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Soldier Integrated Protective Ensemble: The Soldiers' Perspective

Margaret S. Salter
U.S. Army Research Institute
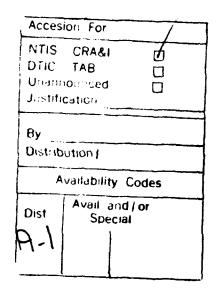
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13. ABSTRACT (Maximum 200 words)

   The field portion of the Soldier Integrated Protective Ensemble (SIPE) Advanced Technology Demonstration (ATD) was conducted at Fort Benning, Georgia, from September through November 1992. Individual task performance data were collected by the Test and Experimentation Command (TEXCOM) Close Combat Test Directorate, and collective task performance data were assessed by personnel from the U.S. Army Infantry School (USAIS). Soldier impressions on and suggestions for the SIPE equipment were collected. As a technical advisory service to the SIPE ATD, U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) personnel collected this data.

   The SIPE, configured as a head-to-toe individual fighting system, demonstrated considerable potential for enhanced soldier capabilities and operational effectiveness. However, the equipment, only prototype in nature, affected test soldier performance and attitude. The enhanced communications capability and thermal sight on the rifle, as well as some items of clothing, were deemed very acceptable; other items were rejected or insufficiently tested. Further testing would be beneficial.

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Soldier Integrated Protective Ensemble: The Soldiers' Perspective

Margaret S. Salter

U.S. Army Research Institute

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Field Unit at Fort Benning, Georgia
Seward Smith, Chief

Training Systems Research Division
Jack H. Hiller, Director

FOREWORD

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Field Unit at Fort Benning, Georgia, is responsible for conducting research and development on training methods and technologies focusing on infantry systems to maximize combat effectiveness during continuous operations across the conflict spectrum. The research reported here was conducted as a technical advisory service in conjunction with the Soldier Integrated Protective Ensemble (SIPE) Advanced Technology Demonstration (ATD).

The Deputy Assistant Secretary of the Army for Research, Development, and Acquisition, George Singley, requested that ARI become involved with the SIPE program being undertaken by the U.S. Army Natick Research, Development, and Engineering Center. A multiagency project, the SIPE is a soldier system research and development program evaluating technology alternatives for the next generation soldier. A field demonstration jointly conducted by Natick, the U.S. Army Infantry School (USAIS), and the Test and Experimentation Command (TEXCOM) Close Combat Test Directorate was conducted September through November, 1992, at Fort Benning, Georgia. ARI evaluated training and observed the entire demonstration, administering questionnaires and interviews to gain soldier impressions of the SIPE equipment and capabilities.

Many of the findings reported here are included in the USAIS final report on the field demonstration; they are echoed throughout the TEXCOM test report. The SIPE field demonstration results were briefed on March 3, 1993, to the Director of Combat Developments, USAIS, as well as to representatives from the office of the Training and Doctrine Command Systems Manager--Soldier and USAIS Directorates of Training, Combined Arms and Tactics, and the Dismounted Warfighting Battle Laboratory. A summary report will be provided to the Commanding General, USAIS, to be used in decisions related to the requirements documents for future soldier systems, particularly The Enhanced Integrated Soldier System (TEISS).

EDGAR M. JOHNSON
Director

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ACKNOWLEDGMENTS

SOLDIER INTEGRATED PROTECTIVE ENSEMBLE: THE SOLDIERS'
PERSPECTIVE

EXECUTIVE SUMMARY

Requirement:

The Soldier Integrated Protective Ensemble (SIPE) Advanced
Technology Demonstration (ATD) is a multiagency program consist-
ing of technical assessments, human factors engineering assess-
ments, modeling and simulation, and a tactical field demonstra-
tion. The field demonstration was conducted at Fort Benning,
Georgia, in from September through November, 1992. Individual
task performance data were collected by the Test and Experimen-
tation Command (TEXCOM) Close Combat Test Directorate, and col-
lective task performance data were assessed by personnel from the
U.S. Army Infantry School (USAIS). Researchers requested soldier
impressions on and suggestions for the SIPE equipment. As a
technical advisory service to the SIPE ATD, U.S. Army Research
Institute for the Behavioral and Social Sciences (ARI) personnel
collected this data.

Procedure:

The SIPE equipment consisted of modular subsystems of
prototype equipment. The integrated headgear subsystem included
improved communications and hearing and thermal sight weapon
interface. Other subsystems included advanced clothing with
protective gear; microclimate conditioning; and an individual
soldier computer that provided enhanced capabilities in naviga-
tion and message management. Test soldiers wore SIPE equipment
to perform individual tasks of target detection, target engage-
ment with the M16A2 rifle, and land navigation; unit performance
was evaluated during situational training exercises (STXs) of
movement to contact/area recon, raid, ambush, and NBC recon.
Throughout all SIPE equipment training and throughout the events
that followed, ARI administered questionnaires and conducted both
formal and informal interviews with the test soldiers to gain
their impressions and perspective on the equipment and its
capabilities.

Findings:

The SIPE was configured as a head-to-toe individual fighting
system that demonstrated considerable potential for enhanced sol-
dier capabilities and operational effectiveness. However, the

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equipment, only prototype in nature, affected test soldier per-
formance and attitude. The thermal sight on the rifle and the
enhanced communications capability were deemed very acceptable,
as were some items of clothing. Other items were rejected or
insufficiently tested. Further testing would be beneficial.

Utilization of Findings:

     The SIPE field demonstration was the initial attempt to look
at the soldier as a system in a tactical environment and to maxi-
mize the contributions of advanced or state of the art technol-
ogy. SIPE results will contribute to and assist in Army deci-
sions on requirements for future ATDs. Specific findings and
recommendations will be incorporated in requirements documents
for future soldier systems.

SOLDIER INTEGRATED PROTECTIVE ENSEMBLE: THE SOLDIERS'
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Introduction

Early in 1991 the Fort Benning Field Unit of the Army Research Institute (ARI) was asked to provide Technical Advisory Service (TAS) to the Natick Research, Development and Engineering Center (NRDEC) and the U.S. Army Infantry School (USAIS) for the Soldier Integrated Protective Ensemble (SIPE) Advanced Technology Demonstration (ATD). This report summarizes the efforts and results of that TAS. It is based on questionnaire and interview data obtained from the test soldiers and on observations of performance.

The objective of the Natick-sponsored SIPE program is to improve combat effectiveness by developing and demonstrating a modular fighting system to improve performance while increasing the soldier's protection against battlefield hazards. SIPE provides improved communications and weapons capabilities, an advanced clothing system, a computer supported integrated headgear subsystem, and a microclimate conditioning system. The program, part of the overall Army Soldier Modernization Plan, takes the form of an ATD focusing on the needs of the individual soldier as a system. Data from the ATD will be used to assist USAIS in the development and refinement of follow-on requirements for The Enhanced Integrated Soldier System (TEISS).

A field demonstration was conducted at Fort Benning, Georgia, from late September through November 1992. The purpose of the field test was to demonstrate and document individual and collective performance by Infantry soldiers wearing SIPE equipment. Training for test soldiers was conducted by the materiel developers and their contractors (Natick, et al.) and by USAIS Directorate of Training (DOT) cadre. Comparison of SIPE and standard performance in individual tasks of target detection, small arms fire, and land navigation was assessed by personnel from the Test and Experimentation Command (TEXCOM) from Fort Hood, Texas, in conduct of an Early User Test and Experimentation (EUTE). The final portion of the field demonstration was a series of squad level situational training exercises (STXs) conducted by USAIS where the test soldiers performed collective task based tactical missions and drills while wearing SIPE equipment.

The field test, only a small part of the overall SIPE program, was designed to demonstrate the capabilities of the SIPE equipment. The equipment was primarily prototype equipment, and was not hardened for field use, and it was acknowledged in advance to be both too heavy and too bulky for soldier comfort. At no time was there an intent to presume the specific equipment

to be the final or fielded version. This caveat is important, however, as the immaturity of the equipment, and the problems associated with its integration impacted on the demonstration and capability assessment.

Full accounts of the historical background on SIPE, descriptions and development of the equipment, and other portions of the ATD will be found in separate reports from Natick. TEXCOM's report (1993) provides results and performance data on comparative capabilities of soldiers equipped with SIPE components and standard equipment. It covers detection and recognition of targets under day and night conditions; hit performance when employing the M16A2 rifle at short and long ranges; land navigation; and human factors, health and safety incidents and problems. The USAIS test issues and concerns are covered in a separate document (1993). Critical issues focused on the ability of SIPE equipped soldiers to execute individual and collective Mission Training Plan (MTP) tasks, with focus on command and control (C^2) and mobility; and on training, human factors problems, and health and safety issues.

This report provides the test soldiers' perspectives on SIPE. Included are brief overviews of the equipment and of the demonstration where needed to provide context; the majority of the content is based on the observations and subjective evaluations offered by the test soldiers. It focuses on information gleaned from test soldier comments and written questionnaire responses as well as tape recorded interview data. It covers the entire time period from soldier selection through initial familiarization, operational training, the individual task events, and the final tactical exercises.

Method

Demonstration Overview

As previously noted, the SIPE field demonstration was divided into separate but interrelated phases, compressed into a two month time frame. Soldier performance was measured, observed and compared during both day and night activity, and in both SIPE and standard uniform and equipment. Training focused primarily on the technical use of the various elements of the SIPE system; little time was spent on integration of the equipment into an operational mode. Training was followed immediately by testing on target detection, small arms fire, and land navigation. The final weeks included STXs, where for the first time the SIPE soldiers used the SIPE equipment in a tactical mode. (More detailed descriptions of each of the phases of the ATD follow, and are available in separate reports from Natick, USAIS and TEXCOM.)

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SIPE Equipment Overview

A brief description of the SIPE equipment is included in this report as an aid to the reader in understanding soldier comments. The SIPE consists of four major areas and subsystems, each with several elements. There are other pieces of equipment associated with SIPE which will also be described.

Integrated headgear subsystem (IHS). The IHS has a ballistic shell component (BSC) similar in look to the basic kevlar helmet. It has intrinsic image intensification (I^2) capability provided to the soldier through a helmet mounted display (HMD) which appears on an electro optic system (EOS) visor. The helmet has an advanced suspension system, and connections to other pieces of SIPE equipment. The SIPE helmet has soldier to soldier radio capability, with a microphone for transmission, and enhanced ambient hearing. The SIPE respiratory protective device (RPD) mask is considered a part of the IHS. A substitute for the M17 and M40 protective masks, the XM44 mask interfaces with the hydration liquid nutrient (HLN) device, a pump system which facilitates water consumption. The HMD and communications of the IHS are controlled by the helmet control unit (HCU) which is affixed to the soldier's uniform. Additional pieces of the SIPE equipment consist of a thermal sight mounted to the M16A2 rifle and appearing as an image in the helmet mounted display. A long range hearing (LRH) device can be mounted, as can the AIM 1 aiming device which projects an infra red dot on a target. A sling designed to help support the weight of the SIPE weapon was also used.

Advanced clothing subsystem (ACS). The ACS is comprised of many components. The load bearing component (LBC) replaces the current soldier back pack, and houses combinations of battery packs, the soldier computer, the microclimate conditioning system or miscellaneous gear. The ballistic protective vest (BPV) is body armor designed to be worn with the advanced shell garment (ASG) (a protective outerwear uniform) or the advanced combat uniform (ACU) which is similar to the current battle dress uniform (BDU). As a part of the chemical/biological protection uniform, the chemical vapor undergarment (CVU) is worn under the ASG. The active cooling vest (ACV) is worn over the Cool Max T shirt undergarment to enhance air flow. SIPE handwear consists of woven combat gloves and chemical protective gloves. SIPE boots are designed to be covered by a protective gaiter.

Microclimate conditioning subsystem (MCC). The MCC has a power pack, and an in-line blower to interface with the XM44 mask and the ACV. They provide ambient air cooling to the head and upper torso of the SIPE equipped soldier who is wearing protective gear.

Individual soldier computer. The soldier computer is carried in the LBC and controlled by the HCU. The computer provides the soldier with the ability to use a satellite dependent global positioning system (GPS) and digital mapping for navigation, position location, and route planning. It includes message management through preformatted messages that provide opportunity for limited interactivity. The computer also interfaces with a hand held combined digitized compass and video capture camera (for transmission of video snapshots).

Table 1 shows the SIPE equipment available to the test soldiers and its prototype weight. The soldiers did not wear all of the pieces of the equipment at any one time, and some parts received a much more extensive evaluation than others. Figure 1 shows a soldier firing while wearing SIPE gear.

Figure 1. Soldier in SIPE equipment. (Adapted from Natick, 1993, page 15.)

Table 1

SIPE Equipment and Weight (Prototype Equipment)

Subsystem	Component	Weight (lbs)
Advanced Clothing System		
	Coolmax T-shirt	0.55
	Active Cooling Vest	1.05
	Chemical Vapor Undergarment	2.25
	Advanced Combat Uniform	2.65
	Advanced Shell Garment	2.85
	Ballistic Protective Vest	10.05
	Combat Gloves	0.25
	Chemical Gloves	0.40
	Combat Boot	3.80
	Gaiter	1.30
	Load bearing Component	5.70
	Top Pack	2.95
	Lower Cargo Pack	1.25
Integrated Headgear Subsystem		
	Ballistic Shell Component with communications	3.20
	Electro Optics Subcomponent Visor	2.30
	Communications Module	1.00
	Electro Optics Subcomponent Module	8.00
	Power Supply Component Module	3.00
	Long Range Hearing Processor	3.00
	Respiratory Protective Device	1.80
	Filter, C2 canister	1.00
	Thermal Sight	4.00
	Laser Aiming Light	0.50
	Long Range Hearing Device	0.25
Microclimate Conditioning/Power Subsystem		17.00
Soldier Computer Subsystem		ˉ15.00
	Camera Compass Module	ˉ1.50

Note. Table adapted from Table 1.2.8-1, SIPE Operational and Maintenance Manual, Dynamics Research Corporation, 1992, Page 1-6.

Test Subjects

Several months prior to the start of the demonstration, the initial group of test subjects was selected from volunteers provided from Fort Benning's Ranger Training Brigade (RTB). A group of more than 25 Infantry soldiers convened in the brigade classroom for an overview of the project from Natick and USAIS personnel. Since the prototype equipment posed restrictions on soldier selection, the volunteers were measured to ensure that the SIPE helmet, available only in size medium, could be fitted. (A second day of measurement was provided for additional soldiers who were unable to be at the first day's briefing.)

All potential test soldiers completed a background and experience questionnaire. The demographic form (see Appendix A) was intended to gain self-reported weapon, thermal sight, and computer experience, in an attempt to insure a well balanced squad. Soldiers were also asked rank, prior duty positions, and a set of questions on physical training (PT) scores, handedness and vision. Because of the non-hardened nature of the equipment, and the potential interface problems associated with the protective mask, the final sample was limited to personnel who wore contact lenses or needed no vision correction. An initial panel of 15 soldiers was selected.

As the test date neared, three from the group had to withdraw, and one more soldier was added, for a final 13 man group present at the start of training. Since there were only ten SIPE helmets available, the final sample had to be narrowed; this was done after a week of training during which the equipment was shared. The final selection of the ten test soldiers was made by the RTB sergeants, based on their assessment of the soldiers' ability to devote full time and attention to the SIPE project; these decisions corresponded to those made independently by the training cadre and independent observers. Although an Infantry squad properly contains only nine soldiers, ten were selected to conform to the experimental design of the TEXCOM events. The STXs were conducted with a nine man squad and the tenth man assisted test personnel.

Of the final ten test subjects, three were Ranger qualified, all were Airborne qualified. The final group consisted of one Staff Sergeant, two Sergeants, five Specialists, and two Privates. The mean GT score was 117.2 (range 97-125); the mean self-reported PT score was 252. Six soldiers were right handed, four left handed. Most had experience with weapons other than the M16A2 rifle; several had limited thermal sight and sniper scope experience. Of the ten, six reported themselves as Experts, three as Sharpshooters, one as Marksman. (All ten later went through formal rifle qualification with DOT personnel.) Although most soldiers indicated that they played video games, few had other computer experience. Of the final ten selected,

only five soldiers had been at the initial overview briefing; the remaining five were added to the group either on the second day, or in the case of one soldier, several weeks later. This factor may have been important as some soldiers never appeared to understand the purpose of the SIPE demonstration.

Schedule and Description

On the first day, SIPE uniforms and equipment were distributed, and the soldiers received an overall equipment safety briefing. Familiarization and training were conducted during the day and into the evening during the next two weeks. After training finished, the TEXCOM test began with a week long audio and visual target detection test; this was followed by two weeks of M16A2 record fire, quick fire and long range firing. A two day training period at the land navigation course was followed by two days of testing on a different section of the course. After the conclusion of the TEXCOM test, the next ten days were spent in training for and conduct of the USAIS STXs. Considerable night and weekend/holiday work ensued throughout the test, and schedules were both demanding and unpredictable. The weight and bulkiness of the SIPE equipment was known in advance; the severity of the impact of this shortcoming had not been predicted.

Training conditions. The conditions for training varied. Initial familiarization was conducted in an interior classroom. Test soldiers sat on the classroom stage on footlockers, with a centrally located instructor; mid-morning they moved to tables with the instructor in front. The classroom had many personnel other than the test soldiers in attendance during training sessions. In addition to the technical personnel from Natick, TEXCOM, and USAIS, data collectors and miscellaneous personnel were on site. Many conversations unrelated to the instruction occurred in the room, and often appeared to be distracting for test personnel.

Range training was conducted with test soldiers seated in the bleachers, with the instructor in front. Hands on practice occurred in the bleacher area, at or around points on the firing line, or, in the case of land navigation, in the wooded area surrounding the range. As before, data collectors, civilian and military test personnel and other observers were present. Again there were many training distractions. The land navigation and STX practice were conducted at the appropriate sites; training events were relatively unstructured and limited by time constraints. This was particularly true of the STX collective training time.

Training format. Initial technical familiarization on the equipment was provided by civilian technical experts and/or developers representing Natick, the U.S. Army Communications and

Electronics Command (CECOM), the CECOM Center for Night Vision and Electro Optics, and Harry Diamond Laboratory (HDL). These individuals were technically proficient and knowledgeable about the equipment, but relatively inexperienced in training military personnel. The SIPE equipment was prototype, and only a very limited number of sets were available throughout the training period, and during the test itself. This limitation precluded test soldiers from having much hands on experience with any piece of equipment; usually three soldiers shared one set during training.

The typical lesson format during the first few days consisted of a lecture with little practical experience. Usually the clothing and equipment were demonstrated or modeled by technical support personnel, then on a later day, tried by the test soldiers. Range training suffered from the same problems: lack of equipment and inadequate time for everyone to practice with it. The fragility of the equipment was a factor which caused frequent stoppages and the need to make repairs and replace batteries. Appendix B gives a day by day overview of training.

Trainers. The cadre from USAIS provided equipment integration training, to include practice in firing, target detection, and land navigation, in both regular and SIPE gear, both day and night, with and without nuclear, biological and chemical (NBC) protective equipment. Five trainers were available initially; a sixth was added later. All six are USAIS qualified instructors; they had received prior training on SIPE equipment, although their practical experience was minimal. They wrote the programs of instruction (POIs) and conducted the SIPE training. Natick personnel provided on-site assistance in maintenance and on other equipment related issues. As additional training material, the soldiers received copies of the SIPE Operating Rules (SORs) (Natick, 1992), a book which described SIPE usage and procedures.

Written Questionnaires

Training questionnaires. Each period of SIPE instruction or training was followed by a brief written questionnaire covering the training which had occurred during the preceding block of time. The same form (see Appendix C) was used throughout. Through rating scales or open ended questions, test soldiers were asked for their perceptions of the equipment and the training. Originally the soldiers were told to answer only selected questions, although some answered more, and some fewer than instructed. In addition to eliciting the desired information, the primary purpose of these first instruments was to accustom the soldiers to answering questions, and to get them used to thinking about what they had been doing. It was an opportunity to establish rapport, and create a climate for open discussion.

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Questions covered training materials, sequencing, pacing, and difficulty of the material. They also covered the equipment - breakage, awkwardness, newness of the capability, etc. The questions themselves were derived from a list of potential interest areas which had been expressed by the developers and the trainers. The questionnaires were designed to elicit the maximum amount of information possible without overburdening the test soldiers. Thus data are limited by the effort to keep the task of minimal interference to the soldiers. (Appendix D covers training data.)

<u>Operational use questionnaires</u>. Near the end of the first week of training, questionnaires were administered on target detection, small arms fire, and navigation and NBC protective equipment. The intent of these instruments was to cause the soldiers to think further about the equipment, its integration, and its capabilities, and to get them ready for the questions they would be asked later in structured interviews. Again, the questions were derived after considerable consultation with Natick and USAIS. These questions are found at Appendix E and F.

<u>Event based questionnaires</u>. During the TEXCOM portion of the demonstration, the Test Officer permitted ARI to administer event-specific questionnaires by conducting individual structured interviews with the test soldiers. ARI was assisted by USAIS and other personnel, all of whom had prior experience in such forms of data collection and were knowledgeable about SIPE and the ATD. The target detection questions and interviews were similar in content to questions answered during training; there were eight interviewers for the ten subjects after target detection. As the test continued, interview scheduling became more difficult; five of the original eight interview personnel served as interviewers for the ten test soldiers after small arms fire. Weather problems and equipment failure shortened the land navigation portion of the test; the impromptu timing caused the debrief format to be changed to a written questionnaire followed by a group interview. Interview data are found at Appendixes G - J.

<u>STX questionnaires and interviews</u>. As an adjunct to the MTP data collection during the tactical events, ARI administered further questionnaires, and, in conjunction with a representative from the Fort Benning Human Research and Engineering Directorate (HRED), conducted group interviews with the test soldiers at the conclusion of each event. Although considerable data were collected, the overall fatigue experienced by the SIPE soldiers precluded much of the in-depth interview and discussion on capabilities that had been anticipated. Interviews and questionnaires are found in Appendixes K - N.

<u>Observations and informal interviews</u>. Throughout the training period, the TEXCOM test, and during the STX practice and events, in addition to the questionnaires, soldiers were asked

questions at every opportunity. Soldiers also volunteered information, both constructive comments, and complaints about the equipment, training, testing, and time management. Sufficient rapport was established with the test soldiers that unsolicited candid remarks were often forthcoming. Most of these comments were recorded on tape.

Post-SIPE questionnaire. A final questionnaire (see Appendix O) was given to the ten test soldiers approximately six weeks after the conclusion of the demonstration. It asked for their comments on SIPE capabilities, given the perspective of time away from the test environment. The SIPE Squad Leader distributed, collected and returned these questionnaires to ARI.

Results

All of the questionnaire and interview data were collated and the soldier comments and responses are reported by phase of testing, and then by individual items of equipment. Data are included in Appendixes D through O; because of the volume of the material, only highlights are presented in the text. Numbers of respondents for specific items in the questionnaires varied with the number of soldiers present (depending on the phase of training) and as a function of individual soldier failure to answer specific questions. Although all soldiers were present and participating in all interviews, no attempt was made to insist on answers to all of the written questions. Responses were generally very full, and in many cases, strikingly insightful. Some soldier responses are provided in the text within quotation marks; in no case are individual soldiers identified.

Familiarization/Initial Training Phase

Overall, comments were fairly consistent across soldiers, with some individual deviations. Generally training was slow paced, and the soldiers expressed concerns about time management, and adherence to published schedules. They felt that they understood the content of the material presented, and could use the equipment without difficulty. SIPE equipment is sufficiently similar to other equipment with which they were already familiar as to be easy to understand. The only area of concern was the soldier computer, and most indicated that more training would have made them more proficient. They would have liked more hands on practice, and more equipment sets available for use. They also expressed a preference for military instructors. The soldiers were fairly positive about SIPE during this training phase; data and summary tables from the first week's training questionnaires are presented in Appendix D at Tables D-1 and D-2.

Operational Use/Tactical Integration Training Phase

Generally, the overall ratings about the equipment and confidence in ability to use it went down as the test soldiers found that integration of the separate pieces of equipment was more difficult than they had anticipated. They felt that they knew how to use the SIPE equipment, but the effects of the awkwardness and weight of the visor and the pack began to affect their attitudes. (See Appendix E.)

Small arms fire. On the first day of firing while wearing the full complement of SIPE equipment, soldiers tried firing from both foxhole and prone positions. Comments ranged from favorable to unfavorable, with concerns on equipment unavailability and time management. There were also comments on equipment awkwardness, weight, controls, and battery and target failures. The eleven soldiers present rated themselves confident in use of the SIPE equipment for target engagement (Very Confident (5), Confident (5), and Neutral (1)); the equipment was not complex and was easy to use. However, poor helmet fit and the weight of the visor caused head and back pain, and finding a comfortable firing position was very difficult. The discomfort impacted on attitudes toward this entire block of instruction and affected both performance and motivation.

Small arms fire - thermal sight and protective mask. The test soldiers were asked for initial comments on using the thermal sight for target detection and engagement. Detection ratings for the responding soldiers (10) were Very Confident (4), Confident (4), and Neutral (2). Use of the thermal for target engagement was rated Very Confident (5), Confident (3), Neutral (1), and Unsure (1). (The unsure rater expressed concerns about the very limited thermal field of view.) The soldiers were enthusiastic about the sight despite limited experience. Four used the black hot polarity display for thermal, five used white hot; none could articulate any reasons for the choice. Learning to adjust the thermal controls presented some problems. Several soldiers commented that they doubted that their weapons had been adequately boresighted or zeroed by the DOT cadre.

Most soldiers had problems finding a comfortable firing position. Firing from the foxhole was best; none expressed any problems with cheek/stock weld, breathing, or trigger pull, except for those associated with the helmet/visor combination. The prone position required the soldier to rest his helmet on his arm or the ground and was particularly uncomfortable. Quick fire while walking produced a very unstable situation, as did firing from behind the wall using the system's indirect viewing capability.

Initially, soldiers reported that wearing the SIPE protective mask relieved some of the pressure from the helmet/

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visor combination. They also much preferred the XM44 mask to the current M17 mask for comfort and vision. Test soldiers felt they could detect and engage targets well.

Target detection practice. After the first target detection test rehearsal, the soldiers were asked to rate themselves on use of the various sight combinations for detection. In use of the SIPE I^2 capability with the PVS4 sight at night, the five who responded considered themselves Very Confident (4) and Confident (1). After use of the thermal, six responded and rated themselves Very Confident (1), Confident (1), Neutral (2), Unsure (1), and Very Unsure (1). Equipment failures and inability to gain and maintain a picture impacted on those rating confidence low. Overall they expressed a preference for the thermal sight at night, and standard iron sights during the day.

Target detection was to include use of the long range hearing device and the enhanced ambient hearing capability. The soldiers said that their enhanced hearing was of no help in the audio portion of the target detection exercise; close in sounds masked far target noises. After the first few soldiers were unable to use the long range hearing because of interference, the LRH was changed to a side test and only limited additional data were collected. The XM44 protective mask did not interfere with either visual or audio detection (although the soldiers reported problems due to the helmet/mask interface).

Land navigation practice. After a day of land navigation training using the computer, the digitized maps and the GPS, soldier ratings of their confidence in using the navigation system decreased from their initial estimates. Only one of seven reporting was Very Confident, the others Confident (4), Neutral (1), Unsure (1). They commented that use of the system took a lot of time and slowed them down. The menu and the icons were slow and the helmet mounted display was difficult to read. Only two liked the idea of a map in their helmet mounted display; seven said that they wanted to be able to look at the map and walk at the same time. Again, there was a need for more hands on time, or practice with the equipment, to be effective with the system. "I had trouble making the land nav do what I wanted it to do" was one comment. Throughout the length of the training period there were problems with lack of GPS information. One soldier commented that it was "easy to navigate when it worked but it didn't work."

Protective equipment. Test soldiers wore the SIPE protective equipment roughly equivalent to MOPP 4 during target detection and small arms fire. The ten respondents rated themselves Very Confident (3), Confident (4), Neutral (3). Eight said the SIPE gear made it easier to move than standard (MOPP4);

one thought possibly it was harder. Five said it was easier to shoot, nine said it was easier to communicate. The SIPE protective mask gave better visibility than the standard M17, and was more comfortable. Nine said the voicemitter helped communications, one disagreed. They could understand and hear themselves and other people but could not tell how loudly anyone was speaking.

Although they did not wear it very long, the MCC was rated "awesome," and they were more comfortable than in standard MOPP gear. With the MCC they did not feel the heat build up, but when they did not have the MCC, the multiple layers of clothing made them very hot. Several noted that breathing with the MCC takes practice to prevent hyper-ventilation; it was also quite noisy. Nine thought they would be able to work longer without tiring because of the MCC; one was unsure.

Training Phase Overall

In a summary questionnaire administered at the conclusion of the training week, most SIPE training was rated Good or Very Good; helmet/visor awkwardness and thermal sight controls and battery failure were distractions. (Data are found in Appendix F.) Ratings from the ten respondents on ability to use the equipment were Very Confident (2), Confident (5), and Neutral (3). With very few exceptions they thought all of the SIPE equipment was easy to use and learn to use.

Most soldiers felt that with respect to the ability to perform infantry collective tasks, the SIPE-equipped soldier would be able to do his job more easily and effectively. However they requested more hands on practice and military instructors who could place the equipment in a tactical context. The soldiers requested more training before being tested and more equipment availability.

Other comments focused on testing, time management, and the sharing equipment lessons learned. Several test soldiers commented that the training cadre did the best they could, but were themselves only slightly more experienced than the test soldiers. Providing a tactical context for the training and the equipment would have helped the soldiers in their integration of the equipment, and in assessment of its capabilities.

The overwhelming concern during the training period was discomfort, actual physical pain from the helmet and visor, and misadjusted back packs (load bearing components). Equipment adjustment and the consequences of inadequate fit became overriding. All ten soldiers reported headaches, many reported nausea, dizziness and neck strain and they experienced back and leg pain from the pack. Nearly all soldiers had deep red welts visible on their foreheads after wearing the headgear. Some

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difficulty in focusing and blurry vision seemed to occur from a combination of pieces of equipment. Initial problems with equipment adjustment, which were verbalized, gave way to a quiet resignation, and reported responses of trying to get used to it, to "tough it out." At this time the test soldiers were still fairly enthusiastic about the SIPE demonstration; their apparent physical discomfort was high but they thought that they would begin to get used to the equipment before the TEXCOM portion of the demonstration began.

Target Detection Phase

Description. The first TEXCOM event was target detection during which the test soldiers detected audio and visual targets during daylight and limited visibility, and in both standard and SIPE equipment. They also wore NBC mission oriented protective posture (MOPP) gear. Soldiers were in foxholes on a firing line overlooking a range where visual targets (wheeled, track, personnel) appeared. Audio targets included realistic taped playback of actual vehicle noise, and noise from personnel.

Soldiers went to the test line in groups of five. The detection process and the data collection and reduction was slow and there was considerable down-time both within and between iterations. The weather was quite warm through most of this activity and the test soldiers reported that they were very hot, particularly when in the highest protection level (MOPP4 or SIPE PR4).

Interview data. At the conclusion of the target detection events, individual structured interviews were conducted with the test soldiers in their battalion classroom. ARI's interviewers used a questionnaire with rating scales, and many open ended questions; several tape recorded the interviews. (Data are found at Appendix G.) The soldiers were asked about levels of confidence in using specific sighting capabilities for target detection, day, night, with and without MOPP gear and SIPE equipment. Table 2 shows mean responses on a five point scale from 5, Very Confident to 1, Very Unsure.

The test soldiers were asked "Can you detect targets well?" with standard sights, I^2, thermal and the LRH. All ten reported Yes for standard iron sights, nine said Yes for thermal, but the number dropped to five Yes and four No for the I^2. Only three soldiers had the opportunity to try the LRH, and only one of them answered Yes. Seven of the ten reported difficulties with the thermal brightness and contrast controls. Asked "Did SIPE clothing and equipment enhance your ability to complete the individual tasks associated with target detection in daylight?" four said Yes, six said No; at night, the numbers rose to nine Yes and one No.

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Table 2

Mean Confidence Ratings for Target Detection

	Standard Iron Sights	SIPE-I^2	SIPE-Thermal Sight
Day - MOPP 0	4.60	N/A	2.80
Night - MOPP 0	2.78	3.83	4.10
Day - MOPP 4	3.78	N/A	2.40
Night - MOPP 4	2.38	3.33	3.88

Note. Number of responses ranged from 6 to 10.

Small Arms Firing Phase

Description. The short range firing events (50-300 meters) were conducted on lanes on a wooded rifle qualification range, the long range (400-600 meter targets) events on more open terrain. Soldiers were given some practice shooting at long range; few had prior experience. As with target detection, soldiers fired in SIPE and standard equipment, day and night, in NBC protection levels 0 and 4. At the conclusion of the event, the TEXCOM test officer again permitted the test soldiers to be interviewed. As before, questions were answered in a structured interview in the battalion classroom setting.

Interview data. The soldiers were asked about confidence in their ability to use various sighting capabilities for target engagement at short and long ranges using standard and SIPE sights. The firing represented the first real use of the AIM 1 aiming device with the I^2 combination. Confidence ratings are shown at Table 3 where a rating of 5 indicates Very Confident; 1 indicates Very Unsure. (Data are found in Appendix H.)

Table 3

Mean Confidence Ratings for Target Engagement

	Standard iron sights	I^2 with PVS4 or AIM 1	Thermal sight - day	Thermal sight - night
Short range	5.00	2.89	4.40	4.30
Long range	3.30	1.88	3.00	2.80

Another set of questions focused on accuracy. Based on experience, the test soldiers described themselves as very accurate at short ranges with iron sights, but less so at long range. With the I^2/AIM 1 combination, they considered targets over 150 meters totally unengageable due to the AIM 1 dot's obscuration of the target. They thought they would be accurate at short range with the thermal sight but less accurate at long.

Several soldiers reiterated a concern first voiced during training. Nine of the ten indicated that they did not feel their SIPE weapons were properly zeroed, thus impacting on long range performance. This may have been true. Because of the constraints imposed by limited time and only three thermal sights, the sights were left attached to specific weapons which were then rotated among the test soldiers. The training cadre zeroed the sights and weapons; test soldiers reported that they were not pleased at not being able to zero their own weapons. This affected attitude if not performance.

When toward the end of the test the soldiers were asked about firing positions, most indicated that firing prone was still very difficult in SIPE, that the foxhole position, while uncomfortable because of the nature of the equipment, was slightly better. Firing tests at long range used only the prone position. Of nine respondents, all said they had trouble holding the SIPE equipped weapon steady, and seven of ten said they had problems with the helmet hitting the thermal sight knobs while in a firing position.

