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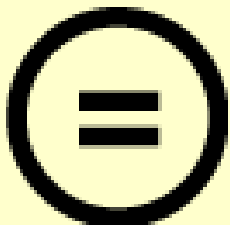
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Exploring accident causation in the
construction industry

Volume Two: Appendices

by
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Doctoral thesis

Submitted in partial fulfilment of the requirements for the
award of Doctor of Philosophy of Loughborough University.

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11 APPENDICES

Appendix 1. Focus group questionnaire

Accidents in the Construction Industry
Focus Group Discussion

1. What do you think was the most important point arising from today's discussion?

2. Were there any aspects of today's discussion you found particularly interesting?

3. Is there anything further you would like to add?

4. Based on your experiences consider how the following contribute to the causation of accidents generally in the construction industry

Please circle the number to represent the contribution of each factor

Project, concept, design and procurement	To a very large degree				
	Not at all	To a slight degree	To some degree	To a large degree	To a very large degree
Inexperienced client	1	2	3	4	5
Unsuitable contractors	1	2	3	4	5
Inadequate identification and assessment of risk	1	2	3	4	5
Inappropriate allocation of finances	1	2	3	4	5
Poor choice of site	1	2	3	4	5
Technical faults in building design	1	2	3	4	5
Non-compliance with legislation	1	2	3	4	5

Work Organisation and Management Factors	To a very large degree				
	Not at all	To a slight degree	To some degree	To a large degree	To a very large degree
Inadequate planning of construction work	1	2	3	4	5
Lack of safe systems	1	2	3	4	5
PPE deficiency	1	2	3	4	5
Inadequate responses to previous incidents	1	2	3	4	5
Poor supervision of operatives	1	2	3	4	5
Lack of feedback on work performance	1	2	3	4	5
Lack of training (e.g. task, health and safety)	1	2	3	4	5
Poor health and safety culture	1	2	3	4	5

Task Factors	To a very large degree				
	Not at all	To a slight degree	To some degree	To a large degree	To a very large degree
High workload of all personnel	1	2	3	4	5
Poor tools and equipment	1	2	3	4	5
Noisy and unpleasant working conditions	1	2	3	4	5
Illogical design of equipment and instruments	1	2	3	4	5
Missing or unclear instructions	1	2	3	4	5

Individual Factors

(All personnel involved throughout the project lifecycle)	Not at all	To a slight degree	To some degree	To a large degree	To a very large degree
Monotony or boredom	1	2	3	4	5
Tiredness	1	2	3	4	5
Low skill and competence levels	1	2	3	4	5
Failure to recognise danger or carelessness on the part of the employees	1	2	3	4	5
Individual medical problems	1	2	3	4	5
The demands of the job are not familiar	1	2	3	4	5
Attitude to risk	1	2	3	4	5

Please add any comments

Appendix 2. The focus group rating scales
Mean results and Standard deviations

	Client team (N=5)	Senior Manager (N=5)	Site Managers (N=6)	Operatives large site (N=7)	Operatives small site (N=6)	Safety personnel (N=7)	Mixed group (N=5)
Inexperienced client	3 (0.45)	4 (0.45)	3 (0.55)	2 (1.14)	2 (0.55)	4 (0.76)	3 (1.30)
Unsuitable contractors	4 (0.82)	5 (0.45)	4 (1.17)	2 (0.89)	3 (1.21)	4 (0.49)	3 (1.10)
Inadequate identification and assessment of risk	4 (0.89)	4 (0.89)	4 (0.75)	3 (1.58)	3 (1.41)	4 (0.49)	3 (1.10)
Inappropriate allocation of finances	4 (0.45)	3 (0.55)	4 (1.05)	3 (1.10)	3 (1.58)	4 (1.13)	4 (1.14)
Poor choice of site	3 (0.00)	3 (0.55)	2 (0.55)	2 (1.41)	2 (1.00)	3 (0.38)	2 (0.84)
Technical faults in building design	2 (0.55)	4 (1.14)	3 (0.52)	2 (1.10)	3 (1.05)	3 (1.11)	3 (0.84)
Non-compliance with legislation	4 (0.55)	3 (0.89)	3 (1.10)	2 (0.50)	3 (1.33)	4 (0.82)	4 (0.84)

Table 77. Project concept, design and procurement – Mean values (standard deviation in brackets)

	Client team (N=5)	Senior Manager (N=5)	Site Managers (N=6)	Operatives large site (N=7)	Operatives small site (N=6)	Safety personnel (N=7)	Mixed group (N=5)
Inadequate planning of construction work	4 (0.55)	4 (0.55)	3 (1.21)	3 (0.71)	3 (1)	4 (0.8)	4 (0)
Lack of safe systems	4 (0.89)	5 (0.55)	4 (0.89)	3 (0.84)	3 (1.51)	4 (0.9)	4 (0.45)
PPE deficiency	2 (0.45)	4 (1.52)	4 (0.84)	2 (1.10)	3 (1.22)	3 (0.5)	3 (1.41)
Inadequate responses to previous incidents	3 (0.89)	3 (0.45)	3 (0.63)	3 (1.10)	3 (1.26)	4 (0.0)	4 (0.89)
Poor supervision of operatives	4 (0.55)	4 (0.84)	4 (0.00)	3 (1.79)	3 (1.26)	5 (0.5)	3 (1.48)
Lack of feedback on work performance	2 (0.55)	3 (1.14)	3 (0.75)	3 (1.30)	3 (0.84)	4 (0.8)	4 (1.29)
Lack of training (e.g. task, health and safety)	4 (0.71)	4 (0.84)	4 (0.98)	4 (1.29)	4 (0.75)	4 (0.6)	4 (1.10)
Poor health and safety culture	4 (0.84)	5 (0.55)	4 (0.84)	3 (1.14)	3 (0.84)	4 (0.5)	4 (1.00)

Table 78. Work organisation and management – Mean values (standard deviation in brackets)

	Client team (N=5)	Senior Manager (N=5)	Site Managers (N=6)	Operatives large site (N=7)	Operatives small site (N=6)	Safety personnel (N=7)	Mixed group (N=5)
High workload of all personnel	3 (0.71)	4 (0.89)	3 (0.52)	4 (0.71)	3 (0.52)	4 (0.7)	(1.14)
Poor tools and equipment	3 (0.84)	3 (1.14)	3 (0.89)	3 (1.14)	3 (1.03)	3 (0.7)	(0.84)
Noisy and unpleasant working conditions	3 (0.84)	3 (0.84)	3 (0.55)	3 (0.89)	3 (1.05)	3 (0.7)	(1.30)
Illogical design of equipment and instruments	2 (0.45)	3 (0.71)	2 (0.82)	3 (0.96)	2 (0.41)	3 (1.1)	(1.14)
Missing or unclear instructions	3 (0)	4 (1.22)	3 (1.03)	3 (1.71)	3 (1.21)	4 (0.8)	(1.10)

Table 79. Task factors – Mean values (standard deviation in brackets)

	Client team (N=5)	Senior Manager (N=5)	Site Managers (N=6)	Operatives large site (N=7)	Operatives small site (N=6)	Safety personnel (N=7)	Mixed group (N=5)
Monotony or boredom	3 (0.55)	3 (1.4)	3 (0.75)	(1.30)	2 (1.51)	2 (0.53)	3 (0.84)
Tiredness	3 (0)	4 (1.0)	3 (0.52)	(1.64)	3 (0.84)	3 (0.82)	3 (1.22)
Low skill and competence levels	4 (0.55)	4 (0.5)	4 (0.63)	(0.45)	4 (0.82)	4 (0.69)	3 (1.64)
Failure to recognise danger or carelessness on the part of the employees	4 (0.84)	5 (0.4)	4 (1.26)	(0.84)	4 (0.82)	4 (0.79)	4 (0.84)
Individual medical problems	2 (0.45)	2 (0.5)	3 (0.45)	(1.95)	2 (0.89)	3 (0.53)	3 (0.58)
The demands of the job are not familiar	3 (0.71)	4 (0.4)	3 (0.75)	(1.67)	4 (1.05)	3 (0.79)	3 (0.50)
Attitude to risk	4 (0.84)	4 (1.4)	4 (0.75)	(1.00)	4 (0.84)	5 (0.79)	4 (0.84)

Table 80. Individual factors - Mean values (standard deviation in brackets)

Appendix 3. Focus group validation sessions

Each group reflected differently upon each of their sample statements and there were varying interpretations, some of which were a broad interpretation of the subject area. A number of delegates were overseas nationals and some misunderstanding was reported. Nonetheless of the four groups there was overwhelming interest in discussion of the 'design' and 'innovation' categories, at the expense of 'planning' and 'communication' categories. As an aside it was noted that the latter two groups (discussing 'planning' and 'communication') were poorly represented and it is believed that of their participants only one (in 'planning') was a UK national. Inevitably this may just reflect the conference subject and too much inference cannot be made.

Planning issues

'Available site space has become compressed over the years'

The respondents felt that the type of site would affect this, but ultimately yes a compressed site leads to higher safety and health risks.

'Delivery and storage of parts and materials has safety implications'

Respondents agreed. Additional relevant factors were the number of times materials / equipment is moved, the training management, and the equipment used for hazardous substances. It was also noted that planning and scheduling is very difficult and can lead to 'site impacts' (understood to mean risks) if accelerated.

'Actions of Quantity Surveyors and Local Authority Planning Committees can inhibit safety aspects of design'

Respondents were not sure. They reported that a Quantity Surveyor may specify cheaper materials, but specifications should be in place to ensure that quality / safety is not impacted. There were indications that Quantity Surveyors are cost planners and do little surveying. They also stated that Authorities do impact design but questioned whether they impact safety (indirectly) – their actions may even assist. It was suggested that Planning Committee members want to be Architects and designers.

'Designers do not communicate with Planning Supervisors'

Respondents were unsure. They indicated that communication must take place but that it can be limited. The first planning inputs are when the drawings are received, and that time constraints are often imposed by planners.

Communication issues

'Operatives have to improvise when design drawings are wrong'

Respondents agreed. They indicated that stress is an important cause of accidents, that the project time is too short to improvise and that there is a lack of knowledge and that more education is necessary.

'Designers do not understand the business case for safety'

Respondents agreed. They indicated that "beauty" was 'versus' safety, that it is the contractor who has to accommodate problems and not the Architect. The respondents felt that the Principal Contractor does not want to pay for safety.

‘Designers provide inadequate information about health and safety hazards’

Respondents agreed. They indicated that there is no risk assessment. They realise that health and safety costs money, but that designers don’t have the knowledge and these concepts are too abstract for them. However they also felt that designers are skilled and intelligent people who do not design ‘unsafe’ structures, but that they receive a lot of criticisms. The respondents described communication failures and the advantages that could be gained by different disciplines doing risk assessments together.

‘Designers don’t facilitate efficient work by ‘trades’

Respondents agreed, indicating that contractors accommodate this problem.

Innovation issues

‘The use of pre-fabricated parts impedes designing for safety ‘

Respondents disagreed, indicating that they reduce work at height, reduce on-site construction, they contribute towards a controlled environment and offer opportunities for competency. However some drawbacks were acknowledged in that they can increase the number of interfaces, can contribute towards loss of ownership and control and can impede design changes.

‘Clients will not bear the costs of design innovations that improve safety ‘

Respondents both agreed and disagreed. They reported that ultimately clients pay for everything, but that some clients are not interested in increasing costs, that clients vary and that some are more informed than others. They felt that innovation increases costs at the start of the project and that these need to be costed properly. They indicated that there is a difference between public and private clients and that ‘political and cultural’ issues should be acknowledged too.

‘When designers do consider safety this can actually reduce operatives ability to work efficiently and safely’

Respondents disagreed, reporting that efficiency may only be affected initially and that the number of operatives may be reduced. They urged the importance of appointing the ‘right’ people and obtaining sufficient detail for every project. There were also inferences that communication and work study would be important issues here too.

‘Audit / review of design is inadequate

Respondents agreed, indicating that sometimes the wrong people are undertaking present audits and that historically there are inadequacies in detail, frequency, cost and communication with designers. Some companies have Quality Assurance systems and, to sign off the project, health and safety has to be considered within the design review. The value of using a 3rd party for successful audit was also noted, as were publicity of lessons to be learnt and review whilst work is in progress rather than at the end of the project.

Design issues

Respondents did not indicate agreement or not, but undertook useful discussion on problem management. An overview of their responses are given below.

‘Insufficient thought is given to the access requirements for service installations’

Important considerations: Client and designer communications; lifecycle costs from erection through to maintenance (to be included in a risk assessment and in the health and safety file), raising client awareness concerning design issues and undertaking a construction risk assessment. The group also noted that short schedule projects have short-sighted engineering and better contractual relationships promote safety and maintainability.

‘Component specifications (weight / dimensions) are not considered in building design’
Respondents indicated that heavy building blocks are a problem and that they need to be designed out.

‘Design modifications cause safety hazards’
Respondents indicated that insufficient design causes hazards on site and that modifications decided on site can be hazardous. The group indicated that some believe in segregation between design and construction and that some find safety in combining these. Changes, which take into account hazards in construction, can be acceptably safe.

‘A desire for aesthetics compromises safety’
The group reported that aesthetics do not necessarily compromise safety but also that the pursuit of aesthetics does not always address the safety considerations.

Results – Second validation session

To ensure that there was a balance in the numbers of participants discussing each of the issues, the group participants were pre-determined by the researchers. This was undertaken on an ad hoc basis and no discipline: subject area distinction was made. All participants were UK based and practising in the field.

Method Statements

‘Method statements accommodate rather than address risk’
Respondents did not state agreement / disagreement. They described hugely variable quality of method statements which are not finished off properly for end stage users. They also described problems with generic production and indicated that there may be some conflict in the quality assurance: safety response.

‘Operatives are not consulted about method statement content’
Respondents strongly agreed. They indicated that there may be some loss of face for managers to consult operatives and that this had follow-through implications to instruction and training.

‘Method statements are treated as a meaningless ritual’
Respondents agreed and questioned whether anything tangible ended up on site at risk level? They described them as an office based paper response (at start-up) created by non-site personnel (loss of hands-on experience). Tight programmes contributed to the problems and too many are required. People taking risks are not supported in decisions taken by risk managers.

‘Method statements do no more than describe tasks’

Respondents neither agreed nor disagreed and reported variable experiences. They felt that poor processing would be a result of poor principal contractors.

This group also offered some suggestions to remedy some of the problems recounted. These included brevity (to the point); concentration on novel or higher risks; that there should be some combination or reflection of the risk assessment process; that (with correctly chosen media) there should be involvement / communication with operatives; that there should be effective SMS request, review and approval of the procedure; that there should be an injection of training and support for managers and that there should be clarity of purpose over SMS in the (CDM) 'plan' review phase.

A seminar discussion ensued. It was noted that method statements are often divorced from the risk assessment process and that there is still confusion as to what method statements actually are. Safety should not be seen in isolation and should be integrated into the work process. It was noted that the media for communication with operatives requires careful consideration and consultation - as does support for training at a senior level.

Work scheduling

'Early completion ensures competitive advantage for future work'

Respondents disagreed. They felt that this was not just a contractor issue, that it is influenced by the client / designer and is a project procurement / management issue. They felt that competitive advantage cannot be obtained without proper planning and thus there should be more dependence on quality and finishing on time, rather aiming for early completion.

'Slippage of time schedule reduces availability of correct tools and equipment'

Respondents disagreed. They felt that this only occurred if equipment availability is limited or if the budget is used up. They also indicated that there could also be a tool / equipment surplus as a result of time schedule slippage.

'Increased use of sub-contractors = Increased time pressure'

Respondents agreed. They reported the consequences of increased induction, contractual problems and trade overlaps. Despite the pre-qualification process the sub-contractor skill level may not be known.

'Shortcuts are necessary to complete a contract on time'

Respondents disagreed. They felt that the problem reflected ineffective management, unrealistic planning, design problems and changes (in design and schedule?).

Supervision and training

'Managers use training certificates to protect themselves'

Respondents agreed. They indicated that although training certificates are a starting point for competence they do not always related to the type of work at hand.

'Modern day apprenticeships are inadequate'

Respondents agreed strongly. They are not tailored towards specific trades (especially 'fitter') and there are now shorter and less demanding courses. Young people (16 / 17 years) are not prepared to start work on the low salary (lack of interest?) and there is fragmentation within the industry, meaning that there is no continuity. There are also governmental issues such as lack of support and leadership. There was criticism of the NVQ system and a reinforcement of the need for on-site training. They also criticised the CITB scheme (CSCS) as there were indications that computer literacy would be required for this and that target operatives would not have these skills.

'Foremen are not as good as they used to be'

Respondents agreed but indicated that there are still some good foremen. They felt that the problems associated with this were commercial pressure to deliver and inadequacies in time to supervise safely. The group questioned the skill base of foremen – 'do they know what they are doing?'

'Supervisors don't encourage operatives / trades to organise their work amongst themselves'

Respondents agreed. They reported that the lack of effective supervision creates an unsafe culture and environment and that trades start to do their own thing. They also

indicated that commercial constraints at the tender stage do not allow for adequate resources.

Payment issues

'Fixed rate pay and shortcuts go together'

Respondents did not state agreement or disagreement. They felt that there were more issues such as bonus, reward, praise, peer pressure (in terms of machoism and from the foreman perhaps according to progress with the work schedule) and that it is human nature 'to make life easy'.

'Pay should be related to the experience of the operatives'

Respondents disagreed. They felt that it should be related to competence and that there should be a rate for a 'grade'. Entry to the grade should be determinable by competence (but that this was difficult to do).

'Exceeding a work target is valued'

Respondents agreed but felt that there were more issues (such as how and why) that needed to be asked. They indicated that 'a blind eye can be turned if there is no blood on the carpet' and that it would be necessary to identify whether the target was correctly set initially. They felt that those undertaking supervision do not enquire as they might be 'frightened of the answer'.

'Procedures are ignored for financial gain'

Respondents generally disagreed but indicated that it may be so at bonus level. Additionally ease, speed and ignorance were likely to be more frequent causes.

Participants from the seminar discussed some of the points raised. They indicated that payment is a management and design office issue. Managers' achievement of targets is also judged by Senior Managers and it was indicated that nobody wants to address the problem of short-cuts too much as this would also require identification of how someone could have got away with it for so long.

Appendix 4. Conference paper

In Designing for Safety and Health, Gibb, A.G.F. (ed.) Proceedings of the ECI/CIB/HSE International Conference, London, European Construction Institute, Loughborough, June 2000, pp 45-52, ECI publication TF005/4, ISBN 1 873844 48 4.

BY ACCIDENT OR DESIGN? CAUSAL FACTORS IN CONSTRUCTION INDUSTRY ACCIDENTS

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ABSTRACT

A three-year multi-disciplinary HSE funded research project has recently commenced, with the main element of work entailing detailed studies of one hundred construction accidents. In order to develop the study methodology, a series of focus groups are being undertaken with a range of employees in the construction industry. This will reveal the perspective or viewpoint from each group within which discussion takes place; data likely to be unavailable through other published resources. Preliminary analysis of focus groups already undertaken indicates that, where participants discussed design, the role of the 'design team' was very much viewed from the concept of practical application of design, rather than a formal appraisal of the merits (or otherwise) of the technical design aspects. The results indicate that although there are failures in the technical features of design, these problems are inherently related to planning and organisational issues. To see design as an entirely technical matter is misleading and a more comprehensive and flexible approach seems desirable.

Keywords: Focus groups, design, planning, communication

INTRODUCTION

It is encouraging that annually published health and safety statistics (HSC, 1999) show a steady decrease in fatality and injury rates since 1996/7. However, the decrease in injury rates may in fact mirror a substantial increase in numbers employed in the construction sector, affecting the statistics. In reality the actual number of major injuries continues to increase, along with the considerable costs that these incur to individuals, employers and society as a whole (HSE, 1999a).

There appears to be acknowledgement of the problem within the industry yet even recently published research concerning accident causation continues to concentrate upon site-based issues such as unsafe conditions or accident inducing worker actions (e.g. Abdelhamid et al, 2000). Whilst the contribution of these factors is undisputed, previous and ongoing research (Whittington et al, 1992, Suraji et al, 2000, submitted for publication to the ASCE Journal of Construction Engineering & Management) indicates a much wider range of interactive and causal factors - especially those with their origin much earlier in the project lifecycle. These include aspects relating to the project concept and design, and general client responsibilities, which may contribute towards accident causation later in the construction process.

Project overview

A three-year multi-disciplinary HSE funded research project has recently commenced, with the main element of the work entailing detailed studies of one hundred construction accidents. These will be undertaken as soon as possible after each accident occurs, and will address the life-cycle factors identified in the Whittington and Suraji research.

The intention is to document the range of contributory design, managerial, site and individual factors implicated in accidents. It is anticipated that the results might also contribute towards development of an industry standard for accident investigation or recording and provide guidance on the better use of accident data.

In order to develop the methodology for the accident studies, initial preparatory work is in progress, and includes a detailed appraisal of existing research and database resources. There is a strong foundation of industrial co-operation and commitment to the project. Importantly, we are drawing upon knowledge and experiences from industrial practitioners to develop the accident study methods, a series of focus groups forming part of this.

FOCUS GROUPS

A focus group is a 'moderator' led discussion. Topics for discussion are gradually introduced to a group of participants and though the moderator may guide and prompt the discussions, their role is predominately passive. This enables participants to explore and consider the issues among themselves, with the ensuing discussions forming the data for analysis.

Aims

The aim of the focus groups was to gain a perspective or viewpoint from the group involved in the discussion; data likely to be unavailable through other published resources. The information provides an insight into current feelings within industry,

and allows critical appraisal of previous research. This data will enable us to develop our study strategy and investigation protocol.

Selection of participants

Seven focus groups are scheduled, with five to eight representatives of employees from a hierarchical stratum in the construction process. The groups selected are client team, senior managers, site managers, operators (from large and small sites) and safety personnel. A mixed discipline group is also included.

Development of the discussion resources

A standard classification of factors involved in safety was selected, to form three categories for discussion – ‘organisation and management issues, task factors and individual factors’ (HSE, 1999b). These can be applied in any work situation yet, to attribute due emphasis to construction project concept and planning, an additional factor – ‘project, concept, design and procurement’ was also added. Under each of these headings, example topics were drawn from previous research findings, and presented as bullet-point items. An example is given below:

“Project concept, design and procurement – what are your feelings or experiences or thoughts on how safety can fail in the early stages of a project? The following prompts might guide you, but mention other things as appropriate”

- | | | |
|-----------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On
Flipchart | { | <ul style="list-style-type: none">- Client background (their skills and experience)- Selection of design team- Procurement of contractors (eg: price or safety history)- Safety considerations (risk assessment, safety management)- Allocation of resources (financial, skills of involved party's etc.)- Legislation (enhances or hinders)- Strategic design considerations |
|-----------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

A similar style was developed for the other three discussion categories and for these, the design specific prompts related to:- managing design changes of work in progress, issues relating to site layout and design, planning and interacting with the immediate task area and use of equipment and tooling.

Questionnaire

To supplement the discussions, a short anonymous questionnaire was developed. The style was two-fold – firstly some open questions (to allow reiteration or to permit respondents to give a private view on any of the discussion points), and secondly a five point rating scale to gauge attitudes towards the issues discussed. There were 27 factors, of which five design related aspects are reported upon in this paper.

Running the Focus Groups

Our focus groups were planned to comprise between five - eight people and to last for approximately 1 ½ hours. In order to ensure direction to the discussions, participants were asked to concentrate entirely upon safety failures from their own experience.

Progress to date

Four focus groups have currently been undertaken – the mixed group, safety professionals, senior managers, and operatives from a large site. It is expected that the remaining three will be undertaken shortly and that the results may be incorporated into discussions at the conference.

RESULTS

Preliminary analysis indicates that, where participants discussed design, the role of the ‘design team’ was very much viewed from the concept of practical application of design, rather than a formal appraisal of the merits (or otherwise) of technical design aspects.

Points which participants mentioned most were categorised by the researchers as being issues relating to inadequacies in design, planning and communication between disciplines. To a lesser extent, aspects relating to legislative compliance and design innovation were also discussed.

The following are example comments compiled from the discussions. Comments are deliberately not attributed to any particular focus group.

Inadequacies in design

- Compatibility of item parts not considered - for example compatibility of item weights with available lifting gear
- Tenders are made on the basis of design drawings, but if they are later found to be wrong, it is rarely possible to change the funding / work schedule – this can lead to short-cuts and subsequent higher risk of accidents
- Design modifications of work in progress are not comprehensively considered in the context of the whole design
- Designers do not consider maintenance (an example comment relevant to this was where a participant reported that maintenance to windows on a particular tower block was only possible from outside, as the windows do not open inwards. Therefore, they had to put up a scaffold every time work was required – costing thousands. Had the windows opened inwards it would have been easy and cheap to maintain).

Inadequacies in planning

- Planners just focus on the task, not site layout issues and related aspects such as traffic management
- Roads get put in at the end, why not the beginning?
- Just in time is not considered and parts delivery and storage can exacerbate problems with layout and task area design
- Designers miss things and, as they are not site-based, site personnel have to ad lib to get around design problems.

Communication issues

- People are too nice to clients
- Quantity Surveying can ruin good things from design
- The industry practice is to blame everybody else for problems

- The tender document and pre-tender health and safety plan often have a number of meaningless statements in them. A typical statement was recalled by a participant “the hazards associated with this project are not beyond the competence of a capable contractor to control. If the contractor should find any hazardous material he should notify the client and the client will then give direction of what should be done”. The participant reported, however, that they are in fact never notified by the designer team as to what the project hazards are, as ought to happen under CDM.

Legislatory related issues

- The Planning Supervisor has insufficient authority to ensure that the designer accounts for CDM responsibilities.
- Designers did not want CDM – they are now starting to think about safety, but not health
- People do not understand the legislation and blame the HSE
- CDM regulations are a paperwork exercise and do not enhance health and safety

Design innovation

- The HSE are urging for innovation to improve design factors, but this responsibility has fallen onto the shoulders of contractors and not the client team
- Nobody is really taking a lead with innovation
- More things now get made in factories (as it has become more difficult to get skilled trade-people on site) and this can inhibit good design.

It should also be noted that there were a number of under-current comments that revealed that some participants regard designers and Quantity Surveyors as distanced from site and safety issues. This was in terms of demonstrating an understanding of their responsibilities or commitment to health and safety, and also in respect of being a continuous contributor to the site once it is in the build and development stage.

Questionnaire responses

Participants were asked to rate the degree to which a number of factors might contribute towards accident causation. The rating scale permitted any of five possible responses for each factor, ranging from ‘not at all’ to ‘to a very large degree’. Some comparison can be made with these responses and the focus group data, although the strength of feeling (indicated by the number of comments) may alter as data from the outstanding focus groups is incorporated.

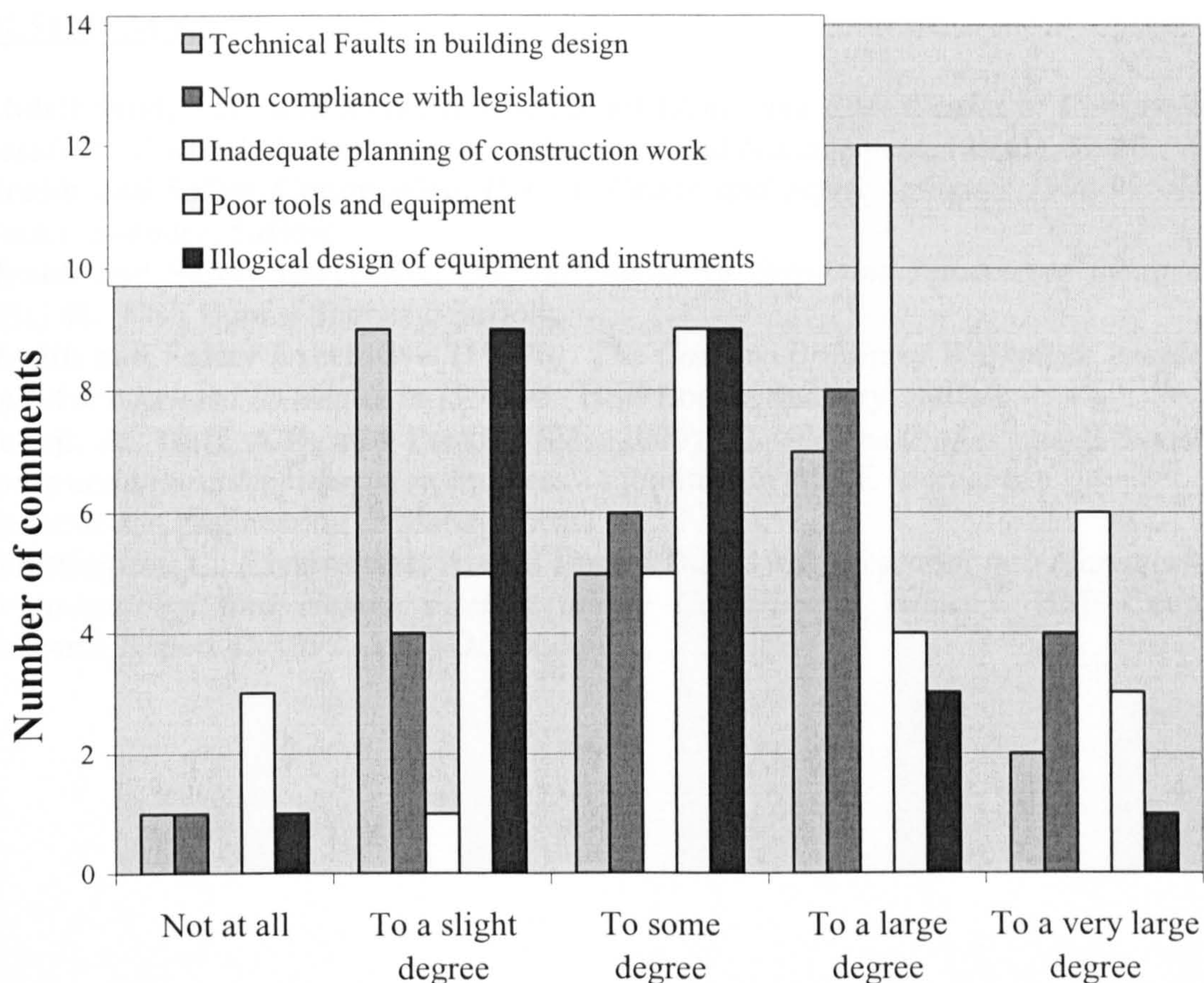


Figure 1: Participant's opinion of the degree of contribution of design factors in accident causation

CONCLUDING REMARKS

The data analysis that has been undertaken so far indicates that, although there are failures in the technical features of design, these problems are inherently related to planning and organisational issues. To see design as an entirely technical issue is misleading and a more comprehensive and flexible approach seems desirable.

The need for improvement in communication between different disciplines has been highlighted. Likewise the development of the public profile and accessibility of designers to site staff also appears overdue. An undercurrent blame culture (attributed here to designers, but overall aimed towards a range of different disciplines) was detected. At the very least this indicates a need to enhance the understanding of professional skills and responsibilities among those employed in the industry.

POST SCRIPT

It is expected that the remainder of the focus groups will be completed shortly. This should allow more detailed data analysis and is likely to offer a greater indication of strength or weaknesses in the comments made.

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Appendix 5. Conference paper

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USING FOCUS GROUP DATA TO INFORM DEVELOPMENT OF AN ACCIDENT STUDY METHOD FOR THE CONSTRUCTION INDUSTRY

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A major study of accident causality in the construction industry is underway. In order to develop and enrich the study methodology, a series of focus groups with a range of industrial practitioners has been undertaken. Seven focus groups, each including either safety professionals or industrialists involved at client level, senior and site management, and operative grades, were conducted. Participants concentrated on failure occurrence in four discussion areas (1) Project concept, design and procurement, (2) Work organisation and management, (3) Task factors and (4) Individual issues. Among the large quantity of anecdotal material generated a number of themes arose repeatedly. It appears that problems may exist relating to financing and pay; work planning, scheduling and management related issues; difficulties with information transfer; and inconsistencies or inadequacies at a role based level.

Introduction

The construction industry is one of the most hazardous employment sectors in the United Kingdom, with the HSE reporting that construction industry injury rates are among the highest for both fatal and major injuries (HSC, 1999). Existing data and research do not give a conclusive picture of causative factors in construction accidents especially given problems with inadequate data collation, over concentration of interpretation at accident event level (Whittington et al, 1992) and under-reporting (Gyi et al, 1999, HSC, 1999).

Focus groups have been used as a preliminary data collection method to develop the study method for research, which ultimately will entail detailed studies of 100 construction industry accidents. The study method requires careful planning: the construction industry is highly complex by virtue of the development process, and the levels of management and chains of consultation, which are inherent from the initial project concept through to the build process. Whittington et al (1992) identified failure according to three factors: issues relating to headquarter responsibilities, site management, and the injured party or immediate work colleagues. An especially important outcome of this research was the identification of contributing factors that are distal from the site-based issues. More recently, Suraji et al., (2000, in press) has developed a theoretical model, the 'Constraint-response model of accident

causation’, which enhances further the distal factor contribution that may be incurred throughout the developmental and build process.

Despite the valuable contribution of the Whittington et al and Suraji et al research, there is little up to date material available that has incorporated consultation with industrial practitioners concerning their perceptions of accident causality. This is especially relevant given significant post 1992 legislative changes (in both general health and safety and construction related aspects), and of the development of initiatives to improve performance, quality and efficiency (Department of the Environment, Transport and the Regions, 1998). Focus groups were selected for this preliminary study as a data collection method that would permit greatest access to practitioner perspectives and viewpoints.

Focus group methodology

Development of discussion materials

HSE classifications of immediate and underlying causes in accidents (HSE,1997) were adopted as main discussion themes. Additionally, a supplementary classification was developed, addressing the early stage concept and development phases, which are unique to the construction industry. Prompts to stimulate discussion were also prepared for each discussion area (but not reproduced here) by allocating key points from the Suraji and Whittington research to the four chosen discussion areas:

- Discussion Area One - Project concept, design and procurement
- Discussion Area Two - Work organisation and management
- Discussion Area Three - Task factors
- Discussion Area Four - Individual factors

Focus Group Participants

All groups had between 5 and 7 participants and composition is shown in Table 1. Groups One and Three varied from that intended, mostly due to the practicalities of recruiting participants. Minimal changes were made after the pilot study and thus the data from this ‘mixed group’ was retained for inclusion with the final data set.

Table 1. Focus Group participants

Group	Employment	Target participants
One	Client team	Clients or client representative, Architect, Engineer (Structural / Civil or Mechanical / Electrical), Financial Manager, Project Manager or Design Manager and a Planning Supervisor
Two	Senior managers	From General and specialist contractor firms representing civil engineering, major building or the residential sectors and from small and large projects
Three	Site Managers	
Four	Operatives large site	Tradesmen or general operatives
Five	Operatives small site	
Six	Safety professionals	Industrial safety professionals and Construction Enforcement Officers
Seven	Mixed group (pilot)	A mixed discipline group (trades and professionals)

Focus group procedure and analysis

Each group was scheduled for 90 minutes with time allocations (used flexibly) to ensure that all discussion areas were addressed. The group moderators introduced the prompts prior to each of the discussions, and participants were encouraged to explore beyond the themes introduced. With each prompt, participants were asked to consider “where does failure occur?” and “why

do accidents still happen?". All discussions were audio taped and an abridged transcription was made for each focus group. Analysis included an intermediate summarisation of all text into short bullet point statements per group, followed later by comparison and categorisation of all focus group information according to the discussion area headings provided. Findings have been since been reviewed by industrialists as part of the validation process.

Results

Project Concept, Design and Procurement

Participants were often very negative about clients who procure construction work, excepting larger, high-tech organisations such as within the petro-chemical, oil, nuclear and (to a certain extent) retail industries. These companies were often seen as more responsible, although alternatively 'larger' companies were also portrayed as arrogant risk takers, with little interest in the build process. They were also described as ignorant of certain areas of the process, such as their legislative responsibilities under the Construction (Design and Management) Regulations 1994 (CDM), which includes aspects such as the appointment of a Planning Supervisor and ensuring the competency of those that they appoint. Clients were also seen as ignorant of the benefits that can be gained from safety innovations. It was suggested that fear of prosecution acts as their main driver to influence safety considerations.

The desire to maintain a high public profile was reported, yet construction personnel, felt that this resulted in reduced time schedules for the build process, reduced site area, and an increased demand to undertake weekend and night work. The general opinion seemed to be that client pressures and inflexibility causes time and output pressure, while perpetual cost cutting induces a compromise of safe working methods.

The design process itself was the subject of many criticisms, directed towards the use of incorrect or outdated drawings and inadequate provision for safety in the design process. Client team professionals, especially Designers and Architects, were seen as distant from site issues and unaware of or uneducated in their legislative responsibilities under CDM, and of their own impact upon health and safety issues.

Lack of appropriate audit and poor innovation in design were considered as shortcomings. Some saw the advantages of increased use of pre-finished components, which permit greater speed in the build process and compensate for site based skills shortages. These were also seen in a more negative light however; an example, involving timber trusses, revealed that manufacturers are reluctant to alter their designs even when possibilities for improvement have been identified. There are a variety of construction management styles, with participants showing preference for a contractor - client alliance, which encourages practical design reviews.

The procurement process, and especially the selection of contractors, was also criticised. Prominent among points raised was the perceived extreme price competition among contractors in tendering (and hence the apparent advantage of firms who inadequately cost safety), and also in ritualisation that has developed in preparing 'paperwork', such as the pre-tender questionnaire and Health and Safety Plan. These were seen often as time wasting generic materials which offer minimal value to the client in their decision making.

Work Organisation and Management

The quality of Method Statements, procedures and general planning issues occupied a considerable proportion of the discussion time. Firstly, it was thought that although Method Statements may provide a 'task breakdown' (although the task analyses may be inadequately considered from an ergonomics perspective) they do not necessarily provide adequate procedural information. It was suggested that Method Statements are invariably prepared as an office-based exercise, using generic texts and with little consultation among practitioners or understanding of the practicalities of their work. It was reported that operatives do not necessarily see, read or understand the Method Statements, although their non-use was

attributed both to habitual practice and a desire to short-cut and make financial gain. Procedural violations were seen as insidious and tolerated, reflecting a wider malaise on site.

Participants described problems with the constant revision of work schedules. Changes to work in progress also contribute to planning problems, arising from modifications in areas such as design, scheduling, as a result of transport and delivery problems, or as a result of weather conditions. The consequences of planning problems were described as trade overlap (and loss of work sequence), work back log, taking short-cuts, and the generation of time pressure – all of which were felt to contribute to risk circumstances.

A number of criticisms were made regarding the move from direct labour towards lengthy chains of sub-contractors. Sub-contractors, and especially those most distal in the chain from Principal Contractors, were seen as distanced from responsibility, often inadequately supervised, and ignorant of and not committed to the common responsibilities of the site.

A range of other comments were offered, again recounting the shortcomings in performance, or circumstances which can have a negative impact upon the performances, of personnel involved in work organisation at site level. Time pressures upon and poor availability of competent foremen were cited especially frequently.

Task factors

The selection of correct tools, materials and equipment received a number of comments, with these appearing to be influenced by availability and work scheduling factors. Although it was generally acknowledged that tools are often good and new to each site, it was suggested that their selection is too cost motivated and that they are not always freely available. There were some concerns about the unknown quality of equipment that is used by sub-contractors, inadequate maintenance and the use of multi-functional equipment.

Participants also discussed the use of personal protective equipment (PPE). It was indicated that availability is plentiful among larger companies, but may be less so or absent among smaller companies. It was indicated that those advocating the use of PPE do not adequately appreciate the considerable loss of mobility and comfort through its wear. PPE seemed to be generally disliked by users and a number of comments were offered suggesting non-use at week-ends (indicating the atmosphere to be more lax).

Participants described different experiences of supervision, with contradictory observations that there is both more and less supervision nowadays. At site level, the efficiency of supervision was seen to deteriorate with a rise in the volume of sub-contractor labour, yet where supervision was regarded as good, sub-contractors would conform to standard. Communication was presented as at times inadequate, both within a same status team, and hierarchically through different grades.

Small jobs, isolated work or short term contracts were seen as those where least forethought is given, and with safety factors more likely to be considered on an ad hoc basis or at an individual level only. It was noted that setting up safely and waiting for arrival of and use of safety equipment can take longer than the job itself and that duration of exposure to a 'risk' influences an individual's choice of safe working methods.

A number of different criticisms about training were mentioned and the first of these concerned the inadequate content and evaluation of site-induction. Likewise, training is often inappropriately seen as a response to all problems. It was indicated that there is a shortage of courses, that training is not provided consistently (absence of manual handling training for labourers for example) and that the training content pays insufficient attention to the development of practical skills. The lack of practical field skills was thought especially important. In this respect, problems were mentioned with one day training courses that provide a certificate of competence, with the recipient expected to display a wide range of skills from a very early stage.

Work load and time pressures, revised work patterns and long hours culture (and consequent disruption to domestic life and lengthy travel time) were reported to be prevalent in the industry. Additionally, there has also been an increase in the introduction of weekend, night

and block work by clients – with resulting fatigue considered to compromise safety, decision-making and productivity.

The implications of payment methods upon performance, quality and efficiency were mentioned on numerous occasions. There are reportedly no longer any fixed wages for trades people, as all work is now target or bonus related. Financial expectations are high and exceeding the work target and increasing bonus related pay is considered essential for income and the prime incentive for operatives. Bonus pay may be safety-related, but it seems that most often bonus pay is solely related to task performance.

Individual factors

The discussions indicated that there is a trend towards increased reliance on young and inexperienced employees on sites, raising particular concern about early responsibility and use of dangerous equipment by young workers. Young people were described as more safety conscious and more likely to follow work instructions, but were reported to experience a high accident rate, especially within their first week of appointment. The verification of 'experience' seems especially difficult and it was discussed that there are problems with people with inadequate skills presenting themselves as a skilled trades person. Concern was also voiced about the appointment of trades people from outside the industry and reservations about the transferability of their skills onto site and the verification of competency.

Although experienced workers were described as having fewer accidents, experience was also seen to have a negative side. The range of problems associated with experience was noted as work fatigue, over-familiarity and over-confidence, complacency, omission of or low safety awareness, and difficulties in changing work techniques. A number of comments were made by participants, which revealed the presence of a fatalistic approach to accidents – with luck and chance seen to have a considerable contributory role.

More broadly, varying views and differing perspectives with respect to general health status were noted, with reports of considerable health problems among construction workers. It was reported that light work may be possible for injured employees, but that dismissal is sometimes the alternative. The general impression from participants was that ill health and health-related issues (especially slowly developing health issues) are under-appreciated in the industry and that an increase in the extent of litigious action is anticipated in the future. Limited health assessment occurs reportedly, but is hampered by the high mobility of the workforce.

Conclusion

The focus group discussions have provided a rich source of data with which to supplement existing materials and develop the accident study method. In particular there were repeated references to four specific themes across the discussion areas: financing and pay related issues, work planning scheduling and management aspects, problems with information transfer, and inconsistencies or inadequacies at a role based level. Whilst judgement has not been passed upon whether views presented by group participants are right or wrong (it is possible that in some respects focus group participants may be factually incorrect or hold opinions with which others disagree) the areas where dissatisfaction has been shown will be used to lead the future enquiry.

Acknowledgement

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Appendix 6. Data collection proformas

Proforma 1 - Accident notification

Contact person name	Telephone & fax number	Email	Site / contact address
Avoiding overlap with HSE investigation			
Was the accident reportable?	Yes/No*	We wish to avoid overlap with ongoing HSE involvement. If you have answered 'YES' to any of these questions, please contact us before completing the remainder of the questionnaire.	
Has HSE been notified (if applicable)?	Yes/No*		
Has any HSE investigation begun?	Yes/No*		
About the accident – duplicate the record from the accident book *			
<div>Who (discipline) made the entry: *</div>			
Details of incident conditions			
<div>Job title of IP - Time, month and day of week – Task / activity – Tools / materials / equipment – Environment – (conditions of light, noise, temperature etc.) Site location – (Level / area)</div>			
Build data			
<div>Contract type – (Design & build , Construction management etc.) Project value – Build type and phase* - Principal contractor - Numbers on site – Brown / Greenfield site - Site start and finish dates - Timeliness of build – (late, on-time, ahead etc.)</div>			
<div>*BUILD TYPE Engineering construction Rail and Civil Engineering Major build Residential</div>		<div>PHASE START - Demolition, site clearance, excavation, substructure, drainage, ground- works etc. MIDDLE - Structure, superstructure, cladding END - Finishes, M&E (mechanical and electrical), commissioning, snagging AFTER - Maintenance</div>	

Access to accident involved personnel	
Are operatives from the accident vicinity available for interview?	
Injured party contact details	
How can we get in touch?	
Please provide the hospital contact details or name and address for further contact (Employer, home or new work address)	

Site resources
Can copies of the following resources be provided (anonymise by 'blacking out' any detail such as names etc. if you prefer)
<ul style="list-style-type: none">• The accident report• Method statement• Risk assessment• Site organisational chart• Other relevant procedures / documentation

History of accident victims direct employer / appointer			
Is the employer: - a PC - a major SC - a sub-sub contractor - other	Please specify place in chain	Nature of business / speciality	
Number of employees in company		Who contracted the employing company	
Length of time employing company on this site		Has employing company previously worked with this Principal contractor	
Is there a history of previous related accidents and any subsequent changes?			

Proforma 2 - Accident involved personnel

Accident involved profile:

Job title:	
What does your job entail *	

Accident data

Accident summary: Describe what happened*
What action was taken afterwards to prevent recurrence?

1. Environmental

2.1.1	What were the site conditions at the time of the accident (ie: temp, light, noise, vibration, wet)	
2.1.2	Any measures to compensate for adverse conditions (ie: task lighting / platform etc.)	

2. Task details

2.2.1	What work were you doing (Task description(s))	
2.2.2	Were you undertaking a number of tasks simultaneously - what was the time proportion at each	
2.2.3	Rate difficultness of this task	1(very easy) – 2 (fairly easy) – 3 (average) – 4 (quite difficult) – 5 (very difficult)
2.2.4	Did you have the skill and experience to undertake this task	
2.2.5	When was task training last received & how	
2.2.6	Were there any task interruptions?	
2.2.7	Were there any known risks in task? (e.g. chemical, electrical, mechanical)	

2.2.8	Were there any unusual events or changes (<i>eg. in schedule / design / improvisation</i>)	
2.2.9	Was apprentice training / supervision in progress?	
2.2.10	Was lone or gang work being undertaken	

3. Describe task / work area & interaction

2.3.1	Do you have any comments on height / space / movement / placement aspects for: <ul style="list-style-type: none"> operatives plant & material movement 	
2.3.2	Describe plant / materials / tools / equipment being used:	
2.3.3	Which were your own and which were provided?	
2.3.4*	How do chose your own equipment ? <ul style="list-style-type: none"> * Is there a range available for your work task * Have you always used this product * Has anyone advised you that this is good * Are there specific features that you like 	
2.3.5	Have you ever received instruction / training on the use and maintenance of your own tools	
2.3.6	Do you have any comments upon preferences, quality, maintenance, availability, interface, usability (of plant / materials / tools / equipment)	
2.3.7	Have you had specific information related to what you were using <ul style="list-style-type: none"> Training in use Information from suppliers 	
2.3.8	Do you have any comments on housekeeping: (standards, management, responsibilities for)	(General and at time of accident)
2.3.9	Have you ever reported any problems about your work relevant to this accident?	
2.3.10*	(i) Do you know if anyone else has had a similar accident (ii) What action was taken	

	Comments	
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4. PPE

2.4.1	What protection do you use at work?	
2.4.2	Is it specific for this task	
2.4.3	Who provides this equipment?	
2.4.4	Have you had training in use & care of this equipment?	
2.4.5	Any comments on availability, range for fit and function, comfort, usability, condition, storage, maintenance	

5. Procedures / MS’s / RA’s / (PTW’s)

2.5.1	Were there procedures / instructions for this task?	
2.5.2	Concerning procedures / instructions * How did you learn about these? * When and where did you last view them * Did you read them in detail* * How long did it take*	
2.5.3	Did the procedures / instructions tell you: <ul style="list-style-type: none"> What to do What techniques to use What risks there were 	
2.5.4	How easy were they to understand	1 (very easy) – 2 (fairly easy) – 3 (average) – 4 (quite difficult) – 5 (very difficult)
2.5.5	For your work was the information: <ul style="list-style-type: none"> helpful appropriate 	
2.5.6	Were procedures followed or were other work methods necessary	
	Comments	

6. Work scheduling

2.6.1	How frequently do you do this task?		2.6.2	Did you have sufficient time to do this task?	
2.6.3	How long had you been doing this task before the accident happened?		2.6.4	How long had you been working (general) since your last break?	
2.6.5	When was your last day off work prior to the accident day?				

7. Welfare

2.7.1	Are your breaks adequate?		2.7.2	Are comfort breaks permitted (<i>ie: toilet / drink of water</i>)?	
2.7.3	What do you think of your welfare facilities (<i>ie: food, drink, loos, changing</i>)?				
	Comments				

8. Work organisation

2.8.1	At the time of the accident was there any trade overlap – (<i>ie: yourself and different trades people working together / close by</i>)? <ul style="list-style-type: none">Was this planned / unplannedWere you consulted about this?	
2.8.2	Were your co-workers / other trades people known to you?	
2.8.3	Were adequate personnel available for the task?	
2.8.4	Have there been any recent changes in the way that your work is organised?	
2.8.5	Who sets-up your work arrangements	
2.8.6	Are you consulted / included in discussions about <ul style="list-style-type: none">your work organisationsafety related issues	

2.8.7	Is there a production target to meet? How is it <ul style="list-style-type: none"> determined, overseen rewarded 	
2.8.8	Were there any time / production pressures how from whom	
	Comments	

9. Work pace

2.9.1	How do you decide how to pace your work rate? <ul style="list-style-type: none"> Decide yourself Someone tells you Gang decided together Other 	
2.9.2	Does it make a difference if a gang member is slower / faster than the others?	
	Comments:	

10. Target / Payment issues

2.10.1	What is your payment method <ul style="list-style-type: none"> Fixed wage Priced work (note criteria for this) Pay based on experience or training Other 	
2.10.2	Do you receive any incentives to increase your pay?	
2.10.3	Which payment and or incentive methods do you prefer and why?	
	Comments	

11. Supervision / management

2.11.1	Was the Supervisor or Manager <ul style="list-style-type: none">• Present when the accident occurred OR• When were they last seen prior to the accident?	
2.11.2	Do you think that you were adequately supervised	
2.11.3	Do you know your supervisor well?	
2.11.4	Do you find you Supervisor <ul style="list-style-type: none">• Approachable• Receptive if you wish to report a problem	
	Comments:	

Proforma 3 - Individual details

It would really help us to know more general things about you, as this too will help us to learn more about the people who work in the construction industry and the problems that you face

1. Personal details

3.1.1	Job title				
3.1.2	Gender		3.1.3	Age	
3.1.4	First language & fluencies		3.1.5	Accommodation arrangements during work time (home or away)	
3.1.6	What are the work hours (& breaks) per week + overtime? * for yourself * * others from your company on site *				
3.1.7	Are you able to chose if you do overtime or not?				
3.1.8	How much time off have you had in the past 12 months for? <ul style="list-style-type: none">HolidaysSickness				
3.1.9	Were you paid for these absences?				
3.1.10	Do you do any paid work outside of your job here?				
3.1.11	What are your daily travel times and distances?				

2. Accident history

(Accidentee only) Previous accident dates and consequences:	
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3. Employment history

3.3.1	Are you self-employed, employed by PC / Main sub-Contractor / sub-sub contractor / other?	
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3.3.2	What is your length of service on this site?		3.3.3	What is your length of service with this employer?	
3.3.4	What is your length of service in this job and industry?		3.3.5	Do you have other previous employment? (type & duration)	
3.3.6 *	Do you feel that your employment is secure * With this company *In the industry		3.3.7 *	Do you belong to a trade union? (if so, which)	
3.3.8	Do you feel that you have an appropriate level of responsibility in your work?				
3.3.9	Do you have opportunities to use all your skills and abilities?				

