

## APPENDIX A – Details of Technical Refresh

The following table details the proposed configuration of the Interspiro 'Incurve-E' B.A. set which will form the upgrade of our existing sets;

B.A set element	Description
Incurve-E Backplate	Provides a more ergonomic design for the wearer to provide additional comfort and support. The backplate also allows for a greater range of adjustability to better suit individual wearers
Rubberised shoulder straps, tight weave waist strap and reduced fabric covers on hoses	Rubberised straps and tighter weave fabric waist strap allow for improved cleaning of sets of contaminants and better grip to the wearers body during use. Amount of fabric used to cover hose has been reduced to limit contamination risk
Chest Strap	Chest strap removed as the rubber straps provide enough purchase to maintain the position of the set on the wearer. Chest straps remain an option if an individual wearer requires it.
Rubberised hip belt provided as part of waist strap	Hip belt and shoulder straps move independently for maximum mobility. Multiple attachment points for attachments provided on the belt
B.A Computer	Computer pack situated at the bottom of the backplate can be removed to allow for thorough cleaning. Computer is pre wired and programmed for telemetry which reduces future costs if retro fitting was required.
Mechanical whistle as low pressure warning indicator	Our current sets have a number of electronic audible warning signals. This has proved confusing at times for wearers and has led to wearers ignoring some signals. The provision of a mechanical whistle will give a distinct difference in audible signals to the wearer to allow them to identify when they should have exited the risk area, without confusion.
Cylinder strap	Cylinder catch is now recessed to avoid damage to mechanism
Quick Release Cylinder Connector	Quick release 'push fit' cylinder mechanism allows for easier connection/disconnection of cylinders.
6.7 litre 300bar cylinders	Our existing cylinders are owned by LFR and do not have an 'end of life' date. The cylinders will continue to be used and will have quick release connections fitted.
Extended Duration Breathing Apparatus attachment (EDBA)	The existing attachment to allow EDBA will be provided with a quick release connection to fit the new cylinder connections
Emergency Air Supply Equipment Connector (EASE)	The air supply hose which connects the air supply to the facemask now incorporates a connection for an emergency air supply. The EASE equipment will be provided for each front line appliance and will allow a wearer to be supplied with an additional air supply in an emergency situation. It also allows the wearer to be disconnected from their own B.A set and remain under air.

'Respire' Facemask	<p>Latest generation design facemask which is an upgrade on our current mask.</p> <p>Spirocom communications pack has been altered to ensure it is more secure on the side of the mask and easier to connect/disconnect, with no tools now required.</p> <p>The Spirocom microphone has been relocated within the mask to provide clearer speech and audibility between wearers and between wearer and ECO</p> <p>Enhancements to the Spirocom unit also provide improved audible wearer notification of actions (e.g mute/unmute, talkgroup change)</p> <p>Spirocom has a Voice Projection Unit (VPU) fitted, which significantly improves wearers ability to communicate with casualties and other B.A. teams</p>
InCurve retractable 'Personal Line'	<p>Rigid plastic carrying pouch containing 6m personal line on a retractable spool.</p> <p>This upgrade gives improved protection from contaminants when not in use and prevents entanglement or the line becoming a trip hazard when used and the wearer is not able to safely restow it in the pouch.</p>
Fire Resistant PVC Radio Pouches	<p>Replacement for existing pouches provides an easier 'wipe clean' option, reducing the spread of contaminants</p>

It is recommended that all of the above options are accepted within the 'technical refresh' package for Lincolnshire Fire & Rescue as per the table above.

