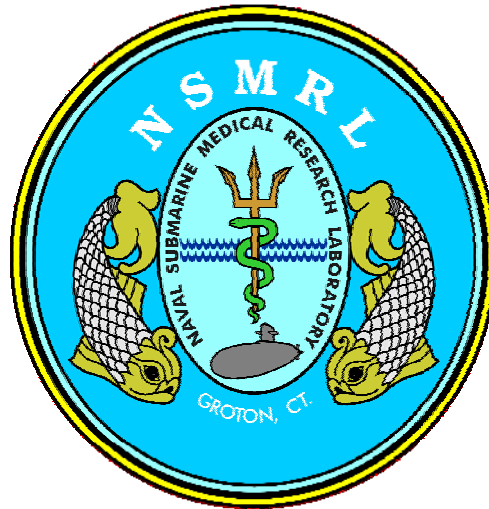


Naval Submarine Medical Research Laboratory

NSMRL/50518/MR--2008-1266

November 21, 2008



**Improved Submariner Eyewear for Routine Wear and Emergency
Equipment Use Underway**

by

Alison America, MA
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Approved and Released by:
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Commanding Officer
NAVSUBMEDRSCHLAB

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Improved Submariner Eyewear for Routine Wear and Emergency Equipment Use Underway

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ADMINISTRATIVE INFORMATION

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SUMMARY

The objective of this study was to investigate prescription eyewear for use with the Emergency Air Breathing (EAB) mask. The eyewear options that are currently available to submariners are unacceptable for many reasons. Primarily, the current eyewear is not compatible with donning an Emergency Air Breathing (EAB) mask. Frames of choice, when worn by submariners, cause a break in the seal of the EAB mask, putting the submariner at risk for inhaling dangerous gases. Rochester Optical designed wire-framed eyewear that did not break the EAB gas tight seal in the submarine environment. We recommend further testing of this eyewear by submariners who wear prescription eyewear during underway time.

Purpose

The purpose of this project was to investigate the possibility for prescription eyewear to replace the standard P3-submariner eyewear that is currently being issued to submariners.

Problem

At a meeting on 03 May 2006 with CAPT William Roberts and Mr. Roger Hill of the Naval Ophthalmic Support and Training Activity (NOSTRA), Mr. Hill requested that the Naval Submarine Medical Research Laboratory (NSMRL) investigate prescription eyewear to replace the current frames supplied to submariners for use underway. Presently, the P3-submariner eyewear is unacceptable for many reasons. Primarily, the current eyewear is not compatible with donning an Emergency Air Breathing (EAB) mask. The P3 eyewear causes pain around the temple region and disfiguring facial creases as illustrated in Figure 1. Rather than wearing the P3 glasses, submariners often opt to wear their frames of choice with the mask, which may prevent the mask from maintaining a tight seal around the individual's face. This causes dangerous gases to seep into the mask and puts the submariner at risk. Thus, interest in this issue has gained considerable attention by Fleet personnel and NOSTRA, both of whom would like to see improvements to the current eye frames, which will allow greater submariner acceptability and use underway.



Figure 1. Disfiguring facial creases resulting from prolonged wear of the P3 submariner glasses.

METHODS

Phase I Evaluation

The first phase of testing was designed to be an exploratory evaluation to identify improved eyewear for use aboard submarines and with an EAB mask. The initial evaluation was conducted at Naval Undersea Medical Institute (NUMI) and Naval Submarine Support Center (NSSC) using 13 Independent Duty Corpsman as evaluators. New eyewear was identified by posting a Request For Information (RFI) on 01 January 2007 (Appendix A). The RFI requested interested vendors submit for testing prescription eyewear frames that would be compatible with the EAB mask. The primary requirement was for the improved eyewear to remain in place and not obstruct the submariners' vision when donning the EAB mask. Not only should the improved prescription eyewear frames be compatible with the EAB mask, they should also be compatible with the periscope, perform well in the submarine environment, and be acceptable to the crew. The eyewear must be made of durable, low-maintenance material and construction. Also, the improved eyewear must be comfortable to wear on a regular basis, either alone for daily use or with the EAB mask. Finally, the improved eyewear must have an appearance and fit that is acceptable to submariners.

