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# **Editorial**

Many of you may be expecting to read articles on the recent deployment to Iraq (*Op Telic*) in this edition. Sadly, I am not yet in a position to publish any Iraq articles but intend to include them in later publications.

I would like to direct you to the progress report issued by the *Journal* Review Working Group and their subsequent draft recommendations. Do these recommendations suit you? If you have any comments, please use the normal Institution contacts to make sure your opinion is aired. Two major change recommendations are to do with the size of articles and the guidance given to authors.

I have revised the advice to authors, with regard to the suggested length of articles and have updated the imagery specifications. I hope the former will prompt a few future authors to share some easier to read thoughts, past or present. The latter is coupled with the wider use of digital cameras. We welcome their use, but please do not try to produce the finished product.

Please provide us with the text (in any format) and if images are digital, they should be in as high a definition as possible.

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# THE ROYAL ENGINEERS JOURNAL

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# THE ROYAL ENGINEERS JOURNAL

# The Royal Engineers Journal A Progress Report

Members will be aware that a review of RE Institution publications is currently underway, and after the initial article which "challenged" people to comment, it is deemed appropriate that an update should be provided. One has to say that the response from the article in April's edition has been superb. The Working Group has had responses from a wide spectrum befitting the Institution's membership (young/old, serving/retired, officer/warrant officer). We have had more than 30 formal replies, so thank you to those who have contributed to the debate! Interestingly, we have received correspondence using just about every type of communication media, except maybe the carrier pigeon, which supports the fact that the Institution has a diverse and active membership.

#### THE RESPONSES

IT is fair to say that the majority of responses, mirrored by the views of the Working Group, are in general terms coherent. There are a number of constant themes in the feedback, many of which are within the Editor's control:

- "It aint bust", with specific accolades to past and present Editorial staff.
- The scope of the *RE Journal* is about right. Given the diversity of the Corps, the broad scope of the *RE Journal* is appropriate, and there is something in the Journal for everyone. Many emphasize the need for continued independence of contributions, not requiring submissions through COs, leaving the Editor to make judgements on protecting the Corps' wider interests.
- Articles of historical nature should be linked to relevance for today's and future operations. This may require the "recycling" of previously published articles with current or future comment attached. There is however a place for historical articles, when published for the first time, without the need for comment. More forward thinking articles, including equipment and doctrine are to be encouraged, but not exclusively so.
- The *RE Journal* should be used for more dialogue and debate, where serving officers need to contribute more. Of note is the thought that there should be more feedback on articles from those responsible for taking discussion points forward (ie. HQ EinC and other policy makers).
- · WOs and Senior NCOs are to be encouraged to

**make more contributions.** This will potentially strengthen membership of the Institution.

- Articles and the Journal itself need a style "make-over". The present style is described by some as "dignified but ossified". The article written by Maj Fawcett has had some style changes made to it, such as the journalistic "hooks", more photographs, colour diagrams and so comment is welcome. Indeed comment would be welcome on the content if we want to start as we mean to go on!
- **Themes.** The idea of Themed Editions of the Journal has not, in general, courted favour.
- Size. Some have suggested that the Journal should change in size to A4 as *RUSI* and *British Army Review* Journals. Most agree that as a serious Journal, it has to have a hard spine.
- **Combining Publications.** Again the suggestion that articles from the *Sapper Telegraph*, the *Supplement* and the *RE Journal* could be combined, merged or repeated received a mixed reaction.
- Frequency. The frequency of the *RE Journal* has come under scrutiny and some have suggested that one *Journal* a year, containing all the articles of significance for that year, would provide the basis for a more considered *Journal*. Most have suggested that three or four *Journals* a year meets the bill, and allows the vibrancy of debate we aspire to.
- If we are to potentially enhance the content and range of articles offered by contributors, it may be that additional editorial support is required or better advice to authors.

#### THE DRAFT RECOMMENDATIONS

At the latest meeting of the Working Group held on 18 Jun 03, we reviewed all the responses and came to agreement on a series of recommendations. These are by no means final and there is still time for comment and adjustment. Please feel free to make comment. The draft recommendations are:

- The Chairman of the BM&P, through the Institution Trustees, should encourage contributions to, and debate in, the *RE Journal*, seeking involvement from the full breadth of the Institution. Trustees may wish to stimulate debate in specific areas through "directed questions" particularly on topics of direct relevance to current and future activities. Trustees should take specific responsibility for forging links with the wider defence community in their own specialist areas.
- The Working Group recognized significant potential benefit from stylistic changes to the Journal and its contents. The Working Group recommends change to the *RE Journal* in line with the current format of the *RUSI Journal*. Future *RE Journals* should be A4 in size (including the *RE Supplement*).
- The Working Group endorsed current editorial policy, principal components of which are: sole editorial control resting with the Editor who acts on behalf of the President of the Institution; the independence of authors contributions from the chain of command; the Editor's sole right to deny publication of inappropriate articles; the need for the Editor to refer articles back to the author where amendment might be beneficial; and the constraint on the Editor to make editorial changes only to style, not to content. The Working Group noted the recommendations of

the Editor that proposed changes to the style of the Journal would not require additional editorial staff or financial support.

- The Working Group recommended review of the advice given to authors; in particular shorter articles (less than 4,500 words) should be welcomed and encouraged, articles could be of military engineer profession relevance as defined in the widest context, articles must be relevant and interesting, appropriate attention is required to the style and presentation of an article, and there are financial incentives for authors to produce quality articles. The biography, a synopsis at the beginning and the journalistic "hooks" to principal content are all key aspects to consider.
- The Working Group reviewed the frequency of Institution and Corps Journals (RE Journal, RE Supplement, Sapper Telegraph and the Sapper Magazine). The Working Group recommends the Sapper Telegraph and the Sapper Magazine remain separate from the RE Journal and encourages continued cross-over of articles where appropriate, and three RE Journals a year and six Supplements. However, the three Supplements which coincide with the Journal, should be integrated with the RE Journal as a single document. The Working Group recognises the Institution's studies into digitization and membership. Regarding digitization, the use of Websites and Chat Rooms, may remove the need for immediacy of information provided by the Supplement. In addition, wider membership could require a further review of the frequency and structure of the RE Journal and its Supplement. We recommend that sponsors of the Institution's Working Group on digitisation and membership, make specific recommendations relevant to the RE Journal.

# The Defence – Do We Think We Can Still Do It?

# Some thoughts on Engineer Support to Divisional Level Defensive Operations

Maj S A M Fawcett, 22 Engr Regt



Major Sean Fawcett was commissioned into the Corps in 1984. He had fun as a young officer, completing a variety of tours, in the more interesting parts of the world, BAOR, UK, Falklands, Wales and Bosnia with the UN. Having felt the need for some mid life improvement he did the PET(Plant) and then promptly disbanded his first command. After a few years of fun and penance in the DLO, he escaped back to Regimental Duty as the Regimental Second in Command of 22 Engineer Regiment where he was on the receiving end of his bright ideas from DLO.

This article is based on a presentation to a 3 (UK) Div DEG Study Day

**Background.** When I was a Troop Commander at the height of the Cold War, engineer support to the division in defence was easy. We had the General Deployment Plan (GDP); we drove to the Hildesheim area laid minefields for 4-5 days, put in the odd route denial and bridge demolition and waited to see who survived initial contact in the great race to the channel! We walked the ground, conducted TEWTs, CPXs over it, sometimes with the real plans. We had Microfiche on most potential targets. We conducted Field Training Exercises (FTXs) over the ground, felt the real friction of Corps and Divisional level activity. In summary we were well prepared for the war.

**The Problem.** In today's climate of expeditionary warfare, we are unlikely to know the ground and do not conduct FTX above brigade level, so must concentrate more on principles, doctrine and Tactics Techniques and Procedures (TTPs) than in the past. So we can prepare for a [generic] war rather than "the war". My aim is to review engineer support to divisional level defensive operations, keeping at a high level whilst homing in on some of the key issues. Some issues will be left hanging, as I currently have no answers. I will conduct the review in classic areas, Survivability, Mobility and Counter Mobility (in particular obstacle planning and control of demolitions), and a quick look at logistics. I will look at the current state of the art, difficulties and possible ways forward in each area. **Author's Note.** Firstly a health warning on some of the problem areas. I have arrived at these from personal experience, discussion with subject matter experts (SME) and from Observations from Training (OFT). However, the latter publication mainly deals with lessons from Battlegroup (BG) level and very limited Formation (brigade minus) activity. As we do not FTX at divisional level any more, a lot of observations are extrapolated and untested on FTX/Operations.

# **Resource allocation**

I make no apologies for talking about resources first. At divisional level, one of the CRE's key functions is to allocate resources. A key output from his planning cycle is the TASKORG and resource allocation, to allow subordinates to achieve their missions, a key tenet of manoeuvre warfare. The control of these resources is likely to be more demanding for real than on CPX and CAST as the real stocks are less generous than those given in exercise start states, thus requiring harder decisions to be made. Given limited funds, industrial lead times and foreign equipment these resource constraints are unlikely to change.

# <u>Survivability</u>

## "we pay lip service to [deception] and rarely resource it on exercise"

At divisional level, construction of field defences is largely a TASKORG matter. Remember defence stores are now an RLC item, however, resources and time will be limited. Both transport and digging assets are in short supply and therefore engineer advice and input will be required to ensure the optimum allocation of stores and digging assets to support the commanders intent.

Camouflage and concealment is a perennial from OFT. Plant track plans are a major give away. Some times it is quicker to hand dig rather than make good the damage from plant. Proponents of TERRIER digging battle trenches take note.

One area worthy of future development is deception. It has a potential high pay off, especially if your opponent has a similar or greater level of offensive support (OS) than you. Witness the number of expensive smart bombs that hit relatively unsophisticated Serb decoys in KOSOVO - NATO claimed hundreds of AFVs destroyed yet only tens were found on the ground.



For deception to work it must be must be coordinated at a high level and fully integrated into the plan to be

Plant making a mess? effective. An incoherent picture will not deceive an enemy. Currently whilst we recognize its worth in the relevant publications we pay lip service to it and rarely resource it on exercise.

With modern ISTAR technology, decoys must be multispectral to work. An inflatable T72 will not fool anyone with TI unless it has a heat source.



These pictures of



A T-72?

modern decoys give some idea of how realistic they can be when viewed thru sensors, VDUs or sights.

Producing these in the field from first principles and basic materials is not likely to be an act of war, so standard designs should be developed and tested and disseminated and

Kosovo 1999. Looks like a T-72 – from the Air.



A Scud Decoy

or procurement action taken to procure purpose designed decoys. Pilots and ROV operators are busy people so if they are not given cues you don't get seen (random CGI glinting in the sun guarantees a second look and perennially gives away def positions at BATUS)

# Mobility AND Counter Mobility

"Until we get controllable obstacles, possibly with ADW, they present the Commander with a dilemma: How to remove the enemy's freedom of movement whilst preserving his own."

Preserving your own freedom of movement is potentially mutually exclusive from removing the enemy's freedom and the commander must strike a balance. Doing so

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involves accepting risk, as you cannot be strong or retain freedom of movement everywhere. From this balance should flow the subordinates freedoms and constraints. Commanders must delegate more authority and freedoms sooner and accept the subsequent restrictions so imposed to achieve tempo.



Before launching into CAOI, it is important to recognize the difference between the ability to move and manoeuvre. Movement is the ability to move in columns, on routes, whilst manoeuvre is the ability to move in tactical formation,



areas. This becomes significant in the detail of IPB and CAOI of which more later.

# "CAOI is a powerful tool to ensure joined up planning and early integration of manoeuvre forces, obstacles and fire."

I will look mainly at Combined Arms Obstacle Integration (CAOI) and SCATMIN. CAOI is an All Arms concept. It has its origin in US Doctrine that we have adopted and greatly simplified – perhaps too much. All arms like the concept as it fits in well with "effects based planning". However, this leads to problems with terminology and they still view it as an engineer black art. CAOI is a powerful tool to ensure joined up planning and early integration of manoeuvre forces, obstacles and fire. In this integration, engineers are at a disadvantage compared to the gunners, as the delivery of artillery fire is much more flexible and responsive compared to the current generation of obstacle emplacement systems. The output from the Commander is likely to be an intent (effect) schematic, with symbols scribbled on a map; it is then up to the staff to tidy it up and identify where the engineer obstacle is best used to achieve the effect as opposed to direct or indirect fire. This could be a combination of all of these.

One of the key tenants of CAOI is the sophisticated and imaginative use of Control measures of Zones, Belts and Groups. These are detailed in AFM Formation and BG Tactics as well as EOPS. Barrier Free and Barrier Restricted are still very relevant. We all need to have a good understanding of them. They are powerful tools that we do not seem to make best use of currently, hopefully illustrated by the following example. The enemy are coming from the right.



Looking at a divisional plan. The divisional Commander intends the Offensive Support Group (OSG), supported by the Formation Recce Regiment (the Covering Force, (CF)), to conduct the Delay between PL OCEAN and PL RIVER, handing over the battle to the two mechanised brigades. The southern brigade will form a hard shoulder, whilst the northern brigade will further delay back to PL STREAM writing down the 1st Ech and forcing an enemy echelon change. The reserve armoured brigade will then strike the second echelon in the area of VIPER whilst a JAAT will go in to strike the 2nd echelon Command and Control and Combat Service Support assets in PYTHON, with a reserve option into COBRA if the southern brigade is hard pressed. Don't fight the pink too hard; I am just using it for illustration purposes.

In CAOI terms the effects the commander wishes to achieve are:

Shaping the Battle in front by *disrupting* and *turning* him.

Two lanes, BLUE and RED have been left for the Covering Force and OSG to *withdraw* down – this implies reserved obstacles in their closure.

**Blocking** him in the south.

Whilst *fixing* him in the north.

To set him up for the *strike* in the north.

And preventing his subsequent escape from the Engagement Area with options to *disrupt* in VIPER, COBRA and PYTHON.



These then translate into CAOI zones K1 –7.

This is the Divisional CAOI trace. It details freedoms and constraints. The obstacle graphics are, by convention, drawn with straight lines. The US practice is that these mirror actual boundaries, which are rarely straight. We do not appear to have "a line" on the subject if you'll excuse the pun! I have never actually seen one as detailed as this at CAST and on CPX, though on a recent CAST it was better than the usual zone box that mirrors the brigade boundaries. This does not allow brigades to tie in or conform to their flanking formations and makes it more difficult for the divisional or corps engineer staff to synchronize obstacle plans. I accept this may be a CAST/CPX-ism but it does degrade our training; we must become more sophisticated in our use of this tool, in all operations of war not just defence.

There is also a real world problem in that the traces are normally received 2-4 hrs after receipt of Operation Order (OPO) and have to be integrated late into the planning process. Schematics and diagrams in the warning order/OPO like the Gunners until BOWMAN is on line may be a possible work round.

#### ROYAL ENGINEERS JOURNAL

## <u>Mines</u>

# "... there appears to be in little in the way of doctrine or TD notes or draft TTPs for likely employment [of ADW]."

Looking at some problem areas with obstacles, particularly mines. Barmine is due out of service in the near future. With Area Defence Weapon (ADW) due in shortly thereafter, there appears to be in little in the way of doctrine or draft TTPs for its likely employment. We should be playing and testing the concept now on CAST and CPX to identify if there is a capability gap. Will ADW replace pattern minefields and ACETAM on its own? This would also prevent another SHIELDER where equipment is introduced into service whilst we are still working up the concept



The GIAT Prototype of Shielder

rather than merely refining and fine-tuning. The fuse settings for SHIELDER are insufficiently flexible and impose a significant constraint on its use. 4 hrs is too short to allow time to lay a minefield, survive and leave the minefield with a meaningful life, 48 hrs is too long and 14 days, you might as well use Barmine. What is required is more options in the 6-48 hour bracket when we either update or replace

the mines.

## "The fuse settings for SHIELDER are insufficiently flexible and impose a significant constraint on its use."

The use of SCATMIN is hampered by excessive procedural red tape. Laying authority tends not to be delegated below Corps/Divisional level, whereas it should be further delegated using the CAOI trace with the Commander accepting he has constrained his activities in so doing. Currently the CAOI trace gives freedoms but every obstacle has to be cleared by Corps any way, which goes totally against the manoeuverist approach. We must also simplify number of reports and returns for example the intention to lay report must be sent 1 hour before mines hit the ground, which could be before the decision is taken to fire a SCATMIN option, clearly an extra constraint. A key problem is cuing SCATMIN. At BATUS Shielder is often deployed in a hide forward of the FLOT, not surprisingly OPFOR kill a lot of them. Working through an example: first some assumptions. First allow 30 mins from receipt of the order to mines on ground to allow time to travel from the hide to site, final firing checks, emplace the minefield and clear the area. Remember RHQ cannot speak to the Shielder as it only has a single insecure set so ensuring communications between the Authorised Commander and Shielder is likely to require an LO, unless authority is delegated. It cannot lay in direct fire range of the enemy as too

Activity	GENFOR rate of adv (km/hr)	Safety separation (km)	Decision point (km)
Advance to Contact & Pursuit	7-17	2-5	9-23
MDA	3-4	2-5	5-9

vulnerable, this requires dead ground or a separation of 2-5 km. Therefore using GENFOR rates of advance:

## The key question is: who has eyes on the NAI associated with these DPs?

MLRS has even longer time lines, up to six hours if mines not on Launcher or at ACP. Also the gunners are loath to tie up a launcher with SCATMIN using the argument, that AT2 achieves little more than bomblet, -only OA can answer that one. It is only at divisional or higher level that the ISTAR assets with the necessary reach to cue a strike exist and division has the necessary authority to dedicate launchers. Therefore I believe that MLRS/AT2 in all but exceptional circumstances should be considered a divisional asset.

# **Demolitions**

Moving on to demolitions and their control. Firstly some quotes:

"Jackie, you dropped your Field Marshal's baton into the Sittang River" Field Marshall W Slim Remark to Maj Gen J G Smith following the demolition of the Sittang Bridge, Feb 1942

"Whenever I see a Sapper Officer coming towards me looking for a signature [on a 9811], I see a court martial staring me in the face." Brig S V Mayall, Comd 1 Mech Bde, Exercise IRON FORAY 02

And a historical example:

During the Arab-Israeli was the Egyptians surrounded GAZA with a major obstacle belt of minefields, however, lanes had to be left for civil and military access on the main roads and railway. The Israelis believed Egyptians would have problems coordinating the closure of these lanes so planned on using these routes to circumvent the minefields in the event Egyptians were the unable to close them, so the Israelis were able to negate the maior Egyptian minefield belt and bypass the main GAZA defences.



A Reserve Demolition – Closing a Safe Lane

Definitions are in the glossary of tactical terms the key ones being Authorised Commander, preliminary demolition, delayed preliminary demolition and reserved demolitions. Are you absolutely sure of them and the implications of each? In particular the delayed preliminary demolition, which requires a maximum firing circuit, a guard and dedicated firing party, who could be assault pioneers or troopers. They are usually at BG level so should not be so important to the plan as to unhinge it if captured. My advice is to avoid them if possible, as they can rarely be properly resourced and leave lots of scope for cockup. If a commander wishes to use this option he and his higher formation must be fully informed of the risks they are taking.

The procedures are simple covered by STANAG and on the AFW 9811 which even has an idiots guide on the back; it really is a case of RTFI (Read The Flipping Instructions). 9811s should be produced by G3 staff with engineer input and advice. Sometimes there is a real procedural "hoo-ha" over who is responsible for producing the forms; remember engineers are G3 staff. Another top tip for exercises is to produce lists of codewords in advance, especially if you get writers block like me. On operations, I am assured that an official list of random, one-use codewords will be issued, though I have never managed to track down exactly who is responsible for it and where it comes from. Reserved demolitions require very robust C2 especially between the Authorised Commander, the demolition guard and firing party commander and – often neglected – crossing units. Multiple redundancy is required as a reserved demolition is likely to be fairly obvious, especially if like Remagan it is the only bridge left. Therefore it will be a high profile target for descent, coup de main and SPF operations and enemy EW. If there is a new commander, a new form is required and like all things, if you hand it over get a signature.

Moving on to handover procedures. It should take place on the ground. All the paperwork and procedures including the very useful multi-language check list are in the Land Component Handbook, Formation and unit SOPs, specifically Formation

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SOP 205 and unit SOP 6-17. Do not underestimate the problem of handing/taking over an obstacle from a Greek or Turk with unfamiliar M&E – especially trying to explain obstacle intent!

## **Logistics**

## "the key to achieving tempo is logistic push"

There are some timeless issues with logistics. There will always be the conflicting priorities between the movement of M&E, defence stores and artillery natures. I believe the key to achieving tempo is logistic push. The IPB should give a guide to the likely resources required. The higher headquarters should then give a provisional planning allocation in the OPO and CSSO to enable informed planning. It is no good coming up with a superbly integrated obstacle plan if there is insufficient M&E to execute it; it is better to accept the constraints up front.



Forward Stores Site

The recent paper by Major Andy MacClachan on M&E in the last RE Journal, and its suggestion to hold more small stores and initiation sets at 1st line, seems like a step in the right direction. A shortfall in bulk explosive is not likely to be critical, however a lack of initiation sets is. Another key issue is where does the reconfiguration of M&E take place (that hardy perennial discussion, set to keep any DEG Study

Day at loggerheads!). Again a balance needs to be struck between the logisticians and their desire for maximum transport and storage efficiency (with ammunition storage regulations adding a further complication) versus the users requirement for the ease of use and thus, tactical loading. There may be some lessons to be learned from the gunners. We try for maximum economy and efficiency at all times, which while commendable sometimes is not practicable. It must be recognized that sometimes time constraints and ease of use must out weigh the need for maximum efficiency. Bulk explosive is cheap compared to artillery ammunition which they are quite prepared to abandon it if the situation warrants it.

## **Conclusions**

• The development of standard designs for multispectral decoys or the procurement of purpose built decoys can make deception more credible and improve force pro-

tection, both worthy objectives.

- •CAOI needs more work and education to ensure a wider understanding amongst other arms; it is after all an all arms issue. We must also start to use the control measures more imaginatively to maximize freedoms whilst minimizing constraints. This is especially true if we are to play with big boys ie the US. It is worthy of note that the US Army has just as many challenges with the subject as us. If you don't believe me just type "Combine Arms Obstacle Integration" into Google and read the results.
- •Will the loss of Barmine leave a major capability gap or will ADW fill it? Unfortunately mines are not flavour of the month, well illustrated by the ban on AP mines and growing campaign to ban AT Mines. If there is a capability gap what "work arounds" must we develop?
- SCATMIN procedures should be simplified; commanders should be prepared to delegate authority sooner to a lower level, though I accept this is difficult with the current fuse settings. Procurement action over fusing is required to produce more time delays in the 6 24/36 hr range.
- Logistics requires further work, though I believe the recent journal article identifies a good way forward. Though the lack of first line lift is likely to remain a problem for the immediate future.

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# Where does all the S\*\*t Go? A Review of Deployable Sewage Sludge Disposal Techniques Relevant to the Military

MAJOR M P WALTON-KNIGHT BENG(H) MSc CENG EURING MICE MCIWEM



Major Matthew Walton-Knight is currently Officer Commanding 5 Field Squadron RE. Prior to command he spent three most enjoyable years in 527 Specialist Team Royal Engineers (Works) where all his time seemed to be spent overseas on operations. Afterwards, as a respite, he returned to university for a year to read a Master of Science degree in Water Management, where he majored in water supply and sanitation in low-income communities.

SEWAGE can be a significant hazard to human health. Worldwide nearly two million children die each year from diarrhoea and at anyone time nearly 1.5 billion people suffer from parasitic worm infestations<sup>1</sup>. These events stem from faecal contamination and the principal means of preventing them is through the safe treatment and disposal of sewage. All sewage treatment systems produce sewage sludge and the problems of dealing with this sludge, being concentrated s\*\*t for the less educated, are complex.

#### CONCENTRATED S\*\*T

SEWAGE sludge is typically 0.25 - 12 per cent solids and consists of organic material and pollu-

tants that will decompose and become offensive, and it also has a very high concentration of pathogens<sup>2</sup>. All methods of sludge disposal are part of the process of relocating the solids from sewage sludge to land: either as an agricultural fertilizer (which is really a method of reuse), or burial as a waste product. Sea dumping of sewage sludge is currently outlawed in the European Union and in many other countries. The current military method for sludge disposal in both the British and United States Armies is to employ a private contractor from the host nation to deal with the matter<sup>3</sup>,<sup>4</sup>. Despite strict contractual obligations that require contractors to dispose of sludge correctly, it is often discharged untreated onto land or into rivers,

<sup>&</sup>lt;sup>1</sup> WaterAid (2002) The Human Waste – A call for urgent action to combat the millions of deaths caused by poor sanitation. TearFund/WaterAid. www.wateraid.org.uk/research (accessed 20th July 2002).

<sup>&</sup>lt;sup>2</sup> Metcalf & Eddy/Tchnobanoglous, G, Burton, F L, and Stensel, H D (eds) (2003) Wastewater Engineering – Treatment and Reuse. 4th International Edition. McGraw-Hill: USA.

<sup>&</sup>lt;sup>3</sup> Department of the Army (1993) *Wastewater Management Study No 32-24-H26K-94*. United States Army Environmental Hygiene Agency: USA.

<sup>&</sup>lt;sup>4</sup> Personal communication with Major M Ropel RE, formerly Officer Commanding 521 Specialist Team Royal Engineers (Water Development), 23rd July 2002.

as has been frequently witnessed in Bosnia-Herzegovina<sup>5</sup>, Kosovo<sup>4</sup> and Macedonia<sup>5</sup>. In its current form, this approach is untenable, not only because it creates a significant human health and environmental hazard, but also because it contravenes the duty of care requirements of both the UK Environmental Protection Act and the Ministry of Defence's Waste Management Guidelines. In future, sludge treatment equipment should always be included as part of a deployable military sewage treatment system. Many manufacturers produce mobile deployable sludge treatment equipment that can safely dispose of sewage sludge, however the techniques that each adopts have end products that dictate very different final disposal strategies, not all of which would be appropriate for the military. This article will review the different sewage sludge disposal techniques, with a view to their use within a deployable military sewage treatment system.

#### SLUDGE DISPOSAL TECHNIQUES

THERE are many methods of sludge treatment, all involve the key process of stabilization (also called digestion) that reduces biodegradable material and offensive smells, and then the process of dewatering. Stabilization is normally achieved by employing anaerobic or aerobic digestion, or by alkaline stabilization (used in 50 per cent, 18 per cent and 4 per cent of treatment systems respectively in the European Union<sup>6</sup>). Digestion is a very space intensive process and consequently inappropriate for a military deployable sludge treatment system. It will not be considered further, however the other approaches will be.

Alkaline Stabilization. Lime stabilization is the most frequently used method of alkaline stabilization. Lime is added to the sewage sludge, either before or after dewatering, to raise the pH to >12, so as to deactivate all organisms. As organisms are not destroyed, the sludge must be disposed of before the pH drops significantly. Hydrated lime (Ca[OH]<sub>2</sub>) is normally used for

stabilization, however where helminths (parasitic worms) are endemic, the use of quicklime (CaO) would normally be better as the resulting exothermic reaction of quicklime and water can raise the temperature of the mixture  $>50^{\circ}$ C so destroying helminth eggs that are resistant to high pH. Stabilization must be accompanied by dewatering. This method has previously found favour within the military<sup>7</sup>, however it is likely to be classed as inappropriate because pathogens ae not destroyed and burial is required relatively quickly.

Dewatering. There are many methods of dewatering using various types of presses or centrifuges. These equipments produce two products, either a sludge cake or granules and a supernatant liquid, which has very high levels of pollutants. The supernatant must be treated and is normally returned to the secondary treatment stage of a sewage treatment system. However, manufacturers of deployable treatment equipment find that the sudden increase in biological loading resulting from returning supernatant to a small sewage treatment system using biological treatment technology (such as Rotating Biological Contactors, Submerged Aerated Filters or Biological Aerated Fixedfilm Filtration) will often cause a significant failure within the equipment and for specified discharge standards to be exceeded<sup>8</sup>. These biological systems would typically then need a period of re-growth before discharge standards were again achieved. However, this is not a problem associated with sewage treatment systems using membrane technology<sup>9</sup>. Hughes<sup>10</sup> among other companies, market a range of mobile dewatering equipment.

**Incineration**. In the European Union, the incineration of sewage sludge is a very minor but growing method of sludge disposal due to the growing environmental and political concerns over the agricul-

<sup>&</sup>lt;sup>5</sup> Author's own experience, in 1996, 1997, 1998, 1999 and 2000.

<sup>&</sup>lt;sup>6</sup> Hall, J E (1995) "Sewage Sludge Production, Treatment and Disposal in the European Union". *Journal of the Chartered Institution of Water and Environmental Management*, vol 9, pp 335 - 343: UK.

<sup>&</sup>lt;sup>7</sup> Joint Service Water Committee (2001) Tri-Service Water Supply and Distribution on Operations. Ministry of Defence: UK.

<sup>&</sup>lt;sup>8</sup> Personal communication with Mr S Nathwani, Group Managing Director KEE Process Ltd, 23rd July 2002.

<sup>&</sup>lt;sup>9</sup> Personal communication with Mr J Noble, Sales Manager Zenon Environmental (UK) Ltd, 7th August 2002. <sup>10</sup>www.bakerhughes.com/birdmachine/bts (accessed 1st August 2002).

tural reuse of even treated sewage sludge. Incineration is really just a single stage dewatering, sterilization and volume reduction process. The only end product is inert ash that is disposed of at a landfill site. However, the ash is free from pathogens and only 20 - 30 per cent of its original volume<sup>6</sup>,<sup>11</sup>. Incineration has considerable utility for a military deployable sludge disposal system, where cost is a lesser consideration than space and efficiency. PDI<sup>12</sup> and SunAgri<sup>13</sup> among other companies, market mobile trailer mounted incinerators, which are capable of burning both solids and liquid to United States Environmental Protection Agency emission standards. This would greatly reduce incineration costs. If a membrane sewage treatment system had been adopted, dewatering equipment could also be used prior to incineration.

#### LOW-COST SLUDGE DISPOSAL TECHNIQUES

In the last few years, low-cost sludge disposal techniques have received much attention. Although they have less military utility, there are occasions when they may have an application, such as when the military is undertaking humanitarian relief operations. The key low-cost sludge disposal techniques are direct burial, burial following drying and composting into fertilizer.

**Burial.** Liquid sludge can be buried directly, although drying greatly reduces sludge volume. When buried, the sludge should be covered with at least 300 mm of soil<sup>14</sup>,<sup>15</sup>. Helminth eggs will die

off after 2 - 3 years, although all other pathogens will have died off after 3 - 4 months, after which the buried material can safely be used as a soil conditioner, if desired<sup>16</sup>,<sup>17</sup>. The burial area should not be used for agricultural purposes before pathogen die-off without contravening the European Sewage Sludge Directive, the European Sludge (Use in Agriculture) Regulations and the UK Guidelines for the Application of Sludge to Agricultural Land<sup>18</sup>.

