

Drilling Safety in UK

Brian Stringer
BDA National Secretary
British Drilling Association

FAB Foreningen for Avancerad Borrning



Hotel Clarion Stockholm
12th November 2009



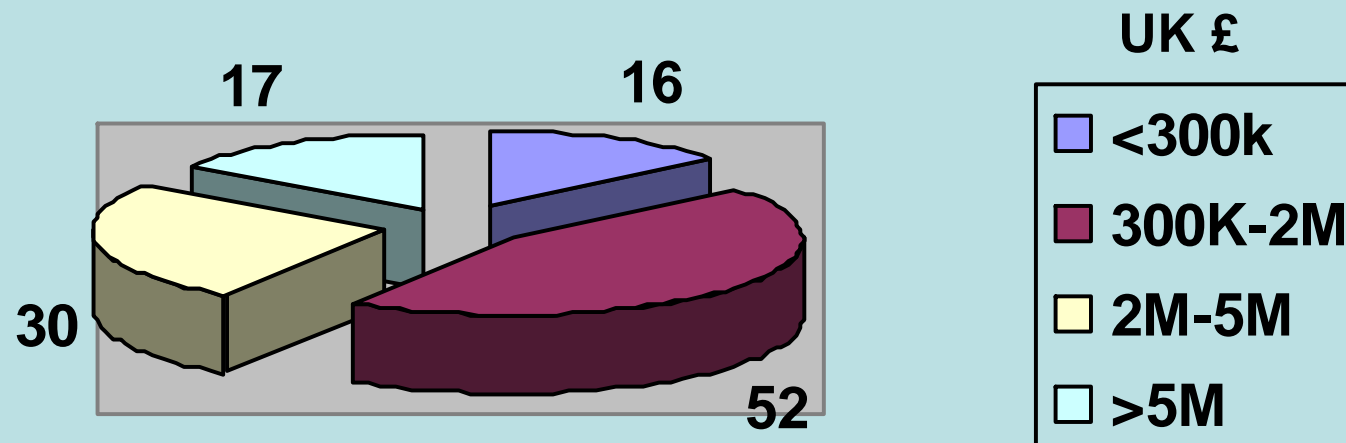
British Drilling Association

- Trade Association – founded 1976
- All Ground Drilling Disciplines excluding Oil/Gas
- Contractors, Manufacturers, Consulting & Civil Engineers, Laboratories, Academics etc.
- 115+ Corporate members
- ***“Committed to Excellence in Health & Safety, Quality of Workmanship and Technical Standards for the Benefit of the Drilling Industry and its Clients”***

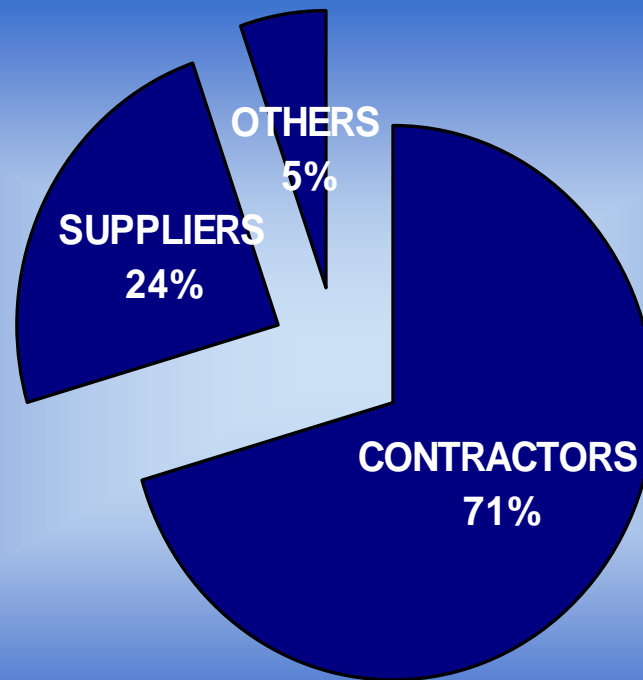


British Drilling Association

TOTAL MEMBERSHIP (115 Companies)

