

1.1. Introduction: READ THIS DOCUMENT THOROUGHLY AND FOLLOW ALL INSTRUCTIONS CAREFULLY. This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d) (2) and 35.016. A formal Request for Proposals (RFP), solicitation, and/or additional information regarding this announcement will not be issued.

1.2. White Paper Selections, Proposal Selections, and Contract Awards: This BAA addresses *mature* research and development efforts that include Step I - White Paper Submission and Review Process, Step II - Proposal Submission and Review Process, and Step III - Contract Award. Contracts will be awarded only from a selected proposal or proposals for mature prototypes deliverable within 60-90 days that the United States Special Operations Command (USSOCOM) will assess by conducting laboratory testing and user evaluations in simulated operational scenarios.

1.3. Long-Term Goal and Technical Challenges: USSOCOM has a long-term goal to develop headborne technologies to meet Special Operations Forces (SOF) mission requirements. The intent is to accelerate the delivery of these innovative capabilities to the SOF warfighter. Prior studies and analysis have determined a number of technical challenges exist for SOF equipment that require improvements for missions into the future. Those challenges are: 1) trade space between weight, protection, and mobility; 2) cost; and 3) system component integration.

1.4. Authorization to Legally Commit the Government: Offerors are advised that only Contracting Officers/Agreements Officers are legally authorized to obligate the Government. This announcement should not be construed as an obligation on the part of the Government to award a contract or expend funds prior to award of a contract.

1.5. Appendices: This BAA contains Appendix A - White Paper Format and Appendix B - Proposal Format to help Offerors in the formatting for writing white papers and proposals. Additionally, this BAA contains Appendix C – Test Methodologies to assist offerors in understanding how the Government may test items.

1.6. Document Submissions - General: Offerors shall complete requisite data fields and submit white papers for USSOCOM-BAASSES-2016 at the following email addresses:

Kelly.mcneill@socom.mil

Nicholas.tsantinis.civ@mail.mil

The subject line of the email should state, “White Paper – Headborne Systems – USSOCOM-BAASSES-2016 – Company Name.”

The Government may, following assessment of the white papers invite the most favorable Offerors to submit technical proposals, statements of work, and cost proposals to these same email addresses. All documents shall be in electronic format as discussed further below. The subject line of the email should state, “White Paper – Headborne Systems – USSOCOM-BAASW-2016 – Company Name.”

1.6. Export-Controlled Technologies: Some requirements may cover export-controlled technologies. Research in these areas is limited to Offerors meeting the requirements of the International Traffic in Arms Regulations (ITAR), 22 Code of Federal Regulations Parts 120-130. Participation by foreign-owned firms is subject to foreign disclosure review procedures and such firms should contact the Contracting Point of Contact in 2.6 below if they contemplate responding.

2.1. General Information:

2.2. Agency: USSOCOM

2.3. Program Office: PM-SOF SSES

2.4. BAA Title: BAA for Advancement of Headborne Systems Technologies for Use by Special Operations Forces.

2.5. BAA Number: USSOCOM-BAASSES-2016

2.6. Closing Date: This BAA will remain open for white paper submissions until COB on March 1, 2016, unless superseded, amended, or cancelled. White papers may be submitted any time during this period subject to the submission process described in this BAA. The Government will evaluate white papers and notify offerors to submit proposals no later than COB on March 8, 2016. If invited to submit a full proposal, full proposals must be received by COB on 23 March, 2016.

2.7. Contracting Point of Contact (POC) and Technical POC:

Contracting POC:

Ms. Kelly McNeill, Phone 813-826-5472, Email kelly.mcneill@socom.mil

Technical POC:

Mr. Nicholas Tsantinis, Phone 508-233-5953, Email nicholas.tsantinis.civ@mail.mil

2.7. Technology Areas of Interest:

USSOCOM is interested in receiving white papers from all responsible sources within industry capable of providing the design, manufacturing, testing, and production of SOF related headborne systems. The intent is to accelerate the delivery of innovative capabilities to the SOF warfighter. It is an interactive process designed to assess the viability of technologies while simultaneously refining user tradespace requirements to support a Family of Tactical Headborne Systems (FTHS).

Information received from this BAA notification may also be used to determine the acquisition strategy for a future Request for Proposal (RFP) for production systems (e.g., Full and Open versus Small Business Set-Aside).

SALIENT CHARACTERISTICS OF THE FTHS REQUIREMENTS:

The FTHS will consist of a Ground Ballistic and Bump Helmet system as well as a Maritime Operations Ballistic and Coxswain Bump Helmet system. The FTHS will be used throughout the spectrum of Special Operations Forces (SOF) operational continuum, from Humanitarian Assistance and Peacekeeping, through Counter-Terrorism and Counterinsurgency, to low intensity conflict and full-scale war, Military Freefall, Maritime Interdiction, Combat Swimming Operations, Visit, Board, Search and Seizure (VBSS), and Long Range Patrol (Maritime and Ground Platforms). The environmental conditions will range from tropic to arctic and from arid desert to open ocean and riverine with weather conditions associated with these environments to include day/night and limited visibility. The following are salient characteristics for each system:

Ground Ballistic Helmet System

- **Interoperability:** In all configurations, provide a comfortable and stable platform that is interoperable with all current USSOCOM headborne Night Optical Devices (NOD), communication systems, spectacle and goggle eye protection, and body armor vests (T=O)
 - In its base configuration (without facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM), and chemical/biological/radiological/nuclear (CBRNE) mask (T)
 - In all configurations (includes facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM), and chemical/biological/radiological/nuclear (CBRNE) mask (O)
 - In all configurations (includes facial protection) shall allow for face to face communication as well as communication via existing headborne communication systems (T=O)
- **Ballistic Protection:** USSOCOM is interested in determining the weight tradespace for three levels of ballistic protection: (1) fragmentation only, (2) fragmentation and 9mm, and (3) fragmentation, 9mm, and 7.62x39mm PS Ball. Interested vendors can provide information on one or all three levels of ballistic protection. Test methodology can be found in Appendix C.
- Provide minimum V_{50} performance against the fragmentation projectiles listed in Table 1.

Table 1: Minimum V_{50} BL (P)s.

Projectile Right Circular Cylinder (RCC)¹	V_{50} BL(P) at 0° Obliquity (ft/sec)
2-grain RCC	4075
4-grain RCC	3450
16-grain RCC	2425
64-grain RCC	1700

- Provide ballistic protection against a Remington 124 grain Full Metal Jacket (FMJ) Round Nose (RN) 9x19mm projectile at 1195+50 ft/s with a ballistic transient deformation according to Table 2.

Table 2: BTD Requirements

Shot Location	BTB Requirement (mm)
Crown	23.4
Sides	27.1

Front	29.0
Back	19.1

- Provide ballistic protection against a 123 grain 7.62x39mm PS Ball projectile at 2400+50 ft/s with a ballistic transient deformation within the limits set by Table 2 in any area of the helmet.
- Impact Protection: USSOCOM is interested in determining the tradespace between the current ACH impact test requirements (two impacts @ 10 ft/s with ≤ 150 G peak acceleration, 2nd impact between 60 and 120 seconds after the first) and a single hit pad system that increases impact velocity ≥ 14 ft/s with ≤ 150 G peak acceleration; or one where the first impact increases impact velocity to ≥ 14 ft/s with ≤ 150 G peak acceleration and the second impact occurs longer than 120 seconds after the first impact at a lower impact velocity. Pad systems should maintain performance and comfort after exposure to environmental and operational conditions such as hot/cold temperature, saltwater, and altitude. Test methodology can be found in Appendix C.
- Compression Requirements: USSOCOM is interested in determining the tradespace between the current ACH compression requirements and any *significant* weight reductions by reducing the top-to-bottom and/or side-to-side compression force or increasing the allowable plastic deformation. Test methodology can be found in Appendix C.
- Sizing Requirements: Provide sizing capable of adequately fitting the head sizes in Table 3. USSOCOM is interested in any male or female anthropometric data showing head circumference outside of these limits or recommendations on additional metrics for sizing requirements.

Table 3: Sizing Ranges

Measurement	Range (cm)
Head Width	14.6-17.4
Head Length	18.5-22.0
Head Circumference	53-64.5

- Area of Coverage: Must provide minimum Projected Protected Area of the Head (PPAH) requirements for each size as described in Table 4. Test methodology can be found in Appendix C.

Table 4: PPAH Requirements

Size	PPAH (in ²)
Small	82.6
Medium	89.6
Large	100.8
XLarge	114.4

- Optional Eye Protection: Provide a non-corrosive, hydrophobic, interchangeable visor system suitable for day/night operations that meets ANSI z87.1 impact/optics (T=O), ballistic protection against 5.8 grain Fragment Simulating Projectile (FSP) at 640-660 ft/s

(T) and a 17-grain FSP at 550-560 ft/s (O), and provides maximum unobstructed eye protection from sun, wind, dust, UV light, and saltwater sea spray while minimizing fogging (T=O), and IR laser threats (O) (in accordance with SOEP requirement). Visor system shall be quickly and easily positioned in front of the eyes without the use of tools (T) and stowed in or on the helmet when not in use (O). Visor system will be interchangeable with the Ground Bump Helmet System and capable of accepting future technology insertions in the area of heads-up displays. Test methodology can be found in Appendix C.

- Optional Ear and Maxillofacial Protection: Provide a non-corrosive, hydrophobic, interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Will be quickly, securely and easily attached/detached to the helmet (T) and will be quickly, securely and easily attached/detached with one hand as an objective (O). Maxillofacial system will be interchangeable with the Ground Bump Helmet System. Test methodology can be found in Appendix C.

