

**Minutes of the Equipment & Techniques Committee held on Saturday 5 July 2008 at 10.30 am at Great Hucklow****Present:**

B Mehew Chair (BM)  
 Andrew Atkinson CSCC (AA)  
 Bob Dearman DCA (BD)  
 Glenn Jones CNCC (GJ)  
 Graham Mollard Training Officer (GM)  
 Stephan Natynczuk ACI (SN)  
 Andy Pryke DCUC (AP)  
 Les Sykes CNCC (LS)  
 Nick Williams (NW)

Apologies: Charlie Milton (CM)

**Item 1 Agreement on Attendees and Voting Status**

BM commented that the list attached to agenda, viz:

Bob Mehew	Chair	Graham Mollard	Training Officer
Stephan Natynczuk	ACI		
Dave Ludlam	CCC		BCRA
Glenn Jones	CNCC		BCRC
Les Sykes	CNCC		CDG
Andrew Atkinson	CSCC		CHECC
Dave Cowley	DCA		NAMHO
Andy Pryke	DCUC		Pengelly
Bob Dearman			
Charlie Milton		?	Forest of Dean
Nick Williams		?	North Wales

was of attendees and their representation plus other persons with valuable experience and other organisations, some of whom who had rights of representation.

GM had been invited to the meeting following a discussion between him & BM about the value of Training Committee and Equipment & Techniques (E&T) Committee having close liaison between the two committees. Noting BM's representation on Training had no voting rights, GM expressed a wish not to have any voting rights on E&T matters.

The Forest of Dean and North Wales had also been added because of their known interest in the use of resin anchors. BD announced that Dave Cowley had recently resigned from his post of Equipment Officer for DCA.

It was agreed that BD, CM & NW were co-opted members of E&T.

**Item 2 Minutes of Meetings on 11 November 2006 and 19 May 2007**

GJ raised a point about the status of the statement in the minutes of 11 Nov 2006 where it was recorded that the E&T Committee adopted the Mountaineering Standard for Anchors. He was concerned about the potential impact of this on Item 7 for today's meeting. BM proposed that the minutes be left as they were and that the specific point be revisited under Item 7. The minutes of 11 Nov. 2006 were accepted.

The minutes of the 19 May 2007 minutes were accepted without comment.

**Item 3 Actions Arising**

BM noted that many of the Actions in the previous two meetings relating to Anchors were superseded by Agendas Items, so he proposed that these would not be taken.

**3.1 11 Nov. 2006**

a) Drills/Batteries - The drills had been purchased. AA confirmed he held one of these drills on behalf of CSCC. AP noted that he / DCUC did not hold a drill. BD did not hold one on behalf of DCA but noted they did hold a much older BCA drill whose battery pack was knackered. LS confirmed he held one on behalf of CNCC and noted D Elliot may have been handed the 3<sup>rd</sup>.

**Action 1 LS** to check if D Elliot holds the 3<sup>rd</sup> drill purchased in 2007.

**Action 2 BM** to check with CCC to see if they hold a BCA drill.

It was agreed that the situation would be reviewed at the next meeting. NW enquired about the old drills which could be sold off to diggers. LS noted that the ones he had held had been sold.

b) Forward Budgeting – It is understood that the proposal had been accepted by Treasurer.

c) E & T Website - BM proposal that this action be ditched since it was covered within Item 4 was accepted.

d) Techniques - BM proposal that this action be ditched since it was covered within Item 4 was accepted.

### 3.2 19 May 2007

a) The various Mendip caves were reopened.

b) A statement was issued.

c) L Williams and L Wilson spoke with the owner of Hunters Hole.

### Item 4 Chairman's Election Statement and Program of Work

**4.1** BM noted he had provided his Election Statement with the Agenda for information.

**4.2** BM introduced his list of potential work program which E&T Committee might adopt by briefly explaining each topic. Specific items discussed were as follows:

a) "Bradford" Rig - LS noted that D Elliot had been using the "Bradford" rope test rig (a rig located that the BPC hut built with support from NCA) to do some work on loading across knots. NW confirmed the rig was instrumented to measure force loads but no one had any knowledge if the capability was still available. He considered it should be possible to reinstate this capability.

**Action 3 LS** to check out with D Elliot as to what the rig was capable of doing.

**b) BMC** - NW confirmed he is still the BCA rep to BMC's Technical Committee and receives the minutes (which he passes to BM). He did monitor their activities to check on items which might be of interest to cavers (these were few). NW noted he had made contact with one of the BMC trustees who lived locally to him and had responsibility for Furnace Quarry which had recently come under the control of BMC (which was where the BMC had set up their anchor test program). NW felt he could arrange to gain vehicular access to the test site. AP noted BMC appeared to have adopted non resin compression anchors by purchasing around 1000 for distribution to their members (thought to be the Petzl Coeur Coujon 33). NW stated he did observe one of their testing sessions at Furnace Quarry in early 2008 and noted their limited approach to testing. BM commented there was a question on whether BCA should seek to become more involved with BMC in respect to the anchor testing work now, or later when our testing was further on, or even testing our chosen anchors in Furness Quarry. NW expressed an opinion that given BMC's different approach to anchor testing, it was probably only worth maintaining a dialogue rather than attempting to create a joint testing program. The meeting agree with this view.

GM noted that Training have a good relationship with MLTUK.

NW noted he had received an E Mail from J Titt re anchors and would forward it to BM for dealing with. NW observed that this contact might be useful for other areas of Equipment interest such as fastening.

**c) Policy on other equipment in caves** – NW observed that he had started drafting a Fixed Aides policy statement. BM noted DYO Access Committee had approached him as Rope Test Officer about installing a fixed rope in DYO. BM had responded positively but the topic had gone quite. BM suggested such work would have to wait until the Anchor work had been dealt with. NW commented that the Fixed Aide policy was to try and provide a basis from which insurance cover might be offered on a similar basis to that for anchors. He suggested that E&T Committee needed a protocol which enabled it to make an observation on whether a proposal was safe or not. In response to a query about testing, NW expressed a view that the E&T Committee might make more use of engineering judgment than testing results. AP wondered if the regions might be able to start the work going by identifying installed aides. NW suggested that we could ask the regions for say their top 5 examples of items to be included, so as to give the E&T Committee some information on which it could base its direction of work. BD noted that DCA did have a Fixed Aide Policy. BM raised a query about the potential for such a policy to replicate all of the features of the Anchor Policy in order to provide sufficient assurance for acquiring insurance cover. NW felt this should not necessarily be a problem. BM also noted the potential problem of incorporating existing ones. It was agreed that the topic should be on the agenda next meeting.

**Action 4 Regional Reps** to bring a list of fixed aides to the next E&T Committee meeting

AA queried about fixed aides in mines. GM noted that bolts in slate mines used very long stainless bar, elsewhere wire traverse lines and fixed line ladders were in use at shafts.