Air Drying. For sludge to be air dried, it is typically spread in 200 - 300 mm layers on drying beds. In a temperate climate under favourable conditions it should dry in less than two weeks, however in less favourable conditions, it could take 10 weeks<sup>2</sup>,<sup>19</sup>. Most of the water leaves the sludge by drainage and the drying bed should be located on either a drainage bed or free draining soil, where neither surface water nor ground water will be contaminated. If drainage or infiltration is not possible, drying by evaporation alone may take over six months. Anaerobic digestion should proceed drying, because it significantly speeds the drying process<sup>20</sup>. The lowest cost approach would be to locate the drying bed on an area of ground where infiltration is acceptable and for the sludge to have undergone digestion prior to drying.

**Composting.** The techniques for disposal (or really the reuse) of sludge by forming compost is described in detail by Cairncross & Feachem<sup>14</sup>, and Francey *et al*<sup>15</sup>, and a safe product can be produced

- <sup>13</sup>www.sunagri.com and http://users2.nbn.net/~terryweaver/Mobil.htm (accessed 1st August 2002).
- <sup>14</sup>Cairncross, S, and Feachem, R (1993) Environmental Health Engineering in the Tropics. 2nd ed. John Wiley & Sons Ltd: UK.

<sup>&</sup>lt;sup>11</sup>New England Interstate Water Pollution Control Commission (2002) Sewage Sludge Incineration. www.neiwpcc.org (accessed 1st August 2002).

<sup>&</sup>lt;sup>12</sup>http://pdimirjv.com/specs.htm (accessed 1st August 2002).

<sup>&</sup>lt;sup>15</sup>Franceys, R, Pickford, J, and Reed, R (1992) *A Guide to the Development of On-site Sanitation*. World Health Organisation: Switzerland.

<sup>&</sup>lt;sup>16</sup>Feachem, R G, Bradley, D J, Garelick, H, Mara, D D (1983) Sanitation and Disease – Health Aspects of Excreta and Wastewater Management. John Wiley & Sons Ltd: UK. Cited by Pescod, M B (1992) Wastewater Treatment and Use in Agriculture. FAO Irrigation and Drainage Paper 47, FAO: Italy.

<sup>&</sup>lt;sup>17</sup>Strauss, M (1994) Health Implications of Excreta and Wastewater Use. Hubei Environmental Sanitation Study, 2nd Workshop, 3rd – 4th March 1994, EAWAG/SANDEC. www. sandec.ch/reuse/downloadables.htm (accessed 1st August 2002).

<sup>&</sup>lt;sup>18</sup>ADAS (2001) The Safe Sludge Matrix. 3rd Ed. Water UK/British Retail Consortium/ADAS. www.adas.co.uk (accessed 20th March 2002).

<sup>&</sup>lt;sup>19</sup>BS 6297 (1983) Code of Practice for the Design and Installation of Small Sewage Treatment Works and Cesspools. Amended 1990. British Standards Institution: UK.

<sup>&</sup>lt;sup>20</sup> Jewell, W J, Howley, J B, and Perrin, D R (1975) "Design Guidelines for Septic Tank Treatment and Disposal". *Progress in Water Technology*, vol 7, pp 1919 – 205. Cited by Pickford, J (1995) *Low-Cost Sanitation - A Survey of Practical Experience*. ITDG Publishing: UK.

in 2 – 4 weeks. However, there must be an established market for compost before it is produced and appropriate carbon rich bulking materials must be available. Composting generates a much greater volume of material and requires additional effort for production and marketing, consequently it is unlikely to be an appropriate means of sludge disposal for even a low-cost deployable sewage treatment system.

#### SUMMARY

THE existing military approach to sludge disposal by using private contractors is generally untenable because in most cases it does not fulfil the Ministry of Defence's duty of care requirements. Incineration of sewage sludge with the resultant ash going to landfill is likely to be the most appropriate method of sludge disposal for a deployable military sewage treatment system, because the end product is inert and free from pathogens. The ash can also be stored almost indefinitely before final burial in a landfill site, which gives considerable disposal flexibility. Alkaline stabilization, previously supported by the military, is inappropriate because pathogens in the end product are only deactivated not destroyed and burial is required before the pH drops. Dewatering should not be adopted where biological sewage treatment is employed because of the difficulties with disposal of the supernatant. If a membrane sewage treatment process were adopted, then dewatering should precede incineration to reduce overall costs. The most appropriate low-cost method of sludge disposal is likely to be anaerobic digestion, followed by airdrying in an area where infiltration is possible, followed by burial of the sludge cake to allow pathogen die-off.

So now you know where all the s\*\*t should go!

# Poles (or Egyptians and Russians) Apart – Reminiscences of the River Nile and Spandau Pumping Station

#### MAJOR D M LONGMAN



Denis Martin Longman was called up in December 1939 and joined 104 OCTU Royal Engineers at Gibraltar Barracks, Aldershot. Following a six-month course he was posted to join 573 Army Field Company, then stationed in Tiverton, Devon. After service in the Middle East, he returned to the UK and was posted to 142 OCTU in Newark as an instructor, specialising in military law, sports and Home Guard training. After the fighting was over, he was sent to Berlin and made Staff Officer on the staff of the Chief Engineer. He was demobbed in March 1946, and started work at Portishead Power Station, near Bristol. During his business career, he held senior management posts at Hinckley Point and Didcot Power Stations. He is now retired and living in North Somerset.

#### INTRODUCTION

My first unit after OCTU, 573 Army Field Company, was stationed in Tiverton, Devon. It had been formed from a Territorial Company – The Devon and Cornwall Electric Light Company - who were to be responsible for the searchlights in the Devon and Cornwall area in the event of war. The War Department however decided to make them into Corps troops with a Colonel and HQ staff. The Commanding Officer was Major J C Annear who was head of a large builder's merchant business in Falmouth, and nearly all the original members of the company were from his staff or nearby companies.

When Major Annear was transferred to other duties, Major Dick Kerr became Company Commander and Captain Spencer Crookendon was second in command. Spencer was a regular soldier and his family had long been associated with the Cheshire Regiment.

Under Dick Kerr we moved first to Exmouth and then to Morthoe, North Devon. We were eventually shipped to the Middle East, sailing from Glasgow, with HMS Nelson being part of the escort. We arrived at Port Tewfik at the southern end of the Suez Canal, and moved up to Mersa Matruh as part of the Western Desert Force. It was during an action to blow up some captured Italian ammunition that Dick Kerr and Spencer Crookendon were captured by the Germans and taken PoW. It was my fortune, as a result, to be made up to Captain and appointed second in command. Major Ken Wibberley was transferred in as Officer Commanding.

The conflicts moved to and fro. My company had been building a defensive position at Bir Harmat. This was a big underground hole in which it is believed grain or water was stored at a time when the desert was fertile. There were several of these across the desert. The idea was to build a position and a pipeline to fill it with water so that troops could live there – a fortress in the middle of the desert. Before we finished the work however, we were ordered to withdraw. As the fighting continued, a German mobile column had cut round in the desert south of our position and we were captured and taken prisoner. They were trying to move us back to



In my tent – note hurricane lamp in use.

their own lines when I, and a number of others, escaped in a truck. Although shot at, we escaped and as it was getting dark I undertook to give the directions. Guided by the Pole Star and the moonlight, we headed North and then East and eventually I directed us towards Tobruk – but we were blown up in a minefield!

Having reformed the Company – mostly from former colleagues who had either avoided being captured or escaped - we were sent to construct a bridge.

#### **BRIDGE OVER THE RIVER NILE**

YOU'VE probably heard of "Bridge Over The River Kwai", and may have even seen the film with the same title, but you've probably never heard of "Bridge Over The River Nile" – and it certainly never featured in a film!

The action took place in the late summer of 1942 at the time when the Allies were being pushed back towards Cairo. The "powers that be" had decided that another bridge should be built across the Nile, just south of the city as an escape route, in case we had to retreat beyond Cairo.

At the time, I was the second-in-command of 573 Army Fd Coy RE and construction of the bridge had already been started by the time we arrived. With traditional construction materials in short supply, the decision had been taken that the bridge would be constructed using local river



In bath outside tent - note new style hairband!

boats – Feluccas – linked together by steel and wood, to form the span. By the time we took over the project the boats, wood and steel and other items had already been requisitioned from local fishermen and traders. I am sure they had been compensated very well for their troubles. The Feluccas were probably no more than 25 or 30 feet in length, were very narrow with high sides and with a tall central single mast and a square sail. The local boatmen sailed them merrily up and down the Nile, carrying various goods and wares.

Having taken over these Feluccas and removed the masts, we began to anchor them side by side across the river, using heavy concrete blocks and ropes to keep them in position – both upstream and downstream. The steel lengths and wooden RSJs meant that each Felucca was spaced roughly six feet apart. On the frames we built the wooden trestles that were to form the roadway to carry the soldiers and the machinery.

We were busily doing this for about three weeks in the heat of the summer. Having spent months in the desert before this, it was light relief for all of us, and nobody seemed to mind getting wet.

One by one, we added more boats, and further lengths of joists and RSJs. I recall that the river must have been 30 or 40 yards across at this point. It seemed enormously wide, but as each day passed, we got nearer to completing the bridge. Everything went well until we got towards the final task of closing the gap. To measure the lengths of timber and steel needed for that last section, we had to close the river for a short while, and it was clear that the local boat people were starting to panic. We feared that they would rush the bridge and try to destroy it. I ordered my men to fire a few shots in the air over their heads to calm them down. This had the desired effect, and we were able to continue with our work.

Within a few minutes a local Egyptian policeman came across the section of the bridge we had already completed. He told me that one of the local boat people had been shot dead during the incident - there was a small round hole right in the middle of his forehead. I expressed great regret and sorrow, and said that it must have been a pure accident as my men had only been ordered to shoot above their heads and not to shoot at anybody. My only suggestion was that a shot must have ricocheted off the rigging and killed this poor, unfortunate man by accident.

I explained that we had to temporarily close the gap across the river to allow us to measure our final lengths of timber and steel. I went on to explain that, when that was completed we would be able to re-open the river to normal traffic again, the bridge having been designed so that small craft could still navigate under the spans between each Felucca.

He seemed satisfied with this and I gave him a 50 Piastre note (about 10 shillings or 50 pence in new money), for his troubles. He returned to the bank and I could see him talking to the local boat people, explaining what was happening. All seemed quiet again and so we just carried on with the final phase of the construction.

Just after that, we received a message to say that General Montgomery had arrived to take over the campaign in the Western Desert and was refusing to countenance any further talk of withdrawal. All work on our bridge must stop immediately and we should proceed immediately to El Alamein ready for mine lifting operations. We prepared to leave, but not before I had the very great pleasure of walking right across the Nile and back again on the bridge we had built. Before we left, we quickly opened the river to the local fishermen again and headed off to El Alamein.

I therefore claim to be one of very few people who has ever built a bridge across the Nile and been able walk across it. After that, we were directed to El Alamein for mine lifting, and continued south to Egypt and on to North Africa. We were stationed not far from Ben Ghazi – and for the second time, I was in a vehicle that was blown up by a mine. Just prior to this, I had been promoted to the full rank of Major, backdated to El Alamein. As was explained to me, I had at this stage been blown up more times than was thought to be good for me, and so was transferred to the RE Depot at Moascar on the Suez Canal.

I then returned to the UK and after the fighting was over I was posted to Germany on the staff of the Chief Engineer, British Forces, Berlin.

#### THE BATTLE FOR THE SPANDAU PUMPING STATION

Our job in Berlin was to look after the power stations and the water supplies. When hostilities ceased and the city was occupied by the Allies in the summer of 1945, it was divided into its well known four zones: Russian, British, American and French. The Russians, having been first in to the city, had stripped out a lot of the valuable things from the other sectors before we were let in a couple of days later.

Knowing that we might have contact with the Russians from time to time, I had asked one of our interpreters to provide me with some useful words. One of these was *Spasiba* – Thank You. The other one was *Kurichi Livi*, that translates to: "Would you like a cigarette?".

At the time, Spandau Pumping Station provided domestic water through large sectors of Berlin. The pumps were powered from steam raised in some heavy boilers that were fired with coal briquettes. These were made of fine compressed coal about the size of a large bar of chocolate.

One morning I made my way to the pumping station as usual to check on the work of my men. I arrived to find a party of about half a dozen Russian soldiers busily loading our briquettes into their hand cart. They were obviously going to take them back to their own sector. This couldn't be allowed, but I knew I couldn't make them understand by just shouting. There had to be another way to make myself understood.

Standing just a few yards from them, I carefully took my .45 revolver from its holster, cocked it and pointed it at them. This immediately had the desired effect! They stopped loading the briquettes and quickly started unloading them. I was then able to try my first word of Russian – *Spasiba*. My first attempts at Russian seemed to go down very well. Once the coal was fully unloaded I un-cocked my revolver and put it back in the holster.

It was at this stage that I ventured a little further into my knowledge of Russian vocabulary. I uttered my other phrase, "*Kurichi Livi*". With this, I pulled a packet of cigarettes out of my top pocket and offered one to the leading Russian, who came forward and carefully took one out of the packet. "*Danke*," he said in German, and put it in his top pocket. He also spoke a few other words, but I've no idea what was said. As this exchange of words and cigarettes was going rather well, I then offered the packet to the other five Russians. They each came forward in turn and cheerfully took a cigarette from the packet. Many "*Dankes*" followed and they put the cigarettes in their pockets.

As they were preparing to leave, the leading Russian came rather close to me, and with a big grin on his face, he pointed down to my revolver. I looked down and could see that it wasn't loaded! He turned to his comrades and pointed out the missing rounds, and with roars of laughter they all walked away, tugging on the hand cart.

As for me, I was left to contemplate how I had won the Battle of Spandau Pumping Station single-handed, and un-armed!

# Expeditionary Air Support – Operation *Fingal*, Afghanistan

MAJOR J V WHITE BENG MSC CENG MICE



Major John White joined the Corps in 1989. After two tours as a Troop Commander at Maidstone with 50 Field Squadron (Construction) and 9 Parachute Squadron he was posted as Second in Command of 3 Armoured Engineer Squadron. He ended up on the Professional Engineer Training Course and spent his 18 month civilian attachment in Australia. After a curtailed tour as Second in Command of 522 Specialist Team Royal Engineers (Works) in Hameln, he was moved early to Waterbeach to take command of 34 Field Squadron (Air Support) for the enabling phase of Exercise Saif Sareea 2. Operation Fingal came shortly after returning from Oman, having just gone through the Lead Air Support Squadron training package.

#### BACKGROUND

TEMPTING fate I said to the Squadron just before leave "... I don't think anything will happen over Christmas.....". Several days later, having taken over as the Lead Air Support Squadron (LASS) early, I was travelling to Afghanistan with the HQ Strike Command (STC) reconnaissance team to look at the activation of Kabul Airport as an APOD. The LASS, one of the 39 Engineer Regiment squadrons, is OPCOM HQ STC and is held at readiness R1/R2 to deploy to enable RAF deployed operating bases worldwide. For those not initiated in air support the key terms are Repair of Aircraft Operating Surfaces (RAOS) and Restoration of Essential Services and Facilities (RESF). In simple terms the former is plant-heavy runway repair "air side" and the latter is trade-heavy artisan and life support work "ground side". As the lead nation for the International Security Assistance Force (ISAF), the activation of the APOD was a UK responsibility. Politically sensitive, the ISAF presence and airhead had to be geographically separated from the rather different style of operations ongoing at Bagram.

#### HQ STRIKE COMMAND RECCE

THAT the prospect of establishing a working airbridge to support the whole of ISAF, the provision of life support for 350 APOD personnel and the repair of several craters at the airport was challenging and hugely exciting would be a major understatement. The task involved the establishment of a deployed operating base and also the requirement to conduct airfield damage repair (ADR). The value of being part of the STC reconnaissance, with OC 529 STRE (Air Sp) included, cannot be stressed enough as it allowed an accurate determination of the vehicle, equipment and manpower ORBAT required for the task and a clear idea of the nature of the works required. With all the RAF specialists included within the recce party all requirements could be fleshed out in detail and detailed planning and design could start almost immediately. Having been collected by a Royal Marine close protection team at Bagram we were escorted to Kabul and deposited at the cluster of buildings adjacent to a dispersal identified as the area for the APOD. Significant works would be required to make the area habitable and operational but it was certainly "do-able". A key factor was that there was a borehole nearby for provision of water.



Apron crater before repair.

## **INITIAL ORDERS & DEPLOYMENT**

ALTHOUGH TACOM to the APOD Commander the LASS deployed as part of 36 Engineer Regiment Group. Initial orders were relatively simple:

- **Phase 1:** Enable initial operating capability C130 operations.
- **Phase 2:** Enable C17 operations by extending the runway.
- **Phase 3:** Enable the full runway for wide body aircraft. **Phase 4:** Develop Kabul airport infrastructure.

The deployment was to be "best effort" and on the principle of absolute minimum men and equipment to be deployed. There was discussion as to whether the LASS should deploy as part of

the air or land components, but given that the capability was linked into enablement of air operations it was right to have been part of the air component FET. Being on the air component FET reduced pressure to remove items as it was understood that the light role RAOS set, pared to the absolute minimum already, needed to be ring fenced as each machine was an integral part of the capability. Numerous lessons were learnt during the deployment phase:

A vehicle and equipment dispatch party at the AMC, separate from the deploying ORBAT and working along side the 29 Regiment RLC Air Dispatch organization was invaluable. The close working relationship ensured that all equipment was presented to an acceptable standard and everything was deployed. All kit had to be searched; there was no point in "tac loading" in unit lines. The task of unpacking and reloading vehicles, able to be left to the dispatching party, would have stressed those pax deploying even further than the normal processing procedure at the AMC!

As resources were going to be scarce a significant quantity of resources such as timber, building

materials, runway repair materials and POL were deployed on unit vehicles. 30 DOS of oils and lubricants should be deployed as it takes that time for demands to start coming through during the theatre enablement stage.

Although seemingly a petty point the bergan normally issued to the Corps is totally unsuitable for expeditionary operations; it is impossible to fit into it the full IPE, CBA, sleeping bag and clothing required. The first satellite telephone call back to the UK was to the Squadron QM to obtain infantry bergans.

Deployment information was scant and should be checked regularly to pick up changes. The direction that the LASS would be tactically inserted into theatre by C130 was incorrect. Had it



Kabul - aerial photograph.

been known earlier that the equipment insertion was to be by wide body aircraft direct into Bagram the FET would have been different; a MWT or MWE would have made a world of difference at the other end in terms of RAOS capability.

Deployment priorities are not always logical or correct. The LASS (priority 4) was almost bumped off an aircraft in place of TFHE equipment (priority 2), yet the LASS was to construct that very TFHE installation. Several telephone calls were made to PJHQ resulting in the final aircraft configuration being decided by the APOD Commander at the AMC several hours before departing. Most of the LASS equipment was embarked with the TFHE loads prioritized to produce a minimum set to achieve the task.

The ORBAT, based on 2 x Field Section and 1 x Plant Section per Troop to give a balanced and flexible capability, deployed in two groups (Activation and Follow On) with their respective vehicles and equipment. The first group, which included SHQ Tac, the embedded Construction Supervision Cell (CSC) and elements of 529 STRE (Air Sp), had to be able to achieve the primary air support mission without reinforcement as the air bridge was always going to be tenuous. This approach was rather different than the current Air Support Doctrine<sup>1</sup> where the normally accepted deployment pattern involves an Advance Group (C2 and STRE), followed by an Activation Troop to create the conditions for the arrival of the Squadron Main Body arriving within days. Diagrammatically the ORBAT was:

## KABUL AIRPORT RUNWAY REPAIRS

THE Main Effort was activating the runway and the most significant planning factor was that a civilian contractor had started the repairs to the main runway - repairing the pinpoint bomb damage spaced at regular 600 metre intervals along the runway centreline. With no Afghan airforce to threaten offensive operations further north we had to question why this vital infrastructure was bombed and could only come to the conclusion that it was done "because they could!" As a simple Sapper though, who am I to question the targeting process! The runway construction comprised a 200mm thick plain, 4 metre square concrete cast in-situ slabs on hardcore material. At a later stage a 200mm layer of asphalt had been overlaid to increase the strength and longevity of the runway. The civilian repairs, replicating the original construction except reinforcing the concrete layer, appeared sound. It also appeared that salt was being used to accelerate curing in the extremely cold conditions so the reinforcement will not last long. Compaction though was the main concern. Single size aggregate was not being used for the bulk fill and therefore the backfill material should have been placed, dampened and compacted in thin layers. With inadequate plant available and no water, improvised compaction methods were being used. There was the risk of collapsing backfill in the spring during the thaw, leading to a void underneath the pavement and potential failure of the runway. Having raised this concern with both



1. ACTIVATION GROUP: 10 JAN 02 SHQ(-), CSC, RAOS TP, RES Sect. 2. FOLLOW ON GROUP: 23 JAN 02 RESF TP. ECH(-), REMAINDER.

<sup>&</sup>lt;sup>1</sup> 12 (Air Sp) Engr Bde Air Support Doctrine dated 1995.



Civilian main runway repair.

the land and air component chains of command, as a contingency to repair the main runway at Kabul, an armoured heavy wheel tractor and its dynamic compactor was held at 24 hours notice to move from the UK.

#### THE BAGRAM DISTRACTION

WITHIN days of establishing a RAOS capability in theatre the main runway at Bagram was closed on 12 Jan 02 as a result of a collapsed pavement slab near the centre line of the runway. Fortuitously it turned out that the LASS aircraft was amongst the last aircraft to land at Bagram before its closure. The runway was in a poor state of repair in any case with foreign object damage (FOD) teams sweeping the runway daily and the removal of fist sized chunks of concrete was common. There was limited American engineer capability deployed at this stage and the assessment was that repairs would take two weeks; this would halt the inload of ISAF Forces completely



Improvised civilian compactor.

as Kabul was not yet open. Having been tasked with the problem of reopening the airhead by CRE 3 (UK) Div, a RAOS Troop (-) was tasked to deploy the next morning simultaneously with a joint 34 Fd Sqn (Air Sp) and 529 STRE (Air Sp) investigation team. It was found that the AOS was essentially 200mm plain concrete, cast in approximately 3.2m x 3.8m panels directly onto graded earth, though in some places a thin layer of aggregate had been laid along the alignment. Old crater repairs, mostly on the verges had failed, and in six areas along the alignment, significant numbers of slabs were showing distress and had crumbled.

Of the various options to repair and reopen the Bagram runway the chosen improvised method involved cutting and lifting slabs from unused taxiway areas and replacing them into the active runway. The plant could not lift a whole slab so they were sawn in half. Lifting bolts and bent reinforcing steel scavenged from the area fitted



Bagram runway construction.



The improvised Bagram runway repairs.

through holes drilled into the slabs enabled the slabs to be handled. The runway was repaired within two days and the *Antanov* 124s (AN124) were able to fly into Bagram again. The principles of slab repair, taught during the pre-LASS training package, were applied in an improvised fashion and found to be perfectly sound. The only issue was supply of aggregate and sand, but once the American local procurement system was in place resources were in relatively ample supply. Stone was being excavated by hand from a scree slope into dilapidated tipper trucks. Quality was certainly an issue and required a SNCO to direct workmen where in the scree slope to excavate and load to give roughly the right grade and size of material.

Very strong warnings had to be made up the UK Chain of Command over the state of the Bagram runway as several areas were starting to collapse under the weight of AN124 traffic. Having completed initial repairs a 4-man scab repair team was left in place to patch the worst areas in periods between aircraft movements but the damage accelerated and required a RAOS team to be redeployed later to conduct significant repairs. Repairs at Bagram were conducted in planned stages and in conjunction with the American Air Traffic Control the "active" run-



Failed slabs at Bagram.



Harvesting slabs.

way minimum operating strip (MOS) for tactical aircraft was moved around the main to allow works to proceed around aircraft movements. The repair team became quite used to having aircraft take off and land right over their heads.

A part of the overall drama at Bagram was the insistence, based on a specialist's report, at the highest levels of the American Chain of Command that the runway was sound and capable of accepting wide body aircraft, even civilian aircraft. The joint 34 Fd Sqn and STRE report stated that runway maximum possible Pavement

Classification Number (PCN - roughly equivalent to the MLC of a bridge<sup>2</sup>) based on perfect ground conditions was no more than 18. A loaded C130 has an Aircraft Classification Number (ACN) of around 30, so even that aircraft was overloading the runway. The recommendation was to restrict Bagram to tactical aircraft (C130 and C17 only) with the acceptance of risk and the need for continual maintenance. When the Bagram runway was closed for a second time HQ ISAF was advised that it would be quicker to forge ahead with opening Kabul Airport and then switch effort to patching Bagram afterwards. Being the main APOD for American Forces, at their request for virtually a month after Kabul was opened a RAOS team continued to repair Bagram until an American team took the lead to affect more permanent repairs.

#### KABUL RUNWAY REPAIRS

THE civilian led repairs to Kabul needed energizing and the sense of urgency raising. The asphalt supply had to be "kick started" with the gift of diesel fuel for the plant and pressure on the contractor. The main runway repairs could not be taken over given that they were nearing completion and involved asphalt for which the LASS did not have the appropriate equipment. In parallel with the main runway repairs, the LASS undertook critical taxiway repairs. Materials were a problem but within an industrial complex



Taxiway repairs.

opposite the airport were found precast concrete bridge footings. Though they were of uneven sizes they were adequate for improvised slab repairs and were purchased. After a great deal of sweeping and foreign object damage (FOD) clearance half the runway was available within days and military and Ilushin 76 (IL76) aircraft could have been accepted. To enable AN124 operations the entire runway and taxiways were required for which two significant repairs were carried out. Two repair methods were used by the LASS, essentially to "give both a go". The first was the concrete slabs at pavement level grouted with flash setting cement based material<sup>3</sup> and the second was slabs at concrete level capped with 200mm of asphalt to pavement level. The latter was a more permanent repair and the former required occasional maintenance. The latter option was adopted as the final main runway repairs were being asphalted at the same time and therefore additional material was ordered through the contractor. An important lesson learnt from Kabul and also Bagram was that the Febmix was too rigid for slab repairs and constantly cracked. The flexible bituminous cold rolled material<sup>4</sup> specified by 529 STRE (Air Sp) was far more successful and became the repair material of choice for concrete and asphalt surface repairs alike. An initial operating capability (IOC) had been declared once

<sup>&</sup>lt;sup>2</sup> PSA Guide to Pavement Design & Evaluation 1989

<sup>&</sup>lt;sup>3</sup> Trade name – Febmix

<sup>&</sup>lt;sup>4</sup> Trade name - Emcol - recently changed to *Repairmaster*.



Apron crater repairs.

half the runway was open and having completed repairs to the taxiway, full operating capability (FOC) was enabled in terms of engineer works. It is a key point to stress that the RE works only contribute to the enablement of IOC or FOC. It is the air operations commander who declares the location mission-capable, taking into consideration such factors as force protection, communications, life support, weapons and fuel (as applicable) and fire cover, against the risk he and his higher authority and prepared to accept.

**CONTROL OF ADR OPERATIONS** BEFORE deploying to Afghanistan an airfield crash map was prepared from an aerial photograph and this proved to be an important tool used from day one. Not only issued as part of the Air Brief to allow pilots to be guided around the AOS using the letters annotated on the map, but also to control vehicle movement across the AOS by defining a proposed route to ATC by hand held SMRE radio. All agencies required the map and when calling for support the crash

map references were a convenient and efficient means of passing location and movement information. Normal ADR procedures were put in place and the SHQ was co-located with the RAF Regiment Tactical Survive To Operate HQ (Tac STO HQ). The system was tested in late March after a multiple mortar attack was launched against the APOD; a post attack recce (PAR) team deployed to check for damage, details were radioed back to the swiftly established Damage



Control Cell (DCC) and the repairs, though minor, were instigated immediately.

#### THE HAJJ EXPERIENCE

THE Hajj period provided the most excitement though and nearly ended in calamity; after the Tourism Minister had been thrown from his aircraft and murdered, the rioting pilgrims thankfully stopped at the thin red line of firemen outside their firestation just short of the APOD buildings. Tensions were high and anger at the poor organization was directed at the Interim Administration (IA). In hindsight the Hajj exodus should perhaps have been overseen more closely from the outset by ISAF given the circumstances but the conscious decision to let the IA organize its own affairs was also a valid stand. ISAF intervened and meals, blankets, passenger control measures and though dangerous, the daylight only flight rules were relaxed. The problem was compounded by civilian charter companies not filing correct flight information and being turned back at international borders. Several nations assisted with additional C130 aircraft to move passengers in the end.

#### **DECLARATION OF FOC**

THERE was a definite perception from the Land Component that aircraft could be landed at Kabul by a tactical air traffic controller with an HF radio on his back. The reality is far from that and much more complex. The Regional Air Movement Centre (RAMC), based at PSAB Saudi Arabia, governs the movement of aircraft in the region. Though normally associated with fast jet operations all transport aircraft were also governed by the Air Tasking Order (ATO) issued daily from PSAB. With over 100 daily coalition aircraft sorties over the Theatre, coordination of airspace, controlled by AWACS, was not simple. Prior to formally declaring Kabul at FOC an Air Brief was published by the APOD Air Operations to give notice of maximum landing weights, airport facilities available, radio frequencies, hazards and all other general information such as ramp space and taxi patterns. All non-military aircraft had to apply for routing information and apply for landing slots at Kabul through RAMC from the outset and were issued the Air Brief document. This was of significance to the LASS; any major runway repairs had to be scheduled several days in advance and landing slots had to be allocated to the LASS by RAMC

to allow repairs to be undertaken. That said the system was fraught with difficulties. With no radar and a limited communication system available at the start of the operation only 10 minutes notice of arrival of an aircraft was possible and operators did not adhere strictly to allocated slot times. Some very short notice vacation of the active runway was required and a scab repair team can vouch for the fact that the IL76 clears the roof of a 4T vehicle by an inch; the aircraft overshot the active runway on that occasion! Another key issue of the LASS operation was EOD. With a significant amount of wreckage around the airfield that needed to be cleared EOD clearance was essential. Minefields surrounded the runway and the UXO threat from 11 years of civil war and conflict was significant. The embedded RAF EOD Team was invaluable, available at nil notice and well used. Though not required for fast jets, commercial and transport aircraft require airfield ground lighting for night operations. There are two expeditionary systems deployed by the RAF. The minimum operating strip equipment ("MOS kit") are individual battery powered units that can be extinguished by radio control and can emit various wavelengths to be compatible with NVGs. The batteries only last about two months and therefore the system is only short term. The portable generator powered airfield ground lighting (PAGL) is a hard wired system, usually requiring taxiway cable crossings. Siting is important and the RAF installation team had to be persuaded to design the system to reduce taxiway crossings as opposed to ease of installation. It was found that the PAGL cables needed anchoring at the point that aircraft leave the ground as a result of jet efflux; large tent pegs proved adequate though EOD clearance was required for subsurface ordnance.

