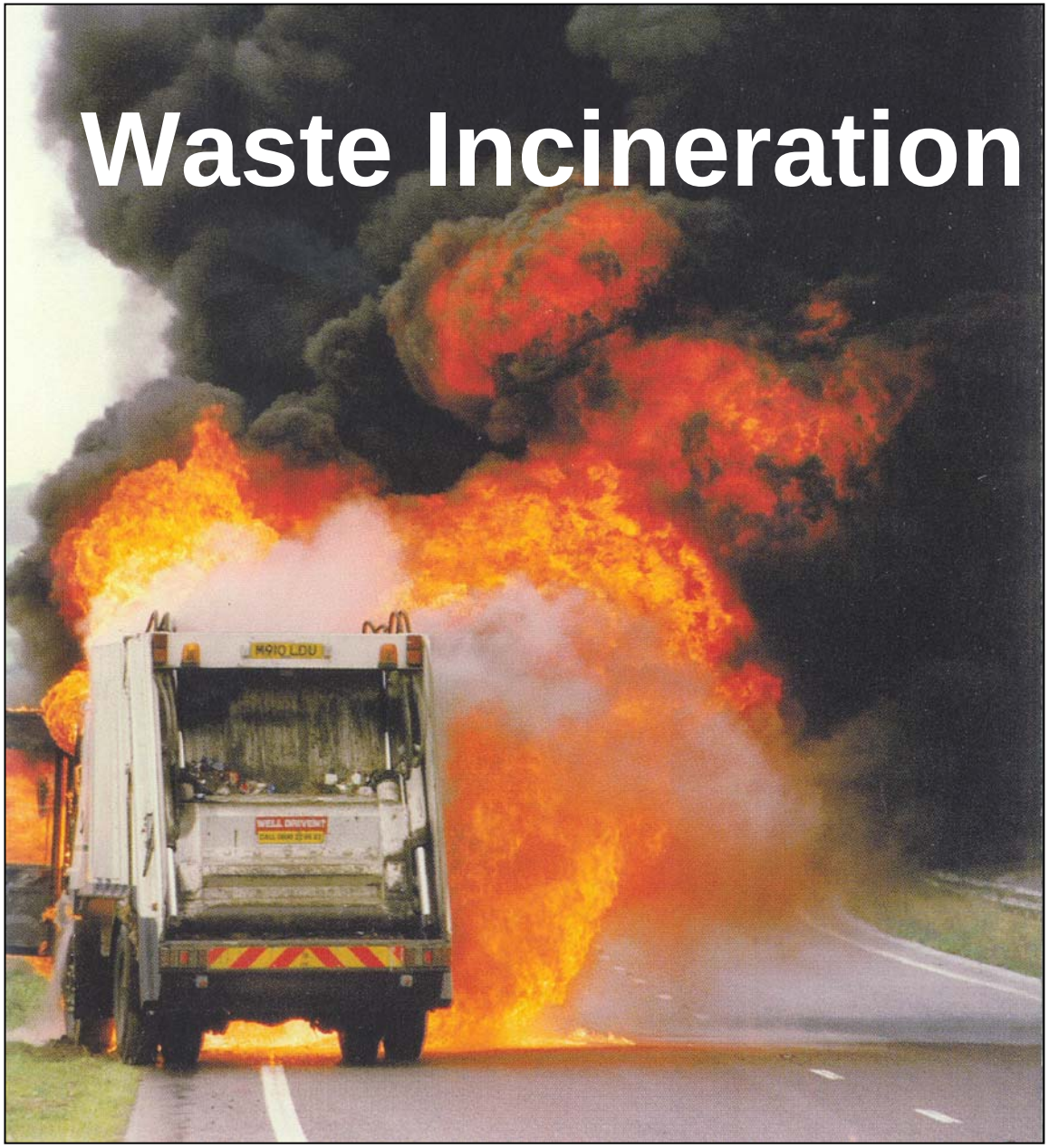
Waste Incineration



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More intensive regulation

Increased environmental awareness


R935 AUJ


Pilot – scale experimental root – zone
treatment system, using Common Reeds,
Phragmites Australis, to treat landfill
leachate to surface water standards.
Aspinwall & company


Randalstown Angling Club
PRIVATE
FISHING
Permit holders only

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Arpley Landfill Site

- 130 hectares, west of Warrington
- Between River Mersey and Manchester Ship Canal
- >10 million tonnes of domestic, commercial and industrial wastes deposited since opened in 1988
- Operated by Cheshire County Council (3c Waste)
- Acquired by Waste Recycling Group in Spring 1999

