1. **Title: Protocol FWR-2003-03-31-H, Limited Military Utility Assessment of the Active Denial System (ADS)**

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5. **Contractor Support:**

Aegis Technologies, Albuquerque, NM.

Conceptual Mindworks, San Antonio, TX.

Veridian Engineering, San Antonio, TX.

Facilities: High Energy Research and Technology Facility (HERTF), Building 66071, Kirtland AFB, NM 87117 and AFRL/DEH Test Range, Frustration Canyon, Kirtland AFB, NM.

6. **Protocol Objective:** To assess the military utility and safety of the Active Denial System (ADS), a millimeter wave (MMW) directed energy weapon, when operated in the field against fully clothed, multiple human volunteer subjects, in various scenarios in which non-lethal weapons could be used.

Background and Relevance:

A. The research and evaluation proposed in this protocol includes an innovative partnership between multiple cooperative Air Force entities for the purposes of rapid fielding and acquisition of a highly desired new military capability. The proposed investigations will result in data required for transition of the ADS from the laboratory setting into the hands of the operator and to a system program office. This project fulfills requirements of the Air Force Research Laboratory (AFRL) system developers and bioeffects experts, while also fulfilling the requirements of the Air Force Operational Test and Evaluation Center (AFOTEC). Participation in this process by the Institutional Review Board is necessary for the protection of human subjects during the phase of research that bridges this new weapons program from 6.2 advanced research to 6.3 advanced system development research.

B. Data Required. Before the ADS can be deployed for operational use, the military utility of this non-lethal, antipersonnel, directed energy weapon must be assessed under realistic field conditions. In particular, technologists, operators, and policy-makers must be confident the weapon will be effective against fully-clothed persons engaged in various scenarios developed by AFOTEC, without substantial risk of undesirable target effects. Execution of the research outlined in this protocol will deliver that essential data.

C. Current R&D Status and Warfighter Demand: The development of the ADS by the Air Force has been hastened by successful advances in the technology and because of an intensified demand by the warfighter for the system. In 2002, the ADS won a high interest designation as an Advanced Concept Technology Demonstration (ACTD) from the Deputy Undersecretary of Defense for Advanced Systems and Concepts (DUSD AS&C). This designation was facilitated by the involvement of the Joint Nonlethal Weapons Directorate (JNLWD) and sponsorship from Joint Forces Command (JFCOM). The outcome of the ACTD must include a residual operating ADS weapon for use by warfighters in field exercises and perhaps actual missions. Effective performance of a number of mission tasks in the Joint Mission Area Task Analysis (MATA) could be aided by including ADS as a deployed weapon for mission accomplishment.

   The increased demand for this system has resulted from successfully demonstrating the repel effect in human subjects exposed to ADS in field research conducted by AFRL. Human and animal bioeffects research conducted by AFRL has not found any adverse biological effects associated with ADS exposures. This research supports the effectiveness and safety of the ADS exposures. Research by AFRL/HED and Naval Health Research Center-Detachment (NHRC-Det) scientists at Brooks City-Base suggests the safety of the system for the face and eye exposures, and also indicates the absence of risk for acute or long-term undesirable health effects. The effectiveness of ADS will be assessed, in part, by recording the time between MMW energy beam onset and the subjects' self-protective reactions. Structured questionnaires and interviews with the subjects will be administered by AFRL/HED as a means of

further assessing effectiveness. AFOTEC data collection will fully address the Operational Manager's need for military utility assessment of the ADS. The most critical operationally relevant element of this research will be the assessment of weapon effectiveness and of successful mission accomplishment by security forces during the operational scenarios.

D. Rationale. A decade of research from AFRL supports the safety and likely effectiveness of ADS as a non-lethal weapon. In 1947, Moritz and Henriques published studies with conventional heating of human skin which, when extrapolated to the MMW heating of ADS, provide assurance of a significant and useful safety margin between effective levels and injury. Rodent studies on the thermal bioeffects of MMW exposure support this assertion. Chalfin et al. (2002) measured ADS energy related to facial sensitivity, eye aversion, and corneal damage in nonhuman primates (rhesus macaques) and their findings support the safety of using the ADS System 0+ for the proposed human exposures.

The research proposed in the Experimental Plan (see below) is critical to both the operational effectiveness and the policy acceptability of the system. Systematic behavioral assessment of the weapon's effectiveness is on the critical path to deployment.

E. DOD Relevance. The technology to be tested in these experiments was developed in response to several Mission Needs Statements (MNS, AFSOC 003-95, Nonlethal/Limited Effects Weapon Capability, dated 22 July 1996; MNS LOG 1.85, dated 20 February 1996, which stated requirements for improved capabilities in Military Operations Other Than War [MOOTW]; Marine Corps Development Center MNS #MCCDC-9602029, NAVMC HQ-355). The Joint Non-Lethal Weapons Directorate has responded to these needs statements by drafting an Operational Requirement Document (ORD) for Non-Lethal Active Denial Technology (ADT) Capability dated 25 October 1999. An ACTD (see above) was approved in February 2002. Results of the proposed studies will answer the critical question for operational effectiveness: Will ADS work as an effective non-lethal weapon when used against humans in operationally relevant scenarios?

8. **Impact Statement:** Success with the technology to date has put it on a fast track to satisfy a warfighter request via the ACTD process and rapid acquisition of a transformational bioeffects-based directed energy technology. The experiments included in the AFRL/HED Bioeffects Research Support Plan Supporting Deployment of the Active Denial System (Scholl et al, 2002) help answer these requirements: Mission Needs Statements (MNS, AFSOC 003-95, Nonlethal/Limited Effects Weapon Capability, dated 22 July 96; MNS LOG 1.85, dated 20 FEB 96, which stated requirements for improved capabilities in Military Operations Other Than War (MOOTW); Marine Corps Development Center MNS #MCCDC-9602029, NAVMC HQ-355); The Joint Non-Lethal Weapons Directorate drafted an Operational Requirement Document (ORD) for Non-Lethal Active Denial Technology (ADT) Capability dated 25 OCT 1999.