**d) Equipment Failures** – GM noted that Council had agreed to Training setting up Near Miss and Failure web pages. BM noted the

challenge of acquiring information and also the potential problem of highlighting mistakes by individuals. GM felt this was not a problem and one can suitably anonymise such information. NW noted that some individuals concerned with rescue had expressed concerns in this area to him. GJ enquired if this was a concern over litigation. BM noted that he understood all rescue organisations had a policy about not making any critical comment on the individuals involved. AP noted that such information should focus on the failure mode. GM noted the need to clear any equipment topic with the E&T Committee before it was put up. BM raised a concern about basis of expertise for making any statement on a piece of equipment. It was accepted that there was a distinction between expertise on the manufacture of a piece of equipment and on its use underground. It was felt that the E&T Committee should be able to find expertise on usage. NW suggested that until the E&T Committee meet regularly and took on consider any such failure, it would be a difficult topic to deal with in the abstract.

**e) Techniques** – BM asked if this was a topic which should be parked. LS asked if the word should be dropped from the name. AP suggested techniques should be focused on techniques in using equipment. GJ suggested this should be narrowed to techniques in terms of installing equipment in a cave rather than techniques on personal equipment to go caving which was covered by Training E&T Committee. GM agreed with this view. A query was raised about use of a device such as a Stop. The view was accepted that the techniques part of the E&T Committee's remit was to focus on the techniques of equipment installed in caves and not personal equipment.

**f) Standards** – BM asked if the E&T Committee should be monitoring caving standards. In response to a query as to whether there were any, NW noted that there were almost certainly no specifically "caving" standards. BM pointed out that there were some standards of direct interest to cavers such as one which dealt with the performance of miners lights. (BM noted that Council libraries were now providing free read access to British Standards.) NW noted that one should distinguish between two types of standards, safety and performance and their origins. Safety standards arise from legislation and are linked to the CE mark. Performance standards come from specifications set down by somebody. NW suggested that standards were more for manufacturers than the E&T Committee. BM said the more fundamental question was should the E&T Committee be aware of the existence of the standard. AP asked what would be the value of being aware. NW was of the opinion that the potential range of standards of potential interest was vast, cf clothing. After some discussion, the E&T Committee came to the conclusion that this was an area which was beyond the resources of the E&T Committee.

#### **Item 5 BCA Handbook entry**

BM noted he had updated the entry without consulting others. AP noted that the 2009 revision should include clarification that Techniques were about equipment for installation in caves rather than techniques for going caving. BM agreed to bring a draft for the 2009 handbook to the next meeting.

**Action 5 BM** to bring a draft revision of the BCA Handbook entry for the E&T Committee.

#### **Item 6 Financial Status of E&T Committee's Work**

BM referred the budget for 2008 which had been attached to the agenda. BM proposed that we held off purchasing a new drill until the current position on drills had been sorted out. In respect of the item to purchase drill bits, NW asked LS if he was using multicross drill bits. LS confirmed they were much better than the other bits. NW offered an 18mm core drill bit for evaluation to LS.

BM noted the budget contained a proposal to upgrade a gauge on one of the puller's to enable us to be able to axial load test anchors at the mountaineering anchor standard. NW suggested that a test point should be fitted to the puller which would then allow a variety of gauges to be fitted. His company could loan specific gauges when required and which would also be calibrated. BM suggested the point be considered after dealing with item 7.

BM enquired whether the allocation for resin for regions was acceptable. GJ noted that 12 tubes cost around £170. BD asked about available resin since he had a project which required. AA asked about out of date resin. It was accepted that out of date resin should be binned. NW noted he could provide some space in a fridge.

BM asked for views on the proposal that "substantial variations in spend require agreement of at least 4 members of E&T Committee including Chair". GJ sought assurance that this would be done on the basis of a majority positive to an E Mail to E&T Committee members. This was agreed.

BM sought information on Council's response at its meeting on 21 June which he had not been able to attend, to proposal in his report that E&T Committee should be given its own account and cheque book. GJ reported that the Treasurer was not keen on the idea and the idea was not pursued.

#### **Item 7 Choice of Anchors**

**7.1 Chinese Anchors** - AP suggested an update on the position. GM enquired as to which anchors were being looked at. In response it was noted that there was information on the original DMM Eco (P) Anchor and in part at the Singing Rock anchor. GJ noted that the preferred anchor of choice was the Chinese anchor since, if it performed acceptably, there would be no change to the anchor scheme, no apparent change to the installer and also no apparent change to the user. GJ noted that we had started to look at the Singing Rock anchor because at the time there was no alternative available. Initial work with the Singing Rock anchor indicated its specified resin would not perform to the same standard as the anchor scheme resin (Resifix) under wet conditions. Although a batch of Chinese anchors had been placed, testing them has gone pear shaped. An alternative test set up had been

created using Hilti's resources by LS, but again unfortunately this work had not been completed. GJ took the view that if the Chinese anchors with the Resifix resin performed to the same standard as the DMM anchor with Resifix resin had, then the Chinese anchor could be adopted as a simple substitution. LS said that is what he thought had been agreed at the last meeting and had issued a proposal (see Annex 1) on standards. The meeting accepted that if the anchors performed to the same standard as the DMM anchors, then they could be adopted on the basis of a simple substitution.

A point was raised over if there was a need to test the Chinese anchors themselves. It was noted that although they might be manufactured to a standard, it was not necessarily the same standard as was used for the DMM anchor and that this difference might extend to both the metal and its metallurgical state as well. NW noted there was value in testing which would enable us to have confidence in the anchor since we did not have a complete grasp of what differences there were between the Chinese and the DMM Eco anchor.

In response to a query LS confirmed that most of Stu's rig (a double hydraulic ram set up manufacture by the late Stu Goodwill and used by CNCC Tech Group in the early 2000's) was available for pick up (though there remained a delicate question of arranging its pick up). The only piece of kit which was uncertain was the load cell used for the hydraulic pressure measurement. NW indicated that his company may hold a suitable cell which could be borrowed.

LS reported that 4 Chinese anchors were in limestone in the Yorkshire dales, 3 in Hilti's concrete test block on Merseyside plus one in concrete set up for a shear test. (The shear set up does not require specialist equipment as it is located in the corner of a building.) That left 2 spare Chinese anchors from the 10 original held. The anchors placed in concrete do not require "Stu's" rig and should be able to be pulled by Hilti's rep. Unfortunately Hilti's rep's has not been available to undertake the work to date.

BM asked if the E&T Committee were prepared to go ahead on the basis of the results from the concrete set of anchors or did they require Stu's rig work to also be undertaken. AP noted that Stu's rig work was required in the longer term for other things such as looking at other potential variations in anchor (cf surface finish). GJ suggested there were two issues, a) if we were happy with the results from the concrete set of anchors, do we go ahead with the Chinese anchor and b) Stu's rig which is required for test bed anchors and other work. GJ felt in respect of a), it was a no brainer, in that the E&T Committee should agree to ordering more Chinese anchors if the test results meet the performance of the DMM Eco anchors. BM then asked whether the criteria should be that the Chinese anchors should meet the 40 kN average axial pull capability shown by the DMM Eco Anchors or should they only be required to meet the Mountaineering Anchor standard (BS EN 959:2007). It was accepted that if the Chinese anchors failed to match the DMM Eco anchors performance on axial loading, then the results needed to be discussed by the E&T Committee before further action was undertaken or orders placed. LS noted that the performance standard to be matched was when using clean holes and proper installation (ie current guidelines), DMM Eco anchors consistently achieved 45 to 50 kN. This was agreed.