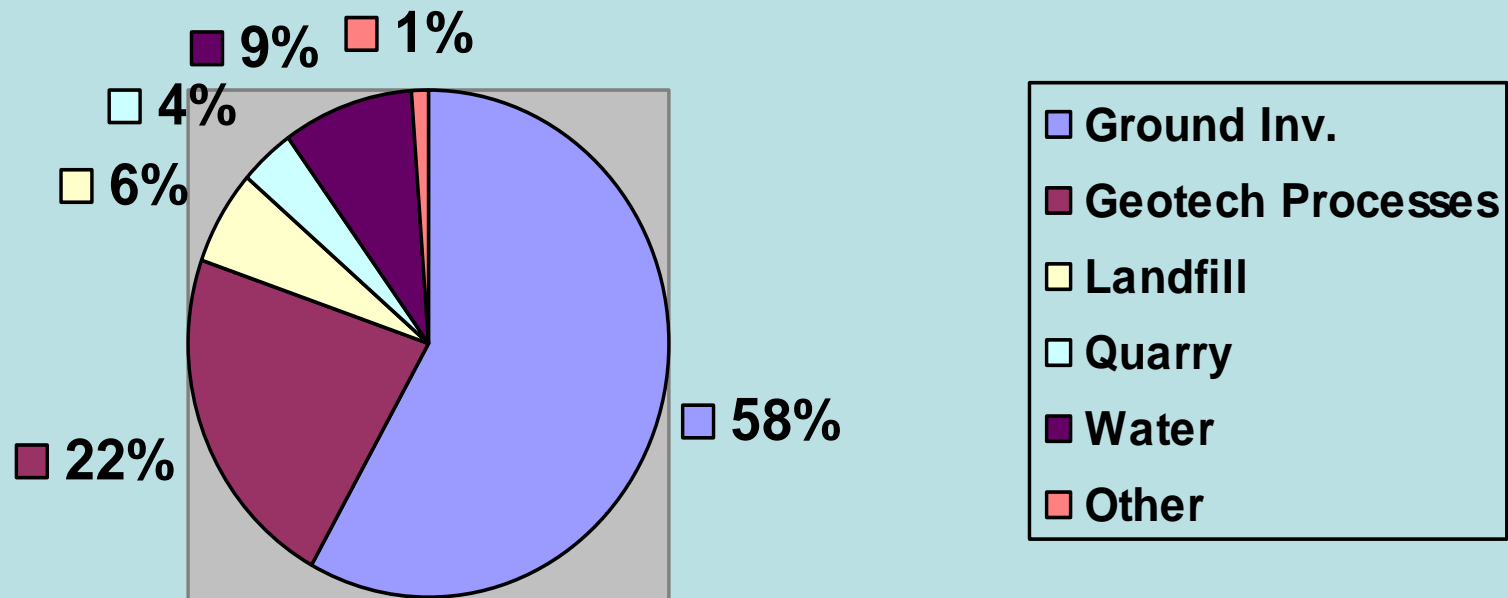


British Drilling Association



British Drilling Association

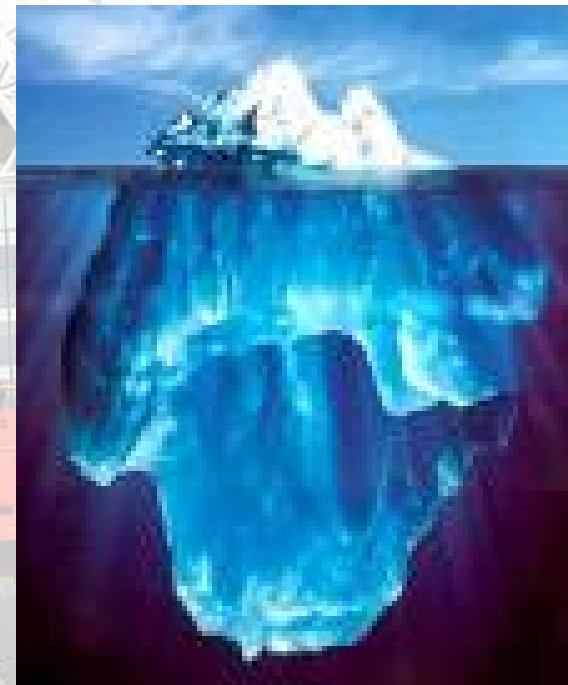
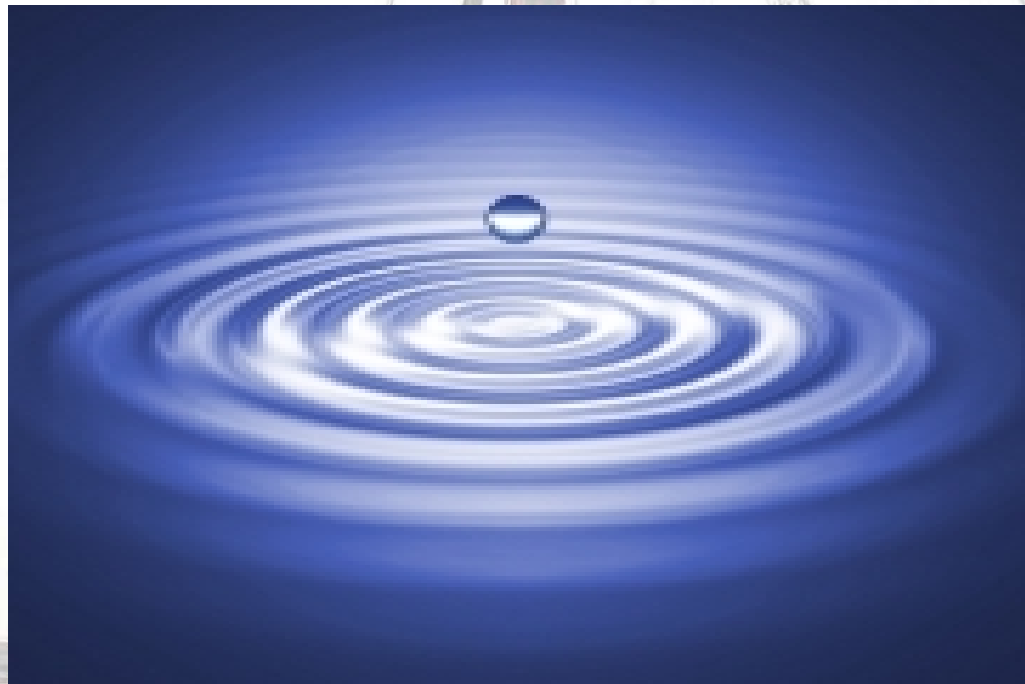
CONTRACTOR ACTIVITY (by number of companies)



THIS CHART DOES NOT REPRESENT VALUE OF WORKS DONE

Safety – Not just a Numbers' Game

Every number involves:



Safety – Not just a Numbers' Game

Every number involves:



If you think health and safety costs a lot – try having an accident!

Safety – Not just a Numbers' Game

Ripple & Iceberg Effect

- An individual human tragedy
- Grief to family, friends, work colleagues
- Other people's time
- Personal, family & social cost (£, \$)
- Business cost (£, \$) insurance, lawyers, disruption, loss of contracts etc.
- Prosecution / fines / imprisonment

Safety – UK Drilling Numbers

BDA Members Yr. end. March 2009	Direct Employee	Sub Contractor	Public
Fatalities	0	0	0
Reportable Major Injuries	28	2	0
Reportable Over 3- day Injuries	103	8	0
Dangerous Occurrences	17	4	0
Non Reportable Injuries	1149	26	0
TOTALS	1297	40	0



9,446 Employees / Sub-Contractors (1 in 7.06)

Safety – Accident Statistics

- Need to measure otherwise can't manage
- BDA collect figures once a year
- Is compulsory for every BDA member
- Provides year on year comparison
- Trend can be calculated
- BDA now seeking details of every major and 3-day off work injury

Main UK Safety Concerns

- **Underground Services**
- **Manual Handling**
- **Slips & Trips**
- **Working at Height / Excavations**
- **Shafts**
- **Ground Gases**
- **Protection against Rotating Parts**

Underground Services

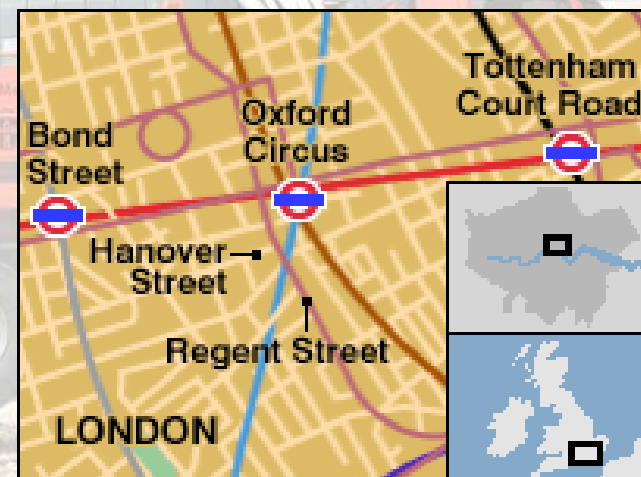


Underground Services

- **Man hurt in city centre explosion** A man suffered serious injuries in an electrical explosion in central London which led to a power cut.
- Shops were evacuated and witnesses heard a loud noise and saw smoke in Hanover Street, south of Oxford Circus.
- The man, in his 60s, is being treated for burns which are said to be life-threatening, after he drilled through an electric cable.

BBC News 7 February 2008

Was digging an inspection pit with powered tool prior to drilling. He's still not back at work and unlikely to return.



London Crossroads – Where to drill?



Underground Services



September 2008 in Glasgow, Scotland. 24 inch water main.