Ground Bump Helmet System

- Interoperability: In all configurations, provide a comfortable and stable platform that is interoperable with all current USSOCOM headborne Night Optical Devices (NOD), communication systems, and eye protection (T=O)
 - In its base configuration (without facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM) and chemical/biological/radiological/nuclear (CBRNE) mask (T)
 - In all configurations (includes facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM) and chemical/biological/radiological/nuclear (CBRNE) mask (O)
 - In all configurations (includes facial protection) shall allow for face to face communication as well as communication via existing headborne communication systems (T=O)
- Impact Protection: USSOCOM is interested in determining the tradespace between the current ACH impact test requirements (two impacts @ 10 ft/s with ≤ 150 G peak acceleration, 2nd impact between 60 and 120 seconds after the first) and a single hit pad system that increases impact velocity ≥ 14 ft/s with ≤ 150 G peak acceleration; or one where the first impact increases impact velocity to ≥ 14 ft/s with ≤ 150 G peak acceleration and the second impact occurs longer than 120 seconds after the first impact at a lower impact velocity. Pad systems should maintain performance and comfort after exposure to environmental and operational conditions such as hot/cold temperature, saltwater, and altitude. Test methodology can be found in Appendix C.
- Modular Ballistic Protection: Provide a modular applique that can be quickly, securely and easily attached/detached to the bump helmet (T), quickly, securely and easily attached/detached by one hand (O). Applique to provide protection against fragmentation listed in Table 5 and a Remington 124 grain Full Metal Jacket (FMJ) Round Nose (RN) 9x19mm projectile at 1195+50 ft/s with ballistic transient deformation according to Table 6 (T). Ballistic applique will be interchangeable with the Ground

Ballistic Helmet System and USSOCOM is interested in the increase in protection level provided (e.g., 7.62x39mm PS Ball). Test methodology can be found in Appendix C.

Table 5: V50 requirements for fragmentation protection

Projectile Right Circular Cylinder (RCC) ¹	V ₅₀ BL(P) at 0°Obliquity (ft/sec)
2-grain RCC	4075
4-grain RCC	3450
16-grain RCC	2425
64-grain RCC	1700

Table 6:

Shot Location	BTD Requirement (mm)
Crown	23.4
Sides	27.1
Front	29.0
Back	19.1

- Sizing Requirements: Provide sizing capable of adequately fitting the head sizes in Table 7. USSOCOM is interested in any male or female anthropometric data showing head circumference outside of these limits or recommendations on additional metrics for sizing requirements.

Table 7: Sizing Requirements

Measurement	Range (cm)
Head Width	14.6-17.4
Head Length	18.5-22.0
Head Circumference	53-64.5

- Area of Coverage: Must provide minimum Projected Protected Area of the Head (PPAH) requirements for each size as described in Table 8. Test methodology can be found in Appendix C.

Table 8: PPAH Requirements

Size	PPAH (in ²)
Small	82.6
Medium	89.6
Large	100.8
XLarge	114.4

- Optional Eye Protection: Provide a non-corrosive, hydrophobic, interchangeable visor system suitable for day/night operations that meets ANSI z87.1 impact/optics (T=O), ballistic protection against 5.8 grain Fragment Simulating Projectile (FSP) at 640-660 ft/s (T) and a 17-grain FSP at 550-560 ft/s (O), and provides maximum unobstructed eye protection from sun, wind, dust, UV light, and saltwater sea spray while minimizing fogging (T=O), and IR laser threats (O) (in accordance with SOEP requirement). Visor system shall be quickly and easily positioned in front of the eyes without the use of tools (T) and stowed in or on the helmet when not in use (O). Visor system will be interchangeable with the Ground Ballistic Helmet System and capable of accepting future technology insertions in the area of heads up displays. Test methodology can be found in Appendix C.
- Optional Ear and Maxillofacial Protection: Provide a non-corrosive, hydrophobic, interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Will be quickly, securely and easily attached/detached to the helmet (T) and will be quickly, securely and easily attached/detached with one hand as an objective (O). Maxillofacial system will be interchangeable with the Ground Ballistic Helmet System. Test methodology can be found in Appendix C.

Maritime Operations (MAROPS) Helmet System

- The MAROPS Helmet System shall provide a comfortable and stable platform to mount night optical devices (NODs) during maritime transits in normal sea-state conditions as well as during high speed maneuvering and boat operations in high sea-state environments.
- Interoperability: In all configurations, provide a comfortable and stable platform that is interoperable with all current USSOCOM headborne Night Optical Devices (NOD), communication systems, spectacle and goggle eye protection, and body armor vests (T=O)
 - In its base configuration (without facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM), and chemical/biological/radiological/nuclear (CBRNE) mask (T)
 - In all configurations (includes facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM), and chemical/biological/radiological/nuclear (CBRNE) mask (O)
 - In all configurations (includes facial protection) shall allow for face to face communication as well as communication via existing headborne communication systems (T=O)
- Ballistic Protection: USSOCOM is interested in determining the weight tradespace for varying levels of ballistic protection: (1) fragmentation only, (2) fragmentation and 9mm, and (3) fragmentation, 9mm, and 7.62x39mm PS Ball. Interested vendors can provide information on one or all three levels of ballistic protection. Test methodology can be found in Appendix C

- Provide minimum V_{50} performance against the fragmentation projectiles listed in Table 9.

Table 9: Minimum V_{50} BL (P)s.

Projectile Right Circular Cylinder (RCC) ¹	V_{50} BL(P) at 0° Obliquity (ft/sec)
2-grain RCC	4075
4-grain RCC	3450
16-grain RCC	2425
64-grain RCC	1700

- Provide ballistic protection against a Remington 124 grain Full Metal Jacket (FMJ) Round Nose (RN) 9x19mm projectile at 1195+50 ft/s with a ballistic transient deformation in accordance with Table 10 in any area of the helmet
- Provide ballistic protection against a 123 grain 7.62x39mm PS Ball projectile at 2400+50 ft/s with a ballistic transient deformation in accordance with Table 10 in any area of the helmet

Table 10: BTD Limits

Shot Location	BTB Requirement (mm)
Crown	23.4
Sides	27.1
Front	29.0
Back	19.1

- Impact Protection: USSOCOM is interested in determining the tradespace between the current ACH impact test requirements (two impacts @ 10 ft/s with ≤ 150 G peak acceleration, 2nd impact between 60 and 120 seconds after the first) and a single hit pad system that increases impact velocity ≥ 14 ft/s with ≤ 150 G peak acceleration; or one where the first impact increases impact velocity to ≥ 14 ft/s with ≤ 150 G peak acceleration and the second impact occurs longer than 120 seconds after the first impact at a lower impact velocity. Pad systems should maintain performance and comfort after exposure to environmental and operational conditions such as hot/cold temperature, saltwater and altitude. Test methodology can be found in Appendix C.
- Compression Requirements: USSOCOM is interested in the determining the tradespace between the current ACH compression requirements and any *significant* weight reductions by reducing the top-to-bottom and/or side-to-side compression force or increasing the allowable plastic deformation. Test methodology can be found in Appendix C.
- Sizing Requirements: Provide sizing capable of adequately fitting the head sizes in Table

11. USSOCOM is interested in any male or female anthropometric data showing head circumference outside of these limits or recommendations on additional metrics for sizing requirements.

Table 11: Sizing requirements

<i>Measurement</i>	<i>Range (cm)</i>
Head Width	14.6-17.4
Head Length	18.5-22.0
Head Circumference	53-64.5

- Area of Coverage: Must provide minimum Projected Protected Area of the Head (PPAH) requirements for each size as shown in Table 12. Test methodology can be found in Appendix C.

Table 12: PPAH Requirements

<i>Size</i>	<i>PPAH (in²)</i>
Small	82.6
Medium	89.6
Large	100.8
XLarge	114.4

- Facial Protection: Provide modular, integrated maxillofacial protection against sun, wind, dust, saltwater sea spray, ballistic and blunt impact threats on high speed maritime craft, including integrated visors usable in day (T) and night (O) operations, and shall be compatible with SOEP and SOFNODs. Shall provide face, eye, and dental protection against blunt trauma impacts on high speed maritime crafts.
- Eye Protection: Provide a non-corrosive, hydrophobic, interchangeable visor system suitable for day (T) and night (O) maritime operations, that meets ANSI z87.1 impact/optics (T=O), ballistic protection against 5.8 grain Fragment Simulating Projectile (FSP) at 640- 660 ft/s (T) and a 17-grain FSP at 550-560 ft/s (O), and provides maximum unobstructed eye protection from sun, wind, dust, UV light (including a polarized lens), and saltwater sea spray while minimizing fogging (T=O). Visor system shall be quickly and easily positioned in front of the eyes without the use of tools (T), and stowed on the inside or outside of the helmet when not in use (O). Visor system will be interchangeable with the Coxswain Helmet System and capable of accepting future technology insertions in the area of heads up displays. Test methodology can be found in Appendix C.
- Ear and Maxillofacial Protection (Level 0): Provide a non-corrosive, hydrophobic, interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Will be quickly, securely and easily attached/detached to the helmet without the use of tools (T) and will be quickly, securely and easily attached/detached with one hand without the use of tools as an objective (O). Shall be interchangeable with the Coxswain Helmet System. Test methodology can be found in Appendix C.