NW asked about material analysis. AP noted he had sent a Chinese anchor and a DMM Eco anchor plus two samples of resin to Steve King but he is not sure if this work was going to include analysis. NW proposed that this should be checked. The E&T Committee agreed that this should be done. BD raised the need to do a surface test but NW felt this would be covered by the pull test. NW proposed a budget £150 to cover this work which was accepted and volunteered to get the analysis done.

**Action 6 NW** to obtain a material analysis of a Chinese and a DMM Eco anchor.

AP asked about QA to ensure future production matched those being tested. NW noted that there were some a further 190 Chinese anchors located somewhere in the UK which formed the rest of the batch from which the test set were obtained. He felt that this could be dealt with by discussion with the manufacturer's representative. It was agreed that it would be reasonable to take the rest of the batch on the basis of the results of the test set. BM suggested that the E&T Committee could ask for a subsequent large batch and redo the testing so as to avoid issues of consistency between the current and subsequent batches.

In response to a comment by NW on laser etching, AA offered to see if he could undertake the task. It was felt this was needed for any anchors to be used under the anchor scheme.

**7.2 Inspection Regime** - BM raised the topic of revising the inspection regime due to the challenge of checking 4000 plus anchors every 5 years. The aim was by showing that the existing anchors meet the Mountaineering Anchor standard which required no inspection, then we could substantially reduce the inspection regime.

LS noted that the reporting procedure provided good information on the state of the anchors and wondered if this was sufficient. NW noted that there was also a set of data from existing inspections which should be able to provide valuable evidence. He felt that it was probable that anchors degrade by wear rather than by time and that after an initial inspection, it should be possible to set up an inspection regime based on estimated usage of the anchor. SN noted that one could also gain evidence from the extent to which the inspection procedure revealed problems as opposed to someone reporting a problem.

NW noted that there was a clear need to maintain an inspection procedure as was shown by Rhino Rift event. The key question was to what extent the procedure was applied. BM asked if we could move on from the existing inspection regime, that is inspect after 1, 3, 8, 13 and so years. He was of the opinion that the evidence had not yet been produced to justify moving from that position.

AA noted that he thought that there were no cases of the inspection regime finding a failed anchor, the only case came from a report (namely Rhino Rift) but accepted that the evidence needed to be formally collected together to demonstrate that. NW noted that the proposal was not to cease inspection, just to reduce it to a manageable level.

BM summarised that whilst we knew where we wanted to go, we had not got the evidence together at this point in time to provide

the demonstration for moving to an new inspection regime. AA volunteered to try to gather together the information on inspections and see what it showed.

**Action 7 AA** to produce a draft report on the evidence from the records of anchor replacements and their reasons.

AP asked if we were just about trying to identify anchors where an issue had been raised. NW responded by stating that what we should be about was trying to identify a frequency of inspection above which we should get information and below which we would still be confident that we have still got a safe system. Thus we should be looking at what failures had been identified by the inspection procedure and what had been identified by other routes, such as the reporting procedure. Plus that there is sufficient information that demonstrates the current system is safe. He therefore suggested that a paper be drafted which the E&T Committee then tried to pick holes in so that the resultant was something which the E&T Committee could have confidence in.

AP suggested that the work would not be that great since few anchors have had any reports on. NW noted that it was necessary to identify all anchors which had been subject to a report or replacement or whatever, so the evidence base was as complete as was possible so as list all known modes which had led to replacement. LS and BD expressed confidence that such data was available for CNCC and DCA. AA was not sure about the status of CSCC records in this respect. BM expressed concern that the records may not identify why a particular anchor was replaced, just that it was, so the records would not identify the reason for replacement. AP noted that a number of anchors were replaced not because they were defective, but because the simplest way of satisfying people that something had been done was to replace them. NW noted that until the work was done, the E&T Committee would not know what the case would be. He also felt that it might take some time and effort to produce the paper.

### **Item 8 Training of Installers**

BM noted that the discussion document was well debated on ukCaving forum and there were some interesting direct responses. (The responses were summarised into a document entitled "Collation of Replies to Discussion Document on a Revision to the British Caving Association's Anchor Scheme" which will be published separately on BCA's web site.) They had been an extremely useful contribution. BM suggested that the E&T Committee should be focusing on two areas, the validation process and the competency issue.

**8.1 Validation Process for Installers and Trainers** – BM noted that comments had highlighted the problem that in years to come, the number of anchors required to be installed would drop to very small numbers. An approach based on a person having installed 10 anchors in 3 years would lead to "bolt rash", the absurdity of anchors being placed solely to match the requirements, rather than being placed to match the need. So he felt there was a need to relook at the process of training installers and trainers and also revalidation. BM felt that the process could not include any requirement to have placed a number of anchors.

AP commented he thought the built in way around it was the concept of running a couple of workshops each year where people would install anchors. BM thought that a workshop would not provide the time for every attendee to place an anchor. AA asked whether we were talking about the simple placement process in a rock which could be located anywhere such a quarry (or indeed even in a piece of concrete) or the extended process of identifying where to place the anchor as well. BM considered it was only the simple placement process; the identification process was part of the competency issue. SN suggested that perhaps the basis should be to have placed an anchor. AP noted a need for a revalidation process if the anchor installation procedure had changed. LS suggested that for revalidation, if other people had judged their work as acceptable, then perhaps there was no need to have placed an anchor.

AA suggested that there was a need for the trainee to have placed at least one anchor as part of their initial training process. LS suggested that this placement did not necessarily have to take place in a cave. But he did take the view that it was necessary for the trainer to check the competency of the trainee in choosing the placement location, to work in an awkward location and in their competence to place the anchor in that position in a safe manner. There was differing views on the need for a once trained person to continue to place an anchor every year (which is part of the current requirement but not in the proposed requirement). LS commented that he considered there was a need to check on the competence of an individual to identify the correct location as well as safely get to that location and then properly install the anchor. BD pointed out that in Derbyshire the choice of the placement location was made by a group of at least 2 trained installers. BM commented that he wished the discussion to focus not on the question of the competence to identify the location for placement of the anchor or of the competence to safely place the anchor (which were the subject of the second area yet to be debated), rather that we needed a process to ensure that the installer was properly trained to install the anchor. Then after a period of time comes a need to refresh that person's expertise. The original paper included a requirement to place anchors as part of the revalidation process.