9. **Experimental Plan:**

A. Equipment and Facilities: Exposures will use a MMW transmitter (ADS System 0+) located at Kirtland AFB, NM. High-power microwave specialists at AFRL/DEHA, their contractors, or potential field operators will direct operation of the ADS System 0+ at Kirtland AFB. Experienced scientists from AFRL/HED and their contractors will operate bioeffects data collection equipment and control research trials for the health and safety of the volunteers. Test and evaluation professionals and contractors from Det 1 AFOTEC will gather data for military utility assessment.

Subjects: Fifty adult volunteer subjects (*n = 10* for Experiment 1 and *n = 40* for Experiment 2) will be recruited from among military personnel, DoD civilians, and government contractor personnel. Volunteers of either gender must be at least 18 years old. In Experiment 1, AFRL and contractor volunteers familiar with the bioeffects of exposure to MMWs will participate in exposures to confirm the safety and viability of the procedures planned for Experiment 2 (the LMUA #2). Questions of safety will be emphasized during this experiment, and based on the results of this experiment, the AFRL staff will determine the procedures and limitations necessary for Experiment 2.

In Experiment 2, the purpose is to assess the utility of ADS by utilizing it in four selected scenarios developed by AFOTEC (See Attachment E). These scenarios entail the use of from 5 to 21 volunteer subjects drawn from security forces of various DOD organizations, e.g., US Army Military Police. Attempts will be made to obtain subjects who have never been exposed to the ADS energy beam. Naïve subject participation will strengthen the prediction of the reaction of actual targets in an operational setting.

B. Duration of the Study: It is anticipated that data collection can be completed within 1 year after final approval of this protocol.

C. Procedures:

1) Experimental Procedures

I. General. Medical and visual screening examinations will be given to each subject to document any pre-existing (but not necessarily disqualifying) conditions. The same screening examinations will be repeated after exposures are completed. As the effects of eyewear (spectacles or contact lenses) on eye exposure have not yet been determined, subjects will not be allowed to wear eyewear during exposures. For similar reasons, individuals will not be allowed to participate if they are using eye medication or if they have had eye refractive surgery (e.g., PRK, LASIK).

II. Experiment 1. The purpose of this study is to determine the fluence level required for the repel effect in a realistic operational environment. Each subject will be exposed while positioned in the scenario locations shown in Attachment E. Starting at a low level, fluence will be adjusted until the repel effect is achieved. Once this level is determined, the subject will be exposed in various orientations (e.g., beam normal to the frontal aspect, different angles with respect to the beam) or activities (e.g., walking, running). This

will allow a determination of the influence of different body positions and activities on weapon effectiveness. Video images will be recorded during each of these exposures with a time mark for the onset of the beam. After each exposure, the volunteers will be interviewed as to their pain perceptions.

Experiment 2. The purpose of this study is to assess the utility of ADS by utilizing it in four scenarios developed by AFOTEC (See Attachment E). In each scenario, the volunteer subjects will play the part of threat, non-combatant, or security forces persons. In each scenario, only the threat persons will be targeted by the ADS, but it is possible that the non-combatant and security forces persons may be exposed collaterally. A pre-exposure questionnaire (Attachment C) developed by AFRL/HEDR will be administered to each volunteer subject prior to commencement of scenario.

The 40 participants will be broken into four groups. For each scenario iteration, only two groups will participate, one as the Red Force and the other as the Blue Force. Up to two iterations will be completed with the same two groups, then the other two groups will continue with the next one or two iterations.

During the weeklong exercise, no individual will participate in more than 10 scenario iterations. Subjects will participate in no more than six scenario iterations as a member of the Red Force for the entire LMUA 2 demonstration. In any day, no individual will participate in more than five scenario iterations, with no more than three scenario iterations as a member of the Red Force.

At least two shielded barriers will be on the field and available during each scenario for any individual to use as cover. Medical observers will be on the field to halt scenarios at any time they feel is necessary to ensure the safety of the participants.

The exposure fluence used will be that determined to be effective in Experiment 1. Video images will be recorded with cameras on the beam boresight as well with cameras located in the vicinity of the scenario location. In some instances, subjects will be imaged in the infrared. The video images will be time marked with the onset of beam activation. Individuals will be instructed to hold their hand up when they feel pain from the exposure and count to 15 before reentering the engagement. This action will allow the exposed skin to cool down before the subject can be reexposed.

Immediately after the conclusion of the engagement, all players will be interviewed by AFOTEC and AFRL/HED personnel. The medical team will examine each exposed person, including those collaterally exposed. After participation in the scenario, subjects will be asked to answer a military utility assessment questionnaire (Attachment F) provided by AFOTEC. Brief surveys on subject attitudes may be administered prior to and after exposure to ADS and responses to a more in-depth follow-up interview may be requested at a later time (see Attachments C & D).

2) Data Analysis: As these experiments are exploratory in nature, inferential (hypothesis testing) statistics will not generally be employed.

3) Safety Precautions: The ADS Test Director will ensure the maximum fluence will be set at a level that cannot produce skin heating greater than 50 °C during a single exposure. For short durations, this temperature exceeds the pain threshold, but does not exceed the threshold for tissue damage. Even in the event of system error the maximum available power density that the system can produce at range will cause an escape response well before damaging levels of skin temperature are reached.