Asked "Over all, did your SIPE clothing and equipment enhance your ability to complete the individual tasks associated with target engagement?" of the ten respondents three said Yes, four said No, three said "both." Most of the benefit was derived from the thermal sight capability; the expressed negativity was related to their discomfort with equipment fit, and their lack of prior experience in 400-600 meter range firing.

Protective Gear

At the same session where they were interviewed about firing, the test soldiers were also asked to fill out a questionnaire on SIPE NBC protective gear. (Data are found at Appendix I.) Half said that SIPE protective gear made it easier to move than when wearing standard MOPP gear. Six said it was harder to shoot in SIPE (three said easier - one said "the same"), and seven said SIPE made it easier to communicate (one said harder, one said same). Nine of the ten admitted being claustrophobic in SIPE MOPP gear.

The effect on firing and target engagement of NBC gear overall was mixed. On the one hand they liked the mask/eye/

weapon interface better in SIPE than in standard MOPP gear, but the heat, the pressure on the nose, sweating and fogging made firing worse. The microclimate conditioning was used only for initial firing during training; the weight of the system became onerous and the MCC was removed. The small in-line blower from the XM44 mask provided some ambient air inside the mask for the face. Firing occurred on very warm days and the soldiers were extremely hot in SIPE MOPP as the uniform does not breathe. The helmet mounted display, better for sighting than the typical weapon canting required with iron sights, was degraded by mask and visor interface problems. Seven of the ten reported problems using the SIPE NBC gloves (too thick). All ten felt that they sounded louder than normal in SIPE; on a positive note, they could understand people talking both with and without the SIPE voicemitter.

Land Navigation Phase

The land navigation portion of the SIPE demo (finding a series of points) was shortened due to a number of factors, including equipment failure, weather, and lack of GPS information. Soldiers were unable to complete the full comparison of SIPE and standard navigation. The interviews could not be scheduled in advance, so the soldiers filled out questionnaires covering their land navigation experiences (see Appendix J). Asked for confidence ratings (5 = Very Confident, 1 = Very Unsure) in their ability to use SIPE and standard gear for navigation, standard gear was much preferred. Table 4 shows mean confidence ratings for day and night training, and day testing.

Table 4

Mean Confidence Ratings for Land Navigation

	Day	Night
Standard	4.90	4.60
SIPE	3.20	2.83

Eight reported flipping up the visor to walk between points and despite the fact that seven of ten had confidence in the accuracy of the system, only one of the ten said he navigated better with SIPE. Eight said it slowed them down, nine did not like the maps in the helmet mounted display - all who responded said they would rather have had the map in their hands. Just as in the training phases, they reported trouble with the display icons, and with the signal from the satellites.

STX Phase

Description. The STXs, although well and thoroughly planned, changed considerably as the demonstration evolved and the original two-a-day missions reverted to day planning for night execution. The test soldiers reported to the site in the morning and remained until well after dark.

The events, one conducted each day, included a movement to contact (MTC)/area recon, a raid, an ambush, an NBC recon, and on the final day, holding a defensive position. The procedures varied with the tactical missions but generally the squad leader received his order in the morning, briefed his team leaders, and then planned for the mission. They rehearsed as much as possible, and executed just after dark. An officer from USAIS served as their platoon leader. Additionally, other officers served as Observer/Controllers (OCs) and graded the SIPE squad according to the standards in Army Training and Evaluation Program (ARTEP) 7-8 MTPs (1988), noting special use of SIPE capabilities. An opposing force (OPFOR) team was also in place and brought fire, smoke, etc., upon the SIPE squad. (OC findings and OPFOR comments are found in the 1993 USAIS report.)

Each night, at the end of the mission, the test soldiers stowed their gear and reported to a location where soup and coffee were available. The weather had turned cold by mid-November, and they reported being both chilled and tired. The soldiers who had performed the squad mission filled out human factors questionnaires for the HRED representative, and then provided written answers to questions on using SIPE equipment during the specific STX they had just completed.

After the questionnaires were completed, all of the soldiers participated in an interview session with the ARI and HRED researchers. Although there were a few interruptions when the battalion commander or other test personnel briefly entered the room, the majority of the time no one else was present and the soldiers spoke freely. (Interview transcripts and questionnaires are presented separately by event at Appendixes K - N; HRED human factors data are reported separately in the USAIS report.) Because of the lateness of the hour (after 2200) and soldier fatigue, interviews were kept as short as possible. After the NBC recon, comments on the protective gear were elicited from the group as a whole rather than individually.

Interview data. The STXs were the first time that the test soldiers had worn their SIPE equipment for very long periods of time without respite. The soldiers reported being extremely uncomfortable because of the overall awkwardness of the equipment, the weight of the helmet/visor, the discomfort and loss of balance produced by the back pack. They had not practiced using the SIPE to perform MTP collective tasks, nor had

they had any real opportunity to explore the capabilities of the equipment. A particularly striking example of this was evidenced when they discovered for the first time the enhanced communications capability provided by the soldier to soldier radio. They had not practiced collective Infantry tasks while wearing the full complement of SIPE gear; they were not accustomed to the adjustments that would have to be made to their movement techniques and behavior as a result of SIPE equipment.

During the STXs, not everyone used every piece of equipment. The basis of issue varied with the mission, but most soldiers had just the helmet/visor combination, the load bearing component and the weapon with I^2 capabilities but without the thermal sight. Only those with computers could use the position navigation system, the video capture camera, etc. Comments are thus limited by actual usage of the equipment; only a few test soldiers had an opportunity to try some of the SIPE capabilities.

After the MTC/area recon, eight of the nine indicated that not everyone in the squad needed a computer; all seven who responded to the same question after the raid mission agreed that only key leaders needed it. (Eight of eight reported that they felt they were well trained in the use of the computer despite the fact that only a few had used it during either of the missions.) Most of the squad had no opportunity to use preformatted messages; leaders used the SPOT report. During the defensive mission, a call for fire, ordinarily very simple, was extremely slow with the SIPE computer, partly due to lack of familiarity with the SIPE message format, partly because the format and the map could not be placed on the helmet mounted display screen at the same time.

As noted earlier, the MTC was the first occasion to try the intra squad communications. The test soldiers were extremely positive about it, and ready for instant fielding. The radio range was adequate during the MTC, and all soldiers said that there were no problems in maintaining radio silence. They reported performance enhancement because of the ability to give an instant ammunition-casualty-equipment (ACE) report and to have greater dispersion during movement. Although they were still enthusiastic about the radio, it did not perform as well the next night during the raid, and the range was barely adequate. On the ambush the quality of transmission had deteriorated, and they were forced to rely on traditional modes of communication, e.g., hand and arm signals.

During the STXs, they also confirmed that the enhanced hearing was more of a problem than a help; they could hear themselves, but not the sounds close by in front of them. They reported that they had been deprived of one of their senses. Several indicated that they kept only one earphone inserted, and

that one only so they could hear the radio. Similarly the LRH was said to be no help although it actually received very little use. The soldiers did not have any confidence in it, and with only two available, there was limited opportunity.

Eight of nine indicated problems with helmet/visor interface and pain after the MTC; only four said Yes after the raid, but six wrote negative comments. The few who had computers and the POS NAV system available said they were able to use it to remain oriented, particularly the point man. Those who had the thermal sight used it successfully for reconnaissance and target detection. They said they could see better using the I^2 at night than they could with most standard issue night vision goggles or the unaided eye, but did not like the fact that the display made them lose their night vision, nor did they like the lack of depth perception when walking.

Overall responses to questions were inconsistent, although definite trends emerged. Despite the favorable responses about the thermal sight and particularly the commo, after the MTC, eight of nine said No to "Did your SIPE clothing and equipment enhance your ability to complete the individual tasks associated with this event?" (One was uncertain.) Asked if SIPE assisted in completion of collective tasks, two answered Yes, six said No and one was still uncertain. After the raid, six of nine said that SIPE equipment enhanced their ability to perform the mission.

Asked after the ambush to name the best things about SIPE, six mentioned the thermal sight, nine mentioned the commo; two mentioned the ballistic vest. They were also asked if there were any activities more difficult in SIPE gear than standard. All ten said Yes for night; five said Yes, four No and one failed to respond for day. Based on comments on specific pieces of equipment, the problem appeared to be the interface of the separate pieces of prototype equipment. The sights were good, but the visor was so onerous that the soldiers forgot to think about the benefits of the sights.

After the NBC recon the SIPE soldiers were asked again about moving and communicating in SIPE protective gear; they responded consistently. Although they liked the ability to move while wearing the SIPE NBC protective clothing, when the rest of the SIPE gear was worn, movement was harder. In NBC gear face to face masked communication was not improved by the enhanced hearing; they indicated that the voicemitter which might have produced a Yes answer could not safely be used in a tactical situation. The noise of the suit, and the MCC, if worn, precluded any semblance of noise discipline. They repeatedly had to readjust mask/helmet interface, and several reported problems in accessing the liquid nutrient system. The NBC gloves were not

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liked at all well. The NBC recon, the fourth STX, was extremely frustrating for the test soldiers. They were hot and tired, and therefore both performance and motivation suffered.

Post-SIPE Phase

Approximately six weeks after the conclusion of the SIPE field demonstration, at the SIPE Squad Leader's suggestion, the test soldiers were again asked to complete questionnaires about their experiences in SIPE. The questions, all open ended, were answered in garrison, without any researchers or outside personnel present. All ten soldiers responded; most with great candor, many with excellent ideas for improving the prototype equipment. (Data are found at Appendix O.)

They were first asked to give their opinions on which equipment should be considered for further testing. Nine commented on the thermal sight, eight mentioned soldier to soldier commo, six mentioned the ballistic vest. Only three mentioned the computer.

Another question concerned capabilities offered in SIPE which are unavailable elsewhere or in standard uniform/weapon configuration. Several commented on body armor, and seven reiterated positive comments on squad commo. The thermal sight capability and the GPS (if working) were also cited. Comments on the IHS made it very clear that the helmet and its suspension were acceptable and even comfortable; but the addition of the visor with the helmet mounted display was totally unacceptable. Few would even admit to its potential. The computer was not very favorably regarded in the present configuration, but most realized that if hardened and miniaturized, it might have potential.

The soldiers liked the ballistic vest and the XM44 protective mask, and the NBC undergarments although the outerwear was extremely hot without the MCC in operation. They thought the liquid hydration device was a good idea although a better drinking tube configuration was needed. The advanced combat uniform was disapproved of by all ten soldiers, and many specifically mentioned both the NBC and the combat gloves as unacceptable. The MCC was well liked but tried very little; its noise and weight were faulted.

Two questions, one indicating soldier opinions on changes which should be made to SIPE training and the demo, and another eliciting additional comments about the entire experience brought mixed responses. Several soldiers said that they had enjoyed the test, at least in part, but most of the comments were uncomplimentary. Their frustrations with the test environment and the physical discomfort they felt remained overriding.

The test soldiers' impressions were colored by the lack of a clear chain of command. Poor dissemination of information was perceived as a problem, as was time management. Several mentioned inadequate train up time on the equipment, and the overall lack of soldier input to test planning and execution.

Equipment and Capabilities

The following sections detail soldier comments and consensus on the various pieces of SIPE equipment, as reported in the questionnaires and during interviews and tape recordings. As noted earlier, data are found in Appendixes D through O; only highlights are presented here. As much as possible the comments are grouped in a logical order of presentation, and independently by subsystem. An overview of the training is followed by additional comments on the operational use of the equipment.

Integrated Headgear Subsystem (IHS)

Training on this system was favorably received and comments were extremely positive. The block of instruction was rated high, and most caught on rapidly. Only a few helmets were available, and none of the soldiers wore one for any appreciable length of time.

Ballistic shell component (BSC)/Electro optic system (EOS) visor. The BSC, by itself, was labelled "awesome." The advanced suspension system was good, although some padding readjustment was necessary. The ratchet was well liked; the soldiers felt that it could make the chin strap unnecessary.

However, the integration of the helmet and the EOS visor caused problems. The visor's front pulling weight forced the soldiers to ratchet the helmet up tight to keep it from falling off. This then caused a vise-grip like pressure on the head and forehead. They constantly had to readjust the helmet to relieve pressure on the head. The helmet/visor combination caused severe headaches, nausea, and marks on the soldiers' faces. The physical pain from the weight of the EOS visor was the cause of many attitude problems in the demonstration. Other comments were that the visors made loud noises as they were raised, and when up, frequently got caught in branches; the joints jammed and it was difficult to insure that the visor was locked in place.

Helmet mounted display (HMD). The problems with the visor caused many of the problems attributed to the HMD and the discomfort from the visor masked the potential value of the HMD. Additionally, the soldiers complained that the HMD blinded them to the periphery and cut off their normal field of vision. It illuminated their faces at night, and also caused vertigo. One soldier cautioned "Never turn your head in SIPE - it makes you

car sick because your eyes are seeing things that your brain isn't expecting because your head isn't moving."

Image intensification (I^2). Another part of the IHS is the I^2 capability in the HMD. Soldiers were bothered by the necessity of switching back and forth from I^2 to the thermal or to the computer display; they felt they were losing night vision capability. They said the I^2 was better than night vision goggles, but they could not walk safely or comfortably with the visor down as the system provided no depth perception. The I^2 over-ride system worked well in causing bright lights to fade out the display. They said the I^2 worked well with the laser dot from the AIM 1.

AIM 1 laser aiming light. Some soldiers commented that the PVS4 sights available during the demonstration were better maintained than average and probably helped them in short range target engagement. They relied on the AIM 1 but did not feel that they had enough practice with it in designating targets. They commented that at ranges over 150 meters the laser beam fanned out; the white dot became so large that it obscured the target. The AIM 1 beam also bounces off grass and is so large that the shooter cannot tell if he is firing high or low.

Protective glasses. The soldiers were required to wear eye protective glasses when wearing the SIPE helmet/headgear; all found them bulky, uncomfortable and irritating to the nose; most removed them whenever they had the opportunity. The laser protective glasses substituted in missions where the AIM 1 laser aiming light was used were better but got sweaty and became fogged in NBC. They slipped and slid on camouflaged faces.

Soldier to soldier communications. A most successful feature of the IHS was the soldier to soldier radio capability, often referred to as "soldier comms." The intra squad communications, with every man able to hear and talk, provided more freedom of operations, and a greater capability to disseminate information. Tactical commands could be given quickly and without the leaders having to move; there was less confusion, especially during movement and at halts. They felt there was better control, and both time and work were saved for the leaders. Everyone was well informed at, for example, danger areas, and information relay was much faster than usual. The ACE report was specifically mentioned as considerably faster than normal because of the SIPE communications. They reported no problems with noise discipline or voice recognition.

The communications produced no problems on first use, during the MTC/area recon, but over the next few days it deteriorated. The soldiers felt that something had broken within the system as several could receive but not transmit. They also commented on

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the sensitivity of the mike; they felt they could hear more and at greater distance than was tactically appropriate since with the ambient hearing ear plugs in, they could not tell how loud they were talking.

Ambient hearing. The combination of the radio communications and the enhanced ambient hearing caused problems. The enhanced hearing helped relieve the feeling of encapsulation and worked to damp out loud noises in the immediate vicinity of the wearer's ears. However, the ear phones produced a whistling noise which sounded like jamming or interference. They heard the buzzing or clicking of the thermal sight, and experienced considerable static; they complained that there was no way to filter out noises or adjust it. They could not pinpoint noises or their origin, could not hear themselves step, and did not know if they were breaking twigs or stepping on leaves. The hearing so muffled the noises around them they could not tell how much noise they were making. One noted, "It's like you are in the middle of a freeway." The solution was to take one ear plug out to safeguard normal hearing; to leave the other in place for radio communications.

Helmet control unit (HCU). The communications and the soldier computer are controlled by the HCU. Although the HCU and the arrow keys were always rated very user friendly, the soldiers felt that the knobs were difficult to get at. During the STXs, several soldiers admitted that they became temporarily mixed up. Some commented on the fact that the box closes with a loud snap.

Thermal sight. A Thermal Sight designed for other purposes was used as SIPE's thermal sight. It was fragile and bulky, and caused an unnatural off balance condition for the weapon. Training on the sight was fairly technical, with more focus on technology than on use or capabilities of the thermal sight. Few soldiers had any prior thermal experience, and little was offered on employment of a thermal device. Limited numbers of sights impacted on practice time.

The SIPE soldiers were very positive about the thermal sight for scanning and target detection, for target acquisition and engagement; they were especially enthusiastic at night. They liked it well during the day but wanted range cards to distinguish targets from hot spots. There was some misorientation caused by the interface of the thermal sight and the helmet mounted display. One soldier commented that in rolling terrain or hills he looked at the tops of trees and brought the weapon down to tell where he was. The field of view, which was very narrow, caused some comment, but few real problems. One soldier said: "You have tunnel vision and you don't know what tunnel you're looking in."

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The soldiers received no guidance on white hot and black hot polarity. They rarely changed back and forth, or from whatever happened to be the selected position when they got the weapon. One soldier defending white hot said it was easier to detect with. Another articulated his preference for black hot. "[I use] black because the cross hairs are green. If you do white hot, body heat is green and you can't see the cross hairs." They also mentioned the poor placement and difficult shutoff of the thermal switch. They wanted its location changed, and in fact wanted the thermal sight independent from the HMD.

Long range hearing (LRH) device. The LRH was available for some use during the SIPE field demonstration. Training was limited by the availability of only two devices, and a very windy day which precluded a good demonstration. There was little instruction; some wanted to try the LRH in a tactical situation to get a better feel for range and capabilities. This did not occur. During its limited use in the STXs, the soldiers who tried it said they could distinguish high pitched sounds like voices and branches but not low sounds. It could not be used with the noisy thermal sight and the MCC; body movement and wind also drowned it out. One said "I would move my head a little and it would sound like a storm coming through."

Respiratory protective device (RPD). The final part of the IHS is the RPD, the XM44 protective mask. Training on this system was well received, and comments were generally quite positive as the class was held on the range and the soldiers were able to try both the new and old masks and compare them. There were comments on awkwardness and difficulty in pulling the hood over the head. Similarities to the old mask made learning easy; one summed it up: "old task different mask."

The consensus was that the mask, without the helmet mounted display and visor, was excellent, and a great improvement over the M17 mask. They reported front and peripheral vision to be "one hundred percent" better in the SIPE mask. However, the integration of the SIPE mask and the helmet/visor combination caused severe problems. Several soldiers said, "You breathe or see, not both." The helmet/visor weight caused the mask to slip down and forward, causing the internal eye cups to put pressure on the soldier's nose and Adam's apple. With the nose "squished up," they were forced to breathe through their mouths; this in turn caused the mask to fog, and soon they could not see at all. The combination produced double vision when the mask and helmet were no longer properly aligned. The pressure and weight of the helmet also caused the mask hooks and buckles to press into their heads. Firing in prone was particularly bad: they described looking face down into pools of sweat that had accumulated in their masks and obscured the field of view.

Hydration liquid nutrient (HLN) device. The HLN was a part of the RPD. It was useful in concept, but in practice caused problems. The soldiers reported being sprayed in the face with water which would not stop flowing, or having the water come out of the line into the inside of the uniform. One noted that his drinking tube was stuck under his chin and he never could reach it; most said the hose was too short. It was hard to keep the water spigot between their teeth; if they let go it was a problem to find it. Some did not mind the trouble with the bottle as they said the water tasted bad anyway; all, however, said that the hand pump was a good idea.

Advanced Clothing Subsystem (ACS)

Comments were very favorable about training in this area, and despite the large numbers of items introduced, the soldiers felt confident in their ability to use them without difficulty. Hands on time was rated highly because for the first time they were able to try on the equipment. As the demonstration progressed the SIPE soldiers learned to consider the ACS equipment as separate pieces; some first impressions changed.

Load bearing component (LBC). One element of the ACS is the LBC, usually referred to as the pack. First impressions were very positive; later comments indicated that "the LBC is OK if adjusted, but if not it kills you and it gets out of adjustment." Because of the pain to the back and legs, the pack became almost as disliked as the visor. The load within the LBC was not balanced; hip motion was encumbered by the weight of the LBC. It sat so far back on their bodies they could not lean forward; the majority of the weight was low, at the waist line, with lighter components on top. They would have preferred the weight supported by the shoulders.

Ballistic protective vest (BPV). The integration of the LBC and the BPV was also poor. The vest, extremely well liked, did not fit well with the LBC and caused the latter to get out of adjustment. The vest was both flexible and comfortable; the side opening vents were well accepted. The only problems with the vest itself related to placement of the ammunition magazine pockets. The soldiers said they could not get magazines in or out of the pockets while prone; that they should be relocated lower toward the waist.

Advanced combat uniform (ACU). Another portion of the ACS was the ACU, jacket and trousers. With very few exceptions the soldiers did not like it. They found the material easily snagged and ripped. It was stiff and very abrasive, causing rashes and chafing. Its moisture resistance caused sweat and other liquids to remain trapped inside; the uniform was hot and did not breathe and the soldiers reported that their legs were much hotter than normal. The pockets and sleeves were fastened with velcro; no

one liked the noise. The ankle drawstrings pulled out easily and jacket and trouser adjustment buckles loosened too easily. They felt sloppy because buttons were missing from the neck of the jacket and the sleeves were not snug; they indicated that they did not feel or look professional in the ACU.

Advanced shell garment (ASG)/Chemical vapor undergarment CVU). The ASG was worn as the outergarment in the NBC protective posture. The soldiers said it provided a greater range of movement than standard protective gear because of fewer layers of clothing; they were not as uncomfortable as in standard MOPP which covers the BDU. The ASG is worn over the CVU, a soft fleecy garment which resembles a sweat suit. It was very comfortable and the CVU together with the ASG was not as heavy as the standard issue BDU/MOPP garments, and offered more flexibility.

Active cooling vest (ACV)/Coolmax T shirt. The ACV interfaced with the air cooling system and the black Coolmax T shirt. The ACV presented no problems. The shirt wicked water well and kept the soldiers relatively cool on hot days. However they felt that it should only be a hot weather item. When they wore it as an every day shirt in cold weather it pulled heat away from the body. They also complained about the Vee neckline; it looked bad and one said his dog tags got caught in it.

Handwear/gloves. There were two kinds of gloves in the SIPE ensemble. The basic combat gloves received both positive and negative comment on warmth - some said their hands were warm, others said cold. Most commented that the woven construction protected from brush but allowed their hands to be stuck by prickers and thorns. They doubted that the gloves would be good protection against broken glass. Even during limited use the adhesive material at the finger tips began to peel off; it assisted little in picking up things.

The multi-layer chemical/biological protective gloves were not well liked. The fingertips were so large and bulky that they could not feel the HCU knobs. The soldiers said they could not manipulate their weapons - use the selector switch, eject magazines or squeeze the trigger because of the bulk. Although they were comfortable and did not accumulate a lot of heat and sweat inside, most soldiers said they would trade heat for dexterity.

Footwear/boots/protective gaiter. The SIPE boots, available only in size 10, were worn by only a few soldiers. Reportedly they wore out quickly and the brown material scuffed easily. The water barrier worked well in keeping water out, but equally well in preventing moisture escape; once damp or wet the boots took an unacceptably long time to dry. One commented that his inserts pulled out every time; he had trouble getting the boots off. The

protective gaiter was termed "impossible" to get on over the boot.

Microclimate Conditioning Subsystem (MCC)/XM44 In-Line Blower

The brief training on this system was rated high; both the awkwardness of the equipment and the newness of the capability were highlighted. Several commented on the very high noise level and the exposed on-off switch; overall they were enthusiastic. Despite the fact that they did not get to try it during training, they rated themselves confident in their ability to use the MCC.

During the first operational use of the MCC, the soldiers maintained their positive attitudes: the MCC kept them much cooler in NBC gear. They felt they would probably be able to work longer before tiring although several commented that they had to adjust their breathing to prevent hyperventilation. The MCC cooled their face and torso and arms in warm weather; the legs were hot. Ambient temperature also impacted: one said, "When it is cold you don't want ambient air in there." MCC noise interfered with the long range hearing, and was thought likely to give away a soldier's position.

They commented that with MCC their faces sweated less and their protective masks did not fog; without it both sweat and fogging were severe. However, because of its excessive weight, the soldiers could not wear the MCC all of the time they were in protective gear. A partial solution to the heat buildup was to use the XM44 in-line blower, a fan to blow air to the face. It helped reduce the sweating and fogging.

Voicemitter. The XM44 mask voicemitter was tried only on a limited basis. Several thought it was a good idea but would be used only during a noisy fire fight or at the rear. They commented that wind or low batteries made it whistle. They often did not remember to turn it off; one soldier volunteered that they all sounded like Darth Vader.

Individual Soldier Computer/Position Navigation (POS NAV)/ Computer Software

The computer hardware was standard equipment; the software and interface with the helmet mounted display were new. During the training sessions, several soldiers had to share one helmet and in the classroom all had to look at the visual display on TV monitors. Comments were positive but the newness of the capability impacted for individuals who were not experienced in using computers. One soldier noted that the training was "difficult but manageable." There was very little actual practice time for each soldier.

POS NAV. The SIPE land navigation system represented the major portion of the test soldiers' use of the computer interface. Since training was in small groups due to limited sets of equipment, the soldiers worked together using the maps and other software, and were not able to explore individually. Overall the group was not very positive about their experiences. The POS NAV system appeared fairly complicated; several said that more training time and hands on practice was needed.

By the time the land navigation exercise was conducted, the soldiers were more familiar with the computer but were still not confident in it. The problem was expressed by one soldier: "If it worked you couldn't ask for more – but it didn't [work]." The soldiers liked the fact that the POS NAV system gave distance and direction at the push of a button. It was a help in finding points at night, and in updating position and distance. One said it helped him maintain his direction while altering his route to avoid water, brush or terrain obstacles. The POS NAV also provided a quick reference to remedy or preclude misorientation. Another said that the POS NAV would be helpful to regain location after loss of pace count or fatigue, and to counteract a tendency to drift.

Global positioning system (GPS). The POS NAV system relied very heavily on the ability of the SIPE soldiers to access GPS satellites. The availability was too unreliable during the test period. Woods and clouds interfered and even high points were uncertain. They constantly lost contact with satellite signals and either had to walk around to try to regain the required three points, or simply sat to wait for their return. The GPS loss was unpredictable, and extremely frustrating.

Software/maps/HMD in navigation. The GPS coordinates, digital compass readout and maps and messages were accessed through the HMD. The soldiers did not like having to flip down the visor to read the compass or the map. It slowed them down because of the menu system, and because they could not walk with the visor down. They either had to flip up the visor or remove the helmet to wall; the lack of depth perception made walking with the visor down very disconcerting and in many cases dangerous. They felt that they could not monitor terrain features well, nor could they use their normal sense of vision in navigation.

Information in the heads up display was hard to read, especially in the day time, and the green background color bothered them. The words did not keep up with head movement, leading to vertigo. The numbers 0 and 8 were easily confused. and contour lines were difficult to read. The icon was slow, and digitized maps were barely adequate; it was hard to distinguish a contour line from a road or a stream.

Message management. Another computer feature was the message management capability where the SIPE soldier filled in selected pieces of preformatted reports. This capability was barely explored in the demonstration. The individual status reports were collected through the communications system, then forwarded through the preformatted SPOT report message. The few soldiers who tried it said it was not as fast or efficient as by radio. The other messages used during the STXs were also slow, in some part because the soldiers had not practiced using them.

Video capture camera. The hand held Video Capture Camera was another feature available with the computer. Tried on a very limited basis, the soldiers said that it worked, but took too much time. The intelligence pictures provided before a mission were only a little help. There was no way to determine range or depth; the flat picture gave no perspective.

Digital compass. Attached to the camera was the Digital Compass. The soldiers liked the idea but considered it a definite disadvantage to have to flip down the visor to read it. Besides the time involved, the fact that they had to look in the HMD at night to get a compass reading caused them to lose their night vision just to get an azimuth. It was also big and bulky.

Weapon sling. A final piece of equipment used in the SIPE demonstration was a weapon sling designed to help accommodate the weight and bulkiness of the SIPE configured weapon. The soldiers liked the sling but commented that there was too much play in it.

Discussion

Training Issues

The greatest impact on SIPE training for the test soldiers (and not incidentally for the training cadre) was probably from the inadequate numbers of pieces of equipment and the correspondingly inadequate amount of individual hands on practice time for each of the soldiers. Due to the compressed schedule, the amount of training time could not be controlled or expanded. The soldiers did not have time to explore the equipment and they began to use it as an integrated system before they knew what it could do for them.

Additionally, during training the test soldiers were given very little guidance on the potential uses of the SIPE equipment, or ways in which it might provide capabilities beyond those existing in current equipment. A partial solution might have been effected by better use of time and personnel. Many on-site personnel could have shared lessons learned to enhance soldier training and provide a tactical context for capabilities offered. Informal feedback of this type was minimal.

There were also problems caused by inadequate dissemination of information. Since only 50% of the test soldiers were present for the initial SIPE briefing, there was an overall lack of understanding of the purpose of the demonstration, the roles of all the personnel, and plans for the SIPE equipment. A later briefing on the overall program helped only slightly. Equipment use and individual skills were taught in isolation, which made the follow on task of equipment integration and collective performance more difficult.

Human Factors Issues

Compounding all of the previous problems was the constant and intense pain caused by the helmet/visor combination, and the weight of the equipment housed in the load bearing pack. Although the test soldiers tried to focus on the capabilities of the equipment, eventually their physical discomfort became unavoidable, and overriding. Much of the potential benefit was lost due to their inability to devote full attention to the tasks at hand. The effects were cumulative over time; the impact was greater as the demonstration progressed.

Equipment Integration Issues

Integration of the equipment caused more problems than did any parts in isolation; it magnified problems and masked positive aspects. This was partially due to the physical discomfort generated by prototype equipment and fit and partially due to the constraints forced on soldier behaviors by the equipment.

For example, the SIPE helmet was very comfortable and very much accepted; the visor was so uncomfortable that it made the soldiers want to take off their helmets. The visor also caused them to reject all helmet mounted displays. They liked the idea of POS NAV, and of the digital compass, but were not willing to have to look into the visor to access them.

The radio communication capability was superb; however this meant that the soldiers had to keep their helmets on, and lose conventional hearing capability because of the disliked ambient hearing enhancement. The choice was to use the communications at the cost of aural awareness to local sounds. The empty LBC pack was fine; filled, the weight at the waist caused such pain that they could not tolerate it. The XM44 mask was extremely well liked - except when worn under the helmet/visor combination. The LRH was potentially a good idea but because of the poor interface with the MCC and thermal sight, was immediately rejected. The thermal sight/M16A2 combination was deemed excellent, but soldiers in SIPE NBC protective gear and helmet had difficulty in clearing weapon malfunctions.

Testing Issues

The SIPE soldiers expressed concerns about the demonstration process. Some were undoubtedly based on their lack of testing experience; some were due to communication problems. Their reported primary focus was on a perception of disorganization, with ever changing schedules and standards. They could not discern the presence of a consistent chain of command.

The soldiers also noted that because of the way in which the SIPE equipment was distributed in the STXs, most of them were not able to try many of the capabilities of the equipment. They felt that it was a mistake to put so much special equipment on the leaders, leaving little for the remainder of the squad to use. As a result of this approach, the leaders began to be overwhelmed and were distracted from the mission itself. A squad or team leader looking at his computer screen to fill in a report was simultaneously unable to use his thermal sight for scanning. Because of equipment assignments the leaders were forced to make leader task trade offs which would not normally have to be prioritized.

The soldiers also noted underutilization of some potential SIPE capabilities. A primary example of this was the soldier computer. Only the maps/POS NAV and a few reports were used; other reports which were less time sensitive and such items as stored references remained largely unexplored during the demonstration. Similarly, although the indirect viewing capability of the SIPE system is potentially extremely valuable, the demonstration did not cause them to utilize it tactically. Some of this was due to time constraints, some due to the structure of the STX and TEXCOM plans.

The test soldiers knew that they were inadequately practiced on SIPE equipment, and since they did not enter the demonstration as an intact squad, had not previously trained together on collective tasks with standard gear or SIPE gear. The demonstration moved too fast for their collective experience level to meet standards; it was a case of too much too soon.

Conclusions

The SIPE field demonstration was very useful with many lessons learned, and its successful conclusion required almost herculean efforts from a large number of very dedicated personnel. This field test was the first Advanced Technology Demonstration to test the soldier as a system, integrating all of his equipment at one time; it was a very ambitious project and considerable data were accumulated. Problem areas were largely due to the sheer magnitude of the project, and shortfalls caused by difficulties in integration of limited quantities of prototype equipment.

In hindsight, test soldier and cadre training prior to the field demonstration should have been expanded to allow more time for both individual and collective training and practice on the SIPE equipment. The soldiers would then have been able to explore the enhanced capabilities component by component before integrating the SIPE equipment in tactical missions. As the field demonstration was structured, both the test soldiers and the cadre had time to <u>familiarize with</u> the equipment but not to become comfortable and <u>innovative</u> with it. Testing should have been in smaller segments, following the more traditional crawl-walk-run sequence.

Problems which surfaced and often interfered with the capabilities demonstration were in many cases due to the pressure to integrate. The equipment was in large part not really ready for a fully integrated demonstration. Capabilities which were known were not often shown; much of the SIPE equipment deserves another look. With minor changes, the thermal sight, the ballistic protective vest, the soldier to soldier communications and the SIPE protective mask were acceptable, and their capabilities acknowledged. The individual soldier computer, the helmet mounted display, the long range hearing, and the microclimate conditioning system need more soldier time. They and other parts of the SIPE system have more potential than was apparent in the ATD field demonstration.