Cable Percussion drilling

Underground Services

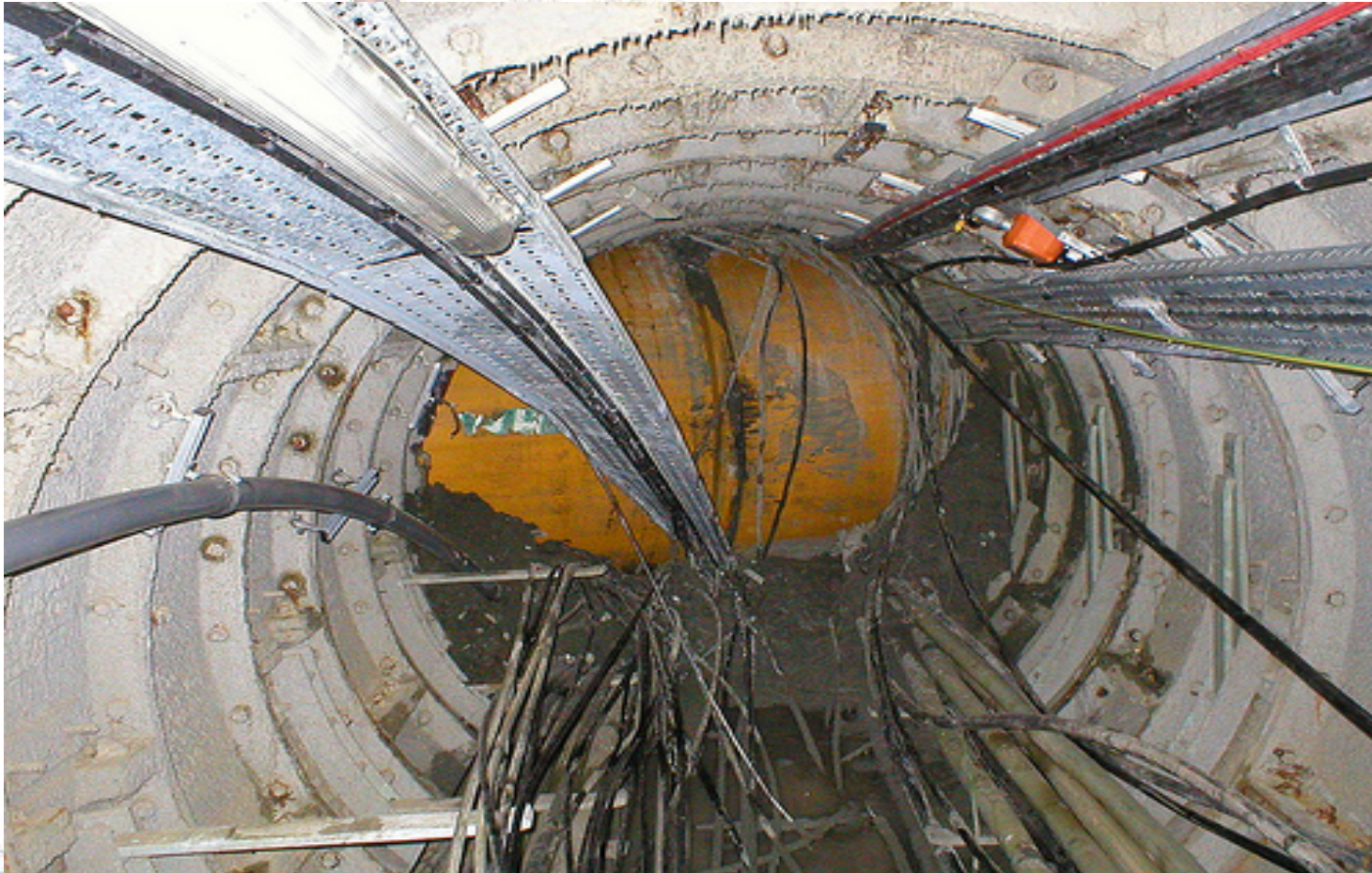


Gas pipeline explosion - 7:45 am on Sunday, 14th September 2008 near the town of Appromattox, Virginia.

Underground Services



Underground Services



London, April 2009, near Olympics site at 10 metre depth. That orange blob is a thrust boring machine which has intercepted a cable tunnel₁₈

Underground Services

- Avoiding services is safer than uncovering
- Client must provide service drawings
- Training on service drawings is essential
- Never trust service drawings
- Cable avoidance tools (CAT) are a must
- CAT the borehole position
- BUT beware – current has be flowing
- Check for signs of unrecorded / out of position
- Always hand dig an inspection pit to 1.2 metre
- CAT as digging progresses and at base
- Inspection pits at base – larger diameter than tools



Manual Handling / Slips & Trips

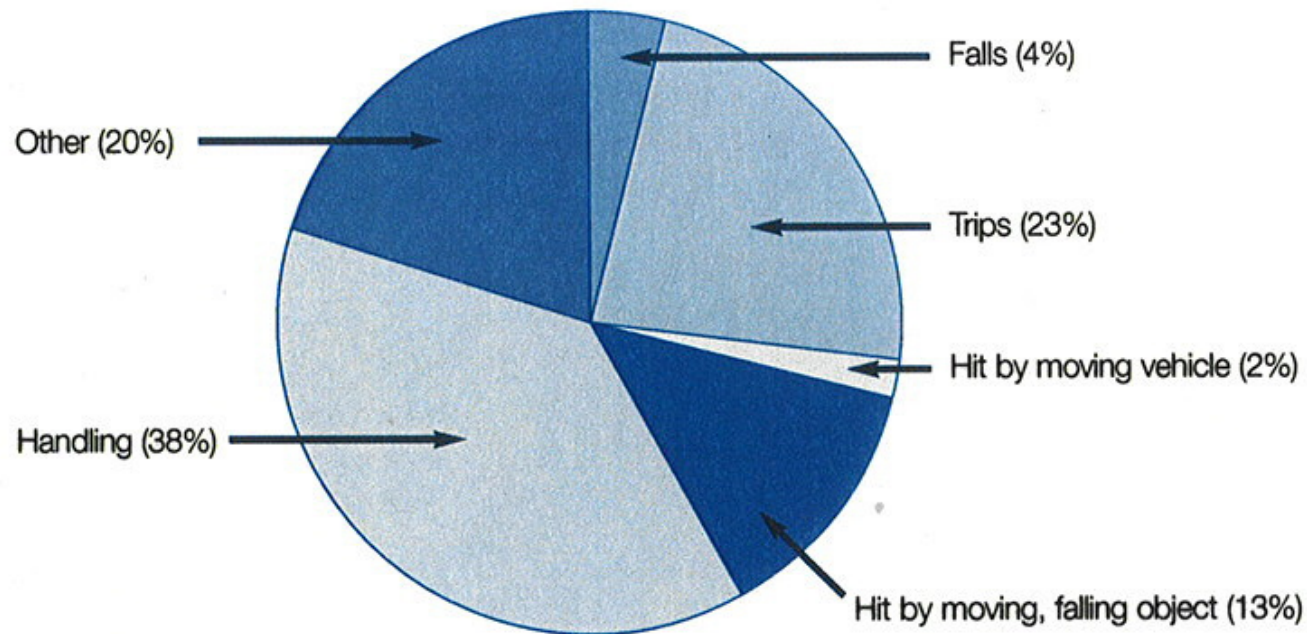
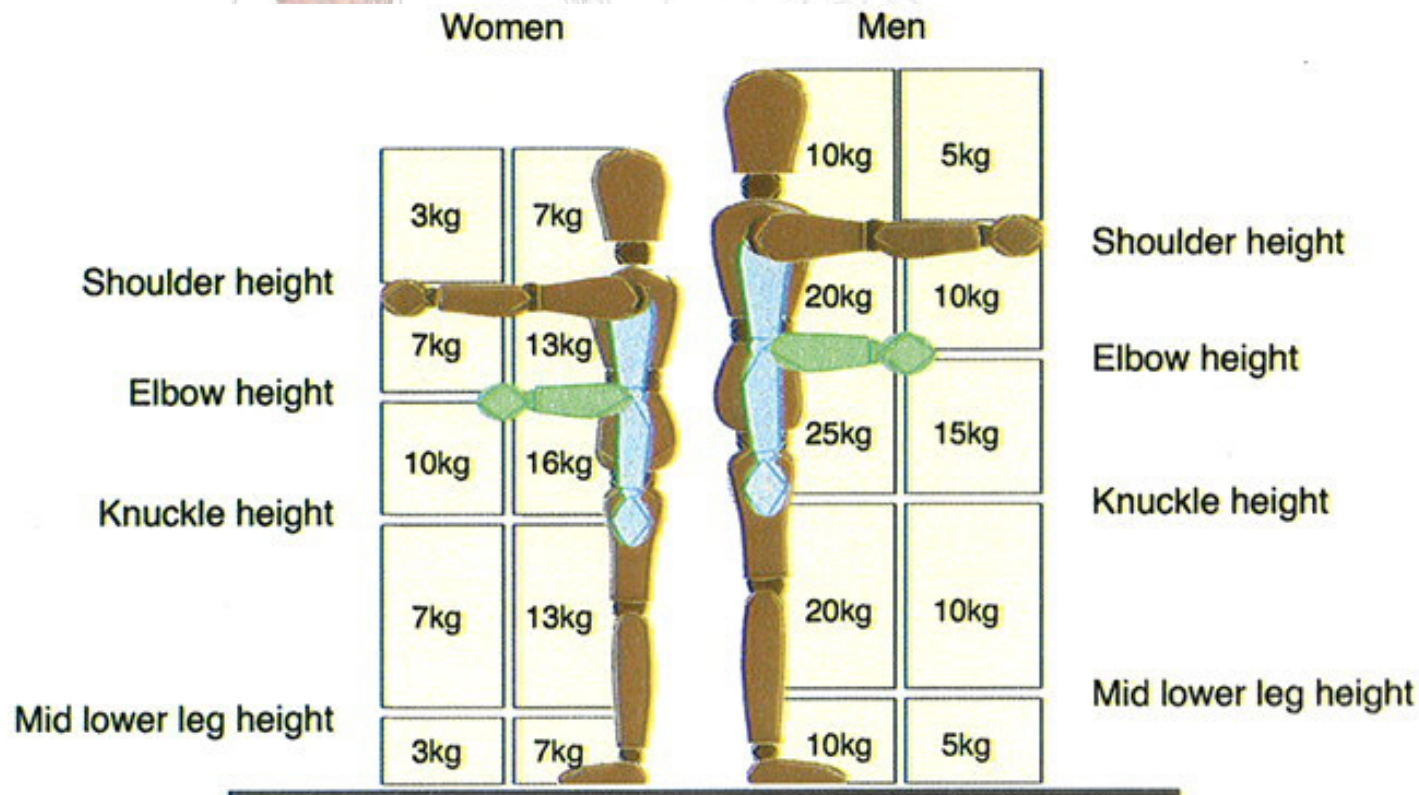