- Ear and Maxillofacial Protection (Level 1): Provide a non-corrosive hydrophobic interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Provide 9mm and fragmentation protection equivalent to the MAROPs Ballistic Helmet (T=O). Will be quickly, securely and easily attached/detached to the helmet without the use of tools (T) and will be quickly, securely and easily attached/detached with one hand without the use of tools as an objective (O). Shall be interchangeable with the Coxswain Helmet System. Test methodology can be found in Appendix C.

Coxswain Helmet System

- The Coxswain Helmet System shall provide a comfortable and stable platform to mount night optical devices (NODs) during maritime transits in normal sea-state conditions as well as during high speed maneuvering and boat operations in high sea-state environments.
- Interoperability: In all configurations, provide a comfortable and stable platform that is interoperable with all current USSOCOM headborne Night Optical Devices (NOD), communication systems, spectacle and goggle eye protection, and body armor vests (T=O)
 - In its base configuration (without facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM) and chemical/biological/radiological/nuclear (CBRNE) mask (T)
 - In all configurations (includes facial protection), provide a comfortable and stable platform that is interoperable with all current parachutist oxygen mask (POM), and chemical/biological/radiological/nuclear (CBRNE) mask (O)
 - In all configurations (includes facial protection) shall allow for face to face communication as well as communication via existing headborne communication systems (T=O)
- Impact Protection: USSOCOM is interested in determining the tradespace between the current ACH impact test requirements (two impacts @ 10 ft/s with ≤ 150 G peak acceleration, 2nd impact between 60 and 120 seconds after the first) and a single hit pad system that increases impact velocity ≥ 14 ft/s with ≤ 150 G peak acceleration; or one where the first impact increases impact velocity to ≥ 14 ft/s with ≤ 150 G peak acceleration and the second impact occurs longer than 120 seconds after the first impact at a lower impact velocity. Pad systems should maintain performance and comfort after exposure to environmental and operational conditions such as hot/cold temperature, saltwater and altitude. Test methodology can be found in Appendix C.
- Modular Ballistic Protection: Provide a modular applique that can be quickly, securely and easily attached/detached to the helmet (T), and quickly, securely and easily attached/detached by one hand (O). Applique to provide protection against fragmentation listed in Table 1 and a Remington 124 grain Full Metal Jacket (FMJ) Round Nose (RN) 9x19mm projectile at 1195+50 ft/s with a ballistic transient deformation in accordance with Table 10 in any area of the helmet (T). Ballistic applique will be interchangeable with the MAROPs Helmet System and USSOCOM is interested

in the increase in protection level provided (e.g., 7.62x39mm PS Ball). Test methodology can be found in Appendix C.

Table 13: BTD Limits

Shot Location	BTD Requirement (mm)
Crown	23.4
Sides	27.1
Front	29.0
Back	19.1

- Sizing Requirements: Provide sizing capable of adequately fitting the head sizes in Table 14. USSOCOM is interested in any male or female anthropometric data showing head circumference outside of these limits or recommendations on additional metrics for sizing requirements.

Table 14: Sizing Requirements

Measurement	Range (cm)
Head Width	14.6-17.4
Head Length	18.5-22.0
Head Circumference	53-64.5

- Area of Coverage: Must provide minimum Projected Protected Area of the Head (PPAH) requirements for each size as shown in Table 15. Test methodology can be found in Appendix C.

Table 15: PPAH Requirements

Size	PPAH (in ²)
Small	82.6
Medium	89.6
Large	100.8
XLarge	114.4

- Facial Protection: Provide modular, integrated maxillofacial protection against sun, wind, dust, saltwater sea spray, ballistic and blunt impact threats on high speed maritime craft, including integrated visors usable in day (T) and night (O) operations, and shall be compatible with SOEP and SOFNODs. Shall provide face, eye, and dental protection against blunt trauma impacts on high speed maritime crafts

Eye Protection: Provide a non-corrosive, hydrophobic, interchangeable visor system suitable for day (T) and night (O) maritime operations that meets ANSI z87.1 impact/optics (T=O), ballistic protection against 5.8 grain Fragment Simulating Projectile (FSP) at 640- 660 ft/s (T) and a 17-grain FSP at 550-560 ft/s (O), and provides maximum unobstructed eye protection from sun, wind, dust, UV light (including a polarized lens), and saltwater sea spray while minimizing fogging (T=O). Visor system shall be quickly and easily positioned in front of the eyes without the use of tools (T), and stowed on the inside or outside of the helmet when not in use (O).

Visor system will be interchangeable with the MAROPs Helmet System and capable of accepting future technology insertions in the area of heads up displays. Test methodology can be found in Appendix C.

- Ear and Maxillofacial Protection (Level 0): Provide a non-corrosive, hydrophobic, interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Will be quickly, securely and easily attached/detached to the helmet without the use of tools (T) and will be quickly, securely and easily attached/detached with one hand without the use of tools as an objective (O). Shall be interchangeable with the MAROPs Helmet System. Test methodology can be found in Appendix C.
- Ear and Maxillofacial Protection (Level 1): Provide a non-corrosive hydrophobic interchangeable ear and maxillofacial system suitable for day/night operations that provides impact protection and protection from wind, dust, and saltwater sea spray while minimizing fogging of any eye protection when worn (T=O). Provide 9mm and fragmentation protection equivalent to the MAROPs Ballistic Helmet (T=O). Will be quickly, securely and easily attached/detached to the helmet without the use of tools (T) and will be quickly, securely and easily attached/detached with one hand without the use of tools as an objective (O). Shall be interchangeable with the MAROPs Helmet System. Test methodology can be found in Appendix C.

This BAA outlines the possibility for four different helmet systems. However, it is optimal that the Ground Ballistic and Ground Bump helmet systems can be modified to meet the MAROPS and Coxswain helmet system requirements or vice versa so that only two helmet systems are procured instead of four or a single helmet system to meet the requirements of all four systems. It should be noted that modified Ground Ballistic and Bump helmets must fully meet the MAROPS and Coxswain helmet system requirements for this to be possible.

The Government is also interested in VAS/NVG mounting solutions that do not provide any ballistic or non-ballistic impact protection but are novel in their method of storing, stowing, mounting, and powering NVG/VAS.

Interested vendors should provide the following information:

- Company information such as a business name, size, NAICS code, DUNS number, and CAGE code
- Technical white paper or proposal to meet the threshold and/or objective salient characteristics of the ballistic and/or non-ballistic helmet system requirements (to include cost and delivery information); provide weight data by component and a total system weight
- Delivery capacity to deliver proposed prototypes as well as future production capacity
- Cost per system, to include cost broken out by component
- Past performance information for any recent and relevant contracts (both R&D and production)
- MSDS information for all known materials

2.8. Award Information: The award of each selected proposal will depend on the methodology and the technical approach to be pursued by the selected Offeror. Proposals identified for negotiation may result in a contract depending upon the nature of the work proposed, the

required degree of interaction between parties, whether the prototypes are mature and can be delivered within 60-90 days after award, and other factors. The Government expects to award contracts using a Firm Fixed Price (FFP) contract. The inclusion of options in any contract award will not obligate the Government to exercise the options at any time during contract performance. The Government reserves the right to remove BAA participants from award consideration should the parties fail to reach agreement on award terms, conditions, and cost/price within a reasonable time or the proposer fails to timely provide requested additional information. For information purposes only, which in no way legally obligates the Government, USSOCOM notionally expects to have approximately \$1M of available funds (includes funding for Government testing) for multiple awards from this BAA.

2.9. Classified Information: Offerors are encouraged to submit unclassified white papers and proposals to simplify and expedite reviews and response by the Government. If an Offeror deems that a white paper contains classified information then the Offeror is instructed to contact the technical point of contact identified in paragraph 2.6 for submission instructions of classified white papers and proposals. Classified submissions must be handled, labeled, and stored in accordance with the National Industrial Security Program (NISP) Operating Manual. Offerors are advised that submission of a classified white paper will require additional time for the Government to process, review, and respond, and will not delay the review and selection of unclassified white papers.

Offerors must possess all required personnel security clearances, facility clearances, and other infrastructure requirements necessary to perform the classified work in accordance with the Contract Security Classification Specification (DD Form 254) and corresponding Security Classification Guide without reliance on Government resources.

2.10. Industry Classification and Business Size Standards: The North American Industry Classification System (NAICS) code for this announcement is 541712 – Research and Development in Physical, Engineering, and Life Sciences (except Biotechnology) with a small business size standard of 500 employees.

2.11. Eligibility Information: Although participation is encouraged, no portion of this BAA is set-aside for small businesses, to include veteran-owned, service-disabled veteran-owned, Historically Underutilized Business Zones (HUB Zone) program, small disadvantaged businesses, or women-owned. Foreign or foreign-owned contractors are advised that their participation, while not precluded, is subject to foreign disclosure review procedures. Foreign contractors should contact the Contracting Officer immediately if they contemplate responding to this BAA.

2.12. Cost Sharing/Matching: The Government does not anticipate cost sharing or matching.

2.13. White Paper Consideration: All responsible Offerors capable of satisfying the Government's needs may submit a white paper for consideration. In order to be considered for award, Offerors must be registered in the System Award Management (SAM), complete the Online Representations and Certifications Application (ORCA) at www.sam.gov, and be considered responsible within the meaning of FAR Part 9.1 "Responsible Prospective Contractors," have a satisfactory performance record, and otherwise be eligible for award based on federal law and regulation.