The options presented below for Breathing Apparatus Respiratory Interface Equipment (BARIE) have been robustly considered or tested by a range of staff to determine the most suitable option for Lincolnshire Fire & Rescue, based on the criteria of;

- Usability
- Audibility
- Simplicity

The following table details the recommendation for BARIE to compliment the upgrade of our existing sets

Equipment Type	Benefits	Disbenefits
<p>Spirocom Quick Connect with dedicated radio and wireless* auto-on adapter</p> <p>*wireless adapters allow more than one connection</p>	<ul style="list-style-type: none"> <li>• Allows all members of the team to communicate with the ECO</li> <li>• Allows 'Teamtalk'* capability between members of the same team</li> <li>• Reduced delays in entering risk area with pre-configured talkgroups on start up</li> <li>• Radio will be pre-set to 75% volume (optimal volume for best audibility)</li> <li>• Allocated talkgroup and callsign of appliance will display on screen every time radio is turned on</li> <li>• Dedicated radios would not be used for general fireground communications and would therefore remain in better condition and ready to go for B.A. incidents</li> </ul>	<ul style="list-style-type: none"> <li>• Teams can't communicate with other teams in the risk area unless they change their preset talkgroup (as current procedures)</li> <li>• If a team changes talkgroup for any reason, they would have to change it back post incident</li> </ul>

The 'Teamtalk' facility allows members of the same B.A team to communicate with each other without being audible to other teams within the same signal area. This is achieved by the radio Bluetooth adapter being placed on different channels.

## 5 FURTHER RECOMMENDATIONS

The configuration of the New 'Incurve-E' B.A. set has been configured through a long period of robust information gathering and testing of new equipment. Whilst the main elements of the set have been selected by service personnel involved in the project and the trials, a number of recommendations based on the feedback and findings from the project and trials to date are proposed:

### B.A. Torches

B.A torches have historically been an integral part of a Breathing Apparatus set. Lincolnshire Fire & Rescue currently operates with a Wolf safety lamp with an incandescent bulb attached to each B.A. set. Notably, if a torch is defective, it does not mean the B.A set is considered 'off the run. Personnel are also issued with lighting units which are integral to their fire helmets and have hand held lighting options on the fire appliance.

The consideration is to remove the torches from the Breathing Apparatus sets entirely and make use of alternate methods of lighting where required.

#### Benefits

- Reduced capital replacement costs
- Reduced revenue costs from repairs and battery replacements
- Less equipment to check on general check of auxiliary equipment on B.A set
- Suggestion that B.A torches are not commonly used in operational incidents
- Opportunity to upgrade to LED torches, providing better light provision and visibility

#### Disbenefits

- Suggestion that B.A torches are not commonly used is not across entire service and therefore some personnel may not agree with removal
- Smaller torch allows more flexibility for checking areas and voids where helmet torches are not appropriate
- Torch is fixed to B.A set so does not require holding during search and rescue or firefighting actions
- Additional capital cost to replace existing torches
- Existing costs required to purchase and maintain torches

### Recommendation

The recommendation is for provision of a Unilight right angled LED B.A torch (preferred option of 3 tested) for each B.A set in the service

### Personal Issue B.A. Face Masks

Personal Issue B.A face masks were considered to reduce cross contamination for B.A. wearers. The Service currently issues 50 personal issue face masks to personnel across the service due to the results of face fit testing.

#### Benefits

- Reduced contamination across B.A wearers – particularly important at the current time
- Possible improvement in care of equipment due to it being a personal issue, rather than a general use

#### Disbenefits

- Increased capital costs for purchasing additional face masks, bags, log books and individual Spirocom units
- Increased revenue costs for ongoing repair, service and maintenance of masks
- Increased risk of loss which may render a member of staff unable to wear B.A.
- Increased testing of masks required across the service
- Spare stock would have to increase by 50 to allow for annual new recruits

### Recommendation

The recommendation is that we do not purchase individual B.A masks for personnel unless there is a requirement following a face fit test

### **Change of all OD Instructor facemasks to a glass visor**

Current B.A facemasks are constructed with a Perspex visor to give maximum durability and safety for the wearer in an operational situation. B.A facemasks are also available with a toughened glass visor which are easier to clean.

Organisational Development Instructors have requested that the current provision of 8 instructor sets and the remaining student sets are fitted with glass visors. This would allow the sets to be rotated periodically to avoid overuse and also aid cleaning following multiple hot wears.