4. Training history

3.4.1	What is the original baseline training that you had for your work? (ie: apprenticeship / professional training)	
3.4.2	In the last 5 years have you attended other shorter (1-2d) training courses? Please record <ul style="list-style-type: none"> Area covered Duration (eg: machine operation, supervisory skills, health and safety)	
3.4.3	What and when was your most advanced training in safety related aspects?	
3.4.4	(This Q not for accidentees) Have you had any training in human capabilities and performance? (and when) [Physical & mental capacities, such as strength, endurance, work over/under load, social factors etc...]	
3.4.5	(Accidentees only) What tool box talks have you have had in the last 3 months?	
3.4.6	Do you consider the training and apprenticeships (and access to these) adequate?	

3.4.7	Concerning site inductions: <ul style="list-style-type: none">• Estimate the number you have had• Do these offer value to you	
3.4.8	How do you perceive the safety culture on this site	
	Comments	

5. Health related issues

(Q's for accident involved personnel only)

3.5.1	For someone of your age, how would you describe your general health?	
3.5.2	Have you suffered or do you have any ongoing health problems <i>(Briefly describe)</i> <ul style="list-style-type: none">• Has this had any implications for your work and how?• Have you sought assistance / advice (what? and from whom?)	

6. Work perception		
3.6.1	What are the best parts of your job	
3.6.2	What are the worst parts of your job	

Below are statements which will help us understand how you perceive your general work situation. Please answer ALL statements and indicate the extent to which you agree or disagree by circling the appropriate number on the scale.

	Completely disagree			Completely agree	
I enjoy my work	1	2	3	4	5
My job meets my expectations	1	2	3	4	5
I can turn to a fellow worker for help when I have a problem	1	2	3	4	5
I get satisfaction from my job	1	2	3	4	5
I like most of my fellow workers	1	2	3	4	5
My job is mentally demanding	1	2	3	4	5
I enjoy the tasks involved in my job	1	2	3	4	5
My fellow workers talk things over with me	1	2	3	4	5
My job involves a great deal of mental concentration	1	2	3	4	5
I am happy with my job	1	2	3	4	5
My job involves a great deal of responsibility	1	2	3	4	5
I would recommend my job and place of work to a friend	1	2	3	4	5
My job causes me worry	1	2	3	4	5
I would chose the same job in the same place again	1	2	3	4	5
My fellow workers accept and support my new ideas	1	2	3	4	5

(Symonds, et al, 1996)

Comments:

FINALLY - Is there anything that you would like to say about your work or workplace or can you suggest how your work or workplace could be improved ? (Record overleaf →)

Proforma 4 - Site Supervisors / Managers / Safety personnel

1. Baseline data

4.1.1	Job title	
	What does your job entail *	
4.1.2	If you have knowledge of the accident, what do you think caused it?	
4.1.3	What action was taken afterwards to prevent recurrence?	

2. The work in progress

4.2.1	Was there anything difficult about this task	
4.2.2	Were there any aspects concerning tools, equipment or materials that made this task difficult	

3. Managing design revision (as appropriate)

4.3.1	Were there any recent design revisions relevant to the work in progress? <ul style="list-style-type: none">• Temporary works• Permanent works• Other	
4.3.2	If you were required to make the above design revisions how did you handle this? <i>(ie: procedures used and disciplines involved)</i>	
4.3.3	Were there any problems with getting design drawings revised	
4.3.4	Were site staff involved in revision of design drawings <i>(ie: record relevant disciplines)</i>	

5. Scheduling the work

4.5.1	If there were any delays what caused them? (eg: starting the task, the schedule or work in progress),	
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4.5.2	Were the skilled people required for the accident task available when you needed them?	
4.5.3	Did any unexpected work have to be absorbed into the existing work schedule	
4.5.4	Were there any unplanned changes? (eg: in work sequence, trade overlap* etc.)	

* trade overlap – two or more trades in the same work area simultaneously

6. Organising the work

4.6.1	In general, how do you assess the competence of new starters?	
4.6.2 *	(i) Do you do anything to ensure health status of new starters (ii) Do you offer any health surveillance for your operatives	
4.6.3 *	Are the operatives employed or self-employed to your company	
4.6.4	Do you discuss trade overlap directly with the trades themselves?	
4.6.5	What arrangements are there for worker consultation or liaison with: <ul style="list-style-type: none"> Trade Unions Safety representatives 	
4.6.6	In planning team work, do you have any criteria for putting together your choice of people into a gang? (eg: previous knowledge of character, performance etc.)	
4.6.7	Were you able to meet these criteria when putting together the gang in the accident?	NEW Q – put in since our meeting
4.6.8	Have you ever felt pressured to proceed without the correct materials or equipment?	

4.6.9	If you organise sub-contracting, how do you identify when you need to do this?	
4.6.10	For the accident task were / are any of the SC skills available among your own operatives?	
4.6.11	How have you co-ordinated activities and communication among the contractors	
4.6.12	How have you ensured compliance with the site rules and H&S plan	
4.6.13	How did you provide training and information on risks to: <ul style="list-style-type: none"> Contractors Operatives 	
4.6.14	(i) Does your appointment specify any responsibilities for the H&S of people you oversee? (ii) Are there any written standards / instructions for you to follow? (iii) If so, is your performance in achieving these ever reviewed?	

7. Work pace

4.7.1	Do you do anything to motivate your operatives to increase productivity?	
4.7.2	How do you ensure that this does not compromise safety?	
4.7.3	If there were time pressures at the time of the accident were there any consequences to this?	
4.7.4	Is there any competition among contractor teams on site, to complete work quickly?	

8. Pay related issues

4.8.1	Is there any conflict between working safely and maintaining earning potential?	
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9. Supervision / management

4.9.1	During the accident task was there adequate: <ul style="list-style-type: none">• Supervision• Project Management	
4.9.2	In hindsight, and in relation to the accident task, were there any hazards that should have been acted upon or reported	
4.9.3	Have you ever previously received complaints relating to the accident tasks & what action was taken?	

10. PPE

4.9.1 *	Who (which discipline) chooses the PPE range	
4.9.2 *	What attributes leading purchase choice (perhaps good feedback from users, price, function etc.)	
4.9.3 *	When did you last select a new product or style & why	

11. Information transfer – paper based

4.10.1	Which disciplines prepared the <ul style="list-style-type: none">• Method Statements• Risk assessments	<i>(In general & for accident task if different)</i>
4.10.2	Were the MS and RA: <ul style="list-style-type: none">• Different documents• Integrated together as one document	
4.10.3	What is the sequence of processes to prepare the: <ul style="list-style-type: none">• Method Statement• Risk assessment	
4.10.4	What materials do you need to prepare these (eg: drawings, information from managers etc.)	
4.10.5	Were these materials suitable for their purpose?	

4.10.6	If any, which disciplines at site level were consulted about content	
4.10.7	How is the information <ul style="list-style-type: none"> • Stored • Made available to all personnel 	
4.10.8	When did you last read the materials? *	
4.10.9	Is the information ever reviewed and evaluated	
4.10.10	Are there any additional resources to instruct people? (procedures, posters, notices etc.)	

12. Information transfer – practical

4.11.1	What did the site induction entail?	
4.11.2	What instruction or training was provided to undertake the accident task?	
4.11.3	Has the accident task ever been the subject of a tool-box talk & when	
4.11.4	Have the induction / instruction / training methods been reviewed and evaluated	
4.11.5	Would you improve the above, given the opportunity and how	

Appendix 7. The rating scales for stress, job satisfaction and social support
Mean results and Standard deviations

	Safety (n=10)	Safety SD	Snr Mgmt (n=11)	Snr Mgr SD	Supervisory (n=26)	Sup SD	Trades (n=16)	Trades SD	Labour (n=18)	Labour SD
I enjoy my work	4	0.70	2	0.69	3	0.62	4	1.15	4	0.87
My job meets my expectations	4	0.92	5	0.83	4	0.97	4	0.93	4	1.06
I can turn to a fellow worker for help when I have a problem	5	0.71	4	0.77	4	0.90	5	1.03	5	0.56
I get satisfaction from my job	4	0.52	4	0.50	4	0.78	4	0.70	4	0.81
I like most of my fellow workers	4	0.92	4	0.60	4	0.62	4	0.73	4	1.10
My job is mentally demanding	4	1.10	4	0.50	4	0.84	3	1.05	3	1.44
I enjoy the tasks involved in my job	4	0.74	5	0.70	4	0.74	4	0.94	4	0.95
My fellow workers talk things over with me	4	1.03	4	0.77	4	0.91	4	1.31	4	1.03
My job involves a great deal of mental concentration	5	0.53	4	0.83	4	0.75	3	1.29	3	1.20
I am happy with my job	4	0.42	4	0.89	4	0.91	4	1.15	4	1.00
My job involves a great deal of responsibility	5	0.42	4	0.69	4	0.70	4	1.36	4	1.21
I would recommend my job and place of work to a friend	3	1.15	4	1.14	5	1.37	3	1.40	3	1.46
My job causes me worry	3	1.10	3	0.90	3	1.13	2	1.31	2	1.27
I would chose the same job in the same place again	4	1.25	4	1.01	3	1.24	3	1.52	3	1.44
My fellow workers accept and support my new ideas	3	1.07	4	0.93	3	0.77	3	1.06	3	0.99

Appendix 8. Data collection techniques – latent conditions

Proforma 5 - Off-site personnel

1. Accident awareness

All	Were you aware of the accident prior to our contact	
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2. History

C	Undertake serial / one-off projects		C	Have a H&S policy	
C	What is your annual turnover		C	Disciplines forming the client team	
C	At what stage did you appoint a PS & Designer		D	Disciplines involved in design of this task	

3. The design process

D	Did you anticipate any build problems with this task (RA related)	
D	Were there any particular restrictions which may have influenced the way that you developed the design / detailed drawings for this task?	
D/PS/C	Was any consultation taken beyond the design team?	
PS/C	How did you ensure the designer was adequately resourced	
D	If the design templates for this task were developed prior to this project, when was this	
D/PS	In what way did you revise the drawings for this task	
D	What site visits did you undertake while you were preparing the drawings for this task	
D	With the drawings complete have there been any ongoing visits?	
D	How did you manage any changes in design drawings?	
D	Was there any interference with this revision process	
D/C/PS	Were there any technical solutions for this task (eg. involving use of pre-finished components)	
D/C/PS	What were your reasons for selecting (or not selecting) the available technical solutions?	
D/C/PS	Opinions of these technical solutions?	
PS/D	How is the design audited for safety	

⁵ D = Designer, PS = Planning Supervisor, C = client

4. Design safety specifications

D	Were there any safety specifications that you had to build into the design of this task	
D	What do you think of these?	
PS/C	Was safety costed at the concept stage and how	
D	How was safety ongoing in the design development?	
D	Was there any conflict between aesthetics and safe design & how was this addressed?	
D /C/PS	Were there any financial constraints upon any of your choices	
D/PS/C	Did you generate any safety innovations for this task	

5. Work scheduling, organisation, supervision and management

C/D/PS	Were there any time pressures upon you at the project outset	
C/PS/D	Does the choice of design and procurement method affect safety	
C/PS	Have you adopted any targets / measures to foster a positive public response during the build process?	
PS/C	How and who confirms competency of SC and acceptable safe working practice?	
PS/C	Do shortcomings in any of these delay project	
PS/C	How do you administer the selection process of PC/ Specialist contractors?	
C	How soon after the appointment of a PC would you expect site to start	
D	How complete would the detailed drawings be at start on site	
D	At what stage were the detailed drawings when the task was started	

6. Information transfer

C/PS/D	Does existing H&S guidance provide the information you require for your work	
D/PS/C	How did you ensure adequate regard was paid to H&S during design	
D/PS/C	How did you ensure the pre-tender H&S plan was accurate	
D	What hazards information did you supply to PC	
C/PS	How did you ensure principal contractor prepared suitable H&S plan	

7. Role clarity

C/PS	How did you ensure the designer was competent	
C/PS	How did you ensure the designer was adequately resourced for the particular work	
C	How did you ensure the PS was competent	
D	Did you advise the client on the need to appoint a PS	
C	Did the designer inform you of your duties under CDM	
C	Did the planning supervisor advise you on competence and resources when considering appointments	
D/PS	At what stage in the project were you appointed	
C/PS/D	Do you feel that your responsibilities are clearly stated in the CDM / C(HSW) legislation	
C/D/PS	Do you feel that your job role has been appropriately used in this project	

Summary

All	In hindsight, and in relation to the accident task, could you through your work reduce the likelihood of similar occurrences in the future?	
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Liaison with Product Manufacturers

Application

1. What is the intended use for this product?
2. Are there limitations / extreme conditions for the product (environment?)
3. Are there any necessary specifications for different work settings
4. What occupational hazards have you considered for the product use?

User

5. What range of users has the product been designed for (age, gender, anthropometry etc.)?
6. Are there any special characteristics that the user must have to be able to use the product (e.g. strength/ mobility/sensory characteristics?)

Instruction / training

7. Does the user require prior experience to be able to use the product?
8. Is specific training required in order to be able to use the product?
9. Does the product need instructions for use? If yes, in what form have these been provided ?
10. What is the cautionary information for this product (restrictions in use /application) and how do you convey this
11. Can you provide the informational / instructional / publicity material for your product

Product characteristics

(i) Competitor products

12. How does your product vary with competitor products
13. Is your product compatible with competitor products / components

(ii) Product design

14. From prototype or earlier designs how have you developed your product and what attributes have you aimed to enhance / improve / abandon
15. Are the physical attributes of the product designed for the users (e.g. size, shape, weight, reach, clearance etc)
16. Do you consult / trial the product with 'end users' & how?
17. What methods did you use to assess /evaluate the product during development
18. Are there any British / International / CE standards / guidelines for your product
19. What design stereotypes were applied (ie. Control design compatibility) ?
20. In what ways might the product be used incorrectly (either deliberately or inadvertently)
21. What efforts were made to design out the consequences of incorrect use or misuse, or to warn users of them
22. Is positive feedback provided in product use (eg. force resistance) ?
23. What provision has been made for adjustment and maintenance ?
24. What efforts were made to ensure durability and reliability ?

(iii) Personnel

25. What is the skill base of personnel involved in the product development
26. Do you obtain advice from external consultants
27. Do you provide external consultancy

Liaison

28. Do you have any arrangements / schedule for ongoing liaison with customers
29. With what level /staff grade might you have ongoing liaison
30. Are you ever informed of accidents where your product has been involved

(Institute for Occupational Ergonomics, 1998b)

Refs:

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- Jordan, P., 1998, An Introduction to Usability, Taylor & Francis, London.
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- McClelland, I, 1995, Product assessment and user trials, In: Wilson, J.R and Corlett, E.N. (eds) Evaluation of Human Work. A practical ergonomics methodology, 2nd Edition, Taylor & Francis, London, pp 249 – 284.

Appendix 9. Accident study data

Introduction

Volume Two reproduces the sequential approach used to generate interpretations for Phase Two and Phase Three qualitative analyses.

Section One (pages 452 – 518)– reproduces the full transcripts of four accident studies – one each of:

- a major accident (accident 002)
- an over three day absence accident (accident 038)
- a dangerous occurrence (accident 010)
- a non-reportable accident (accident 005)

Interviewee responses are presented in tabular format and cross referenced to the four framework classifications ‘Design and Task execution’, ‘Planning, scheduling and management’, ‘Information transfer’ and ‘Role, skills, attitudes and abilities’. These data have been transcribed from Proforma’s 1 – 5. Where possible the transcript also includes evaluation of documentation and the task area. The site data is summarised by thoughts and ideas of important issues and aspects where further information is required.

Follow-up aspects suggested by the construction and ergonomist specialists are listed separately, and the action taken is shown by use of colour to denote choice and success (or not) in acquiring further information. A record of findings from the follow-up data completes the transcript.

Section Two (pages 519 – 586) – reproduces abridged versions of the full accident study transcript for the remaining 36 accident studies. For each study this includes an evaluation of the task area (where possible), summarised data from site interviews and analysis, suggested follow-up by the construction and Ergonomist specialists, and summaries of any latent condition accident specific findings. Data from the generic – collective interviews, relevant across a number of accident studies, are not reproduced. Latent conditions were explored for thirty of the forty accidents (001 – 040).

Section Three – reproduces the early stages of apportioning site data findings to the matrix used in Table 56, Phase Two (site data qualitative analysis). This shows how interviewee’s comments, and observations from the site data summaries, were grouped for development of the full interpretation.

Section One – four accident studies representing

- a major accident (accident 002)
- an over three day absence accident (accident 038)
- a dangerous occurrence (accident 010)
- a non-reportable accident (accident 005)

KEY

AI	Accident involved person
Bld	Building
C/o	Complained of
F/t	Full time
H&S	Health and safety
HS	Health surveillance
IP	Injured person
MH	Manual handling
MS	Method Statement
O/T or OT	Overtime
Op	Operative
PC	Principal contractor
pm	‘as and when required’
RA	Risk assessment
Regs	Regulations
RTW	Return to work
SC	Sub-contractor
SO	Safety Officer / Adviser
TBT	Tool box talk
#	Fracture

ACCIDENT 002 – Major accident

MAJOR ACCIDENT	Joiner. Using mitre saw to cut diagonal braces for Cavity closure sub-frames. After making a cut he raised up the control handle of the saw and went to turn over the wood to cut mitre the other end of the piece. Although in a raised (non-operational) position the mitre saw guard had jammed (fragment retrieved – 35mm x 2mm deep) . This went unnoticed and the operative experienced a severe hand cut from the still spinning blade as he reached towards the wood piece. Tuesday, January 16.45.				
	ERGONOMICS EVALUATION - ACCIDENT INVOLVED	ERGONOMICS EVALUATION – SC MANAGER	ERGONOMICS EVALUATION - SAFETY	ERGONOMICS EVALUATION – CONSTRUCTION MANAGER / RISK ASSESOR	ERGONOMICS EVALUATION – ARCHITECT)
Accident cause	Guard jammed & hand drawn into blade	Wood chip Over-familiarity / confidence ?	Wood chip? Lack of concentration? Machine design?	<u>Latent condition / follow-up interview</u> Guard was jammed open Possibly had wrong gloves on, rubber gloves could have been a tighter fit, but speed would not have withstood any glove	<u>Latent condition / follow-up interview</u>
Baseline data *site *employment details	Residential 70w build, mid-phase & behind schedule by 1m. Self-employed to a sub-contractor joiner. 40 years relevant experience.	16y joinery experience – Own firm brings in help when required.	33y in trade. Joiner for 3y → foreman / Mgr / planner. H&S since 1978	18y in industry. Started as a carpenter. 16y with PC	18y experience. Director & Partner in own business. Design development also included a surveyor (costs) and client (costs & visuals)

ACCIDENT 002 – Major accident

DESIGN RELATED	Task details *content *work area *Plant, tool. equipment	Described working on auto-pilot to do task. Finds task v. easy Observation (demonstrated) technique involved standing directly in front of saw to operate it with the right hand & holding wood (50 x 25mm) with left hand BUT lifting and manipulating wood with R hand ∴ right hand and forearm reach across midline and blade.	New type of window frame using Cavity closure sub- frames. Had to develop dummy frame and place batons x2 with 45° angle to keep this square. Describes as routine carpenters job – group decide on best method to do this together. (Cavity closure sub-frames purpose – some confusion in understanding this)	Nil difficult about task. Had a proper bench to lay the timber flat. Area sheltered and lit. Not sure why wood tannelised, not necessary for the braces, but maybe they were using some wood from the site. Normally only tannelised for permanent fixing.	Had not anticipated any problems with the window build – ‘a competent contractor could cope with the risks involved’. The design was influenced by the Building Regs and requirement to prevent cold bridges, ∴ had to have a cavity closure & thought this the easiest and cheapest way of closure. Saves going onto scaffold and timber handling. Old fashioned method of cavity closure doesn’t comply with Building Regs – new Regs soon.
		To mitre each end takes~ 1 minute. Does ~ 70at once. Accident occurred after ~ 30 minutes Does a batch every 2- 3 weeks on average. 2 men doing task together. Work mate due to leave at end of week ∴ they wanted to make up a stock for when IP would be on	Fine pieces regularly get stuck between blade and guard. Technique often results in small bits being cut. Previous saw had been stolen – needed a replacement fairly quickly. Purchased equivalent – had never had on before with brake & had not thought it a desirable feature. Bought one with a brake		Originally designed the windows as aluminium, but contractors and client requested a cheaper option (PVC). This happened early on, but even if they had used the original choice, it would probably still have required bracing (but wasn’t aware of this requirement). Said that the design was compromised for cost reasons. Bracing could perhaps been put on in

ACCIDENT 002 – Major accident

	<p>his own. Described quite tight schedule for week – wanted to get this out of the way, and free up time to do other things..</p> <p>Extra brickies had been employed and this meant that a lot of frames were suddenly and unexpectedly used up.</p> <p>Joiners work-shop area described as constrained – had to make best of what was available – space between 2 containers. Mobility area (saw face to opposite wall) = 1450mm. Have to carry long things outside to turn them around (but not relevant for accident event task)</p> <p>Mitre saw for accident almost new. Not fitted with a brake, but subsequently replaced with a model which has this feature.</p>	<p>afterwards because on special offer. Site had not previously requested a braked mitre saw, but henceforth he would buy this style.</p> <p>Feels manufactures instructions not that good for strapping and bracing. Originally had a higher brace, but dropped it to avoid lintels → need to include diagonal braces to keep them square-ish</p> <p>Would have like a proper work shop but not enough room. The space they used had already been moved 2 – 3 times.</p> <p>No room was allocated for the joiners activities.</p> <p>Site started before demolition completed ∴ not enough room at start up.</p> <p>A proper workshop would be x2 cabins stuck together – requested at contracting stage, but never allocated.</p>			<p>factory, but this would be a Cavity closure sub-frames manufacturer responsibility.</p> <p>Options =</p> <ol style="list-style-type: none">1. Have a window built-in2. Insert a timber framework & have brickies build up to it3. Use Cavity closure sub-frames or permanent formwork, to save taking out timber and putting it back in <p>This system was developed with the window and cavity closure manufacturer & then he confirmed that the PC if they were happy with the choices.</p> <p>There were no design templates for these window arrangements – window and cavity closure are proprietary / off shelf – there is no design they are tried and tested.</p> <p>Did not visit site whilst preparing drawings for windows – nothing there!”</p> <p>Is always involved in design revision – ‘hundreds’. – back and forth between M&E consultant, structural</p>
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ACCIDENT 002 – Major accident

					<p>Engineer, client, contractor etc... Ongoing.</p> <p>A key person in his office is allocated job of design revision request management – He has to check other peoples drawings too. Number of people involved can impact upon speed of revision process.</p> <p>The contractor chose the Cavity closure sub-frames system – ‘the opening’ is up to the contractor’ – if not they would have used dummy frames. He was happy with this closure system, thought it good and easy to build.</p> <p>The design was overviewed early on and as part of the risk assessments. Plus they always knew that they were using a competent contractor and ∴ don’t highlight every risk.</p> <p>No safety spec. was required for the window construction - The window is standard building practice and therefore no special H&S required. I f had used dummy</p>
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ACCIDENT 002 – Major accident

					<p>frames, then scaffold would be required (the chosen method is better option).</p> <p>Expects contractor to safeguard standard working practice – carpenters work such as this.</p> <p>Safety in design was initially monitored during fortnightly meetings (now monthly). He had wanted window to open inwards (to aid cleaning), but client said that the students would jump out ∴ had to have lock and semi-opening system. (also included harness hooks in design, for window cleaners)</p> <p>Feels that conflict between aesthetics and safety is ongoing – always comes down on safety side and audit their won work before client gets.</p> <p>Financial constraint inhibited use of aluminium</p> <p>Did not generate any safety solutions for the window – ‘standard working practice’.</p>
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ACCIDENT 002 – Major accident

							<p>They had started to set-up the site as he stated the detailed design. Generally they do the overall and detailed design at an early stage to avoid re-work. But the detailed drawings for the site were complete when the accident task started.</p> <p>As a possible remedial measure felt that cross bracing could have been undertaken in a factory, but that the carpenter could alternatively have been injured cutting something else/.</p>
	Environment	No task lighting, but perceived as adequate Windy – had had to replace hoarding to work are – extra work					

ACCIDENT 002 – Major accident

PLANNING, SCHEDULING MANAGEMENT		PPE	<p>Wearing PVC gloves as timber wet following treatment. Not normally worn</p> <p>Sometimes wears goggles for range of other tasks – finds they steam up.</p>	<p>Gloves necessary because the treatment has arsenic in it.</p>	<p>Timber tannelised for preservation – wood wet + arsenic ∴ gloves.</p> <p>Thinks gloves not ideal & are trialling new ones.</p>		
Work scheduling		<p>Week-days only, starts at 07.00. He and work mate both v. experienced and left to sort out own work schedule / breaks etc..</p>	<p>Not aware of unexpected work or unplanned changes in schedule. Workshop tasks generally undertaken before 10 or after 3 because of artificial light.</p>	<p>Not aware of any delays unexpected or unplanned events</p>	<p>No delays/ interruptions / unplanned work</p>		

ACCIDENT 002 – Major accident

	<p>Work organisation</p>	<p>Self-regulated. D/w SC boss – very much left to own devices/</p>	<p>Felt there were no delays in starting work – this was a restocking job they do once or twice a week.</p> <p>Older & experienced employees – left them alone for own work schedule – as long as work done.</p> <p>Happy for them to work together – have done previously. They think the same and travel together</p>	<p>Work sub-contracted due to a lack of in-house resources / skills.</p>	<p>V. skilled operative doing work.</p> <p>Work isolated in a machine shop, no other trades around.</p> <p>No TU reps. Have a safety committee with ops, foremen / supervisors from each trade. Meet every 3-4w.</p> <p>When planning team work – likes people that can think on feet, safety conscious and who can deal with problems (decision makers)</p> <p>Never felt pressured to proceed without correct equipment.</p> <p>PC only employ 2 chippies, no trades appointments as always use SC's. ∴ Skills not available among own PC ops</p> <p>H&S.</p>	<p>Described time pressure from client and contractor – both wanted a speedy design.</p> <p>Wanted completion for September (new students), so had to work backwards from that.</p> <p>At outset, he told them that there was insufficient time for a full detailed design ∴ concentrated on overall design first – at their request.</p> <p>Had to do it like this for he</p> <p>Engineer to do the foundations ∴ Pressure for overall design in a few weeks (1m) rather than a couple of months (preferred). Also had to provide detailed info. for costings too – managed to provide info needed for programme</p> <p>.</p>
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ACCIDENT 002 – Major accident

				<p>Co-ordinates contractor activities with Project Planner + weekly review to work out where each gang should be.</p> <p>Does walkabouts, has target meeting, induction pre start work to ensure co-operation and compliance with</p> <p>PC induction goes through SC MS'S /TBTs (and RA's pm)</p> <p>Observe new starters and get a feel for who's OK. Don't put some people in areas of high risk, especially young ones – put them on graded work until get a feel for their capabilities and outlook.</p>	<p>(Felt though that this really had no effect on the accident task).</p> <p>Thinks that 'design and build affects 'safety'</p> <p>Because the contractors input it tends to make the buildings very buildable.</p> <p>Used to argue with them re. aesthetics, but some situations are dictated by the contractor and is not sure whether H&S is compromised.</p> <p>On traditional contracts the contractor will do it the way he wants - ∴ if haven't detailed the way that things are to be constructed the contractor will carry out the work to their design and with less frequent return to the Architect re. their method.</p>
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ACCIDENT 002 – Major accident

					Info and training provided to SC's through procurement and planning department. Safety Officer helps with CDM Appraisal work – acts as an advisor to the SC's	Prefers 'partnering (he is 'novated' by client) Gave an example where, like 'design and build' the contractor inputs at an early stage and this benefited the design for the H&S. The contractor felt less commercial pressures as there are on other contracts – they are more part of the overall team.
Work pace	Self-regulated with work mate	Thinks that hourly rate is better than pay per job, as pace is then less important.			No competition among contractor teams – just follow programme. No time pressures at time of accident	
Target / Payment issues	Self-employed and had negotiated own hourly rate. No perception of time pressure from S/C boss – there were jobs that needed doing and he had to get on with them.		In general feels safety / pay conflict for some trades – eg. those paid / m ² , roofers, plasterers etc..)		Feels there is no conflict between working safely and maintaining earning potential - working safely is the be all and end all.	

ACCIDENT 002 – Major accident

	<p>Very little. Felt more inappropriate</p> <p>No tool box talks for this task</p>	<p>Had pre-contract meetings re. H&S, but has not read contract</p>	<p><u>Information from PC to SC includes:</u></p> <p>Provision of copy of H&S plan</p> <p>Attending a pre-start meeting</p> <p>Read & discuss RA & MS</p> <p>Attend site induction</p> <p>Provision of daily instruction</p> <p>Attend TBTs</p> <p>Site notice boards</p> <p>Weekly S/C/ management meetings</p>	<p>Felt task supervision and project management were adequate at time of accident.</p> <p>Informed by employer of H&S responsibilities, well documented.</p> <p>In retrospect, no there was nothing about the accident, which should have been acted upon or reported. The guard had jammed, how long for, cant tell.</p> <p>IP was very precise and if cut was ~ 2mmout he would have cut it off – this can get cut in the spring at the top of the saw.</p>	
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ACCIDENT 002 – Major accident

Procedures / MS's / RA's / (PTW's) / instruction	No specific procedures / instructions for the task – feels its up to ops to know how to proceed.	Meets with Site Supervisor to discuss how to tackle the work. Feels inadequate information supplied to do the prep. Thinks MS & RA are one and the same. Although drawings and sketches of finished products available, he had not provided details on mgmt and prevention of risks.	Stated by Construction mgr. SC Mgr meets with him. They are reviewed 6 weekly Info. described during site induction	Gets a generic MS fom Sc to cover carpentry and joinery. 'What can be written about using a circular saw. Good practice on behalf of the joiner. He's (IP) time served and well established'. Has a list in workshop showing who can / cant use the circular saw. Interviewee assesses the company M.S. and the S.O assesses the company H&S policy. Says suitable and sufficient material available to prepare MS. Hasn't got manufacturer saw info. SC Manager should have. On site he and Project Engineer get consulted about MS content. Paperwork kept in a file in the office. Available to all – at induction they read and sign to say they've read it.	Feels that when CDM was introduced this did not provide H&S information required for his work BUT with progress and more publications since then, the requirements are clearer. He had to phone HSE regularly and they 'struggled'. Is not convinced that CDM are reducing accidents, but are making designers more aware of their designs re. H&S. Feels HSE should make more site inspections, rather than expecting self-policing by contractor / selves. Always thinks of H&S when designing and this is always overviewed in office. Prepared pre-tender H&S plan themselves – were Planning Supervisors at that time – (design then very basic). Did overall RA and concentrated on special risks –
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ACCIDENT 002 – Major accident

			<p>Site induction and trades H&S training does not cover woodworking. No TBT's except if young employees.</p>		<p>If its not generic he'll d/w them when they start on site to ensure that they understand and can work safely. Information is evaluated in work changes. But work for 2nd fix joiners does not change. Do TBT if different. MS & RA are together within the same paperwork. Training methods = TBT's induction, walk-round, wall bulletins, H&S notice board (canteen). Also memos from S.O which are circulated to S.Cs. 'The safety Officer is not just a policeman, but will help too'. No induction, instruction, training was provided to undertake the accident task – IP just had to make sure that the shop was set up properly. Has never provided a TBT re. this. Has known IP for 5 –6y, he's v. experienced and reliable.</p>	<p>but not risks that a competent contractor should be aware of. (eg. Poor ground on this site → site survey → advised PC & had piling instead of stripped concrete. This is tried and tested system – thinks that everybody used to dealing with. Supplied PC with RA, drawing & site survey. PC took over as PS when hey were appointed. He stopped at end of the tender stage. Just supplied a basic service (ie. No audit of contractors etc..) From end of tender til site start =? Not being paid but still had to do detailed drawings(?may have had some design fees?). He knew that, after tender, the contractor would become the PS (due to design and build). Normally, if PS → completion and H&S file, but PC wanted to do it o this project.</p>
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ACCIDENT 002 – Major accident

				<p>Evaluation of instruction / training? – It depends who’s there. Advises the people what they need to know first off and then they get a TBT if their role changes. Induction is ~ 20 mins. Attention span can vary – young people have an especially low attention span. When he worked at the airport (build) induction was x2 videos – people fell asleep. People vary – some are appreciative or can think it’s a joke. Induction finishes with ‘any questions?’</p> <p>Use a yellow / red card system on site.</p> <p>Induction = do’s & don’ts on site. For joiner / secondary fixer – doesn’t go into depth in all cases, just relevant to the trade.</p>	<p>He was appointed after land was purchased and was then reappointed by PC when they were appointed.</p> <p>Feels that his responsibilities are clear in CDM, but that there has not been enough helpful info /guidance over the past 5y.</p> <p>Feels his role has been used appropriately in this project</p>
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ACCIDENT 002 – Major accident

	Safety culture comments	Safety good where applied, but felt housekeeping poor in some areas (not joinery workshop, controlled by the 2 colleagues) – potential for fall hazards	Generally v. good	Major SC Mgrs are more committed than smaller SC Mgrs. Some smaller SC lower level supervisors are still prepared to accept risk on behalf of selves/ men – think they are doing a favour.	Very good	Thinks that Regs have generated far too much paperwork. Thinks key to saving lives is more site inspection by HSE Inspectors. FI has more clout (if threat of closure / power) & in-house people do not have this. More policing needed, but costs to Government! Prevention is best cure.
						Thought Safety culture on this site good.

ACCIDENT 002 – Major accident

Skills & Abilities / Training	Dependant upon own core skills. Task and use of saw not subject of especial training.	Thinks it is up to self to be skilled in tasks & not to take things for granted	Specialist courses are available. CSCS endorsed & done	‘Trade training – time served’	BSc (Hons), .
	Felt unable to use range of skills & abilities on site. Can in a joiners shop, but hates it preferring site work. City and Guild apprenticeship when left school. Learnt all else on job since. Finds some value in big site inductions, but generally all the same / common sense.	Had 1d training in H&S from CITB about 5y ago. Plus joinery apprenticeship.	Unsure if site training & induction has been evaluated.	Has done x1 & x2 day training courses from PC. Also a first-aider. Considers training adequate. No training in human capabilities and performance Regular safety related training.	RIBA + CPD. Architect & MAPS (Planning Supervisor) 5y ago. Happy with training. No training in human capabilities and performance, but all cover safety related aspects Thinks site inductions not relevant to designers, more for workers. Inductions could be made more specific for designers, but then they need to cover everything.

PERSONAL DETAILS					
Age	60y	42	52	33	43
Domestic	47 miles each way (40mins drive am & 1hr. 45 on return)	25m miles each way (40 mins am & 1.30 on return). Breakfast. Leaves home ~ 6.15. No lunch & finishes work between 5 – 6	37-50 hrs / week. Travels 24k miles / yr	~ 50hrs / wk. 07.00 – 17.30 / 18.00. Rarely works Sats. 2x30 mins breaks per day permitted – takes as able (mostly). Lives locally – travel minimal.	45 – 70hrs/ wk – longest when covering partner’s absence/hols. Lives local to work, but with site visits

ACCIDENT 002 – Major accident

			pm.					travels ~ 500miles/wk
Previous accidents	Nil serious. Dropped plywood on foot 8/00.							
Health related	Nil							
Motivation / satisfaction	Enjoys variety & pay. Dislikes cold / underfoot mud & brick. Some jobs require a lot of thought, but not accident task.	Best bit of job = going home . Worst = travel itself A lot of tension in job ~ 20 / 30 phone calls / day. Worry – Targets to meet. Joiners service all other trades.	Feels skills could be used to provide more training and to develop systems.. Worst part of job is investigating accidents.	Best parts = communication with lads on site, satisfaction from build, banter, changing site – likes starting a new job and starting new relationships. Worst parts = paperwork, not everyone being as committed as him, trade shortage, chancer's, people don't fulfil your expectations of them.	Happy with level of responsibility and opportunities to use skills & abilities. Best parts = seeing a completed project, a happy client and reimbursement. Worst parts = insufficient time to carry out work. Wouldn't recommend his work to others – too stressful, but in is role, he does try to take the stress off others.			
EVALUATION OF WRITTEN INFO								
Method statement	MS lists cut Cavity closure sub-frames, cut timber, form frame and screw fit together).							
Risk Assessment	RA has pre-printed hazards / services sheet (appropriately completed), but these do not list cut hazard or use of dealing with wet wood).							

ACCIDENT 002 – Major accident

SUMMARY

Accident / Peripheral issues – 1 st draft	
1 st evaluation	
• Technique not reviewed or considered as an influencing factor	
• Respect for previous skills / experience over-road Supervision / training / TBTs / formal H&S Mgmt measures	
• Un-stimulating task	
• Poor mitre saw design	
• Inadequate address to task and risk in MS\RA	
• Impact of PPE unknown	
• Work area not as desired by joiners	
• Joiners workshop not allocated in site plan	
• Poor / absent purchasing policy (saw)	
• Time pressure—due to unexpected demand and prospective loss of employee	
• Unsupervised work - ?? information about sudden workload not conveyed to Supervisor / Mgr by joiners	
• Thoroughness / range of safety management not necessarily perceived by SC firm	
• Indication of poor manufacturers instruction concerning temporary frame for window	
• No apparent instruction in saw use	
• SC Manager workload appears quite stressful	
• ~ 12hr days for all	

Construction specialists – suggested follow-up		Ergonomics specialists – suggested follow-up
Done		Follow-up unsuccessful
(RD)Saw manufacturer Cavity closure sub-frames system manufacturer Architect – design and pre-fabrication		Not pursued / not possible / info already available (RH) Saw manufacturer Brace design issues (architect) Construction Mgr – Risk assessment

•
Evaluation post – Risk assessor interview
• Slither jamming saw implicated as joiners fault and not a saw shortcoming
• No instructions about using a circular saw - ? appropriate
• RA/MS used as a training method
• Feels work doesn't change for 2 nd fix joiners

ACCIDENT 002 – Major accident

•	No distinction between RA /MS
•	Complains re. attention during induction – especially among young people.
•	Reference to policing safety – yellow / red card system (football?)
•	Indication that not much induction required for 2 nd fix joiner
•	No training in human capabilities and performance
•	Fairly low tolerance of people who aren't on the ball / sharp.
•	Job satisfaction appears high

Evaluation post - Architect interview	
•	Felt that this method of cavity closure was a 'design innovation' & superior to former method, as this avoids the need for scaffolding & 'timber handling'
•	Several references to reliance on core competencies (such as contractor and carpenter skills)
•	Original design was revised for cost reasons, but this was deemed acceptable (from a safety perspective) by Architect
•	Architect not aware of bracing requirements for window build
•	Liaison with window & cavity closure manufacturers was undertaken but it seems that the issue of window bracing requirements was not addressed
•	It was the contractor that chose this window type - ?? does ownership / responsibility get lost / blurred, the more people are involved??
•	Client had quite a lot of impact upon the design – time pressure upon designer, choice of window style, cost aspects BUT would window build have been much different even if there had been a free-er reign?
•	There was no formal design development for the windows – they just followed off the shelf protocol
•	Window build has no safety specification as it is standard building practice
•	Expects contractor to safeguard Safe Working Practice of ops (carpenter)
•	If the cross-bracing had been undertaken in a factory, would the carpenter then start to loose his mitre saw skills & become more vulnerable??
•	He showed a clear preference for 'design and build' and 'partnering' where the Architect & contractor are involved from an early stage → improved buildability. The alternative sees contractor developing a lot of 'un-drawn design' on their own initiative.
•	PS role seems to have been 'juggled about a bit' – Architects were PS until PC tender accepted. After this the detailed drawings were developed for the design – did PC exercise their PS role adequately re. the window design OR has nobody considered the task of bracing
•	Not that happy about usability of CDM and guidance from HSE
•	No training in human capabilities and performance
•	Not finding inductions relevant t self
•	Long work hours and driving +++
•	Job satisfaction seems good, but time pressures stressful

ACCIDENT 002 – Major accident

Evaluation – manufacturer interviews		Mitre saw	Cavity closure sub-frames window
Application		Marketing Director - woodworking / machinery	Sales Director
1. What is the intended use for this product?	2. Are there limitations / extreme conditions for the product (environment?)	Trained / qualified end users. M/F. L or R hand. Use data capture to I.d. users ways. Y - tannelised timber	None. Like lego. Brace could be ply or more extrusion material (they don't supply themselves). Designed to be loaded from inside (or outside). Timber is better and stronger especially at length.
3. Are there any necessary specifications for different work settings	4. What occupational hazards have you considered for the product use?	Have to meet a noise category. Measure unloaded + can isolate diff jobs and measure them too. Specify tools for certain capacities. Test with product and level of hardness. Pre 1995/6/or 7 didn't have to have brake, just had to stop within </= 10s. Often exceeded and can stop within 3s	Not a skilled construction other than calculating dimensions
User			none
5. What range of users has the product been designed for (age, gender, anthropometry etc..)?	6. Are there any special characteristics that the user must have to be able to use the product (e.g. strength/ mobility/sensory characteristics)?	Able bodied. Vision corrected prn	none - lightweight product
Instruction / training			None - a straight cut therefore saw guidelines. Particles can come off the plastic therefore PPE
7. Does the user require prior experience to be able to use the product?	8. Is specific training required in order to be able to use the product?	Manual. Training videos for really complicated machines. Pictures in the catalogue. Point of sales materials. Correct use of on TV. CD	

ACCIDENT 002 – Major accident

9. Does the product need instructions for use? If yes, in what form have these been provided ?	Provide a manual (manufacturing and technical) and an idiots guide for site
10. What is the cautionary information for this product (restrictions in use /application) and how do you convey this	
11. Can you provide the informational / instructional / publicity material for your product	Use a tech manual agency to do manual. Cant cut product when cold
Product characteristics	
(i) Competitor products	
12. How does your product vary with competitor products	Innovative design features (PS1745 patent for small rotary table) 46% share in Europe for mitre saws..
13. Is your product compatible with competitor products / components	Competitors don't deal with end users plundered. Standard saw blades and dust extraction to standard
(ii) Product design	
14. From prototype or earlier designs how have you developed your product and what attributes have you aimed to enhance / improve / abandon	No change since concept. Will change to a single frame rather than different top and expanding foam for flexibility + to accommodate revised Bld regs. (thermal properties)
15. Are the physical attributes of the product designed for the users (e.g. size, shape, weight, reach, clearance etc)	Have developed product development process of user spec, pre prototype (secret). Sigma six Anthropometry of handle & switch, balance and interface
16. Do you consult / trial the product with 'end users' & how?	Ideas to local mfrs & builders. Liaison with brickies, built 3 dummy walls - got a brickie to do
17. What methods did you use to assess /evaluate the product during development	Use 'focus groups' and end user visits & trials. Direct and open Q's.
18. Are there any British / International / CE standards / guidelines for your product	TVV governs them (German) BBA Certificate - standard. Need this to sell to the major builders. Unsure if covered by CDM

ACCIDENT 002 – Major accident

19. What design stereotypes were applied (ie. Control design compatibility) ?	Building sites are a law unto themselves - have brick ties to hold them in, but invariably they don't use - not good for the windows.. Nail in can cause problems. Bld Regs say they have to close cavity, but want it cheap as possible.
20. In what ways might the product be used incorrectly (either deliberately or inadvertently)	Provided literature + product is most simplistic in marketplace. Never had any fault with product
21. What efforts were made to design out the consequences of incorrect use or misuse, or to warn users of them	safety hazard review
22. Is positive feedback provided in product use (eg. force resistance) ?	Handle click
23. What provision has been made for adjustment and maintenance ?	Fully adjustable +m 1yr free service contract. Blade removal allows access to internal parts. Special tools required for non-access parts. NA
24. What efforts were made to ensure durability and reliability ?	Reliability and probability tests. fault should be I.d'd by brickie
(iii) Personnel	
25. What is the skill base of personnel involved in the product development	Knowledge of design and extrusion Engineers. Outside consultant with building trade knowledge + U value of thermal insulation properties = cold bridging. Salesmen
26. Do you obtain advice from external consultants	Engineer, Financing, Purchaser, Designer, test technician (~ 10, all graduates) If design capacity specifies. Get consultant from suppliers
27. Do you provide external consultancy	Maybe to consumers - specialist ion racing etc...
Liaison	
28. Do you have any arrangements / schedule for ongoing liaison with customers	Y- for initial business + site visits for any problems

ACCIDENT 002 – Major accident

29. With what level /staff grade might you have ongoing liaison	Y -esp. if litigation. + get letter re design issues. Have early warning system with new products (via customer services etc.. Also check spare parts orders. Site based work ++ +~ strong field contacts. All have to go ~ monthly to site.	Never come across anything, would welcome
30. Are you ever informed of accidents where your product has been involved		
28.9.01		
Mfrs		
31. Are you told about accidents / incidents that occur with your products		
32. What is the feedback loop from users to enable product evaluation / appraisal		deal with them all the time. Sales and new sales.
33. What methods are used to appraise the information / marketing that they provide		Always new business
34. What are your product development and evaluation methods		
Comments	<ul style="list-style-type: none">* 110v causes problems. Why have? - is not used in Europe* People don't use instruction manual (contains 11 languages)* Common problems = wrist torque. Have clutch to avoid* TUV - new European Regs for statutory tools* Problems with Regs = Authors don't understand how tools are used on site & don't consult mfr* Safety features = more difficult tool use and men over-ride	<ul style="list-style-type: none">* Generally 3 sided and therefore need brace. Provide as 50 x 6m lengths in sealed packs* Site pack and put into framesTheir role is just as thermoplastic extruder. No assembly work undertaken.* never supply direct to builder* unusual to cut and insert braces on site. ? Made an error and had to change size on site.

ACCIDENT 002 – Major accident

- * Guard can be jammed / removed
- *Problems with piecework
- *Big probs = (1) Swap PRCD cable (2) jam / poorly maintain guards (3) revise and adapt tools (4) Poor training of temporary labourers (5) People take risks.(6) people buy smallest and overload
- * Provide their dealers with selling skills to enable them to assist with a product selection task
- * 90% business = traditional trade & d/w counter staff
- *Hire companies in UK are governed by the National Association of Hire companies
- *Some co:s quite cavalier in purchase approach and want an all purpose tool
- *Young and less experienced want a cheap tool for as many tasks as possible
- * Big second hand market - no packaging, instructions, PAT, ? Modifications
- * Theft is rife. Car boots, Pawn
- * Normally sell to a 2nd company (eg a window mfr) who make into a frame & with windows deliver to site. Factory work
- *provide 1d training for new customers
- *25y experience - need technical, mfr and engineering knowledge to be able to sell
- *learn on site about product - in house training 6m

ACCIDENT 005 – Non- reportable accident

NON-REPORTABLE ACCIDENT		A panel fixer was working with his supervisor (also his Uncle) moving steel angles that had been delivered to the work area by FLT. Movement was achieved by carrying an end each; laying down was achieved by crouching down and then each person drops their end down in turn. This time both dropped their end together – IP somehow had his fingers beneath the falling material → wound to R middle finger. March 10.30 Weds. IP employed by a SC which is a SC to the PC.			
	ERGONOMICS EVALUATION – IP	ERGONOMICS EVAL. - SITE SUPERISOR	ERGONOMICS EVALUATION – SC SAFETY OFFICER	ERGONOMICS EVALUATION – PLANNING SUPERVISOR	
DESIGN RELATED	<p>Task details</p> <p><i>*content</i></p> <p><i>*work area</i></p> <p><i>*Plant, tool.</i></p> <p><i>equipment</i></p>	<p>3½y experience and ~6w on site at time of accident.</p> <p>Self employed – age 19</p> <p>Job was unloading steel from FLT. Had ~ 10 pieces and it would have taken them ~ 20 mins to do.</p> <p>First job he'd ever done putting steel up, but felt that the task (pre-accident) was easy and that he had the experience to do it.</p> <p>Had received general MH training, but not specifically on how to handle steel.</p> <p>Training had been provided by his supervisor 'on the job'.. Described self as 5'5" and supervisor as 6'5".</p>	<p>25y experience including 20 with SC. On site 3m pre-accident.</p> <p>Thought accident in part due to item awkwardness (~ 9m + ~ 140kg).</p> <p>Though any awkwardness in task was caused by weight and length.</p> <p>Commented that the lengths, although pre-drilled and set out, could be ordered as smaller items/</p>	<p><u>Latent condition / follow-up interview</u></p> <p>53y Safety Manager – with this employer for 35y. Formerly Contracts Manager until 'transferred' by MD to S.O. role in 8/98</p> <p>Accident cause = Just a fluke. 2 people working together and with relatively familiar work material. In essence – just one of those.</p> <p>Remedial action = didn't investigate. Not sure that there were any underlying causes. No action – it was just one of those accidents – dropped on his finger.</p>	<p><u>Latent condition / follow-up interview</u></p> <p>59y old self-employed PS. Providing a service to PC for 5y – & to this site for 15m.</p> <p>Not aware of the accident prior to my contact</p>

ACCIDENT 005 – Non- reportable accident

	<p>Boss was training him in carrying steel, at the time, as hadn't done it before.</p> <p>No task interruptions, but was trying to move the steel 'a bit quicker so that the brickies could get started'.</p> <p>They were moaning that the steel was in the way.</p> <p>No unusual events. Plenty of room (+ tidy) and forks had been positioned at ~ elbow height to facilitate lift of steel angle. FLT was at ground level, but forks had been raised up to level 1 where IP and supervisor were working.</p> <p>Post accident action – use of a sling + 4 people. Hadn't used sling beforehand as thought the two could manage 'had always managed before'.</p>	<p>His role is as visiting S.O. His visits are ad hoc - ~ 2d/wk.</p> <p>Covers nationally. Does admin, safety policy, production of safety memo's etc...</p> <p>Nothing difficult about the task, but arduous.</p> <p>It was a heavy angle, but even if it had been in halves it would have been → 70kg (x3 heavier than benchmark), but these guys were experienced at curtain walling.</p> <p>Didn't feel that they needed to investigate it and trusted the SC to identify whether they should do fine or brute force work.</p> <p>Maybe [they were] not so experienced with lifting such large and heavy materials, but he still feels that this was well within his sphere of control.</p>	<p>This is a one off project of this type for the Council. Not exactly sure of client team, but thinks they are mostly construction, QS and commercial people.</p> <p>At concept stage the PS was Designer (designers). When PC took over the project and assumed the PS role the concept was effectively complete ∴ his role was at the design, development and procurement stages.</p> <p>Designer produced concept / design requirements and specified type of systems they wanted to use + a significant amount of drawings of what the design was to be.</p> <p>Development if these into working drawings was done by SCs [presumably just for their roofing work].</p> <p>The angle would have been shown in Designer drawings, but the design and detail would have been SC.</p> <p>Q = did you anticipate any build problems with this task A = It was a proprietary system, hazards and risks = well known. Only items in designers RAs = cladding units should be of a type manufactured to be of a manoeuvrable size (not to be a risk of having to hang over the edge etc..). Common to use steel angles</p> <p>Not aware of there were any problems influencing the design of the task.</p>
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				<p>No consultation taken by the design team by his company. Identified hazards → SCs sequence of works. If angle had been in 3-4 pieces → time +++ and a single piece would be much quicker.</p> <p>To ensure that the designer was adequately resourced Designer demonstrated this to their satisfaction. He never looked into the SC, but PC did. If PC wants the SC to work from the designer, then would assume responsibility of determining competence etc... / resources.</p> <p>PS does not undertake the design, but designers are based on site. There is an architect instruction system to manage changes in design drawings.</p> <p>Q = were there any technical solutions for the task A= cladding needs to be supported from the main structure. Angle bracket = most common, not necessarily all in one piece. Main concern was the clad system and that this would not harm the op.</p> <p>Not his decision to select the technical solutions ∴ the PS would not see the MS for this action as its not unusual.</p> <p>Not aware of the technical details of the systems – generally sound/safe</p> <p>Q re design audit A = Designers responsibility and submitted to Designer for approval. The overall design</p>
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					<p>responsibility was with Designer.</p> <p>No real safety specs. that had to be built into the task design. Task is fixing the angle. CDM assumes knowledge of standard hazards eg. MH. Standard risk = ∴ the PS would not see the MS for this action as its not unusual</p> <p>No idea if safety was costed at concept stage – doesn't know anybody that has a cost against safety (insurance, down time) & just cost if things go wrong</p> <p>Safety was ongoing in design development by regular meetings with Designer and SCs in early days, but he was not involved in nitty gritty – doesn't follow down to the detailed working drawing – because it's the designers role.</p> <p>No conflict between aesthetics and safety for this part of the design as it should be hidden.</p> <p>No idea if there were any financial constraints upon any of the choices – thinks that there were not any safety innovations – just the standard hoists and platforms.</p>
	Environm ent	Daylight - fine, but dull Wet, not cold.			