2.14. Determination of Technology Readiness Level: The Government is seeking mature technologies from offerors that can be delivered in terms of small quantities of end items (up to

100) within 60-90 days after receipt of award. Each Offeror shall include in the white paper a preliminary Technology Readiness Level (TRL) assessment of the proposed technology that conforms to the technology objectives, and an expected TRL at the conclusion of the effort. The Offeror shall perform a TRL assessment of each subsystem and the system as a whole to identify technical risk areas. The Offeror shall determine the TRL of each subsystem/system in accordance with the Department of Defense Technology Readiness Assessment Guidance. Offerors are expected to be knowledgeable of TRL assessment when submitting white papers.

2.15. Disclaimers/Notifications: USSOCOM reserves the right to select all or some partial white paper content, or none of the white papers and full proposals received in response to this announcement throughout its term. USSOCOM, at its sole discretion, reserves the right to initiate exchanges with individual submitters, for the purpose of clarifying white papers and other material submitted in response to this BAA, when deemed necessary to ensure a full understanding of the Government's interpretation of the information provided. All awards are subject to the availability of funds. Offerors will not be reimbursed for white papers, full proposals, or development costs. There shall be no basis for claims against the Government as a result of any information submitted in response to this BAA. White papers, full proposals, and other material submitted with the white paper for review purposes under this BAA will not be returned.

2.16. White Paper Disclosures: It is the policy of USSOCOM to treat white papers as sensitive and competitive information and to disclose the contents only for the purposes of review. Nongovernment personnel may be used to facilitate the review process.

3.1. White Paper Submission and Review: The BAA was advertised through FedBizOpps on 24 Nov 2015 and closes on 1 March 2016. Offerors may submit white papers beginning 24 Nov 2015 but not later than 1 March, 2016. USSOCOM will conduct scientific or peer reviews on white papers. Approximately 7 days after white paper submission, USSOCOM will notify all Offerors submitting white papers either with a letter informing them that the effort proposed is not of interest to the Government or with a request for a formal cost and technical proposal.

3.2. Proposal Submission and Review: Upon notification of selection, Offerors have 15 calendar days to prepare and submit a proposal in accordance with the format and instructions in Appendix B. Following receipt of a proposal (proposals), there will be an additional 14-day scientific or peer review. After this review period, the Government anticipates contract award within 21 days for those proposals selected for award.

3.2. Data Rights: The contractor shall mark each page of its white paper that contains proprietary information. It is the Government's intention to receive unlimited rights as a result of funded efforts. A contractor may provide with its white paper assertions to restrict use, release, or disclosure of data and/or computer software that will be provided in the course of contract performance. Rules governing these assertions are prescribed in the Defense FAR Supplement (DFARS) clauses 252.227-7013, 7014, and 7017 and may be accessed at <http://farsite.hill.af.mil/VFDFARA.HTM>.

3.2.1 Other Transactions for Prototype Projects, Noncommercial and Commercial Items (Technical Data and Computer Software): The Government does not anticipate Other Transactions.

4.1. Step I - White Paper Submission and Review Process: The Government is interested in receiving white papers from Offerors who possess relevant experience to transform USSOCOM technology needs into practical technology-based products.

4.2. White Paper Submission Process: Interested Offerors shall submit a white paper as described below to be considered for submission of proposals and follow-on award of a contract. Contractors shall submit white papers that shall be valid for a minimum of six months from the closing date of the BAA.

4.3. White Paper Content and Format:

4.3.1. Format: White papers shall use the format described at Appendix A - White Paper Format. White papers shall meet the following requirements: (1) Paper Size - 8.5 x 11 inch paper; (2) Margins - 1"; (3) Spacing - single; (4) Font – Times New Roman, 12 Point; and (5) Microsoft Office 2007 or compatible format and/or PDF format. The Integrated Master Schedule is not restricted in size. The naming convention of white papers shall conform to the following format: "CompanyName_WhitePaperTitle_MMDDYYYY.doc or pdf" and contain no more than 50 characters and no special characters.

4.3.2. Number of Pages: White papers will not exceed ten pages, not including test data. The cover page, Quad Chart, and Integrated Master Schedule are not counted in this page limit. All pages shall be numbered.

4.3.3. Cover Page: Labeled "WHITE PAPER" and shall include: Title, technology area(s) of interest as referenced in paragraph 2.7, period of performance, estimated cost of task, name and address of the Offeror, technical and contracting points of contact, and telephone and fax numbers.

4.3.4. Technical: The Offeror shall submit a description of the scope of work necessary to satisfy the BAA, stated technical challenges and design objectives. This shall include: (1) technical approach; (2) technical risk areas; (3) design maturity; and (4) any other technical data/information to be conveyed for consideration. The Offeror will identify the management, technical qualification, and composition of the research team, key personnel, and subcontractors.

The Offeror must address the quality assurance process to assess its capability to successfully develop the technology and configuration control plan.

4.3.5. Price/Cost and Schedule: The Offeror will provide a determination of the cost to develop the mature prototypes. Each Offeror shall submit a rough order of magnitude (ROM) of the costs based on work areas of development to perform the overall technology prototyping effort. The Offeror will state the ability to complete all requirements within the proposed schedule. The Offeror shall submit a schedule by major tasks to develop the technology through completion of the prototype and proof of readiness and potential production capacity.

4.3.6. Quad Chart: The Offeror shall submit a quad chart following the example at Appendix A. The quad chart shall include: (1) description of the technology effort with drawing or schematic; (2) technical performance required to achieve and complete the effort; (3) costs by deliverable and schedule; and (4) technical resources and team members.

4.3.7. Submission: Only electronic submissions to the following email addresses: Contracting POC:

Ms. Kelly McNeill, Phone 813-826-5472, Email kelly.mcneill@socom.mil

Technical POC:

Mr. Nicholas Tsantinis, Phone 508-233-5953, Email nicholas.tsantinis.civ@mail.mil

4.4. White Paper Review Information:

4.4.1. Review Method: The Government will review each white paper and select the Offeror(s) that have the greatest potential to meet the needs of USSOCOM technology requirements based on the areas stated in the BAA. Initially, a determination will be made if each Offeror is technically qualified and has a comprehensive understanding to undertake the development of the technology based on the information stated in the white paper. The Government will determine the most technically competent and capable of the qualified Offerors using the criteria below.

4.4.2. Review Criteria: The Government will review the Offeror's capability to meet the technology requirements using the following specific criteria listed in descending order of importance:

4.4.2.1. Relevance: The Government will review the Offeror's description of the technology and the USSOCOM unique technology need that it meets for the technical challenges listed in paragraph 2.7. The Offeror's facilities and equipment will be reviewed to assess its capability to conduct complete development of the technology, construction of a prototype or prototypes, proof testing to assure maturity readiness, and production capacity.

4.4.2.2. Innovative or Revolutionary Technology: The Government will assess the Offeror's capability to satisfy the technical challenges and design objectives by reviewing the Offeror's unique, innovative, or revolutionary approach; technical risk and mitigation plan; the ability to achieve technology maturity; and other technical data/information conveyed.

4.4.2.3. Price/Cost: The Offeror will be assessed whether the technology development can be successfully completed from the costs stated by the Offeror.

4.4.2.4. Schedule: The Offeror's schedule will be evaluated based on the reasonable level of effort and complexity of the technology; the resources, facilities, and equipment available; and the allocation of time per major task.

4.4.3. Notification of Selection: All Offerors submitting white papers will be contacted by the Government, either with a letter informing them that the effort proposed is not of interest to the Government, or with a request for a formal cost and technical proposal by a specified date.

5.1. Step II - Proposal Submission and USSOCOM Review Process: All proposals stand on their own technical merit. The evaluation of each proposal will be based on the criteria stated below.

5.2. Proposal Submission/Format/Number of Pages: Offerors selected to submit a proposal will use the proposal format and structure shown in Appendix B. Each proposal shall include a Statement of Work (SOW) so that the evaluation process includes direct consideration for contract award. Proposals shall not exceed 20 pages, excluding test data, cover page, and cost/schedule. The cost proposal page limit is unlimited. All pages shall be numbered.

5.3. Proposal Review, Evaluation, and Selection Criteria and Process: Each proposal will be evaluated by the Government where the proposal must stand on its own technical merit. Each proposal will be evaluated for technical merit using the criteria below.

5.3.1. Proposal is well conceived, scientifically and technically sound, pertinent to the program goals and objectives, and offered by a responsible Offeror with the competent scientific and technical staff, ability to manufacture and supporting resources needed to ensure satisfactory program results. Proposals that meet these criteria are recommended for acceptance (subject to availability of funds) and normally are displaced only by other proposals that also meet these criteria.

5.3.2. Proposal is scientifically or technically sound, but requires further development and is not recommended for acceptance due to maturity level, and at a lower priority than proposals meeting the criteria described in 5.2.1.

5.3.3. Proposal is not technically sound or does not meet agency needs.

6.0. Step III - Contract Award: The Government's plan is to award contracts to selected technologies that meet USSOCOM's needs. Contract awards will be made based on the following.

6.1. Proposal Awards: Multiple awards may be made based on the quality of the proposals and availability of funding. Occasionally, USSOCOM may be interested in buying only a certain portion (or portions) of a proposal. This BAA method provides the flexibility to make an award for only those portions or tasks of the proposal that are of interest to the Government. You will be notified in writing if the Government intends to make an award based on your proposal. The notification will indicate if all or only portions of your proposal will be included in the award.