#### KABUL INFRASTRUCTURE AND LIFE SUPPORT

THE infrastructure development and life support was relatively straightforward and initially austere. The STRE and the CSC personnel worked as one cell to provide technical solutions to water supply, provision of power and most importantly real estate management with the other inhabitants of the APOD. Since the STC recee the French had arrived and the prime space had been taken. Much negotiation and compromise was required during the development of the APOD infrastructure, mostly taken on, thankfully, by the STRE! A large element of the infrastructure works was force protection for which the manpower, time and effort required must not be underestimated. Works included sangars, buried bomb shelters, cover from view berms and the old favourite - HESCO BASTION blast walls. The availability of borehole water was a key and a standard OXFAM tank and pumped distribution system was installed. A major morale factor in the early stages was the provision of hot water. Initially an improvised water heating system was fabricated locally to a Squadron CSC design until electrical water boilers were installed. As an aside much has been written and there has been much heated debate over the years about the relationship between MCF and STRE and who should work for whom. With a pragmatic approach and a will-do, can-do attitude from all sides there was no issue in Kabul between the MCF and STRE; with a little teamwork, integration and communication the relationship can be powerful and very effective. Though STREs and MCFs have rather different roles both are required to achieve the end product, but probably the critically important factor is the input of construction method preferences, tailored to the strengths of the MCF, at the concept design stage. There was little doubt that the infrastructure was more developed at the APOD because of the experience and expertise fielded at an early stage as part of the air component FET - there was no need to accept poor conditions. Designs and detailed stores lists were submitted within four days of returning to UK from the HQ STC recce; the Squadron CSC and STRE working alongside each other. It is acknowledged that within 12 (Air Sp) Engr Bde the situation is rather different where the



APOD nearing completion.



Improvised Water Heater.

squadrons, with their integral design cells, have the ability to take outline design solutions from an STRE and develop the detail for construction.

#### FUEL INSTALLATION

FUEL was a major problem at the start of the operation. Initially 45 gallon drums of diesel were flown forward. Stocks were always in short supply and given temperatures of -24°C it was sometimes a task in itself getting plant machines started in the mornings. A standard four tank EBFI was constructed under the direction of a small team from 516 STRE (BP). After several delays AVTUR was flown in by a specially modified IL76 to download to the EBFI. The single fuel policy thankfully removed the diesel freezing problems. The most interesting aspect of this task was the interaction and relative capabilities of the STRE (BP) and the RLC Fuel Squadron operators. It was probably true to say that the RLC felt somewhat put out that the Corps, with equipment deployed on

the air component FET, provided the theatre fuel solution that they felt perhaps should have been their responsibility. Having commissioned the EBFI, the installation was handed over to the RLC after which several problems and equipment failures occurred as a result of a lack of understanding of basic fuel handling principles. An RLC SSgt who commented to me one morning that the "STRE couldn't build TFHE for toffee" came very close to not being able to eat toffees him-

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TFHE commissioning.

## self!

#### RESOURCES

To my mind resources (and communications) are the key to the success of any venture in any role anywhere in the world. Logistics have always been the key to all military operations and this was even more so the case at the end of a very long chain, reliant upon an air bridge. The Squadron Resources Section, able to purchase materials directly from suppliers in Kabul, proved invaluable as always. It was interesting that an amazing array and quantity of materials became available very quickly including electrical stores - most being imported from Pakistan. More importantly though was a close working relationship with the theatre CIVSEC who was happy to advance significant quantities of cash (\$10K at a time on a regular basis) to the Resources SNCO for local purchase of resources.

#### EQUIPMENT

FROM the initial insertion information provided, equipment was restricted to a light role RAOS set, based round the LWT, uLWT (JCB 3CX), Deuce and uLDTs as the primary work horses. It is interesting that having been unimpressed with the Deuce during the construction of the desert C130 airstrip in Oman on Exercise Saif Sareea, in Afghanistan it was completely in its element at the APOD and a critical equipment. Though slow and with reduced capacity the light role machines were well matched and suited. Some interesting methods of work had to be used to repair the worst crater in front of the APOD building, created by a TOMAHAWK missile. The weapon impacted an engine test pad constructed into the apron and consisted of concrete one metre thick. A MWT tractor and an excavator with a rock breaker in lieu of 2 x LWT would have made a

significant difference to the LASS capability. Given the small payload of the C130 and insufficient quantity of airframes a force cannot be inserted quickly enough by this means and theatre entry by air can only be affected realistically by C17 or larger aircraft. The implication is that the light role RAOS set could now include medium equipment such as the MWT and excavator. One observation from Theatre was that a large proportion of plant time was spent doing small tasks for Field Troop construction tasks as opposed to formal plant tasks. Most other nations deployed BOBCAT machines that

have an incredible array of ancillary equipment including sweepers, rollers, augers, backactors, plate compactors, forks and of course a capable 4-in-1 front bucket. It would be an ideal air portable machine for Field Troops to hold, operate and maintain, thereby releasing scarce POMs.

# THE WAY FORWARD FOR EXPEDITIONARY AIR SUPPORT?

THE ADR & LASS training package taught at Waterbeach has not changed much since I was first in the role with 50 Fd Sqn (Construction) 13 years ago, but the nature of the world and the role for the UK Armed Forces has changed significantly in that short period. The notice for deployments has reduced as has the frequency it would appear. Much has been discussed about the validity of LASS training within 12 (Air Sp) Engr Bde given that it was based rigidly about achieving the NATO standard bench marks for ADR<sup>5</sup>, devised for Cold War scenarios. The training though is an excellent vehicle and did focus personnel on what is required on a deployed operating base anywhere in the world. We certainly found that the principles are all valid, though perhaps the package requires a more expeditionary focus. A great deal of work is currently been done to realign the package. So where does the Operation Fingal experiences take expeditionary air support operations?

In an expeditionary environment with limited resources there is need to construct infrastructure from first principles using locally available materials. Artisans need to be skilled and well practised –

<sup>5</sup> STANAG 2929

thankfully not a problem within the Brigade with its frequent deployments and high tempo. The CSC is a vital part of the squadrons and with some 529 STRE (Air Sp) assistance allows a true design and build capability on the ground once deployed. But turning capability into product takes money and this aspect of all deployments is the most frustrating and annoying feature. Once earmarked, and this point is made in virtually every POR, immediate financial release in writing is required from the highest levels to allow RE works to start immediately. Significant delays were experienced in delivering infrastructure at Kabul as a result of late financial approval. Other than materials bought locally not a single item of construction material arrived on site for six weeks despite constant comments on ASSESSREPs. Another common feature of deployments is the frustration in having site engineering judgements questioned from afar thereby delaying financial authority even further. One can argue about AT limitations during Operation Fingal but the weight and quantity of stores was small and aircraft were arriving with only partial loads. That we were flying in bottled water yet producing Perrier from our boreholes was questionable and compounded the AT problem. A more robust RE local resources procurement and delivery system is required, especially in an austere air support environment where speed is very much of the essence and where enabling works are commonly related to the theatre main effort.

Could we use pre-prepared tac-loaded resources modules deployable as part of a FET? I think so, as elements such as tented camps and general life support packages such as water supply and power distribution stores are common to a wide range of scenarios. It does not need bespoke systems – just basic stores such as fittings, electrical items and

pipework to engineer solutions on site. The existing construction packs, though a good idea, are not specific enough and should be tailored to the delivery of specific elements of camp infrastructure. In Afghanistan all units arrived largely self sufficient and it was only later that ITC tented camps were made available. Essentially twice the quantity of tentage that was required had been deployed to Theatre and this is clearly wasteful. The problem is the storage and maintenance of these resources modules but it definitely needs further investigation. Speed is the issue and it was frustrating that it took nearly two months to improve the austere conditions at the APOD. A discussion over the quality and fitness for purpose of the expeditionary camp infrastructure (ECI) fielded in Afghanistan is out of the scope of this paper but the French comment at the APOD that "you English, you live like rats" was not an unfair observation!

Communications are a vital part of operational capability and at the early stages of deployments they are always difficult. Once deployed, the LASS depends wholly upon the facilities provided by the Tactical Communications Wing (TCW) detachment that accompanies an air detachment. A standalone worldwide "comms box" facility is probably warranted for the LASS to provide secure voice and data back to HQ 12 (Air Sp) Engr Bde. The volume of data for resources demands, FET & DOAST matters, design and back briefing of situational awareness issues is at its peak at the outset of an operation – usually before the full theatre communications infrastructure is in place.

#### SUMMARY

THAT Operation *Fingal* was a challenging and hugely rewarding deployment for the LASS was without doubt. With significant lateral thought and improvisation at all levels some excellent results were achieved with few materials which in many ways is extremely satisfying in itself. It is always good to put to use the skills required for your primary role. Some excellent lessons were learnt though, but many recurring issues from previous deployments are still being raised; from an air support perspective resources, com-



APOD crater completed.

# Engineers on the Hook, Korea, November 1952 – July 1953

### COLONEL V H S HANNAY OBE MC



Spencer Hannay was in the last batch into the Shop in August 1939. He was commissioned in March 1940 and during the war he served with Highland Field companies and Combined Ops in the UK, and the Madras Sappers and Miners in India, Burma and Malaya. Post-war he served as OC 4 Field Squadron from 1948-49 and was at the Staff College in 1950. He then went to Korea as OC 55 Field Squadron. Other posts were MO1 at the War Office, BM SME, BLO Fort Belvoir USA and CO of 1 Training Regiment Cove, during the change over from National Service to a Volunteer Army, from 1961-63. A posting as GSO1 HQ AFCENT Fontainebleu followed in 1963. He retired in 1966 to join Marples Ridgway, Civil Engineering Contractors as Personnel Director. After another retirement in 1985, he started Hannays of Bath Plant Nursery and finally gave up in March 2000!

#### PRELUDE

THE past eight months have seen the 50th anniversaries of the Hook Battles in which The Black Watch and The Duke of Wellington's Regiments added to their fame and to their battle honours. They also gave us the opportunity to commemorate those officers and men of the Corps who worked, fought and died in the defence of the Hook during that period. To this end, the article has been compiled from the War Diaries of the units concerned, from reports written at the time and from the recollections of some of those participating

After the Chinese spring offensive of 1951, and the successful UN counterattack in that summer, fighting stabilised on a line just to the north of the 38th parallel. It was clear that a stalemate had been reached which could only be broken on the ground, at the cost of unacceptably high casualties. Cease-fire talks were initiated. At the start the Chinese used the meetings for purely propaganda purposes while gaining a useful breathing space. Later, their stone wall tactics masked a sustained drive to make their line impregnable by digging and tunnelling, and by greatly increasing their artillery and air capability. At the same time they carried out fierce local attacks to improve their position tactically. This situation persisted throughout 1952, while the truce talks at Panmunjom dragged on.

In July 1952 the various British and Commonwealth formations and units then in Korea were amalgamated into the 1st Commonwealth Division, consisting of the wholly British 29 Brigade, 28 Commonwealth Brigade of British, Australian, New Zealand and Indian units, and the wholly Canadian 25 Brigade. The Divisional Engineers consisted of HQRE, (CRE Colonel F M Hill, later Col Arthur Morris), and 28 Fd Engr Regt which consisted of 12 and 55 Fd Sqns, 23 (Canadian) Fd Sqn and 64 Fd Pk Sqn.

By the autumn of 1952 the Division was holding a nine-mile line forward of the Imjin River, from the Samichon River in the South to the high ground of Point 355 in the North. 29 Bde was on the left, 25 Canadian Bde in the centre and 28 Comwel Bde on the right. To the Division's left, across the Samichon was the 1st US Marine Division, with their 7th Marines holding a horseshoe of low hills with its apex, the Hook, facing Northwest. The Hook itself was a company position separated by a short ridge from Chinese positions on Ronson and Seattle. The Hook was vital to the defence of
ENGINEERS ON THE HOOK



Figure 1 – Map of Hook Area

both the Marines and to the left brigade of the Commonwealth Division. Its loss would almost certainly have resulted in a UN withdrawal to the South of the Imjin.

During September and October 1952 The Hook had been subjected to repeated attacks by the Chinese and had been lost and regained on a number of occasions, with many casualties to the Marines. (See Figure 1).

At the end of October 1952, notice was received that the Division was to side step to the left and 29 Bde would take over the Hook position from the US Marine Division.

This was not the first time that the British held the Hook. In the winter of 51/52 29 Bde had held a line to the left of the Samichon with 1st Leicesters on Point 163, Paris and Seattle, and the 1st Norfolks on the Hook, Sausage, Pheasant and Point 146. Pt 163, Paris, Seattle and Pheasant were lost during the summer when the US held the line. But that is another story.

29 Bde consisted of the 1st Black Watch, the 1st Duke of Wellingtons Regiment, the 1st Kings Regiment and 20 Fd Regt RA, supported by 55 Fd Sqn with Major Bob Frosell and Captain Don Wright as OC and 2IC respectvely. It should be remembered that although 55 Sqn was heavily committed to work in support of the Hook, which generally took priority, it was also responsible for work for the rest of the Brigade. This included operational tasks for the other two battalions together with minefield gapping, recording and fence repair, road maintenance and water supply. These tasks have not been included in the narrative except where they affected the work on the Hook.

Tribute should also be given to the 400 or so affiliated members of the Korean Service Corps Labour Units, a number of whom were killed, wounded or taken prisoner while working with the squadron.

The first urgent task was to make six miles of new road to enable two batteries of 20 Fd Regt to move to support the new position. The work was started by 2 and 3 Tps on 23 October and was finished in two weeks.

Also on 23 October, the 55 Sqn War Diary states that unit suffered three casualties from mortar fire while working on the road. They were LCpl Cotman, and Sprs Hawthorne and Faulkner.

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#### 55 FIELD SQUADRON AND THE BLACK WATCH NOVEMBER 1952

AT the same time the squadron was told that the Hook position would be taken over by the Black Watch. As the 1 BW were normally supported by 3 Tp commanded by Capt Alan O'Hagan, representatives from the troop were attached to the US Marines to gain information on the roads, minefields and defences in their area. The party consisted of 2Lt Ian Thomson, Cpl Wells, LCpl Nunn and Sprs Coxhead and Griffin. They all wore US uniform to conceal the hand-over. On the night of 25 October the enemy attacked and overran the company to which Spr Coxhead was attached. They were cut off for some seven hours. Ian Thomson was wounded and was evacuated through the US medical chain, where he was able to refuse the award of the Purple Heart! On 26 October all personnel from the squadron were accounted for and were safe.

Earlier in 1952, because of the increase in Chinese artillery, Lt Col Peter Moore, the CO of 28 Fd Engr Regt, had initiated a redesign of the standard field defences. These included designs for OPs, CPs, and key LMG positions, proof against 155 mm shells and for section positions and sleeping bunkers with lighter protection. Proof against 155mm required excavation to 12ft, 12in x 12in timber uprights and a roof of 12in x 12in or of interlocking concrete lintels covered by a 5ft burster course of soil and rock. 64 Fd Pk Sqn prefabricated the concrete lintels and heavy timbers. During the summer, the regiment and the infantry battalions had gained experience in installing these structures, but

never at such close quarters as would be required on the Hook.

Prior to 1 BW taking over on the 4 November, and even up to the day before, the Marines on the Hook were subjected to ten days of continuous bombardment and incessant attacks. The attack on the night of 3 November was preceded by a day of even heavier bombardment but was repulsed after fierce fighting. The next morning 1BW took over a position where the trenches and defences had been largely obliterated. Trenches originally over six-foot deep were now three-foot and V shaped. Most of the bunkers were broken. The

defences would have to be completely rebuilt. 29 Bde ordered 55 Sqn to provide the extensive engineer assistance that would be required.

The OC, Bob Frosell, issued the necessary instructions, at an Orders Group on the evening of 1 November, confirmed next day by Operation Order No 5. The defences of the Hook were to be put in good order within two weeks, the work to start on the night 4/5 Nov 52. 1 Tp, under Capt P W Ball, together with three platoons of Korean Service Corps labourers, were to support B Coy, initially by digging a 400 yard communication trench on the reverse slope of the Hook, and by providing a CP and an OP with a concrete lintel, followed by bunkers, and LMG posts as required. 2 Tp, under Capt R T D Sullivan, also with three platoons of KSC, were to support D Coy on the Sausage, with 1000 yards of trench and an OP, followed by bunkers and LMG posts. 3 Tp under Capt A B O'Hagan, with two platoons of KSC were to be in reserve but to carry on with existing tasks until required. Defences for the reserve companies would be done in phase three.

To support this deployment, a Sqn Tac HQ and an admin area under the 2IC, was established adjacent to 1 BW HQ. 64 Fd Pk Sqn delivered the required defence stores, prefabricated bunkers and concrete lintels to the admin area. On the night of 4 November, 1 and 2 Tps and the KSC deployed as planned. 1 Tp dug 100 yards of trench and 2 Tp, 250 yards. The policy of task work, better treatment and respect towards the KSC officers and men paid dividends, (extra rations and tea with British sap-



Tunnelling on the Hook - November 1952.

pers!). Although there was shelling and four KSC were wounded, they all worked hard. Three Sappers were also wounded, Cpl Hollick of 2 Tp seriously, however the Black Watch had six men killed. Radio communication forward from Tac HQ was by 88 sets on the 1 BW net and back to the squadron by 31 set. On the nights of the 5th, 6th, and 7th, together with some daylight work by 1 Tp, 600 yards of communication trench were completed, and 15 bunkers installed. A detachment from 3 Tp then started work on the OP for the Gunners.

Soon after moving onto the Hook, Lt Col David Rose, CO of the Black Watch decided to copy the Chinese by basing his defence on tunnels and overhead cover. Thus if the position were overrun his men could go to ground and airburst artillery fire be used to make the position untenable to the enemy in the open. This was agreed by 29 Bde and Bob Frosell informed his squadron in an 'O' Gp on 8 November, confirmed by an addendum to his Operation Order No 5 issued on 10 November. This gave the design and locations of the tunnels to be built, although preliminary work had already started. Rose's plan envisaged that the platoon position on the front of the Hook and that of 11 Pl on the left of the Sausage would be made into fortresses with tunnels to accommodate both platoons, a total of eight tunnels. Each would lead off the forward trench immediately behind the section position. The tunnel entrance, provided with a grenade trap and two doglegs, would be 4ft 6in high and 3ft wide, close timbered, driven back into the hill until the overhead cover was a minimum 10ft. Thereafter a chamber with an 6ft-arched roof would be dug which would be large enough to hold a section . The soil was hard decomposed granite (DG), which could be dug by hand, aided where possible by compressor picks. (See the original sketch at Figure 1).

Work started on the tunnels on the Hook and on Sausage on the night of 8 November on a two-shift basis, 1800-0100 and 0100-0600, which changed to three shifts as soon as work was sufficiently underground. 2 Tp started those on Sausage for D Coy while 1 Tp started those on the Hook for B Coy. However on 11 November, CO 1 BW moved B Coy from the Hook and replaced it with A Coy from Pt 146, the two companies switching positions. In order to conform, 3 Tp took over the tunnels on the Hook in support of A Coy.

Meanwhile enemy patrol activity and artillery fire had greatly increased, pointing to a renewed enemy attack in the Hook area. It was feared that the enemy were using the dead ground at the base of Warsaw to make tunnels to protect troops forming up for attack, from our defensive artillery fire. On the night of 12 November, Capt Sullivan and twelve men from 2 Tp, together with a section patrol from B Coy 1 BW, left Pt 146 to investigate. They carried prepared charges in large packs; some bound to the end of 6ft pickets. They found that reports had exaggerated the size and importance of the bunkers, but nevertheless set off the charges using time pencils. Snipers wounded two men of 1 BW but otherwise there was no opposition. Again on the night of the 15/16 November a reconnaissance patrol consisting of Capt Alan O'Hagan together with Lt Adam Gurdon and two privates of 1 BW penetrated to the base of Warsaw. A cave was found and plans were made to send a raiding party to demolish it. However the Chinese attack of 18/19 November put the plan in abeyance.

For the whole period up until 18 November, work on the tunnels and defences continued around the clock under increasing shellfire. The new CP for D Coy was completed on 15 November. On 16 November the communication trench between the A Coy CP and the OP was given overhead cover. On the 18th, the tunnels that 2 Tp were dugging for D Coy had reached 20 ft in length and 4 tons of rock were extracted for use on burster courses for bunkers.

At 2000 hours on the 18th, after a heavy bombardment, A Coy on the Hook were attacked and over-run by Chinese in at least company strength, coming from Warsaw and Ronson. There was shift work on in the tunnels at the time in which six sappers from 3 Tp and 6 KSC were employed. Ian Thomson of 3 Tp had just left the position to go to Pt 121, where they were also working. Four of the sappers left the tunnel after the first bout of heavy shelling and were taken prisoner. They were LCpl Brown, and Sappers McGowan, White and Wilkinson. Happily all four returned from captivity in August and September 1953. Both A and D Coys made counter attacks. That from D Coy on Sausage was supported by sappers from 2 Tp who provided covering fire. Later 1 Pl of A Coy sheltered in the tunnel while airburst DF was brought down onto the position. During the night 29 Bde had moved two companies of Princess Patricia's

Canadian Light Infantry (PPCLI) to the Hook area and placed them under command of 1 BW. Just after 0600 on 19 November, C Coy of 3 PPCLI moved onto the Hook to clear the feature and to relieve A Coy 1 BW. Capt Alan O'Hagan who was to guide them onto the feature, met them at the rear of the Hook. During the action, which did not end until 0700 on 19 November, it was estimated that 4000-5000 enemy rounds had been fired on the position. However little of the sapper work, OPs, CPs, bunkers or tunnels suffered significant damage, although most of the communication trenches were half filled, and parapets demolished.

Between 19 and 23 November shift work continued both on the tunnels and in assisting the battalion in repairing their defences, hindered by continuing heavy enemy fire. However the communication trenches remained in poor condition. On 23 November it was decided to take the risk of heavy shelling or attack, and dig and repair them in one night as a squadron task. 150 KSC and 26 sappers and NCOs from 2 and 3 Tps went up to the Hook at 2300 hours and dug until first light. Luck was with them as the night was completely quiet. Almost too quiet since the KSC had been found to work better with a few shells around, with nowhere to run, their safety being the depth of the trench. The only enemy activity was a sniper who narrowly missed the OC as the last of the working party left the position at dawn. Squadron opinion was that he had asked for it by smoking his pipe throughout the action!

During the whole of the month routine engineer support was afforded to the Brigade including construction and operation of a water point for the Hook area, and also the screening of those roads supplying the Hook which were under observation by the Chinese on Point 163. These screens, which were already in extensive use to the north of the Samichon, were made with 20ft poles, carrying screens of chicken wire and scrim. However due to a complete shortage of wire rope, the guys had to be made with barbed wire. Thus when damaged by enemy fire they became a prickly mass difficult to untangle and repair, often under fire. After the communication trenches had been re-established on the night of 23 November, enemy activity diminished and 2 and 3 Tps were better able to get on with the section tunnels and to finish the bunkers and defensive positions. More attention could then be given to the companies on Points 121 and 146.

#### 23 CANADIAN FIELD SQUADRON AND PRINCESS PATRICIA'S CANADIAN LIGHT INFANTRY DECEMBER-JANUARY 1953

ON 26 November notice was given that 25 Canadian Bde would relieve 29 Bde between 30 November and 2 December. 1 BW would hand over to 3 PPCLI, and 55 Sqn to 23 Canadian Sqn. 2 and 3 Tps were to complete all bunkers under construction but not to start any more. On Sausage, 2 Tp were to complete all their tunnels; while on the Hook, 3 Tp were to complete tunnels 2 and 3, and as much of tunnel 1 as possible. If possible, ventilation shafts were to be made for all tunnels. 1 Tp was to finish both the road camouflage and the new Violet Water Point by 30 November. Thus after a month of extremely hard work and exceptional achievement, OC 55 Sqn was able to report that they had constructed 39 4-man bunkers, 4 MMG posts, 1 Gunner OP, 1500 yards of new communication trenches, repaired and deepened a further 1000 yards, and started 6 tunnels. On 1 December 55 Sqn were able to leave the infamous Hook but would be back in April 1953.

The Hook area to the west of the Samichon, and Yong Dong to the east, became the responsibility of 25 Canadian Bde and 23 Canadian Fd Sqn. During the winter, although patrol activity continued, there was no offensive action by either side. Details of engineer work are sparse, as Canadian War Diaries are inaccessible. However those of HQRE and 28 Fd Engr Regt give some information. Work on the six tunnels taken over from 55 Sqn on the Hook and Sausage continued on a three-shift 24-hour basis. Hard rock was reported and progress was slow. On 10 December 3 PPCLI reported that they thought that the Chinese were tunnelling towards the Hook from Seattle, and asked for geophones. A search was initiated within I Corps but it was not until 12 January that 23 Sqn were told to make their own! On 2 January there was an accident in one of the tunnels when a grenade exploded while being cleaned by an infantryman. One KSC was killed and a sapper and a KSC wounded. For the infantryman to have been present it seems likely that the inner chamber had been completed. The Canadian squadron is reported to have dug some 350ft of new tunnels, but where and on which features are not known, perhaps on Yong Dong, Pt 121, and Pt 146 in addition to the Hook and the Sausage. It is probable however that two of the

section tunnels on the Hook were extended and provided with a second entrance.

Meanwhile east of the Samichon, 55 Sqn continued to support the battalions of 29 Bde. The War Diary for 4 January remarks "Since the Battle of the Hook when large scale tunnelling commenced, the 'Bug' has infected most battalions." As the squadron had previously worked on the new underground HQ for 1 Comwel Div, they found themselves to be tunnelling experts with many customers. However during this period they made one contribution to the defence of the Hook, by participating in a raid on tunnels at the base of Pheasant that threatened the Hook. In the bitterly cold dawn of 24 January a fighting patrol of 1 DWR, accompanied by Capt RTD Sullivan and a detachment from 2 Tp, raided a Chinese tunnel at the base of Pheasant, across the valley from Warsaw and the Hook hills. The raid, supported by artillery, was successful. The tunnel was destroyed by a satchel charge and the body of a Chinese officer recovered. In the early morning the British positions were in deep shadow from the Chinese in the west and the patrol was able to assemble and then move across nomans-land without being seen. There were no British casualties. For their actions, Capt Sullivan was awarded an immediate Military Cross, and Cpl I C Jenkins a Military Medal.

#### Commonwealth Division in Reserve February-March 1953

ON 29 January 53 the whole of the Commonwealth Division, with the exception of the divisional artillery moved into reserve behind the Imjin River. The line, including the Hook positions, was taken over by 2 US Division. It is not known whether the Americans carried on with the tunnelling that they inherited, but there is no doubt that they allowed the defences on the Hook to deteriorate badly. Whilst in reserve, the Division carried out extensive training in mobile operations. On 8 April they returned to the line and 29 Bde took over the Hook and Yong Dong positions. 1 BW returned to the Hook, and 55 Sqn resumed the responsibility for engineer support.

In the interim there had been many changes in squadron personnel. Capt Ian Bruce had taken over from Don Wright as 2IC, Capt George Cooper replaced Capt R W Ball in 1 Tp while Lt B L Cave remained as Tp Offr. Capt Tom Watling replaced Capt R T D Sullivan in 2 Tp with Lt J G Davies remaining as Troop Officer. Capt Ross Mason relieved Capt Alan O'Hagan in 3 Tp while 2Lt John Wilks replaced Ian Thomson as Tp Offr. 2Lt Jeffery Lewins was Sqn Recce Offr. Due to the policy of giving selected YOs from Chatham operational experience in Korea, Tp Offrs and Sqn Recce Offrs changed over in bewildering succession.

During the Division's absence from the line, the Chinese had continued to subject the Marines on the left to heavy shellfire and to probing attacks. However 2 US Div, in the Commonwealth Division's old front, enjoyed a relatively quiet time. Nevertheless the Black Watch took over defences that were in urgent need of repair. In addition, patrol dominance of the Warsaw feature had been lost. Nevertheless by 12 April by use of firepower and aggressive patrolling, Warsaw had been cleared of enemy.

#### 55 FIELD SQUADRON AND THE BLACK WATCH April 1953

As usual 55 Sqn's major commitments were defence works and roads. 1 Tp, under George Cooper, was responsible for reinstating and improving defence positions for 1 BW, in particular for D Coy on the Hook; while 2 Tp under Tom Watling undertook the rehabilitation and resurfacing of the Hook area supply roads, six miles in all. Both tasks were subjected to a certain amount of shelling. After so many years it is difficult to assess the actual state of the Hook defences when 1 BW reoccupied them, particularly as details are lacking of the work done by the Canadians and Americans. It is probable that the six section tunnels on the Hook and Sausage started by 2 and 3 Tps were completed by 23 Canadian Fd Sqn, but to a changed design. There were now two longer tunnels on the Hook, running back from the front trench, but these had entrances at both ends. It is probable that similar tunnels were made on the Sausage and Pt 121 in view of the claim that 23 Sqn dug 350ft of new tunnels while they were in the line. To add to the confusion, the regimental war diary states that 55 Sqn started two further tunnels on the Hook on 15 April, although the squadron diary makes no further mention of them. However the plan at Figure 2, adapted from that included in A J Barker's book "Fortune Favours the Brave" shows five tunnel entrances, which tallies.

As soon as 1 BW were back on the Hook, their CO demanded a further prefabricated gunner OP



Figure 2 – Original specification for tunnels in Hook and Sausage.

for D Coy. He also requested that about 75 yards of the forward trench be provided with light shell and mortar proof cover. 1 Tp immediately started work on the OP, which was completed by 19 April. The new covered trench required that the existing trench be deepened to a minimum of 9ft so that 6in x 4in frames could be installed under 3ft of head cover and burster course. Provision was to be made for grenade bays at intervals. Lack of agreement on the grenade bays delayed work, which started on 13 April and progress was initially very slow. All this work had to be done at night.

The Green Finger spur, which ran down the reentrant between Warsaw and Seattle from the NW corner of the forward trench, provided the enemy with a protected approach to the Hook in dead ground. To counter this threat Green Finger tunnel was started on 18 April. The tunnel was designed to run down under the Green Finger ridge for 30 yards, branching into two LMG positions on either side of the ridge to cover the dead ground. After a survey had been completed, work started on 18 April on a 12ft vertical shaft just behind the forward trench, from an already dug Browning position. Once below ground, work carried on continuously in 8-hour shifts and by 24 April the sloping section at the bottom of the shaft was commenced. The tunnels and the shaft were close timbered throughout. 1 Troop was able to maintain a fair rate of progress, the soil being typical decomposed granite. By 27 April the work reached the stage where the main tunnel split into the two fighting positions. The construction of the LMG positions themselves posed a delicate problem, not the least difficulty being to determine exactly how far from the surface each tunnel head was located. Since the timbers and lintels for their construction had to be moved down the shaft and along the tunnel, the shaft had to be left temporarily incomplete, without doglegs and blind entrances.

At the same time an additional prefabricated LMG position was started further up the slope above. The CO later requested that three further strong points should be built in the forward platoon position. These would be extended gunner OPs with concrete lintels. By 30 April the LMG position was installed and the first strong point was 80 per cent complete. This is the position depicted in the Cuneo painting in the RE HQ Mess, with George Cooper and the Black Watch platoon commander in the foreground. Building the strong points off the forward trench was a formidable task. A camouflage net had to be placed over the site, if possible a day or two earlier. A 12ft 6in deep precisely square hole then had to be dug at night and the camouflage net replaced by dawn; the spoil being sandbagged and stored in the forward trench for later use. The smaller prefabricated timbers could be carried up the communication trench, but the heavy 12in x12in roof timbers and the two concrete lintels were dragged forward over the top of the Hook on special sledges. It needed luck, a dark night, and brave KSC. The roof required 5ft of cover including a 2ft rock burster course. The design is at Figure 3. Towards the end of the month, enemy activity, shelling and mortaring increased. On the night of 23 April, the enemy attempted a raid on the Hook itself, but were repulsed by artillery fire and by the action of a BW fighting patrol.

