Health and Safety Executive

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Legal Requirements
Planning and carrying out drilling work

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30 mins

Where does the law come from?

- Legal requirements grow from incidents that the regulator and parliament judge unacceptable
- Legal requirements are refined over time
- So:
  - Learn from previous incidents and don't make the same mistakes
  - Learn from any near misses and avoid the big one

How does health & safety law work?

- Most legal requirements expect you to assess what you are setting out to achieve
- You must then do whatever is reasonably practicable to ensure that your activities don't harm anyone
- This means first identifying the hazards associated with your activity
- Then finding ways (control measures) to keep the risk of incident or injury low enough

Which are the common hazards in construction? (Incomplete list)

• Asbestos – fatal lung damage	~2000
• Silica dust – fatal lung damage	~500
• Diesel fume – fatal lung damage	~300
• Falls from height	~20
• Falling materials / equipment	~10
• Plant & Vehicles – run over or crushed	~10
• Excavation collapse	~2
• Confined space poor air quality	~2
• Entanglement on rotating shaft / drill string	?

How do I know I've done enough to reduce the risk of an incident?

- HSE guidance
- Industry guidance
- Industry practice
- Specialist health & safety advisor
- Early liaison / discussion / pushing clients to provide information and arrangements
- Known knowns – relax
- Known unknowns – add more safety factor
- Unknown unknowns – **watch out for these**

How to avoid criticism or prosecution

- Meet the standards set by your trade body
- Be able to show:
  - Each job is planned
  - Workers are trained for each task
  - Plant is suitable and well maintained
  - Supervisors & managers have training
  - Assess whether site is as expected
  - Don't be persuaded to take short cuts
  - Keep arrangements under review and revise if needed

Brexit

- UK legislation (eg HSW Act 1974)
- EU directives required GB to enact UK legislation covering important topics
- Very little direct EU legislation - eg some Chemical Regs and eg Construction Products Regs 2013
- British Standards are stand alone via BSI
- EN Standards via CEN which is independent of the EU

Don’t let the ground bite you - Most unknown unknowns are foreseeable

- Access
- Gradient
- Services
- Voids
- Contamination
- Ordnance
- Geological gas under pressure – flammable / toxic / asphyxiant
- Artesian gas and water

Access

- Plan access to be sure you can get all kit to the work area
- Enabling works may need to be priced in or provided by others

Preparation is key

Site Gradient

- If you need site access via a gradient make sure you won't exceed the rig / vehicle capability – especially across slopes
- If you need to work from a gradient, use the correct kit – like this:

Services Guidance HSG47

Even striking a water main can cause mayhem

Planning:

- Obtain utility plans
- Survey site
- Mark identified services on ground
- Barrier off sensitive areas
- Hand dig to confirm

Voids – known and usually should have been known

Drill rig lost

Planning:

- Desk top study
- Gnd Pen Radar
- Raking probes
- Bridging deck

Contamination

- Previous use of site – history
- Asbestos
- Hydrocarbons / solvents
- Biohazards – sewage; leptospirosis; anthrax
- Pesticides
- Heavy metals
- Dioxins (eg burnt plastic)
- Ordnance

Preferably not like this:

Piling Rig strikes WWII UXB
Austria 2006 Rig & dumper destroyed

Ordnance Guidance – CIRIA C681

- Desk top study for site
- If concludes not low risk – more detailed study
- If medium or high risk - Site survey
- Inc Drilled magnetometry if piling proposed
- If abandoned bombs logged for site area – find and deal prior to construction work
- Ordnance briefing / training for intrusive works