   MMWs at this frequency are completely absorbed in the skin. The incident power density at the skin surface falls to $1/e^2$ (13.5%) at a depth of 0.4 mm. For the brief exposures contemplated, much of the heat deposited in the most superficial layers of the skin is re-radiated to the environment over the next 10-20 seconds. The rest is carried away by the blood that circulates in the skin. The fraction that is conducted to structures deeper than the skin is negligible. Thus, there is no risk of significant heating of any subcutaneous structures or organs with the exposures contemplated for these experiments. Since this is the case, implanted metallic joints or objects are probably irrelevant. We exclude them only because some subjects might have a concern about being exposed if they had them. This would be a distraction, and an unnecessary worry, in such subjects. There are no known aftereffects of heating the skin to painful but non-damaging levels.

4) On-site Monitoring. (See Attachment G) Dr. Michelle Bryce (the Medical Monitor) and/or her designated representative will monitor all exposures/scenarios. The Medical Monitor or her designated medical observer will examine the skin and eyes of each potential subject prior to any exposure. Individuals who have any abnormal skin or eye condition that might suffer detrimental effects from surface heating will not be allowed to participate. In addition, certain chronic medical conditions may be disqualifying, at the discretion of the Medical Monitor. A brief examination of the skin will be conducted following each exposure/scenario and brief medical and visual examinations will be given following the subject's final exposure. If eye injury is suspected, evaluation may require standard ophthalmic staining drops to be applied to the subject's eyes. Suspected injury would necessitate referral to an ophthalmologist/optometrist for further evaluation. The medical staff will activate the emergency response system in the unlikely event of an accident or significant medical incident.

10. **Medical Risk Analysis**: Although exposures may exceed permissible exposure limits specified by the relevant safety standard (AFOSH 48-9, 1997) by as much as 20-fold, we have shown in previous work, under protocols # F-BR-1998-0026-H, # F-WR-2001-0006-H, and # F-BR-2002-0046, that the pain tolerance limits occur well below exposure levels that produce any but the most minor effects (e.g., transient reddening and sensation of tenderness). Studies by the NHRC-Det at Brooks City-Base, in collaboration with AFRL/HEDR has shown that monkeys avert their eyes

and cover their face at exposures levels much lower than that which induces corneal damage (D'Andrea et al., 2002).

In field exposures to ADS conducted at Kirtland AFB, there have been only 6 medical events and they had inconsequential skin reactions without sequelae. Ryan et al. (2000) reviewed the health and safety issues related to exposure to MMWs. They concluded that:

1) Such exposures result only in superficial heating of the skin
2) Such heating is very unlikely to cause damage in conscious, mobile humans, as it is readily sensed and becomes sufficiently painful to motivate escape responses long before the skin is heated enough to cause burns.
3) In the event of an overexposure to a power density sufficient to produce thermal injury, there is an extremely low probability that scars derived from such injury might later become cancerous. Proper wound management further decreases this probability, as well as the probability of hypertrophic scarring or keloid formation.

Repeated overexposure to MMWs has not been demonstrated to initiate or promote cancer (Mason et al., 2001). Walters et al. (2000) showed that skin heating associated with painful exposure to MMWs is consistent with a simple thermal model that takes into account the shallow penetration depth at these wavelengths. These results (Walters et al., 2000) and conclusions (Ryan et al., 2000) give us confidence that the proposed exposures will produce superficial heating of the skin that is self-limiting at non-injurious levels. No damage to the eyes or surrounding structures is expected. Chalfin et al. (2002) showed that energy densities of 5 to 6 J/cm^2 produce a threshold damage to the cornea that resolves within 24 hours. D'Andrea et al. (in preparation) have shown that monkeys and humans produce blink reflexes that protect the cornea at energy densities of about 1 J/cm^2, with response latencies less than 250 ms. Due to security concerns, we cannot state precisely what safety margin this provides, but it is sufficient to discount eye damage under any planned exposure scenario. Blick and D'Andrea (in preparation) have observed "hot spots" in the region of the medial canthus with direct frontal exposure of the face. Both modeling studies (Ziriax et al., in preparation) and human testing (Blick and D'Andrea, in preparation) have shown that these "hot spots" move away and disappear with changes in orientation of the head to the beam. Such changes in orientation are expected to occur rapidly as exposed individuals perform eye aversion responses and attempt to escape the exposure.

Information for Briefing Subjects: See attached Informed Consent Document (Attachment A) and Instructions for Subjects (Attachment B).

Risk Assessment:

Potential Benefits: The volunteer subjects will receive no direct benefit or compensation for participation.

The volunteer subjects will benefit from direct knowledge that an effective non-lethal weapon system could soon to be in the inventory. The benefit to the DOD is more rapid acquisition of a non-lethal weapon system needed by warfigthing commanders. Human effects data are essential, not only for optimizing weapon design parameters, but also for answering questions related to policy acceptability for the use of such a weapon.

Risk-Benefit Ratio: The benefits listed above are large relative to the risks to subjects, producing an acceptable risk-benefit ratio.

11. **References:**

Blick, D. W. and D'Andrea, J. A. (in preparation).

Chalfin, S., D'Andrea, J.A., Comeau, P.D., Belt, M.E., & Hatcher, D.J. (2002) Millimeter wave absorption in the nonhuman primate eye at 35 GHz and 94 GHz. Health Physics, 83:83-90.

D' Andrea, J. A. et al., (in preparation).

Moritz, A. R. and Henriques, F. C., Jr. (1947). Studies of thermal injury. II. The relative importance of time and surface temperature in the causation of cutaneous burns. Am. J. Path. 23:695-720.

Ryan, K. L., D'Andrea, J. A., Jauchem, J. R., and Mason, P. A. (2000). Radio frequency radiation of millimeter wavelength: Potential occupational safety issues relating to surface heating. *Health Physics* 78:170-181.

Scholl, D. M. and Mason, P. A. Bioeffects research plan in support of deployment of the active denial system, Air Force Research Laboratory Technical Report, (Draft, 2002).