Glass visors are not currently covered under the Interspiro total care package; therefore, the replacement of any damaged visors would be an additional cost to the service. Perspex visors offer a perfectly good option for operational personnel and therefore the project has not extended this request to include the full provision of sets across the service

<b>Benefits</b>	<b>Disbenefits</b>
<ul style="list-style-type: none"><li>• Improved ability to clean visors following regular use of B.A. sets in a 'hot fire' training environment</li><li>• Ability to rotate Instructor sets with remaining training sets, rather than continually use 8 dedicated sets</li><li>• Adds an element of flexibility into the training sets if one or more becomes defective</li><li>• Allows flexibility when a set has to be taken away for repair or deep clean (annual event)</li></ul>	<ul style="list-style-type: none"><li>• Glass visors are more expensive than the Perspex alternative</li><li>• Glass visors are not covered under the Interspiro total care package so would be an additional cost to replace</li></ul>

### **Recommendation**

The recommendation is that all OD B.A sets are procured with glass visors

### **Change to the total number of sets operated by LFR**

Current provision of B.A sets across the service is as follows;

- 4 x appliance (192)
- 2 x spare sets per WT station (18)
- 8 x OD instructor sets
- 54 x training sets
- 24 x Service spares

OD have suggested that they can reduce the number of B.A sets in their provision from 62 to 52, due to not requiring the current number, despite course student numbers, defects at any one time and sets away for deep clean/service. This would be backed up by agreeing to provide all sets with glass visors for additional flexibility.

The remaining number of sets is appropriate for the needs of the service. A consideration however, would be to increase the number of B.A sets on an 'on call' station from four to five, providing one spare set per station. Currently Operational Support technicians attend a defective B.A set as a code 2 defect (repair or replace by next day – except weekends and bank holidays). On these occasions, the appliance will remain on the run with only three B.A sets. An additional B.A set would ensure four sets are available on the vast majority of occasions throughout the year, despite weekend and bank holiday restrictions.

The Operational Support department are looking to provide a more efficient and cost effective service through considering all of the deliveries, station visits and tasks they complete throughout the working week. This may be by providing a weekly delivery day for each station, therefore reducing the number of journeys, immediate response to non-urgent requests, etc. Attending stations for a code 2 B.A. set defect increases the need to attend stations in short timescales, disrupting planned work activities on a regular basis.

The consideration from this option is to reduce a B.A set defect from a code 2 to a code 3, which would allow up to five days to attend and repair or replace the B.A set. Should a second set become defective within that time, it would automatically upgrade to a code 1 (4 hours attendance, which would be attended to at any time of the year). This would require a change of our current policy. This option would provide a far more effective and efficient service by the Operational Support technicians.

The service would have to be comfortable with the fact that an appliance may remain on the run with only three B.A sets for up to five days. Furthermore, for information, there have only been two occasions within the last 24 months, when an 'on call' station observed two B.A sets defective at the same time. Those stations remained available with two B.A. sets.

To provide additional reassurance, the option to change the code for defective B.A sets from 2 to 3, could be supplemented by providing an additional set for each 'on call' station, however, it is not felt that this is required.

### **Recommendation**

The recommendations are that;

- The provision of B.A sets to Organisational Development is reduced from 62 to 52
- The code for a B.A set defect is changed from 2 to 3 within our Service policy
- No further B.A sets are purchased for 'spare' sets for 'on call' stations
- Total number of B.A sets for the Service would be 286 (previously 296)

## **7 FUTURE TECHNOLOGICAL ADVANCEMENTS**

The terms of reference of the original B.A project were;

- Breathing Apparatus Set
- Communications
- Telemetry

Currently, the project is on track to deliver the B.A set and communications elements by the end of the 2020/21 financial year. The recommended B.A set configuration includes the potential to upgrade the sets to incorporate Telemetry in the future.

Whilst the B.A set trials did not formally involve telemetry this time, the telemetry equipment was available and in use throughout the two days at Waddington Training Centre. The initial feedback and view of those taking part in the trials was that Telemetry could offer an improvement in firefighter safety and welfare of personnel on the fireground. Further consideration of the benefits of Telemetry will be considered during the life of the upgraded sets and would constitute a separate business case and project.