Three vendors responded with possible eyewear alternatives. One vendor, Optiq, Ltd./OnGuard Safety Corp., reported that they were unable to produce acceptable eyewear to meet these requirements. Another vendor, Vision Xperts, submitted two types of inserts meant to be worn inside the EAB mask. Finally, Rochester Optical, provided prototype eyewear specially designed to be worn with the EAB mask.

Vision Xperts provided two types of inserts. One insert had a metal frame that fit around the inside of the face mask of the EAB, and is called MS1. The other insert was meant to be attached to the inside of the face mask by a suction piece, called PS1.

Rochester Optical provided two types of eyewear frames. The first eyewear was constructed of a wire frame that fully surrounded the lenses, as illustrated in Figure 2. The width of the frame is $4 \frac{3}{34}$ inches. The other type was a three-piece mount frame, in which the lenses were attached to the frame by screws, as illustrated in Figure 3. The width of the three-piece mount frame is $4 \frac{1}{8}$ inches. Both frame types were constructed of a thin, durable stainless steel material and had a crimp in the temple piece, which allowed for a better fit and a tight seal with the EAB mask. Additionally, both frame styles had an ear hook adjustment and the ear hooks were surrounded by soft rubber for more comfort.



Figure 2. Wire frame eyewear manufactured by Rochester Optical.



Figure 3. Three-piece mount frame manufactured by Rochester Optical.

Phase II Evaluation

A proposal to test the quality and acceptability of the improved eyewear has been submitted and funding has been granted. See Appendix B and C for the Quad Chart and Initiative Summary that was submitted to Navy Medicine R&D Development 6.5 Program.

RESULTS

There were 13 individuals who evaluated the eyewear frames on comfort, appearance, and compatibility with the EAB mask see Appendix D. Table 1 shows the mean and standard deviation values for the six different frames on levels of comfort, appearance, and compatibility. Items were scored on a one to five scale, where a rating of 5 indicated very acceptable and a rating of 1 indicated very unacceptable. Overall, individuals rated the wire-framed eyewear provided by Rochester Optical higher in comfort, appearance, and compatibility compared to all other types of eyewear. Additionally, when asked which type of eyewear was preferred, four of the 13 individuals preferred the wire-framed eyewear and four of the 13 individuals preferred the 3 piece mount manufactured by Rochester Optical. None of the testers preferred the other eyewear options.

Table 1. Mean and Standard Deviation Values for Comfort, Appearance, and Compatibility with the EAB Mask.

Frame Type	Mean (SD)
Comfort of the metal frames	4.46 (.66)
Appearance of the metal frames	4.31 (.63)
Compatibility of the metal frames with mask	4.38 (.65)
Comfort of the 3 piece mount frame	4.33 (.65)
Appearance of the 3 piece mount frame	4.00 (.74)
Compatibility of the 3 piece mount frame with mask	4.08 (1.16)
Comfort of the MS1	3.46 (.78)
Appearance of the MS1	2.54 (1.05)
Compatibility of the MS1 with mask	1.85 (.90)
Comfort of the PS1	3.00 (.71)
Appearance of the PS1	2.38 (.96)
Compatibility of the PS1 with mask	2.54 (1.13)
Comfort of goggles	3.31 (1.25)
Appearance of goggles	2.15 (1.07)
Compatibility of goggles with mask	4.08 (.86)

Furthermore, informal discussions with many Submarine IDCs and Medical Officers provided valuable information on the utility of this new eyewear. Many IDCs reported they thought the metal framed eyewear would be less likely to break. Additionally, should the eyewear become damaged, it would be easier to repair on board the submarine and while underway. It was noted by several testers that the screws in the 3-piece mount frame would likely come loose over time. Were this to occur while underway, it would be difficult to repair, if not impossible. Figure 4 is a photograph of a submariner wearing the wire-framed eyeglasses by Rochester Optical.



Figure 4. Submariner wearing wire-framed eyeglasses by Rochester Optical.

The test eyewear provided by Vision Xperts met the RFI requirements in terms of maintaining a tight seal, yet they were found to be generally unacceptable by the testers. Since the items were inserts meant to be worn inside of the face mask and not stand alone eyeglasses, participants reported they thought it would be unlikely that submariners would have these inserts on their person when they needed to don an EAB mask in an emergency situation. Overall, participants reported they felt these alternatives were not an improvement compared to the standard issue submariner glasses.