Leachate Control at Arpley

- 3 Phases: Birchwood, Lapwing and Walton
- Increasing degrees of containment
- When acquired by WRG, leachate not under control
- No adequate leachate extraction infrastructure
- Leachate heads up to 8m above compliant levels

Initial data for leachate strength in phases at Arpley, chloride and ammoniacal-N (in mg/l)

Landfill Phase	chloride		ammoniacal-N	
	Mean	Maximum	Mean	Maximum
Birchwood	641	2560	274	848
Lapwing	2816	12700	1048	3380
Walton	3522	5500	1695	3910

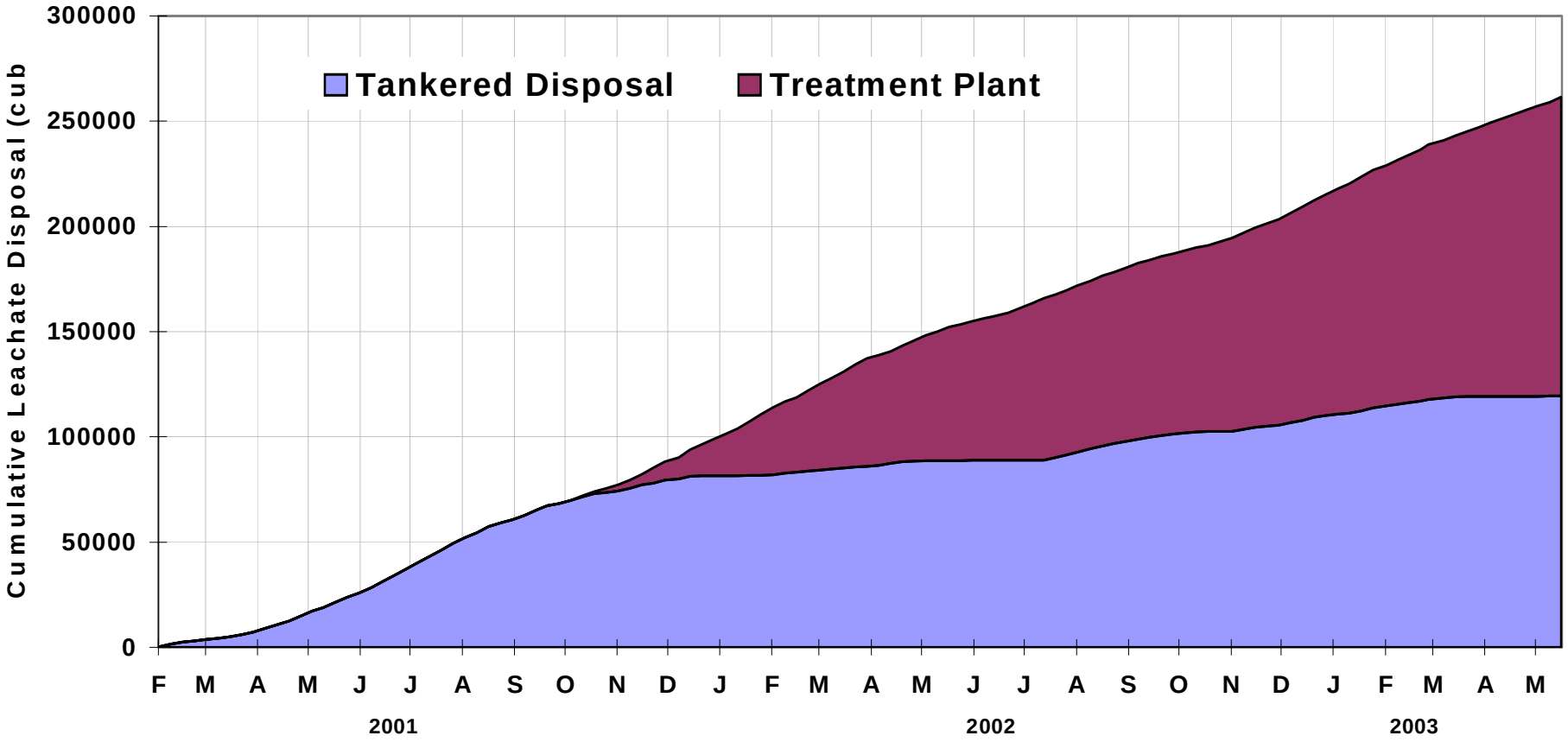
Plant Design

- Maximum treatment rate 450m^3/d
- Roofed and bunded raw leachate balance tanks
- 3 Large sequencing batch reactor (SBR) tanks, with automated pH control, and nutrient dosing
- Effluent balance tank
- Dissolved Air Flotation (DAF) system
- Final polishing in reed beds