U.S. Air Force (1997). *Air Force Occupational Safety and Health Standard 48-9.* Brooks Air Force Base, TX: Radio Frequency Radiation Safety Program.

Walters, T. J., Blick, D. W., Johnson, L. R., Adair, E. R., and Foster, K. R, (2000). Heating and pain sensation produced in human skin by millimeter waves: Comparison to a simple thermal model. *Health Physics* 78:259-267.

Ziriax, J. M. (in preparation).

12. **Attachments:**

A. Informed Consent Documents (Experiments 1 & 2)

B. Instructions for Subjects (Experiments 1 & 2)

C. Pre- and Post-Exposure Interview

D. Post-Exposure Interview

E. Scenarios for ADS Limited Military Utility Assessment

F. Military Utility Assessment Questionnaires

G. ADS Medical Documentation Form

INFORMED CONSENT DOCUMENT

(Assessment of Behavior Following Exposure to ADS)

High Energy Research and Technology Facility

Building 66071
Kirtland AFB, NM 87117

Institutional Review Board Approval Dates:

PRIVACY ISSUES: Records of your participation in this study may only be disclosed in accordance with federal law, including the Federal Privacy Act, 5 U.S.C. 552a, and its implementing regulations. You understand that the sponsoring agency and/or its designee may inspect records of this study.

TITLE OF STUDY

Limited Military Utility Assessment of the Active Denial System

(Experiment 1)

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Murphy, Michael R., Ph.D., AFRL/HEDR, (210) 536-4833 (DSN 240-4833)
Sayegh, Lisa, Ph.D., AFRL/HEDR, (210) 536-5931 (DSN 240-5931)
Villareal, Ken, AFOTEC Det 1, (505) 853-7119 (DSN 263-7119)
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PURPOSE OF STUDY

You have been invited to participate in a research study at Kirtland AFB, sponsored by the Air Force Research Laboratory, titled "Limited Military Utility Assessment of the Active Denial System (ADS)." The objective of this study is to assess the fluence level (i.e., amount of energy) required to produce escape behavior in a realistic operational environment. This new, directed energy system uses millimeter waves to heat the skin of adversaries causing pain and forcing them to turn away from ongoing activity.

This study will enroll up to 10 subjects who are at least 18 years of age. You will participate in a series of scenarios in which you will be exposed to the millimeter wave beam of the ADS. In these scenarios you will be stationary or moving. Prior to and after your participation in these scenarios, you may be asked to complete questionnaires aimed at assessing your attitudes, beliefs, and assumptions about the ADS. You will be given the first questionnaire after the general orientation and safety briefings. This will take place while you are in a group setting with other volunteers, but you will fill out the questionnaire without discussing your reactions or responses with others. You will complete the second questionnaire in a private setting after the

scenarios. In addition, you may asked to participate in a private interview with a specialist to obtain your reactions to your experience during the course of the study.

PROCEDURES

If you volunteer to participate in this study, you may be exposed to millimeter waves during the course of the scenarios at intensities that will exceed the applicable exposure standards by as much as 20-fold. This exposure could cause your skin temperature to rise to 50° C and will cause pain forcing you to take evasive action to escape the beam. Before the start of your participation, you will be examined briefly by medical personnel and asked to fill out a questionnaire. Eye glasses or contact lenses cannot be worn during exposure. If your vision is dangerously weak without glasses or contact lenses, you should not participate in the study. Individuals using eye medications or with refractive eye surgery will not be allowed to participate.

You may be asked to participate in as many as six scenarios on four consecutive days and may be asked to return at a later time to participate in further scenarios. Each test day will not exceed 8 hours.

When exposed, pain is likely to become so intense immediately that you will be forced to take evasive action to escape the pain, either by involuntary reflex or because you feel that the pain has reached your tolerance limit. In the moving scenarios, when you experience this intense pain, you will stop, raise your hand, and count to 15 before resuming your participation in the scenario. The operator and field supervisor will coordinate to not reengage you until after these 15 sec. This will allow the temperature of your skin to cool down. In both the stationary and moving scenarios, at least two protective barriers that block the beam will be available. The exposures will be video taped and, in certain instances, infrared images will be recorded. You may be exposed multiple times to the ADS energy.

If an exposure produces skin pain or tenderness that last for more than 15 minutes, you will contact one of the investigators and your further participation may be terminated. If you have any unusual skin conditions or eye surgery that might be aggravated by surface heating, you should decline participation in this experiment. **You are free to discontinue participation at anytime.**

After you have completed your participation in this study, you will have a brief medical and vision examination and will then be escorted to a private setting where you may be asked to complete a second questionnaire designed to assess your thoughts, attitudes, feelings, and reactions to the weapon and to the exposure experiences. You may also be asked to participate in a private interview to obtain further information regarding your feelings about your experiences in the study. You will then be invited to participate in a group debriefing to interact and discuss any thoughts, feelings, concerns, or suggestions about ADS.

RISKS/INCONVENIENCES

Participation involves a risk of skin reddening. The affected area might remain slightly tender and red for several minutes after exposure. If the skin remains painful and tender for more than two hours after exposure, this should be reported to the investigator or medical staff, and the medical staff will then examine you. Eye complaints or concerns that last longer than a few minutes should also be reported. If eye injury is suspected, evaluation may require standard ophthalmic staining drops to be applied to your eyes. Suspected injury would necessitate referral to an ophthalmologist/optometrist for further evaluation. You are completely free to decline participation or to terminate your voluntary participation at any time. Many scientific studies have looked for possible detrimental effects (for example: skin cancer, damage to the

cornea or lens of the eye, birth defects) of exposure to microwave energy (which includes millimeter waves). Except for the heating effects, there are no known biological effects (detrimental or beneficial) of exposure to millimeter waves. It is highly unlikely that brief heating of the skin to painful, but non-damaging, temperatures will have any short- or long-term deleterious effects. Normal reflexes (closing the eyes, turning the head, protecting the eyes with a hand) will protect the eyes from heating that might otherwise cause damage

PRECAUTIONS FOR FEMALE SUBJECTS

You may not participate in this study if you are pregnant. There is some concern that you could stumble and fall as you are rapidly moving away from the beam. Although there currently is no evidence that exposure to millimeter waves of this type could affect a fetus, it remains a very remote possibility that there are potential risks of harm to an unborn child. Therefore, if you are a female of childbearing potential, and are not certain whether or not you are pregnant, you should consult with the Medical Monitor, who may ask you to take a pregnancy test.