Figure 1 Kinds of accident causing over-three-day injury, 2001/02

- 61% of overall injuries in UK
- Easiest to avoid

Manual Handling

- Let's get a grip



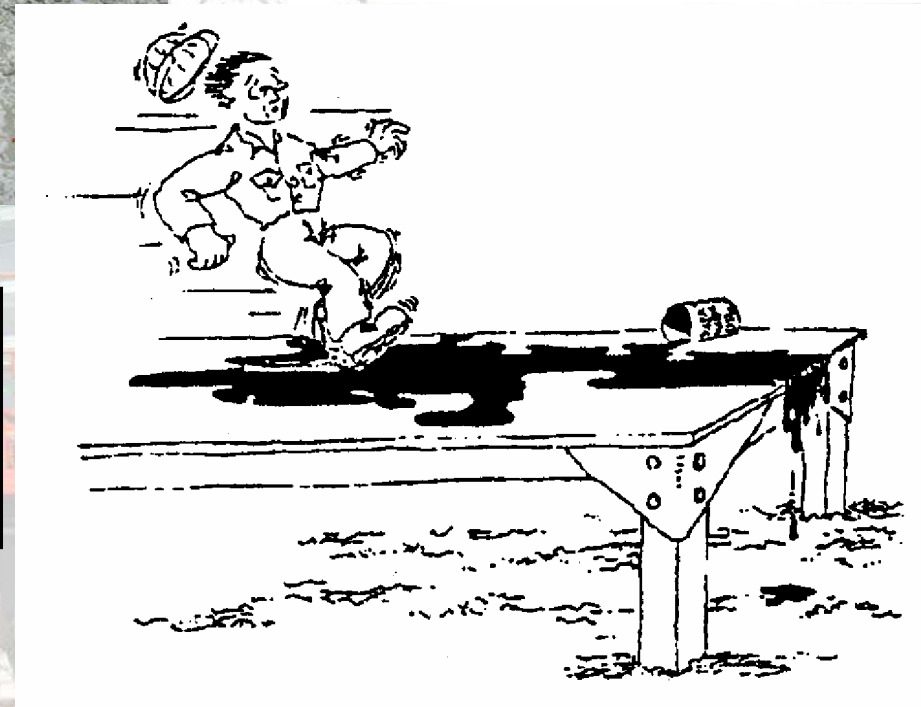
Manual Handling

- 25 kg (55 lbs) is reasonable
- Above it, for repetitive operations, we need to think
- Use the winch more
- Employ more helpers
- Invest in labour saving devices
- Take the problem to clients / suppliers
- Limit size of coreboxes
- Avoid finger trapping