Plant Performance

Determinand	Leachate	Effluent
COD	4730 – 5990	1010
BOD_5	537 – 688	<1
ammoniacal-N	1240 - 1460	1.5

toxicity: no detectable effluent toxicity to monthly Microtox® tests


Cumulative Leachate Disposal (cub
300000
250000
200000
150000
100000
50000
0
Tankered Disposal
Treatment Plant
F M A M J J A S O N D J F M A M J J A S O N D J F M A M
2001
2002
2003

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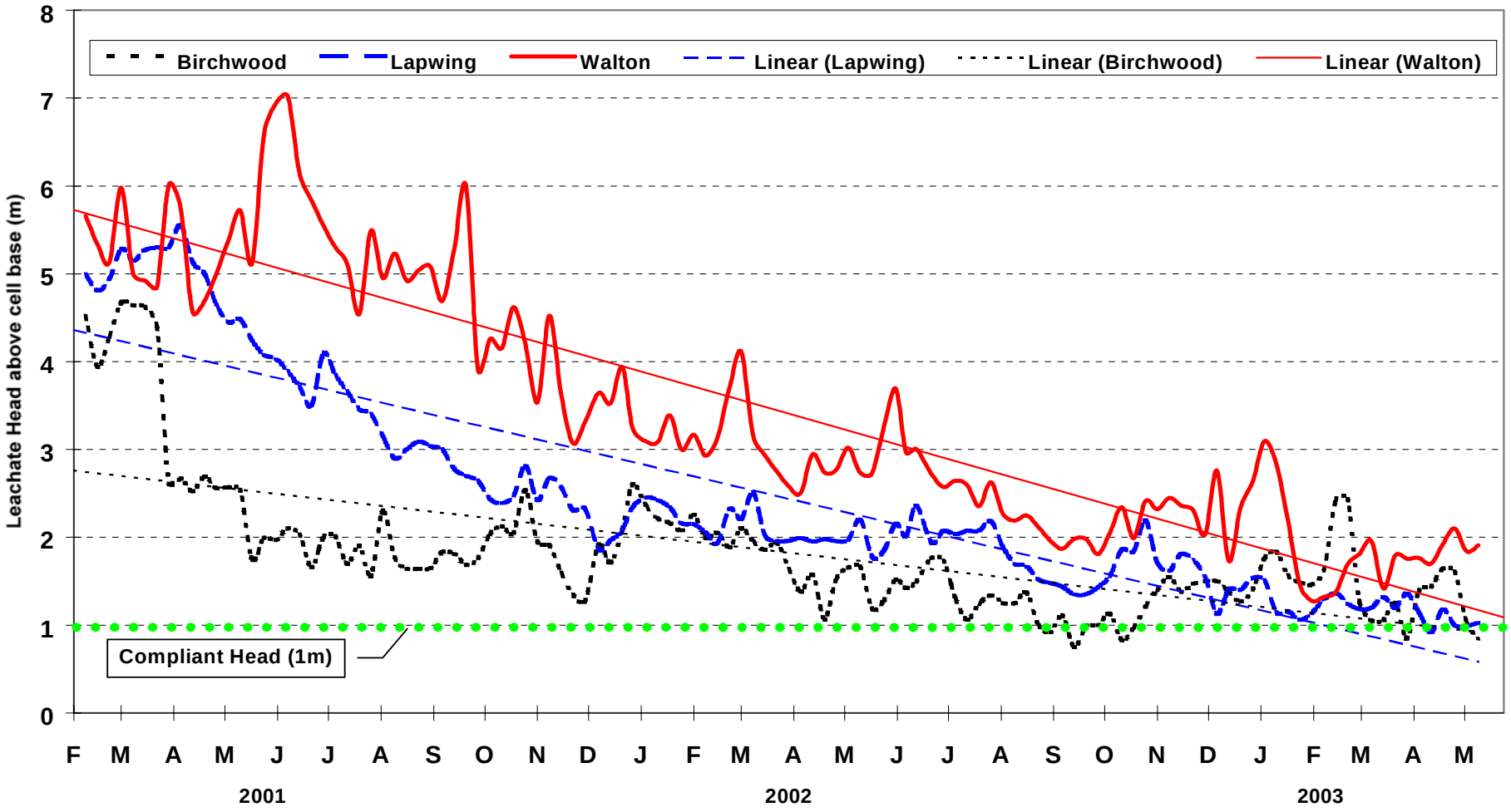