7.0. Government Furnished Information (GFI): All GFI will be provided via email and will be emailed upon request if determined necessary and advantageous by the Government. For verification please provide the following in the request: full company name, address, Cage Code (and Facility Code if differs), Security Office point of contact with telephone number/email, and level of clearance/safeguarding. All requests shall be directed to the Contracting Office POC ONLY via email at Primary: kelly.mcneill@socom.mil; Secondary: Nicholas.tsantinis.civ@mail.mil

8.0. References

Federal Acquisition Regulation
Defense Federal Acquisition Regulation Supplement
National Industrial Security Program Operating Manual

9.0 Acronyms

BAA Broad Agency Announcement
CPFF Cost-Plus-Fixed-Fee
C4 Command, Control, Communications, and Computers
DFARS Defense Federal Acquisition Regulation Supplement
FAR Federal Acquisition Regulation
FFP Firm-Fixed-Price
GFI Government Furnished Information
HUB Zone Historically Underutilized Business Zones
NISP National Industrial Security Program

NAICS North American Industry Classification System
OT Other Transaction
POC Point of Contact
RFP Request for Proposals
ROM Rough Order of Magnitude
SA Situational Awareness
SOF Special Operations Forces
SOW Statement of Work
TRL Technology Readiness Level
U.S.C. United States Code
USSOCOM United States Special Operations Command

Appendix A – White Paper Format

Section A – Title, technology area(s) of interest as referenced in paragraph 2.7, period of performance, estimated cost of task, name and address of the Offeror, technical and contracting points of contact, and telephone and fax numbers.

Section B – Task objective with description of work to be performed.

Section C – Technical summary and proposed deliverables. The white paper should include the anticipated period of performance as well as a ROM cost. The white paper does not include a cost proposal or any of the material that usually accompanies a cost proposal. It must include a short technical description of the concepts and plans to accomplish the technical objectives. It also briefly describes the mature prototypes to be pursued and made available to the Government in the effort. It should also identify any Independent Research and Development (IR&D) work underway within the company that may have direct application.

Section D – Quad Chart

The quad chart presents the overall view of the proposed work in a snapshot. It is essential that the quad chart visually present the relevant information of what the project will accomplish, a description, the technical efforts necessary to achieve results, benefit to SOF, technical and management resources, costs, and schedule/major milestones. It is preferred that quad charts be provided in the latest version of Microsoft (MS) Power Point, although they may be provided in MS Word or Adobe Acrobat files so long as the quad file can be opened and read. A sample quad is shown below in Figure 1.

Figure 1: Quad Chart Layout

Appendix B – Proposal Format

INTRODUCTION: The Offeror's proposal shall consist of three parts. Part I is the technical proposal, Part II is the statement of work, and Part III is the cost proposal.

Part I: Technical Proposal Table of Contents

- i Cover Page (excluded from page count)
- ii Table of Contents (excluded from page count)
- iii List of Illustrations/Tables (excluded from page count)
- iv Executive Summary
 - 1.1 Technical Approach
 - 1.2 Technical Discussion

- 1.3 Technical Program Summary
- 1.4 Risk Analysis and Alternatives
- 1.5 References
- 2.1 Special Technical Factors
 - 2.2 Capabilities and Relevant Experience
 - 2.3 Previous or Current Relevant Independent Research and Development (IR&D) Work
 - 2.4 Related Government Contracts
 - 2.5 Facilities/Resources
 - 2.6 Resumes of Key Personnel
- 3.0 Schedule - Time Line Chart by Task
- 4.1 Program Organization
 - 4.2 Organization Chart(s) with Key Personnel
 - 4.3 Management and Technical Team
 - 4.3.1 Offeror Responsibilities
 - 4.3.2 Subcontractor(s) Responsibilities
 - 4.3.3 Consultant Responsibilities

Appendix(es)

Part I: Technical Proposal – Detailed Description of Contents

i. Cover Page

The cover page shall include the BAA title and reference number; name with telephone number, fax, and email address for the Offeror's principal points of contact (both technical and contractual); and a proprietary data disclosure statement, if applicable.

ii. Table of Contents

Follow the table of contents format described above.

iii. List of Illustrations/Tables

This list is a quick reference of charts, graphs, and other important information.

A separate List of Illustrations/Tables is recommended.

iv. Executive Summary

The Executive Summary allows the Offeror to present, briefly and concisely, the important aspects of their proposals to key management personnel. The summary should present an organized progression of the work to be accomplished, without the technical details, so that the reader can grasp the core issues of the proposed program. The Executive Summary shall not exceed more than one half of one page in length.

- 1.1 Technical Approach: In this section, the Offeror should provide as much technical detail and analysis as is necessary or useful to support the proposed technical approach. Offerors must clearly identify the technologies forming the solution(s) proposed.

- 1.2 Technical Discussion: No technical approach is without its limitations or shortcomings. Every issue should be identified and compared with the successes/ failures of previous approaches. A tradeoff analysis is a good way to make this comparison and should be supported by experimental data or other sound engineering and scientific practices. If the Offeror has a new and creative solution to the problem(s), that solution should be developed and analyzed in this section. The preferred technical approach should be described in as much detail as is necessary or useful to establish confidence in the approach.
 - 1.3 Technical Program Summary: This section summarizes the above technical discussion in an orderly progression through the program, emphasizing the strong points of the proposed technical approach.
 - 1.4 Risk Analysis and Alternatives: Every technology has limitations and shortcomings. The proposal evaluator(s) will formulate a risk assessment; therefore, it is in the best interest of the Offeror to have its own understanding of the risk factors presented. Critical technologies should be identified along with their impact on the overall program, as well as fallback positions that could still improve on existing approaches.
 - 1.5 References: Any good technology discussion must present the basis for, the reference, and the findings cited in the literature.
- 2.1 Capabilities and Relevant Experience: In this section, the Offeror should describe any capabilities the Offeror has that are uniquely supportive of the technology to be pursued. The following subparagraphs are recommended to be addressed.
 - 2.2 Previous or Current Relevant IR&D Work and Points of Contact
 - 2.3 Related Government Contracts and Points of Contact
 - 2.3 Facilities/Resources
 - 2.4 Resumes of Key Personnel
 - 3.1 Schedule: The schedule represents the Offeror's commitment to perform the program tasks in an orderly, timely manner.
 - 3.2 Time Line Chart by Task: Each major task identified in the SOW should appear as a separate line on the program schedule.
- 4.1 Program Organization: In this paragraph, the Offeror should present its organization's ability to conduct difficult technical programs. Any pertinent or useful information may be included in this paragraph, but a minimum recommended response should address the following subparagraphs:
 - 4.2 Organization Chart(s) with Key Personnel: Include prime Offeror and subcontractor organization charts.

- 4.3 Management and Technical Team: This should specifically identify what tasks will be performed by each party and why each subcontractor, if any, was selected to perform its task(s).
- 4.3.1 Offeror Responsibilities
- 4.3.2 Subcontractor(s) Responsibilities
- 4.3.3 Consultant(s) Responsibilities

Appendix(ces): Appendices may include technical reports, published papers, and referenced material. A listing of these reports/papers, with short description of the subject matter, is usually adequate. **DO NOT PROVIDE COMMERCIAL PRODUCT ADVERTISING BROCHURES.** Please be aware that these may be included in the proposal page limitation.

Part II – Offeror Statement of Work (SOW)

a. PLEASE USE THE FOLLOWING DECIMAL NUMBERING SYSTEM FOR SOW PREPARATION. **Do not put proprietary data or restrictive markings in the SOW.**

Table of Contents

1.0 Objective

2.0 Scope

3.0 Background

4.1 Tasks/Technical Requirements

4.2 Task – 1st sub-level

4.1.1 Sub-task – 2nd sub-levels

4.1.1.1 Second level sub-task – 3rd sub-level

b. An Offeror-developed SOW is required to accurately describe the work to be performed and void of inconsistencies. If, in the Government's opinion, the Offeror's SOW does not reflect these requirements, changes or adjustments may be required that could delay the award. The SOW must be a separate and distinct part of the proposal. The proposed SOW must contain a summary description of the technical methodology as well as the task description, but not in so much detail as to make the SOW inflexible. **DO NOT INCLUDE THE OFFEROR'S NAME, OR ANY PROPRIETARY INFORMATION IN THE SOW.**

c. The following is offered as the format for the SOW. Begin this section on a new page. Start your SOW at paragraph 1.0.

(1) 1.0 - Objective: This section is intended to give a brief overview of the specialty area and should describe why it is being pursued and what you are trying to accomplish.

(2) 2.0 - Scope: This section includes a statement of what the SOW covers. This should include the technology area to be investigated, objectives/goals, and major milestones for the effort.

(3) 3.0 - Background: The Offeror shall identify appropriate documents that are applicable to the effort to be performed. This section includes any information, explanations, or constraints that are necessary in order to understand the requirements. It may include relationships to previous, current, and future operations. It may also include techniques previously tried and found ineffective.

(4) 4.0 - Technical Requirements:

- i. This section contains the detailed description of tasks representing the work to be performed that are contractually binding. Thus, this portion of the SOW should be developed in an orderly progression and in enough detail to establish the feasibility of accomplishing the overall program goals. The work effort should be segregated into major tasks and identified in separately numbered paragraphs according to the decimal system above. Each numbered major task should delineate, by subtask, the work to be performed. The SOW must contain every task to be accomplished.
- ii. The tasks must be definite, realistic, and clearly stated. Use “shall” whenever the work statement expresses a provision that is binding. Use “should” or “may” whenever it is necessary to express a declaration of purpose. Use “will” in cases where no Offeror requirement is involved, e.g., power will be supplied by the Government. Use active voice, not passive voice, in describing work to be performed.
- iii. Do not use acronyms or abbreviations without spelling out acronyms and abbreviations at the first use; place the abbreviation in parenthesis immediately following a spelled-out phrase. This provides the definition for each subsequent reuse. As an option, a glossary may contain definitions of acronyms and abbreviations.

d. If presentations/meetings are identified in your schedule, include the following paragraph in your SOW:

a. *“Conduct presentations/meetings at times and places specified in the contract schedule.”*

e. It is preferred that your proposed Statement of Work be submitted via email (with classification marked) using Microsoft Word.