ENGINEERS ON THE HOOK



Figure 3 - Hook Company Trench Layout.

Meanwhile 2 Tp had been working on the Hook roads. On 22 April a short loop road was started to bypass a section of the main Hook supply road which was under observation and shellfire from Point 163.

By 30 April, work on the other Hook roads was complete, and on 6 May the bypass, together with an extra 60 yards of screening was completed. 3 Tp, under Ross Mason, spent the month in support of the remainder of the Bde in the usual tasks of road repair, water points, minefield maintenance, and assistance to the other battalions. In addition on 15 April they started a check on all the minefields in the Bde area. It was expected to take some time as a number of unknown fields had already been discovered. As was usual, each troop lived separately in its own tented camp near its work. Tents were partially dug in and heated in winter by petrol burning stoves. Fire was a great risk After a week's hand-over Major V H S Hannay took over as OC 55 Sqn on 30 April, replacing Bob Frossell who was posted to Japan to start the Sapper wing at the Divisional Battle School. John Wilks , the 3 Tp Offr went with him and was replaced by Jeff Lewins. On the night of 2 May, Sgt Shirley MM, Recce Sgt of 1 Tp, accompanied a 1 BW patrol to re-inspect the caves at the base of Warsaw. He reported that the caves were about 4ft deep and with flimsy overhead cover. There was no sign of them being occupied recently. This was determined by there being no footprints after the rain of three days earlier.

On the night of 4 May, LCpl B H Milne of 1 Tp was killed on patrol with the Black Watch, having detonated one of the few uncharted mines left on the Hook while crawling under the second belt of our own wire. A Black Watch Corporal was fatally wounded. LCpl Milne was a Scot and very popular with the battalion.

On the night of 7 May the Hook Coy was attacked in at least one company strength after an intense bombardment. The enemy did not get within 20 yards of the forward trench and suffered heavy casualties. Next morning 1 Tp, less those working on shift in the Green Finger tunnel, and the whole of 2 Tp under Tom Watling were committed to the Hook to do emergency repairs necessitated by the shelling during the night. These were completed by the evening of 9 May. By 10 May 1 Tp had completed two of the three strong points being installed in the forward trench, and finished the third on 18 May.

## 55 FIELD SQUADRON AND THE DUKE OF WELLINGTON'S REGIMENT MAY 1953

ON the night of 11 May there was torrential rain which caused the planned relief of 1 BW by 1 DWR to be postponed by one day. It took place without incident on the morning of

13 May. Further rain followed requiring greater engineer effort to be put into flood prevention and road repair. This coincided with increasing enemy activity and damaging shellfire. OC 55 Sqn had the task of judging priorities between work on the defences and preventing the Hook road system collapsing. The brigadier and the battalion commanders needed convincing but an acceptable solution was found. Flood prevention schemes and repairs were done at Dan's Lane, Lilac 1 Bridge, and Indigo 4 causeway. They were all completed by 24 May.



Figure 4 - OP Bunker

On 12 May Jeff Lewins and a party from 3 Tp started to widen a gap in our own anti-tank minefield near Yong Dong to give better tank access to the Samichon Valley. Daylight work was only possible just after dawn, when our line was in shadow and the rising sun in the enemy's eyes. On the 13th morning a mine, exploding while being handled, killed Cpl Lipschild. It was determined that the glass/acid fuse was extra sensitive after being frozen in the ground over the winter. The clearance was completed by pulling and no further prematures occurred. In contrast on 23 May, 1 KING'S requested that a gap be made in minefield 57/126 by night at 0130 on 25 May, to allow a passage for a Centurion tank supporting a raid. This field was forward and east of Pt 146 on the track to Pheasant. There was time to study the minefield records and 1 Tp made the gap on time and without incident.

For a day or two after the DWR took over, the Hook area was relatively quiet, enabling work on the covered trench and on the Green Finger tunnel to make good progress. Daylight was seen through the left fork of the tunnel. The DWR spent much effort on placing additional wire in front of the forward trench. Intelligence and intercepts indicated that the Chinese were planning a major attack on the Hook positions. On the night of 17 May significant patrol clashes occurred, and at dawn next morning a Chinese deserter arrived at the Sausage. He volunteered that the Chinese were planning a major attack on all four Hook positions but could not give a date. Spencer Hannay, OC 55 Sqn, had originally intended that Tom Watling's 2 Tp should relieve George Cooper's 1 Tp when the DWR took over. 2 Tp were to complete the covered trench and other defence works, while 1 Tp finished the Green Finger tunnel and would then move with 1 BW into reserve. To facilitate this 2 Tp moved camp to be nearer the Hook. It is noticeable that the war diary makes no further mention of the two tunnels that were reported as having been started on 15 April.

Consequent to being phased out of the Hook, 1 Tp took on the task of installing a counter-mortar radar on a hill on the south side of the Hook amphitheatre. The job was started on 25 May and consisted of camouflaging the site, as it was in full view of the enemy, cutting an access road and a platform for the radar and living bunkers. It was completed by 26 May and was in use during the forthcoming battle.

Just to add to the pressures, at 0530 on 20 May US aircraft bombed Teal Bridge. This is the bridge immediately behind the Hook and essential to its defence. 3 Tp, who were nearest, replaced the damaged decking and the bridge was open to class 30 one-way traffic by 1025. Corps Engrs did subsequent repairs to enable two-way working.

After 18 May it became clear that the expected Chinese attack was imminent, Division moved the Royal Fusiliers to make a fourth battalion for 29 Bde. This enabled the Hook area to be made into a two battalion position; 1 DWR on the left, one company on Pt 121, one on the Hook, one on Sausage and one in reserve; the right battalion with a company on Pt 146, two companies between 146 and the Samichon and one company in reserve. Initially Bde moved 1 BW from reserve into the right battalion position but after the threat was further assessed moved them to Yong Dong and placed 1 KING'S on Pt 146 and on the right. These changes affected the moves of the affiliated troops of 55 Sqn and caused a mix-up of tasks.

By 25 May 2 Tp were working to finish the covered trench on the Hook and assisting 1 DWR on Pt 121 and the Sausage. 1 Tp was clear of the Hook except for shift work on the two LMG positions in the Green Finger tunnel. Shelling was intense, by day Pt 121 and the Hook carried a plume of brown dust from bursting shells and mortar bombs. On both 26 and 27 May, 2 Tp were unable to work on Pt 121. A mortar splinter at the Hook jeep-head killed Spr AV Glenville, Tom Watling's jeep driver.

Throughout the day of 28 May, the enemy bombardment became extremely heavy, estimated at over 10,000 shells, 122 mm and 155 mm guns being particularly directed on the Gunner OPs and Company CPs at the rear of each position. Little engineer work was possible. The Chinese attacked the Hook in battalion strength at about 2000 hours and over-ran the two forward platoon positions using satchel charges to destroy bunkers and fighting positions. Survivors took shelter in the tunnels and an unprecedented volume of defensive fire, including a phenomenal number of airburst shell was brought down by our own artillery onto the position. The enemy in the open suffered enormous casualties and the attack petered out. The Chinese made two more attacks during the night with the same result, the last at half past midnight. Later a counter attack was organized to clear the front of the Hook, but the ground was so shattered and covered with wire and debris that any move forward could only be made along what was left of the trenches. By about 0330 when the forward trench was reached it was found that the enemy had gone. At this time the Hook was effectively unoccupied.

When it was clear that the battle was imminent and taking a lesson from the November encounter, OC 55 Sqn had assembled all three troops in shelter behind the Hook. In addition to acting as a reserve should the enemy break through, the squadron would be ready to move quickly to repair defences. The OC took up station at 1 DWR CP and when it was learnt that the position was clear, ordered 1 and 2 Tps onto the Hook under cover of artillery smoke, committing 3 Tp later after assessing the situation himself. The Hook and the other company positions were a chaotic hell. The trenches were nearly filled with earth and wire blown in from the top of the hill and at first only passable with difficulty. Many of the bunkers, fire positions and tunnel entrances had been blown in and many defenders trapped or wounded. Some 40 or 50 enemy dead were either trapped in the wire or blocking the trenches. Their special clearance squads had carried off all their wounded and the rest of their dead.

## 55 FIELD SQUADRON AND THE ROYAL FUSILIERS JUNE 1953

THE first task for the sappers was to clear the trapped and wounded, after that to repair as far as possible damaged defences and trenches. The position had to be defendable by last light. Although the 1st Royal Fusiliers had relieved 1 DWR, they did not move onto the positions until the evening. Meanwhile the sappers continued with their work relatively unmolested. Enemy reaction during the day was restricted to mortar fire and the Hook was defendable by the end of the day, although it was not put to the test. Some work was continued into the night, plans were made for the next day's work. Five sappers were wounded.

The entry in 55 Sqn's war diary for 30 May is eloquent; "The main point of interest on the Hook posn was the almost complete absence of infantry. Work was difficult, as no Gunner OPs were serviceable to bring CB fire down, and when even the top of a steel helmet showed over the parapet, the enemy brought down 60 mm mortar bombs with incredible precision. The working parties found it particularly annoying to have men moving past their working sites, who showed themselves, but were gone by the time the mortar bombs arrived." Three sappers were wounded by mortar splinters, again no details.

On 31 May 1 Tp withdrew from the Hook and returned to road and camouflage maintenance, and to a rest. 2 Tp continued to work on the east side of the Hook and 3 Tp on the west. One sapper was wounded and one of the sappers wounded on 30 May, Spr F J Vaughan, died of wounds. On 1 June Spr Martin of 1 Tp was wounded. For the next five days, 2 and 3 Tps worked day and night shifts to repair the damage on the Hook. On 1-2 June an armoured dozer was used to make a track and a tank position on Pt 146, and repeated the feat for the Sausage on 3-5 June. On 6 June 3 Tp moved off the Hook, leaving a section to work on defences on Pt 146. The rest of 3 Tp started to work on screening on Amber 5 but was shelled off. The work was then done at night.On 2 June the War Diary had another plaintive entry; "For the last few days we have suffered from being on the regimental net, giving a total of 72 stations. No one could get a word in edgeways. To day we thankfully returned to the Sqn net!"

On the night 4/5 June 1 KING'S made a company raid on the tunnels at the base of Warsaw. Capt George Cooper and 14 sappers from 1 Tp accompanied them, carrying satchel charges. The raid was a near disaster. During the approach to the tunnels the leading patrol ran into an unmarked minefield, three men were killed and nine wounded. Because inadequate arrangements had been made for the evacuation of casualties, the assault parties were fatally delayed and diminished by stopping to deal with the dead and wounded themselves. Only 16 men, of whom nine were sappers, made the final assault. They ran into trouble but Spr J Smythe was able to place his satchel in one of the caves, which was demolished. He also assisted in the rescue of Spr Harris who was wounded. The KING'S casualties were three killed and 23 wounded, while 1 Tp losses were Spr JM Beck, died of wounds and Cpl Rigby and Sprs Harris, Crook, and Rose wounded. Spr Smythe was awarded a Military Medal and Capt Cooper a Military Cross for this action and for work on the Hook.

By 10 June the defences on the Hook and the other company positions had all been repaired, with the exception of the Green Finger tunnel. OC 55 Sqn prepared a detailed report on the damage suffered by defences on the Hook, much of which is still relevant even today. Spoil and wire filled the open trenches, but the covered trench was still perfectly serviceable except where grenade bays had given access for demolition charges. The standard prefabricated OPs and firing positions were generally still usable except where demolition charges had been used or where they had been deliberately

targeted by heavy artillery. In the latter case heavy shells penetrating the sides where burster courses were inadequately wide had destroyed them. The Green Finger entrance and firing positions had been destroyed by demolition charges, but the tunnel itself was still usable. It is strange that the report makes no mention of the section tunnels but talks of left and right sleeping tunnels where many of the DWR survivors sheltered. These were undamaged except at the entrances.

In the light of this report it was decided to undertake extensive tunnelling on the Hook to provide underground shelter for a complete company. The complex was to consist of three tunnels totalling 494 feet of galleries, driven under the Hook from the reverse slope. Work was started by 2 Tp, on 13 June, by winching a 315 cpm trailer compressor up to the jeephead and placing it in a specially constructed bunker. The tunnels were fully timbered for the first 15ft. Thereafter frames were at 5ft spacing. Light picks were used initially replaced by drilling and shotfiring. Progress averaged 5ft per day; the compressor was too noisy to use at night.

**12 FIELD SQUADRON AT THE FINISH JULY 1953** WORK continued without break until 12 Sqn took over the Hook on 10 July. Thereafter 1 Tp of 12 Sqn took on the work, augmented later by their New Zealand section under George Butcher RNZE. They also continued to work on the reconstruction of the Green Finger tunnel. This was finally completed on 18 July. A new entrance was made to the covered trench and additional spacers installed. By 25 July work on the tunnel complex was nearing completion and the NZ Section was fitting lighting



Throughout the end of June and early July the Peace talks at Panmunjom were making progress and a cease-fire was declared on 27 July. Under its terms a demilitarized zone would be established along the existing front line and the opposing armies would withdraw, in the UN case to a line behind the Imjin. All defences were to be dismantled or salvaged by mid-September. This of course included tunnels. 12 Sqn undertook this task for the Hook and Yong Dong. Normal service explosives were in short supply so it was decided to use up the large stocks of 25 pounder supercharges that were available.

A report by 12 Sqn lists the number and lengths of tunnels as: -

Position	Number	Length (Feet)			
Yong Dong	1	80			
Pt 121	1	45			
Pt 146	1	87			
Sausage	2	156			
Hook	6	485			
TOTAL	11	853			

"Scotty" Scott-Bowden, then OC 12 Sqn, recalls watching the demolition of the Hook and recalls vividly the indescribable charnel house stench that was released. A fitting end to the bloody Hook perhaps.

This oil on cavas painting by Terence Cuneo was commissioned by the Corps to commemorate the part played by RE units in the Korean War. The two figures in the foreground are Captain G L C Cooper and a Black Watch platoon commander.

# **Risk – The Dominant Factor in Infrastructure Planning (and Development)**

## MAJOR S L BELL MSC AMIMECHE



Major Simon Bell has recently completed an 18 month posting at Military Works Force as the Second in Command of 523 STRE (Wks), following Professional Engineer Training (PET) at Chatham. For his PET civilian secondment, Major Bell was fortunate to be sent to neither Australia nor America, but Hemel Hempstead, where he worked for British Pipeline Agency, a subsidiary of BP and Shell. During this civilian secondment and on previous and subsequent deployments to Bosnia as SO3 Construction and SO2 G4 Infrastructure respectively, Major Bell has gained significant experience of managing infrastructure projects and, importantly, Risk Management. Major Bell is currently attending the Advanced EOD Operators Course in order to take up appointment as Officer Commanding 49 Field Squadron (EOD) in August

#### "You only have to miss one risk to ruin an otherwise successful project" Laurence Holt, 1996.

RISK is defined as "a chance or possibility of danger, loss, injury or other adverse consequences". Fundamentally it is an inherent characteristic of all human activities. It will, therefore, be a feature of construction projects. By implication, therefore, the management of risk in the planning and development of an infrastructure project can make the difference between a successful project (on time and within budget) and an embarrassing failure. The aim of risk management is, therefore, to "ensure that construction works are delivered at the lowest cost, compatible with the specified quality in the desired time"<sup>1</sup>. The purpose of this article is to lift the veil on the black art of risk management and provide guidance on the subject for military engineers involved in infrastructure projects.

Since the end of the Cold War the nature of operations has changed considerably. The importance of the infrastructure element of expeditionary operations has become increasingly apparent. The publication of infrastructure doctrine in Joint Warfare Publications, provide us, as military engineers, with guidelines on how to go about the business of planning and developing infrastructure on operations. These publications, based upon "lessons learnt" and the experience of their authors and those involved in the consultation process before publication, are, in effect, a corporate risk management tool. By providing guidelines concerning the conduct of infrastructure operations these publications attempt to ensure that mistakes that have previously been made will not reoccur – effectively managing out the risk.

Individual projects, however, need individual Risk Management frameworks, and a completely generic approach is seldom of much use. Although individual risks may be far from simple, this framework need not be overly complicated; indeed one that is overly complex is unlikely to be successful. There are various Defence Estates publications that provide advice concerning the various areas of the subject, and their guidance is useful. These publications include the following Technical Bulletins:

• Estimating using Risk Analysis (07/94)

<sup>&</sup>lt;sup>1</sup> Definition from Defence Works Functional Standard (Defence Estates) Technical Bulletin 96/08 – Risk Management.

<sup>•</sup> Order of Cost Estimates (06/94)

#### RISK - THE DOMINANT FACTOR IN INFRASTRUCTURE PLANNING (AND DEVELOPMENT) 137

- Risk Management (96/08)
- Through Life Costing (96/04)
- Value Engineering (96/03)
- Works Investment Appraisal (95/04)

In generic terms Risk consists of three distinct elements – the likelihood of an event occurring, the likelihood that the event will lead to an disadvantageous occurrence and the worst possible potential loss associated with that occurrence<sup>2</sup>. The key to risk management is to identify these risks and to limit or avoid any impact as an integrated part of the overall project management process.

#### **IDENTIFICATION**

THE first stage of the Risk Management process is to identify the risk items. This can be done in a number of ways, including brainstorming, interviewing, the use of questionnaires and/or the employment of "the Delphi Technique<sup>3</sup>". A combination of these techniques would be likely to produce the best results, but the pace of infrastructure operations will probably make brainstorming the most suitable technique, providing, as it does, immediate gratification. By implication it is vital to engage as many people involved in the project as possible (this may also encourage the ethos of partnering/team building from the very start of the project). The experience that individuals have gained from other, possibly similar, projects may prove valuable. The process must be carefully managed, however, as each project will be unique (despite potentially having some similarities with other projects) and a blinkered approach considering only risks from another project will inevitably lead to new risks remaining unidentified.

#### ASSESSMENT

HAVING identified all of the risks relevant to a particular project, these risks must be assessed. The process involves qualitative followed by quantitative assessment. Qualitative Assessment entails the registration of the identified risks in a format that will facilitate their use in the iterative Risk Management process throughout the life of the project. Conventionally this process involves the compilation of a risk register, an example of which is at Figure 1. It must be considered as a living document, starting perhaps with a coarse qualitative assessment of risk developing potentially into a refined quantitative statement of risk and impact.

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Figure 1 - Example Risk Register.

<sup>&</sup>lt;sup>2</sup> Adapted from Leveson NG, 1991, "Software safety", Communications of the ACM, February 1991.

<sup>&</sup>lt;sup>3</sup> This is not an emergency first aid procedure, but an iterative method that attempts to produce objective results from subjective discussions, by collating the results of questionnaires and circulating them for comment.

The identification, assessment, response and mitigation process creates an action plan to monitor, control and thus manage risks and this is Risk Management. As it relates to every aspect of a project, it is, therefore, a key part of the project plan. This process must be reviewed frequently throughout the life of the project as risks that have been managed in one stage are likely to result in residual risks and/or secondary risks that will need to be dealt with later in the project. These risks should not be left as a contingency or risk allowance that remains constant (often as a financial "slush fund") throughout the project. Risk Management is an iterative process that should frequently re-assess identified risks (and identify new ones, in some cases) and develop the plan to deal with the risks.

#### **RISK IN THE INITIAL STAGES OF A PROJECT**

DURING the design stage of a project the most relevant Risk Management elements are the Designers Risk Assessment and the establishment of a Rough Order of Costs (ROC) by estimating. The former process involves identifying the physical risks to the project, throughout the construction phase and the lifecycle of the facility, and this is used to formulate the Initial Health and Safety Plan, which forms the basis for the development of the Project Health and Safety Plan. This process is now generally well understood by both military designers and construction forces, but it must be borne in mind that the risk identified should be project specific. Risks that will remain once construction is complete should also be identified and managed (not just risks to the construction force and others during construction).

Dealing with risk in estimating the ROC is an area that doesn't seem to be as well understood. Here, the assessment stage mentioned above will have identified the potential impact of the risk, should it materialize, to be an effect on the cost of the project. There are a number of risks that are specific to military construction and how we do our business. As well as changes to the political and security situation that might affect the project, the risk of Client changes to the Statement of Requirement (SOR) is very real and can have a marked influence on the overall cost of the project. Once again, such risks will change as the project develops and must be monitored and managed throughout. As the project develops into the detailed design stage, the financial value allocated to risk should decrease as more detailed information becomes available and risks are managed out. A certain financial value appertaining to the residual risks will, however, be carried forwards to the construction phase of the project. Although the financial risk value is often stated as a percentage (often an arbitrary figure), this value should be a finite sum, calculated as described above.

#### RISK IN THE CONSTRUCTION PHASE OF A PROJECT

WHILST planning the Construction Phase of the project, construction force planners must take ownership of, and manage the residual risks that have not been designed out. In order to do this, they should develop the risk register used by the design authority using the procedures outlined above. Planners must not be blinkered into thinking that all risks result in a financial value, as most risk will actually effect time or quality. Risks such as fluctuations in the local economy (where stores are to be locally procured) and estimating error risks will, however, attract a financial value.

#### **RISK IN THE FINAL STAGES OF THE PROJECT**

By the end of the project the construction risks should have been eliminated, ameliorated or at least quantified. However, there is a key link back to the start of the whole project planning process as the life of the resulting structure or facility continues on through operation and maintenance and ultimately to decommissioning and demolition. Risk management may have resulted in reduced construction risk at the expense of maintenance, for example a cheap but available heating pump may have eliminated construction risk but left a high degree of uncertainty as to its reliability in service. Equally there are design and construction methods, which may have stored up risk in demolition, the use of pre-stressed concrete, for example. These risks must be considered and managed and serve to emphasize the holistic whole life impact of risk management.

#### CONCLUSION

RISK Management is a process that is of great importance, but is not always completely appreciated or practiced in military infrastructure operations. Designers and construction forces tend to focus solely on the Health and Safety

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Plan. The reality is that risk management can and should affect the whole life of a facility and all aspects of its construction, operation and maintenance and demolition.

Risks must be identified and managed throughout the whole process of an infrastructure project with those involved taking ownership of risks at the relevant stages of the project. If this is not successfully done, there is a very real possibility that a project will end in failure. Risk must, therefore, be seen as the dominant factor in the planning and development of an infrastructure project and should be attributed sufficient time and other resources accordingly.

#### **Book Reviewers**

A popular feature of *The Journal* is the section on Book Reviews, which appears towards the end of each issue. We rarely ask for a book for review – we select from those sent to us by well-known and not so well known publishers who are *au fait* with our readership and their interests. The books normally have a bias towards engineering, but that is not an important criteria – indeed the recent trend has been towards general military history. We have a dedicated team of reviewers, who do a sterling job, and long may they continue to do so. We would however like to expand the list, not to oust our faithful few, but to enable us to expand the cross-section of books examined. The one criterion is that you should know your subject. Any one of us could write a review of a book, which, especially if it is well written may be thoroughly enjoyable, but it could be one big inaccuracy from beginning to end. Any reader who has an interest in (and an in-depth knowledge of), a particular subject, and would like to register their details with Captain John Borer at The Institution.



# Mesopotamia 1914-18

BRIGADIER J B WILKS CBE

Brigadier Wilks served in the Corps from 1952-86 and has been a frequent contributor to this Journal. He served The Northern Ireland Office 1986-94 and is now Kent SSAFA Chairman. He keeps himself busy in retirement.

At the time of writing, we were in what is referred to as Gulf War II (Operation *Telic*). It is of course not the first time that we have been involved in conflict in that part of the Middle East. In 1914 the area was referred to as Mesopotamia, the land between two rivers, the Tigris and Euphrates, and was part of the Ottoman Empire. Turkey entered the war on the 31 October 1914 on the side of the Germans and the campaign which ensued in that area was the responsibility of the Government of India.

The force level considered necessary to protect British interests at the head of the Gulf was a division of three brigades. The oil supplies were of particular concern since the Royal Navy was beginning to use oil for the Fleet instead of coal. The outbreak of war with Turkey had been anticipated, and a brigade from India had been pre-positioned in Bahrein.

On the 7 November 1914, the brigade captured the town of Fao, together with its fort, at the mouth of the Shatt-el-Arab, and then established a position across the river from Abadan, the terminal of the Anglo-Persian oil pipeline. As a second brigade arrived they were able to push on, and Basra fell on 21 November. The advance continued along the line of the River Tigris and on 8 December, Kurna was captured.

The Turkish forces had German officers embedded in them, and also had levies of Kurds and Arabs. Many of the Turkish troops marched from Baghdad, a distance of 500 miles. The Turks had concentrated their forces on the River Euphrates and were defeated at Shaiba on 14 April 1915, having come within ten miles of Basra. This defeat enabled the British force to concentrate its efforts along the River Tigris, and to provide a blocking force along the River Karun to protect both the oilfields and the pipeline to Abadan.

As the full heat of summer arrived, and day temperatures exceeded 100° F, the troops suffered high rates of sickness. After the floods, there was much stagnant water which aided the breeding of mosquitoes, and flies. This lead on to dysentery, typhoid, and malaria. The medical staff and facilities were inadequate for the size of the force and it became almost impossible to sustain any operations other than by staying close to the rivers, as they were the only source of an adequate water supply. Many men suffered from heat stroke and as a result, marching troops sometimes only achieved eight miles in 24 hours and then by moving at night. This part of the world was the classic area to campaign in the winter months and to rest in the summer.

Along the River Tigris, the general area was almost completely flooded, and the infantry advanced by wading through the water with their support weapons on narrow native canoes. The Turks retired firstly to Amara where they were defeated on 3 June 1915, and then again to Kut.

On the Euphrates, after their defeat at Shaiba in April, the Turks had retired to Nasiriya, where they were again defeated on 24 July 1915. This advance secured the approaches to Basra, and subsequently very little action took place along that river - the main effort being concentrated along the River Tigris. Much of the action which did take place on the Euphrates came from raids by the tribesmen and the Marsh Arabs. It was not until March 1917 that any major operations resumed along the Euphrates when a force from Baghdad went out to capture Falluja, 30 miles west of the city.

The force on the River Tigris continued their advance and captured Kut on 29 September and then pressed on to within 18 miles of Baghdad. They were held up by a strong Turkish force at Ctesiphon, on 22 November. As they were not strong enough to overcome the reinforcements that the Turks had brought up, the force withdrew to Kut where it arrived on 3 December. The whole area was prepared for defence, with well dug positions, wire, and demolitions. The Turks attacked on Christmas Eve and were repulsed; heavy rains flooded the trenches, but this also affected the Turks who were forced out of their MESOPOTAMIA 1914-18



Mesoptamia

positions. Thereafter the Turks did not attack having decided to reduce the town by starvation. The Turks concentrated their efforts against a relief force coming up the Tigris, and prepared strong positions which held off the attackers. Conditions in Kut became worse; rations were reduced, the horses were eaten and resupply was not possible, although there was an airdrop of mill stones for grinding grain, and some other supplies. Eventually on 29 April 1916, Kut was surrendered, guns were destroyed along with stores and animals, ammunition was thrown into the river, and 9000 men went into captivity. The defence of Kut had lasted 143 days, and the relieving force suffered 22000 casualties in their attempts to reach them.

This heavy defeat resulted in control of the operations being taken over in London, and many of the problems of fighting in such conditions were addressed. The British were exhausted; were too poorly supplied, their movements contained by the flooded marshland and they were not strong enough to sustain a frontal assault. The result was a stalemate. Several of the steps taken to improve the force, apart from reinforcement, were more hospital accommodation, better aeroplanes, motor lorries, ice plants, improved water supply, building railways and a fleet of river steamers. There was  $7\frac{1}{2}$  months of quiet reorganization, until 13 December 1916 when the offensive was resumed with Kut being reoccupied on 24 February 1917. Supporting fire for operations was provided from boats on the river. On 6 March 1917 a position was reached 15 miles from Baghdad, and the next day an opposed river crossing was mounted, in which all the pontoons rowed across were lost. Further attempts were made upstream on the next two nights and a foothold secured. The Turks started to abandon their positions, withdrew beyond

Baghdad and the Union Flag was raised over the Citadel on 11 March 1917. In the preceding 15 days the force had fought two pitched battles, crossed the River Tigris three times, fought continuously with rearguards and advanced 110 miles. By 24 April 1917 the advance had reached Samara, some 80 miles beyond Baghdad, and the Turks had also retired to Kirkuk, in Kurdistan. Before the coming summer the troops prepared defensive positions.

Above Baghdad the advance along the River Euphrates continued in September 1917. Ramadi was captured and a further advance made to Hit, which was the designated place for the concentration of a force of Turks and Germans to recapture Baghdad. Hit was taken on 10 March and Khan Baghdadi, 30 miles further to the north-west, on 26 March 1918. The capture of large numbers of prisoners and the destruction of supply dumps effectively brought the campaign along the River Euphrates to a close.

On the River Tigris, the front did not advance during the summer months and efforts were concentrated on improving the rear areas, civil administration, and developing local resources. The attack was resumed in October 1918 towards Kirkuk, and also along the river. On 30 October the Turks surrendered in Mosul, thus effectively ending the campaign. This Gulf War had lasted four years.

#### Errata – April 2003 Issue

The following corrections should be made to the April 2003 issue of *The Journal*:

Page 23 – second column, line 18. Change to "Cautley died in 1871..."

**Page 86** – first line of the "Zulu Victory" review. Change "Isandlwana Disaster" to "Isandlana Disaster". (*The title "The Isandlana Disaster" was that used on the March 1879 report to the Commander- in- Chief, a copy of which is held in the National Army Museum Archive as part of the "Chelmsford Papers". At the time of the battle, the correct spelling would have been "Isandhlwana", which changed to "Isandlwana" as modern Zulu language spelling conventions were introduced. In 1879, there were few examples of written Zulu).* 

**Page 74** – Memoir of Col J G Hanson DSO. Maj Peter Leslie of the Assault Engineers has asked us to point out that although *Buffalo* Landing Vehicles Tracked (LVTs), were fitted with a limited amount of armour on the forward end, they were *not* armoured vehicles *per se* and therefore vulnerable to everything from small-arms fire upwards.

Page 88 – Abbreviations. CB should read Companion of The Order of The Bath.

**Page 87** – second column, line 8. Change "Holbane" to "Hlobane". (*The correct name of the mountain-top Zulu War battlefield near Vryheid*).

# Iraq in WW II

## COLONEL W G A LAWRIE MA CENG FICE FIL FRSA

RECENT TV films of the war in Iraq bear little resemblance to the country where I spent three years from 1941 to 1943.

To start at the beginning I was serving with the Bengal Sappers and Miners in Roorkee when I was told on 1st June 1941 that I was to raise a new Field Company on 1st July. This gave me time to use the wonderful method of "checked indents". I sent off indents in octuplicate for the entire War Equipment Table of a Field Company. The various Ordnance Depots sorted out the stores and packed them up ready to be despatched after 1st July. Then every day one or two railway wagons would be dropped off at Roorkee for us to collect.