BENEFITS

Subjects will receive no direct benefit or compensation for participation.

The data collected during these studies will assess the military utility of the ADS that will lead to its eventual fielding for security forces.

ALTERNATIVES

Choosing not to participate is an alternative to volunteering for this study.

EVENT OF INJURY

Federal laws and regulations govern your entitlement to medical care and/or compensation in the event of injury. If you have questions about your rights or if you believe you have received a research-related injury, you should contact the Medical Monitor, Major Michelle Bryce, USAF, MC, SFS, (office 210-536-4007 (DSN 240-4007), medical cell phone number, 505-400-9278), or one of the investigators listed at the top of this document

Should you be injured as a direct result of being in this study, you will be provided medical care for that injury at no cost. You will not receive any compensation (payment) for injury. This is not a waiver or release of your rights. Medical care is limited to the care normally allowed for Department of Defense health care beneficiaries (patients eligible for care at military hospitals and clinics). For civilian employees and contract civilian personnel, medical care is limited to treatment within Air Force medical treatment facilities. Necessary medical care does not include in-home care or nursing home care. In case of any medical incident, you will be treated on site, unless personnel on site judge it to be an emergency, in which case they will call for ambulance service.

OCCURRENCE OF UNANTICIPATED ADVERSE EVENT

If an unanticipated event occurs during your participation in this study, you will be informed immediately. If you are not competent at the time to understand the nature of the event, such information will be brought to the attention of your Next of Kin.

Next of Kin if needed: Name_____ Phone # _____

CONFIDENTIALITY

When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity. To maintain your anonymity, only subject number will used to identify medical and psychological documentation. Names will not be associated

with subjects captured on video images. However, complete confidentiality cannot be promised, particularly for military personnel, because information regarding your health may be required to be reported to appropriate medical or command authorities.

DECISION TO PARTICIPATE

The decision to participate in this research is completely voluntary on your part. Refusal to participate will involve no penalty or loss of benefits to which you are entitled, and you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. One of the investigators will answer questions you have about this study, your participation, and the procedures involved. One or more of these investigators will be available to answer any questions concerning procedures throughout this study. If significant new findings develop during the course of this research that may relate to your decision to continue participating, you will be informed. You may withdraw this consent at any time and **discontinue further participation in this study without prejudice to your entitlements.** The investigators may terminate your participation at any time, and the Medical Monitor or Medical Observer of the study may terminate your participation if they feel this to be in your best interest.

SUBJECT STATEMENT: I have read the document "Instructions for Subjects—Assessment of Behavior Following Exposure to ADS." I have read all of the above. My questions have been answered concerning areas I did not understand. I am willing to take part in this study. After I sign this form, I will receive a copy.

Full Name: _____ _____ _____

(Please Print) SSN (optional) Telephone Number

_____ _____

Volunteer Signature Date and Time

_____ _____

Investigator Date

_____ _____

Witness (not involved) Date

Privacy Act Statement

Authority: We are requesting disclosure of personal information, to include your Social Security Number. Researchers are authorized to collect personal information (including social security numbers) on research subjects under The Privacy Act-5 USC 552a, 10 USC 55, 10 USC 8013, 32 CFR 219, 45 CFR Part 46, and EO 9397, November 1943 (SSN).

Purpose: It is possible that latent risks or injuries inherent in this experiment will not be

discovered until some time in the future. The purpose of collecting this information is to aid researchers in locating you at a future date if further disclosures are appropriate.

Routine Uses: Information (including name and SSN) may be furnished to Federal, State and local agencies for any uses published by the Air Force in the Federal Register, 52 FR 16431, to include, furtherance of the research involved with this study and to provide medical care.

Disclosure: Disclosure of the requested information is voluntary. No adverse action whatsoever will be taken against you, and no privilege will be denied you based on the fact you do not disclose this information. However, your participation in this study may be impacted by a refusal to provide this information.

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INFORMED CONSENT DOCUMENT

(Assessment of Behavior Following Exposure to ADS)

High Energy Research and Technology Facility

Building 66071
Kirtland AFB, NM 87117

Institutional Review Board Approval Dates:

PRIVACY ISSUES: Records of your participation in this study may only be disclosed in accordance with federal law, including the Federal Privacy Act, 5 U.S.C. 552a, and its implementing regulations. You understand that the sponsoring agency and/or its designee may inspect records of this study.

TITLE OF STUDY

Limited Military Utility Assessment of the Active Denial System

(Experiment 2)

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PURPOSE OF STUDY

You have been invited to participate in a research study at Kirtland AFB, sponsored by the Air Force Test and Evaluation Center and Air Force Research Laboratory, titled "Limited Military Utility Assessment of the Active Denial System (ADS)." The objective of this study is to assess the military utility of a new, directed energy system that uses millimeter waves to heat the skin of adversaries causing pain and forcing them to turn away from ongoing activity. This study will be conducted in two phases, each taking about one week to complete. The first week will be devoted to training (e.g., ADS orientation, CONOPS, and Tactics Techniques and Procedures) and pre-exposure medical exams. The scenarios will be run during the second week.