ACCIDENT 005 – Non- reportable accident

PLANNING, SCHEDULING & MANAGEMENT		PPE	Ht, vest, boots. Green rubber gloves supplied by main SC Supervisor. Described gloves keeping hands warm & can do more + stop steel digging into hands. Although gloves don't normally fit these did. General c/o poor hat fit & regular falling off – 'better with the chin straps that the steel men have'.		PPE is selected by the Supervisor / Project Mgr. Most recent selection of new product = previous week – mask types. Process of RA development.	

		<p>Works 07.15 – 4pm. 15 mins breakfast only and states would prefer longer.</p> <p>Works 5 – 6 days / week. Occ O.T – describes as voluntary.</p> <p>Always Sunday off.</p>	<p>Works 7.30 – 5.30 / 6pm / day.</p> <p>Breaks pm. Occ O.T – voluntary.</p> <p>No delay to work scheduling.</p> <p>Skilled people available and no unexpected work or unplanned changes.</p>	<p>Formal office hours = 9-5.30, although 8-7 is longest and generally starts at 8 to get the work done. Late finishes are unpaid doesn't do OT.</p> <p>Not aware of any delays in the work.</p> <p>Skilled people were available as needed</p> <p>No unusual work required to be absorbed into schedule</p> <p>No unplanned changes</p>	<p>40 – 50 hrs / wk. Occ 30 hr weeks too – a small independent company and therefore reactive to workload. Works on Sundays too.</p> <p>Recalls time pressure at project outset.</p> <p>Q= did the choice of design and procurement method affect safety A= choice of doing one long piece is quicker</p> <p>Q re. confirming competence of Sc A = SC was vetted by PC and PS. Good history and reputation</p> <p>Selection process administered by questionnaire / interview. Know from their background really</p> <p>Site start after a PC appointment varies – depending on site size, / funding / planning</p> <p>At start of site the drawings were all at tender stage – nil complete – but finished and approved at the start of task.</p>
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Work scheduling

ACCIDENT 005 – Non-reportable accident

Work organisation	<p>No recent work org. changes. Felt adequate staff available. Other trades in area – brickies stood waiting for them to finish. Electricians working ~ 5ft behind them, but not in each others way. No work target to meet. Supervisor sets up work arrangements. Occ. IP gets consulted.</p>	<p>This work needed to be done to allow the brickies and electricians to progress. Own SC Safety Officer visits ~ x2/wk. The gang were already familiar working together.. They sub-contract when haven't enough skilled people among own group. Described other sites where PC meets with Supervisors daily, but PC don't do this – regrets this. Also described an official procedure (roof, clad), when wants sth. done, to ring PC Mgr of specific site area to organise – indicated that in reality and with extended experience of being on site people tend to start working upon their own initiatives and without going through the formal channels necessarily.</p>	<p>Q= how do you assess competence of new starters. A= He prepares briefs for induction. Eg. A SC had wanted to bring a 16y old on site and he said no. Q= re. ensuring health status for new starters. A = on induction there is a box asking whether you have any health problems – dealt with by his manager / S.O. Q= re. offering any h. surveillance A = Work to COSHH, RA's. Would like to do more interpretation of hazard data sheets → COSHH and issue them. His company ops are both employed and self-employed Q= do you discuss trade overlap directly with the trades A= can plan anything, but everything changes. People, such as painters work without a PTW. Q = arrangements for worker consultation with safety rep A = Any q's to</p>	
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				<p>supervisor and then he goes to quality meetings. Head office deals with TUs</p> <p>In the past, as a Contracts Mgr, has felt pressured to proceed without correct materials / equipment – incorrect materials. Programme, someone’s taken something you need. Cant get materials / labour and the MC is shouting.</p> <p>It can happen on this site, but they stop the work. Very difficult as the dates become critical.</p> <p>Q re. sub-contracting - Don’t want people sitting around for 2-3w with no work to do.</p> <p>Had only limited access to same skills among own ops, but certainly not in this work area – no competition to the SC chosen</p> <p>Q= re co-ordination / communication. Among the contractors A= MS/RA. Mainly labour only. Induction by PC and SC – issued with MS / RA and would have tasks shown / explained to them. Also unfixed meetings with Project Mgr / Director</p>
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					<p>Q= re. ensuring compliance with site rules. A = PC induction – explain site rules. Adapted as work progresses. TBTs. Supervisors walk round / spot checks.</p> <p>Q= re. providing training and info on risks A = SCs do RAs of tasks – issued to charge hands at induction + individual instruction to gang. PTWs, TBTs and vast majority have CSCS.</p> <p>His job specifies responsibilities of H&S of people he oversees. Instructions are in job spec and in company safety policy (this is issued to all at induction with company fire policy)/. Thinks that his performance in achieving these is reviewed, but that there is no formal arrangement.</p>	
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ACCIDENT 005 – Non- reportable accident

	Work pace	Working as a team and feels that they need to work at the same pace, but he was slower (inexperience) +his uncle was bigger which made him faster.	Thinks there is competition among contractor teams on site, to complete work quickly. Especially with pay per piece / m ² . No time pressures at time of accident.	Q re motivation to increase productivity. A = its not especially relevant. Motivation = safe system and safe place work, but they argue that it slows them down. No time pressures at the time of the accident. Just movement of materials – a slip, misjudgement No competition between contractor teams on site – just trying to earn money.	
	Target / Payment issues	On a fixed weekly wage. Would prefer more, but likes this method.		Thinks that there is a conflict between working safely and earning potential – but more to do with not doing something unsafely as they want to get the job done and earn £. Plus 'because the boss says so'.	

ACCIDENT 005 – Non- reportable accident

	Supervision / management	Happy with this and thought it was adequate.	Happy with task supervision & project management at time of accident event. Aware of own responsibilities for H&S and has written instructions to follow. Never had complaints re. this job, but knew it was a heavy one.	Happy with task supervision & project management at time of accident event. In hindsight no hazards that should have been acted upon / recorded. Looked hard at material weight. Shifting between A&B – wouldn't make any difference if it was short / long (eg. a few feet) No complaints re accident task, but did have discussions how to do it. Couldn't use a crane as the area was enclosed ∴ had to lift in manually – couldn't use a rope /cable directly above.	
	Welfare	C/o inadequate supplies 'grit soap in toilets			

Procedures / MS's / RA's / (PTW's) / instruction	Described MS as available & kept in office. States that they were appropriate and thinks that they were followed.	<p>All have site induction. This includes provision of MS / RA to read and discuss briefly. They have to sign to say they've got it and are provided with an MS to keep. MS prepared by Project Mgr. People who have gained experience over the years (i.e. learnt how things have been done in the past), study site drawings and see how to access / deal with part weights etc..</p> <p>Consultation for development by self, Project Mgr and Project Technical Director. Info. 'often' revised. Instruction for this task would have been provide in the MS. Also covered in the CSCS course, but not specifically addressing MH.</p> <p>This task had never been subject of TBT, but general MH had.</p> <p>All instruction / training under 'constant review' by Safety Mgr – 'people need to sign for things ... it's a legal thing'</p>	<p>S.O. doesn't see MS / RA.</p> <p>For the walls these documents were prepared by Project Mgr and or Supervisor.</p> <p>The RA = 9 matrix or simpler system of L/M/H.</p> <p>S.O. produced the outline format. The MS and RA were separate but integrated together.</p> <p>MS is prepared in draft for the tender and then developed by Project Mgr when the work starts.</p> <p>Required materials = Set out of the job, layout, terrain, drawings and experience. Go to site and use all materials together</p> <p>Re. Consultation A= Y, SCs get a practical input and d/w the ops too pm and he may speak to experienced people too.</p> <p>Materials are kept in site files and issued at induction too.</p> <p>Info. is reviewed and evaluated as job progresses – the Supervisor / Project Mgr handle</p> <p>Also use TBTs and training notice board as additional resources.</p>	<p>MH regs provide info required for the work</p> <p>Q = how did you ensure adequate regard was paid to H&S during design A = Generally = a regular meeting with designer for the risk register (~ 90 specific items). No idea of routine tasks</p> <p>No pretender H&S plan. Never tendered (and this is often the case and a misleading question). PC and PS discussed to ensure materials normally in the pre-tender plan were there</p> <p>The H&S plan was developed between PS and PC</p>
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					<p>SC and PC use the same format site induction</p> <p>A 2 page induction for the lads and 5 page for the Supervisors. .</p> <p>Given a copy + MS to sign</p> <p>Not sure if any instruction / training provided to undertake the accident task – not as such.</p> <p>Maybe a TBT for ‘T.I.L.E.’. Plus thee SCs have a lot of experience too.</p> <p>This accident was the subject of a TBT after the accident..</p> <p>It’s very different to have an angle set inside a concrete fixture rather than applied outside of a frame.</p> <p>Induction /instruction / training methods are regularly / ongoing evaluated.</p> <p>The guy doing the job was an expert – competent +++ in fixing.</p>
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ACCIDENT 005 – Non- reportable accident

	Safety culture comments	Alright, but thinks that there are too any on site and that they are too fast.	Thinks its fairly strict.	Average	Very good Feels that the HSE should publish more accident details. Its difficult to know how to disseminate info – learn through own experiences This accident lesson will not get beyond the SC / PC team ∴ how succinctly accident types are made available to people. Need info on thousands of the smaller accident types. Info needs to get past first base - other designers don't get to hear the info.
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ACCIDENT 005 – Non- reportable accident

Skills & Abilities / Training	<p>3½y in industry. Previously sprayed cars for 3m. All training provided on the job, thinks this adequate. Also had cherry picker and scissor lift TBTs this year. Has had ~ 30 site inductions – no value – tell you what you already know.</p>	<p>Numerous CITB short courses. Finds all adequate. Plenty of inductions in past 4-5y – need for site familiarisation. No training in human capabilities and performance, but knows ‘on own experience’.</p>	<p>12m visiting this site. Started in industry as assistant labourer → office as estimator → Visiting Supervisor → Contracts Mgr. Always in roofing. Feels employment is secure with this company, but nothing is certain in the industry – just a number. Did NEBOSH General Construction Certificate in 1989/9 (22d on day release). Wasn’t much formally for roofing industry. In past 5y has done short courses in scaffolding, safety and roof work + CDM. Like Civil service – otherwise hands on training – companies were bigger & did apprentices etc.. Brief training in human capabilities and performance. ‘Too much on behavioural side which can mean that you can get out of touch with the physical nature of the job. More concerned about learning the physical practical side of the safety job.’ Thinks training is adequate – ‘get a ticket at end’ Has had ~ 6 site inductions. These offer value – a yard mark of own inductions.</p>	<p>Ensured designer competence by knowledge of experience and performance. Ensured that designer was adequately resourced by ongoing discussion and checked that the design programmes were achievable</p> <p>Designer (as PS) may originally have advised on competence and resources when considering appointments and some parts they were involved in.</p> <p>His company were appointed upon appt. of PC. Designer handed over partly completed RA’s and materials for H&S file from when they were PS. A long way off suitable for final task.</p> <p>Feels that responsibilities are clearly stated in CDM / C(HSW) and that his job role had been appropriately used on this project.</p> <p>Been a PS for 6y and in construction industry 37y – previously a design contractor and design consultant Feels employment is secure with this company and in the industry Doesn’t belong to a TU</p> <p>Originally a BSc in Mech Sciences – had ~ 2m on the job training through short courses</p>
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				<p>No formal H&S training – all acquired over the years.</p> <p>Considerable involvement in Safety Initiative / HSE / CDM issues</p> <p>No training in human capabilities and performance.</p> <p>Doesn't think that training is adequate as its an ongoing thing</p> <p>Member of ICE, does 16d.yr of CPD</p> <p>Always gets inducted (had ~ 24) – often has to ask for them.</p> <p>Some offer value & it's a chance for the contractor to show that he'll do what he says he'll do. Recounted a story that he'd sometimes then try to walk onto site without hat / boots to see if he gets pulled up on it – if not he challenges the Site Mgr to i.d why this wasn't picked up</p> <p>To do the PS role – need design capabilities ∴ PC as contractor farmed PS role as they didn't have these skills. Unusual aspects of the design get a very close scrutiny. BUT construction problems now are the things that are not unusual.</p>
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ACCIDENT 005 – Non-reportable accident

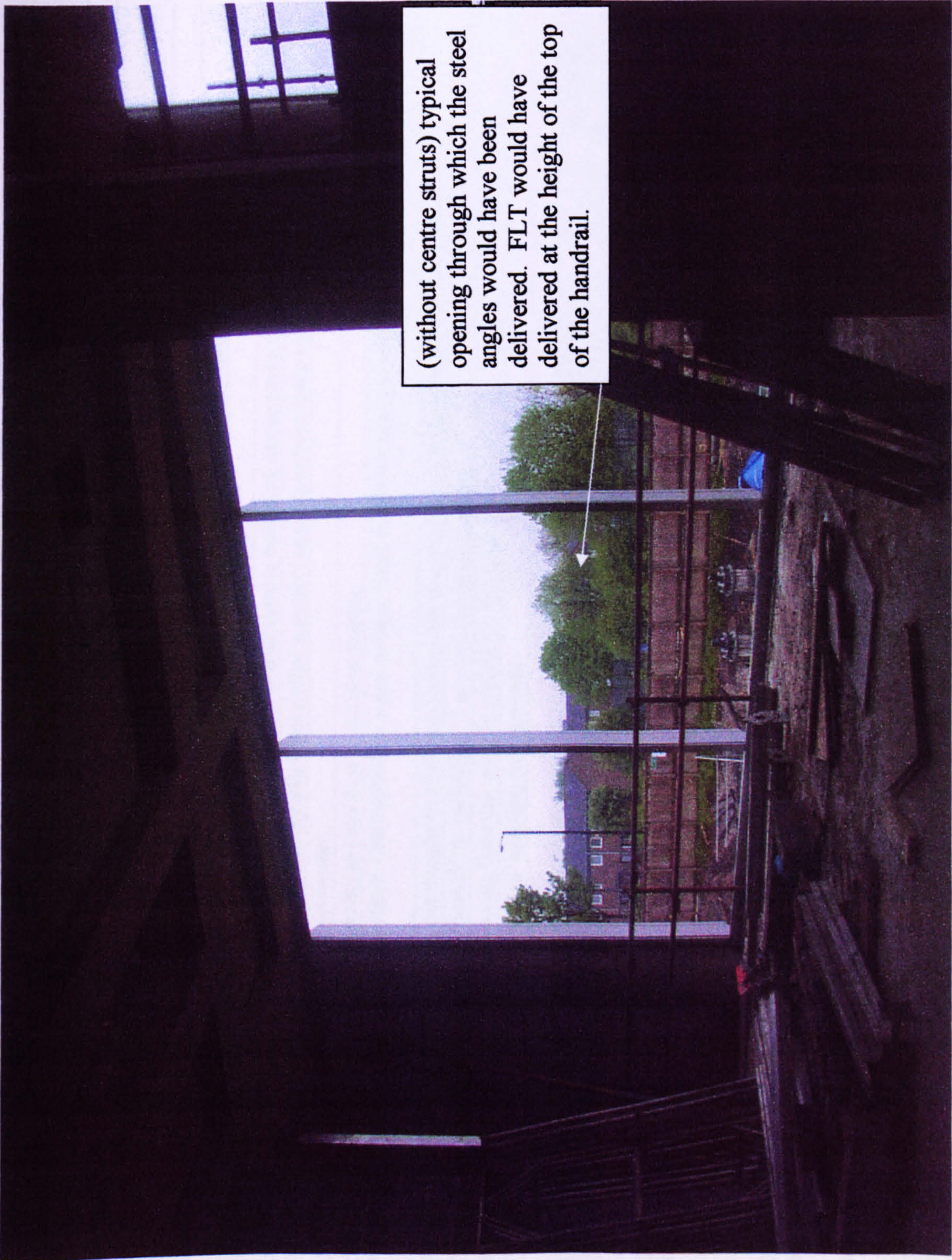
					PS never get to know about these types of small accidents
PERSONAL DETAILS					
Age	19	41	53	59	
Domestic	10mins travel each way.	50 miles & 1 hr travel each way	Lives at home. Annual work mileage = 23k	Home ~ 9k/yr, but formerly 27k/yr (a one off)	
Absences			4w paid holiday, no sick No paid work outside this job	3w holiday and 2-3d absence. Unpaid – consultancy No paid work outside this job	
Previous accidents	2y ago – scaffold fall – cuts and bruises.				
Health related	Good health & no health problems				
Motivation / satisfaction	Best parts of job = doing glazing (as its harder to do) + working with father & uncle (laugh). Worst parts of job = standing about (rare) Would prefer to be a footballer Feels others don't really listen to his ideas – their experience overrides his.	Best parts = being busy Worst parts = sometimes the same. Cant think of more, perhaps pressure to perform.	Yes, has an appropriate level of responsibility in work. No doesn't have opportunities to use all skills and abilities ' safety covers everything, but is so fine line and non-contractual. Not what we do as a day job' <u>Best parts</u> = low major accident rate and if related to influencing this then = benefit <u>Worst parts</u> = Own management arguing against the obvious (safety context) <u>Rating scale</u>	No, doesn't have an appropriate level of responsibility in work. Yes, has opportunities to use all skills and abilities ' <u>Best parts</u> = lifelong interest in design and construction. Likes doing it and seeing things getting built <u>Worst parts</u> = Beurocratic struggles. Some of the garbage for H&S file. Poor quality H&S	

				<p>Disagreed with 'my job meets my expectations' – never expected to be a S.O. – told by his MD that he wanted him to be a S.O.</p> <p>Disagreed with 'I would recommend my job and place of work to a friend' – its not a job I would have chosen</p> <p>Completely disagreed with 'I would chose the same job in the same place again' – lack of involvement of general goings on day to day</p> <p>Completely disagreed with 'My fellow workers accept and support my new ideas' – majority not happy to do so – fight and struggle to put new methods in place & the moment you leave them it tumbles.</p>	
EVALUATION OF WRITTEN INFO	Discussed with Safety Mgr of site at time of accident – advised that the MS reference is <i>"Unloading and handling of materials will be carried out by forklift or crane and then manually handled into position."</i>				
	MS and RA later supplied by SC S.O. during follow up interview & D/W Construction Specialist to get meaning and review content.				

ACCIDENT 005 – Non-reportable accident

Method statement Nov 01	<p>Not provided with all the data, but MS was only approved by PC on its third revision. The MS is 3 pages long and would have the RA and COSHH assessments attached.</p> <p>Layout = good, but heavy use of block capitals. These are for the 10 main headings</p> <p>Heading 4 – Manual Handling & storage’ – indicates that “Heavy materials will be placed on the various floor levels by the Telehandler”” – <i>presumably this did not happen, as there is no indication how the angles will get off the forks and onto the ground / their storage area.</i></p> <p>Heading 7 – ‘Erection sequence’ – <i>Twelve steps. BUT no reference at all as to how the angles get off the scissor lift and onto the forks of the Genie. The sequence of the process is clear, but there is no reference to the required techniques and operative interaction</i></p> <ul style="list-style-type: none">• Prepared by Project Mgr – will he be doing the job – I doubt it.• Nothing here relating it to the SC who actually undertook the work• No reference to the skill base requirements of whoever undertakes the task• No reference to any special training requirements for task execution use of equipment (genie specially brought in and adapted for this work)•
Risk Assessment Nov. 01	<p>Numerical system whereby risk = a calculation of probability x severity. A score of up to 9 can be allocated for either ∴ highest risk = a score of 81. Six potential hazards were listed (including ‘movement of plant’ 6x6=36 and ‘material handling’ 6x6=36) and a final score of 330. There is no indication of how the scores were obtained, or what to do with them once calculated</p> <p>A further six ‘existing measures or other factors’ were also listed and this included ‘trained personnel instructed in movement of plant and banksman’. 4x6=24. Don’t understand how the score applies here or for the other five measures listed. Some additional supporting notes to the RA = “All operatives will be site inducted and issued with methods statements. Instructed in daily work procedures.....Given Regular TBTs” - I think this must be the cross reference to training for the work, but these statements are very general and could apply under any work situation and not necessarily this.</p> <p>There is no MH assessment</p> <p>The angle is not part of the Spanwall system. The designers could have designed the angle so that it was not required at height (an extra sized angle could be at floor level to take load from the adjacent floor levels – a ceiling level angle would not then be required. BUT this would be more expensive and require a more complex fitting (cost and time implications)</p> <p>Also no comment in the MS re. lifting all the angles to the work level. Interviewee commented that they were in the process of lifting 10 angles. Each is 9m long and would ∴ fit 5 inter-column spaces</p>
D/W Construction Specialist A.G. 5.11.01	
EVALUATION AT TASK AREA	<ul style="list-style-type: none">• Very difficult – work mostly completed now. Similar areas seen.• Wonder how they got angle iron to top of ceiling to fix in place?





SUMMARY

• IP had no experience of manoeuvring steel angles
• MH trainer (also 2 nd person) 1ft taller than IP – shows a fundamental lack of understanding of a 2 person lift
• Load also greatly exceeds guide load in MH (Manual Handling) Regs.
• Technique could have been done using a sling & MH could have been avoided / greatly reduced
• Described non use of sling as had always managed before, but had also stated that this is first time with steel angles
• Would half size steel angles been appropriate for the build, but would that then make people even more likely to MH them
• Impression of time pressure from brickies, but no perception of this by site supervisor
• Impression from Site Supervisor that there is generally insufficient consultation re build with Management Contractor
• Also seems that culture is that SC goes ahead with decisions that earlier in project might have been made by PC Mgr
• IP couldn't keep up with speed of taller co-worker
• IP described lack of consultation / opportunity to contribute in decision making
• Both interviewees happy with task supervision – but supervisor seems to have failed in MH training and in realising that trainee needs more time/opportunity to communicate
• IP not sure about whether MS followed, but thought that MS was appropriate in any case – institutionalisation re this process
• Countersignature to defer responsibility from SC to individual - ? any legal grounding at all.
• General MH was a previous TBT, but learning from this was not applied for this task
• MS – no reference to possible consequences of handling requirements

Construction specialists (initials RD and AG)		Ergonomics specialists (initials RH and DG)	Me / other
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>	
(RD) SC Training Manager Planning Supervisor Architect / frame designer		(RH) SC Safety Adviser – MS prep	H&S Generic – motivation of safety personnel AG discussion – angle design alternatives

Follow-up

Info from PC S.O indicated relevant designer. Spoke to [named person] as he suggested, but was told that their input was the design of the concept, but that the design of the angle and fix would be SC. Designer acted as Performance Specifier, but the area of responsibility would be with SC– Project Mgr. They would not wish to cloud our judgement about this issue; and not being a safety person and would not wish to be involved in the research at this stage. Would however consider it if there was still a need to speak with them after having spoken to SCs.

Supplementary Q's to S.O at follow-up interview

1. Training

ACCIDENT 005 – Non-reportable accident

- a. What MH training is given (all and accidentees)
TBT. Based on assessment of capabilities of team and understanding experience). Don't ask re. lifting and handling skills/ experience – happy that they were competent and able. Previous work and very happy with them
 - b. Does it cover the issues relevant to this task
Not aware of anyone working for them that has done MH. Normally outside of the training, but covers it using the HSE pictures in induction – (?Beany man scanned from HSE materials). Aches and pains possibilities – guy will soon tell you if something not physically possible.
 - c. Is it for all new recruits
 - d. Does CSCS cover this too
 - e. Is there refresher / TBT on MH
 - f. What training do supervisors have in providing MH training
Just the induction stuff. MH not a major issue re. repetitiveness of the function. No two tasks are alike (as in a factory). MH (weight) not a problem when looking at stats of accident history ... its without norm of what they do.
2. Design
 - a. Who did the detailed design of this part of the steel work
Designer produced the principle of the thing and they had an outside firm [company name] who designed the angle and capability of the angle to do the job when fixed.
 - b. Was the means of handling / erection considered
Yes – it was a professional drafting and engineering service ∴ need the angle to take physical pressures of building, weather and fixing types. Would have used [company name] materials for RA /MS – extremely rare to have angles of this weight – generally can mechanically handle them and they are smaller / lighter)
 - c. Was MH a recognised issue
 - d. Would the size / weight etc.. of components be considered and by whom
If a half ton would have perceived it as more of a problem, but primary function is to make sure its fit for purpose. Thinks that since use of CAD was introduced that this has been responsible for weird and wonderful designs / architecture
 - e. Are materials dimensions specified in an order or is there any leeway
Both specified and own company choice. Depends on whether employed to do work. Most ordering of [this] done by Project Manager for walls.

3. Planning

- a. What procedures / protocols are followed in MS/RA preparation
- b. If MH is specified in an individual assessment done
No
- c. What are the alternative methods for moving such materials (unload from trestles / bites)
Didn't change in any particular way, given the confines of the workspace. Made a special purchase of a manually operated hoist with which to manoeuvre and raise the angles within the building. The forks had to be especially extended to be able to position the angles while they were fixed

ACCIDENT 005 – Non-reportable accident

During the early stages of the interview with the S.O. he spontaneously suggested that I speak with the IP Supervisor. When I bought this up later in the interview he said that he’s ask him, but then didn’t seem that hopeful. I discovered later that he had spoken with him ‘do you wish to give your time’ and that his response was ‘who’s paying me for this ----- off’. I wonder if the response would have been the same if the request had come earlier, or from somebody else. I would especially have liked to explore why they were handling them manually (perhaps pressure from the electricians or perhaps the hoist was no use??). What a shame to get this response.

SUMMARY – POST FOLLOW-UP

• S.O. reluctantly accepted post and appears to feel it is not appreciated – that he is now less of the gang and this his opinion is now less valued/welcome
• Implications to info. quality & dissemination given
• S.O. thinks accident just a fluke – has not questioned the wider issues – such as why it was being handled at all given the control measures developed
• S.O did not investigate - ?? his real understanding of MH issues / exploring for underlying causes
• ?? S.O. criteria upon which he investigates
• P.S – no knowledge of accident or other similar ‘smaller’ accidents. Implication for learning process
• PS role assumed after project concept - ? disparity in ownership / loss of role clarity
• MS did not address MMH – incomplete
• RA poor and has not addressed the issues
• RA score system is meaningless
• RA accompanying text is a glib contribution towards risk reduction – too broad /lip service

ACCIDENT 010 – Dangerous occurrence

DANGEROUS OCCURENCE		Operatives were on level one striking out a box next to a column. They knew that the formwork would drop a single level and as per procedures they cordoned off the area below. The area directly below was of the same design, but the box had already been knocked out and a board placed had been placed over the cavity. As the formwork was knocked out if fell down onto the board on the ground level, went straight through it and landed in the basement. Two brickies and the S.O were 3 – 4 ft away from the falling debris in the basement (brickie sustained a slight scratch as the boarding dropped flat to the floor, but this has been recorded as a D.O.) May, Tuesday. Company information – it was not possible to obtain this during the site visit. The men who knocked out the formwork were not available for interview.
Company response		When undertaking this procedure in the future ensure that double ply board is used. Written procedures not yet updated
		ERGONOMICS EVALUATION – Safety Officer
DESIGN RELATED	Task details <i>*content</i> <i>*work area</i> <i>*Plant, tool.</i> <i>equipment</i>	Operatives on the roof (currently Level 1) were knocking out a box next to a column. All procedures to cordon of the lower level had been followed. 2 brickies and S.O. working close by in the basement. No knowledge of work 2 floors higher. Didn't know if there is anything difficult about this task – nothing difficult concerning tools, equipment, materials Off-cuts of board are used for the decking. No proprietary board system, just whatever is around. Marine ply
	Environment	
	PPE	

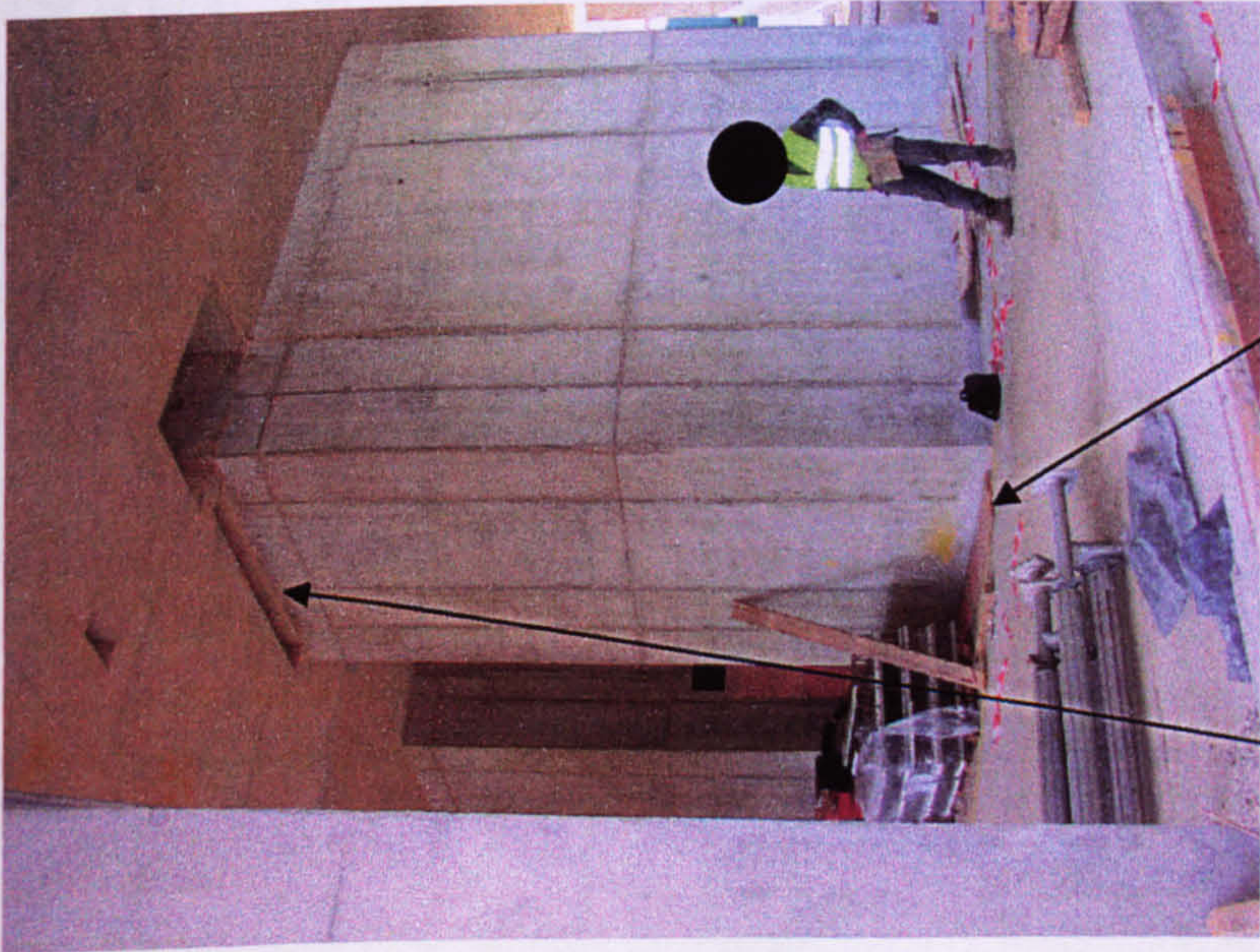
ACCIDENT 010 – Dangerous occurrence

PLANNING, SUPERVISION & MANAGEMENT	
Work scheduling	Not known if there were any schedule delays
Work organisation	<p>Not a skilled task, any labourers would knock out the box.</p> <p>Not known if any unexpected work or unplanned changes in the work.</p> <p>MS are used to ensure that there is no overlap. Meet to discuss these every 1 - 2w to discuss + further information / documentation on safety etc..</p> <p>As Construction Mgrs they try to encourage contractors to communicate between themselves.</p> <p>S.O. ensures compliance with site rules by presence, walk-round and checks. Can also give site unsafe and site stop notices.</p> <p>Says provision of info and training to contractor employees should be provided by the SC, but he will assist pm.</p>
Work pace	<p>Didn't really think there was any speed competition among contractor teams on site</p> <p>Didn't think that time pressure was relevant to this incident.</p> <p>Thinks that business / making money can conflict with working safely</p>
Target / Payment issues	
Supervision / management	<p>Thinks general supervision is low and would prefer more foremen.</p> <p>Thought level of task supervision was not adequate (the supervisors are <u>working</u> foremen), but the task was simple and had been set out correctly.</p> <p>SC would normally expect PC to offer some supervision; this doesn't happen with Construction Mgmt, but the SC have not changed their own practices.</p> <p>Thought that the project management was fine on the day of the incident, but in general thinks that the SC do not project manage well.</p> <p>Didn't think, in hindsight, that there were any hazards that should have been acted upon / reported.</p>
Welfare	

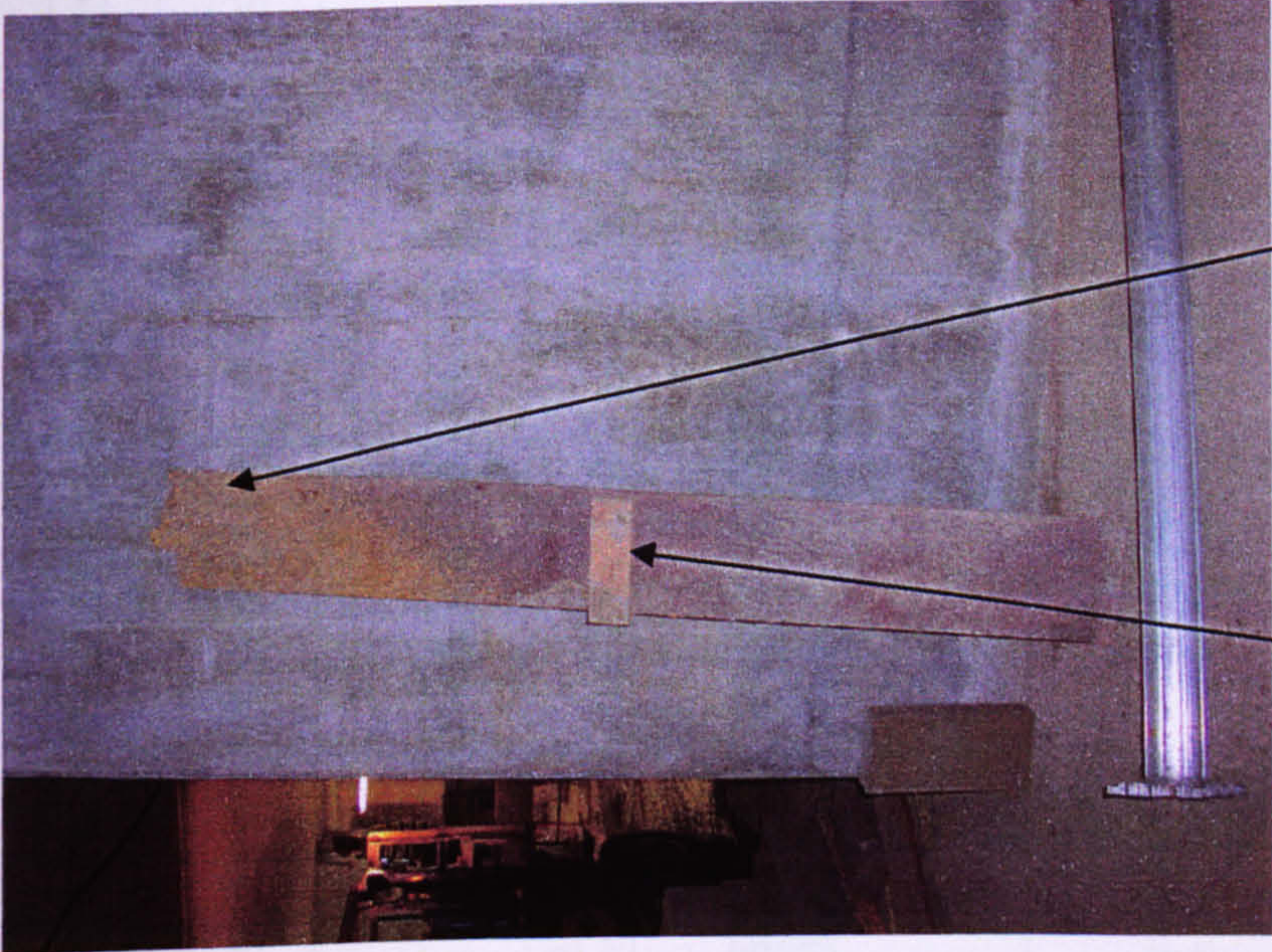
ACCIDENT 010 – Dangerous occurrence

	Procedures / MS's / RA's / (PTW's) / instruction	Describes a generic MS for striking formwork. When MS's are being prepared he comments on them and then returns to SC. Says nobody at site level is consulted about MS content – they are told what to do The information is evaluated 4w before work starts – not otherwise revised unless sth doesn't work. Says RA may have been a separate sheet, but probably not.
	Safety culture comments	SC also provide their own TBTs – people often learn on the job. 'pretty good' – SC will react if asked, but do nil spontaneously (costs money) Safety Committee meets 2 weekly. Can join TU – no reps on site.
	Skills & Abilities / Training	11m on site and 11m since qualifying (+ 1y sandwich course – BSc OH &S) Feels has appropriate level of responsibility, but doesn't have opportunity to the range of his skills (eg. Environment assessments). Cant have the equipment as they have no direct labour on site. Also thinks that not being call ed Mgr lowers his credibility.

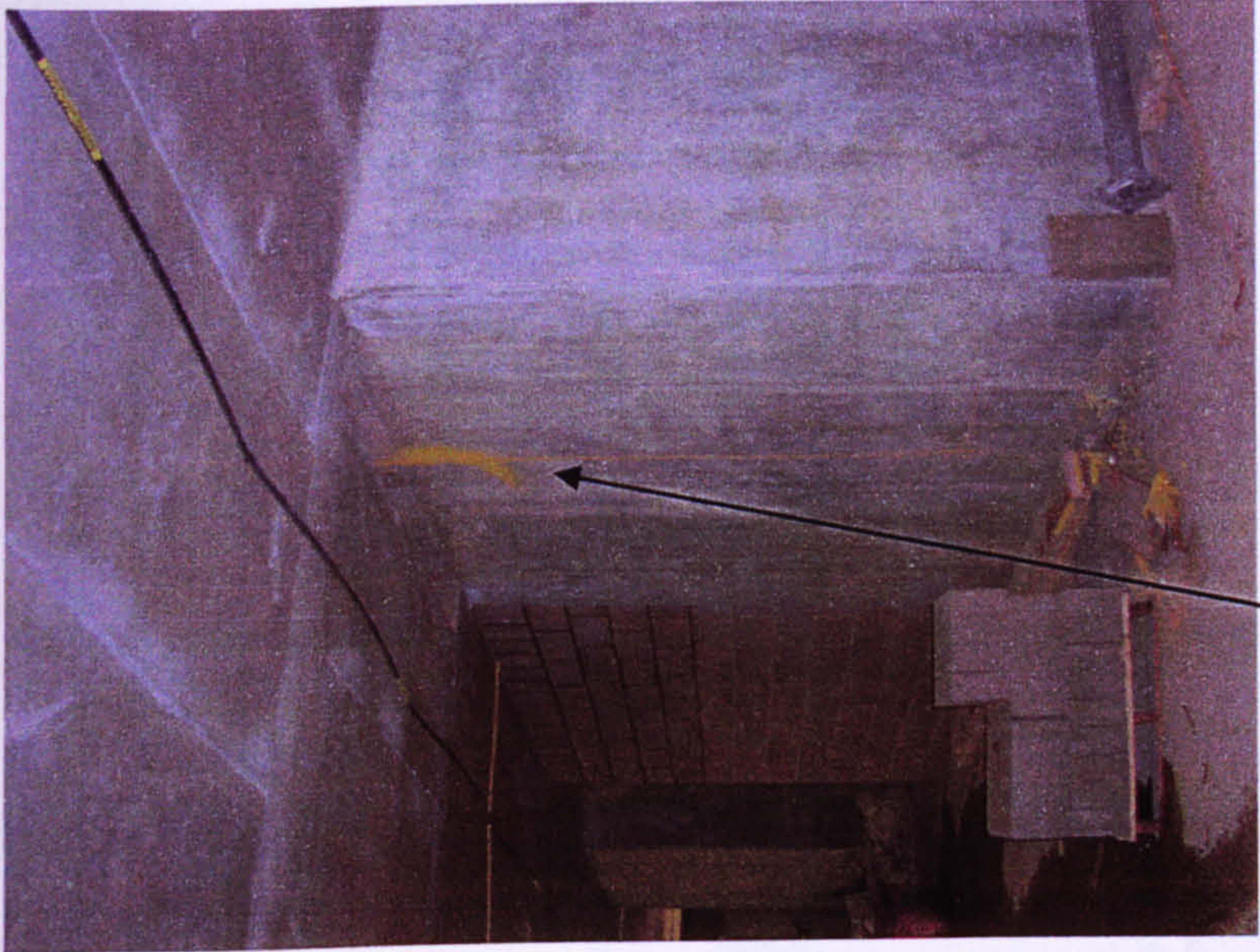
EVALUATION OF WRITTEN INFO		
Method statement	Requested – but already advised that the programme would say ‘strike out box’	
Risk Assessment	Requested	
EVALUATION AT TASK AREA		
	• Board that had covered hole 300mm wide, whereas the replacement board measures 420mm	
	• Board over hole had a batton nailed underneath, length 284mm, therefore 16mm overlap only onto the floor surface. Board that fell through the two levels 240 x 895 x 20 (quite heavy, but couldn’t weigh).	
	• Board was splintered at one end, indicating that it had shattered at some stage – unknown if this was before or after the incident	



Box knocked out and replacement ply covering similar hole through to basement



Ply board that failed. Shattered at end. Baton and 16mm overhang



Basement showing paint damage to finished concrete

SUMMARY

•	Risk of ply damage had not been anticipated in the risk assessment – procedures had been followed
•	Ply ‘lying around’, is used for covering holes - ? is quality assessed
•	Specification dimensions to cover openings – do they exist.
•	Some conflict in roles – as a Construction Management contract the roles of S.O. / Supervisor lack clarity
•	Impression of overall dissatisfaction
•	S.O. did not appear to consider ply board dimensions as a hazard in the accident
•	Need generic MS
•	Wonder why changes to procedure have not been written in yet? – does this reflect a lack of priority OR are written methods a formality superseded in reality by verbal communications?
•	Impression that SC do little toward safety proactively
•	S.O . appeared well liked but I had the impression that he was a bit of a ‘lamb’ on this site. Not sure what support he gets from superiors.

	Construction specialists (initials RD and AG)		Ergonomics specialists (initials RH and DG)	Me / other
	Done	Follow-up unsuccessful	Not pursued / not possible / info already available	
10	(RD) Site Engineer – formwork MS/RA preparation Training Safety - Guidelines for ply use		(RH) Designer – alternative methods RA	Temporary Works Designer – generic CITB

FOLLOW_UP DISCUSSION = Safety Adviser

- Striking formwork from level 1, it fell down and through ply (covering a hole) landing finally in the basement close to yourself and another person working.

Q = With the benefit of hindsight are you happy with the risk assessment of this activity, or was anything important missed?

- No

Q = Are there any standard guidelines on the thickness of ply to use for such a cover and dimensions that should be allowed to border around the edges of the cover?

- None, the board should be secure / nailed in place.

Q = I know you are using the double thickness now, and wonder if an Engineer has determined this through calculation?

- No

FOLLOW-UP DISCUSSION – TEMPORARY WORKS DESIGNER

They should have had something there to catch it. Its very dangerous to have a system whereby it drops to the floor. To have an approach like that is poor. Should never work on the assumption that it would drop the full 3m. The kinetic energy at that distance would be 4 or 5 times the load (with the speed accumulation too).

ACCIDENT 010 – Dangerous occurrence

Problem is down to site management.

Q = how do you know this?

A = Knows through common sense – learn by it happening to you. Try to disseminate info – but its often just on the grapevine.

It should have been in the MS on how to do it. MS would be on erection, use and dismantling. Need a system of signing off at each stage 1 –2 3. Programmes are tight, and there is not enough equipment / availability.

Equipment quality should be maintained, but if a contractor has no yard its difficult to clean. There are proprietary products for cleaning steel and aluminium. Steel rusts, but aluminium is weaker.

Use of ply is very traditional (last 20 –30y) and still has a good quality of finish. Can use steel for this task type, but its more expensive, has to be made up especially for the aperture size and is less easy to handle.

ACCIDENT 038 – Over 3 day absence accident

OVER 3D ACCIDENT		'Whilst moving fuel bowser from XXX to XXXX trailer. Jockey wheel slide on clamp and wrenched left arm and shoulder'. (Quote form accident report). September 10.00 Tuesday	
		ERGONOMICS EVALUATION – 'LEADING DRIVER'	ERGONOMICS EVAL. –MAINTENANCE INSPECTOR
DESIGN RELATED	Task details *content *work area *Plant, tool. equipment	30y old Leading driver. His work involves general landscape duties (grass / tree cutting) and general assistant work)-. With employer and on-site for 2 ½y and 5-6y experience in the industry. Accident description = There's a diesel bowser round the corner. Went to move it and the jockey wheel gave way. The jockey wheel supports the front – didn't break. As it gave way had to take the whole weight of load on his left arm. This exacerbated an old injury and now he may have cortisone injections. Remedial action= not sure. Thinks that they've been looking into different types of jockey wheel.	46y old Maintenance Inspector. His work involves supervision and co-ordination of 17 men, programming of the work and writing of all the MS's RA's. Opinion of accident cause = As it was explained to him - as the IP went to lift the trailer the jockey wheel slipped through the coupling and all the load suddenly came o his arm Remedial action = Has had a look at it. The S.O has proposed a rolling programme to modify the design, but is dubious as this design is the same for all jockey wheels (eg for caravan tow bars and such like) everywhere.

ACCIDENT 038 – Over 3 day absence accident

	<p>His task was in preparation to tow the bowser to where the new pump needed to be fitted. He had to move it back and out to clear the fire escape – this involves unlocking the chain, moving it out of the way and getting it in line of the van.</p> <p>No other simultaneous tasks . rated as ‘1’ very easy. Felt that he had the skill and experience to undertake his task. Had never previously received any task training.</p> <p>No task interruptions, known risks (‘diesel in bowser, but no way it could get to me’), unusual events (‘normal day’) or training in progress.</p> <p>His mate was reversing the vehicle to the bowser position, while he handled the bowser – this was the normal routine.</p> <p>Was out in the yard –felt that there was plenty of space for him and the bowser</p> <p>No information from suppliers on how to use but did have some operating training when started. Basic training on how to use it, how to read the filling information (also tells you on the tap), how to plug into the mains. This did not include van link instructions, but ‘common sense’.</p> <p>Thought housekeeping OK – gets occasional flooding.</p> <p>Never reported any problems about his work relevant to the accident. Doesn’t know if anyone else has ever had a similar accident.</p>	<p>Nil difficult about the task – a routine activity. The only problem being that the load is fluid and can shift.</p>
Environment	Overcast-dry	

ACCIDENT 038 – Over 3 day absence accident

PLANNING, SUPERVISION & MANAGEMENT		PPE	Boots, hat, gloves and trousers – nil specific for this work task and all provided by employer. Has had training in use / c/o PPE . Commented that there's always a good range available, its comfortable and quite a good choice.	A lot of people input into choice of the PPE – S.O, men, Project Mgr.
Work scheduling		Hours = 39 ½ hrs 8-4.30 (and 4pm Fridays and every 3 rd Friday as a day off) – OT is up to his own choice. No delays in the work. This was not a skilled job. He didn't know that they were going to be asked to take the bowser down – but wouldn't normally have known. Usually gives the work out in the mornings. Unplanned changes are a daily occurrence and the work has to be re-organised each morning.		