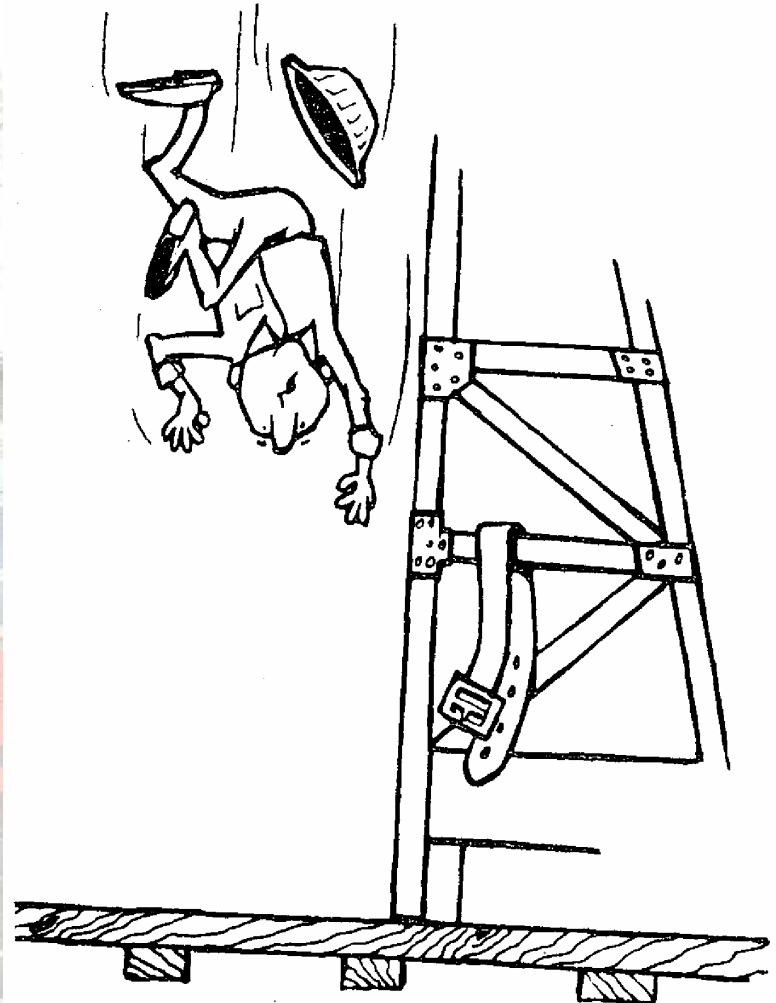
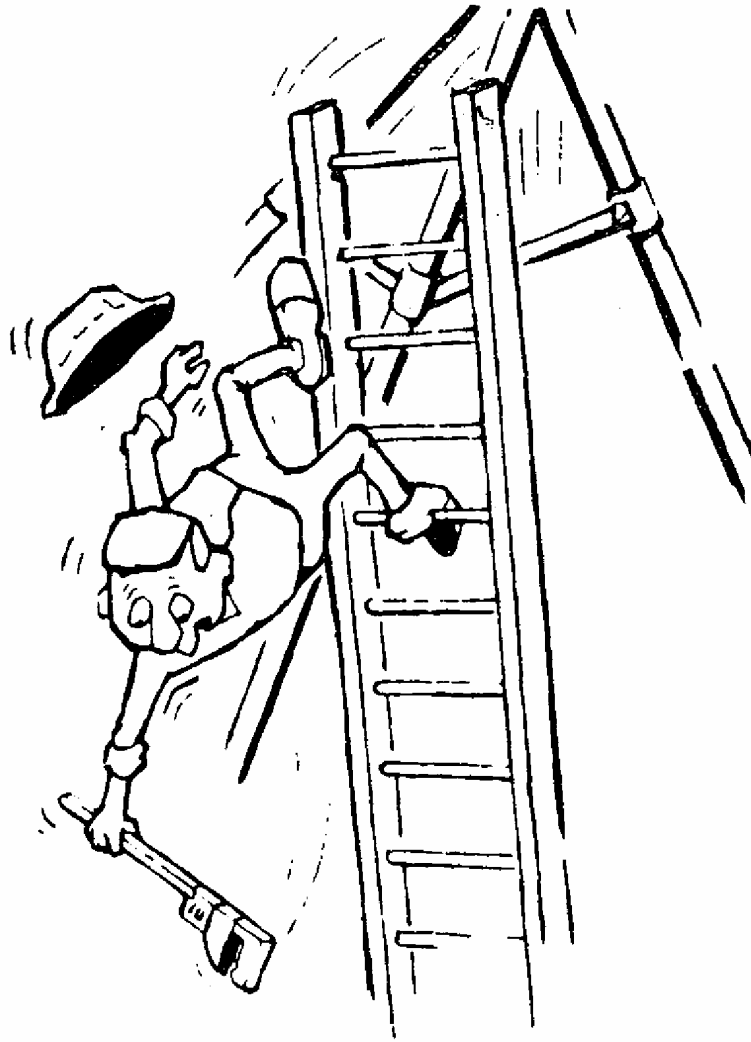
Slips & Trips



- Keep the site tidy
- Avoid spillages
- Watch where you're walking



Working at Height / Excavations



Working at Height / Excavations

- European Directive 2001/45/EC
- “Any Employer ... temporary work ... at height must select equipment affording adequate protection against the risks of falls”
- “Collective protection measures must be given priority over personal protective measures”

Working at Height / Excavations



Is this safe? How would you plan the work?

Working at Height / Excavations



Does he have to be up there? Would an elevating platform help?



**Where is the barrier to prevent a fall?
Also notice that pollution is taking place.**

Working at Height / Excavations

- Keep out of trenches
- September 2008
- 27 year old geologist killed
- Soil sampling in trench
- Trench collapsed



Shafts

- 13,000 recorded coal shafts
- Estimated another 13,000 unrecorded



Shafts



Shafts



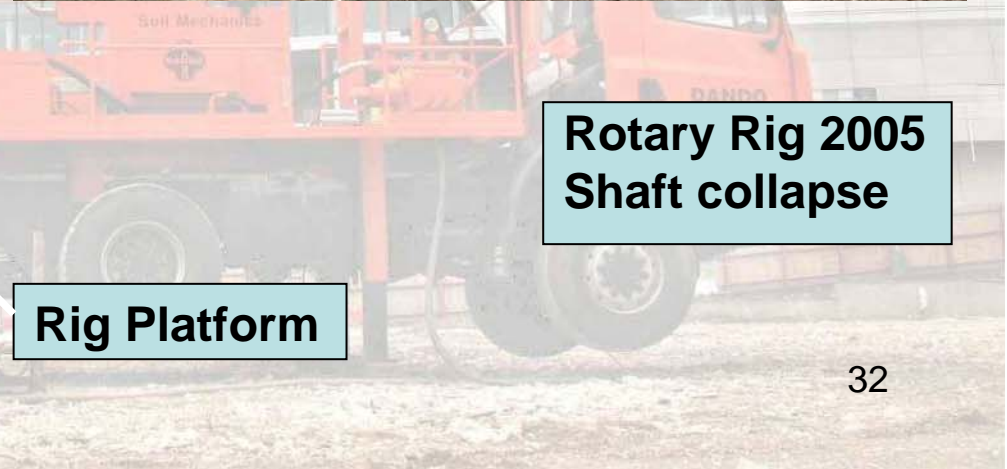
9.5 tonne rotary crawler mounted rig disappeared into 109 metre deep, 4 metre diameter shaft.

September 2009

13 metres of Fill to rockhead

10 metre diameter crater

Shafts



**Rotary Rig 2005
Shaft collapse**

Rig Platform

Shafts

- BDA now discussing joint guidance with the authorities
- Platform design is major priority