AP suggested there was only a need to have a revalidation process if there was a change in installation method. AA disagreed, suggesting there was a need for revalidation at some frequency, not necessarily every year. GJ raised the possibility of using a aide memoir / audio visual presentation on DVD option to provide a process suitable for revalidation. BM asked if anyone complied with the current requirement to place at least one anchor per year. AA and GJ stated that they had meet this requirement. LS stated that he an certificate of competence from an independent body to place anchors. LS suggested that a requirement document should be produced by a process of E Mail debate amongst the E&T Committee. BD stated that he viewed the process should get away from using the number of anchors installed in a period of time. NW suggested that one could develop the workshop concept in place of a specific revalidation process and that revalidation might be left to occasions when the E&T Committee had agreed that a change to the scheme had taken place which required a revalidation process to implement. LS enquired as to whether the E&T Committee should adopt the CIC scheme's approach to revalidation which was based on attending a workshop. There was a question as to whether a workshop would be of sufficient value to warrant it being the process for maintaining competence in the installation procedure.

GM noted that Training Committee wished to have at least one Trainer / Assessor in each area (Region) to be trained to place anchors. BM noted that that request would be very much at the behest of the Regional Caving Council.

BM said that if he understood the discussion correctly, it would be for him to produce a set of bullet points which laid out the existing scheme and the draft revision which could then be issued for comment by members of the E&T Committee to see what needed to be retained and what could be done away with. LS noted that we were at a point in time with an opportunity to review fundamentally the scheme and consider what was needed for the future in the light of the past 19 years experience. He felt that some radical changes could well be justified. GJ commented that he felt the current scheme was flawed as was demonstrated in part by recent experiences. So the current system of training and revalidation is flawed. He felt that a workshop held every so often years where installers and trainers could gather to discuss experience and developments would be sufficient to revalidate installers. But GJ felt we were missing the aide memoir support which an installer could look at, at any time to refresh their memories. This would not be just a piece of paper but also include a DVD along the lines of a DVD he had produced in 2007. He therefore proposed that the E&T Committee started the consideration of the production of a DVD showing the installation procedure. AP supported the idea but had concerns about ensuring that the latest version would be in the hands of the installers. BM said that this pointed to a requirement for a system where by the current information got directly to all of the installers. Comment was made about the need for a single person responsible for ensuring this was done, rather than the current system. BM supported reducing the work load on Regional Anchor representatives who currently had the task of relaying this information by instituting a central role.

BM went on to point out that probably in 5 to 10 years time we may face the situation where no one had placed an anchor for several years. In such circumstances we needed the best quality of information around to ensure that those who were starting out at that point in time would have all the information. AA noted that there had been an example of one trainee failing to understand the correct installation procedure which showed that the paperwork was not sufficient. He therefore considered we needed a system which was fit for purpose which issued updates and information so that we maximised the chance of installers correctly following the installation procedure. LS suggested that the experience implied that there should be an independent check of anchors installed by a newly trained installer so as to ensure that the installation procedure had been understood by the installer. AP noted that the DVD would become not just a training aide but a visual point of reference for the correct procedure.

BM noted that the inspection regime did not pick up on several examples of anchors not installed to the correct procedure. AP noted that part of the cause was the inspection regime was undertaken by the installer. LS noted that part of the problem was that there were few persons who were interested in the scheme which lead to self checking.

**8.2 Competence** – BM noted that the wording used in the discussion document was probably poor since we talked about a competence to undertake SRT and had not separated the competence to use SRT gear plus to also rig a pitch with SRT gear and the competence to identify best placement locations of anchors on virgin pitch. Bearing that in mind, CSCC had expressed their total opposition to the accreditation of amateur cavers by professionals. GM noted that if anchors were not properly located then professional cavers might well take to installing their own anchors in what they considered to be the best location. BM stated that the E&T Committee would have to accept that as much as they might wish to have the trainee show proven competence in personal SRT including being able to safely install anchors, plus the competence to identify the best placement location for new anchors prior to being trained in the installation procedure, the E&T Committee would have to accept that politically it could not go down this route. AP expressed the view that the trainer must assess the elements of whether the trainee was competent at SRT and at identifying new anchor locations as well as being capable of properly installing an anchor. This view was supported by others. BM proposed that the E&T Committee should put back to Council that if the trainer was not going to assess the competence of the trainee in SRT as well as identifying new anchor locations, then the onus for this should be placed on the Regional Caving Council. AA noted that some anchors were being installed for purposes other than SRT and hence questioned if it was necessary that the trainee was competent at SRT and identifying new anchor locations. GM asked if BCA were providing insurance cover for the scheme, and if so, then surely they should be controlling the appointment of installers. AP suggested that given the scheme was based on a national standard, then the training should be to a national standard. BM reminded the E&T Committee that back in November 2006, it had considered that the best approach was for the trainer to check that the trainee who arrived for training had demonstrated their competence in SRT as well as identifying new anchor locations beforehand.

BD suggested that there were too many factors involved to make deriving a standard feasible. That was why DCA adopted the approach that a group identify the location of the new anchors. BM pointed out that DCA's approach missed the concern namely, was the guy who came out to install the anchor at the location specified by DCA's group suitably competent in SRT to safely install the anchor. In addition, there was also the concern of whether for regions other than DCA, the guy was also competent to choose the best location for the new anchor to be installed. (The question surround training on installation of anchors was completely separate.) BM went on to observe that since it most almost certain that at least one other person would accompany the installer on the trip to install a new anchor, then would it be sufficient to record that the location was decided as a result of a combined discussion? GM noted that there was a local issue, namely which caves required anchors which should be left as a local issue. But the second part of where the anchors should be placed and how they should be placed should be in the hands of BCA, not local. GJ noted that the point of concern was the competence of the installer in SRT. GM took the view that that was a BCA matter. GJ noted that CNCC would as part of the training the installer, ask the trainee to rig a location. The trainer would then make a judgement on whether the trainee had rigged the pitch properly and if satisfied, carry on with the training on installation. If the trainee said they did not wish to rig the location, then they filtered themselves out of the system. SN commented that he saw this as a fundamental part of the training process and that it should not be controversial. GJ asked if BM had another question about the competence of the trainers. BM responded that it does beg the question about how does the E&T Committee identify the trainers and make judgements about their competence to make judgements on the trainee. It was observed that this then begged the question of the competence of the person who trained the trainers.

SN enquired about the number of “bandit bolting” in the UK. It was felt that whilst there were a fair number of non DMM Eco anchors in caves, there were no known cases of DMM Eco anchors in caves which had been installed outside of the scheme. GM noted that there were now resin based P anchors available in the shops, so the problem would appear. NW suggested that the majority of anchors being placed outside of the scheme will be non resin based ones.