On 1st July I received five young officers straight from OCTUs in England, one experienced Subedar, a handful of NCOs of each caste and some 300 recruits straight from the Training Battalion. The backbone of the unit was however three first class RE NCOs who could speak Urdu and ran the Workshops, Vehicles and Technical Stores. They were all commissioned later and deservedly ended the war as majors

Our destination was classified Top Secret, but this was soon blown when we got a parcel of books about Iraq through the post. I did not expect we would have long to wait so refused to take over any barracks. We set up a camp under some trees alongside the Roorkee Canal so that everyone could get used to living under canvas

The next problem was the date of our move. Luckily I had a friend in Movement Control who told me that we would be sailing from Bombay on 23rd September. The sailing would be cancelled to "confuse the enemy", but then reinstated, so that I could rely on a firm date. This allowed me to send everyone on leave in relays to say goodbye to their families. This meant a lot to them.

After everything had been boxed up and the vehicles camouflaged in the desert colours of sky blue and sand, a long train drew up in Roorkee on 21st September. Before we got to Bombay I was told I was to be OC Ship on the *Khedive Ismail*, which had recently been hired to the Shah of Persia for his honeymoon cruise. There were four other units on board. Naturally I

got the pale blue cabin on the top deck.

We sailed in an unescorted convoy of nine ships, zigzagging slowly across the Indian Ocean 'Lights Out' rules were strictly enforced, and I was empowered to hold Summary Courts Martial on anyone caught having a cigarette on deck after dark. This happened every day until the penny dropped. The punishment was to be tied to the mast for so many hours a day, which was not much fun in the Persian Gulf. However we arrived safely, which was lucky as the *Khedive Ismail* was sunk with all hands on the next run.

We were whisked off to Shaiba, a place in the desert about 20 miles west of Basra, but before moving off to join the 8th Indian Division, I was given the immediate task of building a prison cage for some 300 Germans who had been rounded up in civilian clothes This was no problem, but I was sorry for the prisoners, who had their watches and rings stolen by Arabs who were able to wriggle through the barbed wire and get out again.

We set out across the desert to look for the 8th Indian Division. There was no sign of a road running north from Basra. We collected a week's rations and drove five abreast following old tracks through the sand.

There was no sign of life – not a man or a camel. The first night we camped beside Ur of the Chaldees and I scrambled up the ziggurat, not surprised that Abraham decided to leave home.

There was a tarmac road from Baghdad to Kirkuk with wonderful mirages of palm trees and villages which astonished my sappers. How did the embedded journalists miss them? Kirkuk had a big mosque with the tomb of Daniel alongside Shadrach, Meshech and Abednego, and we were surprised to find 300 Rhodesian miners ready to destroy the oil wells if the Germans came through Turkey and tried to capture them.

Oil was the reason for our presence in Iraq. Germany was still keen on the "*Drang nach Osten*", relying on her old alliance with Turkey. The Kaiser had ridden a white horse into Jerusalem and you could still buy a ticket for Berlin at Baghdad railway station. There was a real danger that Germany might try to seize the oil fields at Kirkuk, either to block the supply of oil to the 8th Army or to enable German troops to push south through Iraq. Our 8th Indian Division had been sent to the north of Iraq to prepare a defensive position for an armoured division and two infantry divisions covering Kirkuk.

From Kirkuk we pushed on to Mosul to join the rest of the Division. 140 miles of anti tank ditches were being dug by 100,000 Arabs, and each Field Company was given about 60 heavily reinforced concrete bunkers to construct at strategic positions along the ditch Work went well until Christmas. Then we were hit by an unprecedented cold spell. The 9th Army had come from India in thin tropical uniforms. Hundreds of men from South India died of pneumonia and 4000 vehicles were lost in one night with cracked cylinder blocks All my officers went sick, but the Bengal Sappers from the Punjab took it in their stride.

All this time we used to see a German aeroplane flying over our work every Saturday morning at 10 am. There was no thought of camouflage and we were told to leave everything open to view. But as soon as the work was finished I was ordered to camouflage all the concrete bunkers. All I could do was to build 400 dummy bunkers of roughly the same size and make as much mess as possible.

For many centuries Iraq had formed part of the Ottoman Empire. The Turks had been interested only in extracting the maximum taxes from the wretched population. When Iraq was handed over to the British after WW I, we found a miserable lot of people living in a country with absolutely no infrastructure - no roads, hospitals, schools, post or police. We brought in teams of experts to build up an administration from scratch - people like Gertrude Bell and Glubb Pasha, some of whom were still there 20 years later. It is interesting to note that the Turks never tried to unite the country, but governed it as three separate provinces of Kurds, Sunnis and Shiahs. in Mosul, Baghdad and Basra respectively. I see no hope of a democracy being arranged by the Americans.

I had dealings with all sorts of people and found them all perfectly friendly. And there are many other minorities which have to be considered – Bedouins, Armenians and even many Jews still living comfortably in Baghdad, having been there since the time of Nebuchadnezzar. Before leaving Mosul I was asked to make a defensive position on top of the ancient ruins of Nineveh, the walls of which were still eight miles in circumference. I took a party of men to dig and looked for some of the winged bulls which Layard had unearthed 100 years earlier. There were still 14 of them, but I was unlucky. Another interesting site was the tomb of Jonah, which had the jaws of the whale which swallowed him hanging up in the porch to prove it was a genuine story.

By March the weather was heating up and our warm battle dress arrived from India. The situation had changed and I was ordered to prepare a defensive position for a brigade at a place called Altun Kopri which means "bridge of gold" referring to the heavy toll demanded by the Turks for crossing the Lesser Zab. Here the labour force was all Kurds, who seemed a much better sort than the Arabs around Mosul. I was invited to spend a weekend with an old chieftain in his rocky fortress at Rowanduz, a picturesque stronghold in the mountains. He was known as the Shakespeare of Kurdistan. He enjoyed showing me round the wild country and told me about the Russians who were coming to help the British in 1917, but turned back when their revolution broke out.

I had lost touch with my CRE and the rest of the division, who were training in Syria, and was ordered to Basra to prepare a ring of defences round the port to protect the embarkation of the British forces if the Germans drove them out of Iraq. This project was the silliest of all. We were employing local Arabs to dig trenches in soft sand which collapsed immediately. It was now June and extremely hot. We started work at 3 am and knocked off for the day at 9 am. I remembered that the EinC had served under my father in WW I so took a train to Baghad and confronted him. Two days later we were ordered to northern Persia to prepare defences in case the Germans abandoned Stalingrad and turned south.

Here the main contractor was a Danish firm called Kampsax. The Chief Engineer was a Swede called Sorensen, who had six Greek overseers all called George, so naturally all the documents had to be in French! I got very fit here. Our camp was at 5000 ft and I used to walk up to three positions at 8000 ft – one before breakfast and one before and another after, lunch. This went on till October 1942, when we were recalled to rejoin the division in Iraq under the full moon of Alamein. I had been

just a year in Iraq and had been kept pretty busy without achieving very much.

It seemed that the 8th Indian Division would soon be in action and we spent the next few months training hard, particularly in laying and lifting minefields and bridging. There were some splendid rivers to practise on and I enjoyed taking the company to the Shumran bend where my cousin in the Madras Sappers and Miners had won the MC in WW I. I borrowed the divisional bridging train and motored about Iraq looking for crossings to make over any gaps we met. I always insisted that a way across must be found.

I was sent to the Middle East Staff College at Haifa in April 1943, leaving my Field Company with great regret. I learnt a lot about Desert Warfare and watched the Jews and Arabs living together in perfect harmony, before being ordered back to Roorkee as an instructor in Jungle Warfare, not having seen a tree for three years.

I had a month to wait for a passage and volunteered to take charge of the Baghdad Military Prison while the incumbent had some leave to visit his sick wife in America. The point of this was that I had a staff car and a driver and used my time to visit the Baghdad Museum, and ancient sites like Babylon and the Arch of Ctesiphon

On the whole I enjoyed my time in Iraq, where there is so much to see in the way of historical treasures. It amazes me that the journalists who have been there recently did not find time to look around.

My Field Company went off to Italy with the 8th Indian Division and I was delighted to hear later that they had built the "Impossible Bridge". My training in Iraq had borne fruit and the Army Commander's flag off his staff car, which they were awarded, now hangs in the Regimental Museum in Roorkee.



# **Emerging NATO Joint Engineer Doctrine and the Employment of Engineers at Corps Level**

LIEUTENANT COLONEL D G BOWYER BA(H) MA MPHIL



Lieutenant Colonel Daren Bowyer has served in both UK and Germany-based units, commanding 20 Field Squadron 1998-2000. Staff appointments have included postings to the MOD and the British Embassy in Washington. After Squadron command he spent a "year out" gaining an MPhil in International Relations at Cambridge (and becoming a passable oarsman to boot!). A short tour as SO2 Engineer Plans in HQ ARRC followed, before promotion and a move to his current appointment as DS Manoeuvre Support and NBC at the Royal Military College of Science.

# Foreword By

# Brigadier R A M S Melvin OBE

As the British Army's Director of Land Warfare, responsible for land doctrine, concepts and force development, and as a former Chief Engineer of the Allied Command Europe Rapid Reaction Corps, it gives me great pleasure to add a few prefatory comments to Lieutenant Colonel Daren Bowyer's excellent article on joint engineering.

The first issue I would reflect on is "What's all the fuss?" Sappers from earlier generations will no doubt find much that is obvious, and others may even find some of the terminology unnecessary. However, the fact remains that until recently, many in the wider joint and NATO communities did not appreciate the role of military engineers above brigade or divisional levels. Chief Engineers of HQ ARRC for both the Bosnia and Kosovo operations had to deal with the grim paucity of British Corps engineers by adopting a "beg and borrow" basis. Our force structure had become so hollowed out (or "front-heavy") that we had to reinforce perversely "front-to-back", drawing engineers from brigades to assist corps level

support, sometimes against friendly forces' opposition. Post operational analysis and historical studies indicated that we had paid too much attention to "tip of the spear" close support engineering and BATUS battle drill, and had paid too little emphasis (despite our extensive BALKANS experience) on general support engineering and the necessary force structure to support it. Some steps were taken in the course of the 1998 Strategic Defence Review to enhance 28 and 36 Engineer Regiments to provide a better balance. But it still left the corps or land component levels too dependent on Territorial Army support. This was the stimulus to develop our conceptual thinking along more functional lines: generically to consider what we needed to do in order to support formations in combat, and what was required to support the force as a whole. Analysis of the RE ORBAT in 1944-45 confirmed this judgement.

Daren Bowyer's article explains this path of development, which is now inching its way towards NATO's endorsement. Paradoxically, despite the British lead in this matter within NATO, and the adoption of the Joint Force Engineer concept within the United Kingdom, a number of British officers in joint and NATO

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appointments have taken a severe dislike to the emerging doctrine. It is not my place here to describe "ins" and" 'outs" of the debate, but suffice it to say that "not invented here" perhaps sums up one aspect of the discussion; some surprisingly illinformed prejudice against engineers in our sister services is another.

On a more positive note, I am glad to report that concepts of force support and combat support (to formations) chime well with the work of my Directorate in supporting Future Army Force Structures. We are already seeing harmonization of approaches to "force level" and "formation level" requirements of combat support, combat service support and command support. Force elements in "Force Troops" will indirectly support or reinforce directly formations at divisional or brigade levels as applicable. Of course, there will never be enough Sappers to go round so we will need to include a degree of reality, pragmatism and flexibility in developing engineer force structures which the Engineer-in-Chief is fully engaged in. Indeed, his model, influenced by the joint force engineering approach, has won wide praise in the Centre. So, in this case, time spent on doctrine and concepts, in Germany and the United Kingdom was not wasted.

My final point is that none of this conceptual development could have been achieved without the closest liaison between engineer commanders and staffs at Rheindahlen, Minley and Wilton. From my present perspective at Upavon, the Corps would appear to have got its act together in commendable manner – it is now a question of resources to put the joint force engineer concept into practice and to realize a balanced engineer force structure to support it.

#### INTRODUCTION

I FIRST began writing this article a little over a year ago when, under Brigadier Mungo Melvin's direction and tutelage I was involved in developing NATO's Joint Engineer Doctrine. However, Brigadier Mans rather "pipped me to the post" in his article in the April 2002 *Journal*, providing

an overview of the UK's developing doctrine for Joint Force engineering. Much of this is based on work undertaken within NATO - and under the auspices of the NATO Standardization Agency  $(NSA)^{1}$  – over the last two years. It will be greatly beneficial that the UK's national work follows so closely what is being developed by NATO - and in any case imitation is the best form of flattery! I therefore put my article "on hold". It seems strange, but hugely gratifying, to now regularly see diagrams I first sketched out, again under Brigadier Melvin's guidance, of the balance between Force Support<sup>2</sup> and Combat Support Engineering, presented now not as something emerging but as (de facto) accepted doctrine. It is very easy when engaged in doctrinal work, especially in the NATO quagmire, to become despondent and wonder if any of it will ever have any relevance to the "real" world. To see what a little over a year go were vague concepts, being taken into everyday use as structural background (exactly what doctrine should be) is quite exciting (well, almost!) However, I detect that the fundamentals of Joint Engineer Doctrine are not accepted by all – perhaps because those of us involved in the development were so close to the issues that we failed to see that they might take more careful explanation, especially outside of Land military engineer circles. In this article, then, I would aim to explain some of the background issues that drove the development of NATO Joint Engineer Doctrine, and reiterate, perhaps with more explanation, what the fundamental principles are. (Here there will inevitably be some overlap with Brigadier Mans' article, though there have also been some developments, particularly in terminology, since that article was written). In the second section of this article I will endeavour to outline how this doctrine for the Operational level is being extracted and interpreted for the tactical level (and tactical/operational overlap) by HQ ARRC for the employment of engineers at the Corps and Land Component Command (LCC) level. I hope I can also tease out some conclusions about how acceptance of this doctrine impacts on our Corps and also present some arguments that we could all adopt to help win over the sceptics.

<sup>&</sup>lt;sup>1</sup>NSA Study 2238 Joint Engineering.

<sup>&</sup>lt;sup>2</sup> There is a slight divergence in terminology between the NATO doctrine and that in UK: NATO uses "Force <u>Support</u> Engineering" and "Combat <u>Support</u> Engineering"; the UK has dropped the word "support".

#### NATO JOINT ENGINEER DOCTRINE: THE DEVELOPMENT OF AJP-XX JOINT ENGINEERING

#### **BACKGROUND AND DRIVERS**

For 50 years NATO had been preparing, almost exclusively, for war in Europe against a single monolithic threat. Whilst the flanks were not ignored, the overwhelming focus of effort was on the central front. Military Engineering could be quite neatly split between that required at the tactical level and that required at the Strategic level. At the tactical level it could be quite clearly seen to be a G3 matter and doctrinally was well served by the development of ATP 52A. At the strategic(/higher operational) level (Major NATO Command (MNC<sup>3</sup>) and Major Subordinate Command (MSC) ) engineering was perceived purely as a J4 issue: it was about the creation of permanent infrastructure to support NATO's defensive posture: Static HQs, the use of Security Infrastructure Programme funding and so on. There was really nothing in between. Thus, in terms of command and control, at the tactical level one would find a Chief Engineer (however designated) and small engineer staff at Corps and divisional level - with a predominantly if not exclusively G3 focus. At higher levels such engineer staffs as existed would be embedded within J4 and concerned with permanent infrastructure. At the highest level (SHAPE) there was no engineer branch, or even identifiable engineer focus.

There were essentially two drivers for the development of NATO Joint Engineer Doctrine. Firstly, the new strategic environment in which NATO expected its forces to operate and the command structure it is developing as a consequence; and secondly, the lessons of both exercises and recent operations. (From a purely NATO perspective this meant operations in the Balkans, but national experiences elsewhere, and particularly in the Gulf (1991), were equally relevant).

# WHAT THE PROPOSED DOCTRINE DID NOT SEEK TO DO

inevitability of human nature that when asked to consider something new, we invariably assume some sinister intent: someone is trying to musclein on our turf, capture some of our glory or, more likely today, divert our funding to them! Perhaps we have just got so used to vested interest being a key part of any equation that we automatically assume that it is there somewhere and look for it before anything else. Well, that was not what Joint Engineer doctrine was about - though, of course, some have seen it as such. We were certainly not advocating an Engineer Component, analogous to the Joint Force Logistic Component (JFLogC)! Nor were we arguing for the creation of a large independent Joint Engineer staff structure isolated and independent from other staff branches. On the contrary, we fully acknowledged that engineer specialists must be integrated within Combined Joint (CJ) staffs, but we have argued that their efforts must be co-ordinated across a HQ and this is best done through a single engineer focus. It is worth noting that in this sense the organization and practices of Engineer Branch HQ ARRC were taken as something of a model. For example, the SO2 Engineer Intelligence works (on operations) within the G2 staff, the SO2 Engineer Plans within the Corps Planning Group and the SO2 Engineer Operations, of course, within the Current Operations cell. But they all have the same engineer picture because their work is coordinated and supported within the engineer branch; the engineer concept of operations, to support the commander's plan, is formulated by the Chief Engineer and forms the basis for the engineer input by these staff to their own specialist areas. And we were not demanding massive restructuring and the creation of new engineer "czars". We were, though, advocating what in some HQs would involve a re-subordination of some staff elements already present but dissipated and lacking a single focus.

#### PROCESS

THE project has now been running for over two years, having been initiated by Brigadier Melvin in consultation with the Chief Engineers of AFSOUTH and AFNORTH in

I THINK it is worth stating, at a fairly early stage, what we were not seeking to do. It is perhaps an

<sup>3</sup> These terms were superseded by Strategic Command (SC) (i.e. SACEUR and SACLANT) and Regional Command (RC) (e.g. AFNORTH, AFSOUTH). They have, of course, changed again in June 03 with SACLANT now designated Supreme Allied Command Transformation.

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December 2000. JHQ Centre's Exercise *Constant Makefast* in the Spring of 2001 leant it considerable momentum, confirming some critical weaknesses in the Alliance's current approach to engineering. Moreover, the lessons of recent operations and exercises highlighted the importance of having a single focus for engineer matters, which at command levels above Corps was lacking.

NATO's Combat Engineer Working Group (ENG WG) formally endorsed the requirement for Joint Engineer Doctrine as NATO Standardization Agency (NSA) Study 2238 and established the Engineer Doctrine Team (ENDOT) to develop it. Subsequently renamed the Joint Engineer Doctrine Panel (JEDP), this group comprised representatives from both the NATO command structure and the force structure. As the most senior (by rank) engineer appointment, Chief Engineer ARRC became Chairman of the panel, with Chief Engineer AFSOUTH acting as the formal Custodian for the developing document (then entitled Allied Joint Publication (AJP)-XX Joint Engineering).

The "stawman" proposal developed at Ex Constant Makefast 2001 subsequently came to be considered by the NSA to be the first Study Draft but a formal Study Draft 2 was issued in November 2001 and nations were invited to consider it and offer their comments at the ENG WG meeting in Brussels 11-12 February 2002. Few substantive issues were raised by nations at the ENG WG although the US subsequently raised several. It was interesting to note, however, that only the UK was represented by its Joint community. The main voice of contention was SACLANT, which being very Maritimecentric, had a fundamentally different view of "engineering". It became clear from this that a better information campaign was needed explaining what we were about, not to fellow engineers but to a wider audience, and especially the other Components. Nevertheless, the ENG WG strongly endorsed the work to date and the view of the JEDP that it should continue to aim for the document's acceptance as "Keystone" (ie at the same level as AJP 1-9).

The JEDP was asked to prepare a third Study Draft – taking account of nations' and the command structure's views, to be circulated in sufficient time (which in NATO was normally taken to mean three months) for comment to be heard at the Engineer Standardisation Development Panel (ESDP) in Angers in June. This actually gave very little working time to turn the draft around, although it was achieved in a frenetic two days of work in Rheindahlen immediately after HQ ARRC returned from its critical Certification exercise, Arrcade Guard, in February 2002. One thing we had learned early on was that drafting by committee just did not work. We therefore opted to work by means of a very small team of drafters - representing the main players in the command structure plus HQ ARRC, leaving the full panel to comment only on issues of substance, not the position of commas! The meeting in Angers allowed for a broad spectrum of views to be taken on board and for that third Study Draft to be developed into a final Ratification Draft now under circulation to nations.

That still left the issue of the document's position in the doctrinal hierarchy. As I have said above, it was the view of the panel, supported by the ENG WG, that it should take its place with the "keystone" documents of NATO doctrine, ie as an AJP. Our reasoning for this was simple: rather like CIS (accorded it's own Joint Staff (J) number – J6), engineering is an enabler across all other activities. Thus it would be wrong to subordinate it to J3, when it has a pivotal role in enabling J4 and J9 activities, for example, and a large supporting act to offer J2, as well. This had to be presented to the Hierarchy Panel and the Allied Joint Operational Doctrine Committee where, sadly, the argument did not hold up. However, it was always an ambitious aim! Work continues to harmonise the document with other NATO doctrine before finally inviting nations to ratify it. In the meantime, it has become, de facto, the model on which NATO commands are beginning to base their engineer concept of operations, and many nations, including the UK, have adopted the key principles.

#### FUNDAMENTALS

In the UK we have long recognized, in the Corps' role, the 3-faceted nature of engineer support: helping the Army to live, to move, and to fight. The increased emphasis on expeditionary operations that has characterized military activity since the end of the Cold War, means that there is a much greater need than before for engineers to focus on the "to Live" aspect. Moreover, since

future operations will undoubtedly be joint, it is no longer just the Army that we help. Engineers<sup>4</sup>, arguably more than any other arm, support all three services. And today we can invariably add Other Government Departments (OGDs) to our "customer base." There is clearly some distinction to be drawn between this sustainability support, which can be seen as supporting the J4, logistic, effort, and the "Move and Fight" elements that are clearly part of J3 activity. We determined, therefore, that engineer activity can be grouped into two functions: "Force Support Engineering" and "Combat Support Engineering". The UK in its Joint Force Engineer doctrine has

dropped the word "support" but otherwise adopted the principle and definitions verbatim – as Brigadier Mans explained in his article. Although they will doubtless change again in the final drafting and ratification process, the thrust of the definitions can be well understood from Study Draft 3:

Force Support Engineering encompasses the deliberate, longer-term preparation for, and indirect support to ongoing or future operations as well as those engineer tasks associated with sustaining the joint force throughout all stages of an operation.

- It will be the predominant engineer focus pre- and post- conflict and for rear operations during conflict.
- It may involve a greater degree of cross-component support.
- Its products will usually be more enduring, relying more on purpose-designed and built solutions.
- It is likely to fulfill a longer-term, operational requirement.

Combat Support Engineering encompasses those military engineer tasks associated with the direct support to current or imminent combat operations.

• It is conducted by the engineers of all services or



Figure 1. Force Support Engineering<sup>5</sup>

components to support land, air, maritime and information operations.

- It frequently relies on prefabricated equipment solutions and may involve a degree of improvisation.
- It is likely to fulfill a short-term tactical requirement.

This functional approach offers greatest efficiency and economy of effort. It recognizes not only that engineers are multi-role but also that many nations' engineer troops are dual or multitraded. Thus individual units can have a utility across the whole range of engineer activities. The approach is valid for both warfighting and Peace Support Operations. Although in the latter the emphasis of engineer effort will be on force support, we must be prepared for a rapid shift. What is absolutely key here is that we understand that this division is one of function, not of unit - we do not have Force Support Engineers and Combat Support Engineers; we have, for the most part, military engineers capable of contributing to both functions.

The command and control implication of this is that there must be, at all appropriate command levels, a focus for the development of the engineer plan and for advising the commander on the distribution and re-distribution of his engineer assets between the functions. At the

<sup>&</sup>lt;sup>4</sup> There was some discussion in developing the doctrine about the use of the general term "engineers" which for the air force and navy could have different connotations. Some respondents even accused us of trying to take command of, for example, aircraft engineers! Clearly what we mean are "sappers" – whether Army, Navy or Air Force "sappers". (In some nations, of course, air forces and navies have their own construction engineers: the US Navy SeaBees and US Air Force Prime Beef units, for example, who we would see included in the doctrine). However, the term does not have meaning in all nations. Neither does this confusion arise in all languages; in French, for example, "genie" and "mechanician" provide the distinction we seek. We settled for an explanatory note in the introduction.

<sup>&</sup>lt;sup>5</sup> © MOD – Army Picture Library.

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Figure 2. Combat Support Engineering<sup>6</sup>



<sup>5</sup> © MOD – Army Picture Library.

higher levels this may involve support being provided from the engineer assets of one Component to the overall effort of another in "supported/supporting line with the Component" concept. This, then, is the principal rationale behind the introduction of the Joint Force Engineer (JFEngr), and his equivalent at other command levels. However, we should be clear that this is not his only role. It is a crystal clear lesson of operations over the last 10 years that there must be an engineer focus in each HQ to contribute across the spectrum, but perhaps most importantly in all aspects of the planning process. Just one example of this is the need for engineer advice in the targeting process - most recently recognized in NATO's Northern Region Directive (NRD) 80-93 on the Combined Joint Task Force (CJTF) concept which shows the "Combined Joint Engineer (CJE)" (generically, the JFEngr) as a member of the Joint Co-ordination Board. He is thus able to look to the desired end-state and consider the post-conflict reconstruction implications of targeting decisions, possibly advising on alternatives.

It is worth here repeating the diagrams, originally developed for AJP Joint Engineering, one of which was included, in amended form, in Brig Man's article, that show how the balance of engineer effort may alter between the two functional areas through the phases of an operation whilst the overall level of effort remains broadly the same. (Do note, though, that the graphs were intended to be illustrative, not mathematically accurate!)

#### EMPLOYMENT OF ENGINEERS AT THE CORPS AND LAND COMPONENT COMMAND (LCC) LEVEL

#### BACKGROUND: NATO FORCE STRUCTURE REVIEW AND HRF(L) CONCEPT

HAVING carried out a thorough review and consequent reorganization of its Command Structure, in 2000 NATO then reviewed its Force Structure, declaring an ambition to create more Corps/Land Component level forces ready for rapid reaction similar to the capability erstwhile represented in the ARRC alone. The initial requirement identified was for three such HQs, with earmarked forces, to be designated High Readiness Forces (Land) (HRF(L)). A further six formations were to be established at lower readiness and designated Forces of Lower Readiness (FLR). In fact there were rather more volunteers for HRF(L) status than expected - a total of six - and NATO determined to accept all of them, subject to a process of Certification, which ARRC was first to go through during 2002. This by way of background to how HQ ARRC saw itself fitting into the bigger picture - either as a Land Component HQ, or as a Corps HQ. Let me now turn to how ARRC expected to employ its engineers at either of those levels, as demonstrated on its rehearsal for and then final demonstration of Full Operating Capability (FOC) for Certification as the first HRF(L) (Exercises Arrcade Guard 01 and Arrcade Guard 02, respectively). These principles were fully in accordance with the emergent Joint Engineer Doctrine.

#### PRINCIPLES: THE CORPS ENGINEER BRIGADE, ENGINEER WORKS GROUP AND GEOGRAPHIC SUPPORT GROUP

OF course, engineer support within the manoeuvre formations is primarily the responsibility of the Troop Contributing Nations (TCN) and so all formations assigned to ARRC should come with their own organic engineer capability, sufficient to meet their needs. However, the reality is that there is a vastly varying capability integral to those manoeuvre formations and some assistance from the Corps level will inevitably be required. And, of course, it is entirely appropriate to use the Corps level engineers to reinforce the main effort. In addition Corps Engineers had to meet the requirements of Corps level force support - ie the necessary support to Corps/Force troops. As much of this as possible was done through the use of host nation engineers - both military and contractor, but with supervision, liaison and contractsetting, falling to the Corps engineers. And Corps engineers were likely to be the first source looked to for the additional effort required to provide cross-Component support - most likely to reinforce the efforts of engineers in the Air Component or the Joint Rear Area Component. To meet these roles the Corps engineers were organized as what was sometimes referred to as a three-legged stool: the Corps Engineer Brigade, based on 29(Multi-National) Engineer Brigade; The Engineer Works Group (EWG), based on elements of the Military Works Force; and the Geographic Support Group (GSG), based on elements of 42 Survey Engineer Regiment. Tasks for Corps Engineers can, then, be summarized thus:

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# through the Commander.

- **Corps Level Engineer Tasks**. Corps level tasks are those directly in support of the Corps scheme of manoeuvre such as a major river crossing operation.
- •Reinforcement of Manoeuvre Formation Engineers. For specific operations, the Corps Engineer Brigade may be required to reinforce engineers within the manoeuvre formations on a "general support reinforcing (GSR)" basis.
- Support within the Corps Support Area (CSA). This would include tasks in areas not assigned to manoeuvre formations and may involve the provision of support to Combat Support (CS) and Combat Service Support (CSS) formations.
- Other Engineer Support. The provision of engineer advice, technical specialists, resources and engineer support other than that provided directly to combat operations would most likely be controlled at Land Component Command(LCC))/Corps level. It was envisaged that such skills would be required mainly in support of rear operations and to a lesser degree in support of close operations in the forward combat area.
- **Support to other Components.** On occasions when the ARRC was to act as the LCC the JFEngr might request engineer support from the LCC to other components. In such circumstances, the Corps Engineer Brigade would normally be the first source looked to for tasking to provide the necessary support.

#### THE CORPS ENGINEER BRIGADE

THE Corps Engineer Brigade would provide dedicated engineer support to ARRC-assigned troops. Its predominant focus would be on combat support engineering, but note my point above about this division being one of function not of forces. The main role of the Corps Engineer Brigade would be:

- Command and control (C2) of all field engineer units (excluding GSG and EWG elements), that are not organic to divisions and CS brigades.
- Provision of engineer advice to a Crossing Area headquarters for a large-scale mobility operation. Or even acting itself as the Crossing Area headquarters, subject to the addition of necessary additional assets – maintenance, air defence, provost, for example – that are not organic to the brigade.
- Providing additional engineer C2 when a division's reinforced strength exceeds the C2 capability of the division's engineer commander and his staff.
- Reinforcing the engineering effort at division or CS Brigade if required. This would normally be undertaken on a General Support Reinforcing (GSR) basis.
- Other engineer assistance as required, including support to Corps deception and NBC defence operations.
- Exceptionally, reinforcement of other components if tasked by the Joint Force Commander (JFC)

**THE GSG** THE GSG would deploy as part of HQ ARRC group, to provide direct geographic support to

group, to provide direct geographic support to the Commander in the field and reinforce the organic geographic staff within HQ ARRC. The size of the GSG would be determined by the scale of the operation.

#### THE EWG

THE EWG provides technical advice, design and project management support to the HQ ARRC Group. The early deployment of elements of this organization would be crucial in order to facilitate the reception, staging and onward movement of the HQ ARRC Group and assigned formations. With particular strength in design and project management, the EWG would be the primary force support focus.

#### INITIAL ENTRY – BIGGER THAN YOU THINK?

THE next issue that I want just to touch upon is that of Initial Entry Operations and the engineer support to them. I am aware that work on this will have moved on, perhaps quite considerably, since I was last involved in it nearly a year ago. However, the early work we were then doing did highlight a number of things from the engineer perspective. In November/December 2001 there was, for a brief period of time, the likelihood of HQ ARRC deploying to Afghanistan before the NATO option was effectively closed-off, and indeed the whole nature of operations in that country were drastically reduced from what at one stage were being considered. As part of this we did a fair degree of brainstorming, of course, about the force structure that would be needed. From the engineer perspective it was the scale of effort for the initial entry that was most striking (though, to engineers, not surprising): engineers more than anyone else need to hit the ground running, because they must be delivering from the outset - they are both key enablers and main operators - particularly in an operation where humanitarian assistance and major reconstruction were envisaged as key tasks. The doctrinal framework established in draft by AJP-XX Joint Engineering stood us in good stead both in determining the requirement - and justifying it to the planners. A few months later as apart of its annual training cycle, HQ ARRC examined Initial Entry Operations in greater depth in a

MAPEX (by chance using its "Mesopotamia" scenario, that has proved so relevant!). I will not go into details here of the exercise scenario but will concede that it was on the very heavy end of Initial Entry Operations. However, what was clear, again, was the weight of engineer effort required – and that it was not just organic to the fighting formations; the vast majority of the Corps engineers would have been required at a very early stage – including the HQ of the Corps Engineer brigade. Which leads neatly to two issues I want to highlight as likely difficulties for us in our current configuration and mindset.