ACCIDENT 038 – Over 3 day absence accident

Work organisation	No other trades around at the time of the accident. Co-worker was known to him. Task usually only takes one person – reverse the van and then push the bower onto it. Its usually empty, but this time it had 600L diesel in it. Not sure but thinks that he's lifted the bowser full ~ x2 before. No recent changes in work org. Work arrangements are set up by Manager. Feels consulted about work organisation all the time and about safety matters – if there's a need then tells Mgr. There are no production targets and there were no time / production pressures	Q re. assessing competence of new starters = when people first start they are useless. A lot of their training is site specific. They have baseline qualifications for general jobs, but there are no specific skill requirements for general labourers New labourers get pre-employment medicals. There is more frequent health surveillance for those with known health problems. A 3 yearly medical for Abseilers or otherwise a 5y medical. All employees are employed (as opposed to self-employed to the employer) In discussing trade overlap – gets all together and goes through the MS with all the trades / roles Little communication with TU reps, but they are available. Safety reps are site based In planning team work first looks at skills and then compatibility. Not aware that there were any problems in getting the men together for this work gang and felt that he could meet the developing a team criteria. Has felt pressured to proceed without correct materials / equipment as jobs can have a deadline or because equipment can be refused on cost. Organises sub-contracting – this is determined by the need for more men, specialist skills or for specialist plant. All work is task based, with not much interface between contractors and the men – the contractors work under direct supervision of self / inspectors. Ensures compliance with site rules by Supervision; provision of MS/ RA pre-start and provision of site rules in induction.
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ACCIDENT 038 – Over 3 day absence accident

			<p>Re. provision of info. / training = TBT ~x2 / month. The themes = operational issues / plant</p> <p>Yes- his appointment specifies H&S responsibilities for those that he oversees –the instructions that he follows are in the QA / Safety manual. Performance is not appraised in achieving these.</p>
Work pace	Decides this himself or the two together – not pushed. Doesn't make a difference if either are faster / slower than each other.		<p>Q = Do you do anything you motivate employees to increase productivity? A= there's very little incentive that can be offered – its maintenance work.</p> <p>Not aware of any time pressures at the time of the accident</p> <p>Doesn't think that there is any conflict between working safely and maintaining earning potential</p>
Target / Payment issues	Fixed wage Occ overtime to increase pay is only incentive. Prefers fixed wage – 'you know where you are and there's no tax man to chase up'.		
Supervision / management	Supervisor was in the office when the accident occurred (building that bowser was chained to) – last seen that morning Thinks he was adequately supervised, knows supervisor well and finds him approachable and receptive.		<p>Q- During the accident task was there adequate supervision. A= its not a task that he needed to supervise. The jockey wheels need manual tightening ∴ maybe he needed more supervision</p> <p>In hindsight this jockey wheel is the same as every caravan / trailer in the country – a standard set-up.</p> <p>Has never previously received complaints re. this task / equipment.</p>
Welfare	Thinks breaks are adequate. Food, drink, toilets = Quite good		

ACCIDENT 038 – Over 3 day absence accident

INFORMATION TRANSFER		
Procedures / MS's / RA's / (PTW's) / instruction	None known of	No instruction / training was provided in the accident task. No MH assessment had been undertaken Site induction = video, S.O. talk and giving of site rules. The contractors get something similar, but not the video. No formal method for evaluating the success and communication of induction / instruction / training methods to the men.. The format for MS / RA etc is stipulated by PC. He also uses a 'safe method brief sheet' (for a short duration task) – the PC format is to big for their work (its meant for big construction jobs)
Safety culture comments	Good	Very good

ACCIDENT 038 – Over 3 day absence accident

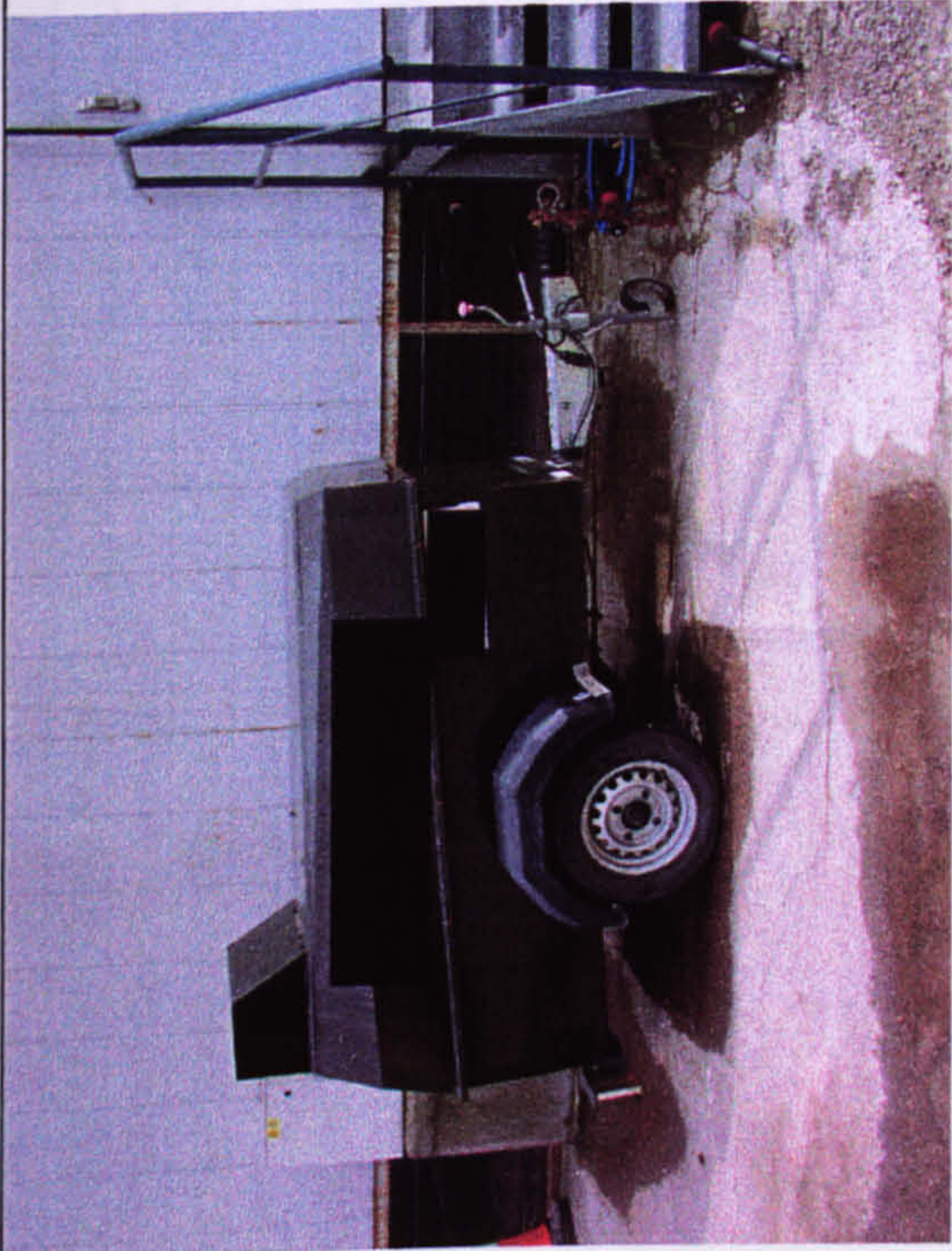
Skills & Abilities / Training	Employed by Client. 5-6y in construction – previously did landscaping. Before that a Butcher – but wanted to work outside	Employed by Client. On this site for 6y and with this employer for 7y. In industry for past 23y. Started from being a pipe fitter / welders mate. Also formerly a structural inspector. Has done courses in ‘non-destructive testing and welding inspection / supervision.
	Did some horticulture training at Agricultural College (Phase 2&3 of YTS). On the job training for butchery.	In the past 5y has done a couple of safety courses – RA’s. Did a crane co-ordinators course ‘this is a form, fill it out and sign – not training !’ Otherwise unsure re other safety training..
	Had a morning of manual handling training in the past 1-2y, ‘but other stuff is more information – such as road closures. Most training is for painter-riggers. MH training is his most advanced training.	No training in human capabilities and performance – occasionally feels that training is just there so that they can say that someone is responsible
	Safety officer provides TBTs – last 1w earlier. Covers things such as look after knives / kit or how to use the accident book. Considers training / access to adequate. Has had ~10 site inductions – ‘they’re just common sense – PPE, power tools, H&S video’.	Feels his employment is secure with this company and in the industry. Belongs to TU Originally employed by County Council and the contract was then taken over by the current client Has had 2 inductions – in one ear and out the other. Not attention grabbing.

PERSONAL DETAILS	
Age	46
Domestic	Lives at home – 30 mins and 30 miles each way
Previous accidents	-

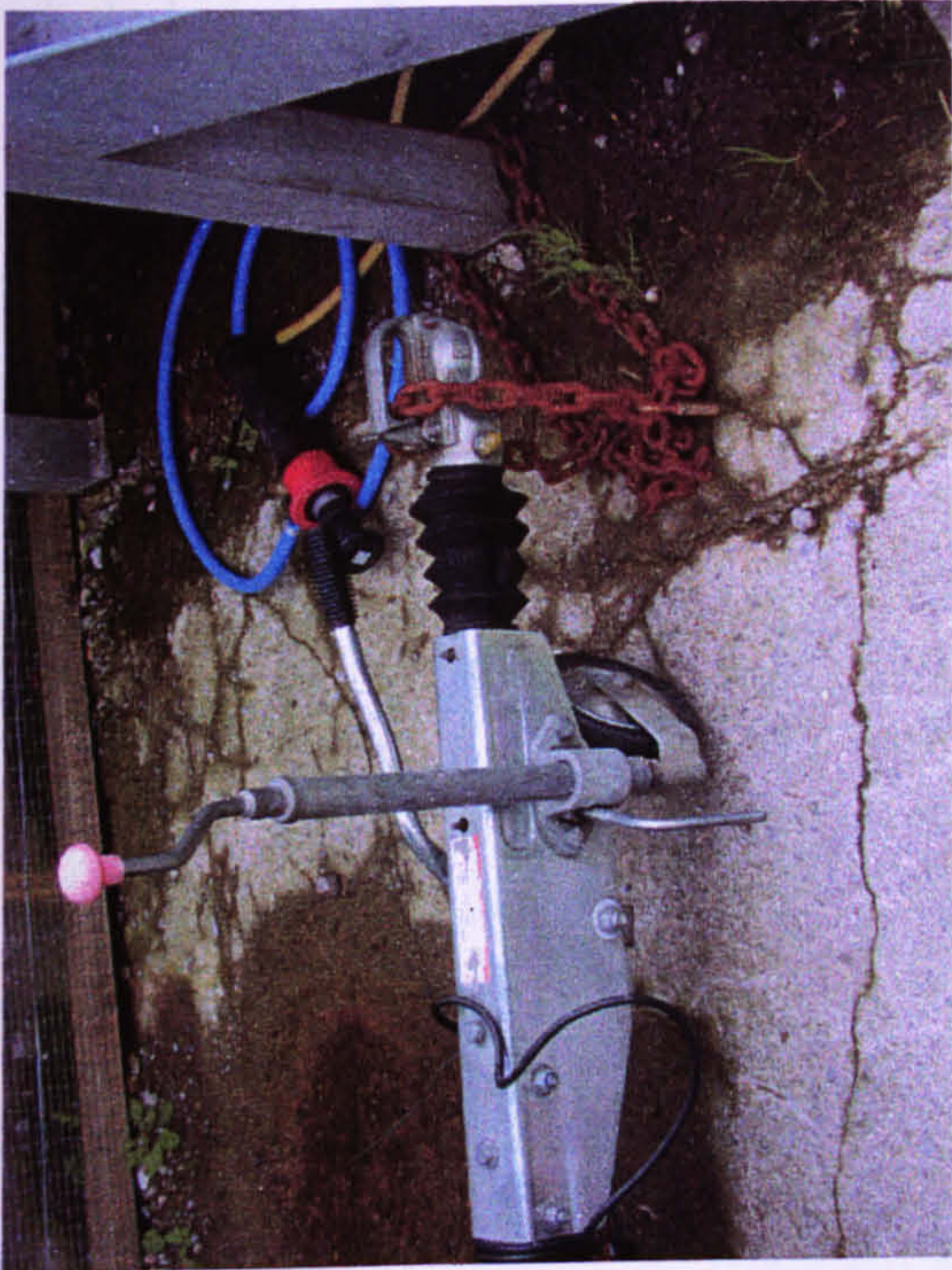
ACCIDENT 038 – Over 3 day absence accident

Absence	3w paid holiday and 3d paid sick leave No paid work outside this job	28 paid holiday, 4d paid sick leave No paid work outside this job
Health related	Average. L shoulder problems – injured in past doing construction work and now re-injured. Even now he tries not to use this arm. Still under c/o Dr. Oral treatment and may have cortisone injections	-
Motivation / satisfaction	<p>Feels he has an appropriate level of responsibility in his work and, most of the time, has opportunities to use all skills and abilities.</p> <p><u>Best parts</u> = Going home – but enjoys it all <u>Worst parts</u> = Strimming embankments – its very difficult to stand on un-level ground. Hard work.</p> <p>Rating scale – completely disagreed with ‘my job is mentally demanding / requires a great deal of mental concentration’.</p> <p>Also disagreed with ‘I would chose the same job in the same place again – said that he doesn’t normally stay in a job too long. Gets bored . and moves on. Is always looking for something better.</p> <p>Also disagreed with ‘my fellow workers accept and support my new ideas’ – says he doesn’t really make any decisions (usually come from Mgmt). He just gets on and does what he has to do.</p>	<p>Feels he has an appropriate level of responsibility in his work and opportunities to use all skills and abilities.</p> <p><u>Best parts</u> = problem solving <u>Worst parts</u> = frustration due to access problems on the bridge. Problems with absenteeism. Everything takes a lot longer than you think that it should</p> <p>Rating scale – Disagreed with ‘I would recommend my job and place of work to a friend- - said that his job is idiosyncratic and couldn’t recommend it.</p> <p>Also disagreed with ‘I would chose the same job in the same place again’ – replied that he’d prefer something a bit more cerebral.</p> <p>Also disagreed with ‘my fellow workers accept and support my new ideas’ – says its OK at peer level, but gets dissent from above / below. He’d prefer to increase the information flow. People keep things to themselves for no good reason.</p>
EVALUATION OF WRITTEN INFO	None	

EVALUATION AT TASK AREA



A fuel bower



Jockey wheel released

The bowser if attached to the fire exit railing for security. Some manipulation would be required to manoeuvre it out of the way, but given the difficulties in holding the load in balance this was not attempted. The bowser was estimated to be ‘half full’ (~300L) while I was there – sample measurements of the downward force at the hand hold area (horizontal) were recorded as 12.15 – 13.95kg. With the jockey wheel released, and the handle angled downwards, sample measurements indicated that the load was 23 – 38.7kg. It was not possible to repeat the assessment with the full load, but I imagine that each weight and attempted manipulation would require a greater effort.

The lever controlling the jockey wheel has no visual / tactile feedback to indicate whether it is securely engaged. This is achieved by screwing the lever. S.O. and Maintenance Engineer on site have already identified these shortcomings, but have not yet identified how / whether they will undertake redesign. The fact that this style is a national standard seemed to make it a daunting prospect (for the Maintenance Officer anyway) – perhaps they could patent it!

SUMMARY

•	Poor jockey wheel / clamp design
•	Lack of manual handling assessment
•	Heavy weight and unstable load
•	Task perceived by IP as ‘common sense’
•	Training had been provided but RA not done / perceived
•	Reluctance to revise jockey wheel design – perhaps because this is a national problem and may feel overwhelmed or that its insurmountable
•	Accident report OK – but English misleads from meaning
•	??? PEM for old injury – apparently all should be seen with HS prn
•	No evidence of OH for re-injury
•	IP concept of risk was re the product rather than the technique
•	Bowser movement is unscheduled work (ie. Need for arises on the day -? Related to lack of RA)
•	Story unclear re whether Bowser is routinely handled full / empty
•	??Supervisor seemed to have low awareness re the bowser related issues – frequency of handling it full etc – he thought that they would handle it full either at this end or upon filling, whereas IP indicated that he had handled it full only a couple of times before – the technique for filling the bowser is not known
•	Employer expects to provide all training on the job
•	Supervisor recounts history of pressure to proceed without correct materials equipment
•	Contractors seem to work in isolation to rest of men and do not work as part of the workforce or get the video at induction
•	Supervisor – no job appraisal in achieving H&S standards
•	Supervisor has developed his own briefing sheet – PC proforma not flexible enough? (off putting for small jobs)
•	Supervisor not impressed with training received
•	Inductions done leave much of a mark upon either
•	IP – not full complement of sick leave
•	IP h/o >3d (unreported) injury when self employed
•	Both appear a bit under-stimulated and lacking in opportunities for development

	Construction specialists (initials RD and AG)	Ergonomics specialists (initials RH and DG)
	Done	Follow-up unsuccessful
	Not pursued / not possible / info already available	
38	(RD) Task technique and work circumstances Equipment design Training of IP and previous user Trailer equipment suppliers	(RH) Jockey wheel mfr Bowser mfr Purchasing & RA criteria Circulation of learning within company

Latent discussion with Site representative

Q = did you go ahead with the planned revision of the tow-bar / jockey wheel

A= No. nothing . no time. Bowser mfrs were known but it was not a bowser problem and no contact

Q = What did you do about communication of the problem to the rest of site – re remedial action?

A= Did a TBT – sat down and reminded them to tighten it up fully. The people at the other bridge probably got to hear about this advice, but it wasn’t disseminated beyond the bridges.

Follow-up - Jockey wheel mfr	
User	
5. What range of users has the product been designed for (age, gender, anthropometry etc..)?	not sure if anthropometric / gender data used etc in design. Have developed an ergonomic handle for caravan use – trailed with 6 people. Handbrake activation must be < 60kg. Put lower force on horseboxes as they tend to be driven by women.
Instruction / training	
8. Is specific training required in order to be able to use the product?	2 times removed as mfrs \ not training. One customer put in a manual with trailer. They do a booklet about repair maintenance and use – but not a legal requirement.
9. Does the product need instructions for use? If yes, in what form have these been provided ?	(none) nose weight is part of the literature. But buyers don’t know all the applications they’re going to sell them to. Also they as mfrs don’t know where they’ll be mounted on the trailer
10. What is the cautionary information for this product (restrictions in use /application) and how do you convey this	
Product characteristics	
(i) Competitor products	
12. How does your product vary with competitor products	Europe use pressed steel rather than cast iron. Cast is more expensive, but UK think its stronger than pressed – but pressed isn’t strong enough because its abused. Pressed = plastic bearings Cast = mechanical bearings
13. Is your product compatible with competitor products / components	Hire companies may replace damaged parts with a lower specification or even use a piece of scaffold tube! Chinese / Indian jockey wheel on market. Cheap - easily bent, dimensions not true. Getting worse, due to no standard
(ii) Product design	
14. From prototype or earlier designs how have you developed your product and what attributes have you aimed to enhance / improve / abandon	Serrated shaft used for 2 ½ tonne load, but they prefer to use more widely as they think its safer. But customers chose their own specification and they don’t have much influence upon their choices
15. Are the physical attributes of the product designed for the users (e.g. size, shape, weight, reach, clearance etc)	Manufacturers have a responsibility to ensure that load onto the nose (tow ball) = < 100kg. EC 9420. Handle for caravan use has a rubber surface, but trailer people wont pay for these extra’s. Bare handles are 12 – 16mm diameter.

16. Do you consult / trial the product with ‘end users’ & how?	Speak to customers for feedback, but not sure about end users. No formal criteria.
18. Are there any British / International / CE standards / guidelines for your product	No EN / BS for jockey wheels, but there is a CE for where the trailer is a piece of equipment in its own right (eg. agricultural equipt.) ad these jockey wheels need to have a CE mark ... but no criteria for judging the jockey. German national Directive – adopted EU wide, except UK. Needs to comply with the Construction and Use 1981 Road Traffic Act
21. What efforts were made to design out the consequences of incorrect use or misuse, or to warn users of them	R clip to stop handle winding down with vibration (? Does anybody use); angles cut on outer to ensure stowed in correct position, weighing devices, automatic jockey wheels.
22. Is positive feedback provided in product use (eg. force resistance) ?	No visual / positive feedback to ensure that the handle is engaged, but this is on the more expensive types
Liaison	
28. Do you have any arrangements / schedule for ongoing liaison with customers	Only military take the right product for the job, rather than just what’s the cheapest. rarely gets to hear about accident with products Does police / expert witness stuff 99% of time related to misuse.
30. Are you ever informed of accidents where your product has been involved	
Comments	No trailer MOT or registration, but rest of Europe do. There they are maintained, serviced and MOT’d. With a lack of legal requirement the system is abused – use cheapest materials and only do what they have to do MOD are developing a new style model with them – they want a simple style activation system for ground clearance and don’t want to have to fiddle around – also available on continent = one where operation id purely top handle. MOD didn’t want two separate deployment mechanisms. Vast majority of continental trailer manufacturers use ‘good style’ and have no concept of integral jockey bracket as part of the coupling. Chassis have to be type approved in Europe, but self-certificated here.

Section 2 – Abridged transcripts of the thirty-six remaining accident studies, detailing an evaluation of the task area, summarised data from site interviews and analysis, suggested follow-up by the construction and Ergonomist specialists, and any latent condition accident specific interviewee reports and findings.

ACCIDENT 001 - Steel fixer. Tying and carrying wire across top mats. End dragged behind, snagged, he pulled it & it sprang back and hit him in the eye → laceration & surgery.

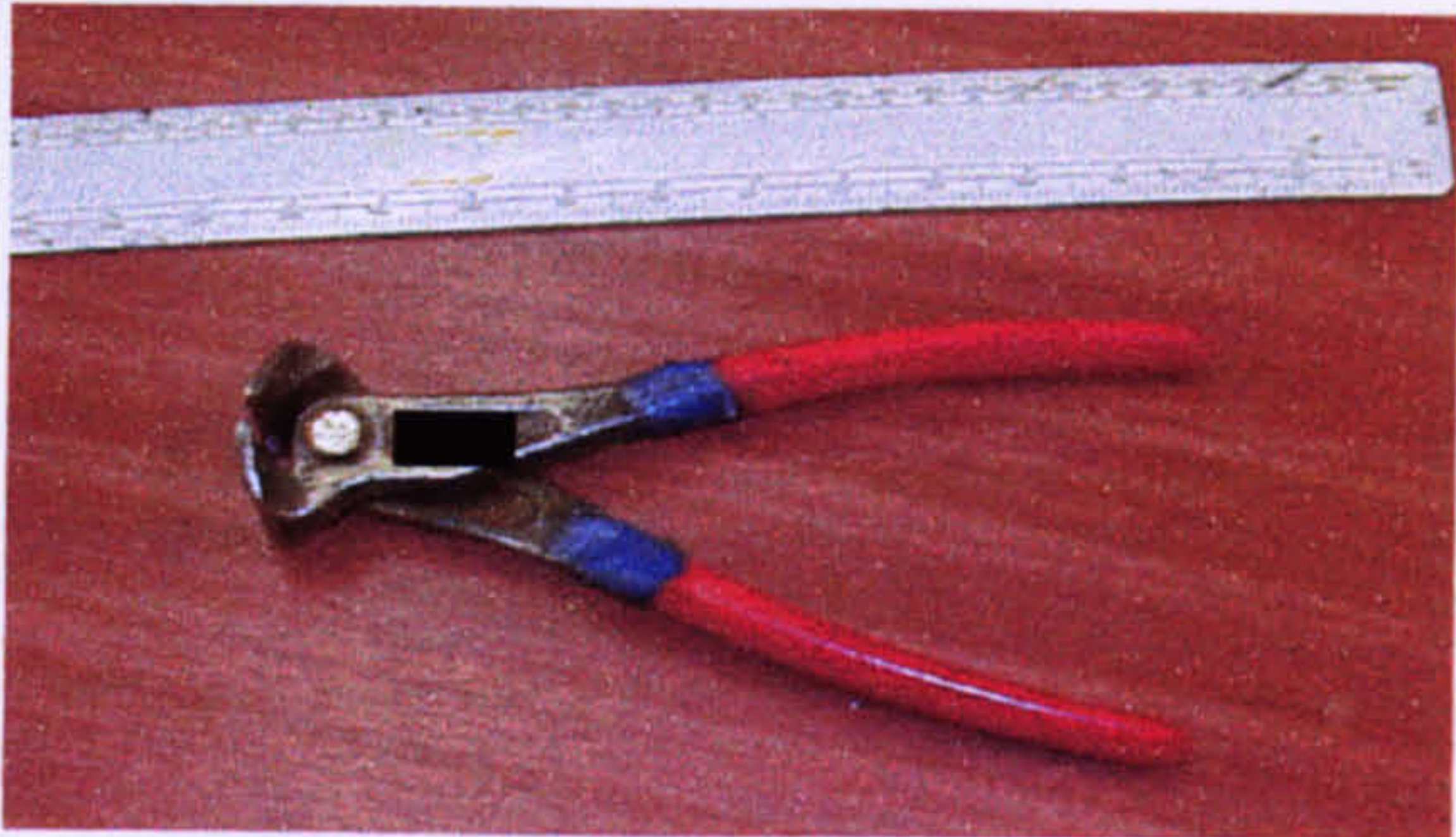
SITE DATA SUMMARY

- No shelter from weather
- Poor environment
- Poor material (quality / presentation for use/ weight/ storage / resolution of known problems)
- Inadequate supply / communication re. PPE
- Long work hours & O/T & travel
- Time pressure
- Safety culture problems
- MS preparation and info transfer (consultation confused & info read to new ops
- High dependence upon core skills (refresher and management supervisory skills apparently not happening)
- Some dissatisfaction among mid-level management grades re. Communication and fulfilment
- Poor tool (inadequate design, not supplied, not PPE compatible)
- Unclear arrangements for prescription of technical solutions by Designer OR selection by PC
- Time pressure when designing concrete frame
- No RA from Designer to PC about this concrete frame work
- Designer training in H&S a bit thin.

EVALUATION AT TASK AREA



Rebar and tying wire



Nips

Work area not seen, but this is a typical rebar and tying activity in progress + a picture of the steel fixer's nips.

Construction specialists	Ergonomics specialists	Me / other
Structural design / Architect – rebar alternatives Project Manager (1/2) <i>Multiple personnel</i>		Reinforced Concrete Council & Assoc for Concrete Frame Contractors—re: tools, preds, techniques Nips evaluation
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Structural design / Architect

- Designers don't specify whether structures should be built on or off site
- Designers may prescribe technical solutions, but the contractor would normally make the choice (such as use of pre-finished components)
- Issues relating to steel fixing considered unlikely to be contained within transfer of residual hazard information to site
- Procurement (and any impact upon safety) is outside the Designers control

- Professional impact on ability to avoid recurrence considered unlikely – control measures within site responsibilities

Ergonomics evaluation

- Site observation and sample evaluation of steel nips revealed risk factors for WRULDs
- Operational manipulation entailed repeated forearm rotation to the extreme of joint rotation to effect the twisting action upon the wire.
- Manipulation of the tool handles entailed lateral deviation of the wrist, concurrent with a power grasp (to hold and twist the steel tie) and the twisting forearm rotation
- Breaking the tie entailed sudden medial deviation of the wrist and concurrent force to break the steel tie
- The nips had no spring release to open the tool, necessitating additional manipulation and finger extension to open the handles during operation
- Steel tying nips observed during the site visit had been modified with the addition of tape over exposed steel between the covered handle and pivot point of the tool. Indication that full handle span was too great (sample nips fully extended = 160mm) for comfortable grasp and manipulation & that are for hand hold was inadequately covered for task purpose
- Analysis of tool trial with PPE use not undertaken
- Automated rebar tying machines are available – criteria for purchase and use unknown

ACCIDENT 003 - Decommissioning phase. Operative using an angle grinder in a small room within a radiological decontamination area. It is thought that ??sparks flew off and ignited the filter of an extractor fan unit causing a fire. No injuries to personnel. As fire was being extracted from the work area it, the alarm was raised by Op's in the room next to that where the work was carried out.

EVALUATION AT TASK AREA

Not possible -

SITE DATA SUMMARY

- Interviewees often defensive and greater attention required to future set up (revision of consent form still in hand) -
- Inability to see work area has inhibited investigation – pictures and records indicate problems with the extractor fan
- Ops not familiar with operating fan / emergency switch
- Switch on outside of work area only
- Position of smoke detector inappropriate?
- Fan filter inadequacy – do Manufacturers know?
- ?Adequacy of in-house fan cover design
- ? cost implication of tooling – all to be disposed of
- Fire watch inhibited by PPE
- Unanticipated and additional training demands of local labour for PC
- ? Adequacy of risk assessment

Construction specialists	Ergonomics specialists	Me / other
<i>Original plant designer – design for destruction</i> People now doing design for decommission (nuclear) <i>Grinder manufacturer</i>	Fan manufacturer <i>H&S person</i> <i>Operative training on protection from sparks</i> <i>Fan purchaser</i>	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

Fan Manufacturer

- They were quite surprised that the fan had caught fire as the spec. for this client is that it should withstand fire at 500⁰ for 10 mins. This was ascertained by a trial whereby the filter was put into a hot oven at 500⁰ and then retested afterwards for efficiency.
- The specification they work to is the UK standard for nuclear safety from Harwell Laboratories (now disbanded with governmental changes ∴ they will continue to make to this standard, but there is no authority to check this anymore).
- The room where scabbling (breaking up) occurs has to be kept under negative pressure to ensure that all waste is directed towards the filter.
- Spark arrestor filters may have been fitted but not by [company name] suppliers
- PC contracted [company name] to do the filtration work – it was up to PC to sort out the ducting and grill (from fan to scabbling room) – the bits that appear to have been involved in the fire
- They have never had any liaison with the people who attach the ducting
- MC air noted the low flow rate supplied by PC. They speculated that this might be because they were using the fan in quite a small room and did not need its full capacity. The flow rate could be reduced by turning off one of the two motors (at the fan base) or by manual manipulation of the inlet damper flow lever.
- Alarms have a manual mute ∴ they may have turned off a fan (deliberately to reduce the pressure) and then muted the alarm.
- The control design may be modified to suit the site requirements, but this would be specified by the customer and probably be input after they had been to do their reconnaissance at [company name] . Otherwise they have never been notified of a requirement to alter the controls and keep to their own specification
- The fan is mobile and is ∴ outside some of the static requirements for equipment in nuclear installations

- Fan has a 'mister' (? Thermistor) control which senses heat and shuts the product down to prevent overheating. Is temperature, but not fume sensitive
- The control panel is all within ~1m from the ground. Their electrician sorts out the layout and they subcontract him to fit out the panel – he does this to his own desired layout (we think)
- There is no user specification – this is down to the customer to specify
- It is always the customer requirements if the product is to be developed – not outside consultants. There have been no further developments in the nuclear industry for a number of years.
- The control panel has the function instructions labelled on it, but there are no cautions / warnings "Press mute, Fire up, Reset mute"
- A Unit can be left on for many hours / months ∴ the only time when people specifically have to interact with it is during filter change.
- [company name] also make a half size unit that can be used in smaller rooms. Few are sold - as they are mobile people want the bigger ones, as these can go anywhere
- The ducting /flexible tubing put onto the end of the fan is up to the customer

Appraisal of design for decommissioning materials

- 4 documents were supplied. (1) Guidance document design reviews (2) Process for the production of design and safety cases (3) Design authority role and responsibilities (4) CDM – design RA's
- Overall – decommissioning very apparent in each as a design role and also allocated roles to different personnel involved too (Technical group, design team, project designers etc..). Difficult to judge really given the complex nature of the job, but the only thing I thought looked a bit thin was the RA guidance with (1) hazard checklist rather than RA –perhaps carried over from HAZOP.
- Our two hazards were (A) Manual handling – 'taking equipment and materials to the site of work' (seems like an interpretation purely of materials transport, not task inherent) and (B) Hot work listed BUT – no control measures for any of our hazards
- Industry ensures that the contractor carries out and presents a risk assessment for the work (this is all work on site, not just work which could involve grinding), that people have been trained and that they use appropriate PPE. Nuclear industry has a a standard on ventilation systems . This was written some years ago by the Atomic Energy Authority. It has been re-badged recently as a BNFL specification NF/0166. This references out to more detailed specifications and standards, which include filters.

ACCIDENT 004 - An SC Scaffolder was picking up steel wedges (at a lower level ~ 3 ft) by a column that was being struck by a carpenter. Whilst he was doing this a loose prop (steel pillar support) fell onto his lower back → A&E (bruised) → RTW.

EVALUATION AT TASK AREA

- The carpenter was apparently removing the chucks/pins before removal of the prop's – I'm not sure why, as dismantling of the prop must take place in order to take down the pillar brace. Perhaps if the brace is loosened then the prop can be removed without having to bother with the screw mechanism for extension / shortening – effort and time implications (although there was no discussion of this during the interview).
- Ease of manipulation of prop screw unknown, but sample ones seen look quite rusty- could be prohibitive?
- Scaffolder felt that the prop should be tied at the top and bolted to the ground at the bottom. I'm not sure how the prop could be tied at the top, but the prop foot plate is at an angle and I cannot see how it could bolted / secured as described
- Are the prop and column braces ever used independently of each other? It seems odd that its quite possible to dismantle the column in the wrong order (chocks out before prop removed) and if they are always used together then why isn't this designed in?
- I didn't see in detail, but it appeared that the prop connects to the brace by being wedged in under force (using the prop screw mechanism). There does not appear to be an obvious contact point or fastener method – It would be interesting to know if this is a desirable feature or whether any other designs are available
- Am also aware that there are no visual cues that indicate whether the equipment is safely set up or not

SITE DATA SUMMARY

- The 2nd Scaffolder started being interviewed but withdrew half way through as thought I was asking too much about his job, which he felt was irrelevant to the accident & misleading. He felt I should be asking why the carpenter had not followed procedures.
- The carpenter stated that he had followed procedures – contradicted by scaffolders and Safety Officer (MS/RA/procedures not supplied)
- Trade overlap relevant to accident, but both employee groups felt justified in being there
- Both employee groups are overseen by Foreman, but otherwise organise their own work pace
- Safety Officer had not identified that the Scaffolders were there to erect a handrail behind the column, just that they shouldn't have been there
- Carpenter works on a price per column worked – time pressure implications
- Carpenter seems to work on a job and finish scheme (60 miles each way, SE England)
- Carpenter reluctant to take time out for interview as would lose work time
- Time pressure not perceived by either employee discipline
- Not sure that lower level position of Scaffolder is relevant to this accident
- Scaffolder felt that the prop should be fixed top and bottom, but this was not reported by the Safety Officer
- Are there other methods of prop fixing on other sites?
- PPE seems to be a source of discomfort for Scaffolder
- Carpenter has musculoskeletal injury to back & elbow which he feels are work related - ? relevant for this accident.
- Rudimentary design of materials involved
- NB: Company were unwilling to ask the Foreman to be interviewed as they felt he would probably be too busy / not keen to participate



Column similar to the one being stripped

Construction specialists	Ergonomics specialists	Me / other
CITB- carpentry work Section Manager—day to-day co-ordination Drawing of column operation		Temporary Works Designer - generic RA/MS requests
Done Follow-up unsuccessful	Not pursued / not possible / info already available	

LATENT CONDITION FOLLOW-UP

Specialist practitioner –carpentry work

- There is no training / guidance upon timbering and shuttering
- Suggests that MH of props is not covered in guidance and that the Foreman and Supervisor should identify the necessary sequence of work
- Ideal situation is that the op ties the pipes with rope once he has released the pin that secures them (& before lowering them proper)
- There are so many different types of ground /conditions ∴ no one set of rules
- Designer designs them and then the Structural / Soil Engineer → design form and falsework → Site Engineer → MS/RA and makes sure that the workers comply.
- The design process stops at the support
- HSE have a falsework / formwork column BUT very little about concrete columns
- Rarely use props on a column as at 45°
- There are a few proprietary systems

Temporary works Designer

- The guy should have taken off the prop first, but people have no concept of accidents until something happens. The top of the prop should have had a connector to stop it dropping out.

- To avoid this accident would need a specific erections and dismantling procedure – but you have to rely on common sense.
- There are case notes, but these are targeted at Engineers, but a Scaffolder should know how to dismantle. It's also a core skill of a chippie. People don't have the core skills – perhaps the foreman chippie has, but he has about 10 people to supervise. The course notes wouldn't get to that level of detail re. what to do to dismantle the column structure.
- They have an external trainer for scaffolding who talks to the Supervisors and Engineers – assumes that ops learn about this on CITB.
- Can push under whalers to secure, but he was dismantling. Should probably have a tilt plate at the bottom. There is a sequence of activities to dismantle – take the ties out first and then go back up and start to dismantle. BUT should take ties out as going down – But they use a different spanner ∴ do all the ties first as its quicker. Doubts whether there are parts whereby the same spanner can be used for all.
- Companies, such as [company names] all do different systems to make up a structure such as the column form/falsework – there is no system where the parts are interchangeable.

ACCIDENT 006 - A fixer / Glazer was descending a scissor lift. In descending the platform, he mistakenly caught his wedding ring against a protrusion at the side of the hand hold area. Not realising this he jumped down from the final step to the ground → lacerations. Subsequent SC action was to circulate a memo to all personnel reminding them that wearing of any jewellery is forbidden – each op had to countersign and return

EVALUATION AT TASK AREA

- Equipment design has limited access points for egress. Injury point is the last handhold area (2.2m from ground) before the grasp has to be removed before completing descent.
- Hand hold points appear sporadic and fortuitous only as a by product from the use of this ‘pipe style’ of barrier for the platform
- The extruding bolts, even in the absence of a ring, look as if they could have caused any soft tissue injury. It seems odd that a contact point has exposed bolts like this & that the manufacturers had not removed / used an alternative fixing mechanism at this point
- Unfortunately I have not got measurements for the step intervals. It would be interesting to compare the height interactions between grasp area and treads etc.. to see if it is at all possible to get of this machine without making a flying leap at the end



SITE DATA SUMMARY

- It does not seem that much attention has been made re. human contact with the equipment (foot placement possibly, but certainly handholds)
- Accident accepted as ‘one of those things’ as seen by IP as not really specific to construction – no consideration by anyone that the equipment design may be a contributory fault
- Not sure if its standard practice to forbid wedding rings? – seems quite severe?

Construction specialists	Ergonomics specialists	Me / other
Scissor lift manufacturer / hire company <i>TBTs on Jewellery</i>	<i>nothing</i>	Scissor lift manufacturer - generic
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Scissor lift manufacturer

- LOLER applies, but the employer still has a responsibility to identify the risk assessment for the work
- Design Engineering undertaken overseas – further information unavailable
- Sales personnel deal with hire companies and would liase any feedback to product design engineers in the US

ACCIDENT 007 - IP was working at the side of the road behind his van,. With a contoured craft knife he was cutting out the opening for a toilet pan from 4mm ply-wood. Ply is supplied as a 1.2m x 2.1m board. He normally stands and makes the cut to one side, but on this occasion he stood behind the direction of the blade. When blade came out it continued to travel and went into his leg.

SITE DATA SUMMARY

- Change of technique – IP could not really describe why he had altered his technique for this particular cut, but had indicated that he was probably rushing and that’s what caused it
- Tool is bare steel – looks a pretty slippery surface and I wonder if there was any features about grasp and handling force. IP chooses this tool especially for the blade stability and the need for this is an indication of what is necessary for the task. Also happy about the way the tool fits into the palm of his hand.
- IP doesn’t ever seem to have received any formal training. A cut to the side (apparently normal technique) would likely have quite a high asymmetrical loading and it doesn’t surprise me that standing behind the blade would offer more control whilst making the cut.
- The blade, having just been changed, must have been at its most efficient. As blades are changed regularly they must be of a constantly changing efficiency during their use – therefore quite difficult to anticipate how much force to apply to each cut.
- Not sure what to think about working I the road – in this case, offered a flat surface & he was not interrupted. Not sure of arrangements during busier traffic?
- Would be quite interesting to explore range of tool designs for this task.?

Construction specialists	Ergonomics specialists	Me / other
Operative task technique Operative task experience Tool design CITB – trade training <i>Supervision</i>	<i>Training / supervision</i>	Knife mfrs x2 Craft knife assessment
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

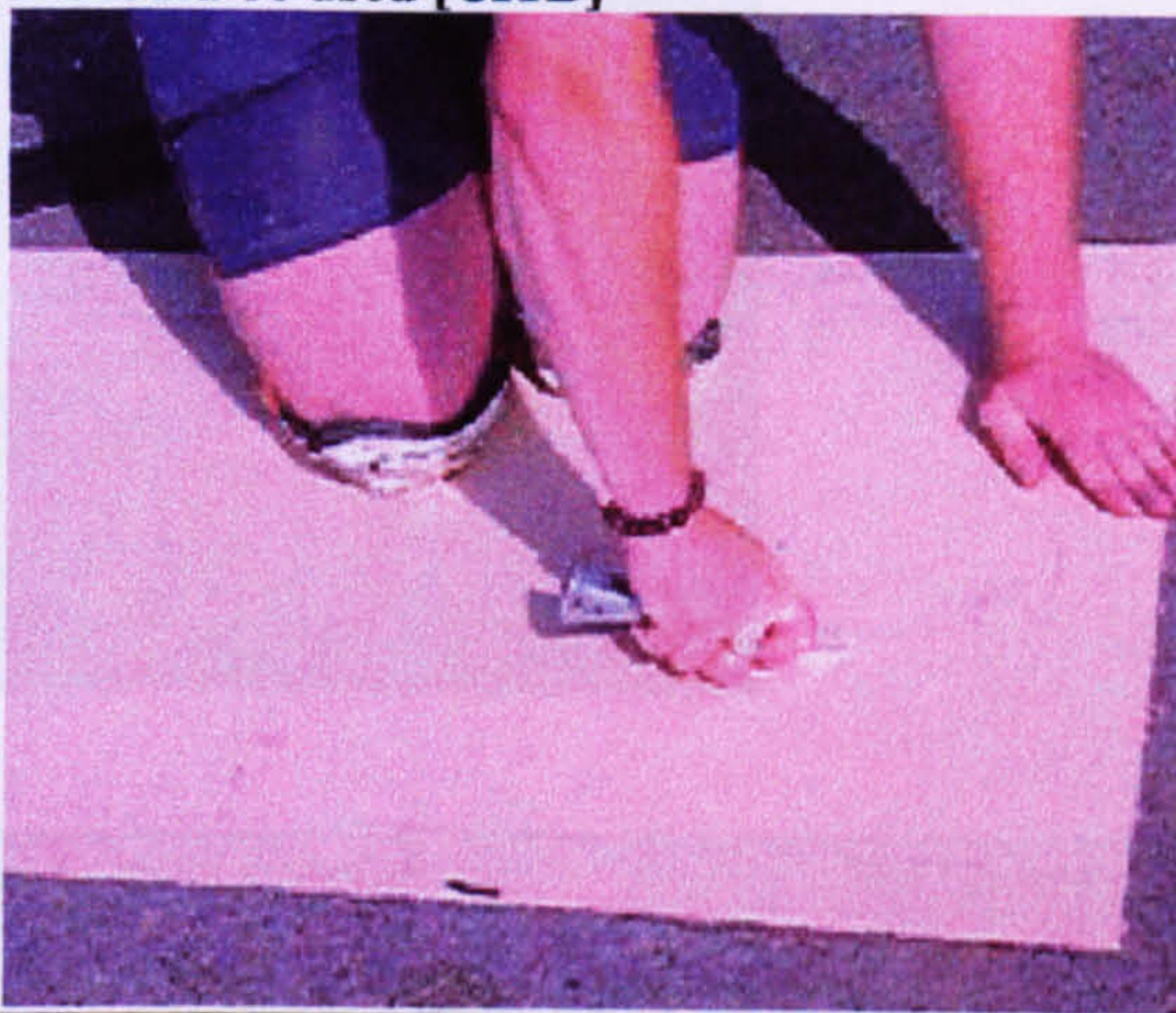
LATENT CONDITION FOLLOW-UP

Construction specialist – trade training

- A craft knife was the wrong tool for the job – A handsaw or jigsaw would be more appropriate [CITB]
- There are no guidelines to indicate which tool should be used [CITB]



Knife used



Cutting circle for the cistern

Ergonomist evaluation of task technique

- The grasp compression force appeared considerable, causing finger blanching whilst making the knife cut The bare steel tool surface appeared to offer poor purchase qualities for grasp.
- It was considered that grasp force upon the tool would likely increase with any hand sweating – [NB: hot day for accident event]
- High rate of blade change required – repeated contact with exposed blades and possible uncertainty in task technique given fluctuating tool quality

ACCIDENT 008 - A concrete labourer was connecting pipes to extend a concrete pouring operation. The pipes push together and then a rubber seal and clip are applied over the join. He had trouble compressing the clip, so was using his foot to try and secure it. For additional force he hit against his foot with a scaffold pipe and hurt it! IP was very embarrassed about this and had told the Safety Advisor that the foot injury was sustained by something in the area of the clip piercing his boot.

EVALUATION AT TASK AREA

- Unfortunately only a very limited assessment was possible, as we couldn't find any of the pipes on site. However a concrete mixer was delivering to site at the time of the site visit and the driver demonstrated a clip that he keeps on his lorry.
- Sample closure, NOT with the pipe in place (i.e. just of the clip) was undertaken and the force to apply appeared fairly light
- Tanker driver commented that the clip can vary considerably depending on how well the clips are maintained. His was spotless and he keeps these only for his own use. However, he commented that invariably they get covered with concrete and this can hamper the closure mechanism if they are not kept spotlessly clean.

SITE DATA SUMMARY

- Language problems made this a very long interview and some issues I felt were only vaguely understood.
- Time pressure from both concrete setting rate and from need to move lorry
- No comments about tools / equipment etc.. – need to find out if always this difficult and if they vary, why / how?
- Some contradiction in whether the work is arranged by the supervisor or whether the rest of the group get involved
- Supervisor reportedly present at time – wonder if he saw what happened – was the accident story concocted just for the Safety Officer, or for all?
- No knowledge of procedures – need to find out about site induction / training



The clip

Construction specialists	Ergonomics specialists	Me / other
Concrete pipe Engineers Equipment maintenance Training	Concrete pipe Engineers Maintenance / housekeeping	Concrete pipe system designer - generic
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

Site Manager

- The clips are cleaned after every concrete pour /use. This involves scrub with water. The concrete gang are supervised by the Ganger man. The pump operator, ganger man and / or operator check the equipment ~ weekly, turn by turn. A high pressure water hose is used to clean pipes and a bucket and brush are used to clean the clips. Occasionally oil them

- Cement workers are general operatives & are told what PPE to use and when
- Supplier
- The equipment can be kept clean with water or chipped off with a needle gun
 - Not aware of innovation into low adhesion products. Trying to introduce lighter weight products for manual handling or boom mounting.
 - Damaged equipment is replaced rather than repaired – commercial incentive
 - Compression force to clamp shut is unknown [researcher unable to close clip during company visit]. Parent company (Europe based) expected to undertake any evaluation into human interface and interaction

ACCIDENT 009 - IP was cutting the steel banding of a bundle of ply, using a pair of nips. He cut first from one side and then the other, and although he thought he was standing out of the way, the band flew back and cut his arm. → A&E. RTW following day

EVALUATION AT TASK AREA

- A product could be used which doesn't have the recoil.
- Wonder if there is anywhere that the break can be made which has least recoil effect.
- Wonder if a specified tool might offer a more controlled cut.



Example banding

SITE DATA SUMMARY

- Supervisor not aware that IP had used nips and not claw hammer to make break
- Contracts Mgr (also responsible for safety) didn't know about the accident
- Other tie method (using nylon) is available and in spite of everyone's knowledge about hazards in this task ply is still secured together in this manner
- Although it would seem that a better cutting tool is available (used in Bahamas), the cut hazard remains even after the break is made and would it therefore be appropriate to explore this further.
- A spectacular example of 'severed vest syndrome' (high visibility vest cut to armpit level), but not really relevant to the accident
- C/o no opportunity to contribute to the Safety Committee – Site S.O. (another study) noted that these meetings are held every 2w. Communication issue
- Indication of time pressure affecting the atmosphere on site – all experience it in different ways
- Concern by supervisor about trying to see what lads are doing – thinks Trades are worse nowadays
- Some mixed messages about who prepares the MS's – indicating ? communication not happening for these
- Also indication by Supervisor that MS's need to be followed only if new task type to do
- Apparent that information and drawings necessary for preparation are inadequate / late
- Supervisor thinks Safety person visits every 2w – actually he's been there f/t for the past month (I think)
- Site based staff perceive little value in induction
- Unhappy with welfare facilities - ? affects attitude among ops. Site looked pretty messy (also more compressed than other of town sites)
- Method of transferring the RA/ MS info (wall display) seems a little uninviting - ? what else happens during induction
- Training for all is distant and little / nil related to H&S (in spite of job responsibilities)
- Impression of job satisfaction issues unique to each grade.

Construction specialists	Ergonomics specialists	Me / other
Suppliers strapping info CITB – cutting tool Task training	Supplier Intervention of Safety personnel - RA's	Timber companies (x2) BS5759 Chance encounter
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

Construction specialist – technique

- There are bespoke wire cutters for safe removal of steel banding
- Gloves should be worn + it's a two person job

BS 5759 : 1987 Specification for webbing load assemblies for use in surface transport

- Synthetic banding has variable qualities and can be weakened by wet, mechanical and chemical exposures

Chance encounter

- During a visit for an unrelated aspect of the research it transpired that a manufacturer's (cement delivery equipment) 'in-house' risk assessment revealed that nylon banding, with a strength capacity to 800kg, would reduce the risk of cuts and abrasions associated with steel banding. Thus, through the manufacturers innovation the industry benefited

ACCIDENT 011- A Hiab delivery driver was delivering scaffold poles to a site. As he was trying to manoeuvre the load towards the drop zone the lorry tipped over (no damage caused). The stabiliser feet (riggers) had been put down to the ground, but had not been extended beyond either side of the lorry beforehand. A railway Inspector, on site at the time, investigated the incident, but this was completed with no further action.

EVALUATION AT TASK AREA

- The interview was undertaken at the Scaffolder depot & the site area was not seen.
- A demonstration of a similar lorry was seen. The one observed had an automated extension of the riggers, whereas the driver of the accident lorry informed me that on his they had to be pulled out manually (only lift lower was automated). He also said that there wasn't much force required to do this.
- Of the lorry demonstrated, the driver had wrapped around hazard tape to his off-site rigger to alert other traffic

SITE DATA SUMMARY

- Restricted area for lorry to park – inadequate space for driver to move forward for preferred parking position.
- Driver then tried to manipulate the load to the drop point without passing it over walkway – the foreman was there, but ?? how could he stop pedestrians from each direction.
- The opinion is that multiple manoeuvres of load made the lorry less stable – Rigger presumed unnecessary if just a single movement?
- One wheel also on railway sleepers – possibly contributory to topple?
- Neither safety devices were relevant to the accident causing conditions
- Driver couldn't see foreman - ? any impact on accident
- Driver felt work area and access was tight, but continued with the job in any case
- ? manual extension of rigger relevant (? Rather than hydraulic)
- Crane controls (as described) appear to contradict population stereotype of lever operations
- Accident occurred at 13.30 – no indication of lunch / break in last 3hrs – still on am. workload
- IP had no perception of 'time pressure' however
- Very long work hours for driver with indication of pressure to do OT & to breach HGV driver rest allowances
- Perception of opportunities to communicate / contribute perceived very differently by interviewees
- Driver quite unhappy overall with work conditions
- Not really sure if there was a MS / RA. Plenty of documentation available, but these were not distinct within this. Driver unaware of any written materials
- High reliance on own core skills. Refresher training up to date.
- Site safety culture not perceived very highly

Construction specialists	Ergonomics specialists	Me / other
<i>working hours</i> Safety Adviser – lorry use and training Lorry manufacturer Site manager – site layout	Operations Manager – site layout Contractor H&S Manager	HSE – Crane contact
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Lorry crane manufacturer

- Pressure from Europe to develop interlock system to prohibit crane op without stabilisers extended
- Stabilisers very wide and sites often don't have room for them
- Some stabilisers still manually operated (cheaper) and they find that they are v.v. stiff when the lorry comes in for service (i.e never used)
- Crane is not central ∴ load carrying and stability is unequal on each side of the wagon
- Controls go contra population stereotype as a result of a death ~10y ago. As the crane was being put away the operative was hit and fell down onto the controls thus ensuring that it continued to operate – he died. Response = to reverse

- There are a range of inter-locks and alarms to alert to misuse / overload. Manual outriggers are cheaper but becoming less common
- Non-extension of out-riggers is a widespread problem. There are moves to make this mandatory over the next 3 years (but met by some resistance in the industry)
- Manufacturers only occasionally hear about product related accidents or failure; perhaps if asked to repair damaged parts or to provide expert witness advice
- The finished vehicle has three separate manufacturers – for the vehicle, bodywork and crane - customers may chose to buy and mount the crane themselves

D/w HSE crane specialist

- Muddled story – the decision / made by trade association but with some endorsement from ex-HSE folk on the board. No indication of trial / wider consultation / ergonomics.
- He feels that a big problem is that lorry drivers are hired through an agency and then just have to get on with the crane work with little of no training.
- There are some issues concerning the specifications and applications of manual vs. hydraulic outriggers. Not all terrain / workspaces are suitable for use
- Customer demand leads UK suppliers to manage this – but it needs to be taken on board by manufacturers internationally

SC Safety Adviser

- The SC had requested unique access to the accident work area, but the PC had denied this. The scaffold drop-off was unplanned work
- There were no daily meetings between the PC the SC - they had to 'anticipate' their role in putting up the build structure
- There was a monthly meeting for worker consultation & access to a safety representative on site

ACCIDENT 012 - Concrete pipes were being blown through (a wet foam ball is placed inside the pipe and with pressurised air propelled to other end) at the end of the work day. The accident report states that an operative was standing over the pipe (at the exit end) and that with the force of propulsion as the last of the cement and wet ball came through, this threw him backwards (onto a column). He sustained a groin and back injury & was off sick for a week. 3 people working together – one on 4th floor and 2 at ground

EVALUATION AT TASK AREA

Concrete pipes connected at time of viewing, but no obvious access / connection to attach the pipe to the tub - ??? just rest it on the top. If there is a knock back of the pipe it seems quite possible that it could snake around whether in a full or empty tub. There is no indication of any measures to secure the two together



Column (wall?) he was knocked back against Concrete pipes disconnection point (I think)

SITE DATA SUMMARY

- Experienced operatives not available for task – indication of an ongoing problem
- Inexperienced operative undertaking task and 2nd operative not undertaking normal task
- Not usual to have 2 people - ? distracted each other??
- Each person has given quite a different account of the accident - ? reluctant to 'grass' on each other to the S.O.???
- Men at ground level seem to have given the OK with the pipe was in a full container – transfer to empty seemed to be an afterthought
- Seems that there was a fairly explosive response at the bottom of the pipe, not expected or previously seen by even the more experienced operative.
- Would pipe fix to the floor really resolve the whip back action – could the pipe break and cause even more potential damage?
- Indication of restricted work area
- Possibility of 'time issues' – trying to finish for the day, Bobcat driver waiting, not fluent at doing these tasks.
- IP's attitude to PPE ? relevant in considering his attitude towards risk / safety
- Long hours of all concerned
- IP at work 5hrs with no break
- IP felt his co-worker was inexperienced - ? was he right or wrong to try to move the pipe (if this was the case) – lack of team work /co-ordination may also be a factor.
- IP indicated that there is just one way to do things right - ? how receptive to new ideas.
- Concrete takes priority and this seems to be reflected in work breaks and pressure upon ops. to perform
- Mixed story re. Whether man at top requested permission to blow down or called out to them that he was doing it
- Nobody on site able to provide training for this task – is this usual for an activity undertaken daily

- Foreman does site safety work – had 2d formal training & nil yet on MS (yet writes them). Doesn't seem to like the weekly safety inspection
- Foreman job satisfaction issues 'average'

Construction specialists	Ergonomics specialists	Me / other
Concrete pump training <i>System for disseminating accident info in Co.</i> Blow back technique	Task training / procedures CITB – cement training (as 008)	Concrete pump manufacturer – generic Concrete pipe supplier
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Concrete pump manufacturer

- No new innovation to make equipment less adhesive. Want them to wear out so that people order more
- Blow down should be done with water rather than compressed air (dangerous) – need special training
- Clamps to put of seal of two pipes together – I had a go and its fairly stiff on its own let alone with equipment inside. They are not aware of any trials done to measure forces.
- Pipes can be cleaned up with water. If not the concrete comes off easily enough with a hammer
- Interviewee commented 'you cant design for humans'
- Use of water and gravity is a preferable method to the use of compressed air for the blow down activity. Blow down can be undertaken from either end of the pipe
- Training is required to use compressed air, to ensure that it doesn't gather momentum
- Manufacturers provide the equipment and documentation but expect the purchaser and user to supply the training and related information
- Training is provided by pump delivery driver / fitter (with subsequent supervision up to 4-5 hours if requested). Not aware of any refresher training provision
- The fitter / driver receives a minimum of a days training in safety awareness and concrete pump operation
- There is also an instruction booklet, but use of this is unknown
- Pump and equipment are manufactured in Europe – they use different methods to pump screed overseas

ACCIDENT 013 - Using a drill with a screw-driver bit on it, IP 'lost concentration' and screwed through wood and into left forefinger. Operative was putting up a new doorway in the walkway leading to the canteen entrance. He was trying to get the work done before the men started to turn up for their break (imminent). Some men already wanted to come by and as he had to twist to move aside for them he drilled into his finger by accident

SITE DATA SUMMARY

- Accident area is quite a busy stretch & if people had turned up before 10.00 I can imagine that it would have been a bit tight
- Does the absence of a flex make the task acceptably less risky , not to cordon off the work area
- Safety Officer doesn't have a lot of knowledge about task (ie roof work and step ladder), but has made recommendations nonetheless
- How approachable is the Project Manager really?
- Interesting comments about IP's undertaking of OT



Construction specialists	Ergonomics specialists	Me / other
<i>nothing</i>	<i>Section Manager</i> Canteen Manager / Safety adviser Procedures for mains / battery tools	H&S generic – procedures for new tool types
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

H&S generic

- The procedures would be part of core skills training. Precautions would be required for the protection of trailing electrical cables
- Whatever new product comes on to site should be subject to the risk assessment process

ACCIDENT 017 - An operative was carrying x4 brick guards in each hand. As walking along he stepped onto an electrical cable, slipped and twisted his ankle. Resulting in x3d absence

EVALUATION AT TASK AREA

Brick guards look pretty light (but didn't have a chance to lift any) and do not seem as if they would obscure view whilst walking. Plenty of contact area for hand-hold. Floor area does look a bit muddled – S.O. described this as a constant problem, due to the power lines that need to come off the power unit. No hazard tape, not secured / run alongside the low wall either. Tolerated by S.O.