This study will enroll up to 40 subjects who are at least 18 years of age. You will participate in a series of scenarios designed by AFOTEC to assess military utility of the system, in which you will be exposed to the millimeter wave beam of the ADS. Prior to and after your participation in these scenarios, you may be asked to complete questionnaires aimed at assessing your

attitudes, beliefs, and assumptions about the ADS. You will be given the first questionnaire after the general orientation and safety briefings. This will take place while you are in a group setting with other volunteers, but you will fill out the questionnaire without discussing your reactions or responses with others. You will complete the second questionnaire in a private setting after the scenarios. In addition, you may asked to participate in a private interview with a specialist to obtain your reactions to your experience during the course of the study.

PROCEDURES

If you volunteer to participate in this study, you may be exposed to millimeter waves during the course of the scenarios at intensities that will exceed the applicable exposure standards by as much as 20-fold. This exposure could cause your skin temperature to rise to 50 °C and will cause pain forcing you to take evasive action to escape the beam. AFOTEC has developed 4 different scenarios to assess the military utility of ADS and you will be assigned to play the role of: 1) security force person, 2) non-combatant, or 3) threat adversary. Before the start of your participation, you will be examined briefly by medical personnel and asked to fill out a questionnaire. Eye glasses or contact lenses cannot be worn during exposure. If your vision is dangerously weak without glasses or contact lenses, you should not participate in the study. Individuals using eye medications or with refractive eye surgery will not be allowed to participate.

The 40 participants will be broken into four groups. For each scenario iteration, only two groups will participate, one as the Red Force and the other as the Blue Force. Up to two iterations will be completed with the same two groups, then the other two groups will continue with the next one or two iterations.

During the weeklong exercise, you may participate in as many as 10 scenario iterations. You will not participate in any more than six scenario iterations as a member of the Red Force for the entire LMUA 2 demonstration. In any one day, you will participate in no more than five scenario iterations and will be a member of the Red Force in no more than three scenario iterations.

During these scenarios, you may be exposed to the ADS beam deliberately (if you are playing the adversary) or collaterally (if you are a non-combatant or if you are assigned to the security forces). If you are exposed, pain is likely to become so intense immediately that you will be forced to take evasive action to escape the pain, either by involuntary reflex or because you feel that the pain has reached your tolerance limit. When you experience this intense pain, you will stop, raise your hand, and count to 15 before resuming your participation in the scenario. The operator and field supervisor will coordinate to not reengage you as a target until after these 15 sec. This will allow the temperature of your skin to cool down. At least two shielded barriers will be on the field and available during each scenario iteration in case you feel the need to take cover. The scenarios may be video taped and, in certain instances, infrared images will be recorded. Depending on your role, you may be exposed multiple times to the ADS energy.

If an exposure produces skin pain or tenderness that last for more than 15 minutes, you will contact one of the investigators and your further participation may be terminated. If you have any unusual skin conditions or eye surgery that might be aggravated by surface heating, you should decline participation in this experiment. **You are free to discontinue participation at anytime.**

After you have completed your participation in this study, you will have a brief medical and vision examination and will then be escorted to a private setting where you may be asked to complete a second questionnaire designed to assess your thoughts, attitudes, feelings, and reactions to the weapon and to the exposure experiences. You may also be asked to

participate in a private interview to obtain further information concerning your feelings about your experiences in the study. You will then be invited to participate in a group debriefing to interact and discuss any thoughts, feelings, concerns, or suggestions about ADS.

RISKS/INCONVENIENCES

Participation involves a risk of skin reddening. The affected area might remain slightly tender and red for several minutes after exposure. If the skin remains painful and tender for more than two hours after exposure, this should be reported to the investigator or medical staff, and the medical staff will then examine you. Eye complaints or concerns that last longer than a few minutes should also be reported. If eye injury is suspected, evaluation may require standard ophthalmic staining drops to be applied to your eyes. Suspected injury would necessitate referral to an ophthalmologist/optometrist for further evaluation. You are completely free to decline participation or to terminate your voluntary participation at any time. Many scientific studies have looked for possible detrimental effects (for example: skin cancer, damage to the cornea or lens of the eye, birth defects) of exposure to microwave energy (which includes millimeter waves). Except for the heating effects, there are no known biological effects (detrimental or beneficial) of exposure to millimeter waves. It is highly unlikely that brief heating of the skin to painful, but non-damaging, temperatures will have any short- or long-term deleterious effects. Normal reflexes (closing the eyes, turning the head, protecting the eyes with a hand) will protect the eyes from heating that might otherwise cause damage

PRECAUTIONS FOR FEMALE SUBJECTS

You may not participate in this study if you are pregnant. There is some concern that you could stumble and fall as you are rapidly moving away from the beam. Although there currently is no evidence that exposure to millimeter waves of this type could affect a fetus, it remains a very remote possibility that there are potential risks of harm to an unborn child. Therefore, if you are a female of childbearing potential, and are not certain whether or not you are pregnant, you should consult with the Medical Monitor, who may ask you to take a pregnancy test.

BENEFITS

Subjects will receive no direct benefit or compensation for participation.

The data collected during these studies will assess the military utility of the ADS that will lead to its eventual fielding for security forces.

ALTERNATIVES

Choosing not to participate is an alternative to volunteering for this study.

EVENT OF INJURY

Federal laws and regulations govern your entitlement to medical care and/or compensation in the event of injury. If you have questions about your rights or if you believe you have received a research-related injury, you should contact the Medical Monitor, Major Michelle Bryce, USAF, MC, SFS, (office 210-536-4007 (DSN 240-4007), medical cell phone number, 505-400-9278), or one of the investigators listed at the top of this document

Should you be injured as a direct result of being in this study, you will be provided medical care for that injury at no cost. You will not receive any compensation (payment) for injury. This is not a waiver or release of your rights. Medical care is limited to the care normally allowed for Department of Defense health care beneficiaries (patients eligible for care at military hospitals and clinics). For civilian employees and contract civilian personnel, medical care is limited to treatment within Air Force medical treatment facilities. Necessary medical care does not include in-home care or nursing home care. In case of any medical incident, you will be treated on site,

unless personnel on site judge it to be an emergency, in which case they will call for ambulance service.