In sum, the eyewear manufactured by Rochester Optical was preferred over the other types of eyewear and eyeglasses that are commonly issued to submariners. The wire-framed glasses were rated higher in comfort, appearance, and compatibility compared to other types of eyewear.

DISCUSSION

The Submarine Fleet and NOSTRA have reported that the current eyewear options for use with an EAB mask are unacceptable for many reasons. The P3 glasses cause pain in the temple region and disfiguring temple creases. Rather than wear the painful P3 glasses, submariners instead choose to wear their frames of choice. Yet, this alternative creates additional problems in failing to maintain a tight seal around the face with the mask. This may cause dangerous gasses to leak into the face mask, thus putting the user and crew at risk.

A Request For Information was posted and interested vendors responded with possible eyewear alternatives. One eyewear prototype from Rochester Optical appeared to be the most viable option. The eyewear met all of the requirements posted in the RFI and was favorably evaluated by submarine Fleet members.

It should be noted that this evaluation was exploratory and the test frames were evaluated by a small number of individuals. Additionally, the frames were not tested in actual use conditions. Yet, there was a clear preference for the wire-framed eyewear manufactured by Rochester Optical compared to the other test products and the standard issue submariner eyewear. The wire-framed eyewear maintained a tight seal with the EAB mask and was far more comfortable to the wearer. The construction material is durable and could likely be repaired on board during underway, should the frames become damaged. Finally, the style of the wire-framed glasses were similar to current frames of choice and were considered to be a significant improvement in appearance compared to the P3 submarine glasses and goggles.

CONCLUSION

In conclusion, the wire-framed eyewear produced by Rochester Optical appears to provide a significant improvement in safety and comfort for submariners who wear prescription eyewear with an EAB mask. Additionally, we recommend further testing of this prototype by subjects while underway, evaluating comfort, durability, function and appearance over a several month trial.

ACKNOWLEDGMENTS

We gratefully acknowledge the contributions by Optiq, Ltd./OnGuard Safety Corp, Vision Xperts, and Rochester Optical for their submissions to the project. Additionally, we thank PO Rohm and Chief Jarvis and all other participants at Naval Undersea Medical Institute (NUMI) and Naval Submarine Support Center (NSSC) for their valuable input and participation in this project.

REFERENCES

An email from CDR Michaud in support of this project, which was received 05 February 2008.

Ms. America,
SUBFOR supports ongoing efforts by NSMRL to improve eyewear for our crews. Your research should have no impact on operations and will require no underway support. A wearable set of glasses that do not affect face mask seals is an absolute benefit. I look forward to the results. Thank you for your support of our submariners.

v/r

CDR M E Michaud
MC, USN
Submarine Forces Command
Submarine Force Surgeon (N02M)
Office: 757-836-1353
Cell: 757-232-0587

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APPENDIX A

Request for Information for eyewear for Submariners that would be compatible with an Emergency Air Breathing (EAB) mask

1.0 SUBJECT

Request for Information (RFI) for eyewear designed to provide prescription eyeglasses that are compatible when wearing an Emergency Air Breathing (EAB) aboard submarines. Responses are due to this RFI by 4:00 PM on November 3, 2006. See section 8.0 for further information.

2.0 DESCRIPTION

Naval Submarine Medical Research Laboratory (NSMRL) is seeking information from the eyewear industry that will provide prescription eyewear frames for use when wearing an EAB aboard a submarine.

Specifically, this RFI seeks the following information:

Conceptual technical architecture alternatives

- Prescription eyewear frames. The frames should permit ready assembly of prescription lenses by the Navy Ophthalmic Support Center, Yorktown, VA.
- Sturdy material. The frames must be durable.
- For use by Submariners wearing an EAB mask.
- Approximate cost information (i.e., order of magnitude, ballpark estimates, etc.) for alternatives
- Schedule estimates

3.0 REQUIREMENTS

The primary requirement for this RFI is prescription eyewear frames that remain in place and provide an air tight seal when the individual is wearing the EAB mask. The eyewear frames should not move around inside the mask or interfere with wearing the mask in any way. They should be durable and comfortable for the wearer.