NW suggested that the problem could never be perfectly resolved because it was a political problem and that it was probably impossible to tie up all of the loose ends. BM noted that if all the scheme focused on was the correct installation of the anchor in the rock, then it would be very easy for the scheme to operate since the training could be done in any old quarry. But he felt that the scheme could not ignore the competence of the guy in SRT and the competence in identifying new anchor locations. NW suggested that one could separate the two and make judgements separately, but agreed that both aspects needed to be checked. NW suggested that it would be for the Regional Council and their appointed Anchor Coordinator to make judgements as to whether the installers were performing to an adequate standard. AP proposed that when a nominated trainee arrived for training, then they must be able to demonstrate their competence to the trainer’s satisfaction that the trainee in personal SRT and identifying new anchor locations as well as installing anchors. BM sought confirmation that the E&T Committee was adamant about retaining the right to check the competence of the trainee in both aspects, namely in personal SRT and identifying new anchor locations as well as installing anchors. The E&T Committee agreed. AP suggested that the E&T Committee should adopt a process in training that the trainee (who having been nominated by a Region Caving Council) should be asked to demonstrate that they can SRT competently including the rigging of a location, they can identify the location for new anchors and that they can install an anchor. AA noted that it was likely that this might cause some problems on Mendip. AP asked if this could be got around by being specific as to what an individual was competent to undertake. NW suggested that the discussion was heading into an unnecessary difficulty in being too specific about what it wanted to achieve. He could understand why, but he felt that some aspects of the competence could not be set down objectively and the committee should accept that.

BM noted that a consensus had been achieved about assessing the competence of the trainee, but what about the trainer. BD enquired as to how did one judge the competence of the trainer who would train the trainer? NW suggested that whilst the training scheme for installing an anchor could be dealt with in specific detail, those for SRT competency including the rigging of a location and the identification of the location for new anchors should be more loosely spelt out, perhaps as guidance rather than requirements. BM asked if the E&T Committee should place some of the responsibility for identifying competence of persons who are to become trainers. NW suggested that this was not necessary as the trainer would be empowered to make appropriate decisions including the specific that a trainer could back out of training an individual if they had the opinion that the trainee was not suitable. BM reiterated that part of the process for determining the competence of a trainee would be for them to demonstrate in cave that they had SRT competency including the rigging of a location and the identification of the location for new anchors. BM agreed to draft something to cover these areas. NW noted that the first hoop that a person would have to jump through to become an installer would be sponsorship of their Regional Caving Council. Secondly, the trainer had an absolute right to terminate the training process at any point they chose to do so for whatever reason. (He noted that there would have to be a right of appeal process.) Those two safeguards should cope with most problems of unsuitable candidates. In response to a query NW suggested that the E&T Committee should state that “it is expected that a Regional Caving Council will only put forward candidates who will have the appropriate experience to enable them to safely reach the place in which anchors are to be installed”. The approach was accepted by E&T Committee.

In response to a query, it was confirmed that GJ’s suggestion of an aide memoir and DVD should be included in the training material. But it was also noted that that the work should not progress too far until the installation procedure is near finalised. GM noted that there were a few people within the Training community who had experience in producing training videos.

**Action 8 BM** to produce a revised BCA Anchor Scheme document incorporating the comments made in the meeting for discussion by E Mail.

**Item 9 Anchor Records** (covering program of work for setting up central set of records of anchors, installers and inspections see attached)

AA handed out a short note on his proposal for a national anchor data base, see Annex 2. BM noted that E&T Committee also had a spread sheet drafted by AP which has a limited quantity of data in it. GJ suggested that AA seems to be reinventing the wheel, that AP had offered a data base which would deal with the situation. NW enquired if the data base was on line. AP noted that from the limited amount of data he had received, there was a variety of ways of recording the material which requires it all to be consolidated. AP produced one such consolidation which was presented at the previous meeting. The position he then stood at was needing the rest of the data to complete the work. AP saw that the spread sheet would be up loaded onto the web site as the master document which would then be updated. He acknowledged that there were details to be worked out with respect to read write access which had not been worked out with the Web Master. AA commented that he saw the need for an on line data base which would reduce data input needs. AP noted that many of the fields in his spread sheet were based on pick lists and did not need a text entry. However, his problem was the degree of disparity between the data he had so far seen, for example in the way a specific anchor was identified. He felt the way then was to upload CSV files produced from the spread sheet onto the web site for others to maintain. AA observed that this would not be very efficient compared to having an on line data base. BM noted that he wished to see a single system up on line which every region used, rather than different systems in different regions and would prefer an on line data base format rather than a set of file which were updated using home based software. He asked if a central data base could be placed on the BCA Web Site. AP stated that he understood that it could be done. AA commented that there is a capability by the servers on which the BCA Web Site is locate to support an on line data base but it has cost implications. He had also had difficulties in obtaining an understanding of what the details of providing such a service were. NW commented that a data base did not need to be on the BCA Web Site; the key thing was that it was accessible. GJ noted that the Web Master had made a statement at a BCA Council meeting that BCA work should go on the BCA server. NW noted that the current BCA server could not

deal with some of the demands being put to forward, so the statement was not being observed. AA's proposal was to use an existing set up and as it happens, UBSS were doing just this. He proposed to use their set up and modify it to our requirements. BM noted that in addition to the objective of providing direct regional input, a significant output was a list of all anchors on a pitch / cave basis which everyone could see. AA stated that it would be possible to achieve this, including diagrams, photos etc. But to him the key question was what does the E&T Committee want to do? NW suggested that what was needed was something put in place from which one can learn and expand.

NW proposed that AA be authorised to produce an example, including placing the data on another server. This was agreed. AP also volunteered to produce something from his spread sheet. BD proposed that AA and AP should get together and sort out what each of them would do and come back to the next meeting with the results of their efforts.

**Action 9 AA & AP** would get together and sort out what each of them would do and come back to the next meeting with the results of their efforts.

**Action 10 BM** would supply the data he held on all regions to them for use.

#### **Item 10 Long Term Rope Test Results**

BM presented a graph summarising the results of NCA's Long Term Rope Test (LTRT), see Annex 3. He noted the first key point from the work was the variability in the drops survived by samples of new rope. AP asked why they might be so variable. BM reported that part of it might be down to the drop test procedure but he thought it was difficult to place much of at variability in the rope samples themselves. AP noted that if this was down to procedure, then used rope results would have a similar variability. AA suggested that the spread might be down to the rope alone. BM noted that the drop test procedure incremented the Fall Factor (drops in sequence FF 1.0, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5 and so on). Hence there is a different and increasing amount of energy being put into the rope after the 2<sup>nd</sup> drop. He felt this was a material contribution to the variability seen. He noted that the increasing Fall Factor sequence was adopted since if one just tested at FF 1.0, then the ropes used are good for over 30 plus FF 1.0 drops. Adopting a FF 1.0 testing regime would become unreasonable. NW asked if it was worth doing an ultimate strength using a tensometer. BM replied that he would love to do so and Stu's rig possibly provided the bits. However, ultimate strength tests were done at a constant speed of applying stress, which was not achievable on Stu's rig.

BM moved onto the used data. He noted the second key point was that at 799 usages, some of the samples only survived one drop and even at 300 plus usages, the rope had dropped to only 3 drops survived which was a substantial reduction from the new rope. He felt that the data was consistent with rope manufacturers' advice. BM went onto report on the knotability test (being the ratio of the diameter of a hole in an overhand knot to the diameter of the rope). For new ropes this ratio should be less than one, but the used samples showed the ratio was up around 4. This was a reflection of how stiff an old rope becomes. He had hoped that this might become a non destructive test. SN asked as to how good was the predictability. BM replied that so far it was poor. BM also reported on some work he had recently found which reported the drops survived data for climbing ropes against length of usage (ie if they abseiled down 100m then that counted at 100m usage) and included previous work by Pit Schubert, see Annex 4, which also found an initial substantial drop off. This supports the findings from the LTRT. BM considered that this was pointing towards more work testing rope at lower usage levels and much shorter intervals say up to 300 usages and at intervals of say 50 plus work with other diameter ropes.