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ACRONYMS AND ABBREVIATIONS

ACE	Ammunition Casualty and Equipment
ACS	Advanced Clothing Subsystem
ACU	Advanced Combat Uniform
ACV	Active Cooling Vest
ARI	Army Research Institute
ARTEP	Army Test and Evaluation Program
ASG	Advanced Shell Garment
ATD	Advanced Technology Demonstration
BDU	Battle Dress Uniform
BPV	Ballistic Protective Vest
BSC	Ballistic Shell Component
C^2	Command and Control
CECOM	Communications and Electronics Command
CVU	Chemical Vapor Undergarment
DOT	Directorate of Training
EOS	Electro Optic System
EUTE	Early User Test and Experimentation
GPS	Global Positioning System
HCU	Helmet Control Unit
HDL	Harry Diamond Laboratory
HLN	Hydration Liquid Nutrient
HMD	Helmet Mounted Display
HRED	Human Research and Engineering Directorate
I^2	Image Intensification
IHS	Integrated Headgear Subsystem
LBC	Load Bearing Component
LRH	Long Range Hearing
MCC	Microclimate Conditioning Subsystem
MOPP	Mission Oriented Protection Posture
MTC	Movement to Contact
MTP	Mission Training Plan
NBC	Nuclear, Biological and Chemical
NRDEC	Natick Research Development and Engineering Center
POI	Program of Instruction
OC	Observer Controller
OPFOR	Opposing Force
POSNAV	Position Navigation
PT	Physical Training
RTB	Ranger Training Brigade
RPD	Respiratory Protective Device
SIPE	Soldier Integrated Protective Ensemble
SOR	Squad Operating Rules
STX	Situational Training Exercise
TAS	Technical Advisory Service
TEISS	The Enhanced Integrated Soldier System
TEXCOM	Test and Experimentation Command
USAIS	U. S. Army Infantry School

APPENDIX A

DEMOGRAPHIC INFORMATION

1. SSN (last 4):   NAME:

2. Rank: **PFC-SSG**
   Time in Grade: **various** Time in Service: **various**
   PMOS: **11B**   SMOS: **N/A**   ASI: **N/A**

3. Present Duty Position: **OPFOR Platoon (9) RGR Instructor (1)**
   How long? **various**

4. Describe your Army experience - Check ( ) ALL that apply.

   3 TM LDR   **3** SQD LDR   **0** PSG   **0** 1SG   **2** M60GNR
   0 S1 Shop   **0** S2 Shop   **1** S3 Shop **0** S4 Shop **7** RTO

   Specialty Platoon **OPFOR (9), mortar (1), antitank (2)**

   2 NTC Rotation (year, unit, duty position)
   2 JRTC Rotation (year, unit, duty position)

5. Describe military schools/courses attended - Check ( ) ALL
   that apply.

   3 Ranger **10** Airborne **4** Combat Life Saver **0** Light Leader
   3 PLDC   **1** BNCOC   **0** ANCOC

   Other: **Air Assault (2), Sniper, JOTC (2), Stinger, Mountain
           Warfare, Pathfinder**

6. How often do you train at night?   (Approximate # of
   nights/week) **0-5**

   How often do you train in MOPP gear?   (Approximate #
   times/month) **zero**

7. Which of the following devices have you used <u>on a regular
   basis</u>? Check   ( ) ALL that apply.

   7   AN/PVS-4 (night sight, individual weapon)
   3   AN/TVS-5 (night sight, crew served weapon)
   7   AN/PVS-5 (night vision goggles, 2 tubes)
   6   AN/PVS-7 (night vision goggles, 1 tube)
   1   GPS (or other position location device)
   2   M21/M24 (sniper scope)
   3   Thermal sight/viewer (specify which) **dragon**
   0   AN/PAQ4 (aiming light)
   1   Other aiming light (specify which) **Litton**

A-1

8. Do you use a personal computer on a regular basis?
   Yes **4** No **6**

   IF YES, how do you use it? Check ( ) ALL that apply.
   1 Job-related   **2** Letters   **3** Video Games
   2 Record Keeping   **1** Other (describe): **school**

9. Do you play video games in your spare time?
   3 No   **7** Yes, sometimes   **0** Yes, a lot

10. During your most recent M16 qualification, how did you qualify?

    1 Marksman   **3** Sharpshooter   **3** Expert
    What is your M16 battlesight zero? **unknown**
    On what other weapon(s) have you qualified? **M203 (5) SAW (5)**
    M60 (5)   50 Cal (2) Mark 19 (1) 9mm (2)

11. As best you can remember, what was your score on your last PT test? Range **214-290**, mean **252**

12. Describe yourself - Circle ONE per question.

    Are you: right handed **(6)** left handed **(4)** both **(0)**
    Shooting, are you: right eyed **(7)**   left eyed **(3)**
                       don't know **(0)**
    Do you wear: glasses **(0)** contact lenses **(0)**
                      both **(2)** neither **(8)**

A-2

APPENDIX B

DAILY TRAINING OVERVIEW

The calendar of instruction was as presented in overview below. Typical lesson format during the first few days consisted of a lecture with little practical experience. The clothing and equipment were demonstrated or modeled by technical support personnel. Each period of instruction was followed by a brief written questionnaire covering the training which had occurred during the preceding block of time.

Day 1. The morning began with an overview and administrative announcements. The first class showed the Microclimate Conditioning System (MCC). It covered the purpose of a cooling unit and a description and statement of function of the component parts. A technical support person wore the MCC and a demonstration of the system was given.

Next was the Advanced Clothing System (ACS), accompanied by a set of flip charts. One by one pieces of equipment were demonstrated, showing how they worked, fit with each other, and an explanation of how they would help the soldier. Included were the Coolmax T-shirt, the Active Cooling Vest (ACV), the Combat Vapor Undergarment (CVU), the Advanced Shell Garment (ASG), the Ballistic Protective Vest (BPV) body armor, the Load Bearing Component (LBC), and the hand and footwear. Equipment was modeled by a technical support assistant. For further information the soldiers were referred to the SIPE Operations and Maintenance (O&M) Manual.

The class on the Integrated Headgear System (IHS) was introduced by a videotape presentation showing thermal sight firing. The video was followed by a demonstration of the SIPE headgear, to include the Ballistic Shell Component (BSC), the Electro-Optics Subcomponent (EOS) visor, battery packs, and the Communications Subcomponent (COMMS).

The next block of instruction demonstrated the use of the XM44 Respiratory Protective Device (RPD) Mask and Hood, the Voicemitter, the XM44 in-line blower, and the Hydration Liquid Nutrient (HLN) Device.

The final block of instruction on the first day consisted of a briefing on the Thermal Weapon Sight (TWS) (primarily technical information, little on practical application or employment) followed by instruction on the AIM 1 aiming device which was to be used with the image intensification (I^2) sight. The final section covered the weapon sling. Some evening hours were spent on simulation of darkness in the classroom, to provide initial exposure to the thermal sight and the I^2 system.

Primary soldier concerns focused on time management (poor pacing of the training - too slow; delays in starting)and the test soldiers' perceptions that the instructors were unduly defensive about answering questions on the equipment. The soldiers were uncertain about the purpose of the study and the potential for tactical employment of SIPE equipment. The inability to provide enough sets of equipment also caused a problem, as there was insufficient activity to keep everyone busy. The day was very long, and despite the fact that the material was not difficult, there was a lot of it.

Day 2. To remedy some of the problems from the prior day, the second day of training started with an overview of the SIPE program. The SIPE Program Manager detailed the SIPE history and chronology and explained the roles of the associated personnel.

The remainder of the morning was devoted to instruction on the soldier computer and its peripheral equipment. The first section covered the video capture camera-digital compass module (CCM) with practice in taking pictures. Soldiers were divided into small groups with USAIS cadre assistants to the primary civilian instructor. Frequently the cadre got ahead of the primary instructor and attempts to keep everyone moving at the same pace were not successful.

The afternoon had further instruction on the computer, and introduction to the mapping feature. After the test soldiers had some practice time (with the same problems as before), they received instruction on preformatted messages and reports, and the use of the computer menu.

Day 3. The next day, and all those to follow, was spent out of doors, initially at Martin Range. The day was planned so that at any one time, four soldiers would use the Long Range Hearing (LRH) device, four would practice land navigation/computer skills, and two fire. The schedule could not be adhered to precisely, due to targeting problems, and difficulties with the computers and the LRH.

The day started with a brief overview of the LRH, followed by practice on the two devices available and the computers. A safety briefing was followed by demonstration of firing with the thermal weapon sight. One of the cadre demonstrated firing positions as the primary instructor gave pointers. Included were firing from the prone position, and, using the indirect viewing capability of SIPE, from a concealed position (in this case, from behind a wall). At this time the soldiers rotated from one station to another. Each soldier received practice in firing,

and the.ı immediately after practice, was tested for
qualification. The primary focus was on qualification; indirect
view firing was very limited.

Day 4. The next day's instruction covered protective equipment,
and a timed test on donning the XM44 protective mask. Donning
the mask caused some difficulty as the hood fits very snug; the
time standards were difficult to achieve. The remainder of the
time was devoted to firing masked, firing from concealed
positions, and quick fire, both day and night.

Day 5. Morning training covered use of the position navigation
(POS NAV) global positioning system (GPS). Soldiers moved to
find points in the wooded area adjacent to the firing range; GPS
satellite unavailability precluded much useful training.
Afternoon training was moved to Griswold Range for day and night
target detection and LRH practice in anticipation of the initial
TEXCOM target detection event.

Day 6. After a baseline paper and pencil land navigation test
using map and compass, soldiers were given additional computer
training. Led by an instructor, they also practiced land
navigation in groups of four, finding points away from and back
to the range area. The navigation exercise was repeated day and
night.

Day 7. Morning hours provided the first, and very limited, use
of the MCC), and the soldiers donned their complete SIPE
uniforms. In the afternoon, long range firing training and
practice was conducted on Malone 5 Range.

Day 8. The final training day was devoted to review and a land
navigation exercise similar to that given on Day 6.

APPENDIX C

SAMPLE TRAINING QUESTIONNAIRE

(Test soldiers checked the appropriate boxes or wrote in their answers; the boxes have been deleted and page spacing has been changed here for ease of presentation.)

1. Rate the following aspects of this training.

Very Good	Good	Neutral	Poor	Very Poor	Not Applicable

   a. Amount of instruction time
   b. Amount of hands-on practice time
   c. Practical exercises
   d. Visual aids
   e. Training devices
   f. Training materials
   g. Equipment availability (# of sets)
   h. Student-instructor ratio
   i. Amount of training each day
   j. Pacing of the training
   k. Sequencing of the training

2. Did the following items impact in a negative manner on your ability to train on this equipment?

A Lot	Some	Neutral	A Little	None	Not Applicable

   a. Complexity of the equipment
   b. Difficulty of the task
   c. Newness of the capability
   d. Overall awkwardness of the equipment
   e. Weight of equipment
   f. Equipment controls
   g. Integrating it with other equipment
   h. Weather conditions
   i. Time of day
   j. Fatigue
   k. Equipment breakage
   l. Battery failure
   m. Instructor

3. How confident do you feel in your ability to use this equipment right now?

Very Confident	Confident	Neutral	Unsure	Very Unsure

Explain your rating.

4.   What kinds of mistakes or errors did you make while you were learning to use this equipment?

5.   What was the hardest part about learning to use it?

6.   Did you ever get mixed up or feel like there was too much to remember?   Yes ___   No ___   Explain.

7.   How will this equipment help you perform individual and collective tasks?

8.   Did this block of training prepare you to use this equipment with the rest of your SIPE equipment?   Yes ___   No ___   Explain.

9.   How would you change this training to make it better?

10.   Was there enough time today to do everything you wanted/needed to do?   Yes ___   No ___   Explain.

11.   Do you have any additional comments on training with this equipment?

APPENDIX D

TRAINING QUESTIONNAIRES

Included in Appendix D are the responses to the questionnaires administered after familiarization training on each of the pieces of SIPE equipment. Preceding the responses are tables giving summary data; full responses are presented by system, including the date of administration of the instrument.

Within the questionnaires and tables, the following legends apply as appropriate throughout:

5 = Very Good (VG)   2 = Poor (P)
4 = Good (G)   1 = Very Poor (VP)
3 = Neutral (N)   0 = Not Applicable (NA)

5 = None (No)   2 = Some (So)
4 = A Little (Li)   1 = A Lot (Lo)
3 = Neutral (N)   0 = Not Applicable (NA)

5 = Very Confident (VC) 2 = Unsure (U)
4 = Confident (C)   1 = Very Unsure (VU)
3 = Neutral (N)

The numbers of respondents ranged from 1-13, depending on the phase of training, and the numbers of personnel who answered or failed to answer some questions. Where mean values are shown, the response Not Applicable was not included in the tally.

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Table D-1

Mean Responses to Training Questionnaires

	MCC	ACS	IHS	TWS	COMP UTER	POS NAV	FIR ING	LRH	NBC	ALL TNG
TIME	4.00	4.31	4.31	4.08	4.31	4.18	4.00	4.00	4.18	3.90
HANDS ON	2.00	3.85	4.46	3.85	4.39	4.18	3.83	4.25	4.18	3.80
EXER CISES	3.50	3.75	4.30	3.55	4.31	3.75	3.82	3.64	4.27	3.50
VISUAL AIDS	4.23	4.31	4.31	4.0	4.33	4.70	3.92	4.18	4.46	4.10
DEVICE	3.88	4.00	4.69	4.15	4.46	4.42	4.09	4.33	4.55	3.80
MATER IALS	4.00	4.30	4.54	4.23	4.39	4.42	3.92	4.25	4.46	4.00
# OF SETS	3.50	4.33	3.39	3.69	3.62	3.83	3.50	3.73	4.09	2.90
S/I RATIO	4.08	4.17	4.00	4.00	4.23	4.33	4.08	4.33	3.82	4.20
AMOUNT TNG	2.67	4.22	3.75	3.56	3.91	3.70	3.46	3.56	4.33	4.00
PACING	3.60	3.58	3.83	3.77	3.58	3.73	3.73	4.18	4.40	3.80
SEQUEN CE	3.90	3.83	4.36	4.08	4.18	3.91	3.82	4.20	4.46	4.00

Note. Numbers of respondents ranged from 1-13. The response Not Applicable was not included in tally.

Table D-2

Mean Responses to Training Questionnaires, Continued

	MCC	ACS	IHS	TWS	COMP UTER	POS NAV	FIR ING	LRH	NBC	ALL TNG
COMPLE XITY	3.86	4.67	3.92	4.08	4.00	4.58	4.33	4.91	4.18	4.48
DIFFI CULTY	4.29	4.83	4.46	4.54	4.39	4.69	4.36	5.00	4.27	4.90
NEW NESS	3.29	4.15	4.18	3.33	3.85	4.70	4.40	4.58	4.60	4.50
AWKW'D NESS	2.83	4.46	3.83	3.82	4.55	4.40	2.92	4.36	3.73	3.30
WEIGHT	3.60	4.69	3.64	3.83	4.88	4.75	3.42	4.92	4.91	3.80
CON TROLS	3.83	4.67	4.17	4.23	4.58	4.58	4.70	4.82	4.91	3.90
INTE GRATE	3.60	3.78	3.91	4.09	4.40	4.30	4.36	4.73	4.86	4.47
WEA THER	1.50	4.75	4.50	4.33	4.33	4.50	4.56	4.38	4.63	5.00
TIME	1.00	4.80	5.00	4.33	4.50	4.33	5.00	5.00	5.00	5.00
FATI GUE	5.00	4.89	5.00	5.00	4.00	4.33	3.91	5.00	5.00	3.88
BREAK AGE	0.00	4.10	4.67	4.75	4.60	4.17	4.00	4.71	5.00	3.33
BATT ERY	2.00	4.75	5.00	4.75	4.50	4.60	3.70	4.71	5.00	3.67
INSTR UCTOR	3.80	3.75	4.60	3.91	4.44	4.78	5.00	4.33	4.91	4.22

<u>Note</u>. Numbers of respondents ranged from 1-13. The response Not Applicable was not included in tally.

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MICROCLIMATE CONDITIONING (MCC) - 9/30/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	3	8	1	1	0	0
	Mean = 4.00 N = 13	too	much				
b.	Amount of hands-on practice time	0	0	1	0	1	10
	Mean = 2.00 N = 2						
c.	Practical exercises	0	1	1	0	0	10
	Mean = 3.50 N = 2						
d.	Visual aids	5	6	2	0	0	0
	Mean = 4.23 N = 13						
e.	Training devices	1	5	2	0	0	5
	Mean = 3.88 N = 8						
f.	Training materials	1	5	1	0	0	5
	Mean = 4.00 N = 7						
g.	Equipment availability (# of sets)	1	0	3	0	0	9
	Mean = 3.50 N = 4						
h.	Student-instructor ratio	3	8	2	0	0	0
	Mean = 4.08 N = 13						
i.	Amount of training each day	1	1	3	7	0	0
	Mean = 2.67 N = 12	too	much				
j.	Pacing of the training	3	4	1	0	2	3
	Mean = 3.60 N = 10						
k.	Sequencing of the training	2	6	1	1	0	3
	Mean = 3.90 N = 10						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	1	2	1	3	6
	Mean = 3.86 N = 7						
b.	Difficulty of the task	0	0	2	1	4	6
	Mean = 4.29 N = 7						
c.	Newness of the capability	3	0	0	0	4	5
	Mean = 3.29 N = 7						
d.	Overall awkwardness of equipment	2	1	0	2	1	7
	Mean = 2.83 N = 6						
e.	Weight of equipment	1	0	0	2	0	10
	Mean = 3.60 N = 5						
f.	Equipment controls	1	0	1	1	3	6
	Mean = 3.83 N = 6	off	switch	should	be		
		enclosed					
g.	Integrating with other equipment	1	0	1	1	2	7
	Mean = 3.60 N = 5	not	tactically	sound	for		
		night	opns;	rations/commo/			
		clothing	=	weight			

		Lo	S	N	Li	No	NA
h.	Weather conditions	1	1	0	0	0	11
	Mean = 1.50 N = 2						
i.	Time of day	1	0	0	0	0	12
	Mean = 1.00 N = 1						
j.	Fatigue	0	0	0	0	2	10
	Mean = 5.00 N = 2						
k.	Equipment breakage	0	0	0	0	0	12
	Mean = 0 N = 0						
l.	Battery failure	1	0	1	0	0	11
	Mean = 2.00 N = 2						
m.	Instructor	1	0	1	0	3	7
	Mean = 3.80 N = 5						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
4	6	1	0	0

Mean = 4.27 N = 11

Explain your rating.

No hands on; firm grasp but not know till try; class was concise; understood it; simple - a 3 year old could do it; only 1 switch.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Loud; bulky; fatigue.

5. What was the hardest part about learning to use it?

Listening; everything was easy.

6. Did you ever get mixed up or feel like there was too much to remember?   Yes 0   No 12   Explain.

Easy task, thorough class; simple easy concept; never confused; easy to understand.

7. How will this equipment help you perform individual and collective tasks?   [No responses.]

MICROCLIMATE CONDITIONING (MCC) - 9/30/92   (continued)

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 0   No 2   Explain.

     Taught as an individual item.

9. How would you change this training to make it better? [No responses.]

10. Was there enough time today to do everything you wanted/needed to do? Yes 3   No 0   Explain.

11. Do you have any additional comments on training with this equipment?

     Needed hands on; it should be simple; class was a bit redundant; we're not stupid; decent concept but little applicability; can't wait to use it.

ADVANCED CLOTHING SYSTEM (ACS) - 9/30/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	5	7	1	0	0	0
	Mean = 4.31 N = 13						
b.	Amount of hands-on practice time	2	8	2	1	0	0
	Mean = 3.85 N = 13	should have put on all gear					
c.	Practical exercises	1	4	3	0	0	5
	Mean = 3.75 N = 8						
d.	Visual aids	4	9	0	0	0	0
	Mean = 4.31 N = 13						
e.	Training devices	1	8	1	0	0	3
	Mean = 4.00 N = 10						
f.	Training materials	3	7	0	0	0	3
	Mean = 4.30 N = 10						
g.	Equipment availability (# of sets)	6	4	2	0	0	0
	Mean = 4.33 N = 12						
h.	Student-instructor ratio	2	10	0	0	0	1
	Mean = 4.17 N = 12						
i.	Amount of training each day	2	7	0	0	0	3
	Mean = 4.22 N = 9	too much					
j.	Pacing of the training	1	7	3	0	1	0
	Mean = 3.58 N = 12	slow					
k.	Sequencing of the training	3	7	0	1	1	1
	Mean = 3.83 N = 12	tng schedule should have been in sequence start w ACS then MCC then vest					

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	1	0	1	10	1
	Mean = 4.67 N = 12						
b.	Difficulty of the task	0	0	1	0	11	0
	Mean = 4.83 N = 12						
c.	Newness of the capability	2	0	0	3	8	0
	Mean = 4.15 N = 13						
d.	Overall awkwardness of equipment	1	0	0	3	9	0
	Mean = 4.46 N = 13						
e.	Weight of equipment	0	1	0	1	11	0
	Mean = 4.69 N = 13						
f.	Equipment controls	0	0	1	1	7	4
	Mean = 4.67 N = 9						
g.	Integrating with other equipment	2	0	1	1	5	4
	Mean = 3.78 N = 9						

		Lo	S	N	Li	No	NA
h.	Weather conditions	0	0	0	1	3	9
	Mean = 4.75 N = 4						
i.	Time of day	0	0	0	1	4	7
	Mean = 4.80 N = 5						
j.	Fatigue	0	0	0	1	8	4
	Mean = 4.89 N = 9						
k.	Equipment breakage	0	2	0	3	5	4
	Mean = 4.10 N = 10						
l.	Battery failure	0	0	0	1	3	9
	Mean = 4.75 N = 4						
m.	Instructor	1	2	0	0	5	4
	Mean = 3.75 N = 8						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
6	5	1	0	0

Mean = 4.42 N = 12

Explain your rating:

Feels comfortable and not too heavy; most equipment is comparable to now and vest is well explained; a little awkward; similar to existing; simple, not very complex; common sense; not enough experience on it.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Putting rings on boots first; tactical enhancement compared to regular.

5. What was the hardest part about learning to use it?

Listening; adjusting the vest.

6. Did you ever get mixed up or feel like there was too much to remember? Yes **1** No **12** Explain.

Very easy; seems simple; new concept with protection levels but no real problems.

7. How will this equipment help you perform individual and collective tasks?

Comfort; mobility; won't enhance but should protect.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 3   No 0   Explain.

9. How would you change this training to make it better?

Faster pace; stop being so redundant and teach it.

10. Was there enough time today to do everything you wanted/needed to do? Yes 4 No 0   Explain.

Given enough time to change.

11. Do you have any additional comments on training with this equipment?

Like the mobility I had in the equipment; they are sugar coating it; open mindedness of the instructor was limited; why is equipment test in winter? How hard would it be to get 13 with combat experience; class was better this time, not treated like we were dumb; good so far; enjoy it so far; want to use it.

INTEGRATED HEADGEAR SYSTEM (IHS) - 9/30/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	5	7	1	0	0	0
	Mean = 4.31 N = 13						
b.	Amount of hands-on practice time	7	5	1	0	0	0
	Mean = 4.46 N = 13						
c.	Practical exercises	3	7	0	0	0	3
	Mean = 4.30 N = 10						
d.	Visual aids	5	7	1	0	0	0
	Mean = 4.31 N = 13						
e.	Training devices	9	4	0	0	0	0
	Mean = 4.69 N = 13						
f.	Training materials	7	6	0	0	0	0
	Mean = 4.54 N = 13						
g.	Equipment availability (# of sets)	1	5	5	2	0	0
	Mean = 3.39 N = 13						
h.	Student-instructor ratio	1	11	1	0	0	0
	Mean = 4.00 N = 13						
i.	Amount of training each day	1	4	3	0	0	5
	Mean = 3.75 N = 8						
j.	Pacing of the training	3	6	2	0	1	1
	Mean = 3.83 N = 3	too slow					
k.	Sequencing of the training	5	5	1	0	0	2
	Mean = 4.36 N = 11						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	1	1	2	2	6	1
	Mean = 3.92 N = 12						
b.	Difficulty of the task	0	0	2	2	7	2
	Mean = 4.46 N = 11						
c.	Newness of the capability	1	1	1	0	8	1
	Mean = 4.18 N = 11						
d.	Overall awkwardness of equipment	0	2	1	6	3	1
	Mean = 3.83 N = 12						
e.	Weight of equipment	1	2	2	1	5	2
	Mean = 3.64 N = 11						
f.	Equipment controls	0	2	1	2	7	1
	Mean = 4.17 N = 12						
g.	Integrating with other equipment	1	1	1	3	5	2
	Mean = 3.91 N = 11						
h.	Weather conditions	0	0	1	0	3	9
	Mean = 4.50 N = 4						

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	0	0	2	11
	Mean = 5.00 N = 2						
j.	Fatigue	0	0	0	0	5	8
	Mean = 5.00 N = 5						
k.	Equipment breakage	0	0	1	0	5	7
	Mean = 4.67 N = 6						
l.	Battery failure	0	0	0	0	5	8
	Mean = 5.00 N = 5						
m.	Instructor	1	0	0	0	9	2
	Mean = 4.60 N = 10						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
2	9	2	0	0

Mean = 4.00 N = 13

Explain your rating.

Not difficult to use; less on use for listening once and easy to have someone use with proficiency; well explained - have working knowledge with little experience, intro good but little hands on; like everything else you need training but it's simple; equipment easy to use and assemble; block of instruction makes me feel confident; good thorough instruction; instruction was better than average; need more hands on (2), excellent coverage.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment? [No responses.]

5. What was the hardest part about learning to use it?

Key pad; hooking up mask and blower.

6. Did you ever get mixed up or feel like there was too much to remember? Yes **2**   No **11** Explain.

Self-explanatory; step by step was given; all the connectors were labelled which would be harder to remember; it's given well enough so you don't get mixed up; more training time will take care of it.

INTEGRATED HEADGEAR SYSTEM (IHS) - 9/30/92 (continued)

7. How will this equipment help you perform individual and collective tasks?

Keep commo between men; keep away from chemicals; commo is a problem when you make contact - this sounds like it will eliminate the problem; better commo; overall enhancement.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 2 No 1 Explain.

9. How would you change this training to make it better?

All gear for everyone.

10. Was there enough time today to do everything you wanted/needed to do? Yes 2 No 1 Explain.

11. Do you have any additional comments on training with this equipment?

Will take a lot of practice to master tasks; speed classes up and don't be redundant; looking forward to having more time on it; without a blower it's too bulky and hot; much more interesting - keeps the attention better; more sets so all can have hands on at once; I like the new squad commo.

THERMAL SIGHT, AIM 1, SLING - 9/30/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	2	9	1	1	0	0
	Mean = 4.08 N = 13 too long						
b.	Amount of hands-on practice time	1	9	3	0	0	0
	Mean = 3.85 N = 13						
c.	Practical exercises	0	7	3	1	0	2
	Mean = 3.55 N = 11						
d.	Visual aids	2	9	2	0	0	0
	Mean = 4.00 N = 13						
e.	Training devices	3	9	1	0	0	0
	Mean = 4.15 N = 13						
f.	Training materials	4	8	1	0	0	0
	Mean = 4.23 N = 13						
g.	Equipment availability (# of sets)	2	7	2	2	0	0
	Mean = 3.69 N = 13						
h.	Student-instructor ratio	2	9	2	0	0	0
	Mean = 4.00 N = 13 good for IR sights [?]						
i.	Amount of training each day	1	3	5	0	0	4
	Mean = 3.56 N = 9						
j.	Pacing of the training	2	8	1	2	0	0
	Mean = 3.77 N = 13 too slow (2)						
k.	Sequencing of the training	2	10	1	0	0	0
	Mean = 4.08 N = 13						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	3	1	1	8	0
	Mean = 4.08 N = 13						
b.	Difficulty of the task	0	1	1	1	10	0
	Mean = 4.54 N = 13						
c.	Newness of the capability	1	3	3	1	4	1
	Mean = 3.33 N = 12						
d.	Overall awkwardness of equipment	0	1	4	2	4	2
	Mean = 3.82 N = 11						
e.	Weight of equipment	1	1	3	1	6	1
	Mean = 3.83 N = 12						
f.	Equipment controls	0	1	2	3	7	0
	Mean = 4.23 N = 13 thermal controls						
g.	Integrating with other equipment	0	2	0	4	5	2
	Mean = 4.09 N = 11						
h.	Weather conditions	0	0	1	0	2	10
	Mean = 4.33 N = 3						

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	1	0	2	10
	Mean = 4.33 N = 3						
j.	Fatigue	0	0	0	0	3	10
	Mean = 5.00 N = 3						
k.	Equipment breakage	0	0	0	1	3	9
	Mean = 4.75 N = 4						
l.	Battery failure	0	0	0	1	3	9
	Mean = 4.75 N = 4						
m.	Instructor	1	2	1	0	7	2
	Mean = 3.91 N = 11						

thermal guy was a weak
speaker - had to be asked
to speak up - often

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
5	6	2	0	0

Mean = 4.23 N = 13

Explain your rating.

    Good block; technical; well explained; easy to use (2); simple (3); used AIM1 before; good class; need more hands on; even if I didn't know I could figure it out.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment? [No responses.]

5. What was the hardest part about learning to use it?

    Attach the sling.

6. Did you ever get mixed up or feel like there was too much to remember? Yes 0   No 11   Explain.

    Well taught: it was simple: pace was easy to digest.

7. How will this equipment help you perform individual and collective tasks?

    Enhance capability; get higher body count in warfare.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 1 No 0

THERMAL SIGHT, AIM 1, SLING - 9/30/92 (continued)

9.   How would you change this training to make it better?   [No responses.]

10.   Was there enough time today to do everything you wanted/needed to do?   Yes 3   No 0   Explain.

11.   Do you have any additional comments on training with this equipment?

     Don't like being treated like a child; thermal was too in depth on technical data; class well taught till got to sling, then stupid.

COMPUTER AND SOFTWARE - 10/1/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	4	9	0	0	0	0
	Mean = 4.31 N = 13						
b.	Amount of hands-on practice time	6	6	1	0	0	0
	Mean = 4.39 N = 13						
c.	Practical exercises	5	7	1	0	0	0
	Mean = 4.31 N = 13						
d.	Visual aids	5	6	1	0	0	1
	Mean = 4.33 N = 12						
e.	Training devices	7	5	1	0	0	0
	Mean = 4.46 N = 13						
f.	Training materials	6	6	1	0	0	0
	Mean = 4.39 N = 13						
g.	Equipment availability (# of sets)	2	8	1	2	0	0
	Mean = 3.62 N = 13 not enough cameras						
h.	Student-instructor ratio	4	8	1	0	0	0
	Mean = 4.23 N = 13						
i.	Amount of training each day	0	10	1	0	0	2
	Mean = 3.91 N = 11						
j.	Pacing of the training	0	9	2	0	1	0
	Mean = 3.58 N = 12 too slow (3); redundant						
k.	Sequencing of the training	2	9	0	0	0	1
	Mean = 4.18 N = 11						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	1	1	3	0	8	0
	Mean = 4.00 N = 13						
b.	Difficulty of the task	0	0	0	3	9	0
	Mean = 4.39 N = 13						
c.	Newness of the capability	1	2	2	1	7	0
	Mean = 3.85 N = 13						
d.	Overall awkwardness of equipment	0	0	1	3	7	2
	Mean = 4.55 N = 11						
e.	Weight of equipment	0	0	0	1	7	5
	Mean = 4.88 N = 8						
f.	Equipment controls	0	1	1	0	10	1
	Mean = 4.58 N = 12						
g.	Integrating with other equipment	0	1	1	1	7	3
	Mean = 4.40 N = 10						
h.	Weather conditions	0	0	1	0	2	10
	Mean = 4.33 N = 3						

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	1	0	3	9
	Mean = 4.50 N = 4						
j.	Fatigue	0	0	1	0	1	11
	Mean = 4.00 N = 2						
k.	Equipment breakage	0	0	1	0	4	8
	Mean = 4.60 N = 5						
l.	Battery failure	0	0	1	0	3	9
	Mean = 4.50 N = 4						
m.	Instructor	0	1	1	0	7	4
	Mean = 4.44 N = 9						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
4	5	2	1	0

Mean = 3.92 N = 12

Explain your rating.

Instruction sufficient for 1-2 time users; simple to operate but many steps divided; need to play more with; system is friendly; menu easy; exercises easy; good coverage; more practice (2).

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Sequencing picture taking at first but easy after.

5. What was the hardest part about learning to use it?

Sequencing info.

6. Did you ever get mixed up or feel like there was too much to remember?   Yes 3   No 9   Explain.

Not that bad; many tasks for 4 buttons; takes time; after practice easy; more practice.

7. How will this equipment help you perform individual and collective tasks?

Total soldier enhancement; help with LN.

COMPUTER AND SOFTWARE - 10/1/92 (continued)

8. Did this block of training prepare you to use this equipment
with the rest of your SIPE equipment? Yes **1**   No **1**   Explain.

9. How would you change this training to make it better?

     Give leader ability to write orders and send to troops at
distance.

10. Was there enough time today to do everything you
wanted/needed to do? Yes **3**   No **0**   Explain.

11. Do you have any additional comments on training with this
equipment?

     Getting easier; learning first, good instruction; somewhat
repetitive; overall very comprehensive; more hands on; most
difficult so far but manageable; like the info it gives you; easy
once you get it; too long.

POSITION NAVIGATION (POS NAV) - GPS - 10/1/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time Mean = 4.18 N = 11	4	5	2	0	0	1
b.	Amount of hands-on practice time Mean = 4.18 N = 11	4	5	2	0	0	1
c.	Practical exercises Mean = 3.75 N = 12	2	5	5	0	0	0
d.	Visual aids Mean = 4.70 N = 10	8	1	1	0	0	1
e.	Training devices Mean = 4.42 N = 12	6	5	1	0	0	0
f.	Training materials Mean = 4.42 N = 12	6	5	1	0	0	0
g.	Equipment availability (# of sets) Mean = 3.83 N = 12	3	4	5	0	0	0
h.	Student-instructor ratio Mean = 4.33 N = 12	4	8	0	0	0	0
i.	Amount of training each day Mean = 3.70 N = 10	1	5	4	0	0	2
j.	Pacing of the training Mean = 3.73 N = 11	2	5	3	1	0	1
k.	Sequencing of the training Mean = 3.91 N = 11	2	6	3	0	0	1

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment Mean = 4.58 N = 12	0	1	0	2	9	0
b.	Difficulty of the task Mean = 4.69 N = 13	0	1	0	1	11	0
c.	Newness of the capability Mean = 4.70 N = 10	0	1	0	0	9	1
d.	Overall awkwardness of equipment Mean = 4.40 N = 10 until familiar with it	0	1	1	1	7	2
e.	Weight of equipment Mean = 4.75 N = 8	0	0	1	0	7	4
f.	Equipment controls Mean = 4.58 N = 12	0	1	1	0	10	0
g.	Integrating with other equipment Mean = 4.30 N = 10	0	0	3	1	6	2
h.	Weather conditions Mean = 4.50 N = 4	0	0	1	0	3	8

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	1	0	2	9
	Mean = 4.33 N = 3						
j.	Fatigue	0	0	1	0	2	9
	Mean = 4.33 N = 3						
k.	Equipment breakage	0	1	1	0	4	6
	Mean = 4.17 N = 6						
l.	Battery failure	0	0	1	0	4	7
	Mean = 4.60 N = 5						
m.	Instructor	0	0	1	0	8	3
	Mean = 4.78 N = 9						

3. How confident do you feel in your ability to use this
equipment right now?

VC	C	N	U	VU
5	2	4	1	0

Mean = 3.92 N = 12

Explain your rating.