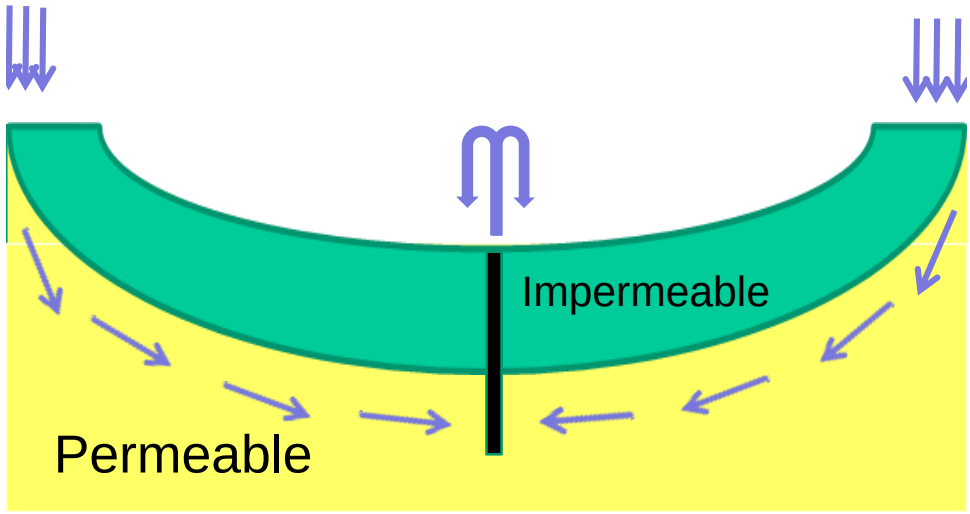
High pressure gas or fluid strike flammable / toxic / asphyxiant

- Piped gas - struck during drilling -v- leak
- Biogenic gas from high organic content strata
- Coal / Mine gas
  - Gas in old workings
  - Gas evolved due to underground combustion
  - Gas diffusing from unworked coal
- Oil bearing strata (unplugged borehole?)
- Air etc under artesian pressure

Coal Authority Guidance 2012

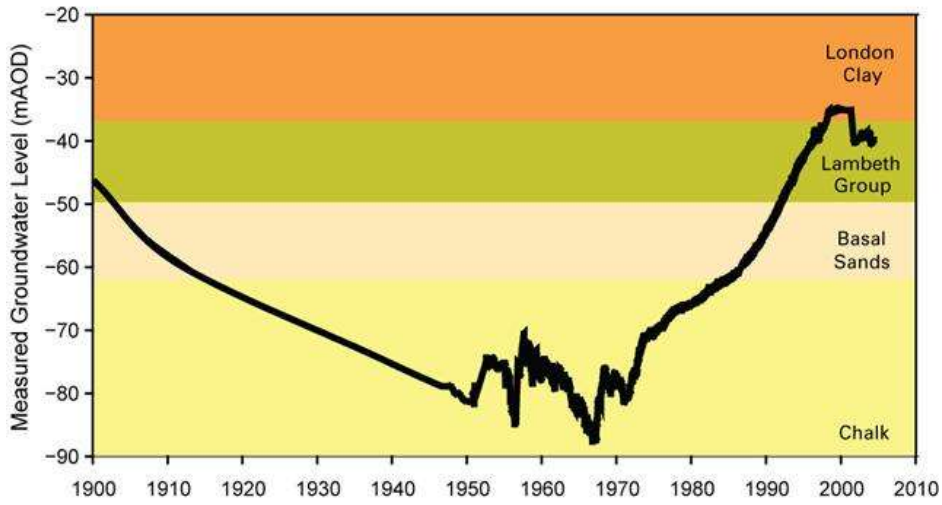
- Applies to all drilling & piling near coal assets
- Leans toward pit-head works
- No direct application to biogenic gases
- No direct application to general artesian gases