LS asked about age effects. BM expressed the view that correctly stored ropes probably did not reduce in strength with age up to 5 or possibly 10 years. AA asked if the strength reduction would occur in a cave with water. BM replied that there were various mechanisms by which the rope strength could be degraded; especially if the rope was in a stream. SN asked about the effect of water or humidity on rope strength. BM noted that he had found a reference to the fact that simply putting bulk nylon in water reduced its strength by a factor of 2. BM agreed that there was an impact of water on rope, but he could not state if it also affected the degradation mechanism. AA noted that he was aware of one rope which was used once in a French cave, left for 3 years where it was out of the water and then broke on the next trip. GJ noted that generally rope stored dried did not degrade at that rate. BM noted that he had a paper which reported degradation of rope when subjected to water soaking, see Annex 5.

GM noted that D Elliot had acquired a range of data which should be pursued. GJ asked what is it that the LTRT was trying to prove, since in the field, ropes do not break. BD noted that one valuable piece of information was that rope testing did indicate when the rope was getting into a dangerous condition. BM replied that the aim was to provide some information on the likely life for a rope. The LTRT results indicate that the life of a rope was not as might have been predicted to be in the many hundreds of usages but only around a few hundred usages. GM enquired if the manufacturers had made any statement on the life. AP noted that they had made statements such as the rope was only fit for 6 months continuous usage etc. LS said that what we knew so far was that wet ropes were significantly weaker than dry ropes and that the life of a rope was more down to its usage than its age. AP asked if the rig should have a load cell to give the value of the force when the rope breaks. BM noted that the drop test was repeated so each drop put some damage into the rope. The question was did the second drop produce the same amount of damage as the first and so on. NW suggested that there were a large number of variables to get an answer. AP went onto ask should the E&T Committee make a recommendation that if a rope suffers a fall factor drop of such and such a value, then it should be binned and a recommendation on what the recommended limit on usages might be. He felt the E&T Committee did not have sufficient information to do this.

GM noted that the LTRT ropes would have been subjected to different extents of usages depending upon the length of the pitch. BM pointed out that for one rope, the ends survived more drops than the middle. AP noted that the knots used to attach the rope was another variable which we did not have any information. LS suggested we should run a test on two ropes, one of which was used purely for ascending and the other purely for descending. BD asked if the general caver would take any notice of the results.

AP felt that at the end of a major testing program, the statement which could be put out would be so generalised to be of limited value. AA expressed the opinion that usage was the prime factor, other matters like knots used is not likely to be of value to the average caver. He considered that E&T Committee should put the evidence up and let cavers make of it what they might. AP noted that the learning was that usage rather than age appeared to be of significance. But he wondered how many clubs or cavers would take note. BM suggested that even a simple statement would be of value and at least some clubs and some people would take notice which was better than no clubs and no people because we had not said anything. AP asked what information was to be provided. BM replied that the information was about usage numbers. If the usage number was very low, then perhaps it would encourage more people and clubs to record usage. And even if we just achieve that we would have something. AP accepted that such an objective was useful.

The E&T Committee agreed to a proposal to carry on and do more work at lower usage levels.

#### **Item 11 Any Other Business**

**11.1 Marking of Anchors** - LS asked NW if marking the anchors with BCA would cover the requirement to provide a manufacture's mark under the requirements of the BS EN 959:2007 and the law which related to that standard. NW confirmed that this did even though it was not a legal requirement given the circumstances we were going to use them in.

**11.2 Anchors supplied to CSCC** - GJ sought assurance that he would be reimbursed for the 20 anchors he donated to CSCC to help resolve last year's problem. GJ agreed to receiving 20 anchors from the new stock rather than being paid.

**11.3 Regime for the French Anchor Test Bed** - GJ asked that the topic of a testing regime for the Anchor Test Bed he had set up in French would be placed on the agenda. He and AP had placed 3 anchors at around 1500m above sea level which would see snow and -10°C freezing conditions in winter and 40°C plus in summer with the aim of getting some information on how such an exposure cycle would affect an anchor. They had considered that the first anchor should be tested after 3 summer winter cycles which would make it summer 2010 but wanted to get the E&T Committee's agreement to the test program and what the testing should be. BM suggested we needed the data from the Hilit tests and whatever else comes in before we could sensibly start discussing the topic.

**Action 11 GJ** to produce a document on the types of tests which can be done at the test bed including upgrading the pullers to higher forces.

**11.4 Use of the Petzl Tikka light underground** - BM noted that Training has been asked for a view on this. AP asked if Training had passed the problem to E&T Committee. GM indicated that the original question was to the E&T Committee. GM provided a brief description of the situation and went on to report that both Petzl and Lyon's had said that the Petzl Tikka was not recommended for use underground. The E&T Committee felt they could not gain say this statement.

**11.5 Resin** - BM asked how much spare resin was left from the last purchase. LS indicated that there were 2 or 3 tubes left. AA indicated he needed some resin. BM suggested we needed another order. BD indicated he needed around 4 tubes. AA thought he only needed 1 tube plus perhaps a second later in the year. LS agreed to order another box and distribute the contents as had been asked for.

**11.6 Date and Time of Next Meeting** - The 8<sup>th</sup> November 2008 was agreed. Location to be confirmed but possibly at Great Hucklow.

The meeting closed at 3.10pm.

Annex 1 – L Sykes’s Discussion Document for the Testing of Chinese ‘P’ Shaped Anchors.

Before we start installing the new ‘P’ shaped anchors, we must look at the historical test data and decide what we want to achieve and how we are to achieve it.

Since 1990 we have pulled numerous Eco anchors out of limestone, sandstone, granite and concrete. We now know that what ever substrate we use the mode of failure is the same. We also know at what force the ‘P’ eye attachment point will start to bend and the forces required to pull the anchor from the substrate. Having examined each pulled anchor meticulously we know the extrusion points and the degree of extrusion post pull.

Dynamic testing of the anchors is certainly a subject that I have various degrees of concern over. Tests were carried out on the Eco anchor in Dalton quarry. In the tests a deflection gauge was used to record the degree of deflection during a drop test, however, only an 80Kg test weight was used. But we do have the data so we know exactly the degree of peak deflection during the dynamic test and the degree of residual deflection post test.

It is my opinion that we use this data to ensure that the testing of the new anchor is not excessive and not the sake of just pulling anchors out. Therefore I am suggesting the following test performance criteria for the next phase of testing the Chinese anchors.

### **1 Axial load test**

Three indelibly marked anchors installed vertically in a suitable substrate using the BCA Anchor Placement Guidelines as the specification. After an appropriate curing time, the anchors are each subjected to an axial load to destruction. If a computer trace read out is not possible then readings will be taken at:

1. Initial moment of eye distortion
2. Egress of the anchor from the resin
3. Maximum load applied
4. Load required to remove the anchor from the resin/substrate
5. A verbal narrative should also be recorded during the tests

All three anchors will be then subjected to detailed examination to ascertain the extrusion points, the results will be recorded against each individual anchor.