#### CHALLENGES

CONSIDERATION of concepts and possible scenarios for Initial Entry operations, as outlined above, served to (re-)highlight what we already know our Corps level engineer capability, based as it is (for the UK - which provides the main components of this capability for the ARRC) almost entirely on the TA, is unlikely to be at a suitable state of readiness. I take that conclusion not only from the particular scenario we used for our consideration of Initial Entry operations but also from contingency planning conducted against the (at the time) quite real possibility of an ARRC involvement in Afghanistan. This too highlighted a heavy requirement for Corps level engineers principally in the force support role, and at a very early stage. This shouldn't surprise us - we are always key enablers. Of course we can deploy

regular regiments but this takes them out of their role with their supported brigades or divisions. At large scale, at least, it is also unlikely to be easy to deploy the CS or Divisional GS regiments from the non-deploying division: the pairing mechanism already means they stand to be somewhat drained to backfill and, as Op Telic has shown, even deployment at large scale does not relieve us of the burden of a myriad other tasks. Some, such as simultaneously executing Op Fresco (cover for the firemen's strike) have a considerable manpower cost. I am aware that 29 Brigade was conducting some work on "smart readiness" - the possibility of putting together of an ad hoc force at higher readiness than their formed units - and this may provide at least the partial answer. Perhaps the critical deficiency, though, is in that brigade's HQ staff readiness- it simply has too few regular posts, but I would not wish to dwell on this area where Commander 29 Brigade and his staff are much better placed to comment.

Linked to this is the experience of operations in both Bosnia and Kosovo that there was inadequate engineer support available at the Corps/theatre level. Such a view is highlighted in post-operational reports but we (across NATO) don't appear to have filled the gap and it is likely that in any future ARRC (or other HRF(L)) deployment, the Chief Engineer would again have to "borrow" from the subordinate divisions – something that in Bosnia and Kosovo proved both necessary and difficult in about equal measure. Indeed, lessons from Kosovo were key drivers in the need for the Joint Engineer doctrine.

#### CONCLUSION

# **Operation** *Freshman* – November 1942

WO2 N E FITZSIMONS AND CORPORAL A DYE

The March 1946 edition of The Journal contained an article by QMS D F Cooper RE recounting the story of Operation Freshman, the attack on the heavy water plant in Norway, which was later portrayed in the film "The Heroes of Telemark". The sixtieth anniversary of the operation fell in November 2002 and it was marked in the UK by a Memorial Service and Civic Reception at Skitten, the site of the RAF airfield from where the troops took off. The March 2003 issue of Sapper Magazine contained a condensed version of the story by Jack Braithwaite of the Royal Signals Radio Society which had organized a special amateur radio licence for the day. Operation Freshman was one of the first missions undertaken by the newly formed RE Airborne Companies. All those on the operation perished, save the RAF crew of one of the Halifax tugs. Their successors from 9 Para Sqn took part in the commemoration for which Cpl Dye researched the story again, and which is once again recounted here as a tribute to those who died. Other services took place in Norway in May 03.

#### THE COMMEMORATION

ON 20 Nov 02, the OC, SSM and three JNCOs of 9 Para Sqn attended a memorial service at the site of the old RAF airfield at Skitten near Wick in Caithness, held to commemorate the 60th Anniversary of Operation *Freshman*, one of the first missions undertaken by the then 9th Field Company RE (Airborne), after becoming an airborne unit. They were joined for the service by delegates from Norway, Canada and Australia, local dignitaries from Caithness and of course members of the Airborne Engineers Association – who are always happy to travel any distance for these events.

The service consisted of two fly-pasts from the RAF, an address from the Lord Lieutenant of Caithness, prayers, wreath laying and finally a

march past, all conducted under some traditional Scottish weather! They then made their way to Wick for the Highland Council's Civic Reception. The trip served to highlight an extremely interesting part of Squadron history and, even given the sad reason for the event, turned out to be informative and enjoyable.

The visit also provided an always welcome opportunity to meet with former members of the Squadron from all eras and allowed everyone to pay their respects to the heroic participants of the operation.

#### BACKGROUND

ALLIED intelligence sources had identified a factory complex in the Telemark district of Southern Norway which was being used by the occupying German forces for the production of deuterium oxide, or Heavy Water, a chemical substance required to produce an atomic bomb. After talks between Prime Minister Churchill and President Roosevelt, the Special Operations Executive (SOE) was tasked with destroying the plant. Several alternative methods of attack were discussed including bomb raids, local saboteurs, flying boats, parachute insertion and gliders. It was decided that a parachute drop by a specially trained force would be the best option and the task fell to two units of the 1st Airlanding Bde, 9th Fd Coy



Major P V Fountaine, OC 9 Para Sqn, at the memorial stone in Wick.



An Airspeed Horsa descends with full flaps.

(Airborne) and 261 Fd Pk Coy RE who between them had enough qualified parachutists available to complete the mission.

#### TRAINING

In order to maintain secrecy, training took place under the cover of a fictitious competition between American and British Airborne Engineers, called the Washington Cup. The competition was to consist of either a parachute or glider insertion followed by a forced march, strenuous endurance tests and a complex demolitions task. The training took place in the mountains of North Wales to bring the men to peak physical fitness, and at various factories with similar machinery to the Telemark plant to ensure success with the demolitions task. By the end of the training, it became clear that something more than a competition was on the way and two 15-man teams were selected. Also brought in were four glider pilots as by then, the plan had been modified on the advice of members of the Norwegian Resistance, from a parachute drop to a glider insertion.

RAF Skitten, a small airfield outside Wick, was selected as the departure field for the two Airspeed Horsa Gliders, each towed by a Handley Page Halifax Bomber. The whole area was sealed off and the men were isolated prior to being briefed on the true nature of the mission. Intelligence from Norway estimated enemy strength in the area at around 200 men, with 30 on guard at the Hydro plant. However, only three weeks before the operation, General Oberst Nikolaus von Falkenhorst, the CinC of the occupying troops in Norway, spoke at the plant about the necessity for increased vigilance and the likelihood of an airborne raid.

## THE TAKE-OFF

SHORTLY before 1800 hrs on 19 Nov 1942, the first glider combination commenced its three hour flight, the other following 15 minutes later. Their orders were to regroup on landing and undertake a 5/6 hour forced march to the objective. On arrival the two teams would attack the power house and electrolysis plant, while the four glider pilots were to destroy all communications equipment and take charge of any German prisoners. Weather forecasts

predicted a full moon and little cloud, temperatures below zero and a 2/3 feet cover of snow. Unfortunately, the weather deteriorated and a snow storm severely reduced visibility. To make matters worse, there were poor communications between the tugs and the gliders, and in addition, the Rebecca-Eureka homing equipment which was designed to guide the gliders in also failed. At this point events became unclear with only faint and incoherent radio messages being received in Scotland. The Germans made a radio broadcast saying that two gliders had penetrated Southern Norway and all the troops with them had been killed in action. All the men from the units involved were then briefed to remain silent about the operation to avoid compromising any possible survivors still at large in Norway. The true course of events was not established until after the War.

#### THE INVESTIGATION

IN 1945, Capt Hogg, of a War Crimes Investigating Team, began to piece together the remainder of the story. The big break came with information from a Norwegian soldier, Corporal Erik Dahle, who had



Looking toward the East, showing the installation as it was in the late 1940s.

spoken to Sappers Bonner and White whilst they were held in captivity by the Germans. He learned that following a snowstorm, their glider had crashed into a mountain. Eight men were killed, four were badly injured and the remaining five were taken to Grini Prison Camp. Their tug aircraft had also crashed, killing all the aircrew on board. More information became available following the interrogation of former guards.

After interrogation by the Gestapo, the men imprisoned at Grini were taken to Trandum Wood outside Oslo where they were told they would be meeting with a German delegation to discuss their Prisoner of War status, but must travel blindfolded. This, however, was a ploy by the Germans and on arrival the men were lined up, still blindfolded, and shot. The fate of the four injured men was even more inhumane. After interrogation in the Gestapo jail they were laid out on the floor and given a lethal injection by a Luftwaffe doctor. Their bodies were then taken out by boat from Stavanger, weighted down and thrown over the side into the sea.

The second glider with Lt Allen's party on board also crashlanded. Three men were killed on impact, six were badly injured and eight were relatively uninjured. Two went to a farm for help but it was not long before the Germans arrived. The men were captured and taken to the Wehrmacht barracks at Slettebo, near Egersund. Shortly afterwards, they were taken to a clearing outside the camp and executed one by one, including the wounded. Their bodies were first thrown into a pit then taken to sand dunes near Egersund and buried by German soldiers.

#### THE TRIAL

THE trial of some of those responsible opened on 10 Dec 1945 and the Germans all pleaded not guilty, blaming the "Hitler Order" of October 1942, stating that Airborne or Commando troops, whether in uniform or not, armed or unarmed, were to be executed immediately. For his part, von Falkenhurst was sentenced to death, which was later commuted to 20 years. He was set free in July 1953. Oberstürmbannführer Wilkens, a Gestapo officer who interrogated the men at Grini, was shot dead by the Norwegian Underground on 4 Apr 1945. Stabsarzt Werner Seeling, the doctor who administered lethal injections to the wounded, was executed by firing squad on 10 Jan 1946. Two other Germans involved with the atrocities were also executed and a further two took their own lives rather than face trial.

On 17 Jul 1945, the bodies of all except the four who were dumped at sea were exhumed by men of the 1st Para Sqn RE and reburied with full military honours on 21 Nov 1945. The people of Stavanger turned out in their hundreds to pay their respects to those who had taken part in the attempt to deny Germany the atomic bomb.

The 34 men who took part in the operation were:

9 Fd Coy Lt Methven LSgt Healy LSgt Knowles Cpl Cairncross LCpl Jackson LCpl Masters Spr Bonner Spr Blackburn Spr Williams Spr Hunter Spr Bailey Spr Norman Spr Grundy Spr Legate Spr Faulkner Spr Walsh Spr Bevan Spr Smith Spr White Dvr Farrell

261 Fd Pk Coy Lt Allen Cpl Thomas Lcpl Campbell Lcpl Bray Spr Smallman Spr Jacques Spr Simkins Spr Stephens Dvr Bellfield Dvr Pendlebury

The Glider Pilots, two of whom were from the Royal Australian Air Force were:

P/Offr Davies RAAF P/Offr Frazer RAAF SSgt Doig AAC SSgt Strathdee AAC

The RAF crew of the crashed Halifax were:

Flt Lt Parkinson Flt Lt Thomas F/Offr Haward P/Offr Sewell de Gency Flt Sgt Buckton Flt Sgt Edwards Flt Sgt Falco

# **Battlegroup Battle Planning Course**

MAJOR S G TENISON BSC(ENG) MSC



#### INTRODUCTION

ONE of the recommendations of ROCC<sup>3</sup> was that captains and majors should be given pre-employment training, to prepare them for specific appointments. The Land Warfare School (LWS) was given responsibility for providing courses for officers going to appointments in the combat field. The ROCC Working Group approved the LWS suggestion that integrated training should be conducted at two levels, Battlegroup and Formation, rather than by separate ranks. This article describes the Battlegroup Battle Planning Course (BG BPC), particularly its impact on the Corps. The first course took place from 28 Apr - 9 May 03, with 32 students including four BGE and one officer attending as part of his engineer training on transferring from the Parachute Regiment.

# AIM AND ENDSTATE

THE aim of the course is:

To give officers selected for key appointments within BG HQ the functional knowledge and under-

Major Tenison spent six years working at the MOD in the Acquisition Stream, an ideal preparation for becoming Chief Instructor on the Battlegroup Battle Planning Course in Sep 02. What he knew about battle planning could be written on the back of a very small postage stamp but, undeterred by ignorance, he set about developing a course to teach officers in Battlegroup Headquarters how to do their jobs! Fortunately, other officers in the Land Warfare School were tasked with writing instructional material and proved more knowledgeable. Considered too old to teach sub-unit commanders on  $CATAC^{1}$  (one of the responsibilities of CATD<sup>2</sup> of which he is a part), he will move to a post that has been gapped for two years in the Doctrine and Training Development Group. Noting that the Corps does not appear to have suffered as a result of the lack of output from the Group, he has decided to resume his professional tiddly-winks career, setting his sights on a place at the next Olympics.

> standing of integrated combat staff procedures that they will need to be immediately effective in an operational environment

and the required endstate is:

An officer employed within BG HQ sufficiently equipped to contribute effectively to the Combined Arms battle at battlegroup level.

The key phrase of the aim is *integrated combat staff procedures*. The course provides an opportunity for students, operating in-role, to learn and practice the planning process as part of a syndicate that includes the key staff functions found in a BG HQ.

#### COURSE CAPACITY AND STUDENT APPOINTMENTS

ONCE operating at full capacity, from training year 04/05, there will be four courses of 60 students per year; each will have six syndicates, structured to represent a BG HQ. The Statement of Training Requirement (SOTR) includes the key officers<sup>4</sup> in

<sup>&</sup>lt;sup>1</sup> Combined Arms Tactics Course.

<sup>&</sup>lt;sup>2</sup> Combined Arms Tactics Division.

<sup>&</sup>lt;sup>3</sup> Review of Officer Career Courses.

<sup>&</sup>lt;sup>4</sup> 2IC, BG Warfare Offr (BGWO), ISTAR Offr, Ops Offr, Adjt, IO, BG Logistics Offr (BGLogO).

the headquarters of all Infantry Battalions and Armoured Regiments, regardless of role, as well as Aviation Regiments and RM Commandos (a total of 57 HQs). Battery Commanders in Close Support Artillery Regiments, Commanders of Close Support Engineer Squadrons and those Operations Officers and Troop Commanders fulfiling the role of Battlegroup Engineer (BGE) are also part of the SOTR. Students should attend the course before assuming the relevant appointment, though this will not always be possible.

There is a requirement to train about 28 of the most numerous appointments annually, on the basis

of a two year tenure; the annual capacity is for 24 of each (one per syndicate). All the core appointments, will be represented in each syndicate, though BCs will be at a ratio of about three per course. Sufficient OCs/BGEs require the course for the engineer function to be represented in each syndicate. It is essential that the correct balance be achieved for each course to enable the students to operate in-role and to practice the integration of staff functions. Lack of any individual function would severely hamper the conduct of planning exercises.

#### **COURSE CONCEPT**

THE course is classroom-based and lasts for two weeks; it is divided into three modules.

Module 1 is delivered over five days; it revises or introduces officers to the 7 Questions Combat Estimate, as well as providing sufficient generic knowledge to prepare them for subsequent teaching in functional areas. The focus is a slowtime planning exercise, spanning most of the module, allowing students to acquire a thorough grounding in the process before the more demanding environment of module 3. The students are required to produce an Operation Order, with some supporting paperwork, as well as verbal BG Orders.

Module 2 covers six staff functions (G1 – G4, Offensive Support, Engineer) in some detail over two days; officers are grouped by function, rather than the "BG HQ" syndicates used in

Enemy ORBAT.

modules 1 & 3. Sqn Comds will attend the G3 package. The Engr module for BGEs includes the following:

- Operational Staff Writing (Engr Annex to OpO)
- Ground/enemy briefing
- Battlefield area evaluation and threat integration
- Engineer equipment capabilities and planning yardsticks
- Force protection
- Combined Arms Obstacle Integration (CAOI)

Module 3 is the final exercise, giving students the opportunity to practice their planning role and develop confidence when delivering orders to a BG audience. Make mistakes here, not during collective training in front of a critical and unforgiving crowd! The exercise lasts for three days and includes three missions, with planning conducted at a progressively more demanding pace. Once the new interactive wargaming system (BC2T<sup>5</sup>) is available (early 04), student plans for the final mission will be "tested".

BG BPC is innovative with all the principal BG HQ functions represented in each syndicate, thus enabling students to improve their ability to integrate with other staff to develop coherent plans. Significantly, there is a wide range of experience and age, unlike most courses where students are all at the same level of inexperience. A key factor in setting the right "tone" for the course is that students get a feel for their role and it is particularly

<sup>&</sup>lt;sup>5</sup> Battlegroup Command and Control Trainer.



Wargaming.

important that the student 2IC is able to perform as the BG COS, giving direction just as he would in a deployed BG HQ. The mix of students provides a unique learning environment; for example, the most junior captain might have recent operational experience, whilst the BGLogO, usually Late Entry, might be the only student with armoured experience. There is no formal assessment or report; COs of exceptionally incompetent students will be informed, so that contingency plans may be made!

#### **PRE-COURSE STANDARDS**

WITH the varied age, experience and appointments of the students it is not possible to state a single pre-course standard. In addition the Army is in a transition phase, having removed AJD<sup>6</sup> some months before JOTAC7 begins. A fundamental requirement is for OCs and BGEs to have a sound grasp of the way the Corps is organized to support BGs, as well as understanding the equipment and capabilities available at that level. For some, with no previous experience of CS engineering, this is likely to prove something of a challenge. In future, OCs must have completed ICSC(L) but need not have attended CATAC before BG BPC. BGEs must have attended JOTAC and any appropriate special to arm training; COs/OCs must ensure that they are introduced to Operational Staff Writing before attending the course (eventually MK2 will cover this).

#### IMPACT

WHILST the initial student evaluation was extremely positive it will not be possible to conduct external validation until the training year 04/05, at the earliest. The output from the first four courses (Apr, Sep, Nov 03 and Jan 04) will only be 160 (steady state 240 per year from Apr 04) and

BG BPC graduates will not appear at collective training events in significant numbers until next year. However, it is clear that this course has the potential to make a huge impact on the performance that can be achieved by a well-trained BG HQ. For the first time individuals will be given specific pre-employment training before arriving at CAST<sup>8</sup>.

The potential impact for RE officers, particularly BGE, is enormous. Officers in BG HQ, less attached arms, will have had contact with and will know the staff in their own BG HQ,



Lt Rosie Robbins describing the "ground".

<sup>&</sup>lt;sup>6</sup> Army Junior Division.

<sup>&</sup>lt;sup>7</sup> Junior Officers Tactics Course, for lieutenants 18 months after commissioning; commences Nov 03.

<sup>&</sup>lt;sup>8</sup> Command and Staff Trainer.
#### BATTLEGROUP BATTLE PLANNING COURSE

making it easier for them to take up their new appointments. On the other hand BGEs join a BG HQ as outsiders and have much to learn both professionally as well as on a personal level. This course will tackle the professional aspect, introducing BGE to the organization and function of BG HQ, as well as making them aware of their role in the planning process. They will have the opportu-



nity to work closely with the IO, answering Question 1 of the Combat Estimate, contribute to the development of the plan, prepare supporting staff work and deliver their part of the orders, whilst gaining an understanding of the roles of the other staff. Most importantly this takes place in a relatively relaxed atmosphere, where learning and improving is more important than getting the correct answer at the first attempt (if there can be a correct answer!). The course is not a test; that happens at CAST and beyond. In future, BG Comds will expect their staff to have attended BG BPC.

Some students will attend the BG BPC more than once, not because they are asked to "show again" but because they hold more than one appointment in BG HQ during their career. The most obvious example is of someone attending as the Ops Offr, returning some

Where to achieve the effect.

years later as the 2IC. While Army doctrine and the course content might have changed, the most important reason is the new role for which the officer must be trained. The same might apply to some RE Sqn Comds, with the added advantage of helping *Whitehall Warriors* to refocus on the field army after a period on the staff.

#### **APPLICATIONS**

IT is intended that officers should attend BG BPC up to six months before assuming their appointment. COs are responsible for nominating their officers to attend, though RE MCM Div will identify the requirement on posting orders. Applications should be submitted to the courses clerk LWS (tel 94381 2233 or 2412). Further information is available from CATD SO2 Engr on 94381 2251.

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## **Carpe Diem**

## COLONEL W G A LAWRIE MA CENG FICE FIL FRSA



After the RMA Woolwich, the author was commissioned into the Corps in 1934. Following Chatham and Cambridge, he was posted to India where he spent the next fifteen years with the Bengal Sappers and Miners, including Waziristan operations, the Middle East, the Staff College and Military Adviser to the Indian States Forces. He commanded 4 Training Regiment in Aldershot and was later Defence Attaché in Jordan and Ghana before retiring in 1966. The next 38 years have been just as hectic, some of his activities having been; schoolmaster, Bridge teacher, property dealer, restaurateur, author and lecturer for Save The Children. He has also completed three Open University courses and held more than ten exhibitions of his own paintings.

WHEN the 8th Indian Division was raised in 1941 under General Charles Harvey he chose a sheaf of corn as the divisional sign and the motto "Carpe Diem" – (make hay while the sun shines), – both being a feeble pun on his name.

Nowadays most people seem to have dull 9 to 5 jobs with nothing more exciting to look forward to than the Cup Final. I was much luckier, and I like to remember the times when I was able to strike while the iron was hot in an attempt to change the course of history. I missed the bus in India in 1947, but made up for it in Jordan in 1958 and in Ghana in 1966

This article gives the background to those events for the first time and shows what might have been.

#### 1. INDIA – 1947

Tall, bearded men with neat turbans are a familiar sight in every continent. I have served with them for many years and think the world of them for their bravery and loyalty. If I had to choose one man to be at my side in a tight corner he would undoubtedly be a Sikh. But who are they and where have they come from?

For over a thousand years India has been torn apart by the struggle between Islam and Hinduism, and there is still no solution to the problem. In 1469 Nanak was born in the Punjab. He was an orthodox Hindu but was interested in other faiths, visiting Mecca and Tibet as well as Hardwar and Benares. In proclaiming "there is no Hindu and no Mussulman" he meant that both were equally futile. He settled down to preach a belief in tolerance and was given the title of Guru – or religious teacher, and the development of Sikhism began. Nine other Gurus followed him, the last being Gobind Singh, who died in 1708.

The Mogul Emperor Akbar the Great (1556–1605) was also keen to bridge the gap between Islam and Hinduism, but Aurangzeb (1658–1707), was determined to enforce conversion to Islam, and civil war broke out. This was when the Sikhs adopted their beards and turbans to distinguish them from their enemies, and banned tobacco after some of them had been surprised when having a smoke. Every male Sikh takes the name Singh, meaning "lion".

The heyday of the Sikhs was probably during the rule of Maharajah Ranjit Singh (1768–1839) who conquered most of what is now Pakistan. One of his officers owned large tracts of land, and on his death-bed apportioned them among his three sons by tearing up his turban into three pieces of different lengths. It must have been his three great grandsons that I knew as the Rulers of the States of Patiala, Nabha and Faridkot when I was Military Adviser to the Indian States Forces between 1944 and 1946. They all had their private armies which were allocated to help the British in WW2. These had often been employed as barefoot guardians of mediaeval palaces armed with antique muskets. My job was to train them up to a standard where they could compete with the Japanese, and to give general advice when required.

The Maharajah of Patiala was a magnificent specimen, 6ft 4ins tall and a member of the Indian national teams at cricket, hockey and polo. His problem was that his capital city had been washed away by a sudden flood with great loss of life. He wanted to build a large mound of earth to stop this recurring.

He had ordered some bulldozers from America and wanted me to have some of his men trained to use them. This was easy and the result was a great success.

His father was 6ft 7ins tall and had been a great man for the ladies. He was banned from Simla by the Vicereine for flirting with English girls, so built his own hill station at Chail nearby and 100 ft higher. He had made a cricket ground by lopping the top off a mountain as if it was a boiled egg, and this was where I met his son. We were served lunch in the pavilion by a typical English butler and then got down to discuss his far-reaching plans for developing his State.

The Maharajah apologized for sending a pale green Rolls which had no air-conditioning to pick me up, explaining that he had ordered 35 new ones which were still at sea. On the way up we had passed a long column of smartly dressed boys of all ages between ten and eighteen, and then by another column of girls of similar ages.

When I asked the driver who they were, he told me they were the children of "The late His Highness". They had all been born and brought up at Chail and looked after by relays of English nannies and governesses.

He then took me on a tour of his capital. I remember visiting a large farm where every sort of fruit was grown. There was a factory in the middle which turned the produce into jam, marmalade and canned products. What impressed me was the model railway which he had been given as a boy and brought all the fruit to the factory. It was big enough to take a man as driver, who sat behind the engine.

He then took me to the public swimming pool, which he had intended to be the largest in India. When he heard that the pool in Bombay was 6ft longer, his pool had to be extended by another 10 ft, and this was going on. Next we saw the Soldiers' Club, which was to be shown next week to Lord Mountbatten. It had Reading Rooms and Games Rooms etc., and the illiterate soldiers were being rehearsed in how to play chess and to hold books the right way up.

The Maharajah of Nabha was much less impressive, but still interesting. His Infantry regiment had been sent to Singapore in 1941, where it had surrendered to the Japanese after burying the Mess silver in the jungle. They had been furiously criticised and accused of high treason when they agreed to fight alongside the enemy.

At the Court of Enquiry after the war, the Colonel explained that they would never have lifted a finger against the British and were never asked to do so. But his men spent the next four years in comfortable barracks on full rations, instead of languishing in a prison camp. He was completely exonerated and I attended a grand dinner in Nabha with all the Mess silver on display, after it had been rescued from Singapore.

He did not have much of a Palace but lavished all his money on a magnificent Guest House. It was a double storey building in the form of a cross, and contained eight suites of rooms lavishly fitted out by Harrods with every modern convenience. In the centre were public rooms and a dining room run by a Portuguese Major Domo. When I stayed there with my wife he urged us to ask for any delicacy we fancied and he would be delighted to supply it. They had very few visitors and were dying to have something to do. He begged us to come back and say for as long as we liked, but this never happened.

Faridkot was different again, but the motto on the State Coat of Arms was "Pagri Thoriya", which means "He tore the Turban" proving the old story. The Rajah had succeeded as a baby and had been brought up and educated by English nannies and tutors, while his income piled up and was cleverly invested. He had his main Palace in Faridkot, with others in Delhi and Simla and I stayed in all of them. I got to know him very well and was able to appreciate the privileges of his position.

When Queen Victoria became Empress of India she was asked to sign a letter to each of the Princes assuring them of her support. She was amazed to learn that there were over 600 of them.

They had never been conquered or occupied by the British but now were swept into the



Colonel His Highness Sir Harindar Singh, KCSI, Brar Bans Bahadur Rajah of Faridkot in 1970.

Empire. I had to deal with about 20 of the most important Rulers and I must say that I found them to be on the whole popular and conscientious. They spoke the same language as their people and shared their history. This form of autocracy seemed to be best suited to the good of the subjects. By doing away with a bureaucracy taxes could be kept low and by giving instant judgement in disputes, the cost of litigation was cut out.

The Rajah of Faridkot used to sit in a balcony outside his Palace two mornings a week. Anyone could turn up and ask for an audience by paying half an anna. I saw him dispose of a dozen cases in a morning. Now the Authorities are far away in Delhi and speak a different language.

He took me for a drive round Delhi and stopped outside a car dealer. "Have you any jeeps in stock?" he called out. "Yes, Your Highness, eighty two". "Well send them round as soon as you can." That was it. No need to consult anyone. They were needed to re-equip the State Police.

Another time I was in Delhi with my wife and he invited us to spend a few days at Faridkot House. My wife thanked him but said it was quite impossible. The children were hundreds of miles away in charge of a nanny. It might take three days to get through by telephone. I had not realised that Ruling Princes had "Clear the Line" rights. He sent an ADC round to the Telephone HQ and got straight through to Miss Marston in Mussoorie, who confirmed that the children were well and happy.

Lord Mountbatten was about to visit Faridkot to present a saluting gun in recognition of Faridkot's contribution to the war effort. This was to coincide with the opening of a pavilion at a new sports arena. I went down a few days early to check up and was horrified to see the state of the work. No decorations started, no furniture in place and a sea of mud all round. The Rajah sent for his Clerk of Works and asked him to explain his plan. There were three days left and he had three teams each of 2000 men who would work round the clock, day and night. Of course it was ready on time.

I could quote many other examples in States all over India, but these may give an idea of how the system worked and was accepted.

At the end of WW2 it was clear that India would be given her independence. Lord Wavell had a plan for doing this in stages over several years, while retaining the Chamber of Princes, but when Churchill lost the General Election the Labour government turned this down and dismissed Wavell in favour of Mountbatten. Attlee had won the Election by promising to bring the troops home and could not leave them in India to keep order during the transition. In place of this I suggested using two divisions of State Force troops with a few British officers. Wavell liked this idea but was not given a chance to implement it

During 1946 I sounded out several Rulers on how they viewed their position. They refused to be worried, saying that they relied on the promises of Queen Victoria, and after all Mountbatten was her grandson. It was announced that States would have to accede to either India or Pakistan and that smaller States could combine to form larger units with a certain overall population. The Maharajah of Patiala immediately set up PEPSU, The Patiala and East Punjab States Union, consisting of Patiala, Nabha, Jhind, Kapurthala and Malerkotla. These were all contiguous, which made it easy.

Faridkot was invited to join, but refused, preferring to set up his own Union.

Faridkot asked me to be his unofficial ADC and to help him persuade other States to join him. We visited several Rulers, but got nowhere because none of them touched Faridkot. Suddenly a few days before the date of Independence, Faridkot was asked to go round to see Mohammed Ali Jinnah and he took me along.

I never liked Jinnah. He had worked as a barrister in London and was by no means a genuine Muslim. He never said his prayers and was fond of alcohol. He knew he was dying of cancer but never let on, determined to be the first President of Pakistan.

All this time Sir Cyril Radcliffe had been struggling to work out a fair frontier between India and Pakistan. He was new to India and was assisted by two Hindus and two Muslims. Naturally they took opposite sides on every point of discussion, so Radcliffe had to make the decisions on his own. It was clear that the boundary was bound to run roughly north and south somewhere between Lahore and Amritsar. Then it would come to Faridkot and could run either to the west of Faridkot, placing Faridkot in India, or to the east of Faridkot, in which case Faridkot would be in Pakistan.

Jinnah now produced a bombshell. If Faridkot opted to join Pakistan he would hand over to him all the well-irrigated farmlands in the south of the Punjab occupied by Sikhs and would appoint him Vice President of Pakistan. This requires some explanation. After WW1 the British had settled thousands of Sikhs from the over-crowded areas of Ludhiana and Jullundur in newly irrigated parts of the southern Punjab. They had worked hard for two generations to build up productive farms. I had visited some of their flourishing villages when on tour. Faridkot himself had bought large tracts of country in the same areas as an investment. On the other hand if Faridkot acceded to India all these Sikh occupied lands would be under threat and would fall into Pakistan.