Figure 8: Changes in mean leachate head within each phase, February 2002 to May 2003

Arpley

- LTP commissioned Autumn 2001
- Treating typically 400m^3 of leachate each day
- Safe effluent discharge to the River Mersey
- Large impact on leachate levels
- Leachate heads in compliance April 2004

Buckden South Landfill Site

- SE England, 400m from River Great Ouse
- Domestic and industrial wastes to 1994
- Taken over by WRG in 1994
- Extensive remedial works needed, including management of high levels of leachate, containing pesticides

Leachate Management Needs

- To reduce high leachate levels
- High concentrations of pesticides
  eg Mecoprop and Isoproturon
- River Great Ouse the only practical discharge route for treated leachate
- Very tight effluent standards required (requirement that Rainbow Trout have 96 hour LC50 > 50 percent effluent)

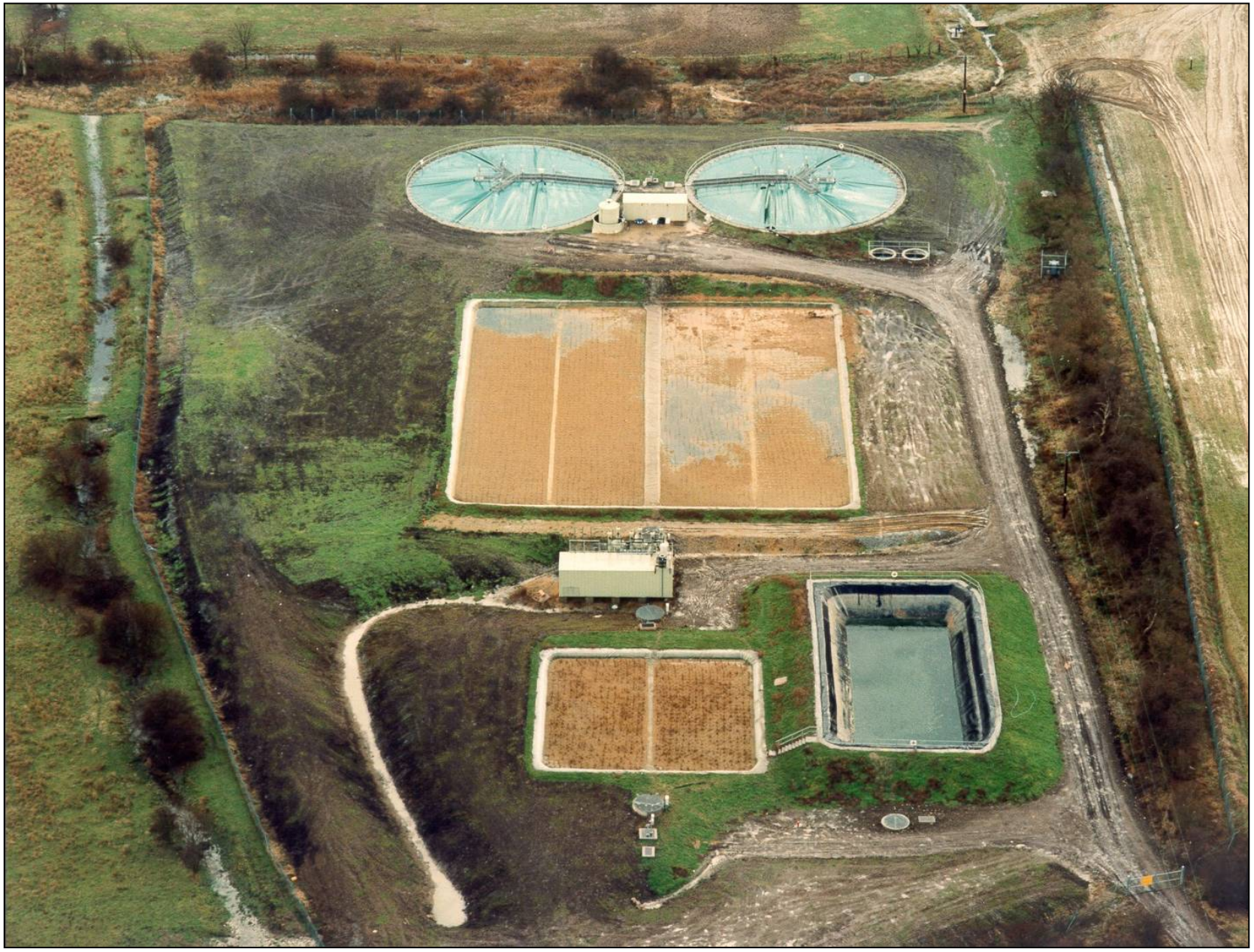
Treatability Trials carried out from April to July 1994