Brick guards (mesh on guard rails)



Probably tripped on one of these cables

SITE DATA SUMMARY

- No RA for power lines
- Tolerance of power lines strewn over floor – is it possible feasible to raise them as suggested or is there another measure?
- Indication of earlier problems with the state of the floors
- IP not overly happy there & feeling isolated. Not helped by communication problem with Supervisor
- IP dissatisfied with his 'trainee' status – perceives it as labouring work with sporadic instruction.
- Is there a formal Scaffolder training or is it all 'sitting with Nellie'?
- TBTs do not seem to be acknowledged as training – all that is acknowledged is 'sit down training'
- Different perception of lifting training – S.O. sees it 'covered' in induction, IP noted only being lent a booklet
- Glove supply doesn't seem to fit demand
- IP perceived harness damage as cutting circulation & would prefer to hit ground! – lack of training in PPE.
- Dissatisfaction with harness by both Scaffolder's – ?reflection of a bigger problem in the industry
- Indication of inadequate craneage time → high dependence upon manual handling on site
- Scaffolding seems to be intermittently designed or at Scaffolder's discretion - ? any formal guidelines for this ?
- H&S responsibilities of Supervisor not explicit in contract and his appraisal appears to be based on failures (accident book)
- Supervisors perception of fault for accident – I'm sure there's something here about ownership /blame etc..?
- Supervisor states safety not compromised by encouraging work pace among the men as 'regulations are still in place (belt and braces approach) – then goes on to say that 'safety' has compromised earning potential. Some conflict here.
- Indication of lack of patience & entrenched ideas among older men as co-workers
- Safety induction seems as if not all understood – the hazards remembered are quite general to any situation (fire, needlestick, Weils)and not necessarily pertinent to construction.

Construction specialists	Ergonomics specialists	Me / other
Main Contractor – electric cable policy SC scaffold training	Housekeeping SO - training	H&S generic – safety standards
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

Electrical cable policy

- 'Trip' is not in training for supervisors of managers
- 'trip' on the same level is not in induction
- all powers sources on the ground like this are a common hazard
- In Electrical service providers brief to ensure that equipment is not left in hazardous places. They are on site all the time
- It's the electrical company's responsibility to lay cables safely, but nobody really has responsibility to maintain cable positions. Trip hazards are reviewed weekly.
- Try and secure as much cabling as possible to ceiling but work and formwork means that this is not always possible. Cant lift cables up because of formwork – same on all sites though
- Induction = informs people of duty of care, but doesn't tell people to put things back where they found them. They are told to check leads for damage / RCD (for trip). Electrician is called if trip. All is PAT tested.
- All cables are tested weekly by owners (Electrical service providers provide to a point and SC provide form there to a work area). Cables can thus belong to Electrical provider, PC or SC
- SC should inspect weekly – supervisors responsibility
- Ops are told in induction to check leads / plugs daily but they don't check for where they are laid. Comes into Housekeeping
- Strategy = meet with electrical contractor to ensure that cables do not create trip conditions. Thinks that Electrical service providers have to check weekly. Certainly its best practice / policy. They would offer, in their safety policy, to check leads and plugs to ensure integrity.

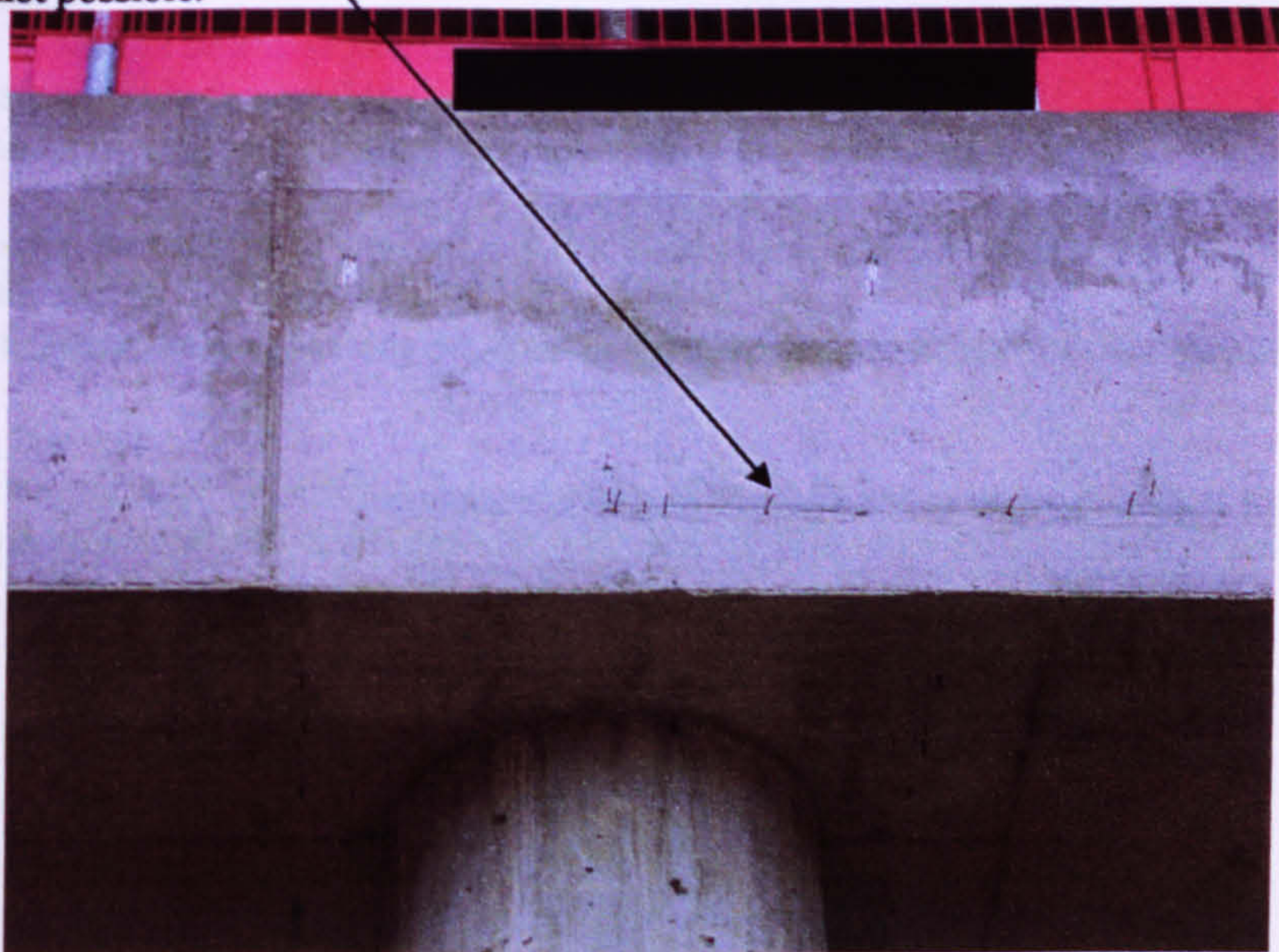
Scaffolder training - D/w Scaffolder Site manager

- Used to do labour work before Scaffolder Part One training. After 6m – 2y go on to do part One → 12m doing basic scaffolding (labour with a spanner). Not design work – handrail / fix lifts
- Part One is at CITB (10d/2w) + an exam. Its common to do just Part One to Part Two. For Par Two to advanced people don't like the responsibility.
- The company decide when op is ready for Part One and Part Two. Part Three is advanced Scaffolder and you have to work with an advanced Scaffolder to get on to this.
- SC pays for this training. They decide on who's any good by – performance, dealing with heights and aptitude – can tell straight away. Plus you rely on the Centre (?CITB).
- Also information about a NVQ scheme - assessed on every job by supervisor.(Time sheets and every job, starting to get more common with the MCG (Major Contractors Group), is longer than the apprentice scheme, do through CITB

ACCIDENT 018 - Was erecting scaffold on a cantilever over the canal and caught right arm on a nail protruding from the concrete → puncture wound on right forearm

EVALUATION AT TASK AREA

This isn't the work area, but this is typical of nails (in a row here) left sticking out. On a walk round with S.O. afterwards, we were not exactly sure where the exact work area had been, so further assessment not possible.



SITE DATA SUMMARY

- Extruding nails from concrete = ongoing problem
- Appears to be issues about beam weight, working alone etc.. which are supplementary to this accident
- Trainee not permitted to climb scaffold to assist – seems a bit odd.
- Training seen as consequent of time (15y) on job
- Sunlight distraction / glare at time of accident
- Supervisor distracted him – insight into task requirements?
- Scaffold solutions (to avoid working directly on tube) seem to be more trouble than they're worth - ? other solutions available
- Scaffold fitting maintenance appears v. important
- ?? time pressure responsible for extruding nails not being knocked off
- Inadequate PPE, limited (no?) stock for range of fit
- No training in PPE use / care
- Harness dissatisfaction and mistrust
- 11- 12 hr day for IP – heavy work
- Work pacing – evidence of dissatisfaction with support labour (? Trainee)
- No procedures / instructions
- Dissatisfaction with inductions
- IP aware of responsibilities in job, but seems to feel powerless in some situations

Construction specialists	Ergonomics specialists	Me / other
Formwork system manufacturer Temporary works designer MS/RA issues	Scaffold Manager – shuttering duties Safety Adviser – housekeeping duties	Temporary Works Designer – generic

LATENT CONDITION FOLLOW-UP

Temporary works designer

- Good practice would be to screw rather than nail in shuttering, but the screws take longer – need to countersink the screw. Can hammer into ply and screw last half inch – but screwdriver might get stolen, but can keep hammer on belt. Don't often re-use the shutter – not cost effective.
- Sometimes too the nails are put in as level markers.
- A good quality shutter wouldn't have nails – should be removed

Scaffold Manager

- Nothing is written down; its part of the carpentry work
- Carpenters are only responsible for fixing – its not up to them to strike
- Its automatic to send in a different gang to knock out the nails – there may be a bit of a time lapse
- There should be a method statement and risk assessment. The MS should describe the technique for dismantling and nail removal
- Intervention may vary depending on whether the concrete will be the finished surface or not

Construction Specialist

- This is a design issue to ensure – designers new to be made aware of the problems that the channels with the nails in them cause. It is possible to drill out the channel afterwards?

ACCIDENT 019 - IP was moving false work tower. He failed to remove a cantilever prop at the top and it became dislodged during the operation and fell ~3m hitting the IP on the left back.

EVALUATION AT TASK AREA

I don't have any comment really. This picture is an example of a cantilever, rather than the actual one involved. It occurs to me now that I don't know how they'd get to the top to lift it off - that may have been a disincentive for the IP - also ? cantilever weight unknown. If you blow the picture up very large, it looks as if there is a depression down the front of the prop that they sit on and that it just slides down - into place.

These look a bit like accident 004 props again. The issues seem to be about parts interdependence and how its quite possible to pull a bit away from a structure of combined parts (i.e need something in a hurry) and leave an apparently 'stable' looking piece of kit in place



Frame & cantilever example

SITE DATA SUMMARY

- Not sure how cantilever could have become dislodged and fallen - ? previously dislodged before trying to relocate the frame - if so how and was it ever properly inserted into the main frame groove in the first place?
- ? standard practice not to bother to take the cantilever off?
- No apparent procedure for this activity - should there be?
- Frames required earlier than expected - ? relevant to accident. An unplanned activity.
- IP had no training in doing this task or in use and care of PPE
- IP had poor English - does this influence training / communication etc.. provided?
- Site training heavily dependent on TBTs & talk - ?? perceived as training by IP
- IP's work is reactive to instruction by supervisor - little perception of 'consultation' by IP, but Supervisor thinks they do
- Competence assessment of new starters a bit unregulated [although I think they all have to do CITB too]
- Project Mgr has no specified / appraisable H&S responsibilities in his contract. Performance dependent upon 'force' of Safety officer
- Project Mgr safety & related training a bit sparse
- IP had a similar accident some months ago - but didn't change his practice. ?? does the risk of a repeat accident over-ride the faff involved in getting the cantilever off in the first place

Construction specialists	Ergonomics specialists	Me / other
Language / cultural issues False work supplier / system designer	Procedures Scaffold Manager - supervision Scaffold tower designer	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

D/W SC Site Manager

- IP should have taken the cantilever off originally when the boards were there
- He moved the tower as it was in the way of other trades
- There is an MS / RA for Striking and erecting, which indicates correct technique and order of dismantling
- Operatives should have been competent and trained, but people think its easy and just get on with it

D/W HSE adviser re Social inclusion and race relation issues.

- They are trying to develop a 'Race Policy' by May
- Of all the FOD's have already flagged construction as key area, with specific issues, such as literacy, spoken language etc..
- They are now looking at how to advise Inspectors. They are always being asked for advice and don't know how to deal with it. In the short term it needs to be dealt with as a 'risk issue' - If they don't understand then stop the work until its safe
- In the long-term – looking at issues relating to training, translation, interpreting – especially at induction
- Don't yet have a definite line on what someone can do, but the construction sector will take the lead
- Big problem = don't want to discriminate v.s don't want to put at risk

ACCIDENT 020 - An operative was removing what he mistakenly believed to be a redundant gas main from an under-stairs cupboard during the restoration of a group of housing association properties. He used a petrol saw and this resulted in a 3ft flame and burns to under stairs and plasterboard. No explosion.

EVALUATION AT TASK AREA

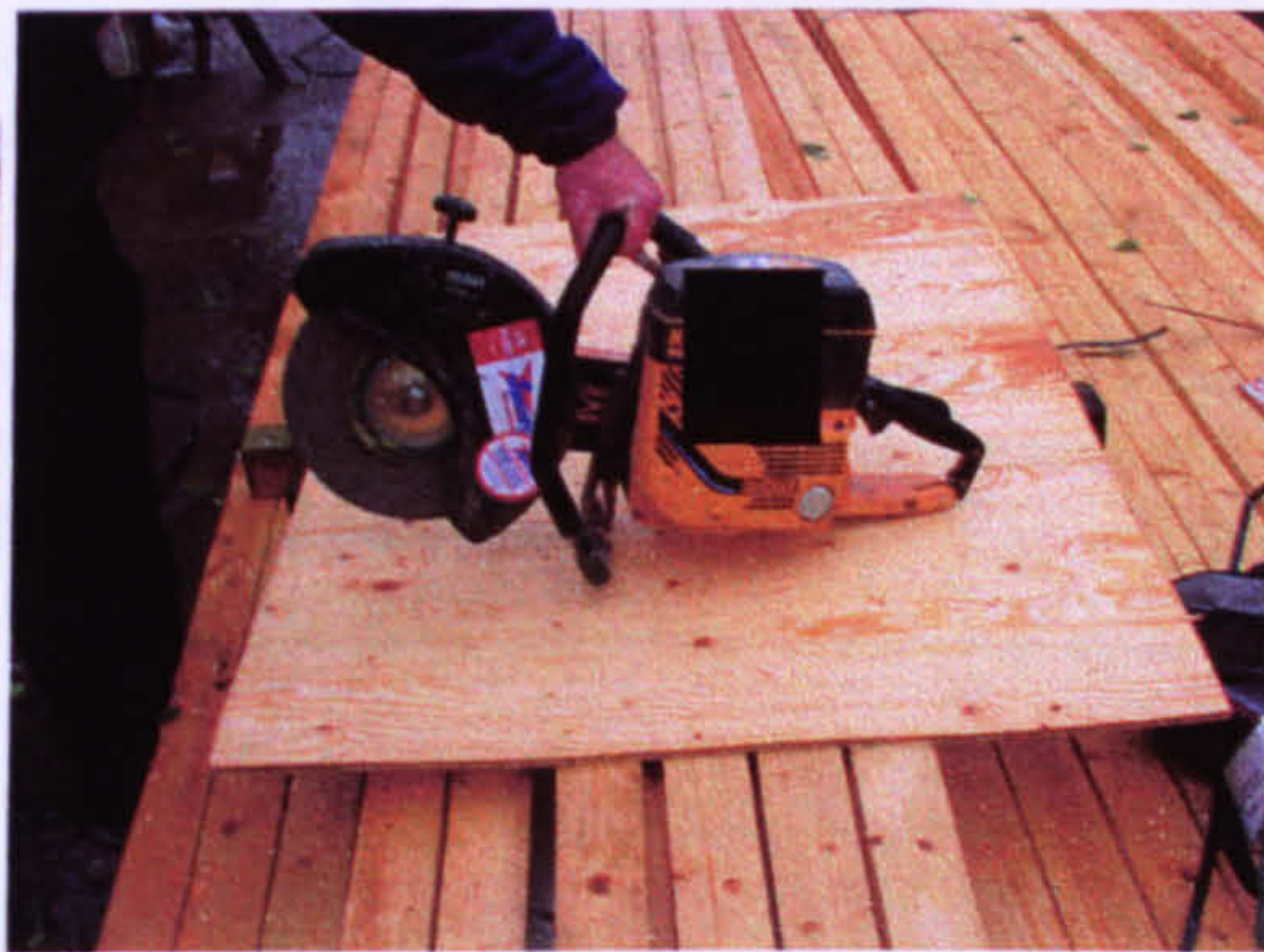
Petrol saw weighed 11.5kg (can vary a little according to petrol quantity – cupful)

Light level under stairs = 3 – 27 lux (varies depending on where you stand & is lower when door way light is blocked and crouching over the pipe)

Doorway aperture = 28cm x 48cm



Hole where old gas pipe was cut off.
New pipes now in position



Saw used

SITE DATA SUMMARY

- Muddled story re which houses were still live and which weren't – poor communication with Gas service provider
- Gas service provider record and notification system not overly clear
- Indication that records, if on site, were not clear. Relatively new General Foreman – why did he think supply was halted in February?
- Task was unplanned/scheduled – just did it because they could carry on - ? would gas records have been rechecked if this had been a planned task, or would they still have been wrong anyway.
- No training by IP in use of saw – not realised by foreman / S.O. OR is training just required to change the blade?
- Large heavy tool for a relatively small task in awkward conditions- ? alternatives available
- No use of gloves /goggles for task - ? VWF risk or possibility of particle release during cut
- Supplies own boots – should be provided. Rest of PPE sounds a bit minimal
- Arrangements for setting up a gang and liaison for safety / TU consultation – all reactive
- Training courses - ? seen as method to comply with H&S rules rather than as a skill transfer (by Foreman) – 'boring'
- Job & finish used to motivate speed, by speed not seen as a possible safety compromiser
- Priced work & need to finish seems to influence competitive element and time pressure
- Process of inductions / task training / TBTs seems to have been overlooked / not perceived as occurring
- Indication that housing has lower safety 'level' nationally
- ? fairly low morale among site based interviewees

Construction specialists	Ergonomics specialists	Me / other
Contracts Manager for info on Planning Supervisor, Training, MS/RA development+ Gas board liaison	Training history	D/W PC H&S Manager re best practice
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP
PC H&S Manager

- The Project Manager would normally write to all of the services to state (1) What services are required (2) When they want things done by
- Gas Board have made a couple of errors – few years ago a # pipe → major evacuation. But they often don't know of the services that exist – records are poor
- Would expect the fitter to take the top off and sniff first. The men should know how to do it – if they've been told. The duty of care rests upon the individual – there could be residual gas in the line even if Gas Board had cut it off – could still have exploded
- Would not expect a MS / RA for that type of work (if only 1 or 2), but should have a permit to dig or access the area. If ~ 100 would expect them to develop an MS/RA
- They rarely do contract housing – Leave it to the Site Management and individuals involved
- A petrol saw is not a good idea and even a handsaw could generate sparks too. Maybe an electric saw would be best – Yes, these are readily available
- He would expect site people to start liaison (+pass info on of other similar work) with the Gas Board and for the Safety officer to check that this was done.
- You cant rely on information from the statutory authorities – i.e. have checked this and this. There's also a problem with tenants who bypass the meter (e.g. 50% goes through meter and 50% goes around it) so ∴ the supply is uncertain.

ACCIDENT 021 - A Senior Supervisory Manager was climbing a rail wagon to see whether contents were fit to leave the site. A piece of wire was hanging over the top edge and he wanted to see if he could push it back in. As he climbed up the wagon he put his hand onto the top rim of the wagon (to haul himself up high enough) and inadvertently pronged his hand onto a 9x3cm metal slither which pierced his thumb. It is thought that the slither is likely to have been generated from damage by a digger as it loads the wagons.

EVALUATION AT TASK AREA

I was not permitted to go to the task area. The photo below (provided) is the best available for now – provided as an example of the work scenario typical of the accident.



Wagon type in accident . Example of triangular rim to stop spoil sitting at top. This wagon has a handrail here, but the accident wagon has a vertical handrail at the far left corner of the vehicle. IP commented that the positioning made it difficult for a left hander to climb with as hand position gets in way of the direction of movement. These hand rails are in the process of being fitted to all the wagons – a Railtrack initiative/

SITE DATA SUMMARY

- No device to look into wagon without climbing up side
- Side ladder and handrail arrangements don't seem to facilitate usability
- Little confidence in contract labour
- Time pressure +++ - does it need to be like this or has it become the accepted norm
- Time pressure encourages undertaking of unusual activities by Supervisory / Mgmt staff
- IP feels need to be 'on the go' all the time – what is impact upon subordinates in terms of productivity / safety behaviour
- Was consideration of human interaction considered during wagon redesign – Are viewing, handhold and foot placement areas designed or ad hoc and just where they happen to fit on?
- Excessive working hours and infrequent days off – but impression that this is self-generated and he finds it difficult to stop
- Task commonly undertaken, but excluded from MS / RA

Construction specialists	Ergonomics specialists	Me / other
<i>Personal issues</i> Ladder location <i>Training Manager, Safety Adviser, Personnel Manager, MS/RA</i>	Wagon design issues— Operations Standards Manager Time planning / pressures	Project Manager + Safety, Quality and Environment Manager
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>
LATENT CONDITION FOLLOW-UP <u>Time planning issues</u> <ul style="list-style-type: none">• The train operation company gives up ‘time’ for work on the infrastructure.• There is no proforma to identify how long a piece of work would take – flexibility is greatly reduced since loss of British Rail• Possession times are set and cast in stone. So you look at the work required and see where it fits into these slots. Makes the decision<ul style="list-style-type: none">- <i>based on previous experience</i>- <i>there is no proforma to work out how long something lasts</i>- <i>varies due to local / site conditions ∴ London and Scotland are different</i> <u>Discussion re Safety / training / design issues</u> <ul style="list-style-type: none">• Rail network have a Safety case – includes MS/RA for all different situations. Its part of the North Midland Alliance.• The MS and set-up is under closer scrutiny from HSE and HMRI.• There is to be the introduction of a Smartcard to clock people in and out for each shift. Endorsed by Heads of rail companies and HSE. This will enable monitoring of hours / week• Wagon climbing would probably not have its own recorded risk assessment – there would be verbal instruction and the task would be incorporated within any generic documentation for digging and loading• A periscope might be feasible but there were reservations about whether that might be used• If they had been consulted about the design a rounded wagon top would have been better		

ACCIDENT 022 - Whilst removing plasterboard from a trolley the persons hand was crushed against a scaffold tube hand rail.

EVALUATION AT TASK AREA

Tried to get best feel for where the accident happened. Yes the scaffold clips all stick out into the walkway area. Also thought the plasterboard trolley was pretty basic. Only had 2 rotating wheel at front – rear fixed. Unfortunately unable to identify weight for push / pull or to see a trolley fully laden and in use. No good handhold areas on trolley where ops might grasp and also be protected from injury. Don't know either what the weight of a plasterboard is.



Plasterboard trolley



Clips stick out into the walkway Plasterboard 8' x 4'

SITE DATA SUMMARY

- Recorded accident cause does not necessarily exactly reflect events described by IP
- H&S Manager speculation of 'cause' very blame orientated
- IP had been reluctant to cite the communication problem for fear of being accused of being racist
- Scaffold design – Is it best practice for the clips to be positioned like this and to be uncapped?
- Remedial action seen as PC responsibility by SC – indication of lack of communal ownership in safety management
- Unclear whether pushing plaster trolley is ceiling fixers job or not – IP only one who thought not
- Is reluctance to push trolley a status issue or is it not actually scheduled into work in progress
- Plaster trolley seen as helpful - ?? comparative competitor product for the job & design variation
- Trolley – need to see it fully laden, but would be worth assessing push/pull forces and manipulation (with only 2 rotating wheels)
- Trolley handhold aspects – contact area is pressed steel
- Trolley – not sure who made it and if there are any guidelines
- No one seems to have considered that the trolley might be an aspect in this accident
- No use of hat when working on the tower – visibility problems
- Alternative hat designs available - ?? any criteria for selecting these or other PPE for that matter ??
- 1 man down on accident day – issue to IP, but not noted by others
- Decisions / opinions of competency seem to be repeatedly conferred to 'a.n.other' (previous experience of a company, responsibility of men to supervise labourers). What do we know of the skill & ability of the person making these decisions & do they realise how their decisions ricochet → impact others
- Try to use certificated schemes for competency too, but need for labour seems to be an over-riding factor
- 'don't discuss safety unless get hurt'!!
- Indication of low level consultation in work organisation – liase on a job by job basis only
- Perceived difference in how internal / external H&S people assess safety with internal appraisal seen as less judgemental OR this might also reflect level of safety training too.??
- Unclear story re. whether IP was on priced work or not (he said no, Site Mgr says yes) – is wrong term being used to ask the Q?
- Site Mgr saw supervision as a responsibility of PC – PC (H&S Mgr) described supervision as a SC issue.
- Dissatisfaction with welfare facilities

- No RA for product transport on site
- Mixed story re. training in plaster trolley transport –(IP no, Site Mgr –yes)
- V.Long hours by H&S Manager + long travel time by him & Site Mgr
- Skill training for ceiling fixer seems a bit ad hoc – sitting with Nellie for an unspecified period of time
- Little in way of short courses for SC personnel
- No specific safety training for any of these men
- TBT perceived by IP as a stick wielding exercise, yet desire for formal training is there
- IP young and suffering long-term back injury – no sickness absence pay. Employer aware - ??no construction assistance

Construction specialists	Ergonomics specialists	Me / other
Language issues (as 019) Generic plasterboard mfr and ancillary kit supplier	Scaffolder – clip cover criteria Trolley purchaser Role clarity – materials collection / transport	Temporary Works Designer – generic
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Temporary Works designer

- Thinks that the clips should be applied, for example at head height – if you’ve got any. Lucky if people tighten them up.
- Not sure that its part of core training for a Scaffolder. Probably shouldn’t insist. But in any case for this accident the clip should be on the outside of the handrail.

Plasterboard trolley manufacturer

- There is no item weight on individual boards (a standard 8ft x 4ft board is 25kg). Weight given only per batch product and supply
- Plasterboard trolleys have two fixed wheels because this gives greater control (two men can push from one end if necessary) and it stops it rolling down an incline
- Handhold for pushing is the board itself
- Contractors can make-up trolleys themselves – welding together base materials + wheels
- The trolley can be driven from either end. (Tend to steer at front and person at back pushes, but individuals may choose otherwise). If working alone manipulate with rotating wheels at back
- Guidance in training is not to overload the trolley

ACCIDENT 023 - Descending stairs carrying a toolbox. Slipped on oil patch which had been covered with paper → bruised elbow & hip

EVALUATION AT TASK AREA - Nothing to see anymore



SITE DATA SUMMARY

- Recorded accident cause does not necessarily exactly reflect events described by IP- paper or plastic oil covering described by Foreman / H&S Mgr
- Was the source a pipe fitting machine with an unsealed oil reservoir ? If so, would it be better to seal the oil tank rather than introduce yet more guidance on a work technique.
- Incorrect action was taken after oil spill – wonder what inhibited correct action
- Complaint re non-user friendliness of PPE
- Alternative hat designs available ?? any criteria for selecting these or other PPE ??
- Foreman determines competency by work performance – no impression of using any criteria prior to being exposed to ‘a risk’
- First-aid training seen as ‘safety rep’ activity
- High dependence on inductions & TBTs to ensure compliance with site rules / plan
- Impression that IP works largely unsupervised for most of a 2m period
- Indication of genuine need for formal training in this trade
- Performance review seems a bit ad hoc for Foreman and H&S Manager
- Perceived difference in how internal / external H&S people assess safety with internal appraisal seen as less judgemental OR this might also reflect level of safety training too.??
- Job and finish w/end only (?? nobody watching work methods!) Safety seen by Foreman as an Operative responsibility
- Does poor planning encourage different contractor teams to make haste to obtain access to install different services? Is this particular to refurbishment?
- Safety culture viewed by IP as good ‘when unnecessary safety is cut’ – frequent impression that safety is OTT
- IP welcomed opportunity to discuss concerns that he has about the industry (safety culture comments) – some good points
- Minimal formal training by both Main SC personnel. No specific safety training for any included
- Induction and TBTs relied on heavily as a training method – induction though not really seen as valued by either Main SC personnel
- Themes describing job dissatisfaction for IP & Dissatisfaction with welfare facilities
- V. Long hours by H&S Manager + long travel time by him & Site Mgr
- Indication of significant work related health problems among duct worker – not apparently being managed.

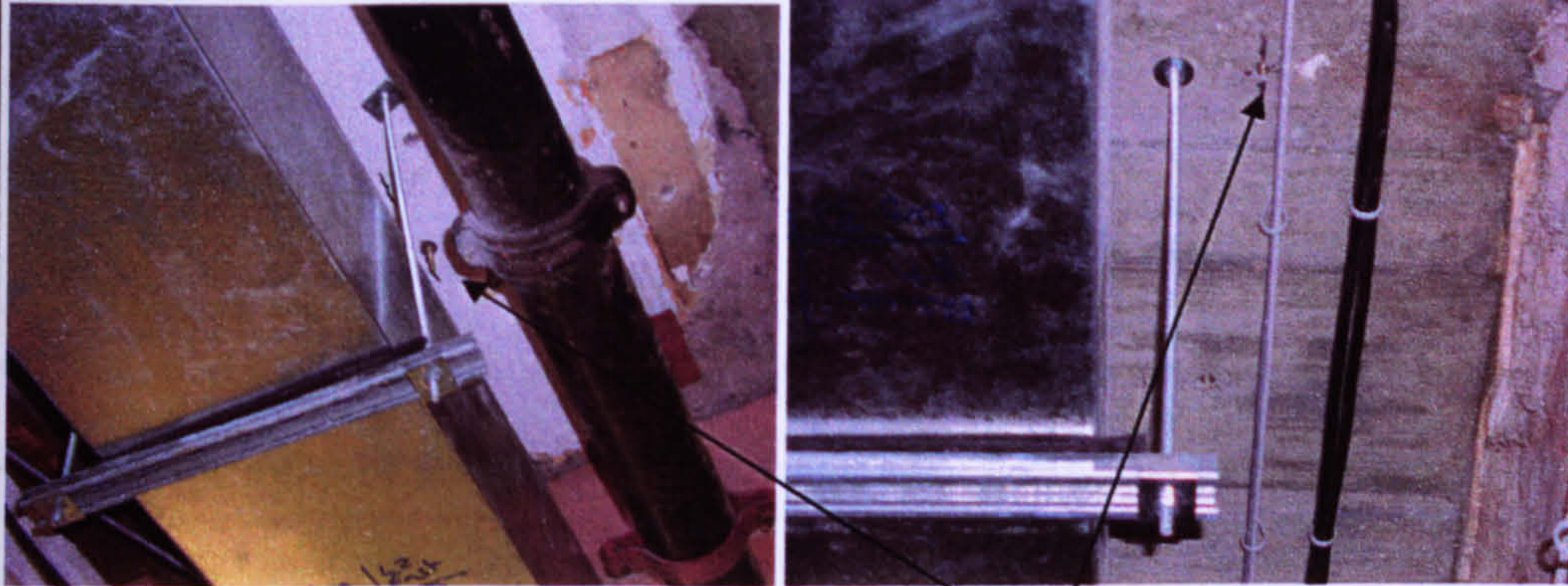
Construction specialists	Ergonomics specialists	Me / other
Procedure for spillage clearance <i>Spillage source equipment</i> <i>Pro's / con's of P/T Safety personnel</i>	Procedure for spillage clearance <i>Safety culture incentives</i>	(
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

- Follow up attempts unsuccessful

ACCIDENT 024 - Was cutting a threaded rod out of the ceiling. Hacksaw slipped out of hand and sliced through top of left thumb above nail → cut.

EVALUATION AT TASK AREA



H&S Mgr told me that these are the bits that need to get cut-off (studs from old ducting system) & this is how they look afterwards. I'm slightly reserved about this as wonder if the IP was in fact describing the sawing off of a piece of the new stud. Difficult to tell and quite difficult to piece together the story that he gave. In any case the positioning looks quite awkward and access to the studs must have been quite difficult for him.

SITE DATA SUMMARY

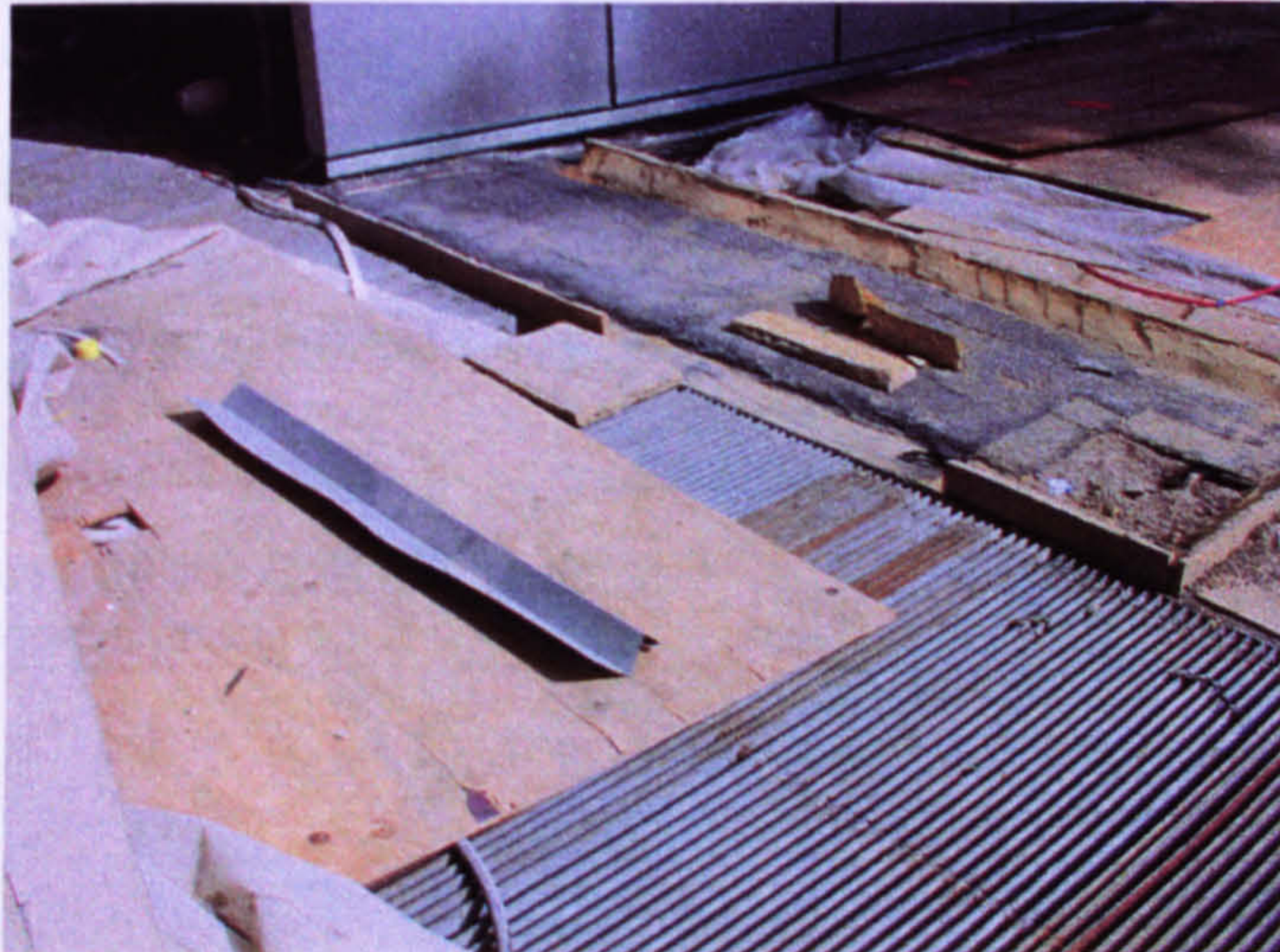
- I think IP was describing the installation of new duct work (but not sure) whereas H&S Mgr discussed removal of old ducting – possibly incorrect knowledge of accident event by H&S Mgr
- IP indicated that he had been trained to use a hacksaw, but not technique to cut off the stud.
- Others attributed accident to carelessness /negligence by IP, but he had never been shown correct technique and indicated that all colleagues worked in same manner
- Alternative and safer technique was known but this had not been communicated until the accident event.
- Task considered a basic trade activity – indication that when considered 'basic' or 'trade' it is incumbent upon op. / Fitter to oversee work practice – these are the baseline skills that they are expected to have
- IP seen as a skilled fitter - ?? awkward phase being towards end of supervisory period but not finally 'improved'
- Indication of tolerance of poor housekeeping
- Complaint re non-user friendliness of PPE
- Alternative hat designs available - ?? any criteria for selecting these or other PPE for that matter ??
- Accident late in day – possible fatigue issues
- Foreman determines competency by work performance – no impression of using any criteria prior to being exposed to 'a risk'
- First-aid training seen as 'safety rep' activity
- High dependence on inductions & TBTs to ensure compliance with site rules / plan
- Indication of low level of consultation in work organisation , but TBTs give feeling of involvement in safety related issues
- Performance review seems a bit ad hoc for Foreman and H&S Manager
- Perceived difference in how internal / external H&S people assess safety with internal appraisal seen as less judgemental OR this might also reflect level of safety training too.??
- Job and finish w/end only (?? nobody watching work methods!) Safety seen by Foreman as an Operative responsibility
- Does poor planning encourage different contractor teams to make haste to obtain access to install different services? Is this particular to refurbishment?
- Minimal formal training by both Main SC personnel
- No specific safety training for any of these men
- Induction and TBTs relied on heavily as a training method – but not perceived by IP as 'training'
- Dissatisfaction with welfare facilities

<ul style="list-style-type: none"> • V.Long hours by H&S Manager + long travel time by him & Site Mgr • There would be some value in observing task technique – especially given the muddled story re the activity being undertaken 		
Construction specialists	Ergonomics specialists	Me / other
M&E ductwork designer – generic <i>Special glove designs</i>	H&S person—job and task design Ductwork designer	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>
<p>LATENT CONDITION FOLLOW-UP <u>M&E Ductwork Designer</u></p> <ul style="list-style-type: none"> • Rods can be left if they are not in the way, but it is preferable that they are flush with the ceiling surface • A flexible wire rope gripper (+ nips to cut off the ends) would likely be a safer method • The contractor makes the choice of whether to use a threaded rod or gripper – the duct designer would only have prepared the initial tender drawings • This is not difficult work and no special training is required • It might be safer to use a small power tool to cut the rod. Not possible to cut pre-installation as has to be adjusted around other ceiling services • Drawings would not help here as building tolerances are too great – any more careful measurements would be very timely and costly 		

ACCIDENT 025 - 'Climbing down external scaffolding and a piece of roofing material cut the back of my hamstring'. (Quote from accident report). NB: Roofing company had since left site and I got the impression that they would not be appointed again.

EVALUATION AT TASK AREA

Not really possible to see anything here as all the scaffolding had been dismantled by the time of the visit.



This is the type of material that wounded him

SITE DATA SUMMARY

- Project Mgr didn't know about accident
- Housekeeping issues related to roof company working under time pressure / delay?
- Does sole occupancy of a work area by an SC offer some endorsement of 'own rules' storage / space use (? Regularly tolerated on sites)
- Accident reported to Site Mgr and not (apparently) the roofing company \therefore feedback failure
- Young employee with high safety motivation, but feels there is lack of interest among his seniors and his concerns seem to be ignored
- No apparent avenue for young employee to apply and perhaps take some leadership with his knowledge and enthusiasm
- Project Mgr appears torn with time pressure +++ and need to keep accident levels down. ??? communication between Site and Project Mgr - OR was there an informal / unregulated standard of safety / housekeeping that is taken as 'norm' but which is out with the best practice that the IP would have learnt.
- Interesting comment about small scaffold aperture between level change - would be interesting to see if there is any formal criteria for this?
- Seems as if the project design was constantly up in the air - too many cooks (Architects / client / tenant)
- Financial compensation for work acceleration - presumable project work plan evolving day by day. Also ?? is there an issue of site size - is there ever a limit as to how many people can be working on one area at a time (per m²).
- What is the criteria for apportioning extra time to a project - how would 6 ½ weeks be identified as the right time (ie. Does it include undoing of work completed or is it just the time to redo the new requirements assuming a 'blank canvas' prep. Area?
- IP no training in use care of PPE
- IP expected a fleece to be provided - is this PPE and how do people generate their expectations?
- At least 11hr day for each employee. OT taken for granted? Taken as read that it will be provided + that breaks will be worked through - culture
- IP experienced supervision problems - clash with one of them
- Project Mgr performance monitored by re-active (rather than active monitoring)

<ul style="list-style-type: none"> • Performance related contract bonus for Project Mgr – criteria unknown, but wonder what the ‘performance’ entails • Client pressure upon work schedule – Project Mgr trying to juggle with this and worries of operative fatigue etc.. • Welfare facilities 2 toilets and 2 urinal short for 150/d on site (But ?? were they available elsewhere) In any case nobody wanted to use them – why? • IP – no safety related training on degree course • C/o emphasis on gaining signature in site induction - paperwork orientated • First –aid seen as ‘safety training’ 		
Construction specialists	Ergonomics specialists	Me / other
Housekeeping arrangements SC Appointment criteria Architects SC views on safety prize	Housekeeping delegation Client / Architect RA	Snr Site Mgrs – generic Architect – generic AI’s
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
LATENT CONDITION FOLLOW-UP <ul style="list-style-type: none"> • Generic interview information 		

ACCIDENT 033 - '(IP) was laying key kerb, as he lowered the kerb he caught his 2nd finger on his right hand between the block and the stone bed cutting the tip of his finger by his fingernail'. (Quote from accident report).

EVALUATION AT TASK AREA

Work completed at time of assessment, but key curb was weighed (5.5kg) - there fore to lift 4 together + by compressive force at each end = 22kg load and outside MH guidelines. Unable to see how they are laid out on the pallet. Don't know where pallet was placed in relation to the brick line - line was ~ 30 foot long.



SITE DATA SUMMARY

- Poor handling technique by IP & inappropriate load
- Handling technique not identified by a RA
- Accident cause blamed as inattention by Foreman – no concept that work technique might be to blame
- No gloves – poor for skin protection, may have enhanced dexterity & grasp ability for this task type
- Superficial injuries / lacerations taken for granted as inherent to the job by both interviewees – fatalistic approach
- Time pressure ?? – labourer had already laid concrete, but kerbs were not in position – did area have to be set out in a bit of a hurry
- ?? insufficient support ops. after all – why had labourer left at this crucial moment
- IP says Foreman was there, but he says he wasn't!
- IP gave the impression that the injury was trivial and that he only went ahead with the formal accident report as this was the price of a plaster
- Gloves not seen as the solution to this accident by IP
- Non-gloved work appears to have advantages in comfort and speed
- Indication that gloves seen as optional (?) even for the cement work as skin gets damaged in any case
- High dependence upon gang cohesiveness for 'on the job training' & transfer of risk information – minimal else formally
- Own purchase of boots – PPE should be provided by employer
- Has he really been told to polish his boots?!
- Indication that glove size / fit / comfort is not satisfactory
- Long hours + quite possibly working > 4hrs in pm without a break
- Criteria for assessing competence of new starters seems a bit woolly / poorly defined / reactive
- All new starters given the MS to read (& sign for). MS is 9 pages long and well laid out, but dense text.
- MH assessment is 7 pages long, some pictures, but a fair amount of text too – Is it realistic to be reading all this & how many people really read it, how much time are they given to read – what does their signature really indicate? Induction all together is 20 minutes
- Indication that there can be competition between contractor teams as a result of time restrictions imposed by MC

- IP had no idea about MS / RA – yet procedures should have led him to read / sign for this at site start.
- Very little holiday for either interviewee in past 12m

Construction specialists	Ergonomics specialists	Me / other
Training in kerb handling Company glove purchasing criteria	Glove related issues <i>Block manufacturer</i>	SC liaison with block mfr
Done Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>	

<p>LATENT CONDITION FOLLOW-UP</p> <p><u>Sub-contractor discussion – all issues</u></p> <ul style="list-style-type: none"> • Operatives all have 1 day Health and Safety Awareness training • Training theory is provided by using *suppliers information * the manual handling assessment and *‘The essential Health and Safety Toolkit’ (HSE, 2002) • Practical skills are taught in weekly TBTs and learnt from working alongside experienced operatives. Ground workers rarely have vocational training (ie. NVQ) • The foreman is responsible for risk assessment and implementation of appropriate reduction measures • All products are delivered and packaged to optimise mechanical handling and mechanical movement of loads • Gloves are selected from a supply catalogue. New styles have not been chosen – gloves do not protect from crush injuries

ACCIDENT 034 - 'Un-stacking ductwork. Pulled duct and caught between 2 bits of duct' (Quote from accident report).

EVALUATION AT TASK AREA

This is a duct pile that was available for me to see. I had the impression that, during the accident, there was a second pile end on to this pile – thus as his hand slipped he pranged it on the raw edge of adjoining ductwork. Oil protects the material. Not much else to say about the work area really.



SITE DATA SUMMARY

- Long contractor chain – has information got lost through the series of people involved
- IP saw himself as un-supervised / own manager, yet Project Mgr clearly saw him as being supervised – role and responsibility clarity situation
- ? need to wear gloves for this task But loss of dexterity and ? quite difficult to make the pinch grasp
- This seems a logical way to store the ducting if you want to get out the innermost tube – I wonder if there are any problems if the intermediate tubes need to be accessed (difficulties in grasping it and manipulating the other sleeves too)
- Technique to transport ducting seems a bit laborious (double handling ++)
- No formal training for duct worker – all skills attained by observation over the years
- Reports no training in PPE – yet paperwork indicates that this is done.
- Purchase of own PPE – contra HASAWA. Plus paperwork indicates that this is supplied
- Job and finish on Fridays (? Accident / performance any different for company on that day)
- ?? is there any conflict between fixed wage for 'employee' and priced work for the job
- How might the boss make a profit on the job – is this part of his contract or will he get extra money for speed / performance etc... - if so ? impact on ops
- Good comments about social support, group cohesion and work incentive
- Impression that inductions and TBT's are the only form of safety training he has received by presentation.
- All time off unpaid – could be a disincentive to take leave (although seems not in his case)
- Paperwork supplied by next SC in line ?? interaction / communication between them and his employer
- No knowledge of RA/MA by IP, yet 'read and sign is apparently part of the induction – 12 pages
- MS does not cover materials storage – circumstances of accident task
- RA does not cover manual materials handling / movement – circumstances of accident task
- Checklists (these are RA's really) require the assessor to indicate if there is a significant risk of injury – 'significant' has a different inference from that implied in the Regulations and could lead the assessor to overlook risk per se.
- Checklists – need to think about how they differ from / support / detract from RA / MS system
- MH RA does not i.d the risk of laceration from the sharp duct ends – focus is entirely on musculoskeletal injury
- MH assessment does not i.d remedial measures – incomplete

- RA – quantification system used. They got their sums wrong – no resource indicated as to what the end result means

Construction specialists	Ergonomics specialists	Me / other
SC Safety Adviser – glove issues <i>CITB – MH in ducting</i> Ductwork designer <i>Anyone done cost-benefit of ignoring little incidents</i>	Ductwork designer <i>Glove issues</i> <i>Site supervision</i>	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

SC Safety Adviser

- People tend not to wear the gloves unless they are policed
- It is very difficult to obtain the necessary dexterity whilst wearing gloves – leather and canvas gloves are provided

Ductwork designer

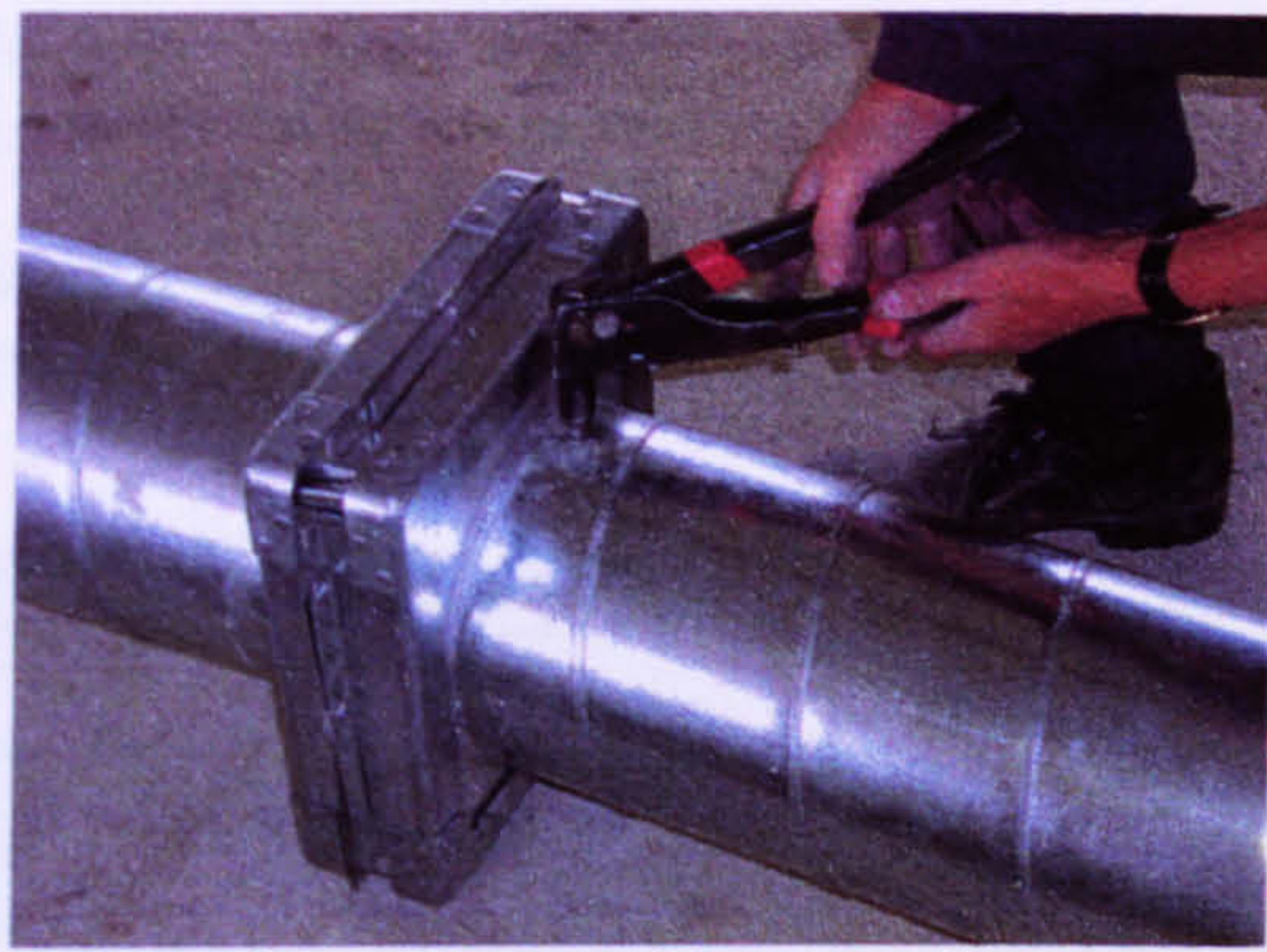
- Almost all UK ducting is made of steel, although different products (such as mixed fibre composite materials) might be used overseas
- HVCA (heating and Ventilating Contractors Association) provide technical guidance on use of all products
- Storage and handling are not part of the designers role although the designers risk assessment might alert to duct work sharp edges
- There is generally little other liaison –unless there is a particularly difficult work aspect
- Fitters have the best knowledge and ideas for better practice should come from them. It’s presumtuous to impose a particular practice upon them

ACCIDENT 035 - 'Drilling ductwork and swarf went into eye' (Quote from accident report).