There was a lot to be thought about and we discussed Jinnah's offer at length. In the end I advised him to accept it, and he agreed. It is generally understood that only Kashmir, Hyderabad and Junagadh had failed to accede to India or Pakistan by 14th August. In fact Faridkot was the fourth. He had to give his answer by midnight.

That evening I was one of 5000 guests invited to the Viceroy's House. I remember strolling in the famous Mogul Garden as the sun was setting and being amazed that we were giving all this up. I happened to meet the Rajah of Faridkot and he invited me back to dinner to take pot luck at Faridkot House. There were only four of us – the other two being his wife and mother. We had an



Original water colour of Faridkot House in 1989.

elegant dinner served on silver plates which had once belonged to King Charles I. The other half of the service is at Buckingham Palace. Then we played Bridge, at which they were all expert. At 11 pm the Rajah stood up, saying he had to change. He came down again dressed in pale blue satin with ropes of jewels and a ceremonial sword. He had a five minute drive to the Viceroy's House and said, "Colonel sahib, why not come along to see the fun?"

This is where I slipped up. I had no doubt that he would accede to Pakistan and I had no official reason to be accompany him. I waved him away in his beige Rolls and walked out into the night to join the cheering crowds singing the brand new National Anthem as the Union Jack was lowered at midnight.

I did not see him again for many years and then he told me what had happened. Some men from Patiala had guessed what he was going to do and threatened to shoot him unless he acceded to India. I had thus missed my chance to change the history of India.

It was not long before I realized the consequences of my failure to ensure that Faridkot reached Mountbatten safely.

For a few days after 15th August everything shut

down. The Mountbattens went off to Simla to relax. There was no news of any sort. Delhi was quiet and I imagined that Faridkot was now in Pakistan.

On 19th August I was told to report to the airfield and was flown to Lahore. Here was the HQ of the Punjab Boundary Force under Major General Pete Rees, which had been set up to keep order across the new frontier. He had asked for 150 British Officers, but only got seven, of whom I was one. The rest were already at Bombay waiting for a ship to take them home.

I was sent to Amritsar, which had never settled down after the disgraceful episode in 1919, when the disgruntled Brigadier Dyer had opened fire on hundreds of innocent people in flagrant disregard of the well established Internal Security regulations. Two British officers had actually been killed in Amritsar the day I arrived.

I found myself in charge of 10,000 square miles of bloodthirsty riots. There was a British Brigadier, but I never saw him. He was away trying to get the politicians to declare a Cease Fire. I had seven Indian Army battalions to play with, but only two could be relied on, made up of Gurkhas and Madrassis. The famous regiments which had served General Rees so well in Burma had lost their British officers and also many of their Indian officers and senior NCOs, and openly took sides on racial grounds.

Just behind my office was a field where about 10,000 muslim refugees had settled. They were waiting for a chance to get to Pakistan only ten miles away. They had brought their cattle, chickens, dogs and anything they could carry but they had no food, water, sanitation or shelter. Many were wounded, but there was no medical help. People were dying and babies were being born. On top of all this we had a continuous downpour of tropical rain. A few brave individuals set off by themselves along the road to Lahore, but they were immediately slaughtered by men waiting in the bushes, and I could see their dismembered bodies lying in the ditch.

A telegram turned up in my office –"Lady Mountbatten and party of 24 arriving Amritsar 1800 hrs. Please arrange accommodation. Her Excellency prefers Irish whisky and Turkish cigarettes." There were no hotels in Amritsar but some house was made available. Next morning she appeared at my office in a break in the rain in a khaki uniform and wanted to see the refugees. She patted some children on the head, said "God, don't they stink" and flew off.

It dawned on me at last that Faridkot had never acceded to Pakistan, and all the many thousands of Sikhs that I had hoped to protect were under constant attack by Pakistani hooligans. Their villages which I had visited in happier times were being torched and looted and the inhabitants slaughtered or driven off. A convoy full of refugees trying to get to India was deliberately held up in Lahore and was fired on at point blank range. I met them in Amritsar with lorries running with blood, packed with the dead and dying. In another incident a man told me how his village was surrounded by a Muslim mob. There was no escape. The Sikhs decided to kill all their women and children and then go out and sell their lives dearly. But next morning their enemies had melted away. There is no end to such horror stories.

One morning I was in a jeep which skidded on a slippery road and fetched up in the ditch with me underneath it. I was fished out unconscious and covered with blood and taken to a nearby British hospital. I never heard what happened to my driver. I remember hearing President Jinnah giving a speech to the nation. He began in faltering Urdu, but then apologized for continuing in English. As I have said he was completely bogus.

A week later they removed the bandages and sent me back to Delhi, having lost all my possessions. Now Delhi was in a turmoil. I could see clouds of black smoke rising over Old Delhi. The smart shops in Connaught Circus were being looted, and mobs roamed the streets. There was no reason for me to be there, so I made my way back to Roorkee, where I still had a house, servants, horses, dogs and a car. The new Indian government invited me to stay on for seven years to help sort out the mess they were in, and I was glad to accept. I could not help feeling guilty for not ensuring that Faridkot acceded to Pakistan and was glad for the chance to make amends.

I made up my mind that next time such an opportunity came my way I would get it right.

## **Journal Awards**

The Budget, Investments, Membership, Scholarship, Memorial and Publications Committee announces the following awards for articles of special merit published in the December 2002 issue:

BRIDGE BUILDING (AND DEMOLITION) ACROSS THE GREAT LAKES by Major R K Tomlinson MBE – £100 HAVE MOSSIE NET AND SPARE TYRES – WILL TRAVEL by Brigadier J H Hooper OBE SBStJ – £75 THE SUPPLY OF MINES AND EXPLOSIVES TO ROYAL ENGINEERS IN THE CLOSE BATTLE – A SOLUTION by Major A J A MacLachlan – £75 SUPPORTING THE STTTS – OP *SILKMAN* by Lieutenant R G Millbank – £75 LEARNING TO LOVE BOWMAN AND DIGITIZATION by Major G E L Buckingham – £50 SAPPER CAUGHT ON CCTV by Staff Sergeant A D Peel – £50

## Annual awards for 2002 were agreed as follows:

Montgomerie Prize for the best article on a professional subject (£90 or set of Corps History):

Lieutenant R G Millbank for SUPPORTING THE STTTS – OP *SILKMAN*  **Arthur ffolliott Garrett Prize** for the best contribution on the technical aspects of logistic engineering (£120): Major A J MacLachlan for THE SUPPLY OF MINES AND EXPLOSIVES TO ROYAL ENGINEERS IN THE CLOSE BATTLE – A SOLUTION **Best Article Of The Year** prize (£120): Lieutenant B J W Day for TIMEWATCH: THE MYSTERY OF A TELEVISION PROGRAMME **Best Warrant Officer or Senior Non-Commissioned Officer Prize** (£60): Warrant Officer Class 2 R C Seymour for A SPARK ON A WIRE – LINE TAPPING IN NORTHERN IRELAND

### Awards for articles of special merit published in the April 2003 issue:

EXPEDITIONARY WARFARE AND THE CHEAP CAMP by Major J M Stephens – £100 THE PAHAR TRUST by Major J H G Parfect MBE – £75 NIGHT LIFE IN KOREA by "Nominal" – £75 ANDOVER ISN'T JUST A QUIET BACKWATER (OR WHAT THE ENGINEER SYSTEMS SUPPORT INTEGRATED PROJECT TEAM CAN DO FOR YOU) by Major S G Tenision – £50 PROJECT E-VOLUTION by Lieutenant Colonel R G Thomas R Signals – £50 NGA WAHI KATOA (UBIQUE) – THE CORPS OF ROYAL NEW ZEALAND ENGINEERS: A FIRST CENTURY COMMITMENT by Captain L Luff RNZE – £50

## Memoirs

LIEUTENANT COLONEL C E P MULHERN OBE Born 8 August 1908, died 1 March 2002, aged 93



GEORGE Mulhern was born in Gillingham, Kent and joined the Royal Engineers as a boy soldier in 1922. He trained as an architectural draughtsman and surveyor, serving at Chepstow, Woolwich and Dover before being posted to Shanghai in 1932 where, in addition to his military duties, he moonlighted as a sports reporter for *The South China Daily News*. His ability to write clearly served him well throughout his career and his many interesting and sometimes humourous contributions to the *RE Journal* continued until his 92nd year.

In 1936 George was posted to Cairo as Chief Draughtsman to the Anglo-Egyptian Treaty Building Committee. He was still there when the Second World War broke out and in 1940 he was commissioned and served throughout the North African campaign, mostly as a staff captain to the Chief Engineer in Headquarters Eighth Army, and continued with the Eighth Army in the landings in Sicily and the advance through Italy. He was Mentioned in Despatches.

Returning to the UK after the war, George was posted to BAOR and held various staff appointments during what was a major reconstruction period in Germany. He made many lasting friends, including his Polish batman with whom he kept in touch until his death.

Briefly returning to the UK, George and his family then went to Singapore where he served as ACRE Planning. Back again to the UK at the end of the 1950s, he spent the last five years of his army service in Headquarters Western Command at Chester in the rank of lieutenant colonel, retiring in 1963.

He was immediately appointed a Retired Officer in his old job and spent the next ten years loyally serving a succession of Chief Engineers, eight in all throughout his time in Chester. One of them was Brigadier (later major general) Bob Britten with whom he had had a firm friendship since BAOR days. When the General Officer Commanding visited on one occasion, Bob Britten introduced George with the words: "You think I'm your Chief Royal Engineer, don't you? Well, I'm not. George is really the Chief Engineer." It was an accolade he thoroughly deserved as his knowledge, efficiency and integrity were something of a byword wherever he served. For his services during this time he was appointed an OBE.

After final retirement and for the next nearly 30 years George continued to lead a busy life. In addition to being an active member of the Institution of Royal Engineers, the Civil Service Fellowship and the Alamein Eighth Army Association, he became President of the Chester branch of the Royal Engineers Association. He played golf into his nineties, using his golf trolley, as he liked to say, as a Zimmer frame, and incredibly scored a hole-inone in driving rain when he was 88!

George made many firm friends throughout his long life and his clarity of thought and razorsharp memory remained with him until the very end. He wrote and spoke about others with great affection and humour. Many were privileged to have served with him.

He met and married his wife, Mabel, in Shanghai in 1935 and they were to spend over "50 golden years" together before her death in 1986. He was later to describe her as his "adored, auburn-haired, vivid blue-eyed wife, his only true love". His son and daughter survive him.

RGM MRC

## MEMOIRS

## LIEUTENANT COLONEL E E N SANDEMAN OBE

## Born 11 March 1901, died 11 April 2003, aged 102.

ERNALD Eric Noble Sandeman (Sandy to his friends), was born on 11 March 1901 and commissioned in the Royal Engineers in July 1920. Posted to the Bengal Sappers in Roorkee towards the end of 1922 he joined 3 Fd Coy in Waziristan in the following year, working firstly on road construction and then as Assistant Garrison Engineer to build the Sarorogha Fort. After his two years in Chitral he returned to Roorkee and from 1932 commanded 6 Fd Coy which became 6 Army Tps Coy in the Nowshera/Rawalpindi area. Early in 1928 he found himself a member of the Chitral Relief Column making the arduous 150 mile march to Chitral over the Lowari Pass. It was the beginning of a two year tour and one of the most memorable experiences of the whole of Sandy's career.

The Chitral Valley lies between high hills of snow and scree and occasionally sheer cliffs. In winter Chitral was, in those days, isolated by snow from the country south of the Lowari Pass and even in summer all movement then was on foot, pony, mule or camel. The Chitralis were ruled by the Mehtar under the protection of a small Indian Army garrison. The only means of crossing the Chitral River was the existing suspension foot bridge. However, the Mehtar had acquired a little Austin 7 tourer and a much heavier Wolsley 12 saloon that had been carried bodily over the Lowari on poles by coolies, the Austin in one piece, the Wolsley in several. Sandy's orders were to design and build a bridge strong enough to take the Mehtar's cars over the river. The design and construction were remarkable achievements when it is considered that the major components had to be carried over the Lowari, in particular the twenty 500 ft SWR cables each weighing 1.25 tons loaded in sections on trains of eight camels. It takes a little imagination to envisage twenty camel convoys

snaking up the 10,400 ft pass – all accomplished without a single mishap. The bridge which was built was effective over a span of 300 ft with twin masonry towers on each bank. Despite a modern bridge which now carries heavy traffic, it is believed that Sandy's bridge is still in use – quite a tribute to the robustness of his design.

In 1934 Sandy reverted to the home establishment where he was employed in works in various locations and as Fieldworks Major of 6 TBRE. In 1940 he was back in India as OC Forming Troops Bn at Roorkee and in 1943 was given command of 23 Engr Bn which was employed on bridging and airfield construction and maintenance in Burma. He remained in command until May 1945 when he reverted again to home establishment to take command of 7 TBRE. He then went to 65 CRE in Palestine, followed by jobs as Planning Officer to the Chief Engineer in Kenya and SO1 RE East Africa before retiring to the UK in 1953.

During his service he was three times Mentioned in Despatches and later he was awarded the OBE. After retirement he became the first Head Librarian to the Corps Library in Chatham and stayed in that appointment from 1953 until 1966. Until 1982 he was much engaged in fund raising for sports facilities in his home village of Biddenden in Kent. He had throughout his life abroad been a keen sportsman and indulged particularly in hockey, polo, shooting and fishing. He made frequent treks in the Himalayas and into Sikkim and Tibet.

The 11th March 2001 was an occurrence of much celebration in his village as it marked his 100th birthday. The Bengal Sappers Association arranged with the Corps Secretary for a specially printed certificate, signed by the Chief Royal Engineer, to be sent, which gave him great pleasure. Sandy was a devoted Bengal Sapper to the end of his days and all who knew him spoke of him as a most approachable man who had a facility for making and keeping friends and endearing himself to his family. He died just one month after his 102nd birthday and is survived by his two daughters, Barbara and Jane.

DDA

#### BRIGADIER J R E HAMILTON-BAILLIE MC

Born 1 March 1919, died 16 April 2003, aged 84.



JOHN Robert Edward (Jock) Hamilton-Baillie was born in March 1919 and educated at Clifton College and The Royal Military Academy, Woolwich where he was awarded the Pollock Medal for the most distinguished cadet of his intake. He was not a games player, but in those early days was a strong horseman. He reached The Saddle Ride at The Shop in 1938 but let this skill lapse in later years. He was however exceptionally good with his hands, whether making, mending or indeed, forging things as he later demonstrated in Colditz and other PoW camps. After the war, he attended Sidney Sussex College, Cambridge and achieved First Class Honours in the Mechanical Sciences Tripos.

Jock Hamilton-Baillie had no family connections with the Corps, but was commissioned on 27 Jan 1939 as Batch Senior of No 41 Batch, one of whom was 2Lt A E Younger, later to become Major General A E Younger DSO OBE and a Colonel Commandant of the Corps.

2Lt Hamilton-Baillie was posted to 26 Fd Coy as a Section Commander and went with it to France in September 1939. The Company was initially in support of 1st Division of the British Expeditionary Force, later on transferring to 51st (Highland) Division. "HB" as he was known at

the time, was wounded and taken prisoner when the Division surrendered at St Valéry-en-Caux on 12th June 1940. He was sent to a French hospital at Rouen and after recovering from his wound, went to a PoW camp at Peronne near Amiens from where he and another officer escaped by scaling the wire. They were free for three days before recapture. From then until his incarceration in Colditz Castle, the prison for persistent escapers, his life was a succession of escape attempts and subsequent moves to various prison camps. From Peronne, he went to Laufen where he engineered a short tunnel that was discovered before it could be used. As a result, he was moved to Tittmoning on the Salzach River. He escaped alone from there, and was free for ten days. His map indicated he was on the Swiss side of the river, but it was wrong and he was recaptured literally just yards from freedom. A letter to The RE Journal in 1979 from Lieutenant H W Ashton describes HB's sense of honour, demonstrated at that time: "Someone suggested the day before his escape that Hamilton-Baillie should deposit his pliers, stolen no doubt from the Germans, [and which he would use to cut the wire], at an appointed place outside the camp where we sometimes had a parole walk. The Senior British Officer ruled firmly against this. It was a point of honour that no advantage whatever should be taken on a parole walk to further escaping activities. I have no doubt that those pliers were thrown away where they would never be found by us on the next parole walk". Whilst at Tittmoning, HB made a perfect Geprüft rubber stamp using a razor blade and a rubber heel off a shoe. This was used many times to "censor' papers so that in a search, the Germans passed over them!

After his recapture, the Commandant at Tittmoning sent him on to Warburg in the Ruhr. This was the scene of an escape attempt that has become *de rigeur* to mention in all histories of World War Two escaping – "The Warburg Wire Job". The escape reflected an important change in strategy away from individual escapes towards attempts to engineer mass escapes, and thus force the redeployment of German resources. The plan was that 40 prisoners would escape over the wire, at night, in three minutes, whilst 50 others distracted the sentries. HB helped design and build hinged ladders made from duckboards and roof-beams. One leg was to reach the top of the wire, and the other spanned its three-metre width

to allow the men to cross over and swing down to the ground, using a built-in trapeze bar. The perimeter lights were fuzed by using string to pull a spanner across an open switch. Forty-one prisoners escaped – three of them making a 'home run'. Meanwhile, HB, who was not part of the wire party, carried on digging a tunnel hoping to escape in the general confusion. Tragedy struck however when John Du Pre of the Seaforth Highlanders was trapped by a roof fall. The German guards were called to help dig him out from above, but he was dead when they reached him.

As a result, Hamilton-Baillie and some other officers were transferred to Oflag VIIB at Eichstätt in Bavaria. He soon became regarded as the 'Chief Engineer' and designed and helped to construct a long tunnel under the wire to a building beyond it. On June 3rd 1943, 65 prisoners including HB, escaped through it. All were recaptured within two weeks. HB himself was only out for two days and was sent straight away to the 'bad boys camp' at Oflag IVC, Colditz. He made a detailed survey of the castle to try to find a way out. He never did however and remained there until the camp was liberated by the Americans on 16th April 1945. In December of that year, his Military Cross was gazetted in recognition of his resolute escape attempts and efforts on behalf of other prisoners.

After his release from captivity, he joined the staff of the SME at Roorkee in India as the Brigade Major. He left there in 1947 to attend the SME, then still in Ripon, for a pre-Cambridge mathematics course after which he went on to study for the Mechanical Sciences Tripos. In the University year 1948/49 he achieved his "First", passed the Staff College examination and produced a most successful village play at Duxford, raising a four-figure sum for the bells in the church. During what "spare time" he had, he helped his wife look after their first baby!

He then became a student at the Staff College, Camberley, moving in 1951 to The War Office as DAAG in AG 14 (I) where he remained until 1955. He then returned to Germany, this time as OC of 5 Fd Sqn in 23 Fd Engr Regt at Dortmund and later as GSO 2 RE in HQ 2 Inf Div at Hilden and G3 Ops of HQ NORTHAG. During this time he attended a long course in Nuclear Weapons Technology at RCMS Shrivenham which included a trip to Maralinga in Australia to witness the explosion of a weapon.

In 1959, he moved to Chepstow as Chief Instructor of the Army Apprentices School - the first Sapper CI on recovery of the school from REME. A two-year 'sunshine tour' in Aden then followed as AQMG (Eqpt) in HQ MELF. In 1964 he returned to the UK to become the first Col (E) Engr 2 (Airfields) when the Corps took over airfield construction from the RAF. This was a tricky management task he accomplished with considerable determination and sensitivity. A further tour in Germany followed as Col 'Q' Quartering HQ BAOR at Rheindahlen, leading to his final post from 1970-74 in HQ EinC in the MOD. He took this job as Brigadier Engineer Plans, but got agreement to change the name to Director of Engineer Services. During this time, he was ADC to the Queen from 1972-74 and also wrote most of the RAF manual on Airfield Criteria

After retirement, he was a Senior Lecturer at the RMCS from 1974-83 and wrote ME Vol IV "Soil Mechanics and Foundation Engineering". He was a Vice President of the Institution of Royal Engineers and a member of the Corps Publications Committee.

He had always had an interest in the history of fortifications and was Chairman of the Fortress Study Group. He was also a member of the RE Historical Society, The Newcomen Society and was a member of the historic concrete working party of The Concrete Society. Amongst other things, he published articles on the history of fortifications and historic concrete. For some 40 years he gave talks about Colditz and other PoW experiences for events to raise money for the Red Cross, in recognition of the role the charity played in feeding PoWs during the war. He would present his slides and remarkable memorabilia from Colditz and other PoW camps, including the flag flown from the battlements of the castle as the American tanks approached, and a complete set of the keys of the prison! He made a video recording of his talk entitled "The Road to Colditz", with all the proceeds once again going to the Red Cross.

In 1947, whilst at Ripon, he married Lettice Mary (Letty) Pumphrey. In 1966, fate struck a cruel blow when Letty suffered a severe stroke and it was feared that she could no longer live a normal life.

Jock would have none of this and by their joint superhuman efforts, she made a remarkable and quite unexpected recovery, able to run the home, drive a car and ride a disabled scooter. She also attended functions of all sorts and in return, entertained liberally. In later years, Jock devoted himself to her support until she died in 2001. They are survived by their four children, Thomas Richard (Lt Col (Retd), RGJ), Griselda Mary, Benjamin Robert and Katherine Maud. Between them they have produced eight grandchildren who in various ways have harvested some of their grandfather's talents. One has a passion for making models and getting them to work, one is a very competent woodworker using many of his grandfather's tools and one granddaughter is totally gripped by Colditz and reads everything she can about it.

All eight regard their grandparents with awe and devotion.

TRH-B BRH-B GMK CHC

## **CAPTAIN J W WRIGHT MC**

## Born 12 April 1922, died 2003, aged 80.

JOHN Wright, who has died aged 80, was awarded an immediate MC in 1944 for his courage and inspiring leadership at the battle of Kohima.

He was born on 12 April 1922 at Paignton, Devon and was educated at St Paul's before going up to St John's, Cambridge where he read Engineering and played rugby for his college. In 1941, after only a year at university, he went to the 2nd Training Battalion RE at Ripon before going to OCTU at Aldershot. Commissioned in 1941, he was posted to Roorkee and later joined 2 Fd Coy of King George V's Own Bengal Sappers and Miners in the Western Desert. At Ruweisat Ridge his unit was engaged in strengthening the British positions in the centre of the Alamein Line. At the battles of Alam Halfa and El Alamein, they were deployed as assault engineers, opening up gaps in minefields and destroying enemy equipment behind the advancing infantry so that the armour and support vehicles could pass through quickly. The Company eventually returned to the Far East; John was still with them, commanding a platoon. On April 7 1944, He received a call for support from Captain Donald Easten, a company commander with the 4th Bn Royal West Kent Regiment. An assault by two companies of the RWKs to clear Detail Hill to the south of Kohima had left a

hard core of Japanese troops still holding out in a large building which was identified as a bakery. The building, with one brick wall and three bamboo walls under a tin roof, slits for windows and containing six ovens, kept the Japanese relatively safe from grenades or automatic fire, but provided them with deadly coverage of the RWK's positions. The only way to dislodge them, John and Easten decided, was to destroy the walls. John tied 22 slabs of gun-cotton to a light-weight door and added a detonator and fuze. Supported by a Lance Naik from his unit he then charged up the hill carrying the door, slammed it against the brick wall which backed onto the ovens, ignited the fuze and ran back. A tremendous explosion resulted and the survivors bolted from the building into the waiting guns of the RWKs. On April 9th and 10th, a succession of assaults preceded by a heavy artillery bombardment, brought the enemy to within 20 yards of the garrison. John and his platoon were holding part of the perimeter when it came under intense gun and mortar fire, causing trenches and dug-outs to collapse. Disregarding the shelling, John rallied his men. Although they were dazed by the bombardment, they were able to beat off the attack that followed. John was wounded later in the siege and, after blood poisoning had set in, was hardly able to use his hands.

He continued, nevertheless, to keep up the morale of his men and to steady other detachments of troops that had lost their officers. He was awarded an immediate Military Cross.

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## MEMOIRS

## MAJOR F I ROBBIE Born 14 May 1925, died 1 May 2003,

aged 78.



MAJOR Francis Ian Robbie was the elder child and only son of Francis and Jessie Robbie. After an engineering apprenticeship at Rolls Royce in Derby, he enlisted in 1945 as a Pioneer Student, which at that time was a system for recruiting officers into the Technical Corps. After the usual Training Regiment, WOSB and 140 OCTU at Newark, Ian was commissioned into the Corps in 1947. Posted to Palestine expecting to be a GE, he volunteered, and was accepted for, service in 6th Airborne Division. As a troop commander in 147 Airborne Park Squadron, Ian served during the worst periods of the "Troubles".

Tours in the UK, including one as an instructor at the Camouflage School, followed. He then went to BAOR where he served in 38 Field Squadron of 23 Engineer Regiment in Dortmund. From 1956 – 59 he was a GE in Singapore.

Retiring from the active list in 1961, Ian joined the TA and from 1963 to 67, was OC of 238 Corps Field Park Squadron in Paisley. At the time, he was working for Atlas Copco Ltd, but later moved to the architectural practice of Donald, Smith, Seymour and Rooney and then to International Harvester (Construction Equipment Division).

Moving to Surrey in 1971, he became Treasurer and later the Chairman of the Windlesham Branch of The Royal British Legion, in which posts he was much consulted by the Legion HQ on options for the way forward for the Legion. He was also a long-time member of The Institution of Royal Engineers, the Airborne Engineers Association and a Friend of the RE Museum. By his contributions to the Legion, the AEA and FoREM, Ian maintained an interest in and support for the Army and the Corps to his dying day. He died on 1st May 2003 after a long battle against cancer. He is survived by his widow Jane, his son Alistair and daughter Jennifer. His second daughter, Susan, predeceased him.

IGS EW

## COLONEL EC O'CALLAGHAN MBE MC

Born 5 January 1923, died 23 May 2003, aged 80.



As his name suggests, Eric O'Callaghan was of Irish extraction but he was born and raised in Gosport. Clearly, though, his ancestors' genes were present in him in full measure for he lacked for nothing in courage, he sought – and found – lots of adventure and he was always "up" for a party!

Like so many of his contemporaries, the Second World War coincided with Eric's adolescent urge to fill every "Kipling Minute" with "sixty seconds" worth of action. The War started whilst he was still as school and he volunteered for the Army as soon as he was eighteen. He was commissioned into the Royal Engineers in 1942 and by September of that year he had joined 9th Field Company (Airborne). It was with this unit that he took part in the assault on Sicily in the following July. Like so many other gliders in this operation, Eric's landed too far from his objective for him to be able to reach it in time. Typical of the man, rather than lie hidden until the relieving forces arrived, he decided that it would much more useful if he could create as much disturbance and disorganization in the enemy lines as possible. He located what turned out to be an Italian battalion headquarters and, with the few soldiers he could muster, he

attacked it and caused heavy casualties and confusion. For his courage, resource and initiative he was awarded the Military Cross.

After the capture of Sicily Eric returned to North Africa with 9 Field Company (Airborne), then to Italy before returning to England at the end of 1943 to prepare for the invasion of Europe. On 17th September 1944 he was commanding the 2nd Platoon when they landed in Holland as part of the 1st Airborne Division. Eric's mission was to capture the railway bridge which was en route to both the pontoon bridge and the main road bridge which crossed the Lower Rhine at Arnhem. On the way to his objective he was astonished to come across a platoon from 2 PARA who, unknown to him, had also been given the same task. Coordinating their attacks, and in the face of direct fire, they succeeded in forcing the enemy to withdraw to the far bank. However, as they arrived at the end of the bridge the centre span was blown. Miraculously none of 2 Platoon was injured by this blast but, clearly, there was now no bridge to capture so Eric followed the sounds of battle. He led his men on and, after a number of excitements on the way, they joined the ranks of a much-depleted 2 PARA at the now-famous 'Bridge Too Far' where he and his men played a full and herioc part in the battle for the Arnhem bridge. The deeds of the following days are too numerous to mention here but one unique distinction which Eric earned was that of having his nose broken by a dead man! A German NCO crashed through the window of a house that Eric was defending, Eric shot him but, in death, the NCO's momentum landed his boot right on Eric's nose. He bore the mishapen result for the rest of his life. But his luck eventually deserted him and, after three days and nights hard fighting, Eric was wounded in the head and awoke to find himself a prisoner of war. There followed some grim months in German hospitals and camps before he was liberated in April 1945 and he returned to England. For his actions at Arnhem he was Mentioned in Despatches.

After recuperation Eric was posted to 1st Airborne Squadron and went with it to Palestine in October 1945 for a hectic and demanding two years, first as a troop commander, then as Adjutant and finally as OC of the Squadron. One memorable tale of his doings there tells of the discovery of a domestic hot water tank, crammed full of explosives and resting on a milk float in a built up area. Eric could not blow it up in situ so he got one of his sappers to drive the milk float to a beach near Haifa while he straddled the bomb, to stop it rolling off, and kept the sweating explosives cool with a watering can. He was awarded the MBE for his gallantry.

On return to UK in July 1948 Eric remained in command of the 1st Airborne Squadron as it absorbed the remnants of 9 Field Company (Airborne) and was re-designated 9 Airborne Squadron. He then handed over command of the new squadron as it departed for BAOR where, subsequently, it also absorbed the remains of the 3rd Airborne Squadron to complete the foundation of what is now 9 Parachute Squadron.

Postings in Wiltshire, Chatham, Fort Belvoir, Germany and the War Office followed which continued to satisfy Eric's wanderlust. In the early 1960s the value of his wide experience was recognised by his being appointed Company Commander of Rhine Company at Sandhurst. Affectionately nicknamed Calor Gas (possibly a reference to his loquacity!) he was held in awe and respect by the Officer Cadets. He was determined to have the best Company in the Academy and that ambition was achieved when Rhine won Sovereign's Company twice during his tenure. Sapper Officer Cadets, including at least one future E-in-C (GWF) had much to thank him for.

After command of a regiment in Cyprus Eric was promoted to Colonel and sent to the Plant, Roads and Airfields Wing at the RSME as Chief Instructor. His reputation for firmness was, by now, well-established. However, there was no doubt that this was more than matched by his fairness. On one famous occasion, he upbraided the YO's for being rather dozy one morning as a result of excessive carousing the night before. He then discovered that his own daughter had been one of the guests at the party. Admitting some indirect blame for their debilitated state, Eric immediately withdrew the punishment!

Eric's long and distinguished military career came to its close in the early 1970s as Commandant of the Apprentices College at Chepstow where his example, high standards and guidance set many of the Corps' best tradesmen on the road to becoming fine SNCOs, Warrant Officers and Officers.

In retirement Eric applied his enthusiasm and robust sense of humour to his new career as a financial advisor and he quickly demonstrated his ability and success here. He also devoted much time to keeping in touch with old friends and, in particular, to making sure that the sacrifices that young men of his generation made in WW2 were not forgotten. The men under his command that he had lost in action where never far from his mind and age did not dim his ability to list their names. He thought of them every day of his life. It was their loss, perhaps, that increased his determination to make the most of his life and his zest continued to the end.

In a life of memorable achievements Eric was most proud of having met and married Caroline at an age when most of his contemporaries were contentedly pruning their roses. To have their union blessed by two children in almost the twilight of his life filled him with indescribable pride.

A warrior, a raconteur and a caring, amusing father: this was Eric. To Caroline and his children Susan, Sarah, Victoria and Matthew we extend our sympathy. He will be greatly missed.