     Very good; new fairly complicated; through more training
should be easy; easy to use but need more experience/play time
with it; learn it and get all it has to offer; never played with
a complete set before; start to get practical use; more
confident; computer similar to PC at home; equipment very user
friendly; need more hands on; like it ok.

4. What kinds of mistakes or errors did you make while you were
learning to use this equipment?

     None - explanations good.

5. What was the hardest part about learning to use it?

     Using different commands.

6. Did you ever get mixed up or feel like there was too much to
remember?   Yes **2**   No **10**   Explain.

     Until used to it, a little intimidating; takes time to get
used to it - control panel; easy to learn; need more training
time.

7. How will this equipment help you perform individual and collective tasks?

    Everything but eat and sleep - help throughout the process.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes **1** No **1** Explain.

9. How would you change this training to make it better?

    More time.

10. Was there enough time today to do everything you wanted/needed to do? Yes **2** No **0** Explain.

11. Do you have any additional comments on training with this equipment?

    No excuses for getting lost; easy to learn; going to take a while; first time on a computer; can't wait to be able to learn where the water is on the map; more individual hands on time to find image; like to play with it.

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	4	5	2	0	0	0
	Mean = 4.00 N = 12						
b.	Amount of hands-on practice time	3	5	3	1	0	0
	Mean = 3.83 N = 12						
c.	Practical exercises	3	4	3	1	0	0
	Mean = 3.82 N = 11						
d.	Visual aids	4	5	1	2	0	0
	Mean = 3.92 N = 12						
e.	Training devices	4	5	1	1	0	0
	Mean = 4.09 N = 11						
f.	Training materials	4	5	1	2	0	0
	Mean = 3.92 N = 12						
g.	Equipment availability (# of sets)	3	3	3	3	0	0
	Mean = 3.50 N = 12						

more than one at once; more
systems set up

		VG	G	N	P	VP	NA
h.	Student-instructor ratio	4	6	1	1	0	0
	Mean = 4.08 N = 12						
i.	Amount of training each day	2	3	4	2	0	1
	Mean = 3.46 N = 11						

too long- better schedule

		VG	G	N	P	VP	NA
j.	Pacing of the training	2	6	1	2	0	1
	Mean = 3.73 N = 11						
k.	Sequencing of the training	3	5	1	2	0	1
	Mean = 3.82 N = 11						

2. Did the following items impact in a negative manner on your
ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	1	1	3	7	0
	Mean = 4.33 N = 12						
b.	Difficulty of the task	1	0	0	3	7	1
	Mean = 4.36 N = 11						
c.	Newness of the capability	1	0	1	0	8	2
	Mean = 4.40 N = 10						
d.	Overall awkwardness of equipment	3	3	1	2	3	0
	Mean = 2.92 N = 12						
e.	Weight of equipment	2	2	1	3	4	0
	Mean = 3.42 N = 12						
f.	Equipment controls	1	1	2	2	6	0
	Mean = 4.70 N = 10						
g.	Integrating with other equipment	1	0	1	1	8	0
	Mean = 4.36 N = 11						
h.	Weather conditions	1	0	0	0	8	3
	Mean = 4.56 N = 9						

FIRING FOXHOLE AND PRONE - 10/2/92 (continued)

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	0	0	9	3
	Mean = 5.00 N = 9						
j.	Fatigue	1	1	1	3	5	2
	Mean = 3.91 N = 11						
k.	Equipment breakage	1	1	1	1	6	2
	Mean = 4.00 N = 10						
l.	Battery failure	2	1	1	0	6	2
	Mean = 3.70 N = 10						
m.	Instructor	0	0	0	0	12	0
	Mean = 5.00 N = 12						

3. How confident do you feel in your ability to use this equipment right now?

	VC	C	N	U	VU
	5	5	1	0	0

Mean = 4.09 N = 11

Explain your rating.

State of the art - a child could use it as long as it functions (iffy); not complex; easy to use; awkward; with more training score would go up; 37/40; it makes it easy; amount of training time good - easy to use.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Shot at same target more than once; trying to raise head for sight picture; unsteady hand on 4 shots; holding the weapon; didn't steady self in the foxhole for qualification.

5. What was the hardest part about learning to use it?

Helmet fitting and position body; forehead and neck fatigue and pain.

6. Did you ever get mixed up or feel like there was too much to remember?   Yes 0   No 10   Explain.

Not complex - same BRM skills.

7. How will this equipment help you perform individual and collective tasks?

Excellent; you can target through vegetation and limited visibility; easier to acquire target; help me kill the enemy; can see around things; increased accuracy.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 5 No 1 Explain.

Things worked into each other; learned how.

9. How would you change this training to make it better?

Better instruction with body position and breaking old position habits; add training on urban terrain; better time management.

10. Was there enough time today to do everything you wanted/needed to do? Yes 3 No 2 Explain.

Too slow; like to have shot around the wall.

11. Do you have any additional comments on training with this equipment?

Unsure about the purpose of this demo; day/night with visor - about the same; need more time to practice standard; helmet caused pain, fingers shake, circulation cutoff; helmet in prone - heavy; extremely heavy; helmet hit thermal controls; can't use SIPE stuff with any standard equipment; test with old; go on a 6-8 mile road march then fire with SIPE and standard; concentrate on safety; when firing prone hard to get shoulder to stock position; prone with head down saw reflection of personnel behind - had to adjust position of head on top of scope - fatigue head and shoulders and neck; range operations slow; technical problems with batteries; helmet uncomfortable, neck; better time management - too much BS during the day - can understand equipment break down.

LONG RANGE HEARING (LRH) DEVICE - 10/2/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time Mean = 4.00 N = 12	3	6	3	0	0	0
b.	Amount of hands-on practice time Mean = 4.25 N = 12	5	5	2	0	0	0
c.	Practical exercises Mean = 3.64 N = 11	3	2	5	1	0	1
d.	Visual aids Mean = 4.18 N = 11	4	5	2	0	0	0
e.	Training devices Mean = 4.33 N = 12	6	4	2	0	0	0
f.	Training materials Mean = 4.25 N = 12	5	5	2	0	0	0
g.	Equipment availability (# of sets) Mean = 3.73 N = 11	4	3	2	1	1	0
h.	Student-instructor ratio Mean = 4.33 N = 12	5	6	1	0	0	0
i.	Amount of training each day Mean = 3.56 N = 9 time management	1	5	1	2	0	3
j.	Pacing of the training Mean = 4.18 N = 11	4	6	0	1	0	1
k.	Sequencing of the training Mean = 4.20 N = 10	4	5	0	1	0	2

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment Mean = 4.91 N = 11	0	0	0	1	10	1
b.	Difficulty of the task Mean = 5.00 N = 11	0	0	0	0	11	1
c.	Newness of the capability Mean = 4.58 N = 12	1	0	0	1	10	1
d.	Overall awkwardness of equipment Mean = 4.36 N = 11	0	1	0	4	6	1
e.	Weight of equipment Mean = 4.92 N = 12	0	0	0	1	11	1
f.	Equipment controls Mean = 4.82 N = 11	0	0	0	2	9	1
g.	Integrating with other equipment Mean = 4.73 N = 11	0	0	1	1	9	1
h.	Weather conditions Mean = 4.38 N = 8 wind	1	0	0	1	6	4

D-25

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	0	0	6	6
	Mean = 5.00 N = 6						
j.	Fatigue	0	0	0	0	5	7
	Mean = 5.00 N = 5						
k.	Equipment breakage	0	0	1	0	6	5
	Mean = 4.71 N = 7						
l.	Battery failure	0	0	1	0	6	5
	Mean = 4.71 N = 7						
m.	Instructor	1	0	1	0	7	3
	Mean = 4.33 N = 9						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
6	4	1	0	0

Mean = 4.46 N = 11

Explain your rating.

Easy to use but not as effective as everyone bragged about; easy to use (3), but it's obvious you need silence to hear.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment? [No responses.]

5. What was the hardest part about learning to use it? [No responses.]

6. Did you ever get mixed up or feel like there was too much to remember? Yes 0   No 8   Explain.

Turn it on and go to work.

7. How will this equipment help you perform individual and collective tasks?

Unsure of distance - good for sensing.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 0   No 0   Explain. [No responses.]

LONG RANGE HEARING (LRH) DEVICE - 10/2/92 (continued)

9. How would you change this training to make it better?

     Should have soldier at known distance and see if you can
hear him.

10. Was there enough time today to do everything you
wanted/needed to do? Yes 1   No 0   Explain.

11. Do you have any additional comments on training with this
equipment?

     Like to use it at night and in rain; wind blowing in ear
plugs totally blocked the sound.

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	2	9	0	0	0	0
	Mean = 4.18 N = 11						
b.	Amount of hands-on practice time	3	7	1	0	0	0
	Mean = 4.18 N = 11						
c.	Practical exercises	4	6	1	0	0	0
	Mean = 4.27 N = 11						
d.	Visual aids	5	6	0	0	0	0
	Mean = 4.46 N = 11						
e.	Training devices	6	5	0	0	0	0
	Mean = 4.55 N = 11						
f.	Training materials	5	6	0	0	0	0
	Mean = 4.46 N = 11						
g.	Equipment availability (# of sets)	4	4	3	0	0	0
	Mean = 4.09 N = 11						
h.	Student-instructor ratio	5	4	2	0	0	0
	Mean = 3.82 N = 11						
i.	Amount of training each day	4	4	1	0	0	2
	Mean = 4.33 N = 9						
j.	Pacing of the training	4	6	0	0	0	0
	Mean = 4.40 N = 10						
k.	Sequencing of the training	5	6	0	0	0	0
	Mean = 4.46 N = 11						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	2	1	1	7	11
	Mean = 4.18 N = 11						
b.	Difficulty of the task	1	1	0	1	8	0
	Mean = 4.27 N = 11						
c.	Newness of the capability	0	0	1	2	7	0
	Mean = 4.60 N = 10						
d.	Overall awkwardness of equipment	1	2	0	4	4	0
	Mean = 3.73 N = 11						
e.	Weight of equipment	0	0	0	1	10	0
	Mean = 4.91 N = 11						
f.	Equipment controls	0	0	0	1	10	0
	Mean = 4.91 N = 11						
g.	Integrating with other equipment	0	0	0	1	6	3
	Mean = 4.86 N = 7						
h.	Weather conditions	0	1	0	0	7	3
	Mean = 4.63 N = 8	wind					

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	0	0	8	3
	Mean = 5.00 N = 8						
j.	Fatigue	0	0	0	0	9	2
	Mean = 5.00 N = 9						
k.	Equipment breakage	0	0	0	0	8	3
	Mean = 5.00 N = 8						
l.	Battery failure	0	0	0	0	8	3
	Mean = 5.00 N = 8						
m.	Instructor	0	0	0	1	10	0
	Mean = 4.91 N = 11						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
6	3	1	0	0

Mean = 4.50   N = 10

Explain your rating.

It's easy - once you know the tricks it's easy: similarities to old mask make it easy; similar to existing; need less of practice with mask; timing of pulling hood out is only difficult thing because of head size; takes practice to meet time limits.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Pulling hood; time.

5. What was the hardest part about learning to use it?

Getting the hood on - speed; time.

6. Did you ever get mixed up or feel like there was too much to remember?   Yes 0   No 9   Explain.

Old task different mask.

7. How will this equipment help you perform individual and collective tasks?

Better vision; keep me from croaking.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment?   Yes 2   No 0

9. How would you change this training to make it better?

    More sets of equipment.

10. Was there enough time today to do everything you wanted/needed to do? Yes 3   No 0   Explain.

11. Do you have any additional comments on training with this equipment?

    Should be a little added material on hood so can pull over head better; more sets; awkward to pull over hood; time may have to be changed - old standards from old mask; just more practice time; hood could be bigger so donning is easier; times are too short.

APPENDIX E

OPERATIONAL USE/TACTICAL INTEGRATION QUESTIONNAIRES

Included in Appendix E are the responses to the questionnaires that were administered during the training weeks, covering operational use and integration of the SIPE equipment. Questions that received no response are omitted or combined.

Within the questionnaires, the following legend applies throughout:

5 = Very Confident (VC)   2 = Unsure (U)
4 = Confident (C)   1 = Very Unsure (VU)
3 = Neutral (N)

The numbers of respondents ranged from 1 - 13, depending on the phase of training, and the numbers of personnel who answered or failed to answer some questions.

CONTENTS OF APPENDIX E

SMALL ARMS FIRING: THERMAL SIGHT AND PROTECTIVE MASK - 10/5/92

1. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION (I^2)/AIM-1** capability for target detection?

	VC	C	N	U	VU
	1	2	0	0	0

Mean = 4.33   N =   3

Explain your rating.

    User friendly.

2. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION (I^2)/AIM-1** capability for target engagement?

	VC	C	N	U	VU
	1	1	0	0	0

Mean = 4.50 N =   2

Explain your rating.

    Need practice standing and using.

3. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability for target detection?

	VC	C	N	U	VU
	5	5	0	2	0

Mean = 4.08 N = 12

Explain your rating.

    Adjusting contrast made me feel confident; should have had a FOV switch and use wide for acquisition and normal for engagement.

4. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability for target engagement?

	VC	C	N	U	VU
	5	3	3	1	0

Mean = 4.00 N = 12

Explain your rating.

    Trouble stabilizing; need practice; good sight easy to use.

SMALL ARMS FIRING: THERMAL SIGHT AND PROTECTIVE MASK - 10/5/92
(continued)

5.   How accurate are you with the I^2/AIM-1 combination at short range?   Explain. [No responses.]

6.   How accurate are you with the I^2/AIM-1 combination at long range?   Explain. [No responses.]

7.   How accurate are you with the **THERMAL SIGHT** at short range? Very **4**

8.   At long range? Very **4** Explain.

     Hooah at short; long iffy- need practice.

10.   Did the TWS work like you thought it would? Yes **8** No **2** What were your problems?

     Pressure of the helmet takes the concentration away; fits better with mask on takes away the pressure; eye pieces relieves pressure.

12.   Could you acquire/detect targets well with the TWS? Yes **9** No **2**

     Small FOV.

14.   Could you engage targets quickly with thermal? Yes **9** No **4** How does this compare with iron sights?

     Because sight picture already lined unlike iron; better than iron; have to get used to it first; no comparison for night firing; thermal better; can't do maintenance.

18.   Were there any times you couldn't use TWS?   Yes **2** No **6**

22.   Were there any firing positions which were more difficult than others with the SIPE equipment?   Yes **7**   No **4**   Explain.

     Behind the wall no support at all; saw reflection of background personnel behind.

24.   Did you have problems finding a comfortable firing position using the SIPE equipment?   Yes **8**   No **2**

E-3

SMALL ARMS FIRING: THERMAL SIGHT AND PROTECTIVE MASK - 10/5/92
(continued)

25. Did you have any problems with the field of view in I^2 0 or
THERMAL 4 Yes 5 No 1   Explain.

   One 50m target.

26. Did it bother you not to have a cheek weld? Yes 3 No 7

   Didn't use one anyway.

27. Did you have any problems holding the SIPE configured weapon
steady? Yes 7 No 5   Explain.

   Standing, moving.

28. Did you have any problems with the **THERMAL** switch? Yes 5
No 7   Explain.

   Pain in the...; in prone helmet kept hitting the controls.

31. Did you have any trouble deciding whether what you saw in
THERMAL was a target?   Yes 0 No 1   Explain.

32. What polarity (black hot 4) or (white hot 5) did you use
most often? Why?

   Can see better; block out anything w/o body heat; saw
targets more clearly; WH easier for me to scan.

33. Did you have any problems in range estimation with SIPE
sights?   Yes 2 No 7 Explain.

34. Did the SIPE weapon system cause you any problems in breath
control?   Yes 0   No 12

35. Did you ever feel that your SIPE weapon was not adequately
boresighted? Yes 4 No 6 or zeroed? Yes 6 No 4 Explain.

   Had to aim above or below target.

SMALL ARMS FIRING: THERMAL SIGHT AND PROTECTIVE MASK - 10/5/92
(continued)

38.   How did your **SIPE PROTECTIVE gear** impact on your ability to
engage targets?

        No impact at all; have to get used to the 6 lb K pot on your
head with the mask on; NBC sucks; have to get used to headgear;
SIPE better.

39.   Describe any quick fire experience.

        It was ugly - couldn't stabilize weapon; only got 12/20;
more practice; had to get used to balancing weapon.

43.   Over all, did the SIPE clothing and equipment enhance your
ability to complete the individual tasks associated with target
engagement?   Yes   3   No   0

TARGET DETECTION AT NIGHT - TEXCOM PRACTICE EVENT - 10/6/92

1. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION** (I^2)**/AIM-1** capability for target detection?

	VC	C	N	U	VU
	4	1	0	0	0

Mean = 4.80   N = 5

Explain your rating.

First time ever; PVS to limited extent; knew capabilities.

2. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT (TWS)** capability for target detection?

	VC	C	N	U	VU
	1	1	2	1	1

Mean = 3.00   N = 6

Explain your rating.

Need more time; equipment down; TWS not working properly; very easy to use; not very effective; unclear.

3. Did the I^2**/AIM-1** combination work like you thought it would? Yes **4** No **1**   What, if any, were your problems?

PVS4 - saw more than one aim dot.

4. Did the **TWS** work like you thought it would? Yes **1** No **3** What, if any, were your problems?

It was broken; worked good before but the system was a mess last night.

5. Could you acquire/detect targets well with the I^2**/AIM-1** combination? Yes **0** No **1** How does this compare with iron sights? Explain:

Could observe only to 150 meters.

6. Could you acquire/detect targets well with the **TWS**? Yes **2** No **2**   How does this compare with iron sights? Explain.

Detect OK; thermal night iron day; soldier needs to be proficient with iron sights; limited range.

E-6

TARGET DETECTION AT NIGHT - TEXCOM PRACTICE EVENT - 10/6/92
(continued)

7. Could you detect targets quickly using the **SIPE** I^2/**AIM-1**
combination? Yes **1** No **1**   How does this compare with iron
sights? Explain.

     OK PVS4 at its max range.

8. Could you detect targets quickly using the **THERMAL**?   Yes **3**
No **2**   How does this compare with iron sights? Explain.

     On Martin - thermal broken at Griswold; limited range.

9. How does the SIPE integrated weapon system (I^2 and **TWS**
combined) compare with using iron sights?

     It's hooah but soldier needs to be proficient with iron;
thermal better at night.

10. Were there times when the I^2/**AIM-1** was more valuable than
the **TWS**? When the **TWS** was more valuable? Explain. [No
responses.]

11. Were there any times you couldn't use the I^2/**AIM-1**
combination? Yes **0** No **2**   Explain.

12. Were there any times you couldn't use the **TWS**?   Yes **1**
No **3**   Explain.

     Broken.

13. For acquisition, which was faster - I^2 **0**   or **THERMAL** **2** ?
Explain.

     Picks up heat targets.

14. Would you prefer to scan in I^2 **0**   or **THERMAL** **3** ? Explain.

     Mounted on PVS4.

15. Which sighting method do you feel more comfortable with - ?
when - ? - why? Explain.

     Too early to judge; thermal or AIM 1 thermal better if
working; thermal = heat from person.

TARGET DETECTION AT NIGHT - TEXCOM PRACTICE EVENT - 10/6/92
(continued)

16. Were there any positions which were made more difficult by use of the SIPE equipment?   Yes **2**   No **1**   Explain.

Prone; foxhole turning around back and forth.

17. Did you have any problems finding a comfortable firing position using the SIPE equipment?   Yes **1**   No **2**   Explain.

18. Did you have any problems with the field of view in I^2 **0** or **THERMAL** **2** ?   Yes **2** No **1**   Explain.

50m left; need a switch for a more normal FOV.

19. Did you have any problems with the **THERMAL** switch?   Yes **2** No **2**   Explain.

Makes finger cramp; need to relocate.

20. Did you have any problems with the **AIM-1 DEVICE**?   Yes **0** No **2**   Explain.

21. Did you have any trouble deciding whether what you saw in **THERMAL** was a target to be engaged?   Yes **1** No **2**   What cues did you use to help you decide?

Should have some kind of material in friendly uniforms that makes the thermal picture identify friendly units.

22. How well did your training help you to identify targets you saw in thermal? Explain.

Good - however test was run poorly.

23. What polarity (black hot **3**) or (white hot **1**) did you use most often? Why? Did you switch? Yes **0** No **1** Explain.

Both.

24. How did your **ENHANCED HEARING** capability help you in target detection?

No help; hear out far but test was bogus; it didn't; technology is good however practice test was run poorly; all data collectors should be moved away from the soldier.

TARGET DETECTION AT NIGHT - TEXCOM PRACTICE EVENT - 10/6/92
(continued)

25. How did your **LONG RANGE HEARING** device help you in target detection and scanning?

No help; it did.

26. Did you feel confident that what you heard was in fact a target of military interest? Yes **0** No **2** Explain.

Both; test bogus - soldier needs to be familiar with terrain; turning around and hear a noise - bogus, not tactical.

27. Were there any surprises in the way the SIPE weapon system worked? Yes **1** No **2** Explain.

28. How did the SIPE NBC **PROTECTIVE GEAR** impact on your ability to perform target detection?

Mask didn't interfere; gets a thumbs up.

29. How did target detection (visual and audio) in SIPE compare with target detection in standard equipment?

Much better - not properly tested.

30. Did the SIPE clothing and equipment enhance your ability to complete the individual tasks associated with target detection? Yes **0** No **1** Explain.

PVS4 - 50% success with PVS4 and unaided hearing; I could hear a SIPE soldier next to me call out targets to his grader but I still couldn't locate them past 800m even using his comments to the grader to help me; I am looking forward to using thermal - should be more accurate at extended ranges; PVS4 good but limitation on distance and sight quality did not let me see but 2 targets; in using PVS4 I could see the environment pretty clear but it did not allow me to see through brush; there were a few times when I detected nothing and there was something there so I want to see what difference there is in SIPE before making the comparison; in PVS4 it is hard to distinguish difference between people and trees from 100m.

LAND NAVIGATION IN DAYTIME - 10/6/92

1. How confident did you feel in your ability to use the
POSITION NAVIGATION (POS NAV) SYSTEM?

	VC	C	N	U	VU
	2	2	2	3	0

        Mean = 3.44   N = 9

Explain your rating.

        Felt confident that I could use it but not that it would
work; I know how but the system is eccentric; compass would have
been quicker and as accurate; takes time; hard to use because it
kept going down; no way to see compass with visor up; trouble
reading numbers; need more hands on practice.

2. When did you use the **POS NAV SYSTEM** capability?

        Every 100m

3. How did the **POS NAV SYSTEM** help you in navigation?

        Not more than a compass; it threw me off; normal with GPS
on; hindered with GPS down; helped to find point; distance and
azimuth; when it worked it was good; didn't; not much.

4. When was the **POS NAV SYSTEM** most valuable?

        Never; when I was misoriented; when recalibrate avenue of
approach; when wanted GPS - but could barely read it; finding out
where you were; distance and azimuth; walk 10 degrees off
azimuth.

5. Did the **POS NAV SYSTEM** work like you thought it would?
Yes 2 No 7   Explain.

        Yes - I saw it mess up before; thought it would be more
accurate; great on the terminal, bad in the field; GPS out;
didn't work; more hands on.

6. What, if any, were your problems?

        Trying to keep azimuth with visor up; the man blinks;
satellites unavailable (5); vision of screen - drop your screen
to get your bearing; push escape too often and lose the map.

7. How well were you able to keep yourself oriented, using the POS NAV? Very well **2** Not very well **5** Explain.

OK-have to flip visor up so you lose azimuth when you put the compass down; ok if satellites; ok with land nav skills, no satellites.

8. Did you have confidence in the accuracy of the POS NAV? Yes **1** No **6** Explain.

Didn't match close enough, needs 10m; inaccurate navigating to a point; too much pushing buttons.

9. Could you navigate better as a result of using the POS NAV? Yes **4** No **5** Explain.

To check self; at night only; GPS; when it worked; land nav skills.

10. How did the POS NAV help you with position location?

None; needs to be more accurate; didn't use; showed where you were on screen; not at all; it took time-had to wait; didn't; helped when off position.

11. Did you use it more for navigation **3** or for position location **5** ? Explain.

Both; just used compass (2); I trust my navigation.

12. Did you use POS NAV to check your route as you moved? Yes **6** No **2** If yes, did you change your route as a result of what the POS NAV was showing? Yes **2** No **2** Explain.

It was wrong; reorient if off course.

13. Did the POS NAv speed you up **0** or slow you down **8** ? Explain.

Compass checks; I am pretty good with a map and compass; very slow; controls; wait for GPS; too long to get position; trouble reading screen; stop to check direction.

14. How often did you check the POS NAV display?

When needed for compass check; every 5-10 minutes; once after the start; every 50-100m; 100m (3), never; for about 45 minutes when I gave up on satellites.

15. Do you feel like you paid more attention to the **POS NAV** than was needed?   Yes **3** No **6** Explain.

   Didn't trust it (2); experimenting; sense the reliability; no satellites.

16. Did you look at the **POS NAV** instead of looking at terrain features and the scene around you?   Yes **3** No **5** Explain.

   I use terrain; not used to it; tired of lifting the visor.

17. Did you change your planning because of the knowledge that you had **POS NAV**? Yes **1**   No **6** Explain.

18. Did you use the **MAPS**? Yes **3** No **4** Explain.

   Image blurry; couldn't read.

19. Would you prefer that **MAP** marginal data (e.g., converting grid to magnetic azimuth, etc.) be included? Yes **5** No **3** Explain.

   Why not?; essential data; would make it easier; just where to go and azimuth.

20. Did you have any difficulty seeing or reading the **MAPS**? Yes **4** No **4** Explain.

21. Did you use paper maps in addition to the **DIGITIZED MAP**? Yes **0** No **8** Explain.

   Not available (2)

22. Did you like having the **MAP** in your **HELMET MOUNTED DISPLAY** instead of your hand?   Yes **3** No **4** Explain.

   ?; no vision around you; not used to it; easy to review without unfolding map; no color is hard to read.

23. Did you ever want to turn the **HELMET MOUNTED DISPLAY MAP** around? Yes **3** No **4**   Explain.

24. Were there any problems with the **MAP/GPS ICONS**?   Yes **6** No **2** Explain.

   The little man moved too erratically; GPS out (4); man wouldn't show up.

25. Did you have any difficulty finding yourself on the **MAP**?
Yes **5** No **3** Explain.

   Man wouldn't come back on screen.

26. Did you use the ZOOM feature to assist you in reading the
MAP? Yes **2** No **5** Explain.

27. Was the **GLOBAL POSITIONING SYSTEM** feature useful? Yes **3**
No **5** Explain.

   Would be if it worked; GPS didn't work; had to have an act
of God to have three satellites; didn't work unless in the open.

28. Did the **POS NAV/GPS** capabilities cause you any problems?
Yes **7** No **2** Explain.

   Hindered movement and speed - didn't help in navigating; not
enough satellites; had to wait around, losing GPS; couldn't read
it and no satellites.

29. Did the **POS NAV/GPS** combination enhance your ability to
complete the individual tasks associated with this event? Yes **0**
No **9** Explain.

   Easier and faster the normal way (2); too long; hard to
read; stop too much; hinder ability to move at a good pace.

30. Did the **POS NAV/GPS** combination enhance your ability to
complete the collective tasks associated with this event? Yes **0**
No **9** Explain.

   Not only did it not work it hurts your head.

LAND NAVIGATION AT NIGHT- 10/7/92

1. How confident did you feel in your ability to use the
POSITION NAVIGATION (POS NAV) SYSTEM?

	VC	C	N	U	VU
	1	4	3	1	1

Mean = 3.30 N = 10

Explain your rating.

Need reinforcement training of running programs prior to PE;
trouble making it do what I wanted; easier once get hands on;
depends on satellites; not sure of GPS; putting you where you
really were.

2. When did you use the **POS NAV SYSTEM** capability?

All day; day & dusk; location and bearing; find where I was;
at night to find points.

3. How did the **POS NAV SYSTEM** help you in navigation?

Maintaining bearing; showed where I was; distance and
bearing to next point; didn't; not much; could find grid when it
worked; easier to navigate; quick reference of position; help you
improve map skills; distance and azimuth; helped with bearing
only; GPS gave location so able to alter direction to evade
brush and water.

4. When was the **POS NAV SYSTEM** most valuable?

Starting out; distance to point; never; when we were
misoriented; distance and AZ; evade different terrain and getting
a feeling of distance.

5. Did the **POS NAV SYSTEM** work like you thought it would?
Yes **6** No **2** Explain.

Graphics could be better - hard to read map; took a while to
get the hang of it; didn't work and never will; bad; not as
accurate; took way too long; satellites limited.

6. What, if any, were your problems?

Lose GPS; time to go through menu to reorient; slow
computing: helmet; no satellites (2); crummy focus; cumbersome;
nav through brush and getting caught; computer failure; computer
man wouldn't catch up; jumped around; couldn't read point
numbers.

LAND NAVIGATION AT NIGHT- 10/7/92 (continued)

7. How well were you able to keep yourself oriented, using the
POS NAV? Very well 2   Not very well 6 Explain.

    Not hard to; takes a while; trouble running program; new
technique; in the middle - not a lot of confidence in it; do it;
just use compass to find AZ.

8. Did you have confidence in the accuracy of the POS NAV?
Yes 4   No 5   Explain.

    100m not close enough; GPS not stable enough; pretty much;
only in compass.

9. Could you navigate better as a result of using the POS NAV?
Yes 2 No 6   Explain.

    Need more time; where you were in relation to point; need
improved slugger GPS; too much lost time waiting for GPS; GPS
handy with compass if you lose your pace count or because of
fatigue; lose self on the map.

10. How did the POS NAV help you with position location?

    No more than normal; approximate idea where; kept my
bearing; yes; it didn't; gave a grid; quick reference when
misoriented; not well; not - used own skills; showed where it was
and in reference to target point.

11. Did you use it more for navigation 2 or for position
location 5 ? Explain.

    Neither; took AZ and split; man off the map; see where you
are in dinosaur country; compass only; both.

12. Did you use POS NAV to check your route as you moved? Yes 4
 No 3 If yes, did you change your route as a result of what the
POS NAV was showing? Yes 4   No 3 Explain.

    Didn't try AZ just went in general direction; only walked
100m; many times it kept telling me I was somewhere else; I tend
to drift and it corrects me.

13. Did the POS NAV speed you up 1 or slow you down 9 ?
Explain.

    Takes a while to go through menu; 1/4 time map and compass;
no satellites; too long to check AZ (2); new; compass and map
faster; takes time to get proficient with computer and
satellites.

14. How often did you check the **POS NAV** display?

100-200m, 2-3 times/point, every few minutes; some; once; often; once for next point.

15. Do you feel like you paid more attention to the **POS NAV** than was needed?   Yes **0** No **9**   Explain.

16. Did you look at the **POS NAV** instead of looking at terrain features and the scene around you?   Yes **2**   No **6**   Explain.

Used map for terrain assn; because you can't read terrain features off the screen map; everything is green; used everything, including compass.

17. Did you change your planning because of the knowledge that you had **POS NAV**? Yes **4** No **5**   Explain.

Didn't follow strict AZ; evaded brush and water.

18. Did you use the **MAPS**? Yes **6** No **1** Explain.

Yes & No, but hard to look at; showed where was in relation to points; points and meters.

19. Would you prefer that **MAP** marginal data (e.g., converting grid to magnetic azimuth, etc.) be included? Yes **5**   No **4** Explain.

Available; not on a map but possibly a data sheet; why not, it has other worthless things; maybe for long movements.

20. Did you have any difficulty seeing or reading the **MAPS**? Yes **6** No **2** Explain.

Both; terrain features; weight of helmet; glasses made foggy; sometimes; learning to use green screen; pretty proficient with map and compass; hard to read green; numbers of points.

21. Did you use paper maps in addition to the **DIGITIZED MAP**? Yes **5** No **5** Explain.

Recommend it.

22. Did you like having the **MAP** in your **HELMET MOUNTED DISPLAY** instead of your hand?   Yes **2**   No **7**   Explain.

Not as accessible; easy to carry map and walk and look at the same time.

23. Did you ever want to turn the **HELMET MOUNTED DISPLAY MAP** around? Yes 2 No 7 Explain.

     Take it off!

24. Were there any problems with the **MAP/GPS ICONS**? Yes 7 No 1 Explain.

     Must press escape several times to update man; both; satellites a problem; with satellites; with man; reading 8 and 0 get confused in grids; icon slow to react; no satellites; GPS in jungle not in open.

25. Did you have any difficulty finding yourself on the **MAP**? Yes 4 No 5 Explain.

     Problem with programs; training not technology; three times man disappeared and it took a while; many times.

26. Did you use the ZOOM feature to assist you in reading the **MAP**? Yes 4   No 5 Explain.

     Map unclear.

27. Was the **GLOBAL POSITIONING SYSTEM** feature useful? Yes 5 No 3   Explain.

     Some quick reference; double check; helps improve map reading skills; not w/o satellites, gave location.

28. Did the **POS NAV/GPS** capabilities cause you any problems? Yes 7 No 0 Explain.

     Slow - training problem; more difficult to terrain associate; headache, helmet.

29. Did the **POS NAV/GPS** combination enhance your ability to complete the individual tasks associated with this event? Yes 2 No 5   Explain.

     Too slow to compute route/locate self; yes but it needs a tactical test; hindered me; with compass it's an awesome combination.

30. Did the **POS NAV/GPS** combination enhance your ability to complete the collective tasks associated with this event? Yes 2 No 4   Explain.

     Same as above.

NBC PROTECTIVE GEAR - 10/8/92

1. How confident did you feel in your ability to use the **NBC PROTECTIVE CAPABILITY** during this event?

	VC	C	N	U	VU
	3	4	3	0	0

Mean = 4.00   N = 10

Explain your rating.

But does it work (2)?; easy to use; like to test in its environment; easy to put on but hard to remember what to put on at each level; not enough time; equipment good but physical exertion; could carry it; enough air?

2. What, if any, were your problems?

Restricted movement but better than now; whistling when breathing; wrong size mask; when fatigue starts have to steady breathing; mobility sort of limited; mask hit neck; hard to swallow; hot without air.

3. Did your **PROTECTIVE** gear make it harder **1** or easier **8** to move than standard MOPP gear? Explain.

MCC awesome; much cooler & comfortable; better and cooler; 10x better; less mobility but more comfort.