A pass shall be indicated by the anchor holding a load of 40Kn. Hold is defined as ‘the majority of the anchor is still held in the resin plug in the substrate’. Distortion of the eye must not occur at a force less than 12Kn. Distortion is defined as being to such a degree that a standard 10mm karabiner could not be removed from the anchor.

### **2 Dynamic load tests**

Although I doubt the validity of this type of test, the rational being that the anchor is being loaded in shear and that the forces are not to the same extent during an axial test to destruction, and that there are weaker components in the rigging that will fail at a lesser force. My second point of contention for this type of test is that under standard caving techniques where these anchors will be installed standard rigging practices are used. In these situations no person is ever at risk from a fall greater than 0.3Ff. And that we never use a single anchor for life situations, they are always used in a combination, known as the rigging.

However, as previous data indicates the anchor does deflect during the arresting of a fall and it does retain a residual deflection once the load is removed. Therefore I suggest that the following test performance criterion is used.

One anchor is installed in a suitable substrate at 90° to the face of the substrate using the BCA Anchor Placement Guidelines as the specification. An ‘M8’ self drilling spit is placed at an appropriate distance to hold the deflection gauge during the test. After a suitable curing time the anchor is dynamically tested using a 100Kg mass on a fall factor 1. Three readings shall be taken from the gauge:

1. The peak deflection, the distance at which the needle pushes the marker bar
2. The load deflection, the point at which the needle steadies when the load comes to rest
3. The residual deflection, the needle reading once the lead has been removed from the anchor

A pass shall be indicated by the fact that anchor holds the load and that distortion is not excessive. Excessive distortion is defined as ‘being to such a degree that a standard 10mm karabiner could not be removed from the anchor’.

National Anchor Database

**Purpose**

Maintain a record of trained placers and inspectors, plus a record of all anchors

**Justification**

Currently records of the anchors are maintained by individual regional co-ordinators. The people trained are maintained by the trainers with little or no central records. As it is undertaken by individuals the formats and methods vary, meaning even when combined that they are difficult to align. This leads to any failure in the system being difficult or impossible to trace. Although unlikely, the worse case, scenario is that records cannot be proved or are incorrect therefore invalidating the insurance leaving BCA or individuals (committee or named participants in the scheme) liable for the costs of a failure.

**Main Criteria**

Must record dated training records with a whole validated time line

Must record anchors and locations with fitting information and dated testing, validated against trained people.

Must be searchable on possible failure criteria, ie all anchors fitted by persons trained by person A.

**Desirable criteria**

BCA as a representative body should be as open as possible, therefore it should be possible to check currently trained people and all the anchors that are placed with there current condition. (This does not necessarily mean topo/rigging diagrams, but if these are sold, they should refer to the original fitting number.)

**Design criteria**

Must be accessible via the web interface, utilising free open standards (without this it is not available to all and also means it can be transferred to another open standard without expensive conversion time.)

Must be part of the BCA domain, preferably hosted on the BCA servers.

To meet the above will require a LAMP server or hosted service. Lack of information on what is available on BCA ISP, but this is the most common web set-up.

**Development time**

I am happy to undertake the design, however, the programming is best given to someone else. First approximation for programming time, including user evaluation and improvement, is 50hrs. Unfortunately my usually willing code monkey is already doing to much for me to undertake another project. Does BCA have one?

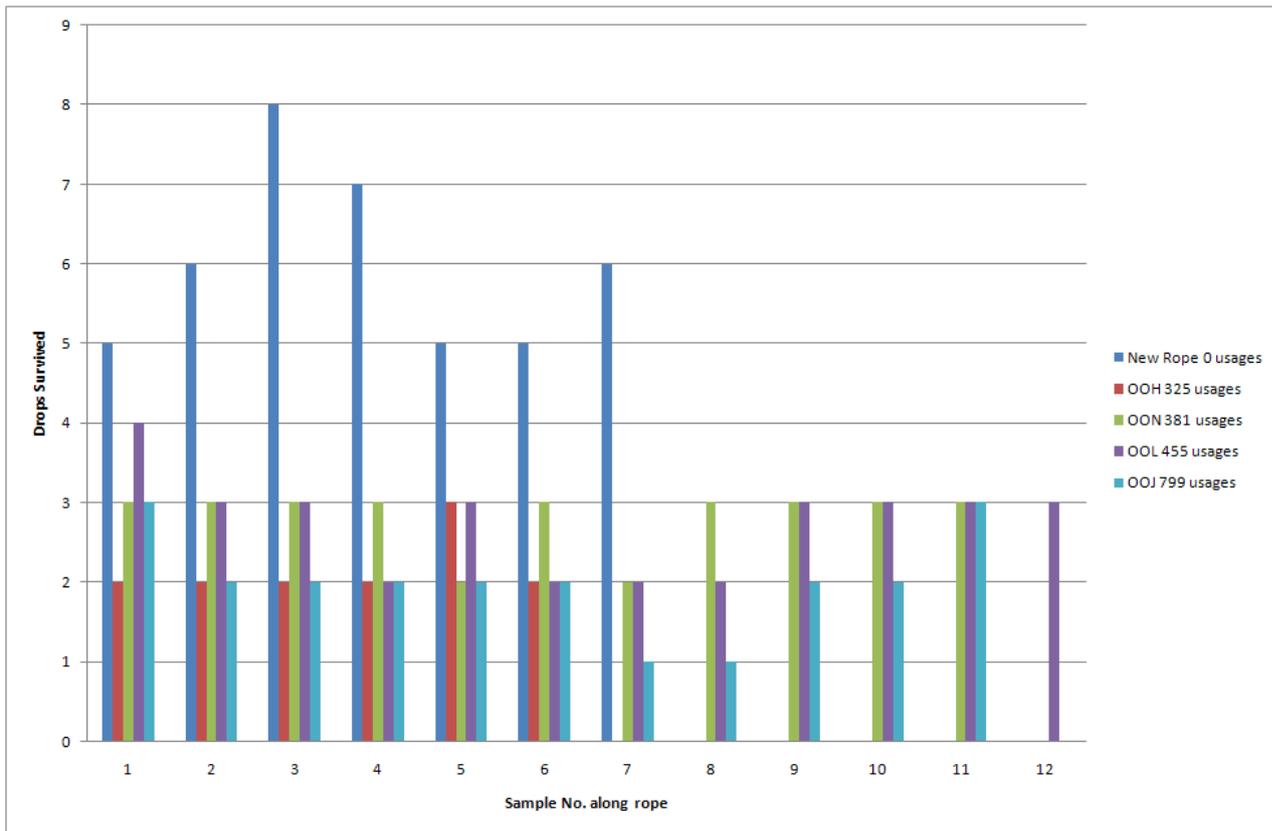
**Next steps**

AA to draw up Entity Relationship Diagram

Find Coder, and check costs, hopefully quite cheap.