PART III - Offeror Cost Proposal

- a. The Offeror’s cost proposal shall be a separate document from the Offeror SOW and included with the technical proposal and SOW. For pricing purposes, Offerors should assume a contract or agreement start date of approximately thirty (30) days after submission of the proposal.

- b. Offerors will limit the cost proposal to the minimum number of pages necessary to adequately support the proposed cost. Cost or pricing data, as defined in FAR 2.101, must be submitted for contract awards. If a negotiated contract is expected to exceed \$700,000, then the submission of certified cost or pricing data shall be required. When certified cost or pricing data are required, the Contracting Officer shall require the Offeror to submit to the Contracting Officer (and to have any subcontractor or prospective subcontractor submit to the Offeror or appropriate subcontractor tier) the following in support of any proposal:
- (1) The cost or pricing data.
 - (2) A certificate of current cost or pricing data, in the format specified in FAR 15.406-2, certifying that to the best of its knowledge and belief, the cost or pricing data are accurate, complete, and current as of the date of agreement on price or, if applicable, an earlier date agreed upon between the parties that is as close as practicable to the date of agreement on price.
- c. If certified cost or pricing data are requested and submitted by an Offeror, but an exception is later found to apply, the data will not be considered cost or pricing data as defined in FAR 2.101 and will not be certified in accordance with FAR 15.406-2.
- d. Format. Cost proposals shall be formatted as follows.
- (1) Paper Size – 8.5 X 11-inch paper
 - (2) Margins 1-inch
 - (3) Spacing – single
 - (4) Font – Times New Roman, 12 Point
 - (5) Electronic Software: Microsoft Word, Excel, or Adobe Acrobat
 - (6) Submission, electronic as stated in Section 1.5 of this BAA
- e. Additional Information: The following information should be contained in a cover sheet attached to the cost proposal:
- (1) Full company name and address
 - (2) BAA number submitting proposal against
 - (3) Point of contact, name, title, and phone and fax number
 - (4) CAGE code
 - (5) DUNS number
 - (6) Type of payment provision proposed (i.e., FFP, CPFF, and T&M)
 - (7) Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office or Office of Naval Research (ONR) office.
 - (8) Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office.

(9) Will you require the use of any Government property in the performance of this work? If yes, identify.

(10) Is this proposal consistent with your established estimating and accounting practices and procedures and FAR Part 31 cost principles? If no, explain.

(11) Award instrument utilized: Contracts are anticipated to be Firm Fixed Price

f. Cost Element Breakdown: Clear, concise and accurate cost proposals reflect the Offeror's financial plan for accomplishing the effort contained in the technical proposal. All direct costs (e.g., labor, material, travel, and computer) as well as

labor and overhead rates should be provided by contractor fiscal year (CFY) unless otherwise specified in the BAA. The cost element breakdown(s) may include the following.

(1) Direct Labor: Direct labor should be detailed by number of labor hours, category, and rates in burdened costs.

(2) Labor and Overhead Rates: Direct labor hours, with their applicable rates, must be broken out by CFY and the bases used clearly identified. The source of labor and overhead rates and all pricing factors should be identified. For instance, if a Forward Pricing Rate Agreement (FPRA) is in existence, that should be noted, along with the Administrative Contracting Officer's (ACO's) name and telephone number. If the rates are based on current experience in your organization, provide the history base used and clearly identify all escalation, by year, applied to derive the proposed rates. If computer usage is determined by a rate, identify the basis used and rationale used to derive the rate.

(3) Material/Equipment: List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes, data and/or engineering estimates; provide copies of vendor quotes and/or catalog pricing data.

(4) Sub-Officer Costs: Offerors must submit all subcontractor proposals and analyses with the cost proposal (See FAR 15.404-3(b)). If the subcontractor will not submit cost and pricing information to the Offeror, this information must be submitted directly to the Government for analysis. On all subcontracts and interdivisional transfers, provide the method of selection used to determine the subcontractor and the proposed contract type of each subcontract. An explanation shall be provided if the Offeror proposes a different amount than that quoted by the subcontractor. The Offeror's proposal must:

i. Identify principal items/services to be subcontracted.

ii. Identify prospective subcontractors and the basis on which they were selected. If non-competitive, provide selected source justification.

- iii. Identify the type of contractual business arrangement contemplated for the subcontract and provide a rationale for same.
- iv. Identify the basis for the subcontract costs (e.g., firm quote or engineering estimate, etc.).
- v. Identify the cost or pricing data or information other than cost or pricing data submitted by the subcontractor.
- vi. Provide an analysis of the proposed subcontract in accordance with FAR 15.404-3(b). Provide an analysis concerning the reasonableness, realism and completeness of each subcontractor's proposal. If the analysis is based on comparison with prior prices, identify the basis on which the prior prices were determined to be reasonable. The analysis should include, but not be limited to, an analysis of materials, labor, travel, other direct costs, and proposed profit or fee rates.

(5) Special Tooling or Test Equipment: When special tooling, and/or test equipment is proposed, attach a brief description of said items and indicate if they are solely for the performance of this particular contract or project and if they are or are not already available in the Offeror's existing facilities. Indicate quantities, unit prices, whether items are to be purchased or fabricated, whether items are of a severable nature and the basis of the price. These items may be included under direct material in the summary format.

NOTE 1: If an Offeror takes exceptions to the requirements called out in the announcement, the exceptions should be clearly stated in the cost proposal.

Appendix C – Test Methodologies

PART I: Fragmentation:

The helmet shell shall be subjected to a fragmentation test and the suspension system, retention system, pads, and any associated hardware (NVG shroud, attachment rails, NVG mounts, etc.) shall be removed prior to testing. The helmet shell shall also have NVG holes (if used in the design) and paint/hook and loop is optional. The helmet shell shall be rigidly secured on a test target mount with the impact side orientated to achieve the required degree of obliquity. The helmet shell shall be capable of providing the minimum V50 BL (P) listed in Table I on all areas of the helmet at 0° degree of obliquity against the specified right circular cylinder (RCC) under the following conditions.

- a. ambient (70°F)
- b. extreme hot (180°F)
- c. extreme cold (-60°F)
- d. after immersion in saltwater, tested at ambient temperature (70°F)
- e. after exposure to gasoline, tested at ambient temperatures (70°F)

All testing shall be in accordance with MIL-STD-662F; however, starting and incremental velocities may be dictated by a Government technical representative. To obtain the V50 BL (P), impacts may be placed randomly on the helmet shell and multiple helmet shells may be used to determine the V50 BL (P) for a particular projectile and environmental condition. Yaw shall not

exceed 5° for any projectile and no helmet shall be tested for at least 24 hours after molding. A witness plate shall be rigidly mounted inside the finished shell, shall be of sufficient size to be impacted by all fragments, and shall be a 0.020 in (0.51mm) thick aluminum sheet of 2024-T3, 2024-T4, or 5052 alloy. A suitable plate shall be placed behind the witness plate, but not closer than 1.0 inch, to prevent any fragments from impacting the opposite side of the finished shell.

The helmet shell shall be divided into 5 sections (top, front, right side, back, left side) with markings made on the outside surface of the shell in accordance with the ACH CO/PD-05-04 dated 30Oct07. Two impacts, randomly placed, shall be fired in each section, except that one of the two fair impacts in the top section will be placed within 1.0 inch of the benchmark at the crown of the helmet. An impact resulting in a complete penetration shall be considered unfair if it is within 1.5 inches of another impact, within 1.5 inches of the closest edge of any hole, or within 1.0 inches of the edge of the helmet. If two fair impacts cannot be placed in a section, the second impact shall be placed on another helmet but not in the same location as the first impact. If an impact, unfair because of location, results in a partial penetration, it may be considered a fair impact. More than two impacts may be fired in each section with approval from the contractor.

The V50 BL (P) shall be calculated using an objective minimum average of 5 fair hit complete penetrations and 5 fair hit partial penetrations with a range of results of ≤ 125 ft/s and a threshold average of 7 fair hit complete penetrations and 7 fair hit partial penetrations with a range of results of ≤ 150 ft/s. If no fair complete penetrations are observed after 14 fair impacts at

velocities at or below the V50 BL (P) and at least 7 fair partial penetrations are observed at velocities above the required V50 BL (P) then the test is considered passed.

PART II: 9mm and 7.62x39mm PS Ball Testing:

All helmet systems (complete baseline system) shall be tested in the “as worn” configuration with the exception of the NVG shroud and NVG mount. Accessory rails, bungee lanyards, exterior paint and hook and loop are optional. The suspension system and pads shall be arranged in an agreed upon configuration between the Government and contractor prior to the test and the helmet shall be pre-drilled for the NVG shroud/mount (if used in the design). Once agreed upon, the pad configuration may not be altered without approval from the Government. The helmet system shall be resistant to penetration from a minimum of a single strike (V0) in any section of the helmet at 0° obliquity against a 124 grain, 9mm Full Metal Jacketed Round Nose (FMJ RN) projectile at a threshold velocity of 1195 fps (+50 fps) under the following conditions:

- a. ambient (70°F)
- b. extreme hot (180°F)
- c. extreme cold (-60°F)
- d. after immersion in saltwater, tested at ambient temperature (70°F)
- e. after exposure to gasoline, tested at ambient temperatures (70°F)

Testing shall be in accordance with NIJ Standard 0106.01 unless otherwise specified. Testing shall occur on Multi-Size Headforms of the ACH geometry with a standoff of 23+/- 0.5 mm verified for each shot location prior to impact. The slots shall be packed with Roma Plastilina Number 1 modeling clay, ensuring there no voids, cavities, or depressions in the final contoured assembly. The clay shall be shaped to create an uninterrupted smooth surface matching the contour of the headform. The clay shall be verified in accordance with the ACH CO/PD-05-04 dated 30Oct07.