4. Did your **PROTECTIVE** gear make it harder **0** or easier **5** to shoot than standard MOPP gear? Explain.

See better; better visibility; mask better FOV and cheek to stock weld.

5. Did your **PROTECTIVE** gear make it harder **0** or easier **9** to communicate than standard MOPP gear? Explain.

Voicemitter louder (5) and unmuffled internal comms.

6. Was the **HELMET MOUNTED DISPLAY** degraded by your **MASK**? Yes **1** No **8**   Explain.

Made helmet fit better.

7. Could you use the **HELMET CONTROL UNIT** with your **PROTECTIVE GLOVES**? Yes **2** No **1**   Explain.

8. Could you hear yourself breathe? Yes **9** No **1** Could you hear other people breathe? Yes **5** No **2** Explain.

   Voicemitter loud.

9. Could you hear yourself walk? Yes **7** No **1** Could you hear other people walk? Yes **5** No **3** Explain.

10. Did you sound louder than normal in **PROTECTIVE GEAR**? Yes **3** No **4** Did other people sound louder? Yes **2** No **4** Explain.

   With voicemitter you sound louder; breathing; equipment bulky.

11. Did you have problems maintaining noise discipline in your **PROTECTIVE GEAR**? Yes **2** No **5** Explain.

   Voicemitter.

12. Could you understand people talking? Yes **10** No **0** Explain.

13. Was **COMMO** in **PROTECTIVE GEAR** easier because of the **ENHANCED HEARING CAPABILITY**? Yes **2** No **1** Explain.

   About the same; ?

14. Was **COMMO** in **PROTECTIVE GEAR** easier because of the **VOICEMITTER**? Yes **9** No **1** Explain.

   Didn't muffle.

15. Did you have to talk louder than you normally do in MOPP gear? Yes **1** No **8** Explain.

   It's amplified; no because of voicemitter (3); not as loud.

16. How did the heat buildup in your SIPE **PROTECTIVE GEAR** compare to the heat build up in standard MOPP gear?

   Not as quick as with cooling; about the same with MCC; not as extreme with MCC; less heat; not as bad - with MCC better; bearable with blower; it was almost non-existent; w/o MCC it would be the same.

17. Did you have to readjust any of your **PROTECTIVE GEAR** during this event? Yes **3** No **6** Explain.

     Cut the throat seal off; ballistic visor.

18. How does the SIPE **MASK** compare to the standard mask?

     Better (2); excellent; much better; 100% better; more comfortable (2); visibility; easier to breathe talk and see; easier to don; better breathing and visibility.

19. Did you have any problems with the **PROTECTIVE MASK**? Yes **1** No **8** Explain.

     Throat.

20. Did you have any problems with the **PROTECTIVE GLOVES**? Yes **2** No **6** Explain.

     Trying to unclip from vest; less finger dexterity.

21. How do the SIPE **GLOVES** compare to the standard gloves?

     What was wrong with the black ones?; much better (3); comfortable; better grip; better cooler; not as hot; thicker-less feeling.

22. How does eating and drinking in SIPE **PROTECTIVE EQUIPMENT** compare to standard MOPP gear?

     ?; same?

23. How did you like the **NBC PROTECTIVE GEAR**? How should it be changed?

     Not for desert; fix zipper on leg; like it; improve MCC; 100% better; nothing; great; less bulky MCC; prefer layers as opposed to 1 thick one.

24. Did the **MICROCLIMATIC CONDITIONING SYSTEM (MCC)** work like you thought it would? Yes **6** No **4** Explain.

     Not as cool but helpful; it was great; helped cool me off; better; not as much area covered - legs hot and tired; much cooler.

25. How well could you breathe with the MCC?

     Good; excellent; breathe like normal w/o mask; work hard
start to hyperventilate; lots easier but still labored uphill;
excellent till fatigued then panic breathing; very good (2)
pretty well; easier than w/o it.

26. Were there any problems with the MCC?   Yes 2   No 5
Explain.

     It is loud; whistling noise; too big too fragile; too heavy
too loud too delicate.

27. Could you work longer without tiring because of the MCC?
Yes 9 No 0 ? 1 Explain.

     Cool air = bonus; cooler and not wear you down.

28. What were your overall performance degradations in SIPE
PROTECTIVE GEAR and how did they compare to standard MOPP gear?

     How to decon self and gear?; zipper; better in all aspects;
standard gear sucks; want to see test results on new; SIPE is
better (2); mask fitting; air flow to mask; where to put hose?

29. Did the SIPE NBC PROTECTIVE GEAR enhance your ability to
complete the individual tasks associated with this event? Yes 2
No 0 Explain.

     Comfort and climate.

30. Did the SIPE NBC PROTECTIVE GEAR enhance your ability to
complete the collective tasks associated with this event?   Yes 2
No 0   Explain.

APPENDIX F

END OF TRAINING--ALL EQUIPMENT

Included in Appendix F are the responses to the questionnaires administered at the end of the training phase. They covered all training, and operational use and integration of the SIPE equipment. The first served as a summary questionnaire and focused on training. The second part covered initial comments on physical problems caused by the SIPE equipment.

Within the questionnaires and tables, the following legends apply as appropriate throughout:

5 = Very Good (VG)	2 = Poor (P)
4 = Good (G)	1 = Very Poor (VP)
3 = Neutral (N)	0 = Not Applicable (NA)

5 = None (No)	2 = Some (So)
4 = A Little (Li)	1 = A Lot (Lo)
3 = Neutral (N)	0 = Not Applicable (NA)

5 = Very Confident (VC)	2 = Unsure (U)
4 = Confident (C)	1 = Very Unsure (VU)
3 = Neutral (N)	

The numbers of respondents ranged from 1 -10, depending on the numbers of personnel who answered or failed to answer some questions.

CONTENTS OF APPENDIX F

F-1

END OF TRAINING QUESTIONNAIRE: ALL EQUIPMENT - 10/9/92

1. Rate the following aspects of this training.

		VG	G	N	P	VP	NA
a.	Amount of instruction time	1	7	2	0	0	0
	Mean = 3.90 N = 10						
b.	Amount of hands-on practice time	1	6	3	0	0	0
	Mean = 3.80 N = 10						
c.	Practical exercises	0	6	3	1	0	0
	Mean = 3.50 N = 10	long range firing					
d.	Visual aids	2	7	1	0	0	0
	Mean = 4.10 N = 10						
e.	Training devices	2	5	2	1	0	0
	Mean = 3.80 N = 10	thermal					
f.	Training materials	2	5	2	0	0	0
	Mean = 4.00 N = 9						
g.	Equipment availability (# of sets)	1	1	4	4	0	0
	Mean = 2.90 N = 10						
h.	Student-instructor ratio	2	8	0	0	0	0
	Mean = 4.20 N = 10						
i.	Amount of training each day	1	8	1	0	0	0
	Mean = 4.00 N = 10						
j.	Pacing of the training	1	7	1	1	0	0
	Mean = 3.80 N = 10						
k.	Sequencing of the training	2	6	2	0	0	0
	Mean = 4.00 N = 10						

2. Did the following items impact in a negative manner on your ability to train on this equipment?

		Lo	S	N	Li	No	NA
a.	Complexity of the equipment	0	0	2	2	6	0
	Mean = 4.48 N = 10						
b.	Difficulty of the task	0	0	0	1	9	0
	Mean = 4.90 N = 10						
c.	Newness of the capability	0	1	0	2	7	0
	Mean = 4.50 N = 10	adjusting to it					
d.	Overall awkwardness of equipment	2	1	1	4	2	0
	Mean = 3.30 N = 10	helmets					
e.	Weight of equipment	1	2	0	2	5	0
	Mean = 3.80 N = 10						
f.	Equipment controls	0	3	0	2	5	0
	Mean = 3.90 N = 10						
g.	Integrating with other equipment	0	0	1	1	7	0
	Mean = 4.47 N = 9						
h.	Weather conditions	0	0	0	0	8	1
	Mean = 5.00 N = 8	wind					

END OF TRAINING QUESTIONNAIRE: ALL EQUIPMENT (continued)

		Lo	S	N	Li	No	NA
i.	Time of day	0	0	0	0	8	2
	Mean = 5.00 N = 8						
j.	Fatigue	1	1	0	1	5	1
	Mean = 3.88 N = 8	neck					
k.	Equipment breakage	1	3	0	2	3	1
	Mean = 3.33 N = 9						
l.	Battery failure	1	2	0	2	4	1
	Mean = 3.67 N = 9						
m.	Instructor	1	1	0	0	7	2
	Mean = 4.22 N = 9						

3. How confident do you feel in your ability to use this equipment right now?

VC	C	N	U	VU
3	5	3	0	0

Mean = 3.90 N = 10

Explain your rating.

Easy to use; more hands on w MCC; I love thermal when it is zeroed; can use LN; prefer old; more total training time; hands on; to be effective; I could use it if it worked.

4. What kinds of mistakes or errors did you make while you were learning to use this equipment?

Have to have equipment adjusted right or you'll be in hell; a lot, but due to my ignorance; trouble making LN do what I wanted it to; familiarize self with computer controls; learning to adjust brightness and contrast on sight.

5. What was the hardest part about learning to use it?

LN controls; order of donning; waiting for hands on time; getting adjusted to trusting the computer on the GPS; P-mask time test.

6. Did you ever get mixed up or feel like there was too much to remember? Yes 0   No 8   Explain.

More practical exercise on LN.

END OF TRAINING QUESTIONNAIRE: ALL EQUIPMENT (continued)

7. How will this equipment help you perform individual and collective tasks?

Vest gives mobility & protection better than standard; tell where you are on the map; engage targets at night much easier; SIPE MOPP better than standard; BDUs seem like they'll be hot; if properly trained, a lot; in the end eliminate hard knocks for the soldier in the field - enemy camouflage, night vision limits (thermal), LN (GPS), chemical (MOPP); in the end, soldier will be able to do his job much easier and effective and that means a higher body count, the most important part.

8. Did this block of training prepare you to use this equipment with the rest of your SIPE equipment? Yes 4 No 1

Get the techie weenies out of sight and give more hands on.

9. How would you change this training to make it better?

More tactical; more time training; more practice/ familiarization before being tested; have more equipment on the range; more hands on.

10. Was there enough time today to do everything you wanted/needed to do? Yes 6 No 2 Explain.

More equipment.

11. Do you have any additional comments on training with this equipment?

Range procedures/operations of live fire need improvement - poor safety standards.

QUESTIONNAIRE: PROBLEMS CAUSED BY THE EQUIPMENT - 10/9/92

[This questionnaire was added to the final day of training; many of the problems in integration of equipment had not yet surfaced.]

INSTRUCTIONS: Mark either **YES** or **NO** box. If **YES**, explain; be sure to tell which piece of equipment.

1. Did the equipment ever cause you any of the following problems?

	YES	NO	Which equipment(s)?
Headache	10		helmet (9); visor
Nausea	4		helmet (4)
Dizziness	4		helmet (4)
Drowsiness	3		helmet (2); classes in Bldg 4
Muscle strain	6		helmet (4); neck - pack (2)
Eye strain	5		helmet (3); heads up (2)
Back strain	5		helmet (1); pack (2)
Neck strain	8		helmet (6)
Burning eyes	1		visor
Tearing of eyes	0		
Double vision	2		helmet (1); safety glasses (1)
Difficulty focusing	7		helmet (1); safety glasses (1); green screen (1); thermal (1); graphics (1)
Blurred vision during	5		helmet (1); safety glasses; (1); thermal if not adjusted right (1)
Blurred vision after	4		night blind after screen
Electrical shock	0		
Cuts or abrasions	1		stumbling thru woods
Too bright	0		
Too dark	0		
Too loud	0		
Too soft	0		
Too hot	0		
Too cold	0		
Other?			

QUESTIONNAIRE: PROBLEMS CAUSED BY THE EQUIPMENT -10/9/92
(continued)

2. Did you ever have any problems with:

	YES	NO	Which equipment?
Donning it	5		helmet/visor (1) ASG pant leg zipper
Doffing it	1		helmet
Adjusting it	6		helmet (5) ruck
Stowing it when not in use	0		
Carrying it when in use	5		helmet (1) compass
Reaching it when you wanted to use it	2		thermal focus
Turning it on in the day time	1		HCU knobs
Turning it on in the night time	1		adjustments
Turning it off in the day time	0		
Turning it off in the night time	0		
Knowing it was off	0		
Function of controls (switches, knobs)	0		
Visibility of controls - day	0		
Visibility of controls - night	1		heads up
Location of controls	2		thermal & AIM1 on/off
Spacing of controls	1		as above
Size of controls	1		as above
Resistance of controls	0		
Labelling of controls	0		
Reach distance for controls	1		thermal focus
Operating while wearing NBC mask day	0		
Operating while wearing NBC mask night	1		
Operating while wearing NBC gloves day	0		
Operating while wearing NBC gloves night	0		

APPENDIX G

INTERVIEW: TARGET DETECTION 10/14/92

Included in Appendix G are the results of the structured interviews administered after the target detection phase of the TEXCOM portion of the test. Soldiers were interviewed alone or in pairs; their comments and answers to specific questions have been combined. Minor editing has occurred as appropriate.

1. How confident did you feel in your ability to use the
STANDARD IRON SIGHTS <u>for target detection</u> in MOPP-0 <u>in daylight?</u>

Very Confident Confident Neutral Unsure Very Unsure

6   4   0   0   0

Explain your rating.

Area within sector was too large to cover (search for
targets) within the one minute allowed. The sector needed to be
more restricted like it would have been in a tactical
environment; on a clear day no clouds; easier than thermal - more
experience; confident to limits of personal eye sight, to about
1500m; prior training; eyes and ears and nothing else to rely on;
from my sniper training.

2. How confident did you feel in your ability to use the
STANDARD IRON SIGHTS <u>for target detection</u> in MOPP-0 <u>in darkness?</u>

Very Confident Confident Neutral Unsure Very Unsure
0   4   1   2   2

Explain your rating.

PVS4 range was the limiting factor - only confident out to
about 100m when using the PVS4; no other sights - too dark; can't
see in dark; N/A used PVS4; prior training; PVS4 pretty good to
800-1000; using moon light - depends on whether target will be
illuminated, detect but not recognize, no moon not see it.

3. How confident did you feel in your ability to use the
STANDARD IRON SIGHTS <u>for target detection</u> in MOPP-4 <u>in daylight?</u>

Very Confident Confident Neutral Unsure Very Unsure
0   7   2   0   0

Explain your rating.

Given the equipment and level of training, performed as well
as could be expected; interference from mask - sweat in eyes,
heat, clouded vision - semi trying to breathe; fairly easy but
field of view limited by mask; less confident than without mask -
not as good sense of surroundings due to encapsulation; prior
training; hearing gone - visor like kaleidoscope - FOV small,
heat, breathing; depends on how I bend my face in the mask -
seeing a bent lens, with SIPE eye cups on face so peripheral
vision better.

4. How confident did you feel in your ability to use the
STANDARD IRON SIGHTS <u>for target detection</u> in MOPP-4 <u>in darkness</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	2	2	1	3

Explain your rating.

     PVS4 was again the limiting factor because of its range.
The P mask did reduce/degrade the ability to hear the targets/the
surrounding environment; without sight, darkness makes it
difficult, PVS4 helps but still difficult - eyecups a problem
with mask; cannot see in dark; prior training; PVS4 pain - hold
eyecups with non-firing hand; because of mask, light, puts
everything low in terms of target detection, with PVS4 have to
position self, even in a fire fight, take 10 seconds to get
comfortable on the scope - you don't have a good angle; SIPE mask
did not but M17 did and that hurt performance a lot.

5. How confident did you feel in your ability to use the **IMAGE
INTENSIFICATION** (I^2) capability <u>for target detection</u> in PR Level
0 <u>in darkness</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
2	1	3	0	0

Explain your rating.

     Did not use; AIM put too large a spot to aim accurately on
the target - no crisp spot, but a blurry blob; if less than 100m
very clear - could only see large objects at distance. If light
in sky above tree tops could see no detail; very confident
because PVS4 and full moon contributed to excellent conditions;
new system not enough time on ground with it, need a broader
experience base to get more confidence, not enough walk around
with it on your head; not - can't see >20-30m; image was a lot
clearer, not comfortable visor on eyebrows, can see from here to
eternity with it; along with the aim point it's excellent for
drawing out to a target - with PVS4 have to take it up to eye get
a bead follow and take a shot, but rare that you get a good
sight; with SIPE not get blinded out; aim point all you have to
do is hit the pressure button on the weapon and with the image
intensification you can see the laser point.

6. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION** (I^2) capability <u>for target detection</u> in PR Level 4 <u>in darkness</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	2	4	0	0

Explain your rating.

Did not use; not as confident - MOPP gear stifles other senses, heating, smell, FOV was limited and had to focus lens to eye to maintain clear image - just took more time; confident in using but put on heads up display and only see part of the screen - push helmet down and on mask which rides on bridge of nose and weighs in and more physical and mental - mask on everyone's eyes and nose - pushes on it uncomfortable and have to look up to use heads up; comfort of mask and the way it fits on head - had to bend my head up and couldn't even crack the visor all the way down because of the way it was riding on the nose - all the 6 lbs of pressure on the nose and eyebrows and I could only take it for about 10 seconds; discomfort of just looking at an angle, trying to look through the lens, and then have to go back and try to support the helmet with my thumb.

7. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT (TWS)** capability <u>for target detection</u> in PR Level 0 <u>in daylight</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	4	1	4	1

Explain your rating.

It was hard to distinguish stationary targets from hot spots; iron preferred - too much clutter, difficult to manipulate buttons on HCU, not clear, prefer regular to scan pain to get knobs to work, especially with gloves can't use tips; hard to identify target from rock, moving targets not a problem; heat signatures blend together, difficult to distinguish targets - pretty clear to 300m after that becomes very difficult - moving easier; during daylight more hot spots down range, harder to detect them in daylight than in dark; if not moving couldn't tell, not a person couldn't, 400-600 max; for moving vehicles excellent; day a lot of hot spots from sun, especially on sides of buildings or wood or trees, something electric heats up the targets; hear with people unless you have range card and know where things are; difficult between a target and a hot spot,

thermal day lets you distinguish person camouflaged and in cover trying not to walk into ambush.

8. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT (TWS)** capability <u>for target detection</u> in PR Level 0 <u>in darkness</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
3	5	2	0	0

Explain your rating.

No problems - very good system - TWS was accurate to about 800 meters; mobile targets best, easier the later it got, good resolution but loss of resolution with heads up, if stationary hard to tell hot spots; much easier than PVS-4 - objects stand out better from background, vehicle could be identified; reduced heat signatures allowed easier target detection, still difficult to distinguish HUMV from track, see well beyond 300m, distinguish vehicles to 1500-1800m; targets show up a lot easier; easier to ID targets; thermal pick up targets but not ID; PVS4 harder to pick up but easier to ID; not hot spots, using contrast brightness can tone down hotness can really see the heat on people, look closely can see hands and feet.

9. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT (TWS)** capability <u>for target detection</u> in PR Level 4 <u>in daylight</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	2	3	2	3

Explain your rating.

It was hard fighting off the glare the sun caused with the mask and the heads up display; too much clutter in day time, could be turned down some by play with knobs; like it since don't have to cant the weapon - basically same capability as PR-0; as difficult as in day without MOPP - equipment fatigue may have contributed to frustration; mask makes helmet eyes half - can't see unless you push; helmet on mask pushes, eyecups on nose, black piece in the way so cut it out, voicemitter hurts nose, visor pushes on it; in MOPP gear your stress level, your smoke level, your trying to fit it on your head, the stress of having the head vise on your head, trying to look at a certain angle. Pretty impractical. But for detection of targets same as without it - just the point of trying to angle one eye so it can look through the lens.

10. How confident did you feel in your ability to use the
THERMAL WEAPON SIGHT (TWS) capability <u>for target detection</u> in PR
Level 4 <u>in darkness</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
1	6	2	0	0

Explain your rating.

The heads up display was very visible - the TWS and the
enhanced hearing were great in combination; after later at night
change in temperature made performance better - heads up still a
problem moving on head, stationary targets still hard but not as
bad, in foxhole flip up visor and back down to re-adjust, real
heavy in front - lean against wall to loosen it and try not to
bump knobs on the way back up; occasionally got caught up in
cables and pulled off the microphone half the time; same as
without. MOPP at night - climatic conditions cooler at night
helped with mental aspect of performance; because targets show
better at night, if more time in daytime could learn to use it in
day - if given a sector and studied a couple of hours; mask still
bad but detection easier; awesome display of thermal heat because
no hot spots, but still have to recognize if target or not.

11. Could you acquire/detect targets well with the **STANDARD
SIGHT** combination? Yes **10**   No **0**   Explain

During daylight not at night; except limited at night; free
to move and observe surroundings, K pot not bad, use your body
the way it was designed to be, pretty good job - other
capabilities take a while to get used to; within 500m, past that
it is going to be very hard - can't clearly shoot them, detect
good eye or depend on weather conditions or daytime/nighttime or
dusk.

12. Could you acquire/detect targets well with the I^2? Yes **5**
No **4**   What, if any, were your problems?

No depth perception walking, I^2 and eye cups and funky
green; amount of light reduced detail, less than 200m worked ok,
beyond 200m need the TWS; during darkness PVS4 worked very well,
FOV was a factor in MOPP due to adjusted eye relief and focus;
the same as day but at night farther capability to see - hard to
detect out to 300m but with this stuff God knows how far.

13. Could you acquire/detect targets well with the **THERMAL**?
Yes **9** No **0** What, if any, were your problems?

Glare during daylight in PR4; quiet it down, just the
thermal w/o the heads up, like PVS4s like a scope; during day
can't distinguish targets from other objects unless they move, at
night much easier, vehicle looked like a moving squad; during
darkness thermal worked very well - works best when the heat from
the sun does not have a dramatic effect on terrain; thermal got
sick like motion sickness, detection not hard but ID is;
especially at night - no way I could see past 300-400m - detected
a track from 2400m; with I^2 hard to detect somebody camouflaged
or hidden - with thermal could clearly detect people. Instead of
that little placker on the front guard they should have a little
wire than runs to the handle instead of on the front because when
you are holding the weapon you can hold with one hand and look
through the visor and see where the weapon is tracking and if you
were at an angle and wanted to shoot you wouldn't have to drag
your whole arm over too. A lot more practical to have the
pressure pin on the hand guard next to the trigger handle; little
turn knobs should have a guard on them - they are resting on your
side and one little brush downward about an inch could turn that
dial all the way down to dark and when you go to track on
somebody here you come up with a light screen, don't know whether
to yield back or go in.

14. If you used it at all, could you acquire/detect targets well
with the **LONG RANGE HEARING**? Yes **1** No **2** Did not use **6**
What, if any, were your problems?

NA; not used at Griswold, could acquire and detect in
training; nothing past yourself - uniform, magazines, thermal
sight - not personnel targets, stuff in distance can't hear -
hear close stuff so not far; stopped wearing; if slightest bit of
breeze no way you're going to hear; make sure you have a good
battery or a lot of fuzz noise like a wrong channel on the TV;
take out the fuzz; within 100m ok but not more just the grating
of a pencil was scratching in my ear; you have so much
interference - like BDUs - move an inch and drown everything else
out, or touch the weapon to the concrete and sounds like someone
jackhammering in the ear; need to do some work with that.

15. How does the I^2 compare with iron sights? Explain

I^2 at night day iron sights I^2 better than nothing; better
at night - can at least see to 200m; at night better, day prefer
iron sights; PVS4 can see at night when iron doesn't work -
limits field of view; no depth perception with I^2 but advantage

in limited visibility; iron better - zero depth perception down, only close up night vision, light flashes out, not more than 20m; whoever is going to use the system will need a lot of practice on drawing a bead and having a steady hand on their hip- on the shoulder - liked it because you don't have to have yourself planted behind the sights - almost like playing a video game.

16. How does the **THERMAL** compare with iron sights? Explain

Thermal was much better especially at night - helped greatly over iron sights when there was something questionable to the naked eye; iron better in day, thermal at night and problem with clutter and hot spots; at night TWS better, day prefer iron; can see at night when iron sights don't work, limited FOV, there is a training deficiency in identifying targets at longer ranges using black hot/white hot; thermal is a good idea - can see through smoke with thermal, not with iron, if hardened and fielded squared away; thermal better than PVS4 at night, not day thermal, LP/OP night, not mounted to weapon; day no thermal held for recon; when I was using thermal in the day I couldn't tell if it was a target or a hot spot - I would just lift up the visor real quick; with thermals detect easier; draw a bead on someone at 600m requires a lot of training.

17. For detection, how does the SIPE integrated weapon system (I^2 and **TWS** combined) in PR-0 compare with using iron sights in MOPP-0?

Day iron better - good alignment - make sure you're looking in the right direction;, use I^2 to check out the general area then go to thermal, used to where your head goes you look; night TWS, day iron; the combination of I^2 and TWS is superior to just iron sights - still cumbersome and not designed for quick easy use; day standard use your eyes, maybe heads up push up day and visor down to fire; pretty much the same - only problem I've run into is fitting the helmet over the MOPP suit. I am impressed with their BDUs - they are really comfortable, they give good flexibility but they are a little bit loud because of the stiffness of the material, that's the only drawback, plus they are missing a button on the top part of the coat.

18. For detection, how does the SIPE integrated weapon system (I^2 and **TWS** combined) in PR-4 compare with using iron sights in MOPP-4?

Day iron night SIPE without the impact of MOPP SIPE mask better and less visual interference, voicemitter interfered occasionally but turned it off; better since don't have to cant

the weapon; all right when together - can see around corners;
rather die than wear that stuff; if cooled maybe; can you see
doing the obstacle course in SIPE4?; in PR4 if you have the air
conditioning system you are good to go but you are going to be
more stressed because you are trying to fit that helmet over your
mask, I was stressed out just trying to get the visor down. Plus
the weight of it was smoking me - I felt like I was in a brain
vice. In SIPE4 I could see my targets, in MOPP4 couldn't -
started fogging because I was hot. SIPE worse because hot and
hurt but body count up; with the SIPE mask better peripheral
vision so more visibility to see your targets; with the SIPE
system - with a little adjustment and a lot of discomfort - you
can smoke the targets plus the lens is a lot closer to you.

19. Were there any times you couldn't use the I^2? Yes 4 No 1
Explain.

        Day and MOPP; when there was sky illumination; bright light;
ok walking target detection no; want nothing on face when
walking, not want to rely on it, snag brush etc.; we didn't
really use it.

20. Were there any times you couldn't use the **THERMAL**? Yes 1
No 6 Explain.

        Good most of the time, bumped controls a few times -
appeared to fail, still prefer iron in day; hard to detect
daytime; there are still difficulties distinguishing targets but
thermal can be used under all conditions; switch was broken -
system failure problem; day not good, better unaided, hand held
better, like looking in a little box, naked eye gives
reflections, contours, dust; good because mounted right up by
your eye not like PVS7 that slips, have good vision. You have
your aiming point on your weapon - that's great. "The only
problem is comfort - that 6 lbs has to go. I know it is a
prototype and we are testing the capabilities but they are going
to have to work on that. When you are walking after a while you
have to hold up that front visor with your thumb - that's the
wrong answer."

21. For acquisition, which was faster - I^2 0 or THERMAL 4 or
STANDARD 0 ? Explain.

        Should not even use I^2 - use strictly thermal; standard day
and note thermal when moving; thermal targets stand out better;
generally daytime iron, night thermal, terrain, type target,
target activity made a difference; standard - once a soldier
studies his sector he can easily pick up something that is out of
place; day standard night thermal; night I^2, day standard; with
thermal could clearly distinguish.

22. Would you prefer to scan in I^2 **0** or **THERMAL** **5** ? Explain

    Didn't use I^2; thermal better for scanning especially when you found your lane; I^2 only worked part of the time - thermal worked all of the time at all ranges; I^2 limited to 200m; night thermal made heated objects show up quickly; thermal picks up targets better and can see farther away; prefer to use I^2 as regular vision, maybe walking point to point - but thermal is practical if you are going into a fire fight.

23. Did you have any problems with the field of view in I^2 **2** or **THERMAL** **1** ? Yes **4** No **2** Explain.

    No problem however would prefer less range for a wider FOV if the thermal is fielded - wider FOV would give quicker coverage; ability to zoom after scanning would be excellent, magnification on a hot spot; same sky illumination problem - FOV doesn't matter if you can't see; FOV causes soldier to use different technique, slows down ability to acquire target; FOV too narrow - misses extreme left or right targets, with eyeballs catch it when it pops up immediately; thermal wider than PVS4, move weapon more in I^2; FOV is very limited, there is no peripheral vision; it is hard for the thermal because it is a scope but maybe for the I^2 they could use curved optics to give a lot better view.

24. Did you have any problems with any switches or controls? Yes **7** No **3** Explain.

    Switches on the TWS were fine but the brightness and contrast controls were difficult to use; except when bumped, sat down and banged into things - easily fixed; adjustments on HCU were difficult with both types of gloves; more difficult with chemical gloves on; comms switch right ear a lot of static, have to turn them off, wait a few seconds and turn them back on; SIPE4 gloves finger dexterity, can't see HCU because of mask - wires can't find HCU; NBC gloves OK combat gloves a joke, hot, touching OK but rubber comes off; put this stuff on short cords or on telephone cords (winding coiled); could have some kind of protector on the knob of the thermal - you can barely touch them and it will throw you completely off.

25. Did you have any trouble deciding whether what you saw in **THERMAL** was a target to be engaged? Yes **4** No **2** What cues did you use to help you decide?

    Could turn down thermal controls to discriminate between targets and hot spots; mostly in the daytime, motion was best

cue, some familiarity with lane helped, could ID metal signs;
definitely during the day - movement and sound were key to
deciding - at night no difficulty; getting used to looking at the
thermal picture downrange; movement, contrast, tilted head up to
see and checked it; movement cues; during the day there were hot
spots so I raised my visor and looked - at night the thermal can
distinguish - there are no hot spots.

26. What polarity (black hot **2** or white hot **7**) did you use? Did
you switch? Yes **4** No **3** Explain.

Once learned the system, white hot seemed best so no switch;
easier in white hot; found white easier to detect targets; went
from white to black - white did not appeal; compared - liked
white because it showed up better; both; BH day; WH night stood
out more; black hot I liked best because the cross hairs are
green - if you do white hot that means body heat is green and you
can't see the cross hairs when you bring them across your target.
With black hot you can see exactly where you will hit.

27. How did your **ENHANCED HEARING** capability help you in target
detection?

Enhanced hearing helped detect targets faster; difficult
because clicking from thermal interfered, constant static in
background - had to turn on and off to fix it - 2-3 seconds off,
spontaneous hot mike; worked - could pick up objects better than
with normal hearing - but problems localizing source; unsure -
could hear targets but not sure it really helped, may have helped
to hear buzz of thermal sight and other equipment noises,
compensated for being encapsulated; not sure; not distinguish
between wheel and track; anything longer than 100-150m drowned
out by yourself; use LP/OP only; noisy even if you stop and lie
down, interferes, don't trust it - did I really hear it?; listen
for key things - can't, walk, leaves; enhanced hearing is like a
funnel - can't filter out stuff you don't want to hear and can't
adjust it; greater than 5m in front is like potato chips; better
than kevlar because kevlar blocks out a lot of sound waves you
hear - only problem is that if there is any wind here it will
block out a lot of what you hear - like people behind - a
forward mike - they will need a backward one so you can hear
behind you.

28. With your **LONG RANGE HEARING** device, could you hear some
kinds of targets better than others? Yes **2**   No **0**
Did not use **4**   Explain.

Cluttered sound - wind, bugs, everything, walking lots of
noise - whoosh ; pick up vehicles and voices - vehicles drown out

voices; if you were silent, 50-75m; not a Miracle Ear; stopped wearing; voices you can hear farther - sharper pitches of noise hear better - knocking, brushing or branches breaking - but deep noises were a lot harder to hear. They weren't real sharp past 100m but within 100m you could hear a conversation - but a little bit of wind will block you - sounds like a hurricane in your ear.

29. Were there any problems in the way the SIPE weapon system worked?   Yes **6** No **4**   Explain

    It is only a sight platform - no problems; can look down and not illuminate everything but heads up, want something on your arm, like small screen, look straight through thermal, other information best displayed elsewhere not heads up, regular sight better resolution; eyecups of PVS4 got caught in the eye pieces, big problem with gloves, controls are too easy to adjust and bumping weapon changes setting; static in one ear and needed to turn off and back on; cables interfered with movement and comfort, helmet made it difficult to assume comfortable firing positions, bulk of equipment also made moving and assuming firing positions difficult; takes time to get used to; helmet all the time; thermal needs autofocus button - too far too hard to do; TWS too loud for long range hearing; cords being pulled off and unconnecting - need remote, batteries go down; like the sling - it is really good.

30. How did the SIPE NBC **PROTECTIVE GEAR** impact on your ability to perform target detection? How does this compare with standard MOPP gear?

    SIPE was hotter during daylight hours which over an extended period may have caused more fatigue and an impact on target detection - no real impact during the test; SIPE preferred - mask better vision, clothing not as hot; MCC excellent; gloves felt good, better than old ones, knit gloves poor, blower - make better smaller less noise sticky stuff coming off gloves; more comfortable in MOPP4 better ventilation, better detection but problems with heat - cooling system would help; weight of helmet pushed down gas mask causing displays to be blurred and considerable discomfort, enhanced hearing picked up crackling of MOPP clothes; mental health stress because of heat buildup - SIPE NBC gear will be superior to what we use now when the MCC is working correctly - quieter and more compact. All NBC protective gear is bad - it's hot, mental stress, soldier doesn't want to be there, he is sweating and hot; better MOPP4 than SIPE 4 because of mask with helmet on, can't breathe; "with the MOPP gear it will be stressful because of the heat and stuff but with the SIPE gear if I had the air conditioning unit I would have been in

seventh heaven. But without it I've had Jesus help me out of the foxhole. It just got so hot it was stressful and with that brain vice on your head and trying to angle the visor"; detection was easier in SIPE.

31. Did the SIPE clothing and equipment enhance your ability to complete the individual tasks associated with target detection in daylight? Yes 4 No 6 in the night time? Yes 9 No 1 Explain.

Working while wearing standard clothing and equipment was more comfortable but you were wearing less equipment and there was not an equipment load such as a rucksack - this was not a fair comparison; simplest more better than regular, under stuff good, flexible, not rub neck; clothing didn't matter - equipment TWS helped at night; sights helped at night and uniforms keep body comfortable temperature, SIPE did not degrade daylight capabilities; can see longer ranges with thermal; personnel easier in thermal, vehicles too; at night - but in the day I'd have to use my naked eye plus the thermals, can't tell people from trees - you lift your visor up.