Additionally, the frames are required to provide an airtight seal when worn with the EAB mask. The masks are worn to protect the individual from smoke inhalation and therefore, no break in the seal can be permitted due to the eyewear frames. The frames, when worn, should permit easy donning of the EAB mask and fit readily inside the mask. The frames must permit an airtight seal of the mask against the face of the wearer, using either a flexible metal or plastic temple or a circumferential strap. The frame assembly must be comfortable when worn.

The purpose of this RFI is to gather information about those requirements enumerated above. To the extent simplifying assumptions are needed, respondents are encouraged to make and document such assumptions in their responses.

4.0 POSSIBLE EYEWEAR SOLUTION

The eyewear must meet the functional requirements specified above. NSMRL is open to alternative concepts for solutions that meet these requirements. NSMRL encourages creativity and outside the box thinking in responses to this RFI.

This RFI seeks information about prescription eyewear that would be compatible when wearing an EAB mask. In doing so, NSMRL seeks to understand the tradeoffs among risks, costs (initial and ongoing) and alternative technical architectures that incorporate increasing degrees of sharing.

5.0 SAMPLE RESPONSE OUTLINE

Following is a suggested outline and suggested page counts for a response to this RFI. This outline is intended to minimize the effort of the respondent and structure the responses for ease of analysis by NSMRL. Nevertheless, respondents are free to develop their response as they see fit.

Section 1 – Conceptual Alternatives

Briefly describe types of prescription eyewear that are easily worn with an EAB mask. It should remain in place and not impair the individual's vision when wearing the EAB mask. Eyeglass frames should be sturdy material. Providing pictures is encouraged. (1 page)

Section 2 – Feasibility Assessment

Briefly describe the feasibility of each alternative and the design tradeoffs involved as matched against the functional requirements (1 page).

Section 3 – Cost and Schedule Estimates

Provide cost estimates for each alternative. Also, discuss cost drivers, cost tradeoffs, and schedule considerations (1 page).

Section 4 – Corporate Expertise

Briefly describe your company, your products and services, history, ownership, financial information, and other information you deem relevant (no suggested page count).

In particular, please describe any projects you have been involved in that are similar in concept to what is described in this RFI, including management and operations approach, security requirements, security assurance processes, and any relevant lessons learned (1 page).

Include any comments on the structure of the requirements for a formal RFP response.

Section 5 – Additional Materials

Please provide any other materials, suggestions, and discussion you deem appropriate.

6.0 INFORMATION EXCHANGE MEETINGS

NSMRL will hold an information exchange meeting to discuss this RFI with interested potential respondents. Details about this meeting will be made available at a later date. If you wish to attend this meeting, please respond to the contact provided in section 8.0, below.

In addition, NSMRL will consider meeting individually with interested potential respondents. If you are interested in requesting such a meeting, please respond to the contact provided in section 8.0, below.

7.0 DISCLAIMER

This RFI is issued solely for information and planning purposes only and does not constitute a solicitation. All information received in response to this RFI that is marked Proprietary will be handled accordingly. Responses to the RFI will not be returned. In accordance with FAR 15.202(e), responses to this notice are not offers and cannot be accepted by NSMRL or the US Navy to form a binding contract. Responders are solely responsible for all expenses associated with responding to this RFI.

8.0 CONTACT INFORMATION

Following is the Point of Contact (POC) for this RFI, including the public information exchange meeting:

Ms. Alison America
(860) 694-2522
America@nsmrl.navy.mil

Please submit responses via e-mail in Microsoft Office format by 4:00 PM on November 3, 2006, to the POC at: govnet.ts.fts@gsa.gov. You may also submit supplemental hardcopy materials such as brochures, etc. (5 copies each) to the POC.