The finished helmet shall be mounted on the headform in the as-worn position and only the suspension/retention system shall be used to hold the helmet to the headform. The suspension/retention system shall be adjusted to ensure a constant standoff of 23 +/- 0.5 mm at each shot location.

Each helmet shell shall sustain at a minimum, 1 strike against a 124 grain, 9mm Full Metal Jacketed Round Nose (FMJ RN) projectile in six different impact locations at zero degrees of obliquity. The contractor may test all six locations on a single helmet or all six locations on six separate helmets. The six locations shall be as follows:

- One impact on the crown: at the approximate intersection of the mid-sagittal and coronal planes
- Two total impacts on the coronal plane: one impact on the right side and one on the left side, approximately 50mm above the edge of the earflap
- Three total impacts in the mid-sagittal plane:
 - One impact on the front in the approximate center of the 3-hole NVG mount pattern, approximately 65mm from the edge of the shell
 - One impact on the back 75mm from the edge of the shell
 - One impact shall be on the rear fastener (left or right).
- If fasteners are not used with the retention system then five shots shall be required in the above locations, minus the fastener location.

The helmet shall also meet the same 9mm RTP requirements in any other location of the helmet as long as shot locations do not violate shot-to-edge or shot-to-hole spacing. The test shall be conducted in the same manner as the rear fastener.

A complete penetration is defined as in NIJ 0106.01 and if clay is used, it is defined as a hole which passes thru the shell or complete perforation of the shell by the projectile or fragment of the projectile as evidenced by the presence of that projectile, projectile fragment, fragment of the shell, or fastener in the clay

- Testing shall occur on Multi-Size Headforms of the ACH geometry with a standoff of 23+/- 0.5 mm verified for each shot location prior to impact.
- Shot location for front and back shall be verified to be 32.5mm from the headform post.
- Shot location for left and right shall be 37.55mm from the headform post.
- Backface Deformation shall be scanned using Faro-Arm and analyzed using pass/fail criteria.

The same criteria above shall be applied to the 7.62x39mm PS Ball at 2400-2450 ft/s.

PART III: Blunt Impact:

The blunt impact protection of the complete finished helmet shall be determined in accordance with DOT FMVSS 218 with the following exceptions:

1. Each helmet shall be tested with the pad suspension system and pad configuration arranged inside the helmet as indicated and agreed upon by the Government and

contractor. The same pad configuration and suspension system shall be used in the both the ballistic and non-ballistic tests.

2. Eight helmet samples of each size shall be required: two each for testing after exposure to each of the four environmental conditions.

3. The environmental conditions shall be ambient (70°F), objective cold (60°F), threshold cold (44°F) and hot (130°F). Helmets shall be conditioned for a minimum of 12 hours prior to test.

4. The hot and cold environmental impacts shall be conducted within 5 minutes after the helmets are removed from the environmental conditioning chamber. Helmets shall be returned to the conditioning chamber and exposed for at least 15 minutes before removal for another test.

5. The impact anvil used for all tests shall be the hemispherical anvil.

6. Helmets shall be fitted to the appropriate size DOT (FMVSS 218) headform (sizes B, C, and D).

7. Each helmet shall be impacted two times at seven locations. These include the front, back, left side, right side, lower left rear, lower right rear, and the crown. The headform shall be oriented as described in Table 16 for each particular impact site.

Table 16: Headform Orientation for blunt-impact testing

9. Two successive impacts shall be made at each location. The second impact shall be made no sooner than one minute after the first and no later than two minutes after the first. This may be modified during this RFI to determine tradespace information.

10. The velocity for all impacts shall be $10 + 0.3$ feet per second. This may be modified during this RFI to determine tradespace information.

For both threshold and objective testing, the acceleration values for all 14 impacts shall be reported separately to determine the worst value for the helmet. Any individual acceleration value exceeding 150G in any location in any of the environments constitute failure of the test. Any objective testing is for Government reference only.

The Government is interested in information regarding blunt impact and ballistic test protocols for mandibles and ear protection.

PART IV: PPAH:

Projected Protection Area on Head (PPAH) Proper helmet to headform sizing is critical for obtaining a good, comparable, coverage estimate. CAD files for the headforms used to calculate PPAH are based on the MICH 2000 geometry and can be supplied by the Government upon request. Headform geometries are surfaces offset inward 0.9 in from the inner surface geometry of the various sizes of MICH 2000. A medium helmet fits on a medium headform, a large helmet fits on a large headform, and an extra-large helmet fits on an extra-large headform. For helmet samples that do not follow the MICH 2000 sizing, the proper headform is the size that most closely replicates a comfortable fit wherein the helmet pads are not overly compressed or the helmet is not loose on the head. See Figures below for the PPAH calculation method.

Proper helmet positioning is critical for obtaining a good, comparable, coverage estimate. The helmet must be placed on the headform “as worn” according to manufacturer’s fitting instructions. The angle of the helmet should be determined according to manufacturer’s fitting instructions or such that the front edge/brim of the helmet is parallel to the Frankfort (or Basic) Plane. The headform-helmet pair should be positioned so that the head is looking forward: in plane with the Midsagittal plane and when the Frankfort (or Basic) plane is horizontal.

Figure 1 is a reference for the primary planes used to define a headform. The Frankfort (or Basic) plane is a horizontal plane through a headform. The Midsagittal plane is a vertical plane separating left and right sides of a headform. The Coronal plane is a vertical plane separating the front and back of a headform.

Figure 2. Reference for the primary planes used to define the headform

Figure 2 shows a representative sample of the Government supplied PPAH headform CAD data. The vertical extrusion on the interior of the headform will be used in defining the coverage area. The primary planes are for reference and aligning purposes.

Figure 3. Representative government supplied headform data for PPAH area calculation.

One helmet of each size shall be digitally scanned on a PPAH headform of corresponding size. The Government supplied PPAH headform CAD data shall be used to create the sized PPAH headforms for digital helmet scanning. The headforms may be created using any rapid prototyping or 3D printing technique capable of at least ± 0.1 mm tolerance. Figure 3 shows a representation of a sample helmet placed correctly on the PPAH headform. Once the helmet has been located on the headform, both the headform and helmet should be digitally scanned at a level of detail sufficient to locate the scanned edge of the helmet in reference to the location of the headform when brought into a CAD software package. Any method of scanning can be used as long as it is able to record the location of a surface in space at a tolerance of ± 0.5 mm and record a reference location for defining the outer edge of the helmet shell at least every 3 mm along the edge.

Figure 4. Locate sample helmet on headform. Digitally scan helmet and headform together, making sure to have enough detail to locate the helmet shell edge in space.

Helmets shall first be stripped of any hardware on the exterior of the shell, while maintaining the use and structural integrity of the retention system. The headform shall then be securely fixed so that a datum point can be collected using the FARO arm at its crown position, in accordance with ATC-MMTB-IP 002 REV E-Helmets-RPS and Helmet Stand-off. The helmet will then be placed on the headform in the as-worn position, using the retention system to tighten/loosen the helmet to the specified helmet standoff of $23.0\text{mm} \pm 0.5$ mm.

Once the correct helmet to headform offset is verified, complete dimensional characterization of the helmet/headform pair using CMM or equivalent technology. The headforms should have two pre-determined fixturing holes in their base to ensure repeatable placement of the headforms within the pre-programmed paths of the CMM (or equivalent) scanner.

After scanning the helmet and headform pair, the helmet point-cloud data should be separated from the headform data. The corresponding CAD file for the scanned headform is the “best-fit” to the scanned geometry. Evaluate the scan for any repairs or inconsistencies needing attention. Delete all scan data relating to the retention system hardware and replace using a hole fill function (or equivalent).

Figure 4 shows a representation of what the scanned helmet shell might look like when aligned to the PPAH headform data in the CAD software package. Any software package may be used as long as it is

able to work to the stated tolerances and can be used to follow the steps outlined in accordance with this section.

Figure 5. Use scan data to digitally align helmet to government supplied head form data.

Figure 5 shows a representation of defining the helmet edge within the CAD software package. Define the outside lower edge of the scanned helmet shell to a tolerance of at least +/- 0.5 mm at locations no less than every 3 mm along the edge. All obvious facets that should not be included shall be manually deleted. The resulting edge will be jagged and should be smoothed using a smoothing function. Although Figure 5 only shows the edge trace projected around half of the helmet (180° rotation), PPAH should be calculated by projecting the edge around the entire portion of the helmet (360°).

Figure 6. Define the edge of the helmet shell in space.

Figure 6 shows the steps to be performed in the CAD software package that are required to determine the protected area of coverage on the headform surface. Create a “curve” in the CAD software package that traces the bottom edge of the scanned helmet keeping it within +/- 0.5 mm within every 3 mm along the edge. Use this created curve to create a second “curve” by projecting it onto the “vertical extrusion surface” (in supplied headform CAD data) perpendicular to the bottom edge of the scanned helmet sample being measured. Generate a “surface” between the curve on the bottom of the scanned helmet and the projected curve on the vertical extrusion surface. Work to keep all surface isoparms (or other surface reference geometry) as close to perpendicular to the supplied “vertical extrusion surface” as possible. Although Figure 6 only shows the edge trace projected around half of the helmet (180° rotation), PPAH should be calculated by projecting the edge around the entire portion of the helmet (360°).