Treatment Process:

- SBR biological treatment
- Reed bed polishing (2000m²)
- Ozonation
- Final reed bed (500m²)
- Fully automated process
- Treatment of 200m³ per day

- Treatment plant commissioned – Dec 1994


WATER
WATER
WATER
EMERGENCY EXIT
Push bar to open



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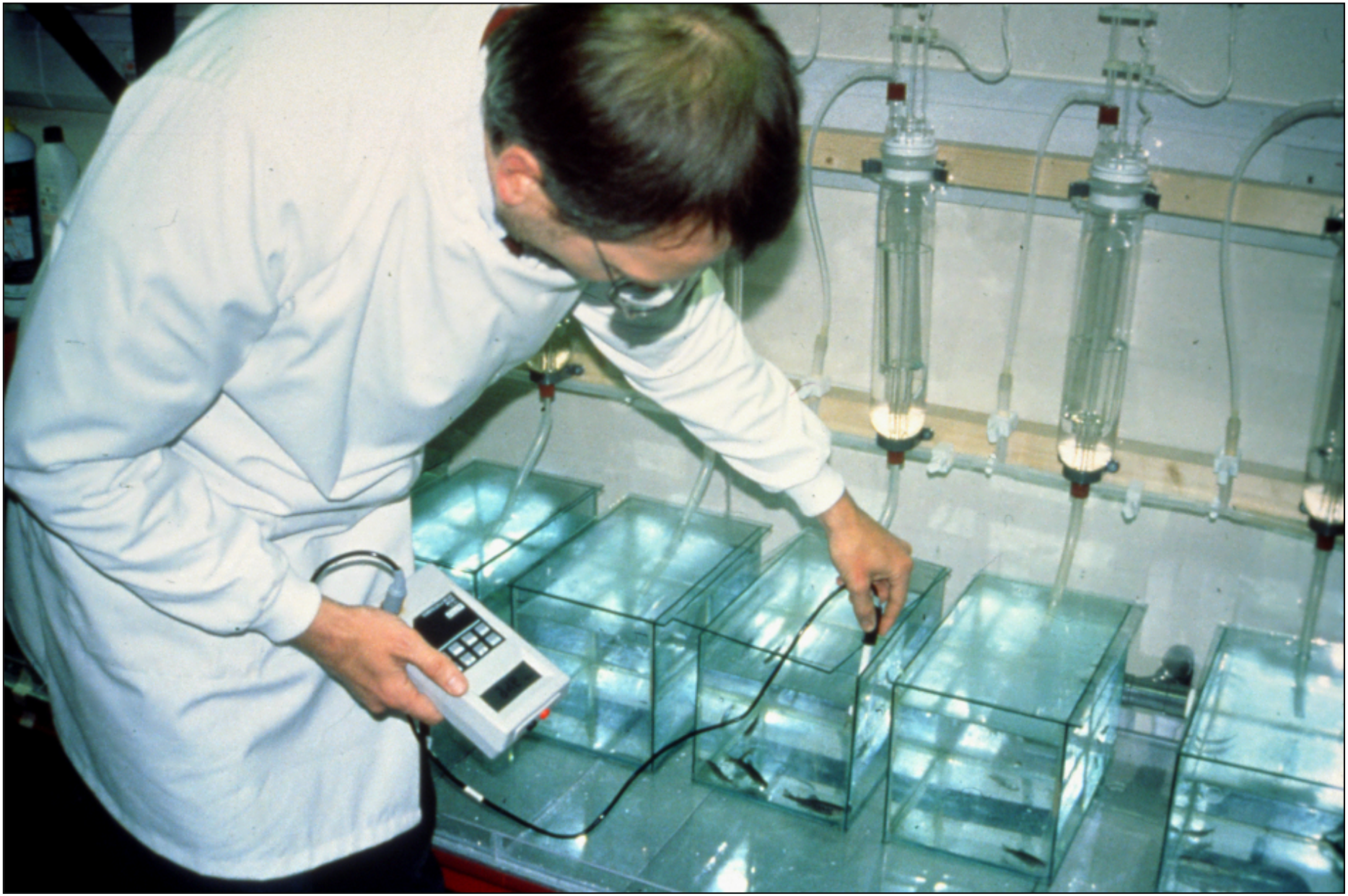