## Correspondence

## LESSONS FROM THE APRIL EDITION

From: Lieutenant Colonel M W Whitchurch

Sir, – I congratulate the Editor for his April edition. The mix of articles was interesting, instructive and stimulating. Our Corps Journal is being reviewed and I offer the view that it is 97 per cent right, and needs little change.

Expeditionary Warfare and The Cheap Camp was delightful. I hope this article has been noted and that the lessons will be applied to future operations. Looking at the wider context of Major Stephens' article, there is another lesson that is vital to Afghanistan's reconstruction; projects like this help the local economy by a chain reaction that ignites enterprise in the area. Therefore, don't get fittings from Blighty; but from Pakistan or somewhere local. Equally, the horizontal work done by 48 Squadron can be done in the same way as the STRE; use local contractors under quality supervision. Add on organized local government and improved security and some of the ingredients of nation building are there. The Economist published a special article recently that made the point that emerging economies are less prone to descend into war and other chaos.

Therefore the lesson is more RE in the supervising role that ignites the local economy and helps build nations. As the nation develops, (trained engineers, managers and so on), the RE recedes. It is clear that Major Stephens and 518 STRE are on to something.

*Nightlife in Korea* was an absolutely splendid study in the reality of war and "Nominal" has done the serving Army a valuable service – if they study this article. Used by an instructor, it brings out a host of lessons. I would have my students study it in detail and then answer the following questions:

- What do you learn about the article?
- How would you deal with the loss of that NCO who died in your place? What form of writing would you use in the letter of condolence to his family? What role would SHQ and the Officer Commanding play in this matter?
- Comment on the idea of reverse slopes, the use of

indirect fire and coordination with the standing patrol, the use of airburst over friendly troops and the implications of fortifications. Could our designs stand up to 155 mm L15 HE? What pre-operational training might be done to give troops confidence in such a tactic? If you were the enemy attacking this position, what could be done to counter this tactic before, during and after the attack?

- Communications were lost frequently when the enemy bombarded the positions – what can be done about this? Describe your arrangements and give examples of the verbal orders you would give, and to whom, as a Company Commander and an RE Troop Commander.
- The Troop Commander decided to rescue the wounded Korean soldier and was told off by his OC. What would you have done if you were the Troop Commander? Give a sample of the orders you might give.
- At one stage, the troop had to hold the ground until relieved by the Infantry. With your current troop organization and weapons, how would you lay out your defence? What, if any additional weapons would you seek? Is our current training adequate for RE to act as Infantry? We take pride in this emergency role, but can we do it well?
- The raid was described as poorly planned. Describe how you would plan such a raid. Comment on the collection of weapons by the troop commander.
- As part of training for a tour in war like this, what training would you wish to do before and during the tour?

In order to help those who may wish to use "Nominal's" article in this way, I will send the editor a précis of possible answers for any instructor.

Finally, in my experience, veterans who were there are always invaluable in any controlled group discussion. These should be run on the lines of the BBC's Question Time. You then add the right environment, (the Ante-Room with coffee). Try it, as I intend to at the next chance.

The ChAVRE Story. David Clegg is too modest to reveal that his MBE was for the work he did in the making of Chieftain AVRE. The credit must go to him and others like Lieutenant Colonel James Johnson, Major (now Lieutenant Colonel) David Holtby and Major (now Colonel) Malcolm Croft for their laudable and workmanlike solution. Their work was splendid. Add the drive of Brigadier (now Major General) Peter Sheppard with his close support concept, and there can be no doubt that RE capability was improved. The story is nicely recorded in the September 1987 edition of *The Journal* and is worth reading as an example of what is now called Force Development.

Despite this, there is a wider and starker lesson:

### The Army, (read The Staff), failed the Corps.

Having seen this project at close hand and seen the subsequent work to date, I offer this lesson: It was for the staff to produce a proper replacement for the Centurion fleet, and not right that the Corps had to improvise in such a manner. This should have been part of the new Challenger One fleet. The acid test of this statement is war. An RAC officer who was a squadron leader in the first Gulf War reported in 1991 that it was unacceptable that the guarantors of our mobility were on chassis that were nowhere near Challenger One's ability.

Chieftain AVRE had in fact less mobility than Centurion. It had no protective firepower and its fascine launch equipments were not armoured and overstated. Consider the Pearson's Dozer, add a jib and a winch (like the US AVRE equivalent of the day) and minor gap crossing is solved just as easily with a Centurion AVRE, but retaining the demolition gun and protective firepower. The controversy on demolition guns is a separate matter and not touched on here. In the first Gulf War, supporting RE were simply left behind once the pursuit started although given the emerging Iraqi ineptitude, this was a fair decision. However if the enemy had been of quality such as The Afrika Korps, The Waffen SS, The Viet Cong, The Chinese or The Israeli Defence Force, we would have been found out. Next time, our luck may not hold. Had the staff done their job correctly, the RE tank fleet would have been treated as one family (RAC and RE and REME derivatives). Given Major Simon Tenison's article on Engineer Systems Support there is a real chance that this mixed fleet failing will not be so in the future. RAC and REME are now on the same chassis and RE will be soon.

Reactions to my comments such as "best is the enemy of the good" or Kitchener's maxim, "Fight as you must, not as you would like", are valid, but that is not to say that we should try to do better. The laudable work of regimental officers and their CCRE is no substitute for the duty of the staff to get the right tanks, and that means an industry that can build better tanks than Willich ever could. I hope with the current work of the staffs and Vickers who are making our next AVRE and AVLB, this will never happen again. Floreat the Corps Journal! – Your Obedient Sapper, Sticky.

#### DIVINING

#### From: Lieutenant Colonel (retd) R J G Begbie

Sir, – In 1945/46 I was DCRE Somaliland Sub Area, with my HQ in the capital, Hargeisha. It was a wonderful appointment as the PWD had not yet been re-activated, so I was responsible for all engineer services both military and civil in the Protectorate, and my next senior engineer was 1000 miles away.

Towards the end the dry season in March 1946 the water supply situation was becoming desperate. At the best of times we could only manage a ration of three gallons a head per day for all purposes, including water for the vehicles. It wasn't much in a hot climate and by the end of March I had to reduce the ration to two gallons and was only maintaining that by trucking water in from Darbarruck 40 miles away. In the end I appealed to the chief engineer in Nairobi for help as I was at my wit's end.

He flew up on the next plane, full of confidence that he would solve my problem as he was a diviner. He used a watch spring holding the two ends in his hands with a loop in between. He told me to drive slowly over the ground and when the loop dipped we would stop the truck and get out. He walked slowly over the ground where he had got the reading in the car. He would then find three spots several yards apart where the loop bobbed up or down. The water would be under the second spot and its depth would be half the distance between the first and third spots. Sure enough, we found water in good quantity at exactly the expected depth, namely about 30 feet down. He encourage me to try divining, and to my surprise I found that I could, though not as exactly as he could. So he returned to Nairobi well satisfied with his efforts.

But my problems were not over. A week or two later the Governor, Sir Philip Mitchell, sent for me and told me I would have to shut down at least some of my new wells. It turned out that we, following the practice of the PWD before the war, had employed a local to indicate to us the best places to find water. But this man was in the employ of the local sheiks, who had instructed him to show the white men only the poorer sources of water. I was not drawing water from the best sources upstream from the Somali wells which not only supplied water for the population, but also for all the camels and goats which were in the Hargeisha magalla for the dry season. So, said Sir Philip, he would have a riot on his hands if we didn't reduce our consumption from the new wells. So I had to reduce the ration again and revert to trucking water in from the Darbarruck wells. Fortunately, a week or two later, the rains came. Yours sincerely – Dick Begbie

#### NOTABLE BENGAL SAPPERS

#### From: The Lord Napier of Magdala

Sir, – Very many thanks for sending the *Royal Engineers Journal* containing the article on notable Bengal Sappers.

The entry on my great grandfather is excellent – an excellent balance between his engineering feats and his military exploits.

I was also interested in the post-script. For what it is worth, at least two others of Napier's sons were serving officers in India, although perhaps not Bengal Sappers: Robert William (who was his father's ADC for several years) and George, Robert's twin, who was sent by Napier on a "Great Game" exploit. My grandfather Eddy was a civil engineer in India. You mentioned my father. If I had had to do National Service, I would probably have joined up as a regular sapper; indeed I kept my options open while up at Cambridge, in the OTC RE Section, until the Cert B course clashed with my rowing. My ambition for a blue took precedence! My brothers and I are all engineers of one kind or another Yours sincerely - Rob Napier

## NOTABLE BENGAL SAPPERS

#### From: Brigadier (retd) G G Blakey

Sir, – I read with interest General Sir George Cooper's fascinating article on the Bengal Sappers, particularly the description of the attack on the fortress at Ghazni. My great great grandfather, Captain George Thomson, Bengal Engineers, was involved with Peake and Durand in blowing the Kabul Gate and was also awarded a CB. I had always understood that he was in overall command of the demolition party. The operation is well written up in Patrick Macrory's excellent account of the first Afghan War, appropriately titled "*Signal Catastrophe*". Captain Thomson left Elphinstone's doomed expeditionary force and was posted back to India soon after the fall of Ghazni. Had not this been the case, it is unlikely that I should be writing to you! Yours sincerely – Gerald Blakey.

## **OPERATION** FRESHMAN

#### From: Brigadier (retd) J H Hooper

Sir, – I was recently fortunate to be in Norway on 17th May which is the Norwegian National Day. The Day is one filled with parades of numerous brass and jazz bands, every conceivable organization from school classes of all ages, voluntary organizations of all descriptions and clubs for volley-ball, hand-ball, soccer, rugger, judo, juggling and gymnastics, country dancing, line dancing – the list is almost endless. The parade took well over an hour and a half to pass and there were two of these parades during the day.

The 17th May is also the day on which the Norwegians remember their war dead, much as we do ours on Remembrance Day. I was invited by Major General James Short (Chief of Staff, JHQ North and SBO Norway) to attend various acts of remembrance held at the Norwegian War Memorial, the Russian War Memorial and the memorial to those who died on, or were later killed after, Operation *Freshman*, (the abortive raid on the "Heavy Water" plant in 1942). The three memorials are in the Eigenes Gravlund in Stavanger, and because of the other celebrations which were scheduled to take place, the memorial services started at 0700hrs.

The ceremonies were most moving, with a band in attendance and crowds of Norwegian men and women in their very colourful national dress. At the Norwegian Memorial there was a short religious service with hymns and their National Anthem sung in Norwegian followed by a wreath laying. At the Russian Memorial, (several thousand Russian prisoners died or were killed in the area), there was just a short prayer in Russian and the Russian National Anthem was played.

At the British Op *Freshman* memorials (there are two), a prayer was said in English, our National Anthem was played and wreaths were laid by the Mayor of Stavanger who also said a few words of appreciation. A further wreath was

laid by a representative of the SAS who had taken part in the liberation of Norway in 1945. The SBO Norway and the senior Royal Engineer officer in the area, Lt Col John Fitzgerald, serving in JHQ, were present at all three ceremonies. The first memorial is in black marble which is appropriately inscribed to the twenty six members of our Corps, the four glider pilots and the crew of one of the Halifax tugs buried there. The second is a large plain local stone inscribed with the names of four Sappers who were tortured to death and their bodies thrown into the sea and never recovered. This latter memorial was placed in position and dedicated in 1985.

Later in my visit, at the SBO's house, I was able to meet the two visiting SAS representatives and two retired British servicemen who have been largely responsible for keeping the memory of the British war dead alive, although there is no mistaking how much the Norwegians appreciated, and still do appreciate, the British efforts on their behalf during World War 2. Eric Mills served with 1st Airborne Division and dropped at Arnhem, escaping across the river to rejoin the Division for the liberation of Norway in 1945. He was later "captured" by a Norwegian lady and has lived as a happily married man in Stavanger for the last forty or so years. From Peter Jeavons, a retired Wing Commander RAF, I obtained a copy of the report on Op Freshman written by the then Lt Col MCA Henniker. Peter took on the job of organizing the various annual visits and ceremonies of 1st Airborne veterans from Eric.

Many of your readers will have seen the excellent article on Op *Freshman* written by Colonel Chris Davies in the *Journal* of the Airborne Engineers Association (April 2003 Issue No 9) and there is also a very good account of the operation in the March 1946 issue of the *Journal* of our Institution. For those wishing to get further information, an internet visit to www. stephen-stratford.co.uk is valuable as are the books "Operation *Freshman*" by Richard Wiggan, ISBN 0-7183-0571-X and "Blood and Water" by Dan Kurzman, ISBN 0-8050-3206-1. Yours sincerely – John Hooper.

## **BRIGADIER D ROSS CBE**

*From: Lieutenant Colonel (retd) F R Howell MBE* Sir, – I am surprised that Donald Ross' Memoir makes no mention of, arguably, the most important phase of an officer's career – command. Indeed it is says that "his last regimental appointment" was 2IC of 37 Regt.

Not so. Donald was the CRE of 2 Division, stationed in Lübbecke, between 1958 and 1961. In 1959 I joined him there from Joint Services Staff College, Latimer as 2IC RE. Admittedly this was one of those periods when numbered divisional sapper regiments had ceased to exist and self administered field squadrons were bedded out with their brigades. Though a great delegator, there were few occasions when the squadrons – and the brigade commanders – were unaware of under whose real command they were!

Donald had another amusing and endearing trait of falling asleep whenever things got a bit routine or boring, be it during lectures, meetings, long sailing passages, when visiting syndicate discussions at 'B' Div of the Staff College, or even at dinner parties! But he was instantly awake at the slightest movement or situation change. However, on exercises, we could never get him to go to bed after he had handed over command. He would sit at the end of the ops vehicle, taking no part in the proceedings, nodding off until the clatter of his pipe on the floor warned the duty officer and me that it was time to frog march him to his bedroll!

I owe much to Donald for his willingness to trust and delegate which helped me to do the same, I think, when I took over command of 25 Regiment a couple of years later from John Hanson (also Memoirs April 2003). Yours sincerely – Ray Howell

#### ACHIEVEMENT

### From: Lieutenant (retd) G P Webb

Sir, – One reads of the ascent of Kanchenjunga one climber reaches the summit - one dies! Of course, climbing should never be an organized military exercise, as Everest was! The glory in the achievement is in the attempt to reach the summit and not the summit itself!

I am sorry I misinformed you and your readers in the April edition. With Kanchenjunga towering above, the trek must have been through Sikkim via Gantok to the borders of Tibet. I crossed into Tibet via the Lachen or Lachung Valley. At that time, no border patrols, no soldiers! One just stepped from one country into another. How simple! How delightful! How one wishes for those procedure free days – "If wishes could be so, the beggar would be king".

Memories will end! What is left? An emotion which embraces India from Cape Cormorin to the Khyber Pass – a vital time of one's life that will live for ever.How can one repay India for her experiences, freely given, garnered over a lifetime! Unforgettable memories!

Sad! One scarcely recalls the ambiance of 1944/45, a time when the habits and customs of pre-war India still existed. Life went on unbidden. One called for a "garrhi" or "tonga" - horse drawn traps which were the taxis of those days.

A leisurely and unhurried time. One went to the hill station Simla which represented the social life of the expatriates of those days. During the monsoon heat the women went to Simla and the men sweated it out in the plains with an occasional weekend up to the hills and pine trees of Simla. Glorious walks on every side and one could look down on the plains below! Yours sincerely – Geoff Webb.

## **SHORT MEMORIES OF 1953**

#### From: Major (retd) A S Hogben QGM

Sir, – Following the request for articles relating to one's activities within the Corps during 1953 it is not surprising that many persons thoughts turned towards Korea. However, for some of us, other things, important perhaps only to us, were taking place. For me it was the first time I saw Her Majesty the Queen, the year I received my regular commission in the Corps and my first OPMAC task, although at that time I don't think the term existed.

In January 1951 as a National Service REME officer, I was posted to 36 Army Engr Regt based in Ripon, Yorkshire where I was being evaluated for permanent transfer to the Sappers. On arrival, I joined Wksps Tp, 20 Army Fd Pk Sqn and in April 1953 was granted a regular commission in the Corps. During this trial period it was explained to me by the Regimental Colonel (Col Gerald Napier) that it was essential that I learn to ride a horse. This was not an entirely new skill for me, but during my first year at Ripon, I spent two mornings a week from 6am to 8am having equestrian instruction. The CO of 36 Regt was Lt Col J M L Gavin later Maj Gen Gavin, CB, CBE. When I rashly volunteered to join a regimental climbing weekend in

North Wales I was totally unaware of the CO's mountaineering expertise or of his Himalaya expedition to climb Mount Everest in 1936. It was an exciting weekend but one I vowed never to repeat!

However, 1953 remains in my memory mainly because this was when 36 Regt was deployed to Mablethorpe during the Lincolnshire coastal floods. This was the first and only time I have rowed into a cinema foyer to assist people from the balcony where they were resting to keep clear of the water. It was also the first time I had been involved in the construction of massive sandbag walls.

It was also during this period that the cartoonist Giles visited the regiment and on Shrove Tuesday, a cartoon appeared showing a Sapper cook standing on a sandbag wall tossing a pancake. This was of course the second cartoon by Giles relating to 36 Regt, the earlier one being just prior to the Festival of Britain in 1951 when he produced his famous cartoon of a bridge which had fallen into the River Thames with the caption "You put it in, you get it out"

Later in 1953, elements of 36 Regt moved to London for the Queen's coronation preparations and in some cases participation. We were living under canvas on Wormwood Scrubs. Many men whilst still in Ripon had spent at least two hours a day standing to attention on the edge of the parade ground and continued this exercise at Wormwood Scrubs to prepare them for route lining duties.

Wksp Tp of 20 Sqn was kept busy preparing components and assisting in the construction of a 64 seater toilet block in Hyde Park. We were forbidden to damage any of the trees growing on the site and so we were forced to build the structure round them. When it was completed I am sure it offered relief to the assembled crowds gathered near by, although I believe it was originally designed for the use of troops.

Having spent much of my sapper career as a "Plantee" it is interesting to note that it began in 36 Army Engr Regt now 36 Engr Regt, and my last sapper unit was 33 Engr Regt (EOD) and that both of these regiments are together in the news with representatives from both regiments being involved in Iraq. I believe that any future Editor of the *Journal* picking two years separated by a fifty year gap will always find that the Sappers are making the headlines whether at home or overseas. Yours sincerely – Arthur Hogben.

## Reviews

#### , the Great Works at PILKINGTON'S PROJ problems faced in recruiting manpower, resourc-THE GREAT WORKS AT WEEDON 1804-1806 ing and then constructing the project. There are detailed accounts of monies expended, stores pur-

BERYL WILLIAMS



Published by Beryl Williams, Sira, Main Street, Whilton, Daventry. NN11 5NN. Price £15.00. ISBN 0 954 3448 0 4.

THIS book is a factual account of the construction of a Major Board of Ordnance Establishment in the small Northamptonshire village of Weedon Beck in response to the threat of invasion posed by Napoleon's army in the early years of the 19th Century.

Set in the turbulent period of the Napoleonic wars, the book reveals the reason for the construction of an enormous armaments depot at Weedon Beck. A successful French invasion in Southern England would rapidly have overrun all the existing Ordnance Depots, located in London and at the dockyards on the South Coast, leaving Britain without weapons, gunpowder or ammunition. To avert this crisis, the Board of Ordnance selected a site in Northamptonshire, away from the coast but with good lines of communication by road and canal to all parts of the country, to construct an ordnance depot comprising a small arms manufactory and storage for muskets, powder and artillery trains.

The book starts with a short introduction to set the historical context and establish the reasons for the construction of the depot. It then goes into some detail on the level of subterfuge employed by the Board of Ordnance to identify a site without arousing public interest, and a consequent increase in land prices, and the appropriation of the land. Once the site was identified and purchased, Captain Robert Pilkington Royal Engineers was appointed by the Board to oversee the construction of the works.

The remaining chapters are dedicated to the designs produced by Capt Pilkington and the

problems faced in fectulting manpower, resourcing and then constructing the project. There are detailed accounts of monies expended, stores purchased, wages paid and progress made, all of which have been painstakingly researched and documented. Equally well documented is the endless fight to obtain funding and justify expenditure, something that is all too familiar to present day Engineers! It finishes with the conclusion of the works, the promotion and deployment of Lt Col Pilkington to Holland on operations and his subsequent progression to Inspector General of Fortifications, the most senior Royal Engineer in 1832. The site still exists and many of the features and buildings can still be seen; the Stores are to be turned into a museum.

Beryl Williams has produced some excellent maps and drawings to support the development of the site, producing her own from originals and interpretation of the remaining buildings on the ground. In her forward she states that "there have been many additions and structural changes to the original buildings. It is for this reason I have not included photographs..." This is an unfortunate decision; the inclusion of photographs and in particular an aerial photograph of the site, would have brought the book to life, particularly as there is so much remaining. Some of the original details could have been superimposed on the photographs producing a suitable memorial to an extraordinary project and a remarkable man.

JMN

## EAST TO THE AMAZON

JOHN BLASHFORD-SNELL & RICHARD SNAILHAM

Published by John Murray Ltd. 50 Albermarle Street, London. W18 4BD. Price £20.22. ISBN 0-7195-60322

As is its name suggests, this is a book about an expedition conceived from the linking of two ideas which formed the basis of the plan. This expedition takes us to the jungles of South America, with the dual aims of investigating a reported site of a "lost" Inca city in the jungle of the upper Amazon basin, and to test a theory that the Incas could have navigated the Amazon eastwards to the Atlantic. The trip was led by the well known founder of the Scientific Exploration Society, John Blashford-Snell.

In a graphically written account, the authors describe the party's struggles to hack a route through dense jungle and over exceedingly steep and difficult terrain to reach the reported site of the ruins. Ironically, one of their major challenges was to maintain supplies of drinking water to the archaeological party, through the rain forest. The prevalence of rain, mud, and poisonous snakes and insects did little to aid their efforts, but they succeeded in reaching the site, carrying out some excavations, and conducting a survey of the ruins they exposed.

Returning to the town of Waricunca, there was then a reshuffle of the team, with many members changing places with a new team fresh out from the UK. These were to take the expedition through the river phase. While the diggers had been at work, a substantial reed boat had been built by traditional experts on the shores of Lake Titicaca, up on the Altiplano, for the modest sum of \$28,000. This craft was 40 feet long and of unusual design, in that it was effectively a close coupled trimaran, with three distinct hulls secured side by side, making it some 18 feet wide. It was equipped with mast and sails, but it also had an outboard engine. Christened the Kota Mama 3, its dry weight was three and a half tons (and a lot more when wet).

This vessel was transported by truck down the rough and distinctly hairy roads of the eastern slopes of the Andes to the steamy heat of the headwaters of the Rio Beni. From here her course was eastwards downstream, ultimately to Belem at the mouth of the Amazon. However she had first to pass the rapids of the Rio Madeira. This the Kota Mama did with mixed success, riding a couple before encountering a minor catastrophe at the Ribeiroa rapid, in which she dumped her crew into the swirling river and went down the next rapid on her own. This led to a pause during which the boat was recovered, repaired and then transported by truck over 140 miles to bypass the remainder of the series of nearly twenty rapids. Thereafter her progress down the now placid river to Belern was less dramatic. For the crew exposed for long hours to the blistering tropic sun, it seems at times to have been positively tedious.

The story is salted with much reporting of local history, and of peripheral activities, including aid to local communities, investigation of other ruins, and receptions by local authorities and celebrities, and the sort of high profile social activity that follows JBS's expeditions.

The expedition was undoubtedly a great challenge for its members, and the story is graphically told, but it is oddly disappointing. This is because the case is not convincingly made for either the scientific aims of the expedition, which are put forward as its primary purpose. The ruins at Paititi were confirmed as being of Inca origin, but little is made of the extent of what was found by the expedition, or of the significance of the settlement in Inca times. Equally, while Kota Mama reached Belem in fairly good order, how the Incas might have transported a three and a half ton vessel from Lake Titicaca to the Rio Beni, or how they might have portaged it around the worst of the rapids is glossed over, leaving the reader to ponder these questions.

That said, the teams undoubtedly had an exciting and rewarding expedition, not least those who took a ducking in the Ribeiroa rapids, and to that extent it was a very worthwhile venture. The book is an interesting tale, which casts a lot of light on the topography and history of the area, and it tells a good yarn – a yarn which is interspersed with gin and tonics on the quarterdeck of the good ship Viagra, the motor driven HQ vessel which escorted Kota Mama all the way to the Atlantic.

MGB

## HOT BLOOD & COLD STEEL Andy Simpson



Published by Spellmount Publishers, The Old Rectory, Staplehurst, Kent. TN12 0AZ. Price £20.22. ISBN 1-86227-154-2.

CERTAINLY since World War 2, most wars have been reported in great detail by using moving pictures where the display medium has been the cinema and, latterly, television. Vietnam was the first war which was documented on TV with almost no holds barred. The conflicts in which the British have fought in the last 20 years -Ulster, Falklands, the first Gulf War, Afghanistan, Sierra Leone and, fresh in our minds and still very current, Operation *Telic*, have usually projected events into our living rooms as they happen. We are now conditioned to relatively unrestricted reporting using television images. Indeed, with the advent of communication technology such as e-blueys and the operational welfare package telephone link, the historical importance of the written word from those at the front is probably lessened.

But it wasn't always like this. Reporting of the Great War was rigorously controlled; there were comparatively few accredited reporters and the images and words that they produced were strictly censored. The public read and saw what the War Cabinet and the Military Censor wanted them to. What was different were the words written by those who took part, either in letters home, usually censored within the unit, or in secretly kept diaries and journals, the latter most often by officers for whom the interpretation of the rules was far more flexible than it was for the private soldier.

So what was the Great War really like? What did those who took part actually think and feel about their lot? What was it like to live much of one's life at war in a patch of ground the size of a large back garden which was both a cemetery and a sewer? How did men exist, let alone live? How did they feed? What was their routine and how did they feel about discipline, the enemy, mortality, sudden death, the prospect of wounding, leave etc, all things which might concentrate the mind when on any operation, let alone when part of the tragedy of the Great War.

This book, which is a reprint from 1993, attempts to answer these questions by reproducing texts written by those who were there. Many of these passages are by officers - possibly more literate and definitely with greater freedom of opportunity but, with universal conscription from 1915 and the death of the old regular army, literacy was not necessarily a prerogative of officers. Regrettably, and this from your reviewer who will devour almost anything on the Great War, I feel that it leaves us wanting more. Some of the passages are frustratingly Boys Own Paper in style and short on detail, and I am not sure whether they really capture the essential horror and inevitability of it all. Perhaps those whose writings were chosen attempted to hide the fact that 60 per cent of all front-line infantry soldiers became casualties. I also question the almost obligatory chapter in any book dealing with the Great War on the Battle of the Somme in 1916, and also the very minor offering on the reaction to the Armistice. It might have proved a better read to add more contrasting detail on the last 12 months of the war. This could have dwelt on the pessimism of 1917 after 3rd Ypres and Cambrai; the reaction and affect on morale to the hammer blow of Kaiserschlact in March 1918, which almost broke the Army; the August counter attacks and then the optimism of mobile operations of the last 100 days leading to the Armistice. Indeed, this might have produced a rather more interesting book.

My verdict? an interesting concept and good in places but, overall, could be better.

MDC

# **Explanation of Abbreviations Used in This Journal**

ADC	Aide de Camp
ADR	Airfield Damage Repair
ADW	Area Defence Weapon
AEA	Airborne Engineers Association
AFCEN	Γ Armed Forces Central
AFM .	Army Field Manual
AFNOR	TH Armed Forces North
AFSOU	TH Armed Forces South
AFV .	Armoured Fighting Vehicle
AMC	Air Mounting Centre
AP	Anti Personnel
APOD	Airport (field) of Departure
ARRC	Allied Rapid Reaction Corps
AVIR	Armoured Vehicle Launched Bridge
AVRE .	Armoured Vehicle Royal Engineers
RAOD	British Army of the Phine
DAUK	Pritich Army Training Unit Suffield
DATUS	Prigada Major
	Dudget Membership and Dublications
DWICP	
BW	
CAUL .	Combined Arms Obstacle Integration
CASI .	Command and Staff Trainer
CB	Companion of the Order of the Bath
CBE Co	mmander of the Order of the British Empire
CGI	Corrugated Iron
ChAVR	E
CPX	Command Post Exercise
CRE	Commander Royal Engineers
CV	Command Vehicle
DEG	Divisional Engineer Group
DCRE	Deputy Commander Royal Engineers
DWR .	Duke of Wellington's Regiment
EOD	Explosive Ordnance Disposal
EOP	Engineer Operating Procedures
EW	Electronic Warfare
FLOT .	Forward Line Own Troops
FTX	Field Training Exercise
FOC	Full Operating Capability
FoREM	Friends of the RE Museum
GE	Garrison Engineer
GSG	Geographic Support Group
GSO	General Staff Officer
HRF(L)	
IO	Intelligence Officer
IPE	
IHO	Joint Headquarters
KING's	The King's Regiment
LWT	Light Wheeled Tractor
M&F	Mines and Explosives
MRF .	Member of the Order of the British Empire
ME	Military Engineering
	to The above abbreviations and the south of
r iease noi	e: The above abbreviations are those which appear w

MELF	MiddleEeast Land Forces
MWT	Medium Wheeled Tractor
NORTHA	G Northern Army Group
OBE	.Officer of the Order of the British Empire
OCTU	Officer Cadet Training Unit
OFT	Observations From Training
OGD	Other Government Departments
ORBAT	Order of Battle
OTC	Officer Training Corps
PET	Professional Engineer Training
PWD	
OGM	
OMS	Quartermaster Sergeant
RAC	Roval Armoured Corps
RAOS	Repair of Aircraft Operating Surfaces
RC	
REME	Royal Electrical and Mechanical Engineers
RESF .Re	estoration of Essential Services & Facilities
RGI	Royal Green Jackets
RLC	Royal Logistic Corps
RMCS	Royal Military College of Science
RSI	Rolled Steel Joist
RUSI	Royal United Services Institute
RWK	Royal West Kent Regiment
SAS	Special Air Service Regiment
SBO	Senior British Officer
SC	Strategic Command
SCATMI	N Scatterable Mines
SHAPE	Supreme Headquarters Allied Powers
onni E .	Europe
SME	School of Military Engineering
SME	Subject Matter Experts
SOPs	Standard Operating Procedures
SOTR	Statement of Training Requirement
STANAG	Standardization Agreement
STRE	Specialist Team RF
STRE	Short Term Training Team
TACOM	Tactical Command
TBRE	Training Battalion RF
TCN	Troop Contributing Nations
TEWT	Tactical Exercise Without Troops
TEUE	Tactical Fuel Handling Equipment
The Shop	Royal Military Academy Woolwich
	Thermal Imagery
11 ТТD	Tactics Techniques Procedures
	Theatre Decention Centre
IKC	Illtra Light Wheeled Treater
ULWI.	United Nations
VDU	Visual Diaplay Unit
WG	Working Crown
WU	Won Office Selection D
WO2R	war Office Selection Board

Please note: The above abbreviations are those which appear within articles published in this edition of the Journal and where authors may not have explained them. They are printed for the benefit of our many foreign and non-military readers. Appointment abbreviations (which appear on the first page) can generally be found in the back of The Royal Engineers List.