EVALUATION AT TASK AREA



Staged hole drilling exercise



Inserting a rivet – tool bare metal.

Not sure about purpose of red tape on rivet tool?. Hand drill example – single finger trigger operations and bit of swarf on it even now. No hand grasp bar ? does tool ever have the benefit of a bit of stability → grasp / manipulation type issues.

Q – Is swarf more likely to be generated under any particular circumstances, or is it random?

SITE DATA SUMMARY

- Goggles not worn for drilling task – IP did not see that they were necessary for this (familiarity / complacency)
- Has had previous similar accidents + hospital treatment, but still no goggles / glasses
- RA indicates that goggles should be worn when using a hand drill – not sure how whether this has been picked up on by site and how managed
- Goggles worn for disc cutting and jig-saws ?? are these supplied tools and could he have a different attitude for materials he does not own / control
- Use of 'tec screw' (alternative measure) rejected by interviewees– need to explore. Seems more efficient, but would swarf be generated in the same manner (or better / worse)
- Hand drill – apparent lack of info from supplier. ?? eye care info overlooked
- Tool design inadequacies
- Long contractor chain – has information got lost through the series of people involved
- IP saw himself as un-supervised / own manager, yet Project Mgr clearly saw him as being supervised – role and responsibility clarity situation
- No formal training for duct worker – all skills attained by observation over the years
- Reports no training in PPE – yet paperwork indicates that this is done.
- Purchase of own PPE – contra HASAWA. Plus paperwork indicates that this is supplied
- Job and finish on Fridays (? Accident / performance any different for company on that day)
- ?? is there any conflict between fixed wage for 'employee' and priced work for the job
- How might the boss make a profit on the job – is this part of his contract or will he get extra money for speed / performance etc... - if so ? impact on ops
- Good comments about social support, group cohesion and work incentive
- Impression that inductions and TBT's are the only form of safety training he has received by presentation.
- All time off unpaid – could be a disincentive to take leave (although seems not in his case)
- Paperwork supplied by next SC in line ?? interaction / communication between them and his employer
- No knowledge of RA/MA by IP, yet 'read and sign is apparently part of the induction – 12 pages
- MS does not cover joining duct sections – circumstances of accident task
- Unsure of protocol for training / instruction for ops own property (drill)
- RA for installing ductwork does not cover joining 2 pieces of ductwork – circumstances of accident task

- Checklists (these are RA's really) require the assessor to indicate if there is a significant risk of injury – 'significant' has a different inference from that implies in the Regulations and could lead the assessor to overlook risk per se.
- Checklists – need to think about how they differ from / support / detract from RA / MS system
- 'Use of handtools' RA does not i.d the risk from product interaction – focus is upon risk of eye injury from tool failure (blame)
- RA sheet – design discrepancies and lack of clarity in meaning
- RA – quantification system used. They got their sums wrong – no resource indicated as to what the end result means

Construction specialists	Ergonomics specialists	Me / other
Criteria for goggle use (Safety Adviser) Duct fixing methods / design <i>drill manufacturer</i>	Eye protection mfr <i>Site Management</i> <i>Dissemination of safety innovation</i> <i>info</i>	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

Safety Adviser / Ductwork Designer

- Swarf is a constant hazard and there are no tool alternatives (such as different drill types) to minimise the hazard
- Slower drilling and a sharper drill bit may reduce the hazard
- Unventilated goggles are uncomfortable, but dust gets though the holes or swarf drops from the hair into the eyes when they are removed
- New products would be selected from the suppliers catalogue – or the sales team would provide information on new products when ordering
- Ducting doesn't always need to be cut on site – it can be delivered ready for assembly (depending on application)
- There is no push fit ducting – fixing is either by pot rivet or drilling in screws – there is no tool that creates hole and pot rivets simultaneously

It is expected that SC operatives are competent if this has been stated in the pre-tender questionnaire

Eye wear supplier

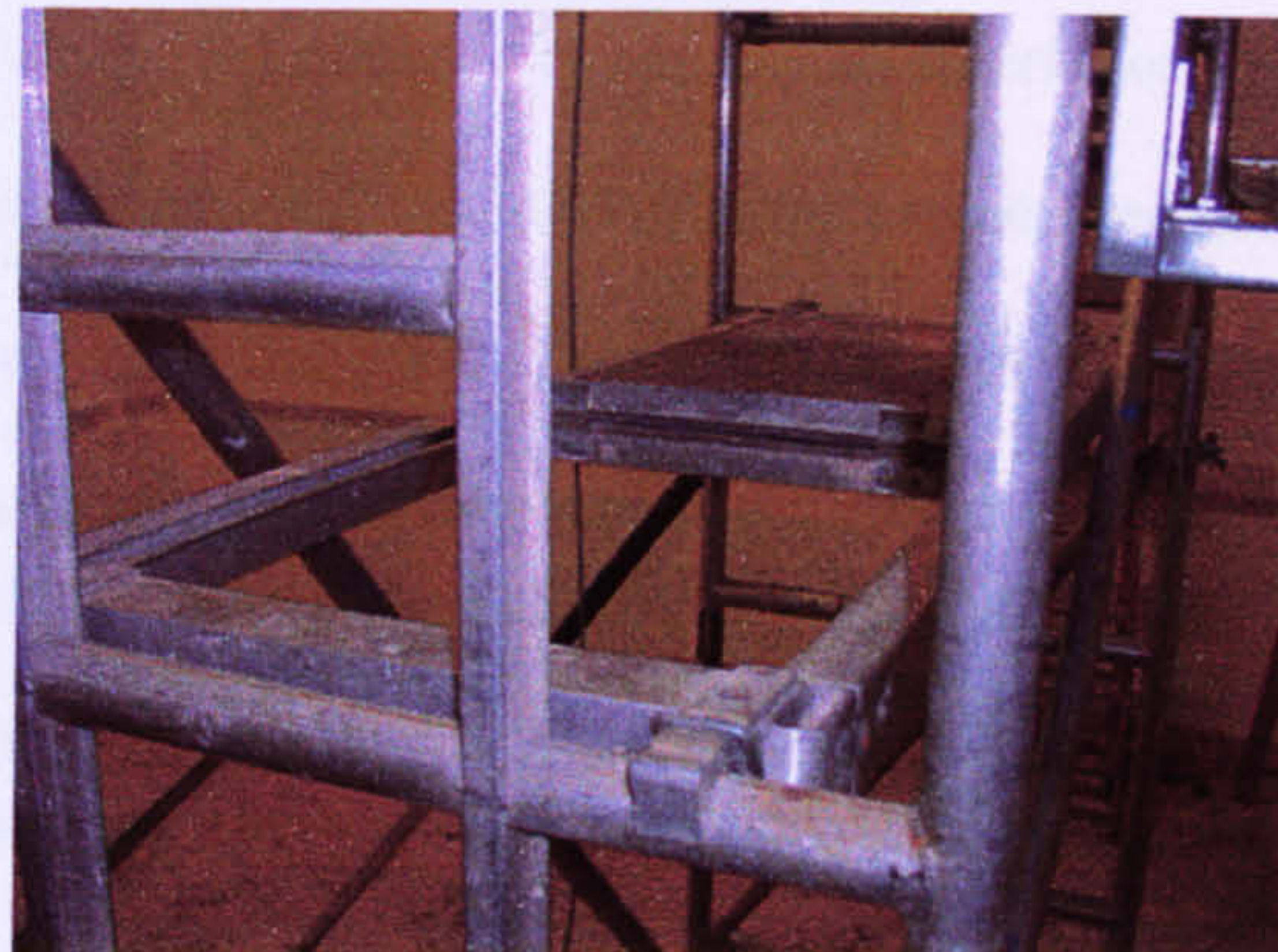
- Recommended care involves washing with warm soapy water and anti-mist wipes.
- People don't look after them properly

ACCIDENT 036 - Whilst climbing down from a mobile aluminium scaffold [the IP] banged his left elbow on the aluminium strengtheners around the access / egress hatch causing a chip / fracture to the left elbow.

EVALUATION AT TASK AREA



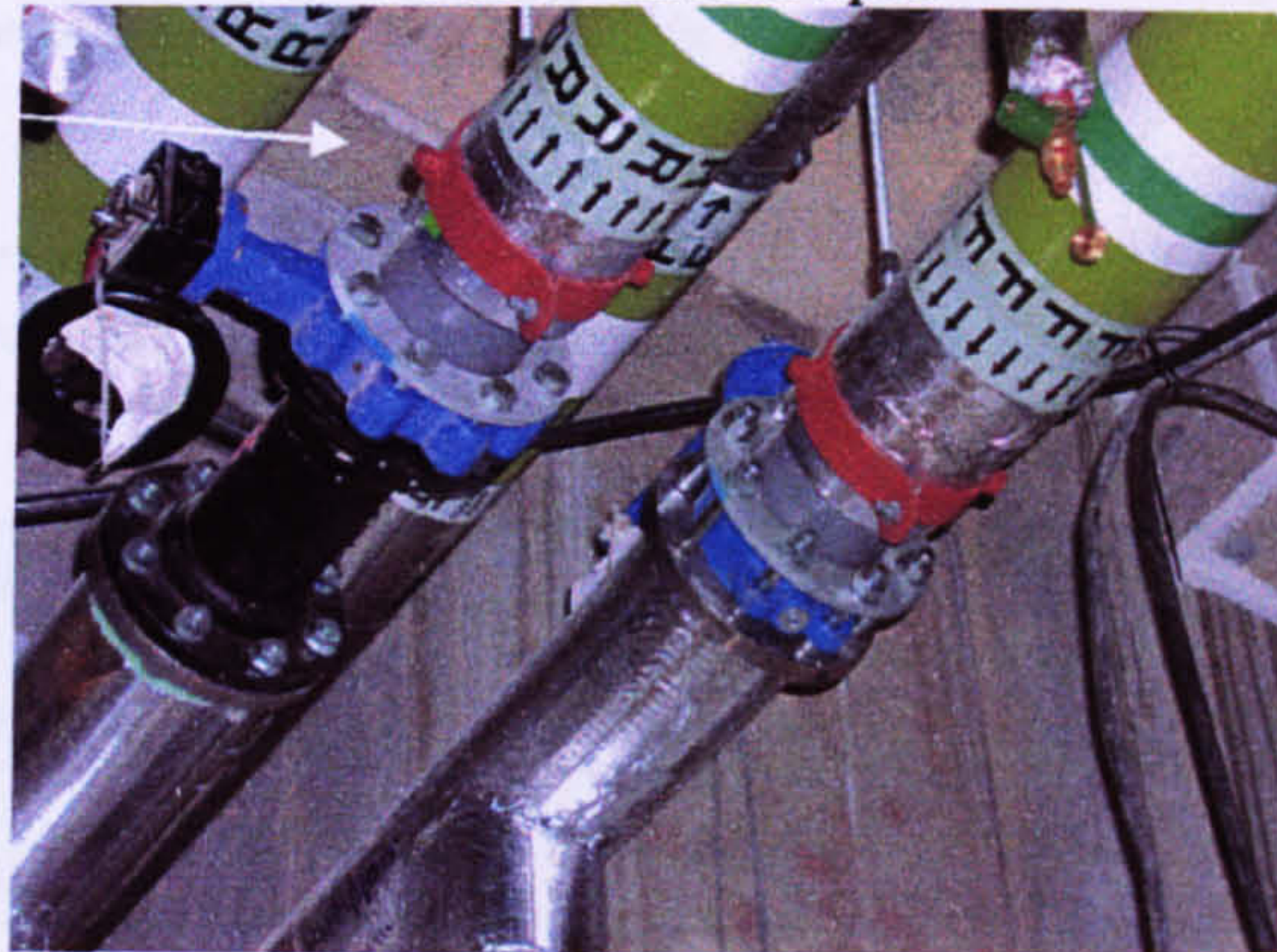
Example harness – not sure which is ‘buckle’ that got caught



Example tower (trap door open).
Area that elbow knocked upon



Typical work area where the tower would be access the ducting. S.O commented that it snagged



Example of duct point where the harness to was ‘tight’

SITE DATA SUMMARY

- Accident record notes the actions that lead to the elbow # not the accident causal factors (harness snag) - poor accident history & incorrect record
- Investigation revealed accident precursors, but incident accepted as no possibility for further action
- ?? not aware that some of his weight was supported by the harness - does the inherent harness wearing discomfort override the tension that would have been there
- Q- re skill & experience – interpreted it as issue around the ‘ticket’ – probably best though – as a bit of daft Q for descending tower
- Not sure how they will take hatch design forward, but the convenience of this may make it more likely to fall shut as they use the access
- Another voice to the ‘universal dislike of harnesses’
- V. negative attitude towards the PPE – yet he has Apprentice of Year .. wonder if this perpetuates this attitude
- Is it really necessary to wear a harness on the scaffold like this?
- Harness management system seems a bit lacking.
- PPE promoted but not available as necessary
- Why do people hang onto harnesses (inadequate supplies??)
- Why do they keep harnesses for months if they don’t get used
- Principles for PPE choice are admirable, but finance ultimately seems to be the overriding factor
- V. long hours for S.O. – an especially early start. Thinks all ops work his hours??
- IP had worked previous 12d at 9hrs /day.

- Varied perception of ?? adequate numbers – IP thought not initially, but then seemed to change his mind
- Looking for 2 harnesses, but only room for one to work anyway. ? reflects nature of working in pairs / gangs ritualistically without forethought?
- was the alternative work methods (one on the tower, one below) better in any case
- Competence assessment – heresay of last supervisor. No evidence of any formal criteria for judgement
- Health surveillance – BUPA – wonder what the package is (? Any OH or gym / private medical refs. etc..)
- Interesting concept by interviewee that Hospitals make diagnoses to capitalise on compensation and to obtain a fee for record provision
- Aware that signature does not exonerate employer of responsibility
- Supervision of 18 –20 people = is there a standard / guide as to what they should do / what their role is?
- IP had no knowledge of MS/RA – yet normal procedures of read / sign had been in operation
- Indication that TBTs only done as a consequence of previous failure, rather than as a result of RA
- Rivalry between PC & SC ops and resentment re. ‘unequal treatment’
- Difficult situation trying to provide stimulating TBT’s for longstanding employees
- S.O wants more control, but does not have the safety training to back this up (safety for supervisors ~ 2d??)
- Harness design – areas ++ for entanglement
- Trap design – process for design review and evaluation
- Building design – tight access space – architectural issues + correct choice of tower / raised platform for this work.

Construction specialists	Ergonomics specialists	Me / other
Working method enquiry Harness design	Tower scaffold designer Harness designer	Temporary Works Designer – generic PPE Supplier
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

LATENT CONDITION FOLLOW-UP

Work method enquiry

- The ceiling structures inhibited erection of the specified handrail height on top of the tower

Tower Scaffold Designer

- Adjustable handrails can be made up to accommodate ceiling structures, but these technically don’t comply with handrail guidance – support from HSE invited
- Rental companies don’t want to keep odd parts in stock –& therefore this restricts availability for sites. Minimum standard height increment is 0.5m
- A harness shouldn’t be used if working at less than 4m in height
- The aperture size is dictated by a EU standard [details not available]

Harness designer

- A harness wearer needs instruction to fit and adjust the harness properly (at least 20 minutes). Its possible to put it on upside down and back to front
- Harnesses are not properly cared for and, in construction, are vulnerable to abrasion and wear
- People buy harnesses indiscriminately – they are not trained to select correctly

ACCIDENT 037 - ‘Walking through ground floor link. Knee wasn’t 100% anyway, it had been giving him problems previously & the turn into the link from another area twisted it’.

EVALUATION AT TASK AREA



This is the accident area, but the power box was formerly in the nearside left corner and the wires were in the foreground walk area.

SITE DATA SUMMARY

- Accident report and personal description don’t tally
- Inferred that IP was previously injured (not corroborated) – blame approach
- Underlying poor housekeeping issues
- Was IP prepared to walk over top of strewn cabling – sublime acceptance of poor housekeeping among all individuals
- ?Blames self for being distracted - ? reasonable behaviour when walking along a corridor
- Apathy - ? reflecting poor spirits from being late on the project
- Battery powered tools and cost implications
- Battery powered tools and load / handling / recharging etc implications
- Rejection of high housekeeping standard by IP as non-productive (he is TU rep too) – didn’t connect work absence with loss of productivity
- Miserable about PC – light level, PPE, changing rooms, provision of traffic routes etc..
- If lighting was poor / obstructed – no action taken nonetheless
- Unhappy with range of PPE – (overall / tee-shirts)
- Long hours culture – 48hr week. Within stat wage for senior staff
- OT encouraged if away from home (to ↓ pub time)
- IP not very happy – seems isolated and doesn’t appear to feel valued, secure. Recounts being treated like a Navvy and that safety for construction workers doesn’t match that required for general public (scaffold clip covers)
- Gets a pat on back when reaches target – but thinks in terms of bonus (monetary returns)
- Competence assessment of new starters – on the job suck it and see
- PEM by ‘office staff’ – little knowledge of these issues by Supervisor
- Supervisor acknowledges more stringent attitude towards working safely now
- Compliance with site rules is by induction and getting told the rules
- Supervisor – no defined H&S responsibilities of people he oversees
- Supervisor – performance review every 6m
- Work pace for IP – task interdependency
- Job and knock favoured for motivation. Rejection of priced work
- Two inductions – PC and Main SC. No value from inductions (either of them)
- H&S rep – minimal safety training and 7y ago
- IP not full holiday allowance

Construction specialists	Ergonomics specialists	Me / other
OH – PEMs	OH arrangements <i>Housekeeping</i>	Industry OH publications
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

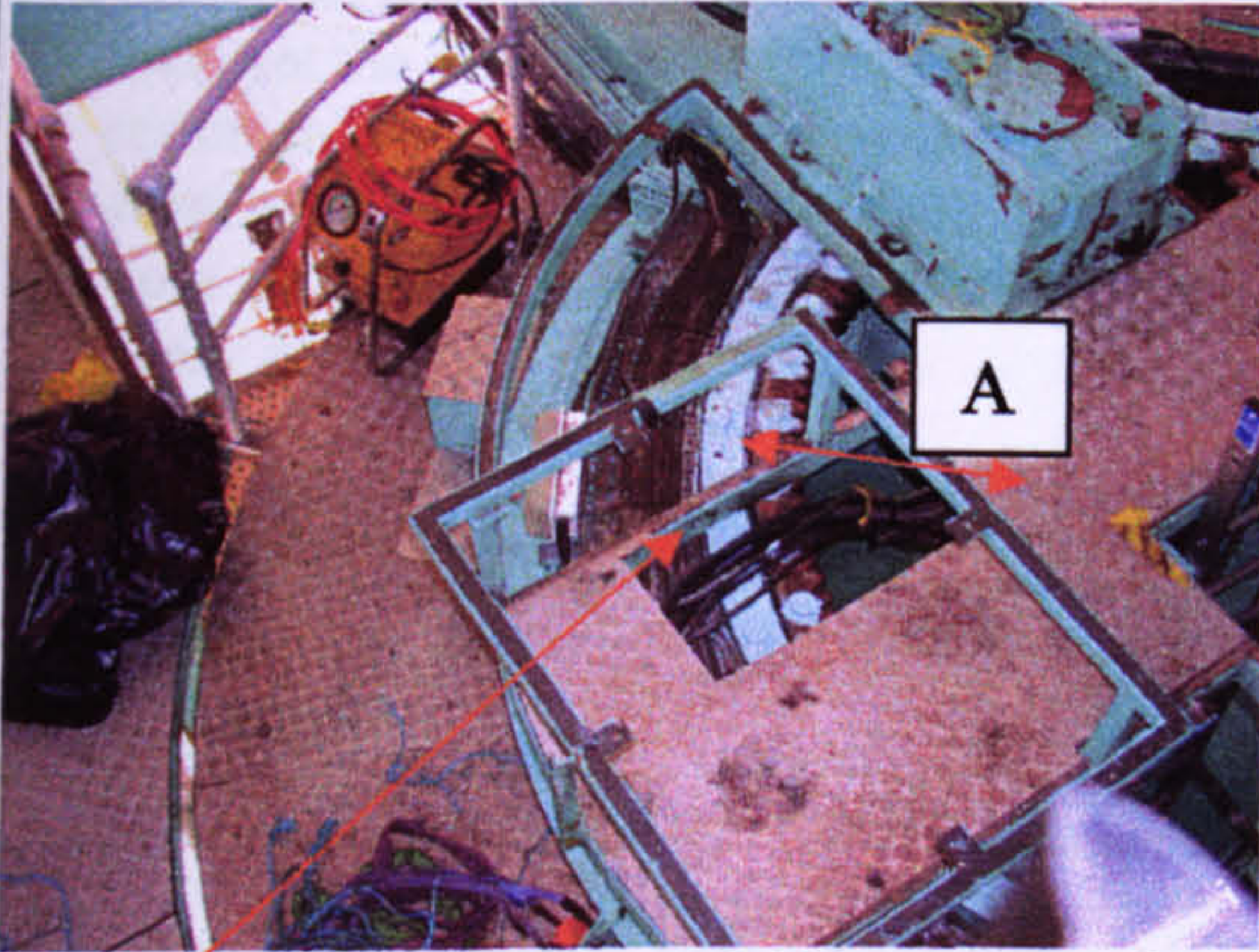
LATENT CONDITION FOLLOW-UP

Supervisor discussion

- They used to do a PEM system, but people wouldn't open up and give out any information (were scared that they'd be required to leave site)
- Thinks a lot of people will be economical with the truth and isn't aware of a formal PEM system at Head Office
- On site all health problems are dealt with by himself (first aider) and at induction he asks people to tell him if they have any health problems such as 'epilepsy, asthma, diabetes' and so on. He has decided himself which questions / ill health to ask about. Does this so that he can take appropriate action if that person has any problems on site. Adds this info. to the persons record, but in an abbreviated code (he developed) to keep it private / confidential and from people who could misuse the info.
- Has not refused anyone a position on site due to health problems – 'if a Dr's happy with them then who am I to say otherwise'
- No Dr / nurse get involved in making the fitness for work decision
- Attempts made at providing support in graded return to work post illness

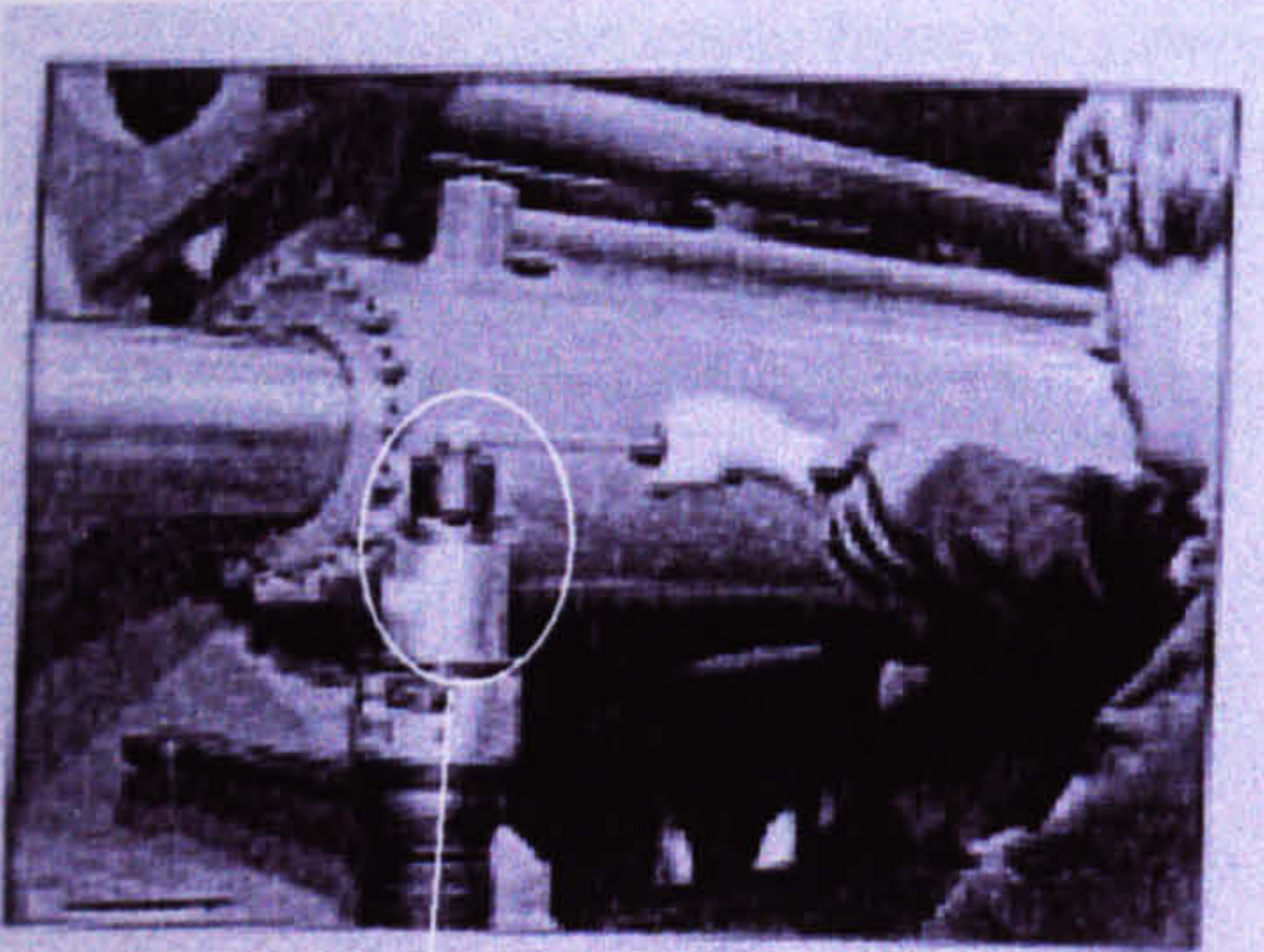
ACCIDENT 039 - Whilst torquing ring on Gantry strained back' (Quote from accident report). . Was working on a slewing ring of a gantry. Was changing the bolts, and these have to be torqued to 860Nm. There are 40 bolts and the placement is such that they are at a slightly awkward height and require leaning forward. The gantry had been moved off a bridge to rest on sleepers on the (dry) river bed, but was in a location that couldn't be left (due to public access). While the men doing this work went for a break he decided to carry on with the job (rather than just stand there). When he straightened back up his back went. Commented that he doesn't normally do maintenance

EVALUATION AT TASK AREA



A = 580mm horizontally and 430mm from floor. The ratchet arm (1.8kg). length ~ 58cm

This was the distance from side of the ring that the IP had to lean forward (NB. The top ring was not there at the time of the work [this shot was taken since the ring had been returned to the gantry under the bridge]. He reckoned that his working height at the time would have been ~650mm from the ground.



Used as a ratchet accessory.

(source picture: product catalogue)

Torque multiplier – estimated that he was handling this at ~ arms length.

There was also a reaction arm which is jammed against another nut [no picture] and this weighed 6.5kg.

SITE DATA SUMMARY

- Inadequate manual handling assessment
- Indication of awkward postures to undertake task, but not identified on RA
- Difficult to understand what the load handling aspects are, but indication that load / torque combination may be near upper limit of guidelines
- Task unfamiliarity by IP (& no task training)– yet he perceived that he had the skill and experience to undertake it.
- Remedial action – has not addressed the causal factors
- Ground unlevel, possibly wet and work area unprotected from wind.
- Indication of time pressure – work load related
- Trying to accommodate two absent / sick ops.
- Pressure from co-worker to maintain a higher than desired work pace

- Some dissatisfaction with welfare facilities (food)
- Some lack of knowledge indicated in MS prep (not this job – but writing MS for riggers who know more than him)
- MS prep is excellent for his learning – but what about ‘the readers’
- No that happy with training provided
- Appears under-stimulated in his work and a bit bogged down with bureaucracy
- MS – heavy weighting on PPE requirements
- The 44 steps for sequence of operation are very detailed. Is it reasonable to expect someone to read these, memorise and then go and do the task. The info. was all written by the Maintenance Inspector, who was there in any case. Who is this information for? This looks like a specialist task, yet the operational procedures are routinely provided for all. Id if is a specialist task is it reasonable to disseminate so widely and to all op. grades? Allied to a highly skilled task (eg. surgery) – who would follow such detailed procedures under any other circumstances – when does own skill and experience come in to the equation, overriding the minutiae of recording every detail.

Construction specialists	Ergonomics specialists	Me / other
<i>Gantry mfr</i> Task design <i>MH/RA training</i>	<i>MH assessment</i> <i>Task design</i> Managing absenteeism	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP

D/W Manager – task / absenteeism

- The slewing ring is a proprietary item normally used on tower cranes, but they are using it upside down on this gantry – an unorthodox move and not planned by the manufacturers.
- They’ve now got a hydraulic torquing wrench. He was researching the tools available to do the torque checks (have to do ~ 2000) as needed something small and suitable for restricted access – this tool cost ~ £7k. All currently using it were trained by the manufacturers.
- No tool guidance came from the slewing ring manufacturers
- Because of the new wrench they will now need to amend the RA’s / MS – the work needs to be re-done shortly.
- There is no change about how the task is handled with staff absence – the workload always changes and they always seem to be short-handed.

ACCIDENT 040 - '[IP] was placing concrete throughout the day and suffered burns around the ankle area. He was not wearing Wellingtons at the time of the incident. Swelling and burning was noted at the end of the shift on [following day.]

EVALUATION AT TASK AREA

Not seen

SITE DATA SUMMARY

- ?Selection of RIDDOR category – implications for HSE investigation and data analysis
- Unplanned work – just an add on 'while you're here'
- Small company – no evidence that they have done any of the paperwork themselves – ownership issues
- IP not very experienced, but 8m is long enough to know to wear correct boot style
- Site Manager sees it as his responsibility to check for correct PPE – realistic?
- IP's gang seem to have 'allowed' him to continue working without the correct PPE – who's responsibility is this??
- Implication from Site Mgr that PPE easy to get hold of if not worn, but this does not appear to have been perceived by IP. Uncomfortable asking for stuff
- IP records concrete depth as 6", but their records indicate cement at 300mm
- Run of the mill job
- No task training for IP /ganger man
- ? lack of control during cement pour – Site Mgr had commented on obstructed vision - ? affected Mr cement too?
- Scaffold handrail had been erected as fall protection, but the foot placement area (side planks) looked inadequate
- IP commented on lack of workspace
- Could boards spanning the walkway (1.3m) have been used for standing on?
- Is the mix change relevant to this accident?
- Why did IP wear wet boots the following day – he also owned safety wellies?
- Ganger man knows of 'loads' of concrete burns cases – trivialisation.
- One response to incident – wellies
- Site Mgr responsible for getting PPE and wants comfy stud, but has no apparent criteria for exploring that this happens – Only new equipment trial was for himself
- ??? no training in c/o /use of PPE by either op.
- Long work day and no break for 4 –5 hr at time of unwise behaviour
- Hanging around waiting for concrete delivery ++
- Site Mgr – has to assess experience and competence at induction! Chat and no: tickets
- Site Mgr and S.O. also seem to be dealing with health issues at induction themselves
- Site Mgr has no formal H&S role, but assumes it
- IP work pace – socially paced. ?? was he tired and reluctant (balancing on side) and ask for a stop
- IP discussed impact of being slow on the gang – not fast
- Job and finish promoted by Site Mgr, but uses gut reaction to i.d whether it there is still risk (e.g. Temporary fence erection – is MH risk OK?)
- Ops prefer priced work ∴ reflects their approach to pace / workload.
- Ganger man v. defensive and not keen on interview at all – Apparently took him 30 mins to read MS and non existent RA!
- IP saw ganger man as supervisor, but ganger man said supervisor not present – lack of role clarity and responsibility
- IP had had and signed for the induction – but this does not record that MS/ RA have been introduced. No way of knowing
- MS did not follow the PC format
- MS done by Site Mgr only – yet he did not do the work. Ownership , relevance and learning effect issues
- Ganger man indicated that procedures were followed from the MS. Correct as the list only specified safety footwear – yet they all knew it should have been wellies → cut and paste-ism
- Site Mgr indicates need for education in training //induction

- Complaint by IP that induction Q's decisions are intrusive and beyond the scope of the inductees responsibilities – see Q re health on induction sheet
- Safety Mgr. has had good training (excl. human capabilities and performance), but the routine ness of the task made the formal MS/RA methods be overlooked??
- IP v. low construction training history and not impressed with induction
- IP unpaid for any absence
- Ganger man – no holiday / sick in 12m
- Ganger man described pressures from priced work & stresses resultant from Agent ordering incorrectly and things not turning up
- MS – very thin. Bold and meaningless statements
- RA not done – although inherent within some of the MS material
- MS – specifies safety boots – incorrect for cement work

Construction specialists	Ergonomics specialists	Me / other
<i>Supervision and training of PPE</i>	<i>Training</i> Temporary Works Designer – generic – PPE responsibilities	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

LATENT CONDITION FOLLOW-UP <ul style="list-style-type: none"> • Followed up as a generic issue 		
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ACCIDENT 050 - 'While passing a bucket full of tools from one deck of scaffold to the next lift, operative felt pain in the top right hand corner of his back. Sustained pulled back. The discomfort was too bad for IP to carry on with his work and was taken home. Injury caused by twisting when lifting bucket.

EVALUATION AT TASK AREA

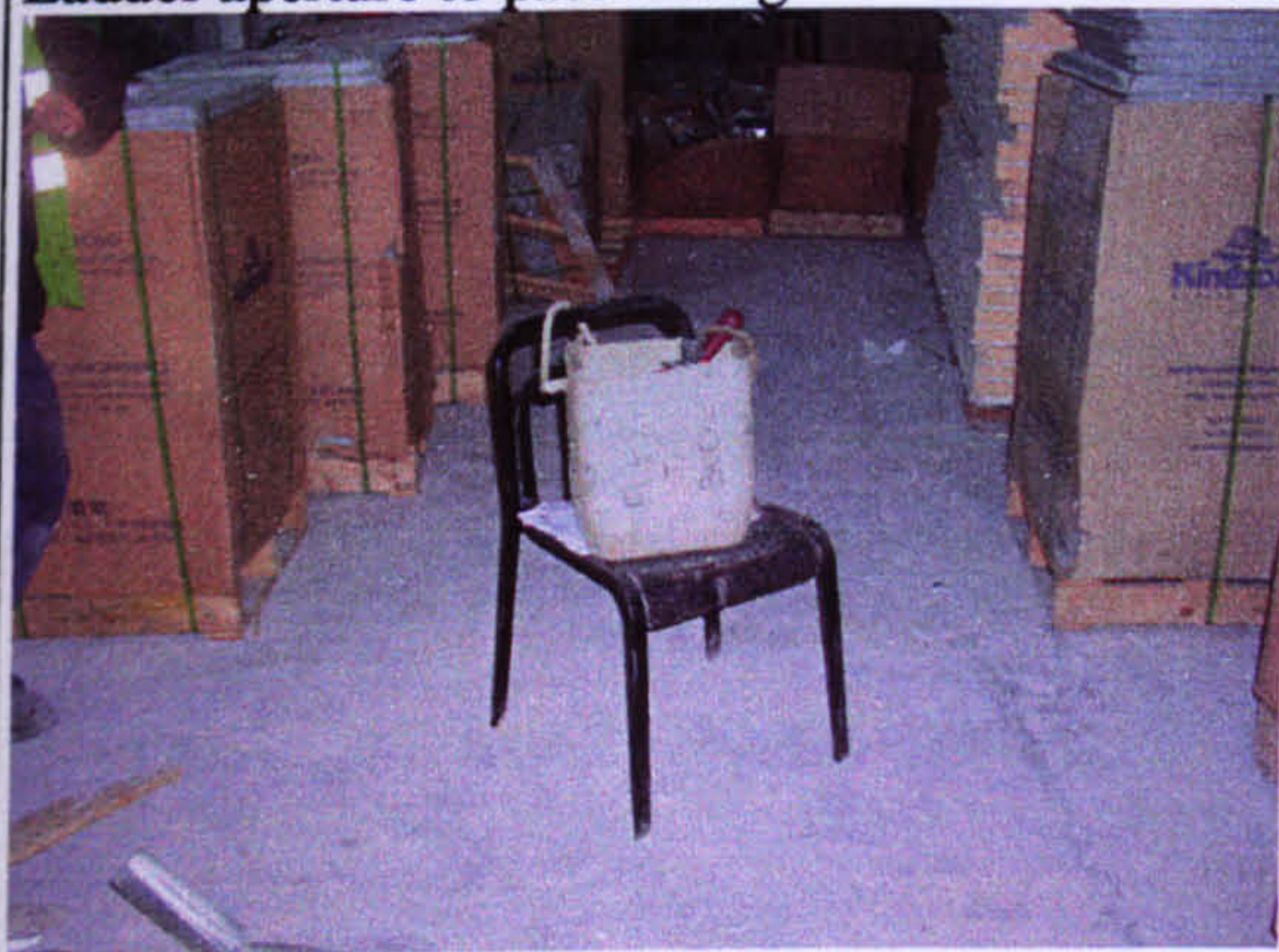
The scaffold and ladders have been removed – but someone took the camera for me and photo'd / measured something similar on another part of the building. The scaffold aperture for the ladder to pass through was 950mm x 500mm & he estimated that the free space for movement in front of the ladder was roughly 75mm. The ganger man refilled the bucket with tools he thought would have been used on that day (and these pretty much filled it) – it weighed 8kg.



Ladder aperture to pass through



was working on the outside of this at the top



The bucket

SITE DATA SUMMARY

- Short-sighted approach to transport method of moving hand tools around the site
- Aperture within scaffold for ladder seems a bit pokey even for a man in his own – let alone carrying anything
- ??? formal guidelines for aperture size in scaffold – or isn't determined by size of the boards, or the width of the pavement outside
- Not long with this employer ? influences whether he would ask for assistance or not?
- IP describes job as very menial, doesn't feel listened to by co-workers – relevant to not challenging the method of moving the tools around the site.
- IP described bucket as quite heavy. Not especially heavy when weighed in isolation, but not considered in the context of the environment or circumstances = no MH assessment
- ?any alternative to cross-membered scaffold for load bearing and people passage.
- Poor environment at the time of the accident – light low. Also IP cold and not warmed up for labour – first task at the beginning of the day.
- ? issue re provision of clothing for employees
- Long working week for all
- Time pressure generated from Supervisor
- IP un-consulted about work org / safety
- No procedures for carrying tools around site

- SC firm not happy with housekeeping standard ‘provided’ by PC
- MH training not well accepted – leaflets
- IP doesn’t perceive lack of training as inadequate
- IP doesn’t perceive value from inductions
- IP has no lifting training with this co. – missed it
- IP no holiday in past year – paid in lieu
- Foreman has not considered alternative to bucket for tool movement around the site
- Foreman chose alternative PPE gloves – only because he saw someone else using them – no formal method to learn about new equipment, range applications, attributes etc..
- Company train people themselves – time generated, although older / experienced ops (??such as IP) may join them
- PEM – do health screening of the Q’s themselves
- Is x4/year = a ‘regular’ safety meeting?
- Safety judged by co-operation with wearing the PPE
- Foreman role for safety not specified in his role – no guidelines and no individual appraisal
- ‘Shout & bawl’ = motivation – how much of a joke was this?
- MS/RA are prepared pre-job ∴ no learning experience in the prep. for the people doing the work
- MH assessments are done by Contracts Director (? What training) & H&S people ∴ Foreman doesn’t see himself in this role
- Foreman = no formal H&S training
- Bucket = ad hoc arrangement. Make do by the men – no formal method for tool movement on site eg. what would happen if he fell with this bucket, or there was weight shift – injury potential and no protection from the contents.

Construction specialists	Ergonomics specialists	Me / other
MS for equipment movement <i>Training issues</i> <i>Warm-up issues</i> <i>Back belt / warm clothing</i>	MH training and system for materials movement Temporary Works Designer – generic – scaffold aperture	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 051 - Operative tripped on loose board on the floor, tried to save himself from falling and twisted his right thumb'.

EVALUATION AT TASK AREA



Typical boards that were tripped on except that the one in question had another rise on it taking it up to 4m high.



Typical of the scaffold being moved (5' x 4'),

I asked the Section Manager (contact person on site) how a decision is made on whether to board / barrier a hole and he replied that a Site Mgr would decide and his decision would depend upon size, depth, location and situation of the area.

SITE DATA SUMMARY

- Criteria for whether its appropriate to be using a tower around boarded area is not clear
- Manhole covers put on after accident – could that have been done before accident task
- C/o debris on the floor – additional obstacle for manoeuvring the tower
- Wonder what the force and manoeuvrability of the tower is like
- What is the maintenance programme for the tower wheels
- Very laborious procedure to go through to get another set of trades to clear up after themselves – chain of 4 telling's to diff people
- C/o lighting problems – subtle, may have been an environmental factor for the accident or just a de-motivator
- Choice of hand tools and PPE – entirely dependant upon catalogue advertising – no apparent methods to provide a non-commercial perspective.
- Theft risk and lock tools at each break – element of mistrust and loss of group cohesion and ownership on site
- Housekeeping – abhorred, but seen as a responsibility of the PC
- Good ideas to prevent reoccurrence of the accident event (barriers) have not gone beyond the SC team – communication issue.
- Disharmony with the brickies – they're dirty, don't turn up and upset their work programme.
- Tower hire company address the erection process, but don't seem to have offered any advice about manoeuvrability – is it reasonable to try to push it over a board or not?
- Impression from IP that the area would have been boarded if any members of public had been at risk, but that this care isn't taken for construction workers.
- Indication that PPE not especially comfortable – especially if long term use expected.
- Suggestion that other trades were in the area at the time – irritation not so much caused by their presence, but rather the overlap of work location requirements
- Safety instruction / training seems to be mainly the responsibility of the S.O. ? can lead to loss of ownership issues
- Doesn't seem to be a huge amount of within team communication (new ideas) for IP
- Brickies work seems to generate a huge amount of debris – is the management of this accommodated in the work set-up
- Block work debris like ball bearings – a design issue?
- Full medical - ? how much OH in here

- ‘Programme’ is the measure for co-ordination /communication, yet simultaneously we hear that the formal programme is always being challenged by circumstances such as no show of ops etc.. – other method is just a walk round
- Measure of compliance with safety rules etc = use of PPE – high dependence on this measure
- How many people actually get Weils Disease in construction?!
- Own company induction = read out to men
- MS/RA – usual sign and read system for ops
- Safety responsibilities informally assumed for supervisor – not managed
- No sick pay seen as a work incentive
- IP senior and seen as ‘supervisory’ in the hierarchy anyway - ? some loss of overseeing for these experienced people
- Both have a pretty low perception of the site safety culture

Construction specialists	Ergonomics specialists	Me / other
H&S generic – housekeeping <i>Designer / Planner – use of manholes</i> <i>Housekeeping</i> Procedures – use of manholes (MS)	<i>Housekeeping</i> <i>Morale</i>	
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>

NO SPECIFIC LATENT CONDITION FOLLOW-UP

ACCIDENT 052 - 'Hand digging for temporary water main for site use, shovel cut through rusty armour on cable and cut outer covering of copper cable causing a short. The area was surveyed with CAT machine prior to excavations starting but the cable was not located, also cable did not show on record drawings. Electricity Board attended site and cable pot ended'

EVALUATION AT TASK AREA

Not seen

SITE DATA SUMMARY

- RA problems - control measures seem fine, but what is the difference between the likelihood and risk factor? Risk factor should be the first column, with hazard identification being a lead in to identify risk factors
- AI doesn't know depth that CAT scans to.
- Is it usual to CAT at any particular intervals? No impression of this from AI interview
- No memorable info on the CAT machine to indicate frequency
- Is there any way that the electricity board can access out dated services – what is a private supply and is pot ending an acceptable response given the potential for injury of stray current
- Did the electricity board update their records after the event?
- AI no opinion on tool range - ?? same products always to do the work ? something better exists but has never had a chance to trial it
- AI unhappy with CAT quality – what the story re. the different colours
- How are CATS improved / revised as a product
- Design inadequacy on the CAT – would depth receptor be feasible and do the company survey users for product development
- Working in water - ?? potential for much more significant injury – no note on RA
- C/o hat problems and inflexibility in safety rules
- Job and knock - ? any impact upon work methods , rest taken etc..
- AI prefers bonus related work as it gives a target - ?? only source of job satisfaction
- AI dissatisfied with welfare facilities
- Lack of knowledge about contamination – what are the risk factors involved and why are these not communicated
- Eating in changing rooms
- Lack of skills training both men – AI nil in past 5y
- Induction is AIs only safety training, but he denigrates this
- Low amount of holiday both men + implications of pay in lieu
- AI – considerable quantity of additional work – fatigue warning given.
- AI motivation / satisfaction – poor work image, yet not apparent in rating scale
- Is CAT suitable for the task – what is its failure rate?
- Is it so that a current needs to be flowing to be able to i.d a current and if so, what work are the manufacturers doing to be able to address this?
- Foreman has pretty low impression of some of the more prominent safety aspects – PPE, regimented guidance
- Considerable problems with misuse of expensive PPE
- Responsibility +++ of Foreman's shoulders – accepting responsibility for work of others and enforced extra working hours
- Problems with getting good and young labour to join them / make up a team – safety measures seen as a discourager
- Not a 'trade' therefore have to train in-house
- No formal competence measure to i.d new starters – gut reaction and chat with the men
- No measures to i.d health status / offer HS of ops.
- C/o time pressure in jobs = trade overlap generally as a result of this
- Induction – paper based
- Foreman has no measure of H&S performance in his job review
- Motivates employees by standing over them – but response is that this isn't allowed to compromise safety – (how)
- Gives bonus for work acceleration
- Foreman thought that there was MS/RA for hand digging – distanced from these procedures.
- Loss of ownership

<ul style="list-style-type: none">• TBT missed - ? process for drawing in new people to training programme• “People lose their wits because of regulated safety”• Comment on lack of awareness that introduction of safety measures can bring other hazards in its own right• Foreman request for more management training• Foreman long travel distances		
Construction specialists	Ergonomics specialists	Me / other
<i>CAT machine issues</i> <i>Time pressures of job and knock</i> <i>Value of RA's</i>	<i>CAT manufacturer / reliability</i>	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 053 - 'Operative was dragging hose back towards ext tap. He tripped over loose rubble and went over on right ankle. Sustained swelling to right ankle'.

EVALUATION AT TASK AREA



The brick storage area



The water tap and source for the site

The 'floor' height that he'd climbed down from

I was surprised that the water source tap for the site had not been mounted onto a pillar. I wonder how often this would be accessed (I don't know) and whether it's the norm to have to scrabble around on the ground to get at it. The right hand picture shows the most walked upon 'path'. Although there wasn't that much brick waste there when I took the picture the surface was loose sand and pitted.

SITE DATA SUMMARY

- Poor walkway and floor condition of access area
- Accident occurred walking along, not at task
- Loose rubble, ? appropriate placement for brick stack -space restriction?
- Should stand pipe be mounted / with drainage if direct access is required
- Distance between floor and ground height unknown (estimated at 3 ft) - seems as if step appropriate. ? arrangements to map out pedestrian routes
- Housekeeping problem – ? skips frequent enough to ensure tidiness
- SC Foreman felt it a PC responsibility to keep the area clear
- Issue re additional storage requirements for winter work
- IP jostling for workspace with ceiling people, brickies and electricians
- IP also concerned about risk of falling debris from overhead work
- IP using own tooling, buys mid-range because of theft risk – always same stuff from wholesale /plumbing retailer
- As men are self-employed they have to loan PPE if need something
- No training in use and care of PPE
- IP reports lack of flame retardant gloves ∴ works bare skinned
- C/o just enough time to do task. Work schedule behind "manic", but not perceived by Foreman
- Job and knock that day 'as really wanted to get work done' +++
- Long hours for Foreman
- IP no consultation re work org / safety, but can comment if sees something unsafe
- No PEM / HS
- TBT given for people to read + signature – learning value?!
- SC stick to same SC's to keep costs down
- Supervision is a way to ensure compliance with site rules
- Foreman no performance review – MS/RA are the written instructions / standards
- IP feels no need for supervision – 18y experience
- IP finds Foreman stressed as in the middle between men & mgrs
- Foreman thinks safe working can occasionally infringe earning potential
- C/o cramped canteen → eating in drying room
- No MS/RA for task, but Foreman noted their existence for safe working areas
- Accident task never subject of training or TBT

- CSCS is by booklet and computerised exam at Driving Licence centre – no personal contact necessary
- Training for interviewees was use of equipment (scissor lift etc..) and FA. Foreman rued lack of formal training. Nil in human capabilities and performance
- Long travel time – 2hrs each way
- IP 1w holiday in past year
- IP health probs exacerbated by use of building materials
- IP would like to work longer hours → 8pm
- Misperceptions about CSCS – thinks it will relieve of need for inductions

Construction specialists	Ergonomics specialists	Me / other
<i>Housekeeping</i>	<i>Housekeeping Site planner – access to essential services</i>	H&S generic – housekeeping Site managers generic – access to essential services
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

NO SPECIFIC LATENT CONDITION FOLLOW-UP

ACCIDENT 060 - During the renewal of overhead ductwork using hoist lift, it was thrown from under duct due to weight of duct. Struck [IP] and trapped him against plant upstand causing injury to left side badly bruised, broken skin, treated at A&E. Back at work on night duties [following day].