Confined artesian water pressure

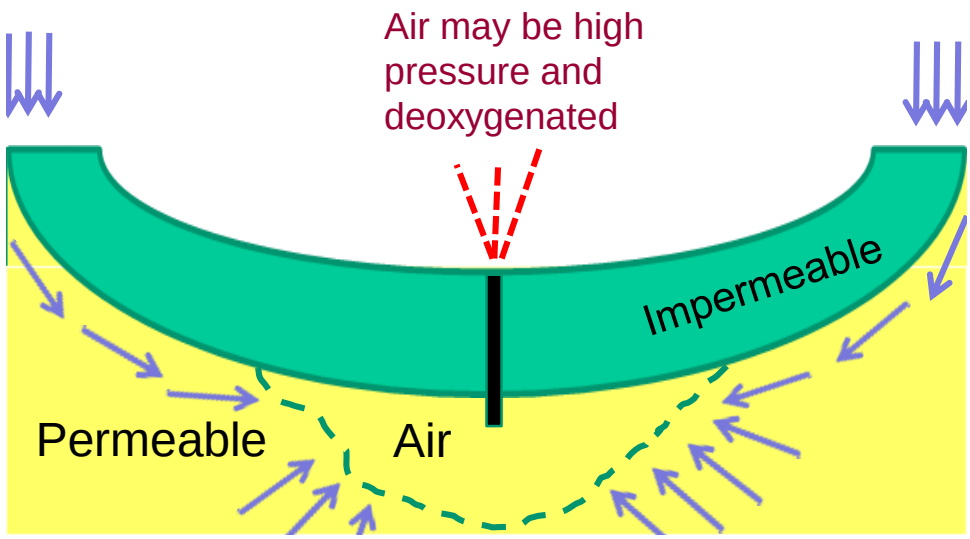


Refill following prolonged abstraction can trap air

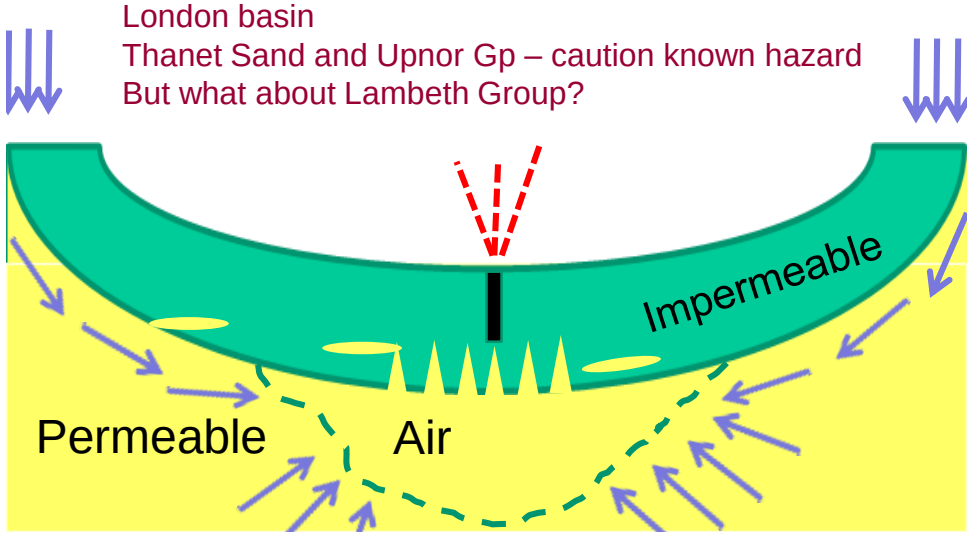
Groundwater hydrograph for Trafalgar Square borehole [Thames water]



Artesian water pressure with trapped air from solution or refill



Could fissured clay or sand path release gas at shallower depth?



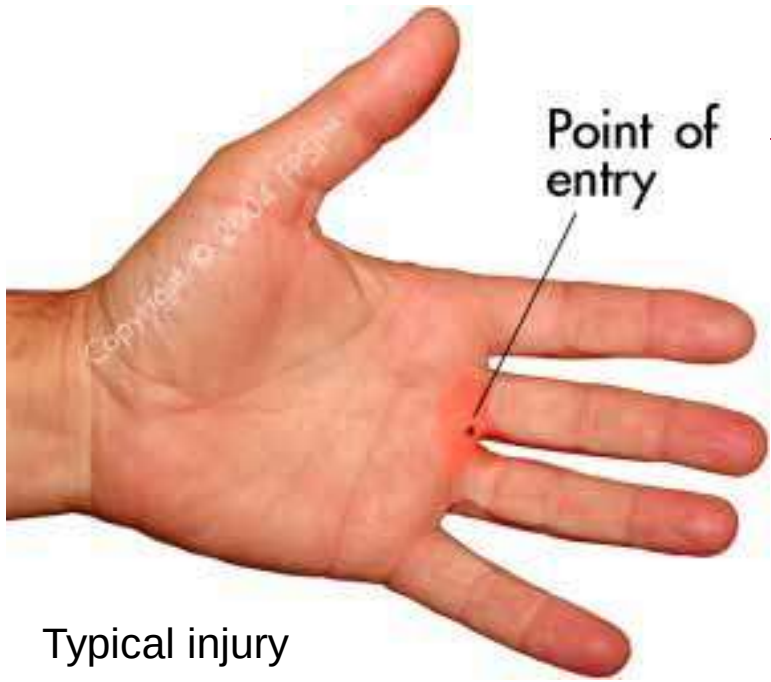
- Desk study of area to be drilled – BGS, LA, history
- Coal Authority advice & permission if drilling on their land OR into their assets
- Services/Infrastructure location
- Gas monitoring for flammables & asphyxiants (including CH4 / CO2 / CO / O2) as needed
- Plan for what if….
- Vent -v- lockdown
- Drilling in confined space may need routine use of BA
- Tidy site allows rapid escape