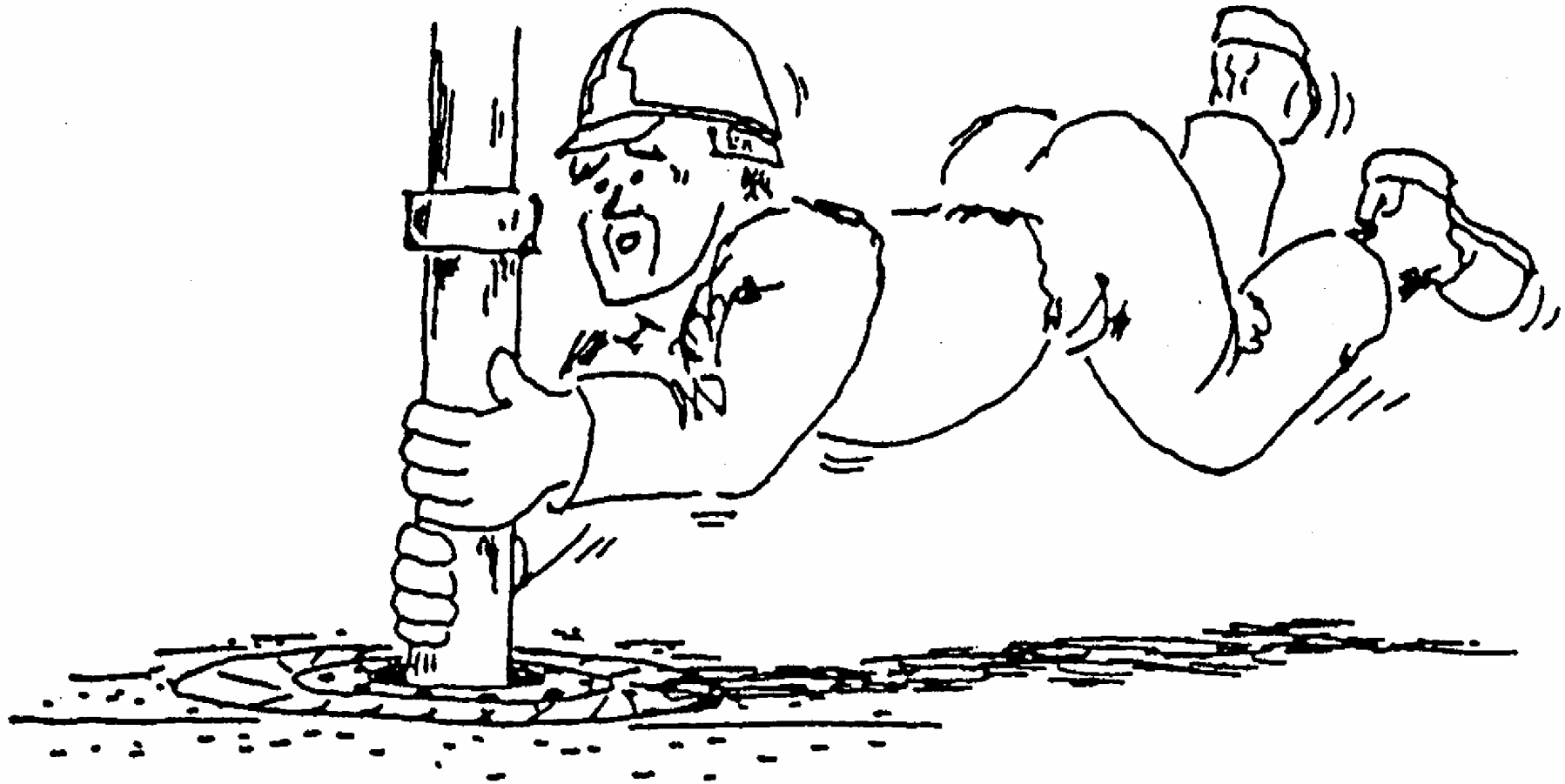
Ground Gases

- Coalfields, Landfills, Chalk etc.
- Methane, Hydrogen Sulphide, Hydrogen, Carbon Monoxide, Carbon Dioxide
- Explosion, Fire, Asphyxiation hazards
- Risk Assessment to include:
 - Creation of gases
 - Displacement & migration
 - Harm to operatives **and the public**

Ground Gases

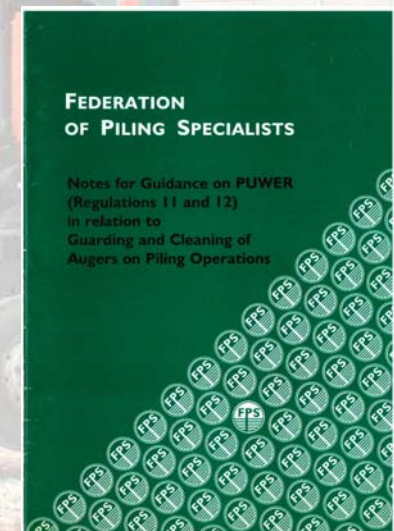
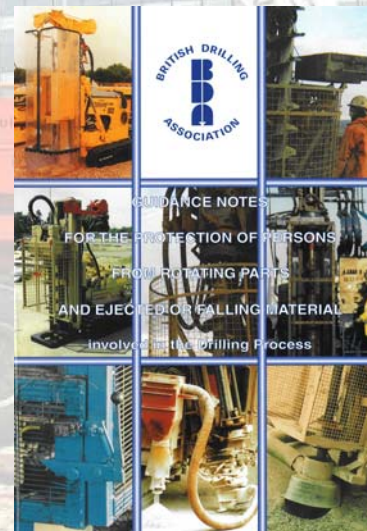
- Elderly Couple died at home July 2005, Dudley, UK
- Carbon Monoxide poisoning
- Adjacent to drilling site
- Air flush open hole drilling - coal seams and past mining activity – 12 to 21 metres
- Subsequent research proved pathway
- BDA / Coal Authority producing guidance

Protection against Rotating Parts



Protection against Rotating Parts

- Known as “**The Rig Guarding Issue**”
- Active in UK since 1999
- UK’s Health & Safety Executive (HSE) called a meeting of the Drilling & Piling industries in April 1999
- Guidance produced Aug/Sept 2000



Protection against Rotating Parts

- One Regulation for Users
- Another for Manufacturers / Suppliers
- **BOTH DERIVE FROM EUROPEAN MACHINERY DIRECTIVE (now 2006/42/EC) which is mandatory on all EU governments)**
- And Directive calls up
- **EN (ISO) STANDARDS (e.g. 12100, 791 etc.)**

Protection against Rotating Parts

- First requirement
- TO PREVENT ACCESS
or
- TO STOP MOVEMENT
before people enter danger zone

(Once entanglement starts it's too late)

- BUT NEXT REQUIREMENT FOLLOWS

Protection against Rotating Parts

(2) The measures required by paragraph (1) **shall** consist of -

(a) the provision of fixed guards enclosing every dangerous part or rotating stock-bar where and to the extent that it is **practicable** to do so, but where or to the extent that it is not, then

(b) the provision of other guards or protection devices where and to the extent that it is **practicable** to do so, but where or to the extent that it is not, then

(c) the provision of jigs, holders, push-sticks or similar protection appliances used in conjunction with the machinery where and to the extent that it is **practicable** to do so,

and the provision of such information, instruction, training and supervision as is necessary.

Protection against Rotating Parts

SEVERAL THINGS TO CONSIDER

- **THE WORD “SHALL”**
- **NOT A MENU. IT’S A HIERACHY.**
- **WHAT DOES “PRACTICABLE” MEAN?**
- **“GUARDS” ??**
- **“PROTECTION DEVICES” ??**
- **CANNOT CLAIM THAT TRAINING, SUPERVISION ETC. BY ITSELF CAN MEET THE REQUIREMENT (UK was forced by Europe to amend PUWER 98 to reflect this)**

Protection against Rotating Parts

- **“SHALL”** is mandatory (Should, must, can etc. are not)
- **“HIERACHY”** Start at the top and work down
- **“PRACTICABLE”** is legal term. If it's technically possible it shall be done regardless of cost. (Prior to 1998 the words “reasonably practicable” were used.)
- **“GUARDS”** & **“PROTECTION DEVICES”** to follow later