EVALUATION AT TASK AREA



Hole left by the duct that was removed (showing its size)



Same as hoist used



Hole left by duct + structure IP was squashed against

SITE DATA SUMMARY

- ? cramped working area plant room area restricted + 2 hoists + 4 men
- IP c/o Architects not considering mobility requirements when designing a plant room
- Unusual event – poor communication / leadership of the task – needed a ‘banksman’
- IP voiced concerns re lack of consultation in work org / safety
- IP ‘supervises self’
- Use of timber to re-inforce brakes – how did this enhance the activity
- Both = No thought to remedial action – seen as a one off and no learning gained from it
- IP fairly experienced in destructive work, but not that much
- No formal hoist training although this is specified in the RA
- Felt competent to do the work
- Thorough task assessment done, but this event not identified in RA
- Messy work area, but apparently had not influenced where hoists were placed
- Impression that unable to pre-empt duct contaminant issue until dismantling in process
- Preference for fixed wage due to IP’s age
- Unhappy with no: of toilets
- IP unaware of the procedures – used own judgement
- IP unhappy with site safety culture – little initiative / proactive improvement
- IP – all training on the job – nil formal, but keen on formal craft recognition

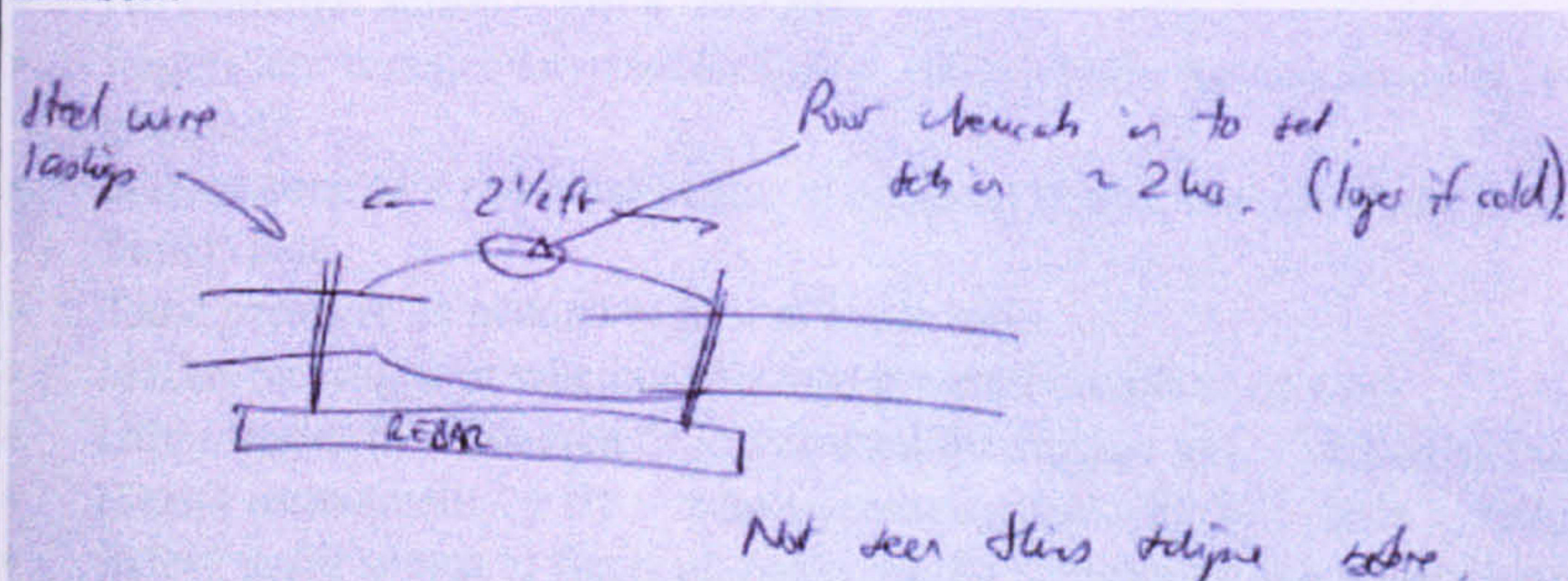
- IP no formal safety training (inductions only)
- IP bored by inductions, yet these are his only safety training source
- IP has musculoskeletal disorder - ? influenced his MH ability too?
- Project co-ordinator – limited experience and time on site. [I don't think that he was there on the day of the accident, but has knowledge of the event]
- ?hoist – balance what is its tolerance of fall – base stability etc..
- Supervisor – c/o housekeeping
- Supposition that the hoist wasn't on a stable base- apparently not investigated by themselves
- Duct weight estimation – why couldn't it be marked with its weight (diameter x length)
- Had trialled the weight handling, but the unanticipated duct movement toppled the Genie
- Work was delayed but this was not perceived as time pressure by the men
- Health issues supposedly picked up upon employment, but musculoskeletal disorder not noted – no HS either
- SC work that's time consuming – not relevant to accident group
- Communication – flyer in wage packet! Never has meetings with site men
- Site rule compliance - only intervention is at induction stage
- Training is by use of MS/RA but later Supervisor says that he goes through them with the Foreman and he then d/w the men
- Work progress excludes the men – just co-ordinator and Foremen
- Supervisor thinks safety slows the job, but accepts it
- Supervisor no aware that the wheel had already been chocked – I wonder could the chocks have destabilised the hoist?
- C/o environmental hazards – microbiology & glass vials
- Supervisor c/o restriction in prep of MS/RA – a bit too much preprepared
- Supervisor c/o inadequate training in dealing across the different trades
- MS seems clear, but implies that the hoist will lift the duct straight to the ground
- RA – idicates training should be provided but it wasn't deemed necessary
- MH RA – risks are identified, but there is no remedial action here – assumed carry over the RA here
- How is ducting cut – would it have been better to cut off the dog-leg while it was in the air ?
- What is the ducing weight?

Construction specialists	Ergonomics specialists	Me / other
Training in problems recognition		Hoist
Usefulness and usability of RA process		manufacturer
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 061 - 'The injured person was removing redundant cables supported by brackets at high level. The brackets ahead were not securely fixed and gave way and the weight of the cables caused by the brackets collapsing proved to be too heavy to hold, it slid through his hand cutting it severely'.

EVALUATION AT TASK AREA

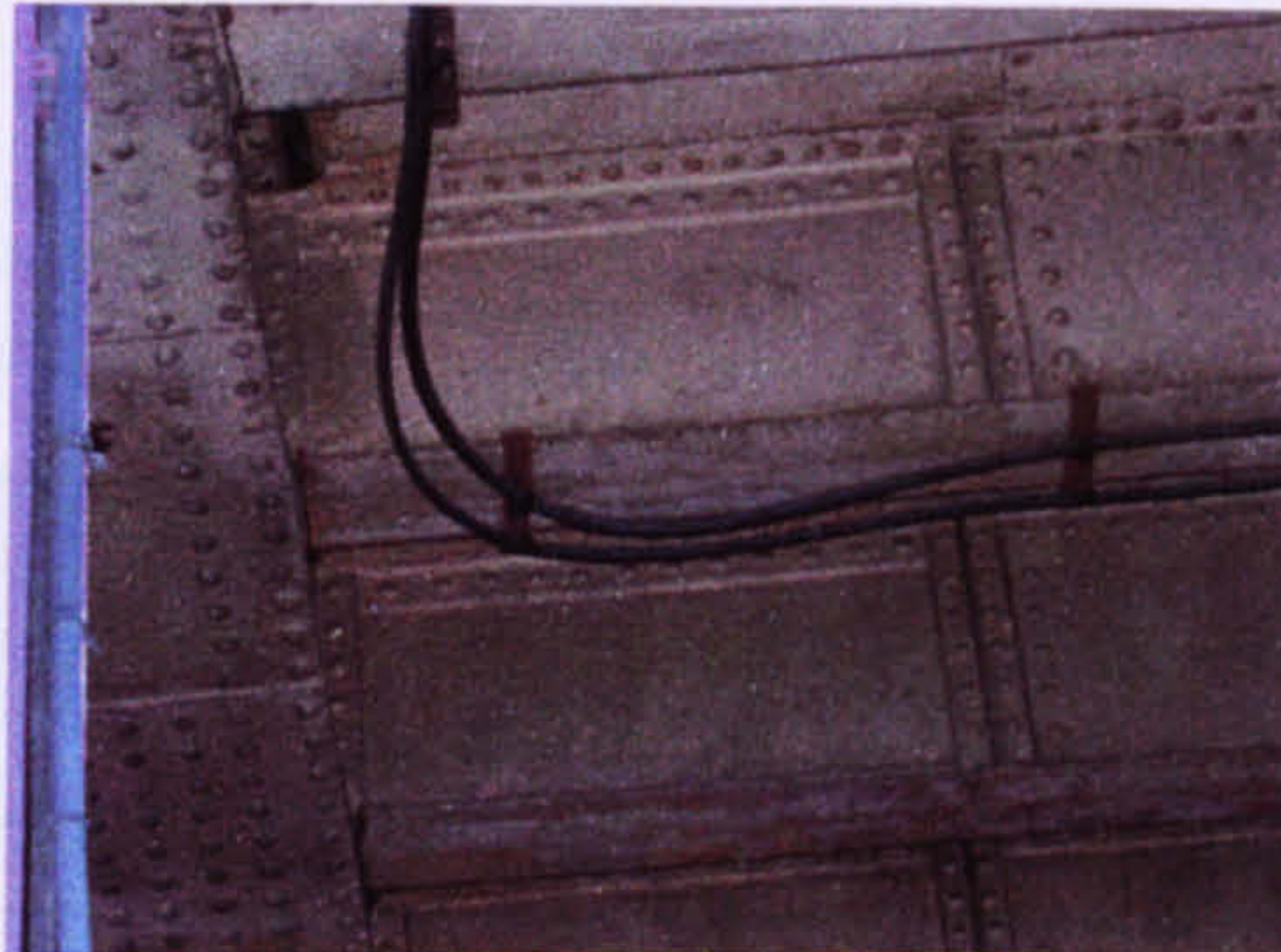
Work completed and nil further to be seen. However, IP drew a picture of the cable join and commented that this isn't normally undertaken in the air – it would normally be in trenches with blocks to level off. He thought that the joint was 75y old and was done to extend the existing cable. Had not seen this type of extension done before, but thought it a good idea and would repeat it himself.



At the end of the interview IP returned to the question about whether you could have prevented recurrence. A = couldn't have foreseen – would have taken longer to go and look at the brackets than it would have done to do the job.



Same as boom being used



Similar to cable and brackets used, but at each cross bar

SITE DATA SUMMARY

Supplementary comment from the SC Project Manager =

- The area was nearly complete and getting ready for hand over
- PC [Section Mgr?] asked the Foreman to take down the cabling [i.e. the task request wasn't instigated or controlled from their own company or following their own methods]
- It was armoured electrical cabling – redundant and not connected.
- Technique issue – could have cut out cable first and then dealt with the brackets
- Different history on lengths that the cable was cut at – unclear work practice
- Lack of RA or MS for this task
- ? wouldn't have happened if there had been 2 in the cradle?
- No task training – reliance on original apprenticeship
- IP purchasing own tools – limited knowledge and criteria for purchase
- Risk of tool theft affects purchase choice?
- Glove incompatibility with task demands and not worn
- 10hr day IP and 11-12hr – Supervisor
- IP describes no time pressure, but this was an additional task and was being undertaken late due to lack of access to the work area

- Could people working underneath have inhibited him using alternative technique? (i.e. letting them drop o the floor0
- IP dissatisfaction with welfare facilities
- IP assumed PTW – happy to go ahead with no knowledge of it
- IP dissatisfaction with housekeeping
- TBT system – pages of CITB? book to read and sign for
- IP bored by inductions
- Task management by PC rather than SC and ?loss of ownership
- Supervisor blames lack of brackets as cause – not considered lack of pre-task assemssment / technique etc..
- No remedial action – just a ‘one off’
- Supervisor reneges any responsibilty – didn’t know he was doing it. How is work organised / planned?
- Gloves seen as a remedial action in accident report, but not really seen as significant by Supervisor
- Time pressure as needed to mount cable trays
- Mixed messages re whether this was planned / unplanned work
- Other trades in work area + it was used for storage too ∴ lack of access earlier on
- Health assessment / + HS – who’s assessing and why full medical rather than OH service
- Safety audit seems to focus on paper work / domunentation – conditions leading tothis type of accident not picked up
- Indication of burdened ‘load’ / responsibilty among Supervisor / Foreman – especially for what the men do or the risks that they may take
- Weekend work seen by Supervisor as a way to spread work load rather than to take on additional tasks
- MS / RA generic and done pre-site start ∴ ownership issues
- No training for IP as he was ‘Approved’, expected IP to know
- Not a TBT – infrequent task and temporary works
- Both trained to Safety for Supervisors standard

Construction specialists	Ergonomics specialists	Me / other
Technique / Procedure Electrical connection method	Glove attachment issues (generic PPE) Procedures / techniques / RA	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 062 - 'Slipped on inside of scaffold, fell and twisted left knee. Mud on boots caused slip. Designated footpath was asked for in H&S meeting 7.12.01. Item 15 in minutes of meeting'. (Quote from accident report)

EVALUATION AT TASK AREA



Nobody available to take me onto site, but this was the tower type used – picture taken through and office window

SITE DATA SUMMARY

- Accident report used as a complaints forum
- Ops advised to wipe mud off feet, but no facilities for this
- No remedial action post accident
- IP thought housekeeping OK and not aware of similar problems in past
- Supervisor c/o apparent longstanding complaints re poor walkways / access and inaction by PC
- IP had had scaffolding training, but this did not cover mud on boots
- C/o problems with scaffolding as fixed dimensions between rungs doesn't always permit adequate space to erect stipulated waist height handrail
- At time of accident 'not cold, no frost'
- IP c/o gloves – doesn't like, ∴ takes off and loses
- Supervisor uses PPE supplier catalogue to access new products
- Long work hours both – IP gets OT pay (2hrs/ day) , for Supervisor it is inherent to role & breaks rare
- C/o work schedule always changes and diff to work to plan
- Supervisor and charge-hand discuss any traded overlap ? operative involvement
- SC appoints according to list he has compiled
- Supervisor c/o always feeling pressured to proceed without correct materials/ equip due to poor planning and scheduling – compensates with unplanned cash in hand arrangements. Impacts in increased manual labour requirements as lack of FLT etc.
- Communication of these problems to Managers appears to have had little impact
- C/o being judged by minor things – hat taken off because in way, at the expense of more important things
- Contractors expected to provide won training
- TBTs = any from a booklet of ~ 50
- Supervisor has no responsibilities for H&S of people he oversees nor written guidelines
- No performance review, but reactive S.O. visit if a lot of accidents
- Job and finish if want work done fast
- C/o toilets smelly & dirty
- SC feels Construction Management relieves them of safety culture responsibility. V poor impression of PC interaction with SC

<ul style="list-style-type: none"> • Supervisor associates training in lifting as training in human capabilities and performance • Not happy with current NVQ scheme – not enough practical • Supervisor not really enjoying role. Promotion from site man not that welcome – ‘made up and now stuck with it’ 		
Construction specialists	Ergonomics specialists	Me / other
<i>Boot cleaning facilities</i> <i>Safety culture – PC/SC responsibilities</i> <i>Impact of corporate stability on safety culture</i>		
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 063 – ‘While fixing a riveting screw to a steel column within the car park a small fragment of steel was projected into the eye of [IP}. [IP] received first-aid from M.B.L (eye wash) and then was taken to hospital where the fragment was removed. [IP] returned to work the next day.

EVALUATION AT TASK AREA



The rivet and brick tie



The rivet through the steel and securing block

The masonry company scribed use of alternative tool whereby the rivets were blasted in all in one movement with a piston gun, but once “the piston went” resulting in hand damage. So, now using rivetting screws instead.

SITE DATA SUMMARY

- IP over 40y experience as brickie ? issues re risk perception for longstanding operatives. Not aware of exposure to fragments, but aware that swarf comes out
- ? necessary to do task as overhead work? Difficult and strenuous work in an awkward posture = perceived by IP, but not SC Site Manager
- Remedial action = tighter control and reinforcement of goggle use
- IP c/o goggles steaming – taken as one of those things. Proposed buying PPE glasses himself. No action on previous reports of steaming up & falling off
- IP never wore goggles. These were supplied by employer
- Poor visibility due to steam and poor lighting (natural light only)
- C/o difficulties using riveting gun in tight spaces – no apparent route to communicate these problems
- IP reports no training in use of the equipment, Site Mgr – thiks yet
- Site Mgr reported no revision of goggles, but had revised gloves for more expensive / efficient range – on advice of another Site Manager
- IP ? no lunch break day of accident
- Site Mgr v. long hours – implicit within contract
- IP working alone on day of accident. Normally works with son & they alternate drilling and prep work - ? fatigue/ workload issues
- Not sure who IP worked for – confusing SC chain
- In piece work
- In new appointment Site Mgr assesses competence and quality by observation & check for only ~ first hr of work. Only mentions own judgment rather than CSCS schemes etc.
- SC no PEM and HS
- Trade overlap d/w Ganger man - ? ops excluded
- C/o always working under pressure – avoid accelerated work pace due to affect on quality (no mention of men)
- SC group insular – men deal only with their own mgrs, not other SC teams
- Site Mgr reports TBT to 82 men together - ? learning experience
- Site Mgr reports happy work env. as best motivator. No training in human capabilities and performance
- Inter-contractor speed rivalries
- C/o priced work inhibiting safety

<ul style="list-style-type: none">• Management by enforcement of PPE• IP not aware of MS/RA• MS – no mention of accident activity & RA out of date mentioning wrong equipment• Safety culture judged reactively by reportable accidents• C/o quality of new gov.t training schemes• Site Mgr regular work away from home• IP longstanding musculoskeletal injury		
Construction specialists	Ergonomics specialists	Me / other
<i>PPE – liaison with manufacturers</i> <i>Rivet gun design</i> <i>Task design and work sequence</i> <i>PC ownership of safety management</i>		PPE Supplier - generic
Done	Follow-up unsuccessful	<i>Not pursued / not possible / info already available</i>
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 064 - ‘Walking through Sector 12 on my way to exiting the building at Sector 16 and tripped on a floor setting out point that was not marked. ‘Twisted left knee’. ‘Quote from accident report’

EVALUATION AT TASK AREA



Setting out point



remedial action

SITE DATA SUMMARY

- Traffic cones get moved as they are in an access route for pallet trucks → inappropriate remedial action
- SCs unable to take remedial action – able only to report to PC
- Screed is normally taken up to the top level of setting out points – IP thinks they were put in too early
- Accident as he walked around – not task
- Site tidy, but IP felt if more untidy would have been more careful
- C/o of safety lighting – light enough but only just
- C/o hard hat – inappropriate for use in all areas. Discomfort too
- V. long hours – both men
- IP rushes all day – feel this motivates men
- No HS service, just first aid
- IP feel she would like more consultation / involvement in decision making
- SC Site Manager no performance review
- Report that priced work → unsafeness & competition between work teams
- C/ poor cleanliness of welfare conditions, inadequate toilet numbers & slow canteen
- SC opinion that site mgmt overlooks what the ‘big companies’ promise to do in their MS
- C/o induction monotony – “same old stuff”
- IP gets 4w sick pay/yr as a loyalty payment, but took 4w unpaid leave - ?one and same. What is the rational for this!!
- IP ongoing MS problems
- SC Mgr interview time pressure induced by visit coordinator

Construction specialists	Ergonomics specialists	Me / other
Walkway strategy – site managers - generic	CITB – good practice for setting out points	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available
NO SPECIFIC LATENT CONDITION FOLLOW-UP		

ACCIDENT 065 - ‘Whilst lowering hod full of bricks, bricks tumbled out and squashed little finger on right hand, breaking skin. (Quote form accident report).

EVALUATION AT TASK AREA

Not seen

SITE DATA SUMMARY

- IP inexperienced – only 4m in industry
- Using a hod, but discussion post incident revealed that they are rarely used due to MH issues - ? why was he using this (12 bricks to a hod). However SC Site Mgr saw hod use as essential to the job.
- Remedial action = wear gloves
- Bricks had to be moved 10-15m. walking on protective boards? Other transport means possible
- Had taken off gloves & often forgets to ware – impression of low value of these. Some bricks are sharp and then wears them
- Report that there are problems with purchasing suitable gloves for durability and that are not more of a hindrance. Price issues too – need cheapest
- IP no task / safety training or training in use/ c/o PPE. Had TBT, but didn’t perceive as training. Induction video ‘stupid’
- SC Site Mgr – long hours and 3hrs travel / day
- No PEM / HS
- Ops are self-employed – issues re. ownership, responsibilities etc..
- SC provide training by TBTs only
- SC Site Mgr uses MS/RA as documentation of his written responsibilities. Performance review is by PC audit
- Report that programme times impact working safely & earning potential
- C/o theft from locker rooms
- RA exists for job (not seen), but issue re. MH aspects of hod use seemingly not i.d.’d
- SC Mgr interview time pressure induced by visit coordinator

Construction specialists	Ergonomics specialists	Me / other
Brick movement methods glove criteria	Brick movement methods glove criteria	
Done	Follow-up unsuccessful	Not pursued / not possible / info already available

NO SPECIFIC LATENT CONDITION FOLLOW-UP

Section 3 - Section Three – reproduces the early stages of apportioning site data findings. This shows how interviewee’s comments, and observations from the site data summaries, were grouped for development of the full interpretation in the thesis.

Phase Failure generation ↓	→	Project Concept Design & Procurement	Work Organisation & Management	Task
Design & execution <ul style="list-style-type: none"> - Survey land - Site plan - Architecture - Detail - Materials - Equipment - Tools - PPE 		<u>Innovations not adopted / known about 1</u> <ul style="list-style-type: none"> • Wire holding canister only used in Europe? 1 • Roll-up rebar mesh which is constructed off-site 1 • Alternative tools for rebar tying – nobody has ever mentioned them? 1 • Alternative, but more expensive angles could have been used 5 • TEC screws rather than pot rivets 35 <u>Designer distanced from build process</u> <ul style="list-style-type: none"> • attends site initially and then transfers responsibility to site personnel 1 • does not specify where steel structure should be built 1 • no safety innovations for this task, yet reinforcement detailers & construction Mgr had seen drawings 1 • Unclear arrangements for prescription of technical solutions (Designer or PC selection)? 1 • Nails stick out when shuttering removed – accepted 18 • Ceiling access tower required but couldn't fit ∴ harness 36 <u>Time pressure 1</u> <ul style="list-style-type: none"> - designing concrete frame 1 <u>Design revisions</u> <ul style="list-style-type: none"> - 1000 confirmation of instructions 25 - 7 conflict from the two Architects for the one build 25 	<u>Repeal of innovation 1</u> <ul style="list-style-type: none"> • Abandoned body attachment carrying method due to cost. No alternative provided. <u>Complaints not acted upon 1</u> <ul style="list-style-type: none"> - re tie wire quality 1 - re request for joiners workshop 2 - re props not being secured at the ground 4 - S/O had not acted on previous complaints as felt it was due to people working too fast - Poor work area for lorry standing 11 - Concrete blow down also leads to splattering of the fence 12 - Trip hazards reported to S.O. – c/o no response 17 - Boarding style 51 - Poor housekeeping 50 - Splitting or cut-down of ladders 25 - Damaged roofing & gangway 25 - Dumpster on site without a roll-bar 25 <u>Shortages</u> <ul style="list-style-type: none"> - inadequate craneage time → increase in MMH 17 - inadequate labour → trades stand in 20, 22,23 - Different stories between labour & supervisors 22 - Tries to keep a list of who he likes, but really it depends on who is available 22 - Tries to work around deliveries etc ... if nothing shows up then re-jig the work 22 - Cost implications may → use of incorrect materials / equipment 38 	<u>Poor material 1,</u> <ul style="list-style-type: none"> • Quality for task - inconsistent tie wire due to metal heating method. Not discernable until use 1 - complaints re quality not acted upon 1 - Unfathomable use of tannelised timber (+ gloves) 2 - Why steel rather than nylon banding 9 - Dealing with materials that are missing, wrong or not pre-fabricated 36 • Presentation for use - 2 foot wide 1 - no handhold area 1 - bracing needed to be made up on site 2 - oil coating on steel ducting → slip injury 34 - double handling +- in transfer around site 34 - TEC screws would be a faster fix method – wondered why not used 35 - Had to estimate weight of ducting 60 • Poor instructions from manufacturer 2, 7 • Presentation for transport 1 • Weight 1, 5, 18, 22, 33, 38 • Unexpected load handling 38 • Storage - rat urine contamination 1 • Resolution of known problems (tie wire quality and carrying method) 1 • Possible lack of sufficient quantities 4 • No specification of board quality for covering a hole in the ground 10 • No specification of board dimensions to cover hole in ground 10

	<ul style="list-style-type: none"> - Longstanding revision and extension of the project timeline 25 <p><u>Uncertainty in design</u></p> <ul style="list-style-type: none"> - accommodating client late requests 1 - accommodating additional client requests 1 - Sc has to accommodate late design guideline provision 9 <p><u>Site layout problems 2</u></p> <ul style="list-style-type: none"> - small work shop, room not allocated for joiner activities 2 - workshop moved x3 during site 2 - Site start pre complete demolition → layout problems 2 - Failure in placement of smoke detector 3 - Peripatetic workers use road as a work surface 7 - Driver c/o inadequate space / restricted access for lorry drop-off 11 - Inadequate lorry parking space - One lorry wheel on sleepers 11 - Access to top floor of site by lorry difficult 11 - Supervisor (not ops) thought work area a bit tight 12 - No method / mechanism to lift tools from one level to another 50 - Scaffold cross-membering reduces space availability 50 - Electricity Board frequently have incomplete drawings 52 <p>Scaffold aperture small 25,50</p> <p><u>Unclear rationale for technical solutions</u></p> <ul style="list-style-type: none"> - design / architectural / aesthetic ? 1 - when is a designer required for scaffolding – own discretion ? 17 - fickle / opposing Architects 25 - original design wrong 25 - changed minds 25 <p><u>Impact of Construction Vexatious</u></p>	<ul style="list-style-type: none"> - Dealing with absenteeism 38 - Erratic cement wagon deliveries → standing around 40 - C/c cement co.s take on too much work 40 - Right stuff not ordered 40 - Things don't turn up that are ordered 40 - Normally tool transfer between levels with two, but had to make do with one → injury 50 	<p><u>Poor Equipment 4</u></p> <ul style="list-style-type: none"> - Acrow maintenance 4 - Design for dismantling permits wrong order 4 - No positive feedback (visual) of safe system 4 - Differing opinions re. what's correct erection method 4 - Interaction with steps to descend requires final 'jump' 6 - Last handhold 2.2m from ground - Handholds fortuitous rather than designed 6 - Concrete solidifies clips 8 - Hazards of steel banding not questioned 9 - Concerns re lorry design, they all vary 11 - Hiab cut out features did not cover this accident type (heavy load + arm over-extension) 11 - Crane controls contravene pop. Stereotypes 11 - ?method to secure concrete pipes onto tub 12 - cables for water / electricity all look the same 17 - why did cantilever on tower appear secure / was operational, yet fell ? positive feedback of being secure 19 - scaffold fittings maintenance important 18 - wagon redesigned to reduce spoil settling on top rim, but → damaged by digger 21 - wagon handrail for inspection rather than body access 21 - side rail only appropriate for access from level ground 21 - feels that separate ladders would be intro further problems 21 - impression of poor access to view inside wagon 21 - scaffold clips left uncapped - ? criteria for covering 22 - no concept that trolley might be at fault or difficult to use 22 - ?OK to use a step ladder to cut a threaded rod 24, c/o narrow scaffold aperture 24, 51 - Tower – desire to change trap door style 36
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	<p>S.O. cant have env assessment equipment as no direct labour on site 10</p> <p>No training in <u>human capabilities and performance</u> Designer – 1</p>	<ul style="list-style-type: none"> - Insufficient tower height options for ceiling access 36 - Failure of jockey wheel design - Assumption by Supervisor that all jockey wheels the same 38 - Full bowser = an unstable load 38 - Bowser usually empty when handled at accident area (cant tell til grab it) 38 - Slewing ring – awkward design for torquing - Slewing ring adapted and used in a novel way 38 - Plastic flagon / bucket for hand tool transport on site – ad hoc, but accepted arrangement 50 - CAT scanner didn't sense underground cabling 52 - Indication from AI that CAT quality varies 52 - CAT ??? doesn't sense if no current / pot ended ∴ adequate tool for this task 52 - Is there a tool range for this task ? 52 <p><u>Task monotony 1,2</u></p> <ul style="list-style-type: none"> - 'working on auto-pilot' 2 - high repetition rate 2 <p><u>Poor tool design 1</u></p> <ul style="list-style-type: none"> - no design innovation 1 - no hand holds provided (on ladder) 4, 7 - narrow handles 1 - personalised by user 1, 3- - purchasing restrictions for self-employed ? 1 - lack of purchasing criteria 2 - not PPE compatible 1 - functions of tool range not known about (brakes) 2, on/off, 3 - tool regularly blocked by (inevitable?) fine pieces 2 - restricted choice as has to be disposed of 3 - high repetition of blade change requirements 6 - incorrect tool chosen for task 7,9 - Self-employed supply own 9, 17
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		<ul style="list-style-type: none"> - Employee chose to use own tool so can look after & maintain it 13 - C/o Multi-use tools misused ∴ use own 13 - Self-employed buy 'middle of range' tools 13 - Report that PC buy bottom of range tools 13 - OP (+ others) not aware that wrong tool used 7,9 - Supervisor not aware of technique op used in accident 9 • Battery v.s power tools (cost v.s work methods) 13, 37 - If had used powered tool with leads would have cordoned area off / done at quiet time 13 - Mail order purchase 18 - Non-rust tools chosen although more expensive 18 - Not trained in tool use 20 - Saw = bulky and heavy tool for cutting gas pipes 20 - Handsaw = alternative but too slow ∴ not used 20 - 'Curb lifter available but by the time you get it its easier to use 2 people at each end 33 - 'own drill always buys Bosch (rather than DIY stuff) – never had any training / info from Mfrs 35 - Drill – no handgrasp bar and a single finger trigger 35 - 118Nm required for torque 39 - multiplier tool weight 8.9kg - Middle of the range in cost in catalogue = determinant of purchasing 51 - Risk of theft has a big impact upon purchase / range 50 <p><u>PPE problems 1</u></p> <ul style="list-style-type: none"> - C/o no clothing provided for poor env conds 51, 25 - heavy in hot weather 19 - selection of new PPE limited to own perception / trials 40, 50 - never tried a new style 51 - not provided to the self-employed men, but
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		<p>may loan 53</p> <p><u>overalls</u> = uncomfortable 51</p> <ul style="list-style-type: none"> • <u>Safety glasses</u> - own provision (quality /safety spec ?) 1 - co/ goggles steam up, 20 - goggles not worn for drilling 35 - Supposes its common sense to wear, but doesn't 20, 34 (despite previous swarf) - People lose and don't take care 52 <ul style="list-style-type: none"> • <u>Hat</u> - poor fit 5 - regularly falloff 5 - IP would like chin strap 5 - No foam lining 20, 24 - Often too small 20 - Interferes with work if looks up 22, 23 - not always needed 22, 52 - headache 24 - short peak was expensive & didn't buy 36 - poorly ventilated – especially in summer 52 - inflexibility re whether needs to wear or not 52 - more likely to hit head as don't account for extra height when walking under structures 52 <ul style="list-style-type: none"> • <u>Gloves</u> - poor fit 1, 5, 33 - people lose them and don't take care 52 - cant operate tools when gloves worn 1, 18, 23 - unfamiliar use ? impact 2 - inadequate supplies 17, 40 - have to continue to wear worn-out gloves 17 - inadequately durable for work tasks 17 - one size generally 18 - left in the van 21 / bag 33 - wouldn't have helped prevent this accident 21 - no flame retardant gloves ∴ takes off for welding work 52 - new vibrations gloves £30 (to allow an extra hour at jack hammer) not worn as couldn't
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		<ul style="list-style-type: none"> - feel what they were doing 52 - trials being done by - ? criteria 22 - didn't bother to go and get any 33 - discomfort 33 - size depends on stitching - no gloves = comfort and speed 33 • <u>boots</u> - have to pay extra for comfort 34 - many people have to buy their own 34 • <u>Vest</u> - Cut off to access scaffold spanners 4 - Cut off to access carpentry tools 9 - Cut-off because cooler 8 • <u>Harness</u> - C/o 2m lead only 4, 17 - v. uncomfortable if > 30min wear 4 - feels not always warranted 6 - restricts mobility 6 - concern that blood supply would be severed to legs if fell 17 - IP would prefer to hit ground than swing round and hit scaffold 17 - Scaffold Site Mgr feels that Safety Regs compromise earning potential (harness wearing) - Just not practical to hook on all the time 18 - Hooking on = a nuisance / distraction 18 - Should be to discretion of scaffolder 18 - Experienced an accident when glad not to be hooked on 18 - Snagged on ceiling structures → fall injury 36 - Doesn't know why has to wear 36 - Took 1 ½ hrs to find one 36 - People hoard them 36 - Previously told off for not wearing, put it on and # elbow 36 - Had to work alone as could only find one 36 - Solo working not preferred but consequence of only one harness 36 • <u>RPE</u> - tiring 3 - Task incompatibility (smoke watch) 3 - Improved mask quality on hunch of Ops rather than by RA 60
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		<ul style="list-style-type: none"> • <u>C/o PPE</u> • - ot aware that PPE care required 12 - PPE care only learnt on NEBOSH 13 - Not necessary as has worked a very long time 19 - No training in care & use of PPE 18, 20, 24, 25, 34, 52 - Training provided during previous pharmaceutical work - IP with 'Apprentice of the year' had a very negative attitude to PPE - ? perpetuates 36 - Would prefer a greater range of hi-Viz – t-shirt / overalls 37 - 'training on use and care is down to the individual' 52 <p><u>Injury hazards 1</u></p> <ul style="list-style-type: none"> • Posture 1 • Wrist manipulations 1 • Grip force 1 • Dust created during sweeping up 8 • Steel strapping 9 • Cement burns 33, 40 <p>MII in cold without warm up 50</p> <p><u>Poor task technique 2</u></p> <ul style="list-style-type: none"> - working across centre line 2 - crossing arm over danger area not considered in site accident investigation 2 - Feeling that skill development / range is a personal responsibility 2 - Happy with own skills in this job 7 - Knocking out formwork on successive levels not perceived as a risk activity but ops or S.O. 10 - Did not extend rigger 11 - Never trained but plenty of experience 20 - Walking backwards pulling trolley & couldn't see 22 - Using a step ladder when ha accident, but normally uses a bench 24 - 'is it reasonable to push tower over boards on floor 51
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			<ul style="list-style-type: none"> - ?use of Genies to manipulate large piece of ductwork - a one off 60 - grasping 4 bricks together at once 33 - put wet (supposedly washed cement out contamination) boots on following day → injury 40 - poor methods to transport hand tools on site (one or two people) 50 - feels that work is menial 50 - correct task technique not communicated until after accident 24 <p>trained to use the tool, but not stud cutting technique 24</p>
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<h2>Planning & Scheduling & Management</h2> <ul style="list-style-type: none"> - Project timeline - Appointment of personnel - Scheduling the work 	<ul style="list-style-type: none"> - <u>Use of SC skills</u> <ul style="list-style-type: none"> - lack of in-house resources / skills 2, 3, 4, 5, 11, 19, 38, 52 - pressure felt by joiners as they service all trades 2 - concern by S/O/ re supervision 4, 10 - preference for directly employed workforce 4 - Regret loss of direct labour - faster reaction time with direct employment 1 - routinely use same good people 9 - SC will react if asked, but do nil spontaneously 10 - If a price shortage 119 - Up to 70 % of SC men unknown to Supervisory Mgr = a big problem 21 - Impression of little confidence in contract labour 21 - C/o contract men double shifting / cabbying 21 - If need extra labour 38 - If need extra plant 38 - Insist s that last lot out before new lot start 36 - Solo working not preferred but consequence of only one harness 36 - SC cheaper than keeping PC employees on - All SC work = task based and there is little interaction with PC men 38 - Its client pressure that's a push to increase hours 25 - Long Sc chains 34 - 'Supposed to have a programme but brickies may be late, not show or leave rubble 51 - cleaning up environment (before can start work) 51 - 'we did job & knock that day as the site really wanted to get the work done' 52 - 'most jobs are fast track programmes and you end up working on top - <u>Concerns of SC by PC 10</u> <ul style="list-style-type: none"> - supervision is low and more foremen preferred 10 - thinks that normally the SC would expect PC 	<h3>Personnel availability</h3> <ul style="list-style-type: none"> - skilled people unavailable 12 - c/o lack of strong young men 12 - brickie took on labourer duties 20 <p>Long working hours (all) 1, 2, 3, 4, 5, 11, 19, 21, 22, 23, 25, 33, 36, 37, 50</p> <ul style="list-style-type: none"> - IP 3w non stop pre-accident 1 - Travel time 2, 4, 7, 9, 20, 21, 22, 40, 52, 53 - Job & knock 4, 12, 34, 37 - Supervisors especially 5, 23 - OT pressured 11, 25, 40, 60 - Feels driving breaks are not honoured 11 - Dissatisfaction with break allowances 11 - Flexible work hours +++ expected by ops. 11 (concrete) 12, 40 - Concrete always has priority 12, 40 - OT habituation rather than necessity ? 13 - 2nd job 18, 52 - limited holiday 18, 33, 40, 50, 53 - pay in lieu 50, 52 - safety personnel 20 - up to 30hrs OT permitted before pay incentive reduced 21 - accepts non taking of breaks 21 - smart cards anticipated to log work hours in rail 21 - unpaid sick absence ? disincentive to rest 34 - covering sick / absent 22, 39 - 'keep going until someone says they want a break' 40 - 'has to do a 47hr wk 50 <p>Trade overlap 4</p> <ul style="list-style-type: none"> - carpenter / scaffolder 4 - 2 ops to compensate for skill lack ? → distraction 12 - overlap and working around canteen use 13 - d'w mangers, but trades may be there too 17 - labourer / chippie 19 - team work planned by putting experienced with inexperienced 19 - Solo working not preferred but consequence of only one harness 36 - Have to move around to accommodate 	<h3>Poor environment 1</h3> <ul style="list-style-type: none"> - Walking across rebar's / no where good to put feet 1 - Constrained work space 2, 3 - C/o housekeeping problems caused by others 2 - IP had expected prop to be secured 4 - People in work area wanting to access the canteen ; not wide enough 13 - Confined space for (bulky) saw use 20 - Had to stand in cement to dig out excess 40 - Inadequate foot placement are 40 - Harness snagged on ceiling structures 36 - Poor task are made tower manipulation more difficult 50 - 'always asking for more lighting' 50 - Transport routed need improving 51 - Housekeeping = a PC responsibility - Block work debris → rollerballs 51 - Dust problems ++ 51 - Cleaning up delays work schedule 51 - Broken brick underfoot → accident 53 - ? clear up weekly when a new skip arrives 53 <h3>Poor environment / housekeeping 1</h3> <ul style="list-style-type: none"> - Weather exposure 1 - Walking across rebar's 1 - C/o housekeeping problems caused by others 2, 22 - Preference for natural light reduces workshop time to a 10-3 time window 2 - C/o site walking areas often poor 17, 25 - Cable that he tripped on wasn't secure or marked with hazard tape or raised overhead 17, 37 - C/o walkways rarely swept 17 - Dealing with cable s when generator powered 17 - Nail sticking out from shutter removal 18 - Distracting glare from sun on concrete 18 - Oil underfoot → slip 22 - Less care for construction workers than general public 37
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	<ul style="list-style-type: none"> - to offer some supervision, but this doesn't happen with Construction Mgmt 10 - PC S.O. thinks that SC do not project manage well 10 - SC's do little proactively in safety - Their work was substandard and the accident happened because of their materials left lying about 25 - SC's working in isolation just consider themselves rather than the rest of the site 25 - Award £100 pcm 25 - Sacking people sends the problems elsewhere 25 - Disparity of views on who has responsibility for safety 22 - <u>Concept of PC by S(SS) C's 5</u> - Regrets that PC do not meet daily with Supervisors 5 - Time on site +- → over-ride formal channels to undertake a procedure 5 - Try to use PC MS style rather than generic materials 11 - PC ops are treated more leniently re safety than Sc ops – double standards 36 - Agents don't always order the right stuff in 40 - 'Their' PC housekeeping is poor 50 - Accident remedial action should have been a barrier for the board a PC decision 50 - of one another 52 	<ul style="list-style-type: none"> - brickies and scaffolders 51 - Have to work around ceiling people and electricians 53 - Have to speed up if other want to access the area 24 - There's competition when the service people clash 23 - The roofers are late and have left the scaffold up 25 - <u>Temporal issues / time pressure</u> - with programme 1, 2, 3, 53 - to do as much as possible 1 - inter-team competition 1,5 - inter-team competition (with piece-work) 5, 13 - safety takes a back seat 1 - in anticipation of trade shortage 2 - not perceived 2, 4, 5, 7, 11, 12, 60 - not communicated between ops back & forth to Mgrs (accepting) 2 - suspected by S/O 4 - job & knock 4, 12 - brickies wanted to work where steel was 5 - concrete setting /heat influencing work pace 8, 9 - concrete delivery late 9 - lorry in the road waiting & causing an obstruction 8 - if weather bad 9 - Contracts Mgr ... describes as 'working to a very tight schedule' 9 - Possibly having to proceed without correct material / equipt. Due to customer led environment 11 - Machine driver waiting for concrete to be cleared 12 - Ganger man on roof giving instruction 2 floor below 12 - Canteen needed & trying to make area free 13 - Carpenters wanted the frame 19 - Concern that time pressure related to non removal of nails 18 	<ul style="list-style-type: none"> • ? habituation of walking across cabling on the ground 37 • Public access – are could not be left unattended ∴ he carried on 39, 51 • Wet in trench work 52 • Poor background lighting (PC > 3 lux) 37, 50, 51 • Rubbish in are pushed to one side 24 • C/o Poor housekeeping 23, 24, 50 • No extra clothing provided for poor environmental conditions 50 • Have to clear up after others before can start work 50 • Temporary manhole covers are a trip hazard 51 • It's a big job on a small site 53 • Sites are clearer in summer as products don't have to sit around while people are rained off 53 • Concern that floor area may have affected Genie stability (chip) 60 • Plant rooms never have enough space 60 • Concurrent demolition of walls during duct removal 60 • -
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		<ul style="list-style-type: none"> - Unscheduled work, thought they'd do it anyway 20 - S. O feels time pressure related to inexperience and reluctance to complain alert people to safety problems 20 - Ip assisting with labouring work 'to gain time' 21 - V. tight time access with w/end work 21 - The roofers are late and have left the scaffold up 25 - IP described being in a bit of a rush 50 - 'The Charge Hand want a surge first thing. A character issue 50 - the work was delayed to check what was in the ducts 60 - I was borrowed from other work to go out and take photos 25 - £35k/wk over-run fine 25 - concrete already lain buy a.n. other ∴ ? time to go and fetch gloves 33 - no concept of time pressure but wanted to get the job out of the way as had other jobs to do 39 - covering x2 people on long-term sick 39 - accommodating unplanned work 40 - Have to clear up after others before can start work 50 - Accident occurred when doing last task of the day 24 <p><u>Need to accommodate extra work 2</u></p> <ul style="list-style-type: none"> - Unanticipated change in stock level extra bricks suddenly used up stock 2 - Wind had blown down hoarding & had to replace 2 - Unplanned gang work to move the Gass tower, but the task itself was part of the normal work 19 19 - Tell them job and finish is the best way to get motivations – safety practice should nt be any different from any normal practice 20 - Would not normally do the job – just did it rather than doing nothing 39 <p><u>No previous skills + Experienced vs inexperienced</u></p>
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		<p><u>staff 2</u></p> <ul style="list-style-type: none"> - experienced informally manage selves 2, 7, 9, 13, 18, 22, 23 - self-employed self-regulate 2, - supervision for experienced unwelcome 2, 4, 52, 53 - avoid disruption of an established gang 2 - no r/a if seen as a core skill 2 - TB T's only for young employees 2 - Young employee feels not listened to. 5 - IP's own preference as to when to do the job, could have done at 'quieter time' 13 - No training in c/o & use of PPE - IP felt skills as a rock climber might make him best man for the job of climbing a rail wagon 21 - 2m worth of work at a stretch 23 - goggles not worn for drilling 35 - Supervisor not seen in past 4-5 hours (but felt it was adequate) 37 - Experienced in duct erection, but less in destruction 60 <p><u>Payment preferences 2</u></p> <ul style="list-style-type: none"> - Supervisor feels hourly rate makes pace less important 2 - (S/O) feels safety conflict for those on priced work 2, 13, 22, 25, 36, 37 - Joiner prefers priced work as can earn more 4, 5, cement 40, ground 52, duct 23 - Preference for fixed wage 9, 19, 18, 20, 21, 22, 33, 36, 38, 50, 60 - V difficult to .id. if self / employed 9 - Interviewee thinks incentive pay can impact negatively on safety 11, 13 - Priced work → competition to finish work 20 - If doing priced work then a production target is more relevant 34 - Duct men have a bonus scheme ?? - consequence of finishing quickly 34 - Gets a bonus if goes well (ie: work through rain) but generally its already very tight and you cant cut it 52 - Confusion between supervisor and op re his payment method 22
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		<ul style="list-style-type: none"> - Performance related contract bonuses for Project Manager 25 - Job and knock on Fridays 34 • <u>C/o inadequate supervision</u> - inadequately supervised because pipe went off 20 	
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<p>Information transfer (MS, RA, induction etc..)</p> <ul style="list-style-type: none"> - client - Off-site personnel - MS - RA - TBT - Induction 	<p><u>Poor liaison between disciplines</u></p> <ul style="list-style-type: none"> - designer sees procurement as outside his control - no RA for concrete frame work 1 - Pre-contract H&S meeting unread by Mgr. 2 - SC Mgr feels inadequate info supplied for prep. 2 - Late provision by PC of information schedule - ∴ work out to contract, but nil available 9 - Construction Mgrs try to encourage contractors to communicate between themselves 10 - Supervisor distracted IP during task → accident ? insight into work demands 18 - Slows up work if labourer / trainee slow 18 - V. confusing re. gas board / site communications 20 - C/o misleading info from gas board 20 - Very labourious (x4) chain to get other trades to clear up after selves 51 - Supervisor role = 'in the middle & the buck stops with me' 52 - Pump had overfilled with cement ∴ had to dig out. Common 40 <p><u>Poor perception of safety</u></p> <ul style="list-style-type: none"> - a token measure 1 - in terms of enforcement 1 - S/O thinks SSSC Mgrs accept risk on behalf of men 2 - Thoroughness of safety management not perceived by SSC's + 2 - Verisory comments about anti-vibration gloves - 'I never got it' Foreman 52 	<p><u>Signaturism 1, 5, 9, 25, 50, 51</u></p> <p><u>Risk assessment failures</u></p> <ul style="list-style-type: none"> - none due to core skills dependency 1, 2 - Reliance upon drawing & sketches of finished products 2 - excludes accident event task 2, 34, 39, 52 - variable evaluation (3m), 3, 52 - alternative work methods not chosen despite previous fires 3 - meaningless scoring system 5, 34 - No MII assessment yet paperwork OK'd by PC 55 - None 6, 7, 8, 9, 12, 17, 19, 18, 20, 21, 23, 24, 52, 36, 37, 38, 40, 50, 54 - S.O. doesn't know if its in the MS 10 - Supervisor unsure whether there is a generic RA 12 - IP unaware despite existence 22, 33, 34, 35, 52, 60 - Possibility to tick awkward postures on the RA form, but not done 39 - MII assessment inadequate 39 - Excludes hand-tool evaluation 35 - Goggles stipulated but not enforced 35 - Poor style and presentation 34 - I.d. risks only if <u>significant</u> risk of injury – disincensive 34 - Did not i.d. handling technique for curbs 33 - Info re. risks is provided by putting in an experienced worker 33 <p><u>MS failures</u></p> <ul style="list-style-type: none"> • Language style poor 1, 33 • Little concerning task process 1 • Little consultation with task personnel – foremen 1, 22, 40 • Uncertainty about who prepares the MS – in spite of apparent consultation 1 • Prepared by 'Manager' 12, • Contracts 1, 9, 50 • Construction 2 • Facilities 3 • SC Civ Engineer 4 	<p><u>Training failures</u></p> <ul style="list-style-type: none"> - core skills dependency 1, 2, 11, 18, 22, 51 - seen as a consequence of time on job 18 - reliance upon CSCS card 1 - No training in being a supervisor 1 - Low safety training – Designer 1, contracts Mgr 9 - mostly on the job learning 2, 5, 7, 23 - on the job training occurs 'if they can be bothered' 17 - on the job learning isn't consistently from any one person, can be 7-8 people (diff techniques) 17 - as much gofering as a trainee 17 - H&S training excludes wood working 2 - Not specific enough to his trade 4 - evaluation ? - cost inhibitive for self-employed 4 - safety training a bit thin 4 - General MII training not applied to task in hand 5 - MII covered in site induction 17 - Supervisor provided 'MI1 training' - ? quality / expertise ? 5 - Trainer instigated bad MII practice 5 - None 9, 22, 24, 34, 35, 38, 40 - Reliance on o/side trainer meant nobody with skills when needed 12 - SC's to provide own TBT's for on the job training 10 - No TBT for lorry unloading, but part of CSCS 11 - MII training involved being given a booklet, nil verbal 17 - Only 'Sit down chats' seen as safety 17 - TBT's v. variable and perception of receipt does not match that of provision 17, 22 - FA counted as safety training 17 - S.O. sees MII training covered in induction, IP sees only being given a booklet 17 - Not required 17, 19, 20 - Never any training in technique or tool use 20, 22 - SC's do their own training, but ops do theirs here 20 - Training and risk discussion covered by
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	<ul style="list-style-type: none"> • Project 5, 9 • Site 9 • General 11 • Quick works 11 • SC foreman / contracts Mgr 13 • Read out as training 1 • MS used as a training medium 1 • Focused on sequence of process rather than necessary actions to achieve this 1, 2, 5, 39 • Skill requirements of ops not specified 5 • No ref to special training requirements 5 • Detail inadequate 2, 24 • Accident happened despite procedures being followed 4 • Developed from generic materials provided by a Safety consultant, 40 • None 6, 7, 8, 9, 17, 18, 19, 20, 21, 23, 33, 34, 36, 51, 50, 38, 37 • C/ never enough info available at outset 9, 22 • No consultation 40 • 'required if new task type to do' only 9 • generic for striking formwork 10 • IP unaware of MS despite existence / signaturism 11, 12, 22, 33, 34, 35, 52, 60 • Perceived as an audit tool for use by S.O. to confirm safe work methods 11, 22 • Regimented • Prepared pre-job 50 • Doesn't cover work processes 35 • Nil on techniques 40 • SSC's don't do own paperwork 40 • 'Safety footwear' specified – inadequate given accident 40 • Bold and meaningless statements 40 • Developed from old MS's 39 • V. heavy on PPE 39 • Glib control measures for MMH risks 39 • Didn't read, late arrival • Shortened version adopted by 38 	<ul style="list-style-type: none"> • discussion at task area 20, 23 • Training in saw use thought of as given by Supervisor / S.O., but not perceived by IP 20 • Seen as a method to comply with H&S rules rather than skill transfer 20 • Inadequate provision 23 • Sit with Nellie is best 'as long as shown the correct way' 23 • Not good enough for young people starting 23 • None, but copied co-workers 24 • Style doesn't encourage compliance 25 • TBT's as a result of previous failure rather than RA 36 • Previous MH training is all leaflets. Rubbish and idealistic 50 • No MH guidelines or TBT 50 • Have a H&S booklet – its all common sense 33 • Expects SC to ensure competent personnel 22 • Style isn't meaningful for ops to receive the message 25, 36 • Told rules and sign for. Reprimanded if disobey 37 • Bowser training given but excluded manipulation 38 • Crane co-ordinator course not training 38 • Training's just there so that they can say somebody's responsible 38 • No training, but has suppliers info 38 • None – its just something you pick up isn't it 40 • Training apparently given but not perceived by IP 40 • Request for training on TBT's / induction 40 • Y, TBT's in past 3m, but ? what 40 • Specialist co: train own men 3-4y ? criteria (some input from extrusionists) 50 • Training in tower erection, but not manoeuvring 50 • Ground work have to train in-house as its not a formal trade. Lots of skills 52 • Foreman thinks inadequate, wants 2-3d/y on safety and man management 52 • C/SCS = booklet and computerised test at DVLC for £30 53
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	<ul style="list-style-type: none"> • Have to start at site without visiting first 22 • Time limit on MS can → inter-contractor competition to get ahead 33 • Have hundreds and hundreds 36 • 44 steps 39 • Complex for low skill readers 39 <p><u>C/o Communication inadequacies 1</u></p> <ul style="list-style-type: none"> - Mid-level management grade dissatisfaction 1 - self-employed joiner = no opportunities 9 - driver not included, just told 'do this' - ? who prepares the MS ? 9 - ? supervisor not aware that 'S.O.' on site for past month 9 - C/o lack of adequate supervision 12 - Gas board supplying muddled & misleading information 20 - Co-ordination / communication with contractors = shout at them; they do as told 20 - Informal arrangement in the build sector 20 - C/o foreign labour 22 - Pat on back for good work 37 - People don't communicate beyond peer group. No reason 38, 39 - Not long employed ? affects request for help 50 - Safety meeting x4/yr (Fri pm) seen as regular 50 - Ensuring site rules = PPE observation 51 - 'Puts a flyer' n their wage packet if they need to know sth 60 <p><u>Accident investigation failure 4</u></p> <ul style="list-style-type: none"> - incomplete record / S.O. unaware of all accident facts 4, 13, 22, 24, 36, 37, 50, 51, 60 - Associate worker refused interview of peripheral factors 4 - Unwillingness to involve foreman / Mgr as too busy for the research 4, 13 - To busy to provide MS/RA 4 - Equipment not seen as a causal factor 6, 22 - IP gave misleading info. (remorseful) 8 - No record as to why op acted as he did 12 	<ul style="list-style-type: none"> - Lots of myths about what CSCS means 53 - Supervisor thinks that his training is inadequate - Hoist instruction = manual when first set-up, left on mast 53 - No training in human capabilities and performance - On the job training 2, - foreman provides practical skills training 9 <p><u>Lack of task instruction</u></p> <ul style="list-style-type: none"> - core skill of ops - no task TBT, just a general MH one 5 - Alternative risks to accident cause identified by IP12 - Had done once before 12 - Unaware of process blow-back 12 - TBT = Laying down the law re. hours and going home early 22 - Safety training : Foremen all going on a 4d FA course 23, 25 - No training in pushing trolley 22 - PC provides training whether own or SC labour 22 - Training seen by IP as perpetual 22 - No formal training available for ceiling fixer 22 and duct worker 34 - Trades (ceiling fixer) need skills to read Architectural drawings 22 - No formal training available for duct Engineering and trying to establish NVQ 23 - Promotion from mate to improver = ad hoc 24 - Costly for self-employed 33 - All safety training = inductions and MS (duct worker) 34 - Occ TBT's by next SC in chain 34 <p><u>Poor manufacturers instructions 2</u></p> <ul style="list-style-type: none"> - c/o not good for strapping & bracing 2 - none 13, 22 <p><u>Induction complaints 2</u></p> <ul style="list-style-type: none"> - excludes wood working 2
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		<ul style="list-style-type: none"> - Mixed story 12, 23, 24, 33 - Manager unaware of the accident 25 - Poor history, fear of grassing 12, 22 - Reluctance to cite language problems as scared of being labelled racist 22 - Accident occurred when doing last task of the day 24 - Had to report the accident only to get a plaster 33 - Blame 33 - Accident report describes sequence of events leading to accident, bnot why 36 - Wrong HSE classification 40 - Supervisor didn't perceive anything different about the task as nothing sticking out of the bucket 50 - Not aware of any CAT alternatives 52 <p><u>Attribution of accident cause 2, 9</u></p> <ul style="list-style-type: none"> - over-familiarity 2 - lack of concentration / judgement 2, 11, 22, 24 - distraction 13, 22, 33, 37 (self) - IP technique 13 - machine design 2 - training in progress 5 - slower than 'bigger' Uncle 5 - material awkwardness 5 - materials could have been smaller 5 - lads don't see danger 9 - policing approach 9 - Op trying too many manoeuvres with crane 11 - Poor environment 11 - IP should not have stood astride pipes 12 - No hazards should have been reported upon as 'done to Mfrs instructions' 12 - Carelessness 19, 24 - Supervisor distracted IP during task → accident 18 - 2nd person would have made job easier, but unavailable 18 - lack of control by site BUT site said gas board to blame 20 - adrenaline 21 	<ul style="list-style-type: none"> - ever evaluated? 2 - signature disclaimer 4 - all common sense 2, 36, 38 - tell you what you already know 5 - time consuming 6 - don't provide enough knowledge, just signature orientated 9 - no value 9, 22, 23, 25, 34, 37, 40, 50, 51, 52 - just a few as 'only delivery' 11 - some bits not understood, but not asked about 17 - remembers Weils & needlestick , fire and muster points 17, 18, 51 - preference for video ones 19 - some too long & difficult to take in 19 - boring 18, 52 - is used to i.d English 22 - need a card to say done it 23 - not good if have to read them 51 - Pfizer good – 2d induction 23 - 'doesn't get training, just run through the induction' 24 - it's the same old thing, but you have to go 34 - its just a task small SC's have to do to get on site 36 - 2d induction if working for SSC 37 - not attention grabbing 38 - they cover issues (drug / alcohol) that the questioners aren't qualified to make a judgement upon 40 - occ something new 40 - to ensure compliance with site rules 52
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		<ul style="list-style-type: none"> - complacency 22 - IP poorly positioned 22 - Negligence 24 - Rushing 24 - PPE incorrect 40 - No thoughts that stud cutting might not be necessary 24 - (uncorroborated) recurrence of old injury 37 - Supervisor felt he should have noticed that correct PPE omitted 40 - IP chose to walk over uneven ground BUT this was only access point to the site water supply 53 <p><u>Aspects of remedial action</u></p> <ul style="list-style-type: none"> - work method introduced that was not part of MS 5 - fix pipes to floor to avoid whiplash –idea awaiting approval, but could they create additional problems 12 - ‘Sin bin’ system of enforced 1hr supervision if seen working unsafely. Do it x2 = sack 13 - none (trip hazard remains) 17, 35 - TBT 19 - stick to existing procedures 4, 22 - knock the nail over themselves 18 - Liaison with gas board only 20 - General Foreman glad it happened as now this will lead to action – but what action ? 20 - S.O = Live gas should have been better recorded with wall charts 20 - Live services should be labelled & dated in future 20 - Responsibility of PC 22 - Technique advice (re. trolley 23) cutting 24 - Use a spanner with ring end instead 24 - Tidy up accident area 25 - None, hazard of the job 33, 34, 50 - None – only one ever caught. If more than one would have to do something about it 36 - Exploring alternative jockey wheel types 38 - Apply proper manhole cases that don’t stand proud 51 - None – it was a one off 60
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		<ul style="list-style-type: none"> - Keep to each corner in future - No remedial action re. harness snagging as was already following site rules 36 ‘ nothing else could have been done’ 36 - Let someone else do it 39 - Wear wellies 39 - Make sure someone on next level to take the bucket 50 - ‘Stand over and drive them- - if you don’t then they don’t do it 52 - A good tidy up 53 <p><u>Providing motivation</u></p> <ul style="list-style-type: none"> - a word in their ear or a look generally does it 17 - discussed and gets views from men 19 - if SC doesn’t perform then don’t use them again 22 - Supervisor doesn’t want speed as unsafe 22 - Uses own manner (nice) 22 - W/end job and knock to increase productivity 23 - Financial incentives 25 - Increase hours and double shifting 25 - job and knock 37, 40 (pm) – follow gut reaction if its OK - just ask 50 - redundancy effect 51 - no sick pay = incentive to be safe and ∴ get correct materials and method 51 <p>could have checked Genie wheels: didn’t think of other method 60</p> <p><u>Welfare complaints 5</u></p> <ul style="list-style-type: none"> - inadequate grit soap 5, 6 - provision of fresh water 8 - changing rooms 9, 37 - inadequate water pressure to wash properly at end of day 9 - no shower 11, 25, 52 - not taking breaks but not bothered 21 - breaks inadequate 22, 23, 24, 25 (slaves) - canteen pressure 23 - inadequate toilet no:s 22, 25, 60
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		<ul style="list-style-type: none"> - toilets dirty 22, 24 - Flexi-breaks not permitted 23 - Would prefer a pm break too 33 - Would like 'clean room style' changing rooms 37 - All trying to use the kitchen at once, it could be redesigned 39 - Need shower as working on 'contaminated ground' 52 - Canteen too small and some people have to eat in the changing rooms 52 <p><u>C/o lack of consultation</u></p> <ul style="list-style-type: none"> - S.O 1 - Young panel fixer 5 - Site workers not consulted re MS content, but 'told' 10 - None, just did it 12 - Trainee just told what to do 17 - Foreign labourer 19 - Scaffolders excluded from work org discussions, just told what task requirements are 18 - Scaffolders had feelings of powerlessness in job 18 - Yes about work, but not about safety issues 20, 25 - Not about work org. or safety 22, 50, 52, 60 (but would like to be) - Doesn't discuss safety unless gets hurt or can go to see someone if sees something unsafe 52 - Yes safety, no work 24, 37 <p><u>Non-communication of alternative design knowledge</u></p> <ul style="list-style-type: none"> • IP never suggested better wire carrying methods 1 • Contracts Mgr has seen alternative band cutting tool in Bahamas 9 • Could colour into concrete reduce glare? 18 • Alternative riveting screws would be a faster fix method – wondered why not used 35
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		<ul style="list-style-type: none"> • Has skills from army, but no chance to put forward 36 <p>Idea of depth sensor dial for new CAT design 52</p> <p><u>Determining competence</u></p> <ul style="list-style-type: none"> - reliance on CSCS card 17 - watch and review labourers 17, 19, 33, 37 - see where they've been before 19 - can tell by talking to them 19 - give them a week or two trial 20 - competent persons register → CSCS scheme 22 - responsibility of a.n.other 22 - by no: tickets 40 - supervisor not approachable for young worker 25 - lack of clarity re whether trade should push plasterboard too 22 - 'basic' task seen as core skill AND something that would be overseen by a trained / competent person = conflict 24 - Closest you can get to a supervisor for this duct gang (unofficial role) 34 - IP felt he had skill and abilities to work with the tower as 'had ticket' 36 - Relies on last Supervisors opinion 36 - Stress for supervisors with 18-20 under them 36 - No formal criteria for judgement 36 - Quota to fill local labour posts = exposure to risk especially as higher pay at sharp end 37 <p>Suck it and see 37</p>	
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Role, Skills and abilities