OCCURRENCE OF UNANTICIPATED ADVERSE EVENT

If an unanticipated event occurs during your participation in this study, you will be informed immediately. If you are not competent at the time to understand the nature of the event, such information will be brought to the attention of your Next of Kin.

Next of Kin if needed: Name_____ Phone # _____

CONFIDENTIALITY

When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity. To maintain your anonymity, only subject number will used to identify medical and psychological documentation. Names will not be associated with subjects captured on video images. However, complete confidentiality cannot be promised, particularly for military personnel, because information regarding your health may be required to be reported to appropriate medical or command authorities.

DECISION TO PARTICIPATE

The decision to participate in this research is completely voluntary on your part. Refusal to participate will involve no penalty or loss of benefits to which you are entitled, and you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. One of the investigators will answer questions you have about this study, your participation, and the procedures involved. One or more of these investigators will be available to answer any questions concerning procedures throughout this study. If significant new findings develop during the course of this research that may relate to your decision to continue participating, you will be informed. You may withdraw this consent at any time and discontinue further participation in this study without prejudice to your entitlements. The investigators may terminate your participation at any time, and the Medical Monitor or Medical Observer of the study may terminate your participation if they feel this to be in your best interest.

SUBJECT STATEMENT: I have read the document "Instructions for Subjects—Assessment of Behavior Following Exposure to ADS." I have read all of the above. My questions have been answered concerning areas I did not understand. I am willing to take part in this study. After I sign this form, I will receive a copy.

Attachment A – Informed Consent Document

Full Name: _____ _____ _____

(Please Print) SSN (optional) Telephone Number

_____ _____

Volunteer Signature Date and Time

_____ _____

Investigator Date

_____ _____

Witness (not involved) Date

Privacy Act Statement

Authority: We are requesting disclosure of personal information, to include your Social Security Number. Researchers are authorized to collect personal information (including social security numbers) on research subjects under The Privacy Act-5 USC 552a, 10 USC 55, 10 USC 8013, 32 CFR 219, 45 CFR Part 46, and EO 9397, November 1943 (SSN).

Purpose: It is possible that latent risks or injuries inherent in this experiment will not be discovered until some time in the future. The purpose of collecting this information is to aid researchers in locating you at a future date if further disclosures are appropriate.

Routine Uses: Information (including name and SSN) may be furnished to Federal, State and local agencies for any uses published by the Air Force in the Federal Register, 52 FR 16431, to include, furtherance of the research involved with this study and to provide medical care.

Disclosure: Disclosure of the requested information is voluntary. No adverse action whatsoever will be taken against you, and no privilege will be denied you based on the fact you do not disclose this information. However, your participation in this study may be impacted by a refusal to provide this information.

_____

Experiment 1
Instructions for Subjects – Behavior Assessment

This research is designed to assess the fluence level (i.e., amount of energy) of the Active Denial System (ADS) required to produce a repel effect in a realistic operational environment.

When you are exposed, the pain may become so intense that you will take evasive action, either because of an involuntary reflex withdrawal, or because the pain reaches your tolerance limit and you want to move to end it. If you are exposed, you should hold up your hand and count to 15. The operator and field supervisor will coordinate to not reengage you until after these 15 sec. This will allow the temperature of your skin cool down. In both the stationary and moving scenarios, at least two protective barriers that blocks the beam will be available. You may feel a "burning" sensation that lingers for a few seconds. The exposed area may also feel tender for up to a few minutes. We expect that these conditions will disappear within an hour or two at most. If the skin is still painful or tender after two hours, you should notify a member of the investigator team, who will arrange for the medical staff to examine you and apply appropriate treatment. Any eye discomfort or concerns that last longer than a few minutes should also be reported. There is no reason to expect any aftereffects more serious than a mild sunburn. In contrast to a sunburn, which entails some long-term risk from the effects of ultraviolet exposure, millimeter waves have no known long-term effects.

You should NOT be afraid of the exposure. The most that might happen is that you could be forced to escape the millimeter waves because the pain becomes too intense. The minimal skin damage that may occur (reddening, tenderness) should not last more than a few minutes to a few hours.

Please feel free to ask any questions or express any concerns regarding this experiment.

Experiment 2
Instructions for Subjects – Behavior Assessment

In order to assess the military utility of the Active Denial System (ADS), you will be assigned to play a role in various field scenarios. You will be dressed appropriately for this role.

AFOTEC personnel will brief you with regard to the rules of engagement for the scenario and assign you a role. You may be deliberately or incidentally exposed to the ADS beam during play. If you are exposed, we expect that the pain will become so intense that you will take evasive action, either because of an involuntary reflex withdrawal, or because the pain reaches your tolerance limit and you want to move to end it. If you are exposed during the scenario, you should hold up your hand and count to 15 before you resume playing your role. This will allow your skin to cool down. You may feel a "burning" sensation that lingers for a few seconds. The exposed area may also feel tender for up to a few minutes. We expect that these conditions will disappear within an hour or two at most. If the skin is still painful or tender after two hours, you should notify a member of the investigator team, who will arrange for the medical staff to examine you and apply appropriate treatment. Any eye discomfort or concerns that last longer than a few minutes should also be reported. There is no reason to expect any aftereffects more serious than a mild sunburn. In contrast to a sunburn, which entails some long-term risk from the effects of ultraviolet exposure, millimeter waves have no known long-term effects.