Andrew Atkinson 2008:07:05

Annex 3 - NCA Long Term Rope Test – Some Results

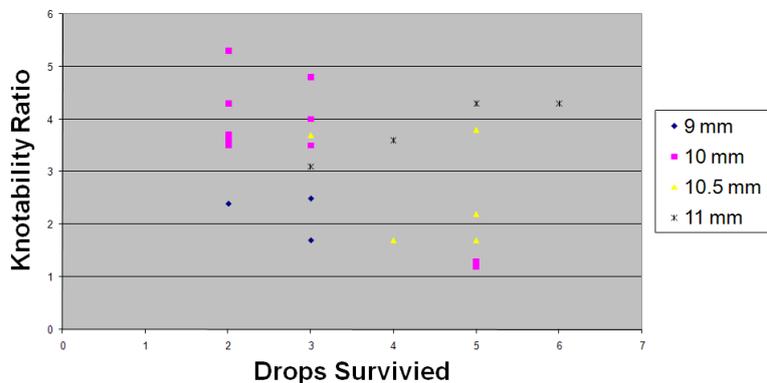


The above graph shows the variation in drops survived along rope length for some of the samples. Key points to note are:

- Variability in new rope samples
- OOL sample 799 usages very doggy at some down to only 1 drop survived
- Even 300 samples questionable since 2 or 3 drops survived
- Points to rapid drop off of drop survivability, less than 300 usages
- Consistent with rope manufacturer’s advice (6 months continuous usage)

Knotability – the ratio of the diameter of the hole within the knot to the diameter of the rope, new should be less than 1.0

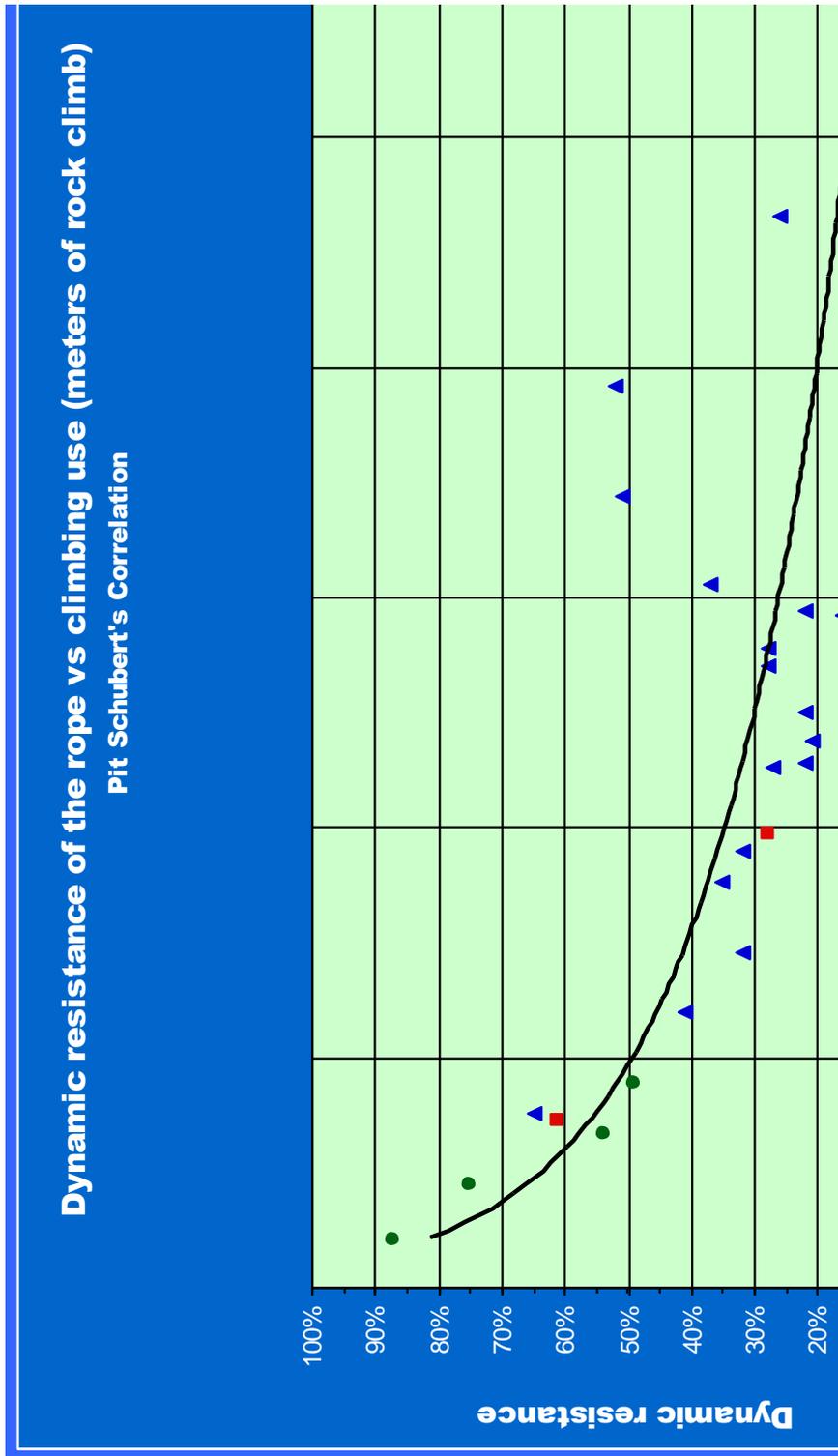
**Knotability**



Should we:

- carry out tests for 50, 100, 150, 200 250 and 300 usages
- extend to 8 and 9 mm rope
- look further at knotability

further



080705 Minutes ET Com V2.Doc

Annex 5 – Data from “Effects of UV and Water – Ice on Rope Performance” by G. Signoretti, UIAA Conference on Nylon & Ropes, Turin, March 2002

Treatment	Test		New		New		Used
dry	Falls on the Dodero		8		11		4
	Impact force daN		886		946		950
48 hr soak	Falls on the Dodero		2, 3		3		1, 5
	Impact force daN		926		1022		1052
2 hr soak	Falls on the Dodero				3		
	Impact force daN				984		
splashed wet	Falls on the Dodero				5		
	Impact force daN				990		
wetted, then dried	Falls on the Dodero		6		9, 4		
	Impact force daN		867		812		
wetted, then "extra" dried	Falls on the Dodero		9		10		3
	Impact force daN		785		826		861
4 cycles of soaking & drying under cover	Falls on the Dodero				12		
	Impact force daN				860		
4 cycles of soaking & drying in sunlight	Falls on the Dodero				8		
	Impact force daN				860		
Frozen wet and kept at -30 C for 48 hr	Falls on the Dodero		4		5		3
	Impact force daN		805		898		819
	NB data averaged over 3 tests						

Notes

1 Climbing ropes used

2 Falls on the Dodero are Fall Factor 1.0 falls on a rope test rig as per BS EN 892:2004

3 Impact force in daN is approximately equivalent to 0.01 kN