Figure 7 Offset the defined helmet edge normal to the supplied interior extruded surface. Generate a surface connecting the two edges. Work to keep all surface isoparms as close to normal to the extruded surface as possible.

Figure 7 shows how the surface that was generated between the two curves intersects the supplied PPAH headform CAD data. Define the intersection of the generated surface and government supplied headform data as the surface to be measured for the protected area of head coverage. Although Figure 7 only shows projecting the edge around half of the helmet (180° rotation), PPAH should be calculated by projecting the edge around the entire portion of the helmet (360°).

Figure 8. Use the intersection of the generated surface and the government supplied headform data to define the boundary to the area of coverage.

Figure 8 shows the area for use in calculating the protected area of head coverage. Use the CAD software package to measure the headform surface resulting from the intersection of the two curves and generated surface.

Figure 9. Analyze to determine total surface area in square inches.

PART V: Compression:

Top-to-Bottom:

The finished shell shall be tested on a constant rate of extension (CRE) machine in accordance with ASTM Test Method D-76 expect that the machine shall be used in the compression mode as follows. Use a fixture or jig to completely support the test specimen around its periphery. The fixture or jig shall extend at least 1.0 inch beyond edge of the finished shell on the same plane as the edge (not up the sides of the test specimen) to ensure that it is supported. Position and center the test specimen on the jig on the base platen of the machine so that the test specimen is in the as-worn position and the planes (see drawings 2-1-2515, 2-1-2516, 2-1-2517, and 2-1-2518 OF

ACH CO/PD 05-04) are parallel to the platen. While in this position, measure and record and mark the maximum height reading of the test specimen at its apex to the nearest 0.001 inch. Using a 2.50 inch diameter flat anvil, compress the shell at its vertex at the rate of 12 inch/minute until a compressive force of 400 lb is reached. Release the applied force to 5 lb. and repeat testing for 24 additional cycles. Within 5 minutes of the completion of the last cycle, again measure and record the height dimension in the same manner as above. One shell from each helmet size shall be tested.

- There shall be no dimensional change in excess of 0.020" immediately (within 5 minutes) following compressions and 0.010" after 24 ± 1 hour when compared to pretest dimension. This may be modified during this RFI to determine tradespace information.
- Additionally the shell shall exhibit no visible delamination, ply separation, distortion after the compressions.

Side-to-Side:

The finished shell shall be tested on a constant rate of extension (CRE) machine in accordance with ASTM Test Method D-76, except that the machine shall be used in the compression mode per the following. Measure, record and mark the maximum shell width dimension of the test specimen to the nearest 0.001 inch. Using a top 2.50 inch diameter flat anvil position the test specimen so that the highest width dimension is aligned with the center of the top anvil. Suitable means shall be made to keep the test specimen in position so long as the means does not add to the structural rigidity of the shell. A method successful used is shown in Figure 5. Note that Figure 5 shows a finished shell – unfinished shells are permitted. Compress the test specimen at the rate of 12 inch/minute until a force of 300 lb. is reached. Release the applied force to 5 lb. and repeat testing for 24 additional cycles. Within 5 minutes of the completion of the last cycle, again measure and record the height dimension in the same manner as above. One shell from each size shall be tested.

- The finished helmet shell shall be resistant to repeated compressions in the side-to-side direction. There shall be no dimensional change in excess of 0.125" (immediately, within 5 minutes) following compressions and 0.100" after 24 ± 1 hour when compared to pretest dimension. This may be modified during this RFI to determine tradespace information.
- Additionally, the shell shall exhibit no visible delamination, ply separation, distortion after the compressions.

PART VI: Visor Testing:

The visor must meet the ballistic requirements of MIL-PRF-32432 Class 1 as a Threshold (T) and Class 2 as an Objective (O)

Ballistic fragmentation protection for Visor-Threshold level of performance.

MIL-PRF-32432 Class 1

Ballistic fragmentation protection, Class 1. Spectacles shall be hit once with a 0.15 caliber, 5.85 (+/- 0.15) grain, T37 shaped projectile at 640 to 660 ft/sec at normal incidence (0 degree obliquity) to the primary lens at a location within each the left and right critical areas. Impacts shall be alternated between the left and right sides during testing. The critical area is defined as a circle having a 20 mm

radius centered on the horizontal centerline and 32 mm from the vertical centerline). A shot shall be considered valid if the projectile hits within the critical area, if the velocity requirements have been met for the shot (i.e., considered “fair” per paragraph 4.4.3.3.2), if obliquity requirements have been met for the shot, if the impact location is at least two projectile diameters (.76 cm) away from the edge of a lens, and the projectile does not impact the frame. Projectiles shall be a fragment simulating project (FSP) of shape and dimensions as specified in Figure 2 and shall be manufactured from cold rolled, annealed steel conforming to composition 4340H; the projectile hardness shall be Rockwell C30 (+/-2). Projectiles will be visually inspected for damage in between each shot. Projectiles may be reused after they have been fired unless visual observation indicates that the projectile has been damaged or deformed. The test item shall be mounted on an EN head form (small or medium) in the as-worn position. Compressed gas propulsion (N₂ or He) of the projectile may be used. The test item shall be removed after each impact for inspection of both the sample and the witness plate and any other observations noted. Damage to the witness sheet or eyewear and all observations (i.e., breakage, cracks, complete dislodgement, partial dislodgement, delamination, flaking, etc.) shall be noted. Ballistic fragmentation testing shall be conducted on a sample size of ten (10) for each configuration tested initially, and a sample size of three (3) for each post exposure (such as post chemical and post environmental). Class 1 and 1a spectacles designed with temple arms shall be tested without the optional retention strap.

The test shall be considered a failure if one or more of the following occur

- 1) if the witness sheet is perforated or if there is a complete penetration of the test item,
- 2) if the primary lens is cracked, fractured, or shattered,
- 3) if one or more fragments become dislodged on the inside of the eyewear (to include coatings)
- 4) if an eyewear component needed to retain the eyewear on the head becomes completely separated from the eyewear
- 5) if the primary lens becomes completely separated from the eyewear
- 6) if the eyewear falls off the head form
- 7) if the inside laminate is cracked and results in a loose flap of material larger than the diameter of the projectile (for laminated lens structures only)

A lens crack is defined as a fissure that propagates beyond the impact site from one surface of the lens to the other. Petalling is not considered a crack.

Figure 10: 15 caliber fragment simulating projectile

Ballistic fragmentation protection for Visor-Objective level of performance.

MIL-PRF-32432 Class 2

Ballistic fragmentation protection, Class 2 and Class 3. Class 2 Goggles shall be hit three (3) times with a 0.22 caliber, 17 (+/- 0.5) grain, T37 shaped projectile at 550-560 ft./sec, once on the left side and once on the right with both impacts at normal incidence (0 degree obliquity) to the primary lens at a location within the critical area. The third shot shall be in the center at the vertical center line at normal incidence (0 degree obliquity) to the primary lens. Class 3 shall be impacted in the same

manner, with the exception that the center shot shall not be taken. The critical area is defined as a circle having a 20 mm radius centered on the horizontal centerline and 32 mm from the vertical centerline). A shot shall be considered valid if the projectile hits within the critical area or within 10 mm of the designated impact point, if the velocity requirements have been met for the shot (i.e., considered “fair” per paragraph 4.4.3.3.2), if obliquity requirements have been met for the shot, if the impact location is at least two projectile diameters (1.09 cm) away from the edge of a lens, and the projectile does not impact the frame. Projectiles shall be a fragment simulating project (FSP) of shape and dimensions as specified in Figure 3 and shall be manufactured from cold rolled, annealed

steel conforming to composition 4340H; the projectile hardness shall be Rockwell C30 (+/-2). MIL-PRF-32432(GL) 35

Projectiles will be visually inspected for damage in between each shot. Projectiles may be reused after they have been fired unless visual observation indicates that the projectile has been damaged or deformed. The test item shall be mounted on an EN head form (small or medium) in the as-worn position. Compressed gas propulsion (N₂ or He) of the projectile may be used. The test item shall be removed after each impact for inspection of both the sample and the witness sheet and any other observations noted. Damage to the witness sheet or eyewear and all observations (i.e., breakage, cracks, complete dislodgement, partial dislodgement, delamination, flaking, etc.) shall be noted. Ballistic fragmentation testing shall be conducted on a sample size of ten (10) for each configuration tested initially, and a sample size of three (3) for each post exposure (such as post chemical and post environmental). The test shall be considered a failure if one or more of the following occur:

- 1) if the witness sheet is perforated or if there is a complete penetration of the test item,
- 2) if the primary lens is cracked, fractured, or shattered,
- 3) if one or more fragments become dislodged on the inside of the eyewear (to include coatings)
- 4) if eyewear component needed to retain the eyewear on the head becomes completely separated from the eyewear
- 5) if the primary lens becomes completely separated from the eyewear
- 6) if the eyewear falls off the head form
- 7) if the inside laminate is cracked and results in a loose flap of material larger than the diameter of the projectile (for laminated lens structures only)

A lens crack is defined as a fissure that propagates beyond the impact site from one surface of the lens to the other. Petalling is not considered a crack.

Figure 11: 22 Caliber Fragment Simulating Projectile