Protection against Rotating Parts

UK History

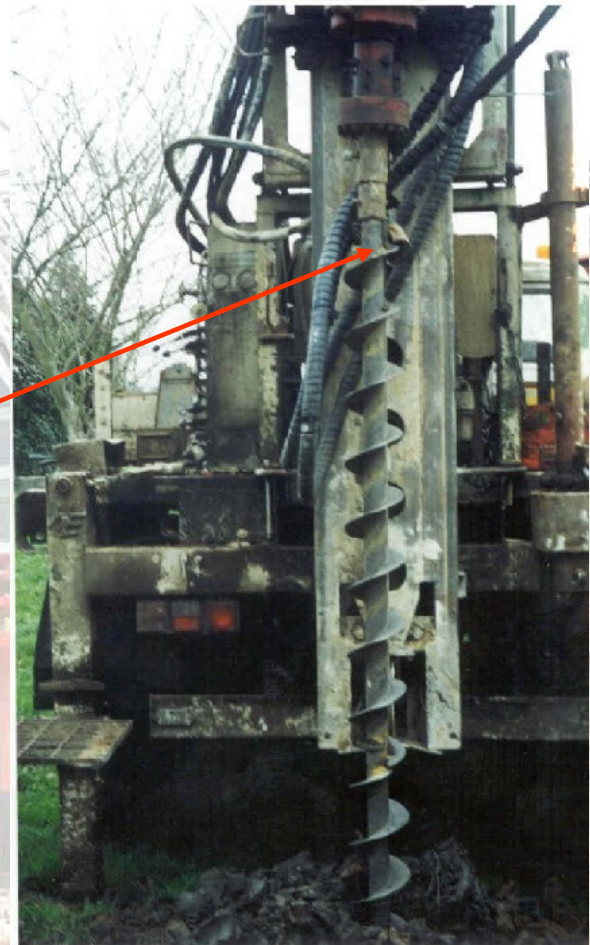
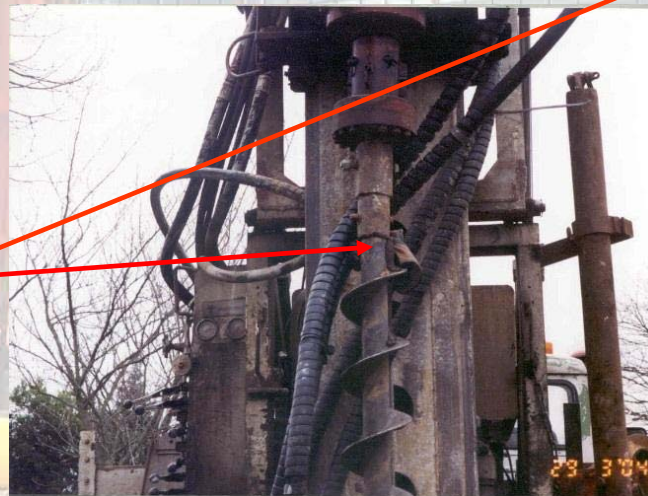
- 1999 HSE raise the issue
- 2000 BDA & FPS publish guidance
- Guidance allows slow rotational mode
- 2000 – 2006
 - Awareness developing
 - Some contractors take action & fit guards
 - Fears of loss of production, loss of visibility, cost, change in working practice etc.
 - Manufacturers less than supportive
 - Retro fitting the problem

Protection against Rotating Parts

UK History

- March 2004 severe entanglement
- April 2006 HSE prosecute
- £50,000 fine
- Industry wakes up

Driller's glove



Protection against Rotating Parts

UK History

- 2006 onwards – HSE raise the game
- BDA circulates information and encourages compliance
- More entanglement accidents (abroad as well)
- BDA works with HSE to clarify exact requirements e.g. interlocked guard
- Contractors put pressure on manufacturers / suppliers who respond
- Contractor fears largely disappear (not proven in practice apart from cost)

Protection against Rotating Parts

UK History

- 2009
 - HSE turns the screw more (prohibition notices)
 - Has been a culture change
 - Vertical drilling in open air (all sides agree that it's interlocked guarding)
 - BDA / HSE

**Inclined Drilling
Working Party**



Protection against Rotating Parts

- EU Directives state legal objectives
- “Harmonised” EN Standards identify technical means to meet legal objectives
- 3 classes of EN Standard
 - **A-type**, basic methodology (only 2, of which EN ISO 12100 is most important, and referred to in Canadian CSA Z432)
 - **B-type**, common to all e.g. Noise
 - **C-type**, specific class of machines e.g drill rigs have EN 791, piling rigs have EN 996

Protection against Rotating Parts

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 791

November 1995

ICS 91.220

Descripteurs: Drilling equipment, percussion drilling, rotary drilling, safety of machines, dangerous machines, hazards, safety measures, operating stations, control devices, brakes, safety devices, stability, fire protection, engine noise, vibration, marking, name plates, technical notices

English version

Drill rigs — Safety

Appareils de forage — Sécurité

Bohrgeräte — Sicherheit

This European Standard was approved by CEN on 1995-07-01. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 26, B-1050 Brussels

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Ref. No. EN 791 : 1995 E

BRITISH STANDARD

BS EN
791 : 1996

Drill rigs — Safety

The European Standard EN 791 : 1995 has the status of a British Standard

ICS 91.220

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BSI



EN 791 1995 (November)

BS EN 791 1996 (June)

Protection against Rotating Parts

- CEN is European Standards body
 - CEN TC 151 (Technical Committee), WG3 (Working Group 3) looks after drilling, and now includes WG2, piling)
 - Currently revising EN 791 & 996 (of 1995)
 - France, Germany, Italy, Sweden, Finland, UK + +
 - Started revision Feb 08
 - 6 meetings since
- Combined Standard 10/11**



European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



Protection against Rotating Parts

- pr EN 791- 996 Drilling and foundation equipment – Safety
- 7 parts
- Part 1 General requirements
- Part 2 Drill rigs
- Part 3 HDD
- Part 4 Foundation equipment
- Part 5 Diaphragm walling equipment
- Part 6 Jetting, grouting, injection
- Part 7 Auxiliary equipment

Protection against Rotating Parts

- **Pr EN 791 – 996 Part 1, Draft 6 (May 2009)**
- **“Where manual operation in the zone close to rotating parts is required, access to rotating drill rods, spindles, casings, augers, tools, etc. shall be prevented by barriers such as a guard or protective device”**
- **Protective device is defined elsewhere but may not include trip wires, toggle switches, emergency stops etc. It could be radar, infrared, digital camera technology etc. etc.**

Protection against Rotating Parts

- Are these Protective Devices?
(See EN ISO 12100-1 for definition)



Emergency stop



Toggle switches



Trip wires



Multiple E stops



Pressure plates

Protection against Rotating Parts

- WHAT HAVE UK & EUROPE BEEN DOING?