Current Issue

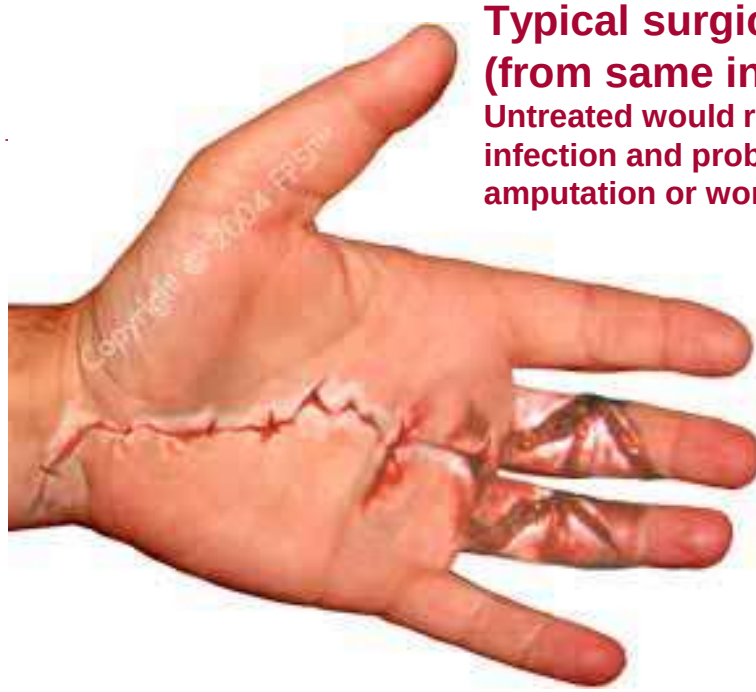
- Tracked plant - adjustment and maintenance - preventing injury from hydraulic blowout
- HSE new safety alert
- Google 2017 Safety Bulletins or:
- http://www.hse.gov.uk/safetybulletins/track-tensioning.htm

Hydraulic Injection Injury

- Hydraulic injection can occur from approx 100 psi (~7bar)
- It happens when hydraulic fluid is able to penetrate the skin
- A typical injury occurs when a worker uses their hand to find a pinhole leak – eg in a hose - don't do it
- A hand operated grease gun can achieve pressures of 9000 psi (600 bar)



Typical injury



Typical surgical repair (from same injury)

Untreated would result in infection and probably amputation or worse

Fig 1
Tracked plant undercarriage chassis
Typical arrangement - schematic

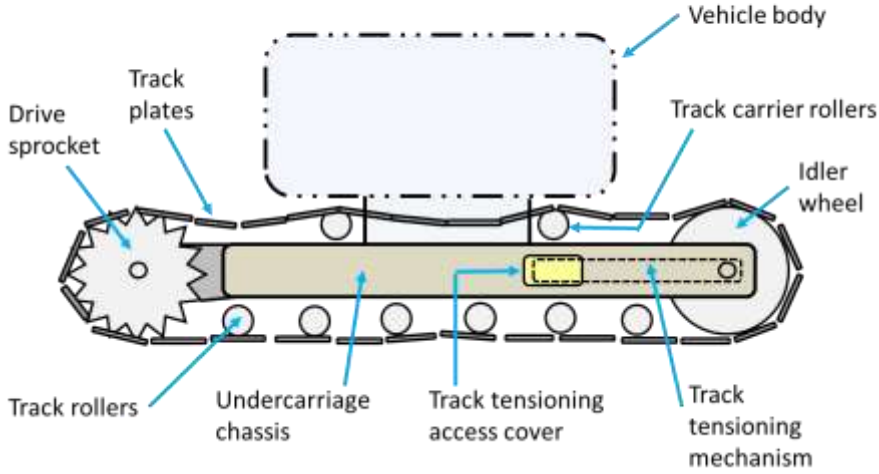
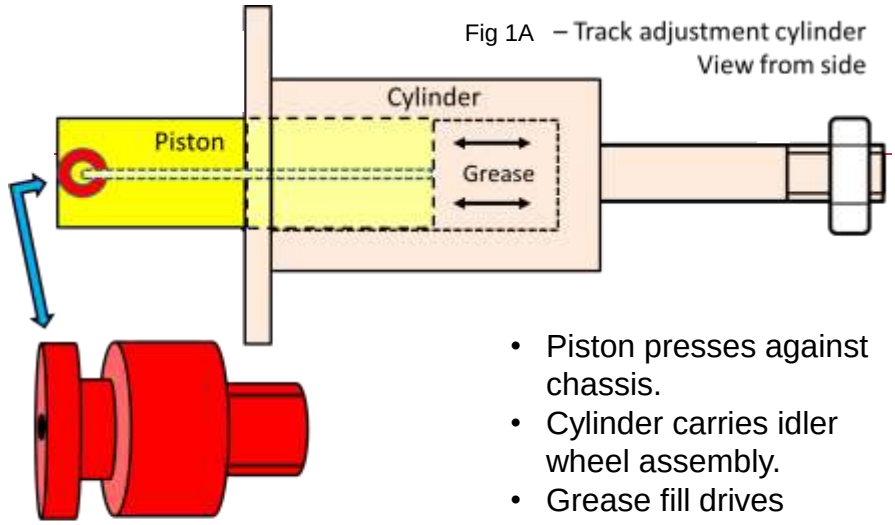