32. Is there anything else you would like to say about target detection?

Get rid of the heads up display - everything else I like; like SIPE gear better than MOPP; like mask better able to see without heads up, like drinking thing - I was one of the people who could actually reach it; heads up - hard to see day time eyecups especially with mask, cups don't stay stable, flip up mask and cups get messed up, it wobbles; just feels like a vise grip - it hurts so then you crank it open and it falls so you have no picture - then tighten it up and down and play with the eye cups - scrunch up the cups and then light comes in and try to block the light- get picture in front of you and like its superimposed - see your eyes in reflection; lots of clutter cause of eyes and glasses, could see better without the safety glasses - they got in the way big time; a good well maintained PVS4 can work very well, thermal worked well at night; disorganized, slow, could have been faster, hard to maintain my military bearing, try to explain to someone who knows nothing about it; they should tighten themselves up on the scheduling - it was too stressful to be in gear for so long - it was unnecessary; ballistic vest - on the pockets there is no drainage like on the regular BDUs - if you get a lot of water you're going to have water balloons; I'm not impressed with the combat gloves - to me the reason a soldier uses gloves is thorns, prickers or glass. They say the kevlar gloves are so good with

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the rubber - if they made them of leather or something that is
solid then put the tips on them...if I'm going through vines and
trying to pull them away and they are stabbing my hands I'm going
to throw them away; same for glass. They ought to be able to
offer some protection, wet or dry. Even though the leather gloves
stay wet you sacrifice that because you don't want your hands
scraped up - repelling I can't see getting my hands blistered and
smoked just because its kevlar - just because somebody up top
says its good; boots are real good - going to have to work on
inner quality because my inserts always pull out with my foot and
I can never get my boots off - but they are really comfortable;
the gaiters - they have to start on a better system because they
take too long - even without the MOPP gear; the weight of the
head display - after a few minutes you just had to lean your head
back. For the back of the neck you had to try to even out the
weight - it leads to the back of your head and that's where most
of the stress in your body starts. And when it locks up on your
temples and forehead that's a trauma to your skull; your head's
not used to that. Here it is getting viced up especially right
in back - the back of your brains getting all tensed up. You are
so tense your body seems like it is going downhill. You get
claustrophobic in that helmet because it's so GD heavy. You get
a big purple ring around your forehead and its not like the one
you get with the kevlar helmet; helmet is comfortable without the
visor - it is like a construction hat and sits on the top of your
head - we put in jump straps like in our regular helmets and that
helps a lot; BDUs were comfortable but they make a lot of noise -
when you go to jungles you will have trouble with prickly heat
because the pores in your skin are not going to be able to
breathe like the regular BDU; Cool max t shirt is excellent; with
the thermal sight you have to balance the weapon so that it
doesn't roll over; but you sacrifice that for the capability.

APPENDIX H

INTERVIEW: SMALL ARMS FIRING   11/5/92

Included in Appendix H are the results of the structured interviews administered after the small arms firing phase of the TEXCOM portion of the test. Soldiers were interviewed alone or in pairs; their comments and answers to specific questions have been combined. Minor editing has occurred as appropriate.

INTERVIEW: SMALL ARMS FIRING   11/5/92

1. How confident did you feel in your ability to use the **IRON SIGHTS** <u>for target engagement</u> during the day <u>at short range</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
10	0	0	0	0

Explain your rating.

Highly familiar with iron sights; that's what we have been using all along; full field of view, familiarity; so much training; lots of practice.

2. How confident did you feel in your ability to use the **IRON SIGHTS** <u>for target engagement</u> during the day <u>at long range</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
1	3	4	2	0

Explain your rating.

Harder to use iron sights at long range; past 450m with iron sights in the day, depending on weather, no way, past 500m you can't even see the target; depending on whether you can see the target - glare, obstructions sometimes interfere; as long as there is no wind - having someone spotting is a big help plus the fact that I enjoy long range shooting; not so much practice but trained at long range; Army does not train units on long range fire plus M16A2 was not made to fire at ranges over 300m with good hit probability; never have been trained on it plus weapon is ineffective at long range.

3. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION (I^2)/AIM-1/PVS4** capability <u>for target engagement</u> at night <u>at short range</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	3	4	0	2

Explain your rating.

PVS4 confident - AIM not; bounces off grass - targets covered by grass; mist with PVS4 made it difficult - frequently had to wipe; 50m limit for I^2, 150m with PVS4; after 400m the beam that comes out will cover the target and you are not sure if you are tracked to the target or not - 50m or 100m you can see it on the target, past that it gets too wide; if there is just one blade of grass in the beam it splits the beam, and the beam will

just haze out the whole area; confident with PVS4, unsure with I^2 - hard to see past 150-200m. Over 100m laser obscures the target, larger margin of error; PVS4 eyecup is hard to depress, especially unsupported or in P mask; with I^2 and aim neutral can't see past 100m, PVS4 better - they are really good, well maintained. PVS4 performance degraded in dust, fog, rain; you can't see very well past 100 with I^2; good for 80-150m; was limited by night vision device for target detection

4. How confident did you feel in your ability to use the **IMAGE INTENSIFICATION (I^2)/AIM-1/PVS4** capability <u>for target engagement</u> at night <u>at long range</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
0	1	1	2	4

Explain your rating.

      PVS4 neutral - AIM 1 not; PVS4s were OK but I^2 was gone at 150m; could see to 400m; couldn't beyond 150m; didn't use I^2 at long range, PVS4 unsure when using a protective mask at long range; didn't use I^2 - PVS4 without mask and good weather conditions I was confident - we didn't zero our own weapons so we weren't sure they were right for us; didn't do it, N/A; not made for long range - dot is bigger than target

5. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability <u>for target engagement</u> during the day at <u>short range</u>?

Very Confident	Confident	Neutral	Unsure	Very Unsure
7	2	0	0	1

      Very unsure in prone but confident in foxhole; targets showed up well; there's no question on the point of aim, better target acquisition and rifle marksmanship than with iron sights. Fine for fixed fighting positions but would prefer iron sights for daytime movements; easy to attain a good sight picture but you needed to get used to the weapon's point of impact since someone else zeroed; good piece of equipment; liked the way the thermal is set up - you see exactly what your target is and set the cross hairs - you know where you are going to hit - thermal sight is one of the best things about the system.

INTERVIEW: SMALL ARMS FIRING (continued)

6. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability <u>for target engagement</u> during the day at <u>long range</u>?

Very Confident Confident Neutral Unsure Very Unsure
1   2   5   0   2

Explain your rating.

Difficulty in hitting targets; range reticle did not correspond to actual range; had to compensate because did not zero weapons ourselves; hot spots and trouble finding the 600m target; at long ranges it's going to be difficult to hit anything due to wind and so on - but thermal lets you see at 500m; more confident than iron sights as long as sight is zeroed accurately, better sight picture/target acquisition; lot of hot spots to distract you - at real long ranges it was hard to find where on the reticle to put the target; never been trained at long range; TWS is very good because it provides better acquisition than naked eye; difficult to get steady shut off.

7. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability <u>for target engagement</u> at night at <u>short range</u>?

Very Confident Confident Neutral Unsure Very Unsure
6   3   0   0   1

Explain your rating.

Very unsure in prone but confident in foxhole; targets showed up well - zeroing was adequate at close range, normal compensation worked; there is no real big change between the night and the day - some things not as hot in the night - at night everything really cools down - during the day the sun shines on skid plates or vehicles or trees - you have to distinguish that, especially in target engagement; you're going to need a range card out there so if you look out and see the enemy you won't mistake them for a hot spot; even better than thermal day - only the things you need to short are hot as opposed to daytime when the ground and sandbags are hot; same as day; better than naked eye; target detection is vastly enhanced by TWS.

8. How confident did you feel in your ability to use the **THERMAL WEAPON SIGHT** capability <u>for target engagement</u> at night at <u>long range</u>?

Very Confident Confident Neutral Unsure Very Unsure
1   3   2   1   3

Explain your rating.   H-4

INTERVIEW: SMALL ARMS FIRING (continued)

Heads up stinks; zero - not see 600m target; could see targets but not hit them; uncomfortable to fire - weapon above and head on bag; could not get shoulder weld, recoil problems added to inaccuracy; sight picture and target acquisition; confident but I didn't do so well - targets are more distinct at night but finding where to put the target on the sight reticle was still a problem perhaps because every time it was a differently zeroed weapon; not trained on long range; acquiring target is good but weapon not accurate at long range; difficult to get steady shut off.

9.   How accurate are you with **IRON SIGHTS** at short range?   At long range?   Explain.

Fair; confident at short, very at long; highly at both; highly at short so so at long; short very, ok at long; good at both - easy to use shooting fundamentals and with all the practice; average at short, not very at long; very at short not too bad at long (2); short range is excellent - at long ranges not so - we have weapons crews M60 and snipers to take care of the targets at longer ranges.

10.   How accurate are you with the I^2/**AIM-1** combination at short range?   At long range?   Explain.

Neutral at short, very unsure at long; S...; better cause most firing time ever had; if you saw the target it was highly accurate, didn't use at long range; short OK long N/A - can't see past 150m with I^2 and Aim 1 obscures target for proper sight picture; at short range OK at long useless - I^2 doesn't give you a picture beyond 150m that is definable - from 1-50m it's great; it's an accurate thing at short range, at long the beam spreads out and you aren't sure - you just have a general idea; would be good for MOUT; doesn't see well past 100m; very accurate; long range not tested.

11.   How accurate are you with the **THERMAL SIGHT** at short range? At long range?   Explain.

Short range foxhole very, everything else terrible; these weapons aren't zeroed right so the tests and scores become moot; confident at short neutral at long; highly accurate at short, not at long (2); problems with weapon zero - reticle may not reflect bullet drop from M16; very effective at short range, effective at long but the biggest problem that you run into is that those sergeants out there think that they are the best zeroers for those weapons - that is not the case; very at short, ok at long depending on who zeroed the weapon; short very, long OK - short

targets are larger and easier to hit, naturally the long range ones are smaller; short very, long not very; not too bad at short, not very good at long; good at short - would have been better if we zeroed our own weapons, very at long.

12. How does the SIPE weapon system compare with using iron sights in the day? At night?

Rather use iron sights during the day, thermal at night (2); it stinks; no comparison; much much better at night because weather doesn't matter with target detection, same results SIPE and standard during day; iron are better because you can see the target without any heat distractions and have a better field of view, at night SIPE is better because you can actually see the targets; SIPE should have included a 7.62 weapon system that is for SIPE attachments because M16 had a Christmas tree effect which took away from marksmanship fundamentals; heads up is a pain; day was about the same; thermal is a good idea; at night it is better; at close range, or in day - thermals are better if there is any brush or if the enemy is camouflaged - it's harder with iron but at night I'll take the thermal in a heart beat, especially if you have your Pro mask on.

13. How did your standard MOPP gear impact on your ability to engage targets?

Greatly as far as comfort but with practice you get as good as system; hard to acquire targets; no impact; hit one target less in MOPP; M17 mask didn't fog like the XM44 SIPE mask, although I sweated more in M17 which blurred eyes; MOPP4 during the day don't like having to cant weapon to get sight picture; it hampered it greatly with seeing, and getting a good position to fire from; more difficult to get a sight picture; mask messes up sight alignment, makes it difficult to engage properly; difficult to fire because of eye lens in mask; not so bad during the day with a bit of practice you just have to look out of the opposite eye that you usually use but at night you almost have a nervous breakdown trying to get your eyecup in to the PVS4 eyecup and you can't get a comfortable position and there's no way you're going to get an accurate shot.

14. How did your **SIPE PROTECTIVE gear** impact on your ability to engage targets?

Almost impossible to spot targets - after 2 magazines can barely see out of mask - difficult to squeeze trigger, hard to breathe due to heads up causing base of neck to squash nose and impair breathing; greatly hindered; mask made it difficult to get

sight display in prone; minor problems only; don't have to cant weapon, same sight picture because of heads up display; SIPE4 gloves are often more difficult to manipulate weapon during loading/unloading, trigger squeeze; gloves wouldn't let me get a good trigger squeeze, the mask hampers your head movement by not letting you get comfortable, the heads up visor crushes your face; I was hitting stuff but with the SIPE suit on comfort was nil - the weight of the scope, the helmet, the head vice stuff - the MOPP part isn't too bad, especially with the air conditioning - good having air come into your mask; mask rides low on your face - it's a little more comfortable than regular because I didn't have to try to get my eye in the eyecup; it's a mental thing - hot and claustrophobic; was difficult to get in a comfortable firing position.

15. Were there any firing positions which were more difficult than others with the SIPE equipment? Yes **10** No **0** Explain.

      Prone (2); prone is a joke; prone and kneeling behind walls; foxhole isn't that bad but prone puts strain on neck when head is resting on non-firing arm then firing arm gets too fatigued; prone you couldn't hold your weapon steady at all; all equipment was very awkward; prone hard to engage targets, keep weapon steady, etc.; prone - helmet was too heavy; prone - it's difficult to get in a comfortable position and you can't move an inch so you try to keep the position. When you walk one step at a time that would take a while for your body to get used to because your whole body is moving, so it's hard to draw a bead on the target and stay on the target - by the time you're on the target and pull the trigger you are off another couple of feet.

16. Did you ever find a comfortable firing position using the SIPE equipment? Yes **8** No **2** If yes, which one? If no, explain.

      Foxhole was (fairly) comfortable (2); it's not humanly possible; foxhole; prone was comfortable with sandbag for head; standing (2); standing - leaning against foxhole with elbows on ground; prone resting head on non-firing arm; in the supported position, standing up in the foxhole was pretty comfortable - you have sandbags under your arms, your chest and put two sandbags to mount the gun on and you are finally comfortable and then you rest your helmet on your forearm - I didn't have a problem with the helmet as bad; foxhole, standing with the weapon supported; foxhole standing; prone was most comfortable but not very.

17. Have you become used to turning your weapon to scan instead
of turning your head to scan? Yes **7** No **3**   Do you like it?
Yes **1** No **6** Explain.

Misoriented; I never turned my head in SIPE; neutral; makes
you car sick because your eyes are seeing things that your brain
isn't expecting because your head isn't moving; I don't like it
because you have to steady the weapon after scanning which is
tough sometimes because the sight makes the weapon top heavy, it
takes time to acquire the targets after you are moving left and
right; now you are so used to using the scope you just have to
look in the opposite direction or you put your head down because
if you are looking in the same direction as the target you are
tempted to move your head; keeps you misoriented - a kind of
vertigo effect; it's a natural reflex to turn your head - I don't
think you will ever break it.

18. Do you ever feel claustrophobic wearing the SIPE equipment?
Yes **9**   No **1**   Explain.

Mopp and SIPE helmet; always; in PR4, breathing problems
too; at the beginning PR4 and breathing better now; during target
detection phase I often became nauseated in SIPE4 with helmet on;
too much pressure on head; while wearing mask and protective
gear; while in SIPE4, especially helmet; especially in MOPP gear.
Loved having the air conditioning system but along with the MOPP
gear, walking up a hill or starting to work up a sweat, your
breathing starts going - you have to try to control your
breathing or you will start panicking - you start
hyperventilating because you can't get enough air even with the
air conditioning coming in - if you start working up your heart
rate you can forget it. Problem with the P mask is that it will
start sliding down your face and the bottom cup will start going
down on your Adam's apple and the eyecups will start sliding down
- but it's a lot more comfortable than the M17.

19. How do you feel about having a heads up display for target
engagement?

Would like to be able to have normal vision through HUD both
day and night and have a button to bring up thermal or I^2
display; it sucks for comfort and works 1/2 the time; the worst
thing that I've ever encountered since I've been in the Army;
great at night or limited visibility but would prefer iron sights
during daylight with no fog/smoke; it would be good if it felt
comfortable on your head but it works; good if it was reduced in

size and weight and allow one eye free to scan without HUD; it's worthless - use thermal like PVS4; should not be in visor - should be a small box carried in the cargo pocket with same graphics; I like it because of the thermals - you see more targets than with the naked eye.

20. Did you have any problems with the field of view in I^2 2 or **THERMAL 4** ? Yes 1 No 4 Explain.

Not get weapon bracing - jumped into next lane and didn't know it; I^2 isn't even as good as PVS4s - who are these people trying to kid; misoriented as to where your lane is and no clue as to what's around you; could see entire lane side to side but couldn't see very far with it; the thermal's limitations left and right stinks; the I^2 isn't even half as effective as the thermal - even close up because you're not sure if you're hitting the target; I^2 range is not long enough; hard to see past 100m in I^2; thermal very narrow FOV.

21. Did you have any problems holding the SIPE configured weapon steady? Yes 9 No 0 Explain.

I haven't been able to do it yet; bracing the weapon is impossible in prone; thermal sight made weapon unsteady, bad balance; can compensate most of the time; only during unexposed wall firing and quick fire; getting a good firing position is tough - you basically end up holding the weapon with your hands - not in your shoulder or arm - plus it is top heavy; location of thermal switch - make smaller place on pistol grip; only in the prone position and when walking - walking is going to be a problem; while kneeling around corner, standing around corner and walking; too many switches that takes away from marksmanship.

22. Did you have any problems with the **THERMAL** switch or adjustment knobs? Yes 7 No 3 Explain.

Make thermal like the aim light switch - bad position, knobs move too easily; sight knobs need locking device; with thermal switch have it stay on, not have to hold it on; constantly bumped them with heads up; many in MOPP4; I can't even load or pull spots on a magazine; four switches to adjust brightness and contrast - when you go down to the prone position, 90% of the time the helmet turns the dial and blocks out your screen; like combo of switches on weapon and on person; if you could leave it on without touching it it would let you think about one less thing; it is too far out of the normal firing position; location is bad - make smaller and place on pistol grip.

H-9

23. Did you have any problems with the **AIM-1 DEVICE**? Yes **5**
No **3**   Explain.

Bouncing off grass disperses it, in the clear it's OK;
blurred whole target; visibility distance too short; did not have
enough practice with it; obscured target at 100m and beyond
making proper alignment inaccurate for bullet impact; can't see
the target when the laser is on it because it reflects and blocks
it out; location is bad - place on pistol grip; not a bad idea
but when used with the I^2 doesn't see well past 100m; past 100m
you are not really sure if you will hit the target or not; after
150m. dot is bigger than target.

24. Did you have any trouble deciding whether what you saw in
THERMAL was a target?   Yes **3** No **7** Explain.

Lane boards look the same in the day; range targets were
highly visible - might not apply for actual objects; at long
range when ground and sand bags are hot; yes and no - once in a
while but now I am pretty sure what I am looking for; just during
the day - might see hot trees or something like that - in a
stationary position you would want to have a range card to see
what was out there so it was not mistaken; in day time the range
would heat up and leave hot spots.

25. What polarity (black hot **1** or white hot **8** both **1**) did you
use most often? Why? Is this the same as you used in the target
detection event? Yes **6**   No **0**   Explain.

Day black, night white it changes; white easiest to see; did
not even try black hot; less eye fatigue with white hot; white
just seemed natural because in black hot it seemed like
everything was in negative; similar to night vision; I darken
screen so when a hot spot shows up it stands out like a sore
thumb; used black because the green crosshairs are easier to see
on the target.

26. Did you have any problems in range estimation with standard
sights?   Yes **0**   No **9**   With SIPE sights?   Yes **5**   No **4**
Explain.

You can't see 3 D in SIPE; no depth perception; would have
if target size had not been a cue since there is no depth
perception with SIPE sight; long range I would have no idea if
range wasn't called out or there were more targets in lane and I
couldn't memorize them; I went by target sizes - without targets
then yes problems in SIPE because of the flat screen; cannot
determine range because perception is distorted; not really

because out on the range they told you where all the targets were - how many meters out. Without that I'd say there would be a problem. With SIPE sometimes when your battery was low the dots start to get blurred or when you have MOPP gear on.

27. Did the SIPE weapon system cause you any problems in breath control? Yes 7 No 3 If yes, did it impact on your accuracy? Explain.

Couldn't hit a thing in MOPP; yes of course - dumb question; in PR4 in prone position; compensated and did not affect accuracy; probably hurt accuracy; only in the mask; SIPE was very awkward and uncomfortable; in prone you couldn't fire effectively; only in MOPP.

28. Did you ever feel that your SIPE weapon was not adequately boresighted or zeroed? Yes 9 No 1 Explain.

25% of the time; [checked yes box 8 times]; boresighting was fine - zeroing was off - it showed up with long ranges; I always had to adjust point of aim with a sight that was zeroed by someone else; most of the time you needed to figure it out; it would have been better if we had been allowed to zero our own weapons - zero and adjust from there; some of the time; they weren't really the best - they were doing it quick because they wanted to get out of there - I ended up shooting six or seven feet above the targets.

29. Describe your experience in shooting through smoke.

The hot smoke blocked out the targets because the smoke pots were right in front of the targets; with thermal sight when we did night firing, the heat of smoke pots distorted my ability to engage targets effectively.

30. Describe any quick fire experience.

Hard to steady a weapon with no bracing; impairs movement, rate of movement, unstable weapon, misoriented; hard to maintain sight picture; problems would have been overcome with more training; takes a while to get comfortable with it - while practicing 1-2 months ago I didn't do that well but did pretty good this week during test; tough walking and steadying the weapon because you don't put in your shoulder; difficult to maintain a good sight picture; you can't hold a weapon steady enough to engage targets effectively; quick fire is a stupid idea.

31. Describe any experience in shooting with the visor flipped up.

Not possible in prone; useless; never fired with visor up; fired during PR4 - centerpiece on mask prevented sight picture and failed to hit; a lot of neck strain because center of gravity is not right - too high; uncomfortable and cumbersome tough to get a sight picture; could not with helmet strapped down; couldn't lift head to see sights or engage targets effectively; weight of helmet pushing down on forehead and neck strain made it very difficult.

32. Over all, did the SIPE clothing and equipment enhance your ability to complete the individual tasks associated with target engagement? Yes 3   No 4   Both 1   Explain.

Heads up totally impaired use of what would otherwise be a superior system if thermal was used in the same manner as a PVS4; clothing really made no difference; like all the capabilities of it but they are going to have to work on it - mainly the discomfort for the morale of the person using it - they are just going to want to throw it away; thermal helped but not Aim light; Aim light would help if visible on thermal sight; same as during day - much better during limited visibility, night and fog; in certain situations such as night or cloudy nights or days - basically it helped when the atmospheric conditions made everything else useless; at night short range, yes, the rest of the time, no; the protective gear except the boots is a good idea - the helmet with the adjusting strap and thermal sight are good ideas. The heads up display, computer and land nav device are not worth the money; Army wasted a lot of money even considering using the SIPE gear that I tested: helmet too heavy - don't put display on visor, vest good but not sure of its ability to stop fragments, collar too high; uniform too hot - doesn't absorb moisture, boots wore out quickly, poorly made; thermal good - only piece that should go forward; NBC undergarments may be a good concept, NBC overgarments just like Gortex, not sure of its ability to provide protection; mask rides too low on face.

A problem with the SIPE system - if you are down in the prone position you've got this weapon that is totally lopsided because you've got this ten pound scope mounted on it - your wrist is going back and forth and you get a cramp in your forearm from trying to hold it steady - you've got to have sandbags too. The thing is so bulky and the helmet is so ... heavy the helmet goes down and it turns the knob on the scope. When you put your head down all the time it turns the dial on the scope - have to have some kind of safety latch on it. Everybody seems to be

running into that problem. Both MOPP4 and the helmet in the probe position are uncomfortable.

        You start to get used to the weight problem of the helmet and your head starts tightening up to handle the helmet but you're never going to get over that. Everybody has different shaped heads so it's affecting each of us differently. Me and a couple of other guys have bigger heads and trauma to your forehead is just immense and you end up - its like a gut check to get through the firing iteration - you keep saying to yourself "I can handle it, I'm not going to rip the helmet off and throw it on the ground."

APPENDIX I

INTERVIEW: NBC PROTECTIVE GEAR 11/5/92

Included in Appendix I are the results of the structured interviews on NBC protective gear. These interviews were conducted after the small arms phase of the TEXCOM portion of the test. Soldiers were interviewed alone or in pairs; their comments and answers to specific questions have been combined. Minor editing has occurred as appropriate.

1. Did your **SIPE PROTECTIVE** gear make it harder **5** or easier **5** to move than standard MOPP gear? Explain.

Easier if outershell not included; mask more comfortable, CVU/ACU not as thick as BDU; more flexible to move in; helmet back pack mask and gloves - harder; [harder] because of helmet and backpack; too claustrophobic - the mask is a good idea though I would like to fire with it like an M17; the material on your legs - it's not as obtrusive as the standard gear where you feel like you have 5 layers of quilt on each leg.

2. Did your **SIPE PROTECTIVE** gear make it harder **6** or easier **3** same **1** to shoot than standard MOPP gear? Explain.

Face mask interfered; didn't have to change sight picture and cant weapon; easier to hit targets but harder to get comfortable with the visor; body position and SIPE gloves make it very difficult to get good trigger squeeze; hot; can't steady weapon, poor trigger squeeze, can't see through pools of sweat in eye lenses; it wasn't comfortable but it was a lot more effective when it comes to shooting.

3. Did your **SIPE PROTECTIVE** gear make it harder **1** or easier **7** same **1** to communicate than standard MOPP gear? Explain.

With voicemitter easier, didn't do commo, took voicemitter off; easier - enhanced your hearing; voicemitter (3); same as standard; voicemitter and squad communication; equal; with the voicemitter - but if there is wind or the battery is low or you bang it hard it makes a whistling sound, got to remember to turn it off and on when you talk. Easier to use the intercom off your helmet to communicate with the rest of your squad - you don't have to sit there and yell in a muffle to another guy

4. What, over all, were your problems with your **SIPE PROTECTIVE GEAR**?

Uncomfortable in prone position; mask did not fit well; claustrophobic at first 1-2 months ago but I've gotten used to it by now. Some times I get double vision and see two sight reticles when the mask/helmet aren't properly aligned; the visor bearing down on my nose with the mask - the gloves don't afford you any "touch"; makes me dizzy; gloves, helmet, backpack; they need to improve the MCC harden and quiet it because the protective gear is superior over MOPP; restrictive, heavy, bulky helmet hurt more, didn't fit, fogging; the gloves are too bulky,

I-2

the heads up squishes nose causing you to breathe through the mouth which fogs lenses, face straight down causes pools of sweat that can't be seen through to see targets; getting down in the prone position isn't comfortable.

5. Was the **HELMET MOUNTED DISPLAY** degraded by your **MASK**? Yes 6 No 2 Yes & No 1 Explain.

Had to press down to get sight in view; had to push up to see; not when properly aligned; couldn't see it unless I pressed it down, crushing my nose; have to push mask up and pull helmet down while firing; no though it made mask more uncomfortable; couldn't use heads up with MOPP effectively; it's degrading all on its own - the mask only intensifies it; having problem wearing the helmet so it at least gets down over the eyecups - I would have to look up at an angle and tilt the helmet and look down so that I could look through the heads up display.

6. Could you use the **HELMET CONTROL UNIT** with your **PROTECTIVE GLOVES**? Yes 3 No 7 Explain.

Lost needed dexterity; but not very well or fast; it's all technique; fingertips too large and bulky; gloves too bulky; couldn't feel the knobs; they were better than the standard MOPP gloves.

7. Could you hear yourself and other people breathe? Yes 8 No 2 Could you hear yourself and other people walk? Yes 3 No 3 Explain.

With voicemitter on; if close enough - 5 feet; hear others breathe when their voicemitter was on, could hear myself breathe all the time; I could hear them walk without my earplugs in; hear myself (2); especially in the foxhole - could hear other people walk but it was muffled.

8. Did you sound louder than normal in **PROTECTIVE GEAR**? Yes 10 No 0 Did other people sound louder? Yes 5 No 5 Explain.

Others louder because of own voice; the crunching of the overgarment; with voicemitter (2); more gear more weight more sound; louder breathing; with the voicemitter - you sound like Darth Vader with that stuff on or if you talk it's a lot louder than one regular person's voice, they sounded louder - its good for commo if you remember to turn it off.

9. Could you understand people talking with the voicemitter? Yes 10 No 0 Without the voicemitter? Yes 9 No 0 Explain.

INTERVIEW: NBC PROTECTIVE GEAR (continued)

Understand without the voicemitter if very close; talking was muffled without the voicemitter - just like a normal P mask; better with voicemitter; without sounded like a regular M17 mask.

10. How did the heat buildup in your SIPE **PROTECTIVE GEAR** compare to the heat build up in standard MOPP gear?

With outer shell it was worse; did not use outer shell; much greater with ASG - entirely tooooo much. Not bad with CVU/ACU. Mask more comfortable but CVU liner of mask soaks up a lot of sweat and XM44 fogged up too much; it was the same; very ; hot; hot as hell; much hotter in SIPE; more so in SIPE; the heads up greatly intensified; it was a little bit cooler without the MCC - with the air unit it was a lot cooler.

11. How does the SIPE **PROTECTIVE MASK** compare to the standard mask? Did you have any problems? Yes **6** No **1**   Explain.

Standard mask fit better; XM44 fogged every time but other than that much better comfort and iron sight target engagement; much better than the standard - I had a problem with the visor and nose crunching. Your head movement seemed restricted with the back pack; good concept - I just didn't have a good fit; 100% better field of vision much better more comfortable; just with heads up and my right lens steamed up constantly - the mask itself is a good idea; I couldn't say - mine doesn't fit properly; it's better - only problems I had were caused by the heads up; I especially liked the little fan in the mask - that helped a lot - only problems when putting on the helmet the mask will slide down.

12. Did you have any problems with the **PROTECTIVE GLOVES**? Yes **8** No **1**   How do they compare with the standard gloves? Explain.

Controls hard to use; more comfortable but lose almost all finger dexterity; no "touch" - the two layers hampered trigger squeeze and they seemed to hurt my fingertips; too bulky - the tips of fingers hard to adjust thermal control unit; poor trigger squeeze and tips bulky but cooler and comfortable; much bulkier, harder to properly trigger squeeze; too bulky for the tasks needed to operate SIPE controls; too bulky poor trigger squeeze can't feel adjustment; more comfortable than standard gloves - liked tips you could pick stuff up easier.

13. How does drinking water in SIPE **PROTECTIVE EQUIPMENT** compare to standard MOPP gear? Were there any problems? Yes **3**   No **5** Explain.

I-4

Trouble with bottle; able to do it with SIPE; easier with SIPE water pump (2); much better (2); not used enough; drinking hose too short in mask; I don't know - my mask didn't fit so I couldn't reach the water tube; I like it cause you've got the hand pump and it pumps water right up into the mask - it's a little bit hard trying to keep the water spigot between your teeth - if you let go it's a problem.

14.   How do you feel about the **MICROCLIMATIC CONDITIONING SYSTEM (MCC)**?   Were there any problems? Yes **1** No **6**   Explain.

Great but not enough experience; solved breatheability problem; very good - mask never fogged when using it, more comfortable to wear all around; didn't use it; for REMFs - should not be used by others; improve and harden; great; liked it - they've got to beef up the power switch because that thing is going to break right off plus it shuts on and off real easy - put a flip down cover over it.

15.   Was the **MCC** adequate to cool your body? Yes **6** No **3**   your face? Yes **5** No **0**. Did the XM44 in-line-blower help keep you cool? Yes **3** No **0**   Explain.

Awesome! Good stuff; blower makes more sense; torso cool face cool legs and arms OK; got rid of some of the mental problems you have in SIPE and MOPP; upper body is very good, legs are hot as hell; a Godsend, biggest thing I noticed was the air intake into the mask helped to keep your face from sweating - from sweat getting in your eyes - helps your breathing a lot plus you are breathing in cooler air.

16.   How did you like the **SIPE NBC PROTECTIVE GEAR** over all? How should it be changed?

Mask and gloves (2); thinner gloves but everything else is user friendly; p very good for movement and communication - gloves need to be modified somehow; good concept way off from fielding; good - fix gloves and make it all lighter and improve MCC; DX the boots too expensive - the rest of the gear is far superior (ASG); water tube reachable instead of 2 eye holes, one long bubble visor, less bulky gloves, MCC must be a part of MOPP, mask needs to fit better; it's good except for the gloves are too thick; 100% better than regular MOPP - it's cool and you can move a lot faster in it, material doesn't rub like the standard MOPP, gloves need to be a lot more rugged, bring the durability up.

INTERVIEW: NBC PROTECTIVE GEAR (continued)

17. What were your overall performance degradations in SIPE
PROTECTIVE GEAR and how did they compare to standard MOPP gear?
Do you think you would be able to work harder/longer in SIPE
level 4 than in standard level 4? Yes **3** No **1**   Explain.

        Dexterity; when breathed out mask vibrated, noise/
distraction; as long as you don't have to wear the ASG - too hot
and poor mobility; I don't think it's any different than standard
heat wise - the gloves do breathe but the MOPP gloves are better
for working; with MCC you can perform longer and harder; possible
with the MCC (I don't know I never used the damn thing -
otherwise definitely not; it's better only if heads up is
removed, gloves are too thick; nothing in standard that is
superior over SIPE MOPP - only draw back is the mask how it slips
down on you. SIPE more comfortable. Regular is more physical
because of the way it rubs together - it will wear you out
because it doesn't glide like SIPE gear. Clumsier and bulkier in
standard. In SIPE you have the targets in front of you in the
display and no way we could get targets at 400m in regular MOPP
because we could not get the mask up to the PVS4 eyecups so we
could see.

APPENDIX J

INTERVIEW: LAND NAVIGATION 11/13/92

Included in Appendix J are the results of the questionnaire administered after the land navigation phase of the TEXCOM portion of the test. Since individual/group interviews could not be conducted due to time constraints, soldiers completed questionnaires. Their comments and answers to specific questions have been combined. Minor editing has occurred as appropriate.

1. How confident did you feel in your ability to use standard gear to navigate during the daylight hours? (Circle the number)

Very Confident Confident Neutral Unsure Very Unsure
9   1   0   0   0

Explain your rating.

     Prior training; Yankee Road has footpaths from other walkers; no challenge

2. How confident did you feel in your ability to use standard gear to navigate during the hours of darkness? (Circle the number)

Very Confident Confident Neutral Unsure Very Unsure
4   4   0   0   0

Explain your rating.

     A little harder in lim vis; confident in pace count and sense of direction tho hard to recognize land features; lim vis makes terrain association and movement slower.

3. How confident did you feel in your ability to use the **SIPE NAVIGATION SYSTEM** during the daylight hours? (Circle the number)

Very Confident Confident Neutral Unsure Very Unsure
3   0   5   0   2

Explain your rating.