Buckden

- Most advanced leachate plant in the UK
- Operated for nearly ten years
- Toxicity-based consent never exceeded
- SBR proved robust, reliable and readily automated
- Ozonation effective, but site- specific

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Leachate Treatment in South Africa

- Enviros involved since 1992
- Cost-effectiveness paramount
- Water resources scarce
- Appropriate technology needed for operators
- Landfill standards high at largest sites
- Rapidly advancing regulatory control
- “Minimum Standards” document

Vissershok Landfill, Cape Town

- Long-established site
- 750,000 tpa municipal & industrial wastes
- Inputs include low-medium hazardous wastes
- Need to use effluent for dust suppression on roads, to replace existing use of potable water

Vissershok Leachate

- Very strong and methanogenic
- Up to 80 m^3/d produced
- ~20% from hazardous waste cell
- COD values 4000-9000 mg/l
- Ammoniacal-N 1500-2000 mg/l


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Typical Performance

	leachate	effluent
COD	8930	680
BOD_5	588	20
ammonia-N	1517	2.3
solids	-	21

mg/l

Mariannhill Landfill, Durban, KwaZulu Natal

- New landfill developed by eThekwini Municipality
- Opened in July 1997, life 25 years
- 250,000 tpa of household & commercial wastes
- Became a nature reserve in September 2002
- Plant Rescue Unit (PRUNIT) Nursery
- Very high standards indeed in housing area

Mariannhill Landfill

"Nothing short of a valley of environmental treasures, and engineering ingenuity"

Resource Magazine, South Africa, Feb 2004

Mariannhill Leachate

- 30-40 m^3/d (more after tropical storms)
- COD typically 2000-3000 mg/l
- ammoniacal-N typically 400-500 mg/l
- surface water discharge required


DSW
DSW


DURBAN SOLID WASTE
DURBAN METRO LANDFILLS
LEACHATE TREATABILITY TRIALS
Plan-scale research cells by
Durban Solid Waste in association
with Aspinwall & Company, UK.

From rubbish dump to nature reserve

Site gives regular educational visits to schools

An ambitious plan is afoot to beautify the Mariannhill landfill site, writes Tony Carnie

WE ALL KNOW that environmentalists can be an odd bunch – but have they finally fallen off their perches by trying to turn one of Durban's biggest rubbish tips into a nature reserve?

And when the dump ... er, landfill, was still in the planning stage, the monitoring committee recommended that destruction of the indigenous coastal bush be limited, and that a buffer zone should be created around the site and screened with local plants and trees.

Although 20ha will be used for landfill, the remaining 30 hectares

we get regular visits from indigenous plant and butterfly interest groups."

One of the big successes was Richard's establishment of a plant rescue unit and massive indigenous nursery at Mariannhill.

It started about three years ago, when new landfill cells were carved into the valley. Rather than flattening the indigenous vegetation completely, Richard began


WELCOME TO
MARIANNHILL LANDFILL CONSERVANCY
You are now entering a 30 hectare conservation area which is the buffer zone of this landfill site.
Enjoy the birds and animals in these grasslands, wetlands and forests, conserved through public participation for our community.


LEACHATE
TREATMENT
PLANT
CONSERVANCY
BOMA


MARIANNHILL LEACHATE
TREATMENT PLANT
Commissioned February
2004 for the treatment
of 50m3 / day of
landfill Leachate
Designed by DSW
and ENVIROS (U.K)
DSW
ENVIROS


MECER
MECER

ENVIROS

Technologies

for

Leachate Treatment

The minimum acceptable standard is complete compliance with a specific discharge consent

Well-established and tested techniques are available to provide reliable and consistent treatment of landfill leachates

There are no technical obstacles to the treatment of landfill leachate to extremely high standards


THANK YOU
SIYABONGA
DANKIE