Fig 1A – Track adjustment cylinder
View from side



Typical button head Grease nipple – screws into piston or via an adaptor – may have hexagonal head

- Piston presses against chassis.
- Cylinder carries idler wheel assembly.
- Grease fill drives cylinder/idler away from chassis thereby tensioning track

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Fig 2
Track tension - adjuster piston extended
Coil spring uncompressed

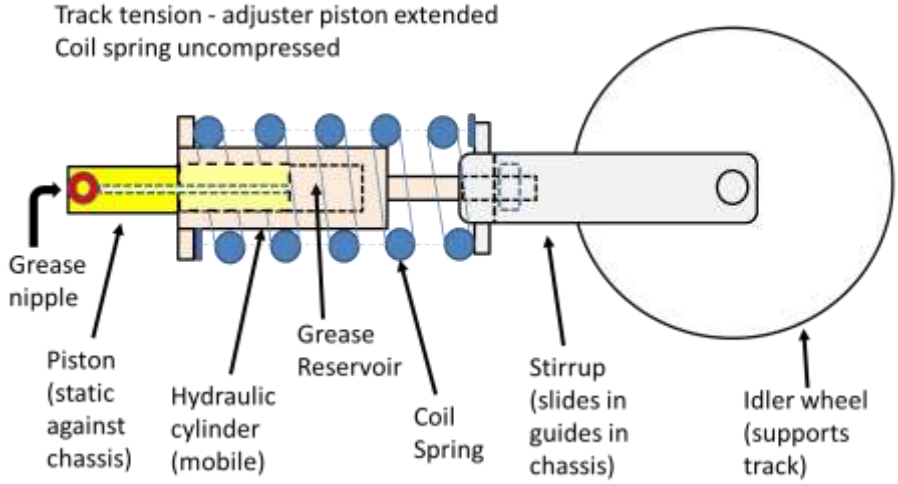


Fig 3
Track tension adjuster piston extended
Coil spring compressed

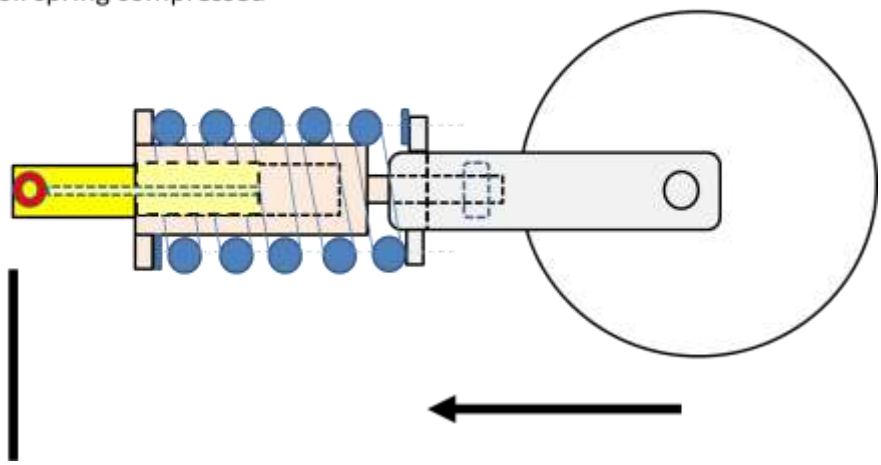
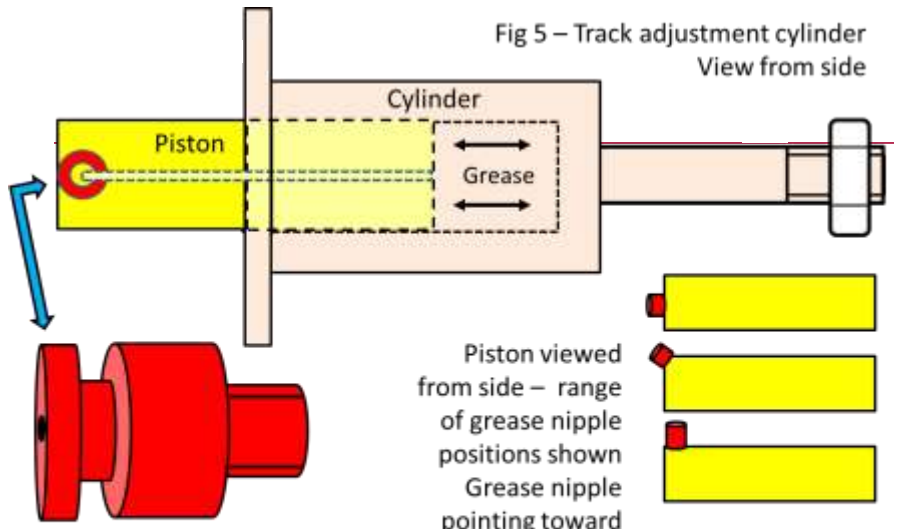


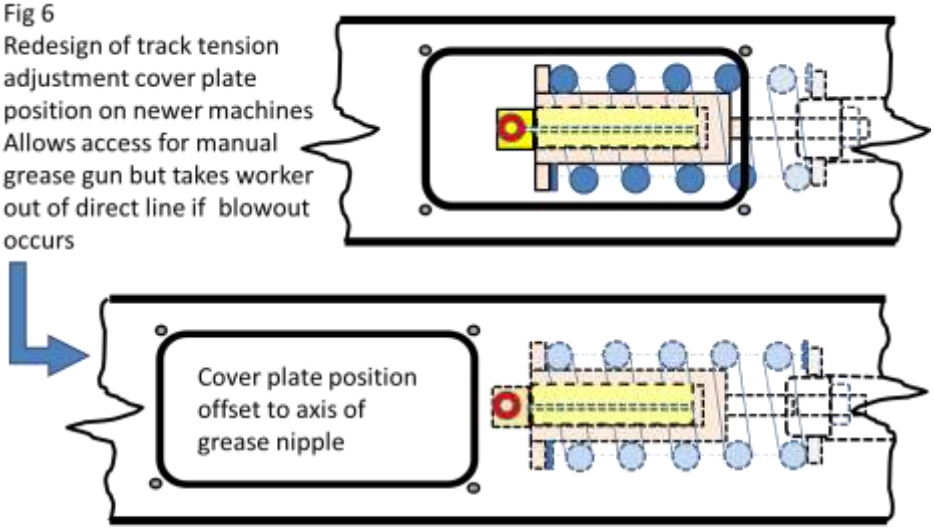
Fig 5 – Track adjustment cylinder
View from side



Typical button head Grease nipple – screws into piston or via an adaptor – may have hexagonal head

Piston viewed from side – range of grease nipple positions shown
Grease nipple pointing toward worker increases risk of injection injury if blowout occurs

Fig 6
Redesign of track tension adjustment cover plate position on newer machines Allows access for manual grease gun but takes worker out of direct line if blowout occurs



On older machines a replacement one piece or two piece cover may be available that allows offset access for the grease gun fitment whilst keeping the grease nipple axis permanently covered

Actions:

- Do not reuse components that have separated under pressure – damage may not be visible to the eye – fit new parts
- High pressure grease guns should not be used without tool and task training
- Problems should be logged and reported to your plant / maintenance manager
- Difficulty maintaining track tension must be investigated

Thank you for listening

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