APPENDIX B

QUAD CHART

Title: Improved submariner eyewear for routine wear and emergency equipment use underway

Sponsor: Naval Ophthalmic Support and Training Activity

IOC POM Cycle Year: FY09

Proposed Performer: NSMRL

Funding Years: FY08

PI: Alison America

Organization: Naval Submarine Medical Research Laboratory

Capability Gap Identification

- Operational Medicine Research Vector
- Frames of choice do not permit functional use of the EAB mask and allow dangerous gases into the mask.
- Non-use of prescription eyewear results in impaired vision underway and puts the submariner at risk during emergencies.
- Fleet personnel and the Naval Ophthalmic Support and Training Activity (NOSTRA) report that current Submarine eyewear frames are uncomfortable and cause disfiguring facial creases, resulting in a high rate of non-use by crewmembers.
- The Fleet is highly interested in this issue and would like to see changes to the current submariner eyewear options.

Key Performance Parameters (KPPs)

- Eyewear frames must be compatible with an EAB mask and maintain a tight seal around the face.
- Eyewear frames must be created from sturdy material and be durable for regular use.
- Eyewear must not obstruct the individual's vision or be uncomfortable when wearing the eyewear and mask together.
- The appearance of the eyewear must be acceptable to submariners.

Desired Capability & End User

- Improved prescription eyewear frames that are compatible with EAB masks, periscopes, the submarine environment, and crew acceptance.
- Durable, low-maintenance eyewear that maintains a tight seal with EAB mask and does not obstruct sight in normal submarine duty use and emergency response.
- Frames must be comfortable and acceptable to submariners.
- Able to replace both the submariner eyewear and frames of choice, resulting in the potential for cost savings to the Fleet.
- The Submarine Fleet and individuals who regularly wear an EAB mask are the intended end users. NOSTRA is responsible for transition to the fleet.

Potential Solution and Alternative Solutions

- Several vendors have developed prescription eyewear that is compatible with the EAB mask and maintains a tight seal; yet preliminary results indicate these alternatives are unacceptable to submariners for many reasons.
- Another vendor, Rochester Optical, developed prescription eyewear that is compatible with the EAB mask and is suitable enough to be worn as frames of choice.

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APPENDIX C

Date of Submission		MEDICAL DEVELOPMENT USE ONLY
Initiative Title	Improved submariner eyewear for routine wear and emergency equipment use underway	
Fleet/Force Sponsor/Champion	Submarine Force Naval Ophthalmic Support and Training Activity	
POC/INITIATOR	NAME/RANK OF POC: Alison America TELEPHONE NUMBER: 860-694-2522 FAX NUMBER: 860-694-2547 MAILING ADDRESS: NSMRL Department of the Navy Box 900 Groton, CT 06349-5900 E-MAIL ADDRESS: Alison.America@med.navy.mil	