H&S responsibilities among Supervisory staff

- no written standards / instructions
- performance review = reactive
- ad hoc for SSC Mgrs and Foremen
- standards = site rules
- Standards = MS
- No performance appraisal
- Not specified but expects it as par of his role
- Just what PC say they have to do and company COP
- No performance review
- MS/RA = standards

Inexperience

- Youth perceives site as too fast
- never done job before
- aware that two ops did not have skills / abilities
- IP not qualified to deal with gas, but normally a ground worker would do this anyway
- Covering labourers work due to manpower shortage
- Lack of experienced men → Supervisor taking risk himself ∴ don't have to worry about paperwork
- Young are more safety aware (s.o.) says
- Young people undermined
- ? reluctance to request a break
- slow pace concerns
- mot long employed ? requests help
- IP feels menial ∴ not challenging poor work methods

Work related ill health

- Hip belt wire carrying ked to abscess
- Non-communicated anxiety since accident
- Background MS injury
- Twisted ankles
- Eye problems for duct worker
- Treated respiratory problems for duct worker
- Asthma
- Stress for Mgrs
- No PEM / HS
- HS = BUPA
- OH perceived as discounted
- Health status questions at induction
- Health .status questions by S.O./ Mgr / Contracts Mgr /Director

Fatalism

- Pure chance accident
- Expects to get skin damage from MH
- Supervisor knows 'loads' of people who have had cement burns

	<p>Supervisor pressure / tension - ? impact on subordinates 21</p> <p><u>C/o under stimulation</u></p> <ul style="list-style-type: none"> - supervisor 1 <p><u>communication of role</u></p> <ul style="list-style-type: none"> - drivers expected to work according to their own judgement 11 <p><u>Attitudes / abilities</u></p> <ul style="list-style-type: none"> • No training in human capabilities and performance • Designer – 1 • Scaffolder Manager 17 • General foreman 20 • Couldn't read 24, 12 • Unable to use range of skills and abilities 2, 18 • Language issues 8, 19, 22 • On the job training 2, • foreman provides practical skills training 9 • Phone calls –2 • 20/30 per day 2 • Dissatisfaction re. working interchangeably with semi-skilled ops 3, 23 • Unable to use range of skills and abilities 2, 18 • Language issues 8, 19, 22 <p><u>Dissatisfaction with other trades</u></p> <ul style="list-style-type: none"> - joiner skills → accident 4 - carpenter skills → accident 4 - new tradesmen not as good as used to be and ∴ increases Supervisors responsibility 9 - chain boy – hopper driver 11 - site v.s gas board 20 - apparently brickies v.s chippies & M&E v.s everybody else 20 - thinks people are reluctant to own up to damage in case they are blamed 23 <p><u>Desire to help others</u></p> <ul style="list-style-type: none"> - use of crane 11 - preventing blow-back 12 - helping chippie move tower 19 - young ones try to take on ladder / strenuous work from older ones in gang 34 - strong cohesion of work groups 34 - torquing gantry bolts 39 - family 5, 50
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	<p><u>Opinions of safety culture</u></p> <ul style="list-style-type: none"> - Young are more safety aware (s.o.) says 22, 25 - never good around concrete pour 4 - too many on site 5 - 'couldn't fault them – took me to hospital when accident happened 7 - only apparent post accident, to look good 11 - Scaffold Site Mgr feels that Safety Regs compromise earning potential - A bit much - Rationale for non use of prescribed safety measures in scaffolding 18 - S.O thinks housing has poorer safety level than other construction, but not perceived by Brickie / Foreman 20 - Safety tight if he's there, but easy to get into bad habits 21 - Things get changed only if you ask. Induction ≠ reality 60 - Poor –too much stuff lying on the floor 50 - The safety and tickets measures have inhibited young people entering the trade over recent years (cost implication) 52 - C/o doing a special RA for 17y old lad 52 - Some safety measures introduce new risks (ie fall by barrier) 52 - 'people loose their wits because of regulated safety 52 - Slows the job down but got to do it 60 - Not good, shaft left open and brick dust gets in 60 - Accident 23 lps comments - Good when unnecessary safety is cut 23 - Deteriorated due to production pressures 25 - Would prefer to improve / increase ops safety training and reduce the need for managers to oversee 25 - Some parts good, others disgraceful 37 - Suggestions for separate pedestrian access long requested and only done when in the interests of production 37 <p><u>Poor perception of safety role 9</u></p> <ul style="list-style-type: none"> - contracts Mgr sees this as 'wet nursing' - Contracts mgr would prefer to be site engineer 9 - C/o not being called Mgr lowers credibility 10 - Backchat 10 - Laborious form filling (Foreman) 12 - Reliance on COSS → relinquish personal responsibility for safety 21 - For most = worst enemy until sth goes wrong 36 - Thinks hospitals are too free with their diagnoses and capitalise on claim fees 36 - Safety seen as responsibility of visiting S.O. – little ownership by interviewees 51 <p><u>Role clarity</u></p> <ul style="list-style-type: none"> • task content and role varies for different jobs 22 <p>ganger man did not see himself as a supervisor ∴ ? role 40</p> <ul style="list-style-type: none"> - poor verbal clarity of supervisors 17
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	<ul style="list-style-type: none"> - Done by chat and ticket count at induction 40 <p>Designer – 1</p> <p>Scaffolder Manager 17 - training is watch and see</p> <p>General foreman 20 'life's a training – pressure of work ' Couldn't read 24, 12</p> <p>Dissatisfaction re. working interchangeably with semi-skilled ops 3, 23</p> <p><u>Dissatisfaction with other trades</u></p> <ul style="list-style-type: none"> - joiner skills → accident 4 - carpenter skills → accident 4 - new tradesmen not as good as used to be and ∴ increases Supervisors responsibility 9 - chain boy – hopper driver 11 - site v.s gas board 20 - apparently brickies v.s chippies & M&E v.s everybody else 20 - thinks people are reluctant to own up to damage in case they are blamed 23 <p><u>Opinions of safety culture</u></p> <ul style="list-style-type: none"> - Young are more safety aware (s.o.) says 22, 25 - never good around concrete pour 4 - too many on site 5 - 'couldn't fault them – took me to hospital when accident happened 7 - only apparent post accident, to look good 11 - Scaffold Site Mgr feels that Safety Regs compromise earning potential - A bit much - Rationale for non use of prescribed safety measures in scaffolding 18 - S.O thinks housing has poorer safety level than other construction, but not perceived by Brickie / Foreman 20 - Safety tight if he's there, but easy to get into bad habits 21 - Things get changed only if you ask. Induction ≠ reality 60 - Poor – too much stuff lying on the floor 50 - The safety and tickets measures have inhibited young people entering the trade over recent years (cost implication) 52 - C/o doing a special RA for 17y old lad 52 - Some safety measures introduce new risks (ie fall by barrier) 52 - 'people loose their wits because of regulated safety 52 - Slows the job down but got to do it 60 - Not good, shaft left open and brick dust gets in 60 - Accident 23 lps comments - Good when unnecessary safety is cut 23 - Deteriorated due to production pressures 25 - Would prefer to improve / increase ops safety training and reduce the need for managers to oversee 25 - Some parts good, others disgraceful 37 - Suggestions for separate pedestrian access long requested and only done when in the interests of production 37
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	<p><u>Poor perception of safety role 9</u></p> <ul style="list-style-type: none">- contracts Mgr sees this as ‘wet nursing’- Contracts mgr would prefer to be site engineer 9- C/o not being called Mgr lowers credibility 10- Backchat 10- Laborious form filling (Foreman) 12- Reliance on COSS → relinquish personal responsibility for safety 21- For most = worst enemy until sth goes wrong 36- Thinks hospitals are too free with their diagnoses and capitalise on claim fees 36- Safety seen as responsibility of visiting S.O. – little ownership by interviewees 51 <p><u>Desire to help others</u></p> <ul style="list-style-type: none">- use of crane 11- preventing blow-back 12- helping chippie move tower 19- young ones try to take on ladder / strenuous work from older ones in gang 34- strong cohesion of work groups 34- torquing gantry bolts 39- family 5, 50 <p><u>Role clarity</u></p> <ul style="list-style-type: none">• task content and role varies for different jobs 22• ganger man did not see himself as a supervisor ∴ ? role 40 <p><u>Verification of skills / experience 3</u></p> <ul style="list-style-type: none">- CV 3- Local labour constraints 3, 37- Undervalued 18- Very responsible job 18
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Appendix 10. Ethical issues

The process of developing and obtaining ethical approval is summarised in the following sections

Section 1	November 1999	Initial application to the Ethical Advisory Committee An early application was made to the Committee – At this stage problems relating to confidentiality; data storage disclosure, and destruction; and action to be taken upon discovery of risk circumstances were identified. These issues were discussed at a special meeting with the Ethical Advisory Committee (section 2)
Section 2	January 2000	Notes of initial meeting with the Ethical Advisory Committee The research team and Committee members discussed the issues of concern. The details in Section 2 summarise the main points and proposed actions
Section 3	April 2000	Revised application to the Ethical Advisory Committee The initial application was revised, in the light of Committee discussions and feedback from the project sponsor and Steering Group. Accident studies commenced on the approval of this application
Section 4	May 2001	Notes of later liaison with the Ethical Advisory Committee and revision of protocol At the early stages of data collection problems were experienced with the provision of a signature on the consent form and the strategy relating to confidentiality. Alternative measures were proposed and a new 'consent' form was devised (section 5)
Section 5		Revised consent form
Section 6		Final approval by the Ethical Advisory Committee This records the final approval of the revised methods by the Committee. The signature record that they mention was addressed by the research signing each of the data collection proformas.

**RESEARCH PROPOSAL FOR PSYCHOLOGICAL AND SOCIOLOGICAL
INVESTIGATIONS**

This application should be completed after reading the Code of Practice paying particular attention to the advice given in the British Psychological Society and the British Sociological Society guidelines.

(i) Applicants:

Dr R. Haslam; Mr A. Gibb; Dr D. Gyi; Ms S. Hastings; Ms. S. Hide.

(ii) Project Title:

Site and Personal Factors in Accident Causation in Construction and Civil Engineering

(iii) Aims and Outline of the Project:**a) Aim**

The project has been developed to identify the range of contributory managerial, site and individual factors, which are implicated in the causes of accidents in the construction and civil engineering industries.

b) Collaboration

The Health and Safety Executive are funding the work. Industrial representation has been obtained from John Laing PLC, Carillion PLC and The Construction Confederation. There is academic collaboration with Dr R. Duff and Mr A. Suraji of UMIST.

c) Schedule

The project will be undertaken over a three year period, from October 1999. It is envisaged that the preparatory period will continue until July 2000, after which a period of accident investigations will start. A pilot study will continue until September 2000 and the main data collection period will follow from September 2000 – February 2002. The remaining months will be spent in report and PhD write-up.

d) Preparation

There will be a development period of information search to identify aspects to be addressed in the accident investigation process. UMIST has already prepared a model for risk factors for accidents and this will form foundation material for the assessment criteria. Ultimately, the preparation will incorporate literature review, liaison with academic and industrial collaborators and a series of focus groups with different employee grades.

e) Selection of accident types

Accidents are already categorised by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995 as 'fatalities', 'major injuries' and 'injuries resulting in more than three days of absence'. The investigations will not include fatalities. We also intend to avoid accidents under investigation by HSE Enforcement Officers. The issues relating to choice of accident types are discussed in ix. (b).

(continued overleaf)

(continued)

The main element of the research will entail detailed follow-up investigation of 100 accidents. We expect the industrial collaborators to inform us of accident occurrences. The preparatory process will involve the identification of a sampling strategy to ensure an appropriate distribution of accident types / scenarios.

f) Accident investigation

The investigations will involve the identification of contributory causative factors, and include interviews with accident affected personnel, line and senior management staff on-site. The style of investigation will be determined as part of the preparatory period of the project.

g) Deliverables

The findings will be used to refine a model of accident causation and to validate a methodology for investigating construction industry accidents. It is likely that the sponsor will eventually adopt this material so that it may be used in investigations undertaken by Enforcement Officers.

The industrial collaborators expect ongoing, but anonymous, feedback of findings. This will enable them to consider remedial actions and be forerunners of 'best practice' in the industry.

The findings of the research will be reported publicly and disseminated within the industry and in scientific publications.

(iv) Names and status of investigators:

Sarah Hastings – Research Associate; Sophie Hide – Research student

(v) Subjects:

Subjects will include accident affected personnel, witnesses and any line and senior management staff from the site.

(vi) Location (any special facilities to be used):

Investigations and interviews will be undertaken at the site of the accident or appropriate nearby facilities.

(vii) Duration (including demand on subject's time):

This is currently unknown and cannot be determined until the preparatory period is complete.

(viii) Reasons for undertaking the study (eg contract, student research):

The Health and Safety Executive have contracted the work to the Health and Safety in Ergonomics in Construction (HASEC) research group at Loughborough University.

ix) Methodology (a brief outline of research design):

The research will involve two stages:-

a) Stage 1 - Development of investigation criteria

There will be a development period to determine the accident investigation criteria. This will include information from literature review, liaison with academic and industrial collaborators and data from previous focus group meetings.

b) Stage Two - Accident investigations

Issues relating to accident type selection (and confidentiality of information as described below in xi) are currently our prime concerns.

We wish to avoid accidents that we know that the HSE are investigating / plan to investigate themselves (HSE are only able to investigate ~ 10% of major incidents). This is because interviews may be duplicated, or litigious action may be pending, and this may compromise the quality of the material provided by interviewees. The intention is that the industrial collaborators will be provided with criteria to guide them in notifying us of accident occurrences.

(x) Subject knowledge, consent and ability to withdraw from the investigation:

The proposed statement of informed consent is as follows:-

Loughborough University - Department of Human Sciences

Health and Safety Ergonomics Unit

“Investigation of Site and Personal Factors in Accident Causation in Construction and Civil Engineering”

General information

Thank you for agreeing to take part in this study, which has been sponsored by the Health and Safety Executive. The work we are carrying out is an investigation of the causes of accidents in the construction and civil engineering industries and this is one of 100 accidents that we shall be following-up.

The study will be examining a wide range of factors involved in each accident including problems with plant and equipment and the way that the work was organised and carried out.

As a result of our work we expect that the information obtained will be used to direct and improve better work practices, and to make future accident investigations more efficient. For maximum benefit this information will be made available to our sponsor and industry-wide.

Confidentiality

In recording information on our database we will not list your name, although we will need to make a note of your job role / title. The findings of the study will be reported anonymously.

In offering our assurance of confidentiality, however, we are not above the requirements of the law¹. Prior to answering this form you should have been given details of the information that we are seeking and have any questions of your own answered.

Participation is entirely voluntary and you can stop at any point if you do not wish to continue without having to give any reason.

I have read and understood the above description of the study and agree to take part.

Signed Date

¹ As for anyone who is party to confidential information, this means that we would be required to release information (1) if subpoenaed in a court of law, or (2) if disclosure is justified in the public interest.

(xi) Confidentiality of research information:

a) General reporting to the HSE / Industrial collaborators

All information will be recorded on the database anonymously. However, it will be necessary to record employee grade /role against the information obtained. Inevitably, from this information, it may be possible to identify an individual within individual reports (especially where interviewee numbers are small). All effort will be made to avoid such an occurrence.

b) Disclosure in a court of law

If the investigators are subpoenaed to report findings (in the case of enforcement action or a civil claim) they will do so to the best of their abilities. The quality of testimony will be dependent upon distinction by employee grade / role recorded on the data and the memory of the investigator. We also need advice on, if subjects withdraw from the study and require their data to be destroyed, would we then be destroying legal evidence ?

c) Disclosure to the Enforcement Authority (HSE)

The HSE have agreed that all information that is passed to them will be anonymous.

d) Other

In order to achieve the benefits that will accrue through improved understanding of causal factors in accidents, we need to ensure that respondents are free to give an uninhibited account of events, as far as possible. However it is possible, that during the course of this research, individual actions may be identified that constitute a serious contravention of safe working procedures. In such instances it is proposed that (at the very least) the individuals concerned will be provided with a written statement drawing their attention to the situation and avenues they might approach to avoid future accidents.

Another possibility is to establish an independent panel to provide guidance to the researchers in particular circumstances.

In sum we are uncertain of the best way to proceed in this respect and would appreciate any guidance that the ethics committee has to offer.

(xii) Possible physical and mental risks, discomforts and/or distress:

None

(xiii) Procedures for taking measurements and for chaperoning and supervision of subjects during investigations:

The method for data collection from individuals will be determined during the preparatory period. It is anticipated that this will take the form of structured or semi-structured interview.

(xiv) Names of investigators and personal experience of proposed procedures and/or methodologies:

Sarah Hastings and Sophie Hide both have previous experience of interviewing. Roger Haslam has previous experience of accident investigation.

(xv) Details of any payments to be made to the subjects:

None

(xvi) Do any investigators stand to gain from a particular conclusion of the research project:

No

(xvii) Whether the University's Insurers have indicated that they are content for the University's Public Liability Policy to apply to the proposed Investigation (Committee use only):

(xviii) Declaration

I have read the University's Code of Practice with particular attention to appendices A and B and completed this application. I enclose the Checklist Guide of Ethical Principles and, where appropriate, have referred to the sections of that checklist which caused me to seek guidance from the Committee.

Signature of applicant:

Signature of Head of Department:

Date

Notes from the meeting with a sub-group of the Ethics Committee
14th January 2000

Present: Dr. Robin Hooper (Chair), Dr. Joanna Whattie (OH Physician and ex-S.E.M.A.), Dr. Roger Haslam, Dr. Diane Gyi, Sarah Hastings & Sophie Hide

Introduction: Roger described the project and our main ethical / confidentiality concerns. Robin then summarised the main points that had been understood from the Ethics Application of November '99 – addressed below under each heading. The presence of the Steering Group was introduced and it was noted that a meeting had been held since the ethics application had been submitted. A discussion of protocol (which types of accidents / which types of industry or build types) was touched upon, but not pursued as this has yet to be confirmed. One issue different to the original application – it was noted that the investigations are now to be called 'accident studies'.

Issues of concern

These are for the most part inter-related issues, but for clarity are discussed separately below.

1. Being subpoenaed to give evidence

To enhance and encourage co-operation with the studies, we wish to obtain and record data anonymously. However, there is a chance that we may be required to give evidence in Court upon the information gained in the studies; Although unlikely, this may be from an HSE prosecution or from a civil claim (prosecution or defence).

Outcome

- Our commitment to confidentiality (but not over-riding our 'legal obligations') needs to be worded and declared on the consent form (present format needs to be revised).
- To show our commitment to confidentiality we would wish to store the signed consent and participant data separately. Likewise we may also avoid cataloguing the data in a manner that might distinguish individuals.

2. Discovering inadequate practice / health status

This was discussed at length and the following issues became apparent.

- (a) Defining 'malpractice' – As 'lay' public, invited by a company to be present on site, we have no remit to undertake a formal accident investigation. Neither do we necessarily have the comprehensive range of skills to identify a breach in legislation, health status or 'best practice'.
- (b) We have no responsibilities to report under RIDDOR, as this would be the remit of a named person within an organisation.
- (c) Whilst on site we may become aware of issues, unrelated to the study in progress, that are cause for concern in terms of health, safety or welfare of employees / public.

Outcome

- There was strong support for re-enforcement with companies, prior to commencing a visit, that our studies would not be a formal accident investigation. As such, companies would have continued responsibility to thoroughly investigate all causes and remedial actions of their own accidents. If we go with this stance a letter needs to be drafted to this effect, and must be signed (by 'a company') before the studies start.

However, our attention was drawn to the Bradford Stadium case (JW), the outcome of which defined a common responsibility upon anybody aware of 'risk' circumstances to report / take action upon this. As such, and although we would not have formal investigative responsibilities, we cannot necessarily renege the responsibility of reporting a 'risk'.

Although there was enthusiasm for complete transferral of responsibility to the company, a final decision was not made upon this.

- No decision was made about action to be taken if we become aware of 'non study' problems and this requires further thought.

3. Removing data

Standard research practice is to destroy participant's data, if they chose to withdraw from the study. This however may cause problems under the following circumstances:

- (a) Anonymity – if the data is 'pooled' anonymously it may not be possible to isolate this information.
- (b) If destruction is requested upon the initiation of a legal case then, by destruction, would we then be destroying legal evidence and become accomplices to the defence.

Outcome

- One option is to isolate the information for a specified time period, during which it would not be pooled with other data, and during which participants may request destruction.
- We were not willing to destroy data if there were potential legal issues, thus a proposed wording to describe removing the data could possibly be 'if physically possible and not illegal to do so'.

4. Providing early feedback to industrial collaborators

There was concern from the Ethics Committee that, with a single or small number of investigations per company (in the pilot or preliminary study) that it may be possible to identify individuals in the reports.

Outcome

- It was clarified that all effort would be made to avoid this. Where isolated case information such as this is an issue the data would not be reported per se, but an example would be used to illustrate the points to be made.

5. Informed consent

The first draft consent letter needs revision. Participants need to read / understand and sign before we start discussions. We also need to determine our position on action to take if participants are hospitalised / at home & if so how long after the incident we can leave before interviewing them.

Outcome

- This procedure for this needs to be determined as part of our strategy and shall be determined at a later date.

Finally

Next Ethics Committee Meeting May 11th 2000. Need to have forms / clarity of thoughts on issues raised ready for that.

Sophie Hide 14.1.00

RESEARCH PROPOSAL FOR PSYCHOLOGICAL AND SOCIOLOGICAL INVESTIGATIONS

This application should be completed after reading the Code of Practice paying particular attention to the advice given in the British Psychological Society and the British Sociological Society guidelines.

Revised submission:

First application to the Ethical Advisory Committee for the December 1999 meeting

Following the December application a meeting was held on January 14th 2000, between representatives of the research team and members of the Ethical Advisory Committee. The issues of data storage, confidentiality and the researchers position upon discovering ongoing 'risk' circumstances were discussed. The enquiries were felt to address legal issues which were beyond the knowledge and experience of attendees. Consequently our concerns and enquiries were redirected to our sponsor (the Health and Safety Executive) for appropriate guidance upon the issues of concern. ~~The relevant letters for enquiry and HSE response are attached to this document and have been drawn into developing our action study protocol.~~ *(not reproduced here)*

(i) Applicants:

Dr R. Haslam; Mr A. Gibb; Dr D. Gyi; Ms S. Hastings; Ms. S. Hide.

(ii) Project Title:

Site and Personal Factors in Accident Causation in Construction and Civil Engineering

(iii) Aims and Outline of the Project:

h) Aim

The project has been developed to identify the range of contributory managerial, site and individual factors, which are implicated in the causes of accidents in the construction and civil engineering industries.

i) Collaboration

The Health and Safety Executive are funding the work. Industrial representation has been obtained from John Laing PLC, Carillion PLC and The Construction Confederation. There is academic collaboration with Dr R. Duff and Mr A. Suraji of UMIST.

j) Schedule

The project will be undertaken over a three year period, from October 1999. It is envisaged that the preparatory period will continue until July 2000, after which a period of accident studies will start. A pilot study will continue until September 2000 and the main data collection period will follow from September 2000 – February 2002. The remaining months will be spent in report and PhD write-up.

(continued overleaf)

(continued)

k) Preparation

There will be a development period of information search to identify aspects to be addressed in the accident study process. UMIST has already prepared a model for risk factors for accidents and this will form foundation material for the assessment criteria. Ultimately, the preparation will incorporate literature review, liaison with academic and industrial collaborators and a series of focus groups with different employee grades.

l) Selection of accident types

Accidents are already categorised by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995 as 'fatalities', 'major injuries' and 'injuries resulting in more than three days of absence'. The investigations will not include fatalities. We also intend to avoid accidents under investigation by HSE Enforcement Officers. The issues relating to choice of accident types are discussed in ix. (b).

The main element of the research will entail detailed follow-up investigation of 100 accidents. We expect the industrial collaborators to inform us of accident occurrences. The preparatory process will involve the identification of a sampling strategy to ensure an appropriate distribution of accident types / scenarios.

m) Accident investigation

The investigations will involve the identification of contributory causative factors, and include interviews with accident affected personnel, line and senior management staff on-site. The style of investigation will be determined as part of the preparatory period of the project.

n) Deliverables

The findings will be used to refine a model of accident causation and to validate a methodology for investigating construction industry accidents. It is likely that the sponsor will eventually adopt this material so that it may be used in investigations undertaken by Enforcement Officers.

The industrial collaborators expect ongoing, but anonymous, feedback of findings. This will enable them to consider remedial actions and be forerunners of 'best practice' in the industry.

The findings of the research will be reported publicly and disseminated within the industry and in scientific publications.

(iv) Names and status of investigators:

Sarah Hastings – Research Associate; Sophie Hide – Research student

(v) Participants:

Participants will include accident affected personnel, witnesses and any line and senior management staff associated with the site.

(vi) Location (any special facilities to be used):

Investigations and interviews will be undertaken at the site of the accident or appropriate nearby facilities.

If accident involved personnel are absent from the work-site, the researchers will attempt to contact them elsewhere. This may entail visiting them either in hospital or at home, and will only be where feasible with the expressed permission of the individual and their carers. It is also possible that individuals will have moved on to work at another site.

‘Off-site’ accident personnel will be contacted either through using contact details provided by the company, or by a representative of the company on our behalf. The key information that will be covered (in a conversation or letter) has been drafted overleaf. If the individual agrees to participate they would be given the opportunity to discuss participation with the research team before agreeing to any involvement.

[Loughborough University – Headed paper]

[Address]

Direct Line: 01509 228481
Fax: 01509 223940
E-mail: S.A.Hide@lboro.ac.uk
S.Hastings@lboro.ac.uk
[Date]

Dear [name]

We are approaching you with regard to the study of construction industry accidents that we, a research team from Loughborough University, are undertaking. Our research involves a study of the causes of 100 different accidents; one of these being the accident which we understand that you witnessed or were involved in.

We are aware that if there have been any accident related injuries, that key personnel may be absent during the time of our visit - perhaps at another site, at home or in hospital. For the comprehensiveness of our study, however, we are approaching all concerned to enquire whether you are able to participate in the study? We have asked a representative from the work site to provide a contact for all who are currently absent. At this stage we are not necessarily aware of any injuries that you may have sustained, or the degree to which you may have been affected. If you do not feel well enough to be involved, we understand and apologise for any intrusion.

Although the Health and Safety Executive are funding the research; our work is separate from any formal investigations that may be made by HSE Enforcement Officers (Factory Inspectors). Our research is attempting to identify the range of factors that are reported in accident causation and we are intending to use our findings to try and identify how working practice can be made safer in the future.

This study involves us attending the site after an accident. We will discuss the issues involved with all personnel who have been associated with or involved in each incident. If you are able to participate the instructions overleaf will indicate what action you should take.

You are most welcome to contact either of us to discuss this information if you would like. Please call us on 01509 228481 and we will be happy to answer any questions that you might have.

Thank you for your assistance
Yours sincerely

Sophie Hide / Sarah Hastings
Health and Safety Ergonomics Unit

Practical aspects about providing information

What happens next?

- In the first instance we would like to provide more details about the research for you and offer you the opportunity to ask any questions about the study. This does not commit you to participate and we are happy to visit you (or discuss on the phone) regardless of whether you chose to continue or not.
- If you would like us to visit you we can arrange to speak to you at a suitable venue – a public place, at home or in hospital for example.
- If you are currently receiving care for your injuries, we will also require agreement from your carers to speak with you. We must be sure that you are free from any pain and discomfort and from any adverse effects of medication. The carer may be present during any discussions if you wish.

What should I do?

- If you would like to discuss any of the information that we have provided, please contact either of the researchers Sophie Hide or Sarah Hastings on 01509 228481. We are very approachable and will be happy to chat about our work and answer any questions you may have.
- If you would like to arrange for one of us to come and visit you, please either
 - complete the slip below and send it to us, so that we may arrange a suitable time to visit you
 - phone us to arrange a convenient date and time to visit

Thank you for your interest in the study

----- ✕ -----
I have received the information about your research into accidents in the construction industry.

I am able / unable * (delete as appropriate) to discuss the matter with you further.

NB: If you are able to discuss the accident with us please add your contact details below and return in the pre-paid envelope enclosed.

Name _____

Address _____

Telephone _____

We will add a numerical code here, so that we can maintain accurate records or respondents. Only the researchers will know this code.

(vii) Duration (including demand on participant's time):

This is currently unknown and cannot be determined until the preparatory period is complete. The content is likely to be a mix of open and semi-structured interview.

(viii) Reasons for undertaking the study (eg contract, student research):

The Health and Safety Executive have contracted the work to the Health and Safety in Ergonomics in Construction (HASEC) research group at Loughborough University.

(ix) Methodology (a brief outline of research design):

The research will involve two stages:-

c) Stage 1 - Development of investigation criteria

There will be a development period to determine the accident investigation criteria. This will include information from literature review, liaison with academic and industrial collaborators and data from focus group meetings. This work is in progress and is to be finalised.

d) Stage Two - Accident investigations

Issues relating to accident type selection (and confidentiality of information as described below in xi) are our prime concerns.

We wish to avoid accidents that we know that the HSE are investigating or plan to investigate themselves (HSE are only able to investigate ~ 10% of major incidents). This is because interviews may be duplicated, or litigious action may be pending, and this may compromise the quality of the material provided by interviewees. We understand that Principal Inspectors will shortly be issued with an 'accident selection criteria'. By conversely applying this criterion to our own studies we should ensure that there is not duplication of our approach to companies. The intention is that the industrial collaborators will be provided with criteria to guide them in notifying us of accident occurrences. This criterion is yet to be developed.

a) Participant knowledge

The purpose of the study will be explained to participants. There are a number of key points which need to be conveyed to participants:

- Anonymity – data will eventually be stored anonymously. However there will be an interim time period (estimated at 2 – 4 weeks) where named data will be retained; this is the time period allowed for participants to withdraw from the study (see (x) d) overleaf)
- Employee responsibilities – Employees have duties under the Health and Safety at Work Act 1974 (S.7) and detailed in the Management of Health and Safety at Work Regulations 1992 (R.12), to co-operate with their employer, to enable them to comply with statutory duties for health and safety. This entails providing information on a work situation with immediate and imminent danger, or (even in the absence of immediate danger) so that remedial action may be taken to resolve shortcomings in health and safety arrangements.

As such, and from information gained during discussions or interviews, should any information come to light which appears to fall within this criteria (and which has not already been revealed in the companies own accident investigation process), the researchers will advise the interviewee of their responsibility to co-operate with their employer. There are a number of options available to achieve this:-

1. *Researchers will seek assurance from the interviewee that they will inform their Supervisor /Manager of the issues of concern. If this is agreed, the Researchers will document brief details of the intended action, but will not intervene further on the issue.*
2. *If interviewees are unwilling to divulge the information to the responsible person, they may alternatively opt to pass their information directly to the nearest HSE information point. If this is agreed, the Researchers will document brief details of the intended action, but will not intervene further on the issue. Guidance on how to inform the HSE will be provided to interviewees if necessary.*
3. *If the interviewees refuse to fulfil their responsibility to co-operate (perhaps if they themselves are implicated), yet the interviewee or researcher considers that there is a significant or immediate risk of a further dangerous occurrence/ accident or ill health, the Researcher will over-ride the interviewees wishes and divulge the information to the employer or HSE. Interviewees will be informed of the intended action beforehand and, again, will have the opportunity to use any of the above options 1 – 2 beforehand.*

This criteria applies to interviewees seen on location or who are at home or hospitalised.

(continued overleaf)

(continued)

e) Consent

A sample consent form has been prepared and is presented overleaf. This details the nature of the study, information on data storage, the circumstances under which interview data might need to be revealed and guidance on withdrawal from the study. The information will be discussed with participants and they will be asked to sign agreement before proceeding with the discussion / interview.

d) Withdrawal from the investigation

We will only be able to identify the data to a particular individual for 2 – 4 weeks after the interview, and any participants wishing to withdraw from the study will need to notify us within this period.

The selected time period is expected to be much shorter and outside any possible call for evidence at a court hearing. In the very unlikely circumstances that we might be approached for our data (within this time period) it would not be possible to destroy the data under these particular circumstances.

**Loughborough University - Department of Human Sciences
Health and Safety Ergonomics Unit**

“Investigation of Site and Personal Factors in Accident Causation in Construction and Civil Engineering”

Thank you for agreeing to take part in this study. The work we are carrying out is a study of the causes of accidents in the construction industry and this is one of 100 accidents that we shall be following-up. The Health and Safety Executive (HSE) are sponsoring us in this research, but our study is not an HSE investigation. However, because the topic of our interest is similar we will not undertake studies of accidents that the HSE pursue themselves.

The study will be examining a wide range of factors involved in each accident including problems with plant and equipment and the way that the work was organised and carried out.

As a result of our work we expect that the information obtained will be used to direct and improve better work practices, and to make future accident investigations more efficient.

Before we start our discussions there is information you should first understand:

Confidentiality

The findings of the study will be reported according to employee grade or job role and names will not be mentioned in any written reports. This is to ensure that the information you provide can be stored and used as confidentially as possible – it also means that if there were ever any legal proceedings related to this accident, it would be very difficult to trace information to individuals, for example if the researchers were subpoenaed to give evidence from this accident study.

Withdrawal from the study

We will record your name against the information you provide for 2 – 4 weeks. If you wish to withdraw your information from the study you must do so during this time period. We would then destroy any information you provided **except in the unlikely event** that any legal proceedings are pending in relation to the accident.

Your responsibilities as a worker

Employees have a legal responsibility to inform their employer if they know of a work situation where harm might occur, or if there are any shortcomings in health and safety arrangements. If our discussion reveals such information your line manager or the HSE must be informed. There are a number of different ways that this can be done and these are described on the attached sheet.

**I have read and understood this description of the study and agree to take part.
Participation is entirely voluntary and you can stop at any point if you do not wish to continue without having to give any reason.**

Signed Date

Action upon discovering a work situation where harm might occur, or if there are any shortcomings in health and safety arrangements.

As part of our discussions there is a chance that information may come to light where there is a continued risk of injury, ill health or a dangerous occurrence. If this information has already been noted in the company investigation, then no further action is necessary.

On the other hand, if this risk goes unreported then there is a chance that the accident may happen again, repeating the injury, ill health or damage ... or worse.

All employees have a responsibility to report risk circumstances – there are a number of ways that this can be achieved:-

- 1. You must inform your Supervisor or Manager of the issues of concern
This is the usual and most straightforward way of reporting a risk circumstance*
- 2. If you don't want to do this, you must tell someone at the nearest HSE information point – we will advise you how to do this if necessary*

Your agreement to pass on the information is the only information that we require.

If however, and for whatever reasons, you do not agree to tell someone about the risk circumstances, then the researchers will undertake to provide the information themselves. We expect that this situation will be extremely unlikely, as we are sure that you have the best interests for the well-being of your-self and others on the site.

Thank you for your co-operation

(xi) Confidentiality of research information:

e) General reporting to the HSE / Industrial collaborators

All information will be recorded on the database anonymously. However, it will be necessary to record employee grade /role against the information obtained. Inevitably, from this information, it may be possible to identify an individual within individual reports (especially where interviewee numbers are small). All effort will be made to avoid such an occurrence and this will include the exclusion of an employee grade / role link with any company names.

f) Disclosure in a court of law

If the investigators are subpoenaed to report findings (in the case of enforcement action or a civil claim) they will do so to the best of their abilities. The quality of testimony will be dependent upon distinction by employee grade / role recorded on the data and the memory of the investigator.

(xii) Possible physical and mental risks, discomforts and/or distress:

None

(xiii) Procedures for taking measurements and for chaperoning and supervision of participants during investigations:

The method for data collection from individuals will be determined during the preparatory period. It is anticipated that this will take the form of structured or semi-structured interview, which will be audio-taped for later analysis by the researchers. Tapes will be erased within 2 – 4 weeks after the interview, when relevant information has been extracted

(xiv) Names of investigators and personal experience of proposed procedures and/or methodologies:

Sarah Hastings and Sophie Hide both have previous experience of interviewing. Roger Haslam has previous experience of accident investigation.

(xv) Details of any payments to be made to the participants:

None

(xvi) Do any investigators stand to gain from a particular conclusion of the research project:

None

(xvii) Whether the University's Insurers have indicated that they are content for the University's Public Liability Policy to apply to the proposed Investigation (Committee use only):

No contact made

(xviii) Declaration

I have read the University's Code of Practice with particular attention to appendices A and B and completed this application. I enclose the Checklist Guide of Ethical Principles and, where appropriate, have referred to the sections of that checklist which caused me to seek guidance from the Committee.

Signature of applicant:

Signature of Head of Department:

Date

Dr Robin Hooper (Chair)
Ethical Advisory Committee
Loughborough University

3rd May 2001

Dear Robin

Thank you for joining us yesterday for the meeting with our project sponsors. It was very helpful to have you there and for the 'independent' viewpoint upon the problems that we are experiencing. We are very fortunate too that the Ethical Advisory Committee will be able to review the proposed changes so promptly.

To assist in your communication to the Committee concerning the problems we are experiencing I have added a few notes below:

1. We have experienced a number of problems with the consent form.
 - On one occasion a participant refused to sign (believing that this might endorse any notes recorded by the researcher and disadvantage him should there be any legal action). He was, however, happy to be interviewed (and this was done, with a note on the consent form made by the researcher indicating that the contents had been explained and were understood).
 - We have also had outright rejection of participation from a number of companies because of (i) the recording of individual names and (ii) the information on the 2nd sheet concerning conditions for confidentiality over-ride.
 2. The consent form was developed over a year ago (in anticipation of an earlier start to the data collection). At that time we had expected a relatively direct style of accident investigation; this style however has not come to fruition and the method is now an exploratory enquiry of influencing / interacting factors, rather than a direct probe of accident data. We now refer to our work as accident studies rather than accident investigation.
- As a result of this we now feel that the consent form needs to be toned down, shortened and be less off-putting to potential participants.
3. We have redrafted a new consent form (reproduced at end), in the light of suggestions made.
 - We would like review whether it would be possible to drop the paragraph (under Confidentiality) about legal proceedings / subpoena. We would retain the earlier para. text indicating that material will be 'stored and used as confidentially as possible' (but would be happy to discuss the meaning of this, if a participant requests additional information or clarification).
 - We would like to drop the aspect about over-riding confidentiality if a person refuses to divulge information him or herself (as on attached sheet of the consent form in current use).

As was pointed out by the corporate objectors, employees have a personal responsibility to report risk under any circumstances (i.e. this is not a matter of choice). Additionally they noted that 'risk' is a very grey area and not necessarily written in health and safety guidelines – Ultimately could we experience problems or blame in circumstances of both reporting and not reporting.

- We would like to drop any recording of names / signatures. The implications of this are (i) we would keep our own records to confirm explanation of the project to a participant, and (ii) this will help in the provision of anonymity. Whilst this is a greater safeguard for participants, it would also mean that they would not have the opportunity to have their data removed should they wish to withdraw from the study. It appears that this may be a preferable option for the individual, rather to the provision of their name.
- Any changes would also need to be written into the consent form for off-site personnel

I enclose a copy of the last submission to the Ethical Advisory Committee; this contains the original consent form agreed last May. We have revised this somewhat since then, to try and make it shorter and the revised copy that we have been using is enclosed too. ~~For your interest copies of the study questionnaires are also included and whilst I don't expect you would want to read through them, they do give a feel for the interview style and direction~~ *(not reproduced here)*.

We welcome any feedback and comment from the committee and look forward to an early resolution to our problems.

Yours sincerely

Sophie Hide
Research student

**Loughborough University - Department of Human Sciences
Health and Safety Ergonomics Unit**

Study of Accident Causation in the Construction industry

Thank you for agreeing to take part in this study. The work we are carrying out is a study of the causes of accidents in the construction industry. The study will be examining a wide range of factors involved in each accident including problems with plant and equipment and the way that the work was organised and developed. We will also enquire generally about yourself and your work.

The Health and Safety Executive (HSE) are sponsoring us in this research, but our study is not an HSE investigation. However, because the topic of our interest is similar we will not undertake studies of accidents that the HSE pursue.

Before we start our discussions there is information you should first understand:

Confidentiality

The findings of the study will be reported according to employee grade or job role. Names will not be recorded or mentioned in any written reports, to ensure that the information you provide can be stored and used as confidentially as possible. This means that your confidentiality and anonymity will be respected and maintained by the research team as far as is possible under the law.

Your responsibilities as a worker

Employees have a legal responsibility to inform their employer if they know of a work situation where harm might occur, or if there are shortcomings in health and safety arrangements. If our discussion reveals such information you must inform your line manager or the HSE.

Withdrawal from the study

If you have any queries or concerns about the study, please do ask at any time. Should you feel uncomfortable about the questions and change your mind, you are free to stop. You will be under no obligation to give us a reason.

We wish to thank you for taking the time to help us today; your input is very much appreciated. If you want to get in touch with us at anytime regarding what we have spoken about please do so.

Sophie Hide & Sarah Hastings
Health and Safety Ergonomics Unit
Department of Human Sciences
Loughborough University
Loughborough
Leicestershire
LE11 3TU

Tel: 01509 228481
Fax: 01509 223940
Email: S.A.Hide@lboro.ac.uk
S.Hastings@lboro.ac.uk

Ergonomics Unit

**LOUGHBOROUGH UNIVERSITY
ETHICAL ADVISORY COMMITTEE**

**PSYCHOLOGICAL AND SOCIOLOGICAL INVESTIGATION
RESEARCH PROPOSAL**

Title: Site and Personal Factors in Accident Causation in Construction and Civil Engineering.

Applicants: Dr R Haslam
Mr A Gibb
Dr D Gyi
Ms S Hastings
Ms S Hide

Departments: Human Sciences, Civil and Building Engineering, Design and Technology

Date of clearance: 7 June, 2001

Comments of the Committee:
The Committee was content to issue clearance for the revised procedures after receiving a satisfactory response to their comments. Clearance is issued on the understanding that the investigators maintain a record that the information sheet has been handed to participants.