     Compass was good; I am confident but the system just does not work; no problem till GPS broke; not operating 100% of the time; if it worked it would be good (3); if it worked you couldn't ask for more.

4. How confident did you feel in your ability to use the **SIPE NAVIGATION SYSTEM** during the hours of darkness? (Circle the number)

Very Confident Confident Neutral Unsure Very Unsure
1   0   3   1   1

Explain your rating.

     Confident that I could but it doesn't work - didn't do it.

5. How did the **SIPE SYSTEM** help you in day navigation? In night navigation?

    None because it malfunctioned; when it worked it gave you 8 digit where you were at; then lost all satellites; ok till ready to roll; not; slowed me down, hindered me; GPS good when it works; if it worked, to ensure I was on point; gives you distance and direction at the push of a button; showed me where I was in relation to what I was looking for.

6. When was the **POS NAV SYSTEM** most valuable?

    Not; when I wasn't wearing it; when it was working (at the start point); never; back in the UAV; back at Natick; when I was misoriented, to find out where I was and update position and get GPS and distance to target. Verify I was at the right point.

7. Did the **POS NAV SYSTEM** work? Yes 0 No 8 Explain. What, if any, were your problems?

    GPS down; hard to maintain satellite contact; yes but it slows you down; a small pocket size slugger would be better; malfunctioned; unreliable and too fragile; 25% of the time; except for the GPS it worked. I had loose wires; GPS did not work because of the woods and the clouds; lost compass and GPS half way thru.

8. How well were you able to keep yourself oriented, using the **POS NAV**? Very well 2 Not very well 5 Without the **POS NAV**? Very well 6 Not very well 0 Explain.

    Malfunctions; when pos nav worked you knew where you were; without it as long as you can use compass and map, ok; harder to monitor terrain features with SIPE and head up; when it worked well OK; map is a bad picture; GPS wasn't working so useless; equipment didn't work with distance and azimuth from last known point.

9. Did you flip up your visor to walk between points? Yes 8 No 2 Explain.

    Can't see when walking, flipped up or took it off; took off helmet (2); take it off if you don't want to trip or fall into trees. POSNAV should not be part of the visor. Usually took the helmet off.

10.   Did you have confidence in the accuracy of the **POS NAV**?
Yes **7** No **3** Explain.

       When it was working (3)

11.   Could you navigate better or worse than standard as a result
of using the **POS NAV**? Better **1**   Worse **9**   Explain.

       Compass and map don't need satellites; too slow, too heavy
and cumbersome; I knew the area; if I used it would take longer
and be more uncomfortable; lost the GPS and compass

12.   How many points did you find in day standard? **range 5-7,
mean 5.6** In night standard? **NA** In day SIPE? **range 1-7, mean
3.8** In night SIPE? **NA**

13.   Did you use **POS NAV** to check your route as you moved?
Yes **5**   No **4**   Did you change your route as a result of what
the **POS NAV** was showing? Yes **4**   No **5** Explain.

       I went off azimuth; when it worked; I didn't check it
because it threw me off; didn't follow az but walked in general
direction, then relied on icon man to show me how far off I was.

14.   How did the **SIPE SYSTEM** help you with position location?

       No help; great when it worked; NA, not, GPS (2), it didn't
(2), to check the points; yes.

15.   Was the **GLOBAL POSITIONING SYSTEM** feature useful? Yes **7**
No **3**   Did you have many satellite problems? Yes **9**   No **0**
Describe your problems, if any.

       Malfunctions; more work needed; too long; it doesn't work,
no satellites, GPS didn't; did not work 95% of the time; no sats,
clouds; lost GPS even on open hilltops.

16.   How often did you check the **POS NAV** display?

       None; every 300m (3); 200-400m, every 10 minutes, 200-300m,
when I wanted a compass.

17.   Did you look at the **POS NAV** instead of looking at terrain
features and the scene around you?   Yes **2** No **7** Explain.

       Had to change contrast too often; pulled out map; can't read
map; used everything; used both (2).

18.   Did the **POS NAV** speed you up   0   or slow you down   8 ?
Explain.

About the same but weighs more. Neither - the other stuff
slowed me down; should not be in the visor; adjust course to open
field and try to get sats; had to walk around looking for a place
to get sats/GPS.

19.   Did you change your planning because of the knowledge that
you had **POS NAV**?   Yes   2   No   7   Explain.

Nav is nav; when it worked oriented self if off route;
didn't follow az.

20.   Did the **MAPS** in the helmet mounted display work well?
Yes   1   No   9   Did you have any difficulty seeing or reading
the **MAPS**?   Explain.

Had to adjust if want to read the numbers; adjust again to
see terrain; got a negative picture; hard to read features on
map; couldn't read map - difficult to read contour line; better
graphics needed; not enough definition; need more terrain
features; not good enough resolution.

21.   Would you prefer having the **MAP** in your helmet mounted
display   0   or your hand   7 ?   Did you wish you had marginal data
in your SIPE map?   Yes   4   No   3   Explain.

General map info - too hard to see in helmet.

22.   Did you use paper maps in addition to the **DIGITIZED MAP**?
Yes   9   No   0   Instead of the digitized map?   Yes   7   No   0
Explain.

Both (1) Couldn't read terrain features; digital map to
show route, where in relation to position; GPS didn't work so
used paper map.

23.   Were there any problems with the **MAP ICONS**?   Yes   8   No   2
Explain.

Not accurate enough; system down; Icon left with the GPS, no
GPS, too big - obscures the map.

24.   Did you have any difficulty finding yourself on the **MAP**?
Yes   7   No   3   Explain.

Hard to see; GPS not work.

25. Did you use the **ZOOM** feature to assist you in reading the **MAP**? Yes **6**   No **3** Explain.

Sometimes; map too unclear, can see contour lines better, more detail.

26. If you had a **DIGITAL COMPASS**, how well did it work? What were its advantages or disadvantages?

Should read az on the compass itself; need az on the compass instead of the helmet; works well, disadvantage to have to flip down visor to get it and see digital reading; connections were bad; too precise - not get it right on that number; had visor down and couldn't shoot az to woodline point - a pain to use because had to flip down visor to read it. It broke (2); worked well (2), wires came out; too bulky.

27. Did you use your regular compass while you were wearing your SIPE gear? Yes **5** No **4** [Confidentiality will be retained - and if yes, explain only if you want to!]

Equipment failure; every 50m - 100m shoot az to prominent point; had to flip visor down to use compass and see az; GPS didn't work. I didn't bring it - wish I had.

28. Were there differences in your use of the **POS NAV SYSTEM** between day and night use? Yes **0** No **6** Explain.

29. Describe the experience of using the **POS NAV SYSTEM** while wearing protective gear.

None; NA.

30. How do you like the SIPE land nav system compared to the standard?

SIPE too much trouble with equipment failure; heads up, controls hanging, too much noise; present is better, the standard words; NA, sucks; a waste of time; not; a good concept; Yankee Road course not a challenge; not at all; GPS only good when it works; just like carrying an unwanted 50 lbs - ended up using the compass; like GPS when it works but if you have to rely on it you're lost when it goes down and your compass breaks. We will have a lot of stupid soldiers.

APPENDIX K

MTC/AREA RECON: INTERVIEW AND QUESTIONNAIRE

Appendix K contains data from the Movement to Contact (MTC)/ Area Recon conducted on November 16, 1992.

The interview (pages K-2 through K-6) was tape recorded; it has been edited as appropriate and individual speakers are not identified. Most comments and answers had other than the original speaker offering concurrence. Soldier comments are grouped by category; previously explained acronyms are not reidentified. Items in brackets [..] indicate questions or comments made by the interviewer or other personnel.

The interview is followed by the written questionnaire filled out by the test soldiers before the interview. The questionnaire begins on page K-7.

INTERVIEW - MOVEMENT TO CONTACT/AREA RECON

<u>Magazines and vest</u> Have trouble getting them out of there - too high and hard to reach them. Should get a bottom opening thing so pull them out, gravity flow.

<u>Sling</u> Not happy with routing of the strap on the sling.

<u>Vest</u> Problem with the vest - when you fire up a magazine instead of taking time to put it away, you want to throw it down your shirt and wait till later - the vest made it so this was not easy to do - he worried about losing the magazine - lost concentration. You unload it, throw it in your shirt and rock and roll - the vest slows you up. Hard duty when it has a hot end on it.

<u>HUD</u> [PSG - HUD illuminated the face when the visor was flipped up and people were walking around. The black shield was on it but when up everyone could see - in ORP - 20m.]

<u>Noise</u> - The SIPE squad and the entourage could be heard - someone went out to the objective. OCs ok but one OC with non-tactical shining captain's bars on a 6-6 body gave away position on leader recon.

I^2 SL asked how did it go? rifeman - worked great. Kept them on all the time. Better than without. Have to place feet well for depth perception.

<u>Thermal battery</u> [PSG - fail to understand how a battery can go dead in 30 minutes.]

<u>GPS</u> - TL A started with 4 then they went away, SL's stayed the whole time. TL B computer went in and out.

[Who saw whom first?] The OPFOR saw us "We were toast." With all that equipment we were like a herd of buffalo coming up the hillside.

[What did the SIPE equipment prevent you from doing that you would normally do?] Cuts off peripheral vision, can't see where you're stepping, equipment bangs into everything and makes your head go all over the place and throws you off balance - you don't concentrate, makes you want to swing at people.

<u>PL/OPFOR COMMO</u> We can hear the PL and OPFOR Ldr talking - shouldn't. They shouldn't know what we're doing. He's monitoring; keep talk down, he is discussing them with the enemy, shouldn't be transmission between him and the enemy, he's your

MOVEMENT TO CONTACT/AREA RECON (continued)

guy, not supposed to be with the enemy. [PSG concurs full net monitoring.]

Enhanced hearing If you are sitting it'll help you because it is so much more sensitive, everything is amplified. Once you are walking and beating brush, you can't hear yourself take a step so you don't know if you're breaking twigs or stepping on leaves, etc. - on top of that, then you can hear everyone else but yourself so that's all blended in. It's like you are in the middle of a freeway. [Could you overcome this with training?] Not with practice. So many sounds. Training on EH was <5 minutes. [Maybe try something to see if you can turn it off a while - or just give to point man.]

I was point and was miserable. Did better without the EH - turned it off. Kept comms in one ear and that was it. When you turn it off you still have the ear plugs in - then when you stop and decide to turn it on you have to fumble around to find the ear plugs if you took them out. Better to have EH and normal at the same time and turn off EH.

Comms Best thing out there is that commo with everyone able to hear. PSG - could hear SL and TLs 100 yards away. Too loud maybe. Very sensitive mike, going off facial bone conduction. Too sensitive - maybe move it. Could hear you even if not in your squad. With the ear plugs in you can't tell how loud you are talking - louder than you think. SL call TL easy for everyone to hear. First time they had ever used it. If they had trained on it they would have known what volume you need to talk. Have to teach self how loud to talk - is it trainable? Probably. All like being able to talk. All can talk - they can stand farther apart. But noisy when 9-12 people all get on the net at once. Everyone has 2 way commo - could be noise discipline but not problem.

Need everyone to have capability to talk. Time when two guys low on rounds and want to tell TL - he was busy - just let him know he was low on the commo. TL ACE report to the SL in 2-3 seconds rather than 2-3-4-5 minutes in standard. Sent message to SL - only can to higher. Did it on the radio. SL sent one spot report up.

LRH Not good. [Should it be in two bands?] Or maybe a single smaller one? Should be very limited, a directional device - pick up a little and know exactly where it is coming from.

Video camera Not have time to do.

K-3

Equipment in general TL - think it is a mistake to put all the special equipment on only 3 guys - Rifleman with the weapon only - give LRH to him and he has only one thing to concentrate on. I don't have to worry about it screwing my thermal. Plus with him as sentry on the road, there is a benefit factor in being able to point it down the road and hear a truck 200m before it is there.

[Did you experience task overload at any time - more to do than physically able?] Yes for SL, TLs.

Thermal SL - was working on the spot report and the thermal was just lying there against his leg - wasted. SL is usually in the center of the group - should give it to someone outside for security - to one of the other guys on periphery.

Compass - way too bulky and too big - fact that you have to look in helmet at night to get a compass reading - it kills you to lose all your night vision to figure out the azimuth. They talk it all up but it isn't all that good - don't like helmet or electronic compass. Good old fashioned equipment is OK.

HUD & etc. Several - Electronic equipment is highly overrated. Other functions - not sold on any heads up at night - walking in the wood line at night - and not much better in the day time. Read stuff a little better at night because of contrast.

See better with eyeballs. Did not take off helmet because of comms. Nothing to shoot with - no AIM 1. With I^2 and suppose I see someone what do I do? Can't hit him today.

Helmet Helmet front - push up the part of the band that presses on the eyeballs - the part that leaves the indentation on eyeballs; loosen chin strap, push it down on neck - lift and push helmet up to keep the commo and nothing else. Knew it wouldn't fall off. Makes neck and back hurt but not crush the brain. [Did your heads forget?] No and necks didn't either. Rucks bad too.

LBE First time we saw them in the classroom we thought they would be excellent (Hooah all) but now no matter how awful, they say if it hurts you its not high enough on your waist - it's gonna ride on top of your buttocks. Hurts.

Maps [Did you look at the maps?] TL - Hooah. TL - constantly, in the helmet. Decided we were out here sniping and I'd do it. Sucks. Cannot tell a road from a stream from a contour line.

MOVEMENT TO CONTACT/AREA RECON   (continued)

Messages - not use in assembly area - no vehicle ID. Only 3 with computers. Sent SPOT report - they said it worked. Not as fast as on the radio.

Radio Two radios one in each ear - no problem. Worked pretty good - one for talking to every man in the squad, one to the PL. Not confused about who talking to.

[Yesterday MTC to attack, today area recon to MTC. Standard vs SIPE - was there something you could do today which you could not do before, because of SIPE?]   **Comms** All - Move lots quicker because of comm.   TL said B team pick it up lets move - we did. We were facing out and heard it and didn't keep having to turn around and look and he didn't have to go walking around to tell them. Just call not turn. Especially at night with contingency plans you just sit there and listen - only thing is trying to figure out who is who. I couldn't do it - "form a wedge off me - who is me?"   [Can you get used to it?] Use voice recognition - or A team. Try something.

Reflecting tape Need reflecting tape on stuff so can see like on the backs of headgear now - maybe ID #s. One fire team halted, the other picked up and moved till they saw the other - but can't tell where others are so depending on where they were they kept moving - not know if in the middle or on the left flank. Which way is he facing? Maybe put tape on ruck.

Test SL - main thing is we are going too fast - trying to test specific capabilities - one day should do nothing but movement - try travel in an open area, travel in thick area, switch from travel to bounding overwatch - we lost a lot of data - could get valuable training. The data we got is how to do the test better.

Thermal sight Hooah - scanning. Knew it was a target. In rolling terrain or hills not so sure. Not know where you are. Look at tops of trees and come down to figure out where you are.

Equipment What was most wrong was I was beginning almost to lose the basic concept of patrolling and recon - when we got hit the first time (TM A w/o SL) received fire, the first thing you are taught is to hit the ground, but with the SIPE equipment you are kneeling - in a kneeling position, exposed. [Is there a way around it?] No, when you have to protect the equipment. You don't want to get prone.

Apparent lack of aggressiveness TL - due to type of mission, unless you're 100% certain there's a guy out there ready to shoot

MOVEMENT TO CONTACT/AREA RECON   (continued)

full auto at you, you don't want to fire - he might be firing at
a squirrel - or recon by fire like Vietnam; if you give away
your position - if you open up - you give the game away. They
know where you are - see who will fire back.

<u>Commo</u>   You lose your basic skills - you still need to look
around even if commo is out.

QUESTIONNAIRE: MOVEMENT TO CONTACT/AREA RECON 11/16/92

1. How did the soldier **COMPUTER** capabilities help you during
this event? Be specific.

    Not; didn't - no GPS and computer locked up; communications
was excellent

2. Did the **COMPUTER** ever hinder you or make things more
difficult? Yes **4** No **2** Explain.

    Takes a while to operate. Nav; went down; the physical and
mental pain and stress of the helmet and lower back pain killed
morale and concentration.

3. Does everybody need a **COMPUTER** for this event? Yes **1** No **8**
 Explain.

    Wouldn't have room to have any equipment.

4. How well could you use the **PREFORMATTED MESSAGES**?
Very well **1** Not very well **1** Explain.

    Takes time.

5. Was it hard **0** or easy **2** to remember to use the
PREFORMATTED MESSAGES instead of the radio? Explain.

6. Which **MESSAGES** did you use? Did you use any **MESSAGES** more
than once?

    SPOT

7. Were there any problems with the **PREFORMATTED MESSAGES**?
Yes **0** No **2**   Explain.

8. Are there any **PREFORMATTED MESSAGES** you would have liked to
have but didn't? Yes **0** No **4** Explain.

9. Did you use the **PREFORMATTED MESSAGES** to practice/rehearse
for your mission? Yes **1**   No **4**   Explain.

10. Did you use any of the computer provided **CHECKLISTS** for
planning purposes? Yes **1** No **4**
For TLPs? Yes **0**   No **2**   Explain.

11. Did the SIPE **COMPUTER** enhance your ability to complete the
individual/collective tasks associated with this event?
Yes **2** No **3** Explain.

K-7

12.   Did you ever get temporarily mixed up with the HCU keys?
Yes 2   No 4   Did you ever have any difficulty with the HCU?
Yes 0   No 5   Explain.

13.   Could you use the HCU without looking at it?   Yes 4   No 1
Did you keep the HCU in one place all the time 6   or did you
move it 0 ?   Explain.

14.   Did you have any problems with the **HELMET MOUNTED DISPLAY** in
low light ? Yes 3   No 3   In bright sunlight?   Yes 3   No 1
Explain.

        Not clear enough; it illuminates your face; it sucks.

15.   Did you feel that you could see as well as you <u>wanted to</u>
with the **HELMET MOUNTED DISPLAY**?   Yes 2 No 4   As well as you
<u>needed to</u> ?   Yes 0   No 4   Explain.

        Not very good range with it; it helped in low moon light
areas; it stinks; too many wires in helmet.

16.   Did it bother you to switch from computer displays to I^2 and
back?   Yes 3   No 2   Explain.

        Wasn't worth it; ruins night vision.

17.   Did you have any problems with the **HELMET** and **EOS VISOR**
during this event?   Yes 8 No 1   Explain.

        Visor was broken; heavy, awkward, gets hung up on branches
when up; helmet gives you a screaming headache; the joints in the
flip visor were jamming; still hurts head and neck, visor got
stuck when tried to swing it up; locking the helmet visor up.

18.   Did you have to adjust your **BSC/VISOR** during movement?
Yes 5   No 4   Explain.

        Constantly; I had to release the pressure on my forehead.

19.   Did your **VISOR** ever appear to fog up?   Yes 0   No 8   or get
dusty? Yes 1   No 6   Explain.

20.   How did the I^2 **VISION ENHANCEMENT** help you?   When was it
most valuable?

        When I was in thick brush, in a rifle formation I could
follow the man in front of me; close up seeing in the dark; when

K-8

going through open terrain it helped; no it wasn't valuable; when
walking through the woods at night; cover too dense to utilize;
at a halt.

21.   Did the SIPE visual system affect your walking ? Yes 5 No 3
Explain.

　　　Dizziness; no depth perception (4); I adapted.

22.   Were there any times or weather conditions where you
couldn't use the I^2? Yes 4 No 4 Explain.

　　　Deep brush; during the day; too thick - preferred to use own
eye.

23.   When did you use the **DIGITAL COMPASS** capability during this
event? Did the **DIGITAL COMPASS** help you?

　　　Constantly - I was point man.

24.   When was the **DIGITAL COMPASS** most valuable?

　　　At Natick.

25.   How well were you able to keep yourself oriented, using the
DIGITAL COMPASS and **POS NAV**? Very well 1 Not very well 1
Well 0 Explain.

　　　Medium - it was OK; GPS was at a limit.

26.   Did you use the **COMPASS AND POS NAV** to check your route as
you moved? Yes 3   No 2   Did you change your route as a
result of what it was showing?   Yes 2   No 3   Explain.

　　　Was helpful but not as good as standard.

27.   When did you use the **VIDEO CAPTURE CAMERA** capability during
this event? Did it help you? Yes 0 No 2 Explain.

28.   When was the **CAMERA** most valuable? [No responses.]

29.   Did the **CAMERA** work like you thought it would? Yes 0
No 2   Explain. What, if any, were your problems?

30.   Approximately how often did you use the **CAMERA?** 0 times.
Do you feel you should have used it more 0 or less 0 often?
Explain. [No responses.]

K-9

31. Did you use it more **0** or less **0** often as the mission
continued?   Was it your idea **0** or were you told **0** to use it?
Explain. [No responses.]

32. How did your commo capability (everybody with squad
LISTENING capability) help you?

    100%; faster control, better dissemination of information,
better control; much easier to get people to move in dark - don't
have to move along as much - i.e., leaders; it saved time, work
and it was the best thing out there; it was great; it dispelled
a lot of time wasted; yes everyone was well informed on what was
going on.

33. When did you use the **SQUAD RADIO** capability? When was it
most valuable?

    100%; all the time (3); at danger areas or to inform;
constantly; took directions from team leader and relaying info to
ACE report.

34. Did the **SQUAD RADIO** work like you thought it would?
Yes **8**   No **0**   Explain.   What, if any, were your problems?

    Better; the earphones cause you to talk too long; much less
confusion; time saver.

35. Did you mainly receive communications **5** or send
communications **1** ? **Both** Whom did you send communications to and
when? Not applicable **0** Whom did you receive communications from
and when? Explain.

    Sending and receiving constantly; on squad level I received
information and told any important info; SL, TL, squad; TL commo;
squad and team leaders.

36. What kinds of **RADIO** messages did you receive? What kinds
did you send, if applicable?

    SPOT reps, ACE, general info; commands from my sergeant;
ACE.

37. Which messages did you use more often during this event: the
RADIO **7** or the COMPUTER **0** messages? Explain.

    Inner squad commo.

38. Did you use hand and arm signals too? Yes **5** No **4** What
other types of commo did you use? Explain.

    Just to emphasize or out of habit.

39. Was the **RADIO** range adequate during this event? Yes **9**
No **0** Explain.

    We were never more than 100m apart.

40. Did the squad maintain **RADIO** silence as appropriate? Yes **9**
No **0**   Did the **RADIO** net get too noisy? Yes **2** No **3**
Explain.

    Good discipline; static off and on.

41. Did you ever feel like you were in acoustic overload? Yes **2**
No **6** Explain.

    I caught myself speaking a bit too loud; enhanced hearing.

42. Did you change your types of movement formations or
distances between soldiers because of the **RADIO**? Yes **4** No **4**
Explain.

    A team was farther ahead of B team.

43. How well did the **ENHANCED HEARING** capability work during
this event?   Very well **1** Not very well **6**   Explain.

    Muffled noises around you when wearing it so I didn't use
it; it was about the same as regular; can't pinpoint the source
of noises and hard to tell how much noise you are making.

44. How did the **ENHANCED HEARING** help you? How did it hinder
you?

    Help you not; hard to tell source and hear your self.

45. Did your **ENHANCED HEARING** (not the **RADIO**) help you
communicate with the rest of your squad during this event? Yes **1**
No **6** Explain.

    Can't hear yourself move (2).

46. If you had both the squad and platoon radios, were you
bothered by different channels in each ear? Yes **1** No **0**
Not Applicable **0**; Explain.

K-11

QUESTIONNAIRE: MOVEMENT TO CONTACT/AREA RECON 11/16/92
(continued)

47. Did you have any problems with the **BALLISTIC PROTECTIVE VEST**
or the **LOAD BEARING COMPONENT** during this event? Yes 3 No 2
Explain.

     Ruck sucks; magazines are awkward/hard to get out, put away
(2); comfortable; LBC; loading and unloading of magazines.

48. Did you have any problems with the combat **GLOVES** during this
event? Yes 3   No 6 Explain.

     Took them off; didn't wear them; they're not durable;
rubberized parts drew heat away from hands and made them very
cold - otherwise good.

49. Did you have any problems with your SIPE **OUTERGARMENTS**
during this event? Yes 2 No 7 Explain.

     Too hot; velcro.

50. Did the SIPE clothing and equipment enhance your ability to
complete the individual tasks associated with this event?
Yes 0 No 8   ? 1 Explain.

     Flak vest hooah, inner squad comms, thermal sight, no to the
rest; BDUs are just as good; too clumsy/noisy - enhanced hearing
hindered.

51. Did the SIPE clothing and equipment enhance your ability to
complete the collective tasks associated with this event?
Yes 2 No 6   ? 1 Explain.

     Commo saved time; squad commo is great.

52. Did you use the **THERMAL SIGHT** capability? Yes 4   No 5
How did it help you? Explain.

     Not; scanning; it helped me locate figures in darkness.

53. How was the **THERMAL SIGHT** most valuable?

     At Natick; scanning in dark; locating bodies in darkness.

54. Did you utilize the indirect viewing capability of the **SIPE
SYSTEM**? Yes 0 No 9 If yes, how useful was it?

56.   Did you use the **LONG RANGE HEARING** capability? If so,
describe how it helped or hindered you during this event.

   Sucked; hindered - doesn't work too easy to drown out.

57.   Could you tell what kind of sounds you were hearing with the
LRH? Yes **1**   No **4** If yes, could you tell where they were
coming from (distance and/or location)? Yes **0** No **2**
Explain.

59.   What kind of range do you feel you were getting with the **LRH**
device?   Did it vary with the terrain? Yes **1** No **1** Explain.

   50m; sorry; not worth it.

APPENDIX L

RAID: INTERVIEW AND QUESTIONNAIRE

Appendix L contains data from the Raid conducted on November 17, 1992.

The interview (pages L-2 through L-4) was tape recorded; it has been edited as appropriate and individual speakers are not identified. Most comments and answers had other than the original speaker offering concurrence. Soldier comments are grouped by category; previously explained acronyms are not reidentified. Items in brackets [..] indicate questions or comments made by the interviewer or other personnel.

The interview is followed by the written questionnaire filled out by the test soldiers before the interview. The questionnaire begins on page L-5.

[Tenth man responding to questions while the others wrote answers to questions.] Never did see them come up. [Could you hear them?] No we were a lot quieter tonight. It was more open terrain and easy to be quiet. Quieter with the comms too.

[What else did you notice about them in SIPE, different from without it?] They were more spread out because of the comms. Other things too like getting in prone - things that are totally impossible. I tried to look/get up over the objective to shoot some pictures for the SL - it took me like 20 minutes to get over the crest trying to low crawl with all that on me. [You actually low crawled?] Yes - and you could tear up the equipment.

[Any other problems you saw?] Comms kept coming up short - hard to keep them up tonight. Not work as well tonight. Was it a function of being more spread out than before, or because of the equipment? Always within 200m so that couldn't be it - don't know.

[Mobility: How did they walk?] Rocking back and forth - with your feet its a lot harder. They all look the same - you gotta walk with your visor up, your head is going back and forth, it throws you off balance. If you have like a stick, you don't want to or mean to step on it. Usually you just step over it - walk right past it or do a heel toe walk to get over it - with the SIPE stuff you look and judge where it is and then your head will throw you off and you'll step all over stuff. It's real tough. People walk a lot more side to side [Like an elephant?] Yes. [Anything else?] They look like they are in a lot of pain.

Broken equipment My computer locked up. My commo went out so I could hear them but I could not transmit - during the side test.

Outergarments Water problem inside.

Thermal_ Good stuff. Could see people, and anything else hot. Saw smoke grenade. [Using the thermal?] Yes but on security so not much. Thermal on the objective was good because I had targets - we started firing and I used the AIM 1 to acquire targets for all the guys using I^2 . They used the I^2 to watch my aim light - all with the same point of aim. "Who wants to be SL tomorrow?" Are anyone else's knees ringing? "My left ear was ringing."

Radio [What did you do when your radio went out?] Sniveled.
[Did you do any ID stuff like we talked about last night, call
signs?] Yes - Sierra 3 and so on - our SIPE numbers. TL - my
radio went out and I humped this stuff back to the ORP and got
the SL ("And I sure appreciate it."). SL called TLs up to the
objective - then when we got there he said OK go back.

Camera And leaders had it. [How did it do - did you take any
thermal pictures?] Yes I did. [Did any one say good pictures?]
He said talked to PL and he said they got there. [Any in the
day?] Yes SL. I didn't see the actual pictures but it worked.
[The intel pictures you had in advance - did that help?] No.
You get no range, no depth and can't tell how far it is. Here
everything is just flat and here - jammed up - no perspective.
The way this picture is there is no ability to tell what range
things are - no ability to do that. Everything looks like it is
all on a line - all in one place with no depth.

Clothing His pants ripped all the way around - just getting into
a kneeling position.

LRH [Did it work better today?] Not really.

[Ear things are supposed to damp out big sounds - did they?] We
haven't had any big noises yet - don't mention it or they will
bring them into test it as a side test.

I^2 [Did the bright lights get the I^2 in the illum part?] It
blacked out. Like with a PVS4 or 7 you can see a little with the
illum flare but when it gets to a certain level it blinds -
whites you out. This went black, flashout, and you could see
stuff. The artillery simulator went off and the over ride system
kind of like a circuit breaker in the I^2 kicked in - that worked
pretty good - saves your eyes. No problem to black out for a
second.

Enhanced hearing Sucks. [Did you turn it off or take the plugs
out?] Like last night and more than just took one out, leaving
the comms one. With the LRH you are stuck because you have to
have it in - but I don't keep the EH in too - one is enough.
Don't put the ambient in - keep the other one for the commo.

Computers & GPS 3 satellites to the ORP.

Maps Have not changed my opinion of maps, feel same way as
always. GPS on all the time

Computer/HCU Computer went out than back on without explanation.
Turned it off and it worked ok. The HCU up down left right
locked up and wouldn't go. It fixed itself. The cursor wouldn't
move across the screen.

Camera - it got stuck taking picture of the objective - 5 minutes
about. Turned it off.

Laser glasses - Good with the back strap. Mine were bad because
they kept slipping and sliding on face - [Sweaty?] Sort of, and
face paint makes it slippery. But a lot more comfortable than
those other glasses.

[Anything else you did different because of the SIPE stuff?]
(silence). "Well - without the SIPE stuff we could go faster and
quieter." "Aspirin ought to be standard SIPE equipment."

Distance between men - probably a good 200m usually. Spread out
like Bldg 4 wants - not possible to do this without SIPE commo -
cannot be in a wedge and be that far. [As a SL with that kind of
commo, can you manage that dispersion?] Just because you are
spread out does not mean you are better, it may not be tactically
sound. If you make contact directly in front of you, you may
only have 2 guys firing - the rest of the squad is too far spread
out and over here far on the right, then it takes them with all
that SIPE stuff time to bound over here to where they can fire.
So it is not always good to be that spread out. I would rather
have a tight 10m perimeter - that way you can react quicker than
when everyone is spread out.

Camo Rangers camo up - OCs may not, but Rangers do.

Equipment Need someone to be watching us when we use the SIPE -
how do we cross a danger area? Sit down and watch us. A big AAR
for everyone together. The tactical MTP grading not good
enough - and they cannot remember it all afterwards.

QUESTIONNAIRE: RAID 11/17/92

1. Did the **COMPUTER** help you **3** or hinder you **1** during this
event? Be specific!!!

    LN easier; awkward - throws you off balance.

2. Does everybody need a **COMPUTER** for this event? Yes **0** No **7**

    Nice but too heavy; key leaders.

3. Were there any problems with the **PREFORMATTED MESSAGES**?
Yes **0** No **2**

4. Which **MESSAGES** did you use? **ACE, SPOT**   Which **MESSAGES** did
you use more than once? Are there any **PREFORMATTED MESSAGES** you
would have liked to have but didn't?   Yes **0** No **0**

5. How did you use the **PREFORMATTED MESSAGES** to practice/
rehearse for your mission? [No responses.]

6. Did you use any of the computer provided **CHECKLISTS** for
planning purposes?   Yes **0** No **1**   Did you use them for TLPs?
Yes **0** No **1**

7. Did the **SIPE EQUIPMENT** enhance your ability to perform this
mission? Yes **6** No **3**

    Thermal target acquisition; no help; commo (4); target
clarity with thermal.

8. How did you do things differently from when you were in
standard gear?

    Walking differently; spread out more; commo - team leaders
didn't have to move to relay info; standard quieter, faster,
better; standard used hand signals and map and PVS4 and PVS7; in
standard got in prone, moved quietly, concentrate; in standard
did them better.

9. Did you ever get temporarily mixed up with the HCU keys?
Yes **1**   No **6**

10. Did you have any problems reading the **HELMET MOUNTED
DISPLAY**? Yes **1** No **6**

    [unprintable]

11.   Did it bother you to switch from computer displays to I^2 and back? Yes 1 No 5

    Easy to use.

12.   Did you have any problems with the **HELMET** and **VISOR** during this event? Yes 4 No 4

    Heavy; uncomfortable; painful and uncomfortable; joints on the visor are jamming; visor; helmet is a head vise.

13.   Why did you have to adjust your **VISOR** during movement?

    So you could see; too uncomfortable if down too long.

14.   Did your **VISOR** ever fog up? Yes 0 No 8 Did your protective glasses ever fog up? Yes 5 No 2

    Laser glasses fogged (2); got camouflage paint on the lenses.

15.   When was the I^2 **VISION ENHANCEMENT** most valuable?

    At Natick; non tactical walking; at night look at other lasers to key in on target; none on this mission.

16.   How did the SIPE visual system affect your walking ?

    Did not use for movement (2); more careful and slower; didn't; harder because of depth perception; no depth perception.

17.   When did you use the **DIGITAL COMPASS** capability during this event?   When was it most valuable?

    Yes; never.

18.   How well were you able to keep yourself oriented, using the **DIGITAL COMPASS** and **POS NAV**? Very well 1 Not very well 0 OK 1

19.   Did you use the **COMPASS AND GPS/POS NAV** to check your route as you moved? Yes 3 No 0

    GPS

20.   Did you have any trouble with **GPS** satellites? Yes 0 No 2

    Yes and no - OK till got to ORP then went out.

21. When did you use the **VIDEO CAPTURE CAMERA** capability during this event? Did it help you? Yes **0** No **2**

    On objective, video through thermal; on objective.

22. Did the **CAMERA** work like you thought it would? Yes **2**
No **0** What, if any, were your problems?

23. Approximately how often did you use the **CAMERA?** **2** times.
Was it your idea **1** or were you told **0** to use it? Do you feel you should have used it more **0** or less **0** often?