<p>Narrative/Mission Impact and Justification of Initiative</p> <p>DO NOT DESCRIBE A SPECIFIC SOLUTION OR VENDOR HERE</p> <p>(Example: Must produce 200 units per minute (T), 300 units per minute (O))</p> <p>Be sure to include Threshold (T) and Objective (O) values.</p>	<p>The goal of the current project is to identify improved eyewear for submariners for use with the Emergency Air Breathing (EAB) mask. Due to the discomfort in wearing the standard submariner glasses, submariners will either wear their frames of choice or not wear eye glasses at all while wearing the EAB mask. This is unsafe and may result in harmful gases seeping into the facemask. The current project is designed to remedy this problem by providing eyewear specifically designed to be worn with the EAB mask that is comfortable, durable and acceptable to submariners.</p> <p><u>Initiative/Capability Gap</u></p> <p>A deficiency exists with the presently available submariner eyewear choices, which are meant to be worn while wearing the Emergency Air Breathing (EAB) mask. The current eye glasses are unacceptable to many submariners for multiple reasons, including pain around the temple region and disfiguring facial creases. Instead, submariners often opt to wear their frames of choice with the mask, which prevents the mask from maintaining a tight seal around the individual's face. This causes dangerous gases to seep into the mask and put the submariner at risk. Thus, interest in this issue has gained considerable attention by Fleet personnel and the Naval Ophthalmic Support and Training Activity (NOSTRA), both of whom are interested in seeing improvements to the current eye frames, thus allowing greater submariner acceptability and use underway.</p> <p><u>Desired Capability and Concept of Operations</u></p> <p>The primary requirement is for the improved eyewear to remain in place and not obstruct the submariners' vision when wearing the EAB mask. Not only must the improved prescription eyewear frames be compatible with the EAB mask, they should also be compatible with the periscope, work positively within the submarine environment, and be acceptable to the crew. The eyewear must be made of durable, low-maintenance material and construction and must be comfortable to the wearer. It is likely that the improved eyewear will replace both options for current submariner eyewear and frames of choice, resulting in potential for cost savings to the Fleet. The end users for this initiative will be submariners who wear prescription glasses and/or other military personnel, who regularly wear full-face masks (e.g. Surface Fleet sailors).</p> <p><u>Key Performance Parameters</u></p> <p>Of most importance, the improved eyewear must be compatible with an EAB mask and permit a tight seal around the face. The improved eyewear must be manufactured from strong, tough materials and be durable enough for regular occupational use. Additionally, the improved eyewear cannot obstruct the individual's vision or move out of place when the submariner dons and wears the EAB mask. Also, the improved eyewear must be comfortable to wear on a regular basis, either alone for daily use or with the EAB mask. Finally, the improved eyewear must have an appearance that is acceptable to submariners.</p>
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Solutions and Exit Criteria	<p><u>Potential Solution and Alternative Solutions</u> Many prototypes were supplied by several vendors and nearly all were found to be compatible with maintaining a tight seal with the EAB mask. Yet preliminary results found that these solutions were unacceptable to submariners for various reasons. One vendor, Rochester Optical, developed prescription eyewear specifically designed to work with the EAB mask. Additionally, this eyewear is suitable enough to be worn daily as frames of choice.</p> <p><u>Exit Criteria/End Product Specifications</u> The end product specifications include compatibility with the EAB mask fit, permit a tight seal with the mask, comfortable to wear, made of durable material, and also be acceptable to submariners in appearance. The real exit criteria are submission to BUMED to start procurement.</p>
Who will be the end user of this initiative	The end user of this initiative will be any submariner who wears prescription eyewear and is required to wear an EAB mask. Additionally, other end users may be individuals who are eligible to obtain eyewear from NOSTRA.
POM Cycle FY for Transition	FY09
Required Funding (\$K)	101K
Cost Share if Any and with Whom	POC: None Amount: \$ _____ Contact Information:
Start/Stop Dates for Development to Deployment	Start Date: Oct 07 Expected Deployment Date: Oct 08 (Month/Year) (Month/Year)
Transition Plan Include: Sponsor IOC date FOC date	NSMRL will identify and determine the suitability, performance and acceptability of the improved eyewear design. COMNAVSUBFOR approves the recommendations. BUMED and NOSTRA initiate the procurement and issuance of the improved eyewear. Sponsor is NOSTRA IOC date: FY09 FOC date: no FOC date, as it is a continuing process.
Dependencies	Describe what other systems or events need to happen before this initiative can be developed, purchased, or deployed. If none, so state. No dependencies
Performance Metrics/Critical Milestones	Describe the metric(s) you will develop or use that will allow you to measure the efficiency/effectiveness of this initiative once it is deployed (i.e. ensure this initiative meets the need) Definition/selection of suitable frames that meet performance criteria. Submariners report a preference for the improved eyewear compared to the P3 submariner glasses and other eyewear options when wearing the EAB mask.

Attachments	<p>Required: QUAD CHART</p> <p>Optional: Other Documents <input checked="" type="checkbox"/> (list): 3 photographs</p> <p>Photo 1 Temple Gouge: temple crease resulting from long term use of the P3 type of submariner glasses.</p> <p>Photo 2 Old Frames Gouge: IDC wearing P3 eyewear causing painful temple gouge.</p> <p>Photo 3 Improved eyewear on IDC: IDC wearing the improved frames, which relieves the pressure on the temple.</p> <p>Note: A formal ICD or CDD can substitute for this summary document. If none exist, identify responsible office to create it with coordination from that office.</p>	
Category	<p>(a) <i>Note: Medical Development initiatives are expected to be developed to initial deployment. Once deployed, these initiatives will need to be sustained and funded by one of the other entities listed below. Please identify the one category in each column that best fits the sustainment of this initiative.</i></p>	
	<p>(b) Surgeon General's Research Vector Major Initiative Area</p>	
	<p>(c)</p> <p>(d) <input type="checkbox"/></p> <p>Medical Countermeasures for ID</p> <p><input type="checkbox"/> Medical Countermeasures for CBRNE</p> <p><input type="checkbox"/> Battlefield Medicine & Surgery</p> <p><input checked="" type="checkbox"/> Aerospace & Operational Medicine</p> <p><input type="checkbox"/> Health Promotion & Medical Mission Support</p> <p><input type="checkbox"/> Environmental Medicine & Physiology</p> <p>(e)</p>	<p><input type="checkbox"/> Combat Medical Support</p> <p><input checked="" type="checkbox"/> Medical Equipment</p> <p><input type="checkbox"/> Casualty Care</p> <p><input type="checkbox"/> Medical Management</p> <p><input type="checkbox"/> Mental Health</p> <p><input type="checkbox"/> Dental Operations</p> <p>Other _____</p> <p>(Specify)</p>
Other Comments:		