Protection against Rotating Parts



Protection against Rotating Parts



Protection against Rotating Parts



**Boart Longyear
Sonic Rigs**

Protection against Rotating Parts



Casagrande & Hutte Rigs

Magnetic interlock

Protection against Rotating Parts

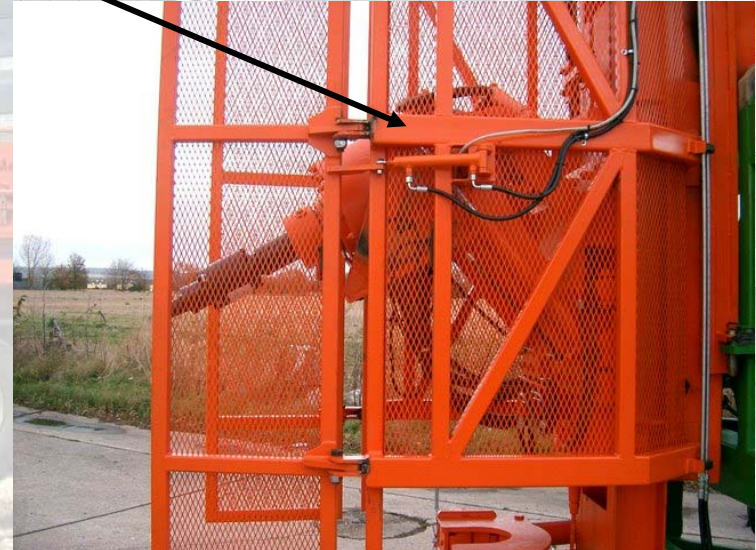


Protection against Rotating Parts



Dando Rigs

Hydraulic
gate opening



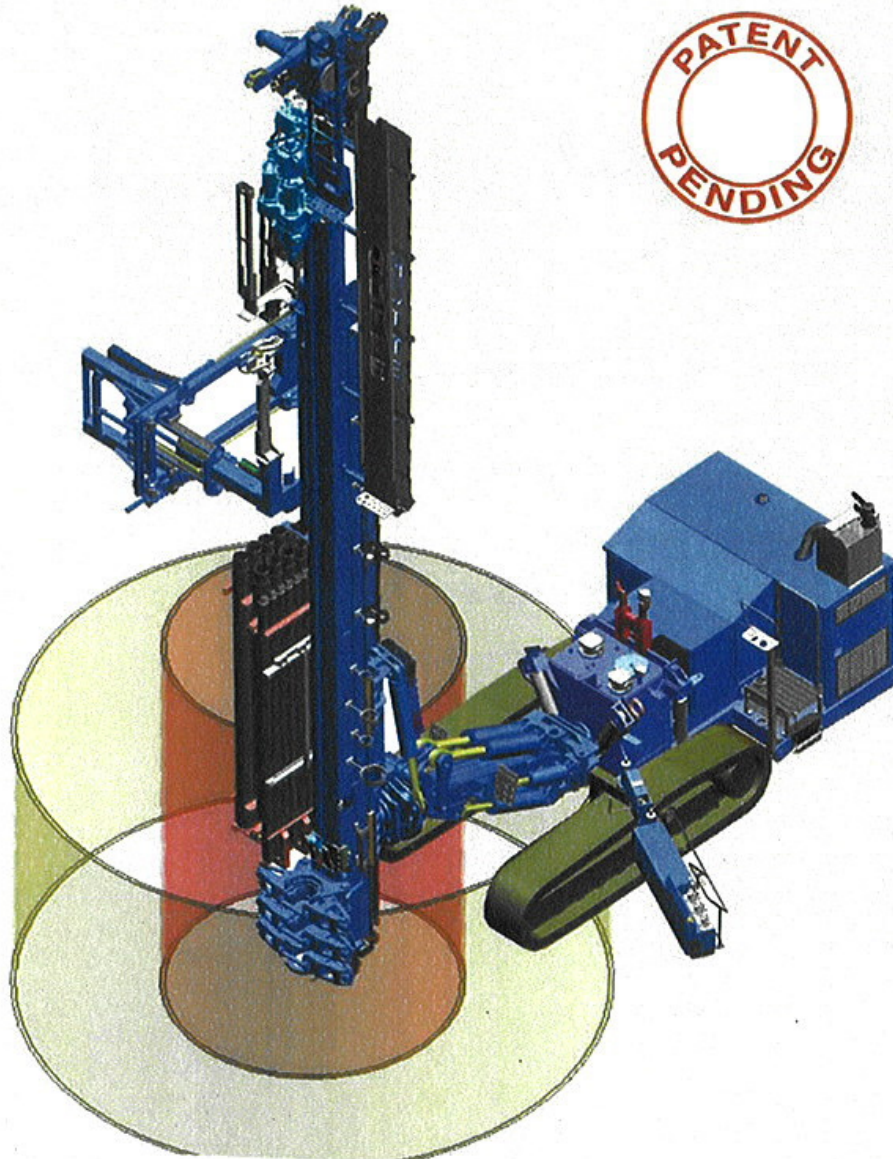
Protection against Rotating Parts



Soilmec
Rigs



Protection against Rotating Parts

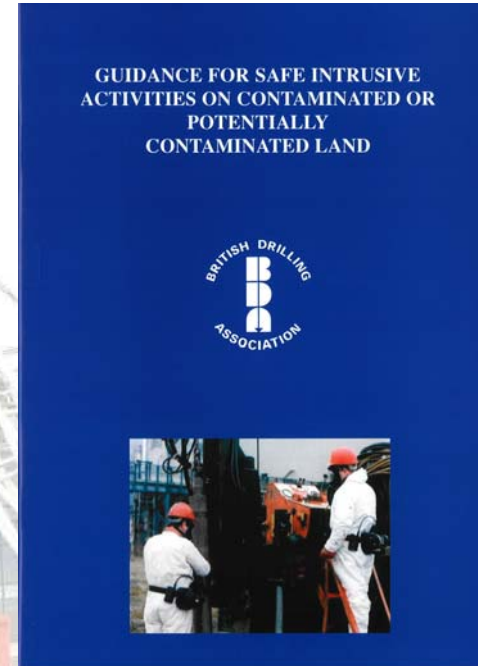


THE FUTURE ?

- Digital cameras configured to detect movement
- Defines dangerous working area
- When people enter
 - drilling immediately stops
 - safety procedure activated (rotation/feed slow mode)

Other BDA Safety Areas

- Contaminated Land
- Silica Dust
- Hazardous Substances
- High Speed Roads
- Noise
- Transport & Driving
- Health Surveillance
- Environmental Pollution



Canadian Safety Conference



Grizzly bears are a safety hazard in British Columbia

Canadian Safety Conference

- International Drilling Safety Conference (IDSC)
- Lindsay, Ontario, 25-26 July 2009



IDSC - Canada

- Organised following death of young Canadian driller who became entangled in rotary geotechnical rig
- First attempt to raise issue of guarding
- Other safety issues also discussed
- Was opportunity for international Drilling Associations to meet



IDSC - Canada



CDDA

BDA

ADIA

NDA

NGWA

MAPAM

IDSC - Canada

Australia Drilling Industry Association

- Working with the consulting engineers (ACEA) and manufacturing communities to be more proactive regarding safety and training.

National Drilling Association (USA)

- Need national consensus about training and training standards.

Canadian Diamond Drilling Association

- National Occupational Standards by MiHR across Canada for diamond drilling starting fall, 2009
- Selecting standards/committees to craft a uniform format
- Establishment of General Performance Objectives (GPO's)
- Equipment guarding issues, Canada wide

Establishment of one drilling association across Canada



IDSC - Canada

British Drilling Association

- Guarding issues
- Inclined drilling
- Geotechnical standards

Manitoba (MAPAM) (Canada)

- Updating Workplace Safety and Health Act and regulations
- Training standards in Manitoba
- Equipment guarding issues, Canada wide

National Ground Water Association (USA)

- Electrocution/contact with electric wires
- Slips, trips, and falls
- Proper cargo securement

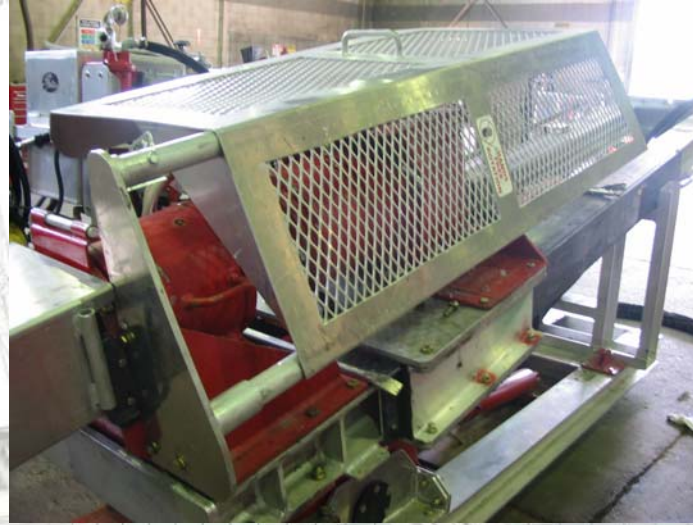


IDSC - Canada

International Drilling Associations agreed:

- **Share information on competency, training and guarding**
- **Membership rate for publications**
- **Compile Database of international Drilling Associations**
- **Association reports every 6 months**
- **Try to meet once a year**

Some Canadian Pictures





**THANKS FOR LISTENING
NOW OPEN FOR QUESTIONS**