24. How did your commo capability (everybody with squad **LISTENING** capability) help you?

    100%; more freedom in how we operate; a great deal, with everything; kept going off and on (2); disseminate information - tactical commands; less confusion - leaders don't have to get close to soldiers to communicate; keep men in communication; disseminate information.

25. When was the **SQUAD RADIO** capability most valuable?

    Movement; movement and halts; security halts and perimeter; giving commands; take directions from team leader; all the time.

26. Does the **SQUAD RADIO** need to be changed in any way? Yes **4**
No **3** What, if any, were your problems?

    More range (3); hurry up and field it; needs an emergency power boost to allow signals to go further.

27. How did you decide who was talking on the **SQUAD RADIO**?

    Key leaders; rank and priority of info; pertinent info; call signs and know voices; voice (3); went by name; familiarity.

28. What did you do if your radio went out?

    Hand and arm; if in a halt, wait for someone to realize - if not, hand and arm; nothing; snivelled; relay through others (2).

29. When or why did you use hand and arm signals too?

    Noise discipline; when there was radio traffic; when the commo was down.

30.   Was the **RADIO** range adequate during this event?   Yes   **2**
No   **7**   What do you guess to be the farthest apart you were away
from the next man?

      15ft, 100m, 200m (2), 300m (2), 400m.

Is this farther than usual **4**   or about the same **2** ?

31.   Did the squad maintain **RADIO** silence as appropriate?   Yes   **9**
No   **0**   When did the **RADIO** net ever get too noisy?

      No (2); mine wasn't working well; get a humming noise; there
was a lot of traffic when we were losing commo and people
couldn't tell that others were talking.

32.   Did you ever feel like there was too much in your ears?
Yes   **2**   No   **7**   What did you do about it?

      Shut off LRH or lowered volume.

33.   How did you change your types of movement formations or
distances between soldiers because of the **RADIO**?

      Open up; greater distance; increased distance (2); made it
larger; spread out more; just tell them over comms.

34.   How well did the **ENHANCED HEARING** capability work during
this event?   Very well   **0**   Not very well   **3**   Why?

      Didn't use it; OK; can't tell origin of noise.

35.   Overall, does the **ENHANCED HEARING** help **1** or hinder **4** you?

      Non-directional.

36.   What were your problems with the **BALLISTIC PROTECTIVE VEST**?

      None (5); ammo pouches/magazines (2); good vest; very good.

37.   What were your problems with the **LOAD BEARING COMPONENT
(ruck)**?

      Painful and cumbersome; none (3); awkward, throws you off
balance; weight on hips sucks; same as before; awkward.

38. How did the **COMBAT GLOVES** work during this event?

Well; didn't wear (2); didn't keep me warm; poorly; kept my hands warm; excellent except for prickers; protected hands from brush at objective; kept me warm.

39. Did you have any problems with your SIPE **OUTERGARMENTS** (uniform) during this event? Yes **4** No **5**

Too hot; pants ripped up the middle; [retained water inside]; absorbed moisture.

40. How did you use the **THERMAL SIGHT** capability?

On objective; on support by fire position; clarify targets at night; easier to recognize targets at 250m; scan.

41. How was the **THERMAL SIGHT** most valuable?

On objective; OP/LP; see targets at night; scan.

42. Did you utilize the indirect viewing capability of the **SIPE SYSTEM**? Yes **2** No **5** If yes, how useful was it?

OK

43. Did you use the **LONG RANGE HEARING** capability? If so, describe how it helped or hindered you during this event.

Didn't help - had to put in ear plug to use it; yes- got no benefits from it.

44. Could you tell what kind of sounds you were hearing with the **LRH**? Yes **2** No **0** If yes, could you tell where they were coming from (distance and/or location)? Yes **0** No **1**

Can hear all around you and distance by intensity of sound; birds.

45. Is there anything else you want to say about this SIPE mission?

Excellent mission - hooah; went very well.

APPENDIX M

AMBUSH : INTERVIEW AND QUESTIONNAIRE

Appendix M contains data from the ambush conducted on November 18, 1992.

The interview (pages M2 through M-4) was tape recorded; it has been edited as appropriate and individual speakers are not identified. Most comments and answers had other than the original speaker offering concurrence. Soldier comments are grouped by category; previously explained acronyms are not reidentified. Items in brackets [..] indicate questions or comments made by the interviewer or other personnel.

The interview is followed by the written questionnaire filled out by the test soldiers before the interview. The questionnaire begins on page M-5.

INTERVIEW: AMBUSH 11/18/92

[Beginning and end of session covered mobility-portability
course, plans, details, etc.   There were questions about wearing
BLEPS and the tactical assault vest; soldiers commented on the
fatigue factor after three months of the SIPE testing.
Interviewers noted that combat fatigued troops need to be able to
deal with the equipment; SIPE troops are fatigued like combat
troops.]

Mission today Supposed to be demo-ing SIPE capabilities and the
OPFOR cdr has guys doing a low crawl in the woodline instead of
on the road - learned that trick on a special ops mission.
If not for someone being in standard nothing gear we'd all be
dead and there'd be no ambush - the guy would have gone right by
us. Luckily he got a few rounds off after. OPFOR sneaked
through the woods not on the road like supposed to be. [Enemy
was approaching - unsuccessful challenge/password; he opened fire
and broke the ambush. Said squad was in excellent position and
would have been successful had fire been held a little longer.]

LRH - not good; couldn't tell. I would move my head a little and
it would sound like a storm coming through. Didn't hear them. I
thought they were moving across the objective - we must have
heard them, hear noises - all right here they are.   Then
nothing. Then firing started - it was us. Nobody fired. [Was
everyone asleep?] No.

Computer - additional capability: Need to be able to access a sub
menu when the GPS goes out to be able to tell distance to point.
Be able to put the icon man on your spot and have the computer
tell you. You know you are on X hilltop and put the X there and
then have the computer have a function to run your distance. It
can do it right now with GPS but need to be able to without it.
An update from distance to point. So it will update you.
Without a protractor you can't plot that on the map and do
distance and azimuth. I am here and you put 1 X here and there
you want to be and how far. Computer figures it out.

Mission Claymore - fire in the hole - SL blew someone up!

[CDR - good mission. If you young guys paid attention here, you
are way ahead for Camp Darby. What the man said about hand
grenades and 35m is correct but you may want to get closer so the
guys don't fall asleep.]

Commo - Seems to be going down hill as we use it. Something
inside the radio, the more you use it the more it breaks. First
day everyone got commo, last night a few of us had problems,
mostly the guys who use it a lot - today pretty much everybody

M-2

was breaking down. I had only 1 guy who could transmit. It's receiving but not transmitting. One problem was we kept hearing noises like we were being jammed [demonstrates the sound of the noise]. Commo got worse from the time we started. SL - We didn't see it till now as Monday the day we started was the first day we had comms at all - while we were training it probably was not ready yet and they did a quick fix and it wasn't the right decision. First time I noticed was SL - when he had power at the start then he passed by some power lines and he got to the other side, he then had nothing - it was gone. When everyone passed that boundary it was gone.

Thermal fine as long as your eyes are open. For scanning, LPs.

Uniform My knee caps gave out from kneeling; you catch things on uniform. Beggar lice not as bad here as on other ones. Uniform is very abrasive - rash and chafing on rear and legs, especially inside thighs. Raw - not much on top of body but on legs. Sweat trapped inside.

[Any component that creates a noise discipline problem?] Computer thermal MCC - everything electronic they have makes entirely too much noise. Even the BDUs. The click of the visor. HCU box when it shuts it makes a loud snap - not tactical.

Visors stay up better. They took off tape and fixed left side locking up. Otherwise not better no fix. Not rocking back and forth well.

[Anything good?] The commo if they get the bugs worked out. Here is what is happening - we are trying to use the equipment and plan its use into our operation and then when it doesn't work it screws up the operation. We plan certain things to go certain ways and then it doesn't work and we go back to normal ways.

Camera TL took some on the ORP; planned to after the ambush but didn't.

Mission They came up from the village - I was over there by the ridge - I kept hearing them from the village - like hearing mosquitoes. I had to relay through him and I guess he got tired of it - I never heard him. I kept calling in.

[Did you get things straight and keep track of each other?] TL - he needs GPS; he walked in there and they blew demo by him.

Enhanced Hearing - [Did the damping thing work with the loud noise?] Yeah - sort of like the I^2 thing did.

INTERVIEW: AMBUSH (continued)

[CDR - who initiated fire?] He did. I fired back. If you'd waited another 10m you'd have had them, no problem. If he hadn't acquired, doubt seriously we probably would have missed them entirely. [You had a berm up to your knees - I had stinger sight - the white trees messed me up. If they'd come another 10' you'd have had them.] I still find it hard to believe they came from our L to our R on the road unless they were in low crawl. Even if in low crawl you had a good position. I'd like to know how they did that trick of throwing the noise to my left. I kept hearing them from the left - I kept calling it in and they were on the road and the road was to my right and all the noise I heard was to my left. Neat trick. OPFOR CDR needs to come out of his SF mode and get into the mode of test SIPE. Supposedly they were a part of a line - they challenged and passed him and he didn't come through my direction and no one else since then has come through my way on this side and I heard them on the left and they say they walked up the road - they say we're sleeping.

Commo & movement Good dispersion but commo bad so pulled everyone in tight

Helmet's plastic ratchet strap - the strap on the back is good - but on a kevlar helmet. The plastic thing. They could do away with the chin strap. With this if you took a hit, the helmet would blow off and you wouldn't break your neck; with the chin strap if you take a hit you're gonna die any way because the chin strap snaps your neck.

Vest - ok but the way it is configured - need magazines where they belong - to get at them lower on the waist. Cannot get at the magazines in prone at all. Cannot deal with the pockets and get them out of the pockets fast enough. You'd never get them out.

Mission challenge - if I say 5 he should say 4 and that adds to 9 - it has to add up. In an ambush anything that comes up in front of you out there you kill it - can't be tricky and ask questions - you kill it. If you're on the road and you meet somebody, somebody is dead. We were where they said we should be.

QUESTIONNAIRE: AMBUSH 11/18/92

1. Did you ever get used to the **HELMET MOUNTED DISPLAY?** Yes 5
No 5 Did it get easier as you went along? Yes 4   No 4
What did you like or not like about it?

     Map representation not good enough to read; cuts off your
sense of vision; blinds you; hurts; did not like visor.

2. How do you feel about the **PREFORMATTED MESSAGES & REPORTS?**
What problems did you have? Should the messages or their format
be changed? Yes 1 No 3

3. What do you think about the **COMPUTER** menu and the process of
accessing information?

     Good (2); simple - like having choice of up-down keys; too
slow; ok, shaky; not much.

4. Were you adequately trained in the use of the computer?
Yes 8 No 0

     Gets easier every time; easy but inefficient.

5. Can you think of any other ways to use the **COMPUTER?** How
could it be better? Are there any capabilities you wished you
had?

     Point to point, distance to AZ; smaller lighter; make it
more durable; get rid of it.

6. Did you like the **DIGITAL COMPASS?** Yes 4 No 3   Did you
like the **VIDEO CAMERA?** Yes 5 No 0 So So 1 Should the
COMPASS be separated from the **CAMERA?** Yes 4 No 2   How should
the compass and/or the camera be changed?

     Don't like having to look at screen to read compass; smaller
compass (2); smaller camera, VHS.

7. Could you hold the **DIGITAL COMPASS** steady? Yes 5 No 1
Could you hold the **CAMERA** steady? Yes 3 No 1

8. Did you get any feedback on how well your picture
transmitted? Yes 1 No 4 Did waiting interfere with your
mission?   Yes 1 No 1

     Too much time to transmit.

9. Should everybody in the squad be able to talk on the **RADIO**?
Yes **8** No **2** Did you ever have difficulty deciding who was
talking? Yes **0** No **9**

   Know voices; discipline.

10. Did your **ENHANCED HEARING** cause any problems? Yes **6** No **2**
Did you ever turn it off? Yes **4** No **1**

   Can't pinpoint noises - don't like it; never used it, can't
hear as well.

11. Did your **LONG RANGE HEARING (LRH)** cause any problems?
Yes **3** No **0** How should it be changed?

   Axed; doesn't work; cuts off regular hearing; make it more
directional.

12. How do you feel about the **THERMAL**? Did you like it better
as you went along? Yes **5** No **1** How would you change it?

   Good; not use with heads up; wider FOV; mounted; smaller-
lighter; I love the thermal.

13. Your **THERMAL SIGHT** has a longer range than your weapon does.
Was this a problem? Yes **3** No **3** Did you ever take advantage
of this capability? Yes **5** No **1**

   Learn new point of aim - it works; long range firing;
because of the woodline.

14. Did you have any problems estimating range or distances
using your **THERMAL**? Yes **2** No **2**

   You can't.

15. Do you feel that you were adequately trained in the
capabilities of the **THERMAL**? Yes **4** No **3**

   Not at first, but after several times it gets easy.

16. Did you and your fire team work out any special techniques
for using the **THERMAL/I^2** combination? Yes **2** No **4**

   Those with thermal key in on target and paint target with
laser, all others use I^2 to find target.

17.   With your visor down, did you have any problems walking?
Yes 8 No 2

Don't walk with visor down - that would be suicide [marked
No]; tons; impossible; no depth perception (2).

18.   Was it hard to go from I^2 to **THERMAL** and back?   Yes 2
No 5 Did it work as fast as you wanted it to?   Yes 3 No 1
Did it ever make you feel misoriented?   Yes 3 No 1 Explain.

You lose your night vision; it takes practice.

19.   Does the weapon system have some capabilities you have not
had a chance to try?   Yes 2 No 8 Explain.

Thermal during STX; I^2 with aimpoint.

20. Did your **BALLISTIC PROTECTIVE VEST (BPV)** cause any problems?
Yes 3 No 7   How should it be changed?   Explain.

Getting to magazines; ammo pouches relocated; magazine
placement and collar; put ammo pouches on the waist; don't change
it.

21. Did your **LOAD BEARING EQUIPMENT** (pack) cause any problems?
Yes 7 No 3   How should it be changed?   Explain

Back and knee; like ALIC pack; placement of magazines;
magazines in bad spot - too hard to get in and out; get rid of
it; the fit...

22. How did the rifle sling work?

Good but adjusting part needs to be stronger so weapon
slowly slides down; OK (2); it works well but it slides too much;
OK with SIPE; served the purpose; normal; good.

23.   Did the protective glasses impact on your performance?
Yes 5   No 4 Explain.

Bulky; laser glasses hurt nose very much; get sweaty and
helmet slides down on the bridge of your nose; fogged up (2).

24.   How should the **SIPE HELMET** be changed?

Load lightened; readjust padding; lighter (2); get rid of
the EOS; "c'mon"; Not - I like the strap in back; lighter, more
comfortable; removed (2).

25. Should the **HELMET CONTROL UNIT (HCU)** be changed in any way?
Yes **4** No **4** Explain.

    Roll knobs; brightness/contrast/volume knobs are hard to get to; bigger knobs; eliminated.

26. Did you have to re-adjust the **HCU** brightness and contrast often? Yes **5** No **5** Was this a problem? Yes **2** No **4** Explain.

    As it got darker I had to adjust; it's inefficient to take that time.

27. Did you ever feel like there was too much to remember?
Yes **0** No **10** Explain.

28. Were there any activities which were more difficult at night in SIPE gear than in standard gear? Yes **10** No **0** Explain.

    Moving; most all; everything; all harder in SIPE; standing, sitting, kneeling, getting up and down; detecting the enemy; hearing, moving, seeing; the prone position is impossible.

29. Were there any activities which were more difficult in the day time in SIPE gear than in standard gear? Yes **5** No **4** Explain.

    Most all; everything; all harder in SIPE.

30. Were there any activities which were more difficult in SIPE protective gear than in standard NBC gear? Yes **2** No **1** ? **1** Explain.

    Not sure; weapons adjustment, finger manual dexterity; magazine change.

31. Were there any problems with the complete SIPE ensemble that have not already been covered? Yes **0** No **7** What **REALLY** needs changing? Explain.

    Heads up display; heads up and the ruck.

32. What is the **BEST** thing about the SIPE system?

    TWS, Aim 1; the comms, vest and thermal; working comms, mounted thermal, ballistic vest and that's it!; comms (4); thermal and comms (3).

APPENDIX N

NBC RECON: INTERVIEW AND QUESTIONNAIRE

Appendix N contains data from the NBC recon conducted on November 19, 1992.

The interview (pages N-2 through N-5) was tape recorded; it has been edited as appropriate and individual speakers are not identified. Most comments and answers had other than the original speaker offering concurrence. Soldier comments are grouped by category; previously explained acronyms are not reidentified. Items in brackets [..] indicate questions or comments made by the interviewer or other personnel.

The interview is followed by the written questionnaire filled out by the test soldiers before the interview. The questionnaire begins on page N-6.

INTERVIEW: NBC RECON 11/19/92

<u>Comms</u> is worse than last night.

<u>MCC</u> - it is good, definitely. But loud.

<u>Mask-helmet</u> trouble with mask and slipping down to squish the
nose. Big draw back with the helmet. When it slides forward it
hurts eyes - squish - with the mask on too then it slides more
and the mask has that internal cup and the whole thing rides down
on the bridge of your nose. Mask is worse now because moving,
worse than during target detection and engagement. Buckles -
hooks on the mask press into your head from the helmet's weight.

<u>NBC gear</u> harder or easier than standard depends on the stuff on
your back. With it, much harder. Without it, not. Clothing
alone ok but ruck does not go with it. With this you have more
range of movement. When in regular MOPP they won't let you take
off your regular BDU; here put on the stuff instead so it is
better, fewer layers, not as hot, with regular MOPP get all
sloppy - a mess. This with CVU is heads and shoulders above the
other.   But you put the helmet and the weight and the computer
on. Helmet squishes buckles in mask into head - much pain.
Worse than before.

<u>Enhanced Hearing</u> - leave it in today - the whistling noise was
awful - whistle bad, gut checking sound - jamming or
interference. Couldn't hear over the MCC anyway. Commo not
easier with EH.

<u>[Voicemitters?]</u> No - "carried but not used." They are ok.
[Would you ever use them in a tactical situation?] In a fire
fight maybe if you wanted to scream at people. [In the AA?] In
the rear - the far rear if you were in MOPP. Voicemitter is a
good thing but its just more weight to hump, more on your back.
"Forty two don't-weigh-much things add up."

<u>Noise discipline</u> [How about it?] "None, not applicable." Not
worse than regular MOPP but if you have all the stuff on it is.
Your head thing makes noise. No, it doesn't but you do when you
have it on due to the fact that you don't know where you're
walking or stepping. The deal is you put on the MCC or the in-
line blower, walk in mask and computer and have the noise - the
zzz is a constant factor. That's how he found our ORP when he
came to pick us up - he heard us - no comms though. 50m away he
could hear us. If the MCC were not noisy it would be a good
deal. The capability is worthwhile - if quieter.

[Heat build up?]   Not so bad here except that with all the stuff on...I blanked out and tore off the mask and helmet even after I told myself not to.   The little black rubber things surrounding your eyes - they are gone now, part is missing.   Got up and moved out and the pain in my back and in my neck was so intense that I couldn't turn my head - it's hard to walk with your head down after movement.   Next thing I knew it was off.   [Lou had the stuff on - a P mask and helmet and he was dying too - he was the only one who bothered to try the stuff on and get our perspective - an attempt much appreciated.]

Mask does not go with helmet - with helmet on I couldn't hold my head up.   When we were moving and I stopped I had to use my left hand to hold my head up because my neck was not strong enough - I couldn't hold my head up unless I used my hand.   And when sitting down when my arm got tired I had to use both hands. If I wanted to look I had to turn my head with my hands.

Mask without the helmet is awesome.   "My straps popped loose and the mask fell and my helmet flopped down and I was eating the damn eye pieces."

NBC gloves - NO GO.   You can't operate any of the equipment, you can't do anything with them; can't charge your weapon, can't use your selector switch, can't squeeze the trigger-shall I go on?

Squeeze bottle things - Every time I'd get sprayed in the face with water.   I'd press it and get an ocean spray on me.   You thought I was drooling - it kept on and wouldn't stop and kept spraying and water down my shirt and both legs in boots.   Mine got stuck under my chin piece and I never had the water.   Good idea if it works.   [Can you make the mouth piece longer?] Like in other mask already.

MCC works but it's loud and heavy.   I was not uncomfortable - I felt guilty sitting there in the ORP just sitting - except for the [...] on my head - I was comfortable and I knew the other guys with computers were sucking some serious wind walking.   Just sitting I wasn't moving - maybe walked 100m and sweated a few beads and then sat for 1 1/2 hours.   Comfy except for head stuff. Problem with being on back and trying to keep bottom of blower out of the leaves - so turn to one side - or sat on it.   It cooled well - you can move around - feel it in your arm pits. [Could you work longer?] Yes.

Water thing tasted awful.   Like rubbing alcohol or listerine. Drank from the same canteen as before - stuck the thing in and had about 2 gulps - sour tasting they cleaned the insides of the tubes and need to pump a whole canteen of water through it.

Equipment "What really stood out today was the Christmas tree effect." The whole world piled on me.

Ruck The load was not balanced - lying on the computers in the dirt. [Could you get up?] Yeah. Go fall forward a little bit and catch yourself. [What threw you off balance?] MCC heads up and ruck. Roll over on your side and try to get up and all the water falls out of your tube and water goes down your pants leg. The stuff sits so far back you can't lean forward no balance. They got in their head that you should rest the weight on your hips - that's the way it was built - but it's your pivot point. For the Infantryman who has to run in the brush and woodline, leave it on the shoulders. Fine that way. Problem with way this is designed - even if cut bottom ruck loose and try to carry the weight on your shoulders, the majority of the weight is still on the bottom and the light stuff is on top by the shoulders - weight centralized down here.

Coolmax T shirt - [Does it wick the water?] Almost dry now and I was sweating like a horse. Still not sold on it. This should be a hot weather coolmax shirt, part of the NBC but not wear it when not in NBC. Need to wear regular cotton T shirt. Coolmax is part of the cooling device with MCC and you don't need it without - on the cold nights it made it much worse than normal - too cold.

NBC gloves - not a lot of sweat in them compared to standard gloves, they do keep moisture under control but they are terrible. "I'd rather have puddles in my gloves and be able to operate a weapon and save my life than die with dry skin." Much less feeling through these - old ones can feel through. These cannot charge a weapon, eject a magazine. These are like clumsy mittens.

Mask - vision 100% better in XM44 mask, curved view screen no distortion. But terrible with helmet. More difficult to put on and take off mask. Elastic band with inner cloth thing - have to pull over crown of head to get seated on top - it's snug and takes about 20 seconds longer than standard. Getting it adjusted, etc. takes about the same time as standard. Overall more comfortable, more form fitting, not as bulky. Rode on my Adam's apple. Rides too low on my face and I have to hold it up all the time when I am walking (even without the helmet).

Ruck & vest interface - "ruck was not designed for humans." The ruck rides on the hips - but then you put the tactical vest on and you have to adjust the ruck so it fits under the vest because it can't go around it because of the bulk and it rides too far

down to buckle the ruck over it and it doesn't fit any more.
They designed the ruck to fit on the back; then they designed the
vest but they never tried them together.

LRH not with the MCC

Eyes   [No vision distortion for contact lens wearers; some
dryness from air blowing.]   "But I sweat into my eyes so I don't
miss the tears."

Helmet - without the visor the helmet would be awesome - could
get along with no chin strap and just have the ratchet strap.
[What about a light weight visor?] NO. Still wouldn't like it.
[What about a pull down eye piece for 1 eye and you could flip it
up?] Probably not. Better to get a hand held or chest mounted
thing that you could open and look at and click shut again and be
on your way - something hanging down in front so you would be
able to see it - light screened - like a lap top computer.

QUESTIONNAIRE: NBC RECON 11/19/92

[Oral group responses to some questions prior to in depth
interview; test soldier fatigue precluded their writing
responses.   Most responses were chorused; occasionally one
soldier spoke.   Questions without responses were treated
extensively in the interview; the interview was used as follow up
to this questionnaire.   An **X** indicates a group response.]

1.   Did your **PROTECTIVE** gear make it harder or easier to move
than standard MOPP gear?   Explain.

        Depends on stuff.   Without SIPE it is easier, with SIPE it
is harder.

2.   Was **COMMO** in **PROTECTIVE GEAR** easier because of the **ENHANCED
HEARING CAPABILITY**?   Yes -   No **X** Explain

3.   Did you use the **VOICEMITTER**? Yes -   No **X** If yes, was commo
in easier because of it? Yes -   No -   Explain.

4.   Did you have problems maintaining noise discipline in your
PROTECTIVE GEAR?   Yes **X** No -   Explain.

        Noise discipline is not applicable in gear; not possible.

5.   How did the heat buildup in your SIPE **PROTECTIVE GEAR** compare
to the heat build up in standard MOPP gear?

        Not so bad without all the SIPE stuff.

6.   Did you have to re-adjust any of your **PROTECTIVE GEAR** during
this event?   Yes **X**   No -   Explain.

        Mask.

7.   Did you have any problems with the **PROTECTIVE MASK**?   Yes **X**
No -   Explain.

8.   Did you have any problems with the **PROTECTIVE GLOVES**?   Yes **X**
No -   How do the SIPE **GLOVES** compare to the standard gloves?
Explain.

        Gloves are a NO GO.

9.   Did you use the liquid nutrient system?   Yes **X** No -   How
well did it work?

        Not.

10. How did you like the **NBC PROTECTIVE GEAR**? How should it be changed?

11. Did you use the **MICROCLIMATIC CONDITIONING SYSTEM (MCC)**?
Yes **X** No - How well did it work? Explain.

    Loud and heavy.

12. Were there any problems with the **MCC**? Yes - No - How well could you breathe with the **MCC**?

13. Could you work longer without tiring because of the **MCC**?
Yes **X** No - Explain.

14. What were your overall performance degradations in SIPE **PROTECTIVE GEAR** and how did they compare to standard MOPP gear?

15. Did the SIPE **NBC PROTECTIVE GEAR** enhance your ability to complete the individual and collective tasks associated with this event? Yes - No - Explain.

APPENDIX O

POST-SIPE QUESTIONNAIRE

At the SIPE Squad leader's suggestion, Post-SIPE Questionnaires were filled out in garrison, between January 6 and January 20, 1993, six weeks after the finish of the demonstration. Five of the ten soldiers filled out a second questionnaire because they thought they had lost the first – identical comments are given only once. Responses are grouped by category within question and have been edited as appropriate.

POST SIPE QUESTIONNAIRE

Now that you have had some time to think about the SIPE equipment, and the capabilities offered by the SIPE system, please answer the following questions. As always, these are your opinions - there are no right or wrong answers!

1. Which pieces of SIPE equipment should go forward for further testing and evaluation? Why?

Thermal sight could be fielded as is but would be nice to have it smaller and lighter - possibly higher magnification for sniper capabilities; thermal increases soldier's ability to destroy the enemy at greater ranges; thermal sight 100% more effective at night than PVS7 or PVS4; thermal sight; thermal; thermals are effective; thermal sights better than thermal sights I'm using now; thermal sight enhanced night vision and limited visibility.

Soldier computer and camera 100% increase in hand references and giving and getting from higher; computer stuff needs a lot more development before fielding.

Protective vest could be fielded as is; ballistic vest; vest; vest is effective; body armor felt better and more mobility than conventional armor.

Soldier comms increases the squad's effectiveness and speed; commo needs to be improved and field hardened; communications; intercom (squad) more compact; squad commo enhanced movement; commo increases C^3.

Kevlar helmet without IHS - kevlar felt much better, stays put on your head, doesn't give you a headache.

Air System.

Thermal, body armor intersquad commo - these items are just about ready to field now - just need a few adjustments and field toughened. Most of the equipment should be tested again once they have done with the equipment what they said they would do - for example miniaturizing the computer; TWS, soldier computer, squad comms, body armor - all of these can enhance the soldier's ability without hindering his performance and uniform in current use - also the GPS - just the GPS not the whole nav; all should go forward except heads up, but dramatically changed; all but heads up.

POST SIPE QUESTIONNAIRE   (continued)

2. What capabilities does SIPE offer that are unavailable with
standard equipment and how will they affect your mission?

        Higher protection levels for NBC and projectiles; the body
armor with mobility and survivability over current body armor.

        Soldier comms - commo speeds the mission execution phase;
inter squad commo makes information to the squad more available
and will make the mission more organized and informed; intersquad
comms has 4 stars - needs greater capability on range; intersquad
commo (2); squad intercom - mission would be able to move faster
and smoother; the comms helps commo which is always good.

        Thermal; thermal capabilities; the TWS offers improved
detection; TWS greatly enhanced night vision and limited
visibility capabilities; firing at greater ranges

        GPS (2); the GPS to check where you are - not to depend on

        The computer if used and designed correctly can enhance the
soldier's knowledge and ability to report while in the field

        None

3. If you were in charge next time, how would you change your
SIPE training or the demo?

        More coordination between SIPE leaders and USAIS. SIPE
technicians and SIPE NCOs were squared away but the upper levels
all tried being in charge and there did.not appear to be any
chain of command other than those in uniform; one individual
overall in charge of testing stop the stupid [...] - put one man
in charge of iterations and times rather than [...] start things
when supposed to - disseminate info; designate someone to be in
charge of the whole mess - some one who's not afraid to be in
charge and take charge and tell people what to do - person who is
not worried about friendship but mission accomplishment should be
first and foremost in their scope - friendship will come about
later - it's the whole respect thing, you know; better command
and control, one person in charge of the whole demo - better
coordination between Natick, USAIC, and TEXCOM. Demo should not
have been a test because of the awkwardness of the equipment,
should not have had TEXCOM involved this early in the development
- senior Infantry officers in charge every day and involved -
clearly defined chain of command for all involved and information
flow - demo very unorganized.

Three to four months of train up time prior to testing; better training for demo soldiers; the training should go straight to the soldier, not to someone else and then the soldier - most of the time I knew more about it than the NCOs. Include the squad leader, A team leader, B team leader during planning phase for exercises.

More time for questionnaires.

Make it organized and create standards to fill - have the standards made and see whether they can be achieved with SIPE - don't change standards as you go. Reconstruct the test scheduling.

4. What are your overall comments on the Integrated Headgear System?

Don't prefer heads up display, possibly monocular would be better; concept is good - night vision and heads up display have to be smaller and lighter; get rid of it; visor needs to go and get rid of ambient hearing; what they need to do is have goggles that can be worn as needed; junk basically sucks; heads up is the most useless thing I've ever seen - stinks; too heavy - needs a lot of work on weight; too heavy - did not like the senses being changed; too bulky - heavy; it ruins your night vision at night - it gets in the way during movement - they should try using goggles you can put on and off your face.

The helmet alone - hooah - with all the other stuff was very uncomfortable, bulky. The helmet fits comfortably, doesn't give you a headache and rides the head comfortably.

5. What are your overall comments on the Advanced Clothing Subsystem?

Like the pro mask.
Like the vest.
ACU should only be worn during threat - not every day wear; clothes BDUs - too hot and too fragile; get rid of velcro pockets and water resistance; too abrasive; combat uniform needs to stay cotton - would wear; waste of money - too much velcro, doesn't breathe - go back to old system; didn't like it - chafed the skin, didn't breathe - maybe in mechanized, tankers, crew chiefs, pilots where flame retardance is a must and you don't have to move around a lot; not needed.
CVU may be a good idea.
Gloves [...]
Get rid of it; junk - scrap - worthless; stinks.
Neutral.

O-4

6.   What are your overall comments on the Microclimate Cooling/Power Subsystem?

     Great for garrison.
     In-line blower would be good for field if it could be quieted.
     Good concept - shrink it make it lighter; it's a great idea just make it smaller and quiet and lighter and it will be great; heavy but good - more power, less noise and weight - air to the legs - otherwise the new NBC is the same or worse than the old!; too heavy and noisy - good concept; excellent idea but too loud; too noisy and bulky with combat load; real good but too heavy and too much noise - it would be good in the rear but in the woods it isn't worth it because of its effectiveness to weight ratio; good idea needs improvement - quieter, smaller; good concept - reduce weight and field harden.

     For the front line troops I think it's got a lot of improvement to go through but for rear echelon troops (i.e., chem decon sites) it will greatly enhance a soldier's ability to fight longer and feel better.

7.   What are your overall comments on the Soldier Computer Subsystem?

     Worked surprisingly well as demo equipment; good concept make it lighter and shrink it; good idea make it smaller - once it is smaller and lighter, needs to take input in all modes - needs a keyboard and screen needs to be a different color; junk; good idea but not on head - remove from heads up - put on forearm; too big and heavy - needs to be smaller; more time to operator equipment - more classroom time; it's a good meld if you need it for your mission but you don't always need it - it needs to be faster and lighter and quicker to use - the POS NAV is its major downfall; sucks - it's going to make stupid soldiers, soldiers who won't and won't know how to work alone or take charge; good idea needs more work.

8.   Which pieces of SIPE equipment should be eliminated from further consideration?   Why?

     Back pack - my back and legs still hurt (14 January); rucksack.

     Combat gloves completely ineffective; combat glove.

     Helmet visor/heads up display - kills night vision and too bulky; a fixed position heads up display; heads up unless totally changed; heads up masks normal senses; the heavy visor; heads up.

POST SIPE QUESTIONNAIRE   (continued)

ACU (2); current SIPE BDU; the ACU because it isn't comfortable and not worth the effort.

Computer.

Boots; gaiters.

Ambient hearing because it just doesn't work.

Long range hearing not a good idea - too hard to distinguish sounds - tell them apart.

None - development and planning needs to graduate from the kindergarten stage.

9. Is there anything else you would like to say about SIPE? If you participated in VIP/media week, comment here.

Everyone worked pretty well together to get the job done but upper level admin needed improvement/cooperation; I hope the testing and development continue - overall concept is excellent; good concept overall - needs work and removal of the heads up display; I'm glad that I was part of this system - I enjoyed working with everyone and the SIPE gear; I'm glad I got my two cents in - I just hope they listen and don't just write it off; It was definitely a learning experience - I'm glad I got to see how the civilian side and the higher echelon military operate. It definitely made career decisions for me!!!

VIP days went better than the whole demo.

Only Infantry officers involved; TEXCOM officer should be very familiar and oriented on limits and capabilities of equipment prior to developing test standards.

Squad leader and team leaders should have been trained 30 days prior to start of the test - DOT NCOs should not have been used, squad leader and team leaders serve as SMEs; demo/test soldiers should be an organic squad, also provide NCOIC/OIC.

Demo only demonstrated 25% of the capabilities, especially during FTX [...]