APPENDIX D

Rochester Optical eyewear

Please answer for the metal frame style

Please rate the **comfort** of this eyewear:

1	2	3	4	5
Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable

Please rate the **appearance** of this eyewear:

1	2	3	4	5
Very Unattractive	Somewhat Unattractive	Neutral	Somewhat Attractive	Very Attractive

Please rate the **compatibility** of this eyewear with the EAB:

1	2	3	4	5
Very Incompatible	Somewhat Incompatible	Neutral	Somewhat Compatible	Very Compatible

Compared to the P3 Submariner glasses, do you like these glasses:

1	2	3
Better	Same	Less

Please answer for the 3-piece mount frame style

Please rate the **comfort** of this eyewear:

1	2	3	4	5
Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable

Please rate the **appearance** of this eyewear:

1	2	3	4	5
Very Unattractive	Somewhat Unattractive	Neutral	Somewhat Attractive	Very Attractive

Please rate the **compatibility** of this eyewear with the EAB:

1	2	3	4	5
Very Incompatible	Somewhat Incompatible	Neutral	Somewhat Compatible	Very Compatible

Compared to the P3 Submariner glasses, do you like these glasses:

1	2	3
Better	Same	Less

Hudson Optical eyewear

Please answer for the MS-1 style

Please rate the **comfort** of this eyewear:

1	2	3	4	5
Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable

Please rate the **appearance** of this eyewear:

1	2	3	4	5
Very Unattractive	Somewhat Unattractive	Neutral	Somewhat Attractive	Very Attractive

Please rate the **compatibility** of this eyewear with the EAB:

1	2	3	4	5
Very Incompatible	Somewhat Incompatible	Neutral	Somewhat Compatible	Very Compatible

Compared to the P3 Submariner glasses, do you like these glasses:

1	2	3
Better	Same	Less

Please answer for the PS-1 style

Please rate the **comfort** of this eyewear:

1	2	3	4	5
Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable

Please rate the **appearance** of this eyewear:

1	2	3	4	5
Very Unattractive	Somewhat Unattractive	Neutral	Somewhat Attractive	Very Attractive

Please rate the **compatibility** of this eyewear with the EAB:

1	2	3	4	5
Very Incompatible	Somewhat Incompatible	Neutral	Somewhat Compatible	Very Compatible

Compared to the P3 Submariner glasses, do you like these glasses:

1	2	3
Better	Same	Less

Criss Optical eyewear

Please rate the **comfort** of this eyewear:

1	2	3	4	5
Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable

Please rate the **appearance** of this eyewear:

1	2	3	4	5
Very Unattractive	Somewhat Unattractive	Neutral	Somewhat Attractive	Very Attractive

Please rate the **compatibility** of this eyewear with the EAB:

1	2	3	4	5
Very Incompatible	Somewhat Incompatible	Neutral	Somewhat Compatible	Very Compatible

Compared to the P3 Submariner glasses, do you like these glasses:

1	2	3
Better	Same	Less

Which eyewear type would be your preference?

- a. Rochester Optical Frame style
- b. Rochester Optical 3-Piece Mount style
- c. Hudson Optical MS-1
- d. Hudson Optical PS-1
- e. Criss Optical Mag-1
- f. None, I'd rather be blind.