You should NOT be afraid of the exposure. The most that might happen is that you could be forced to escape the millimeter waves because the pain becomes too intense. The minimal skin damage that may occur (reddening, tenderness) should not last more than a few minutes to a few hours.

Please feel free to ask any questions or express any concerns regarding this experiment.

Directions: Please read each statement below and check the box which most applies to your level of agreement *before experiencing the effect of ADS*. Check only one box per statement.

No.	Statement	Answer					
		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1	Having the ADS available to commanders as a non-lethal weapon is a good option.	☐	☐	☐	☐	☐	☐
2	I'm confident that the ADS will not harm the weapon system operator.	☐	☐	☐	☐	☐	☐
3	I'm confident that the ADS will not harm the targeted person.	☐	☐	☐	☐	☐	☐
4-5	I believe the ADS will be effective if used in a: • crowd control situation (for example, peacekeeping and riot control).	☐	☐	☐	☐	☐	☐
	• force protection situation (for example, perimeter defense, harbor protection for naval assets, embassy protection).	☐	☐	☐	☐	☐	☐

No.	Statement	Answer					
		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
6-9	I believe the following social and cultural factors will influence the target's motivation to tolerate the effect of the ADS:						
	• religious values	☐	☐	☐	☐	☐	☐
	• political agendas	☐	☐	☐	☐	☐	☐
	• gender	☐	☐	☐	☐	☐	☐
	• culture or ethnic heritage	☐	☐	☐	☐	☐	☐
10	I am concerned about getting injured by the ADS exposure.	☐	☐	☐	☐	☐	☐
11	I feel nervous about being exposed to ADS.	☐	☐	☐	☐	☐	☐

Thank you for completing this survey.

Other Comments?

Directions: Please read each statement below and check the box which most applies to your level of agreement *after experiencing the effect of ADS*. Check only one box per statement.

No.	Statement	Answer					
		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1	Having the ADS available to commanders is a good option.	☐	☐	☐	☐	☐	☐
2	I am confident that the ADS will not harm weapon system operator.	☐	☐	☐	☐	☐	☐
3	I am confident that the ADS will not harm the targeted person.	☐	☐	☐	☐	☐	☐
4-5	I believe the ADS will be effective if used in a: • crowd control situation (peacekeeping, riot control).	☐	☐	☐	☐	☐	☐
	force protection situation (for example, perimeter defense, embassy protection).	☐	☐	☐	☐	☐	☐

No.	Statement	Answer					
		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
6-9	The following social and cultural factors will influence the target's motivation to tolerate the effect of the ADS: • religious values	☐	☐	☐	☐	☐	☐
	• political agendas	☐	☐	☐	☐	☐	☐
	• gender	☐	☐	☐	☐	☐	☐
	culture or ethnic heritage	☐	☐	☐	☐	☐	☐
10-11	I felt my heart beating faster than normal: • during ADS exposure.	☐	☐	☐	☐	☐	☐
	• after ADS exposure.	☐	☐	☐	☐	☐	☐

No.	Statement	Answer					
		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
12	I was concerned about being injured by the ADS exposure.	☐	☐	☐	☐	☐	☐
13	I felt anxious, as though I wanted to leave just before feeling the ADS exposure.	☐	☐	☐	☐	☐	☐
14	I would feel nervous about being exposed to ADS again.	☐	☐	☐	☐	☐	☐
15	I wanted to move out of the area as soon as I felt the heating effect during ADS exposure.	☐	☐	☐	☐	☐	☐
16	I could effectively protect a valuable mission asset if ADS was the only weapon available.	☐	☐	☐	☐	☐	☐
17	I could have tolerated the heating effect longer if I were on an actual mission rather than participating in a scientific experiment.	☐	☐	☐	☐	☐	☐

Thank you for completing this survey.

Other Comments?

_____

_____

Background Information Items

1. Age: _____

2. Gender (please check) _____ Male _____ Female

3. Duty Status (please check only one):
   - _____ Active Duty
   - _____ Reserve
   - _____ National Guard
   - _____ Military Retired
   - _____ Civil Service
   - _____ Contractor

4. Branch of Service (please check): _____ Army _____ Navy _____ Air Force _____ Marines

5. Military Occupational Specialty (please spell out):
_____

6. Time in Service (in years and/or months): _____

7. Highest Education Level (please check):
   - _____ High School
   - _____ Some College
   - _____ BS/BA
   - _____ Masters
   - _____ Doctorate
   - _____ Other (please state): _____

Attachment D – Post-Exposure Interview

Subject Number: _____

Date of Interview: _____

0. ADS EXPOSURE EXPERIENCE

   A. How many times were you exposed?

   B. To what would you compare the pain of the ADS?

1. ATTITUDES ABOUT NON-LETHAL WEAPONS:

   A. What do you know about non-lethal weapons?

   B. Do you consider them preferable to lethal weapons?

   C. Are you confident that non-lethal weapons can protect you as well as lethal ones? Why? If situational, which situations?

   D. Are you afraid (fearful) that non-lethal weapons may not protect you as well as lethal weapons?

   F. Do you consider the use of non-lethal weapons to be morally superior to the use of lethal weapons? Why or why not?

   (If yes) Is this important to you?

2. ATTITUDES ABOUT ADS

A. What have you heard about the ADS, if anything, before participating in this study?

From what source? (Ex.: friends, fellow unit members, the media):

B. What do you think are the **capabilities** of the ADS technology:

- in effectiveness to repel?
- as a non-lethal weapon system?
- compared to other non-lethal weapons (rubber bullets, TASERs®, bean bags, etc.)?
- as a psychological tool? (For instance, will targets be motivated to avoid its effects, or will more primitive populations be more fearful of it?)
- How would you implement ADS as a psychological tool? Signs, warnings, etc.

C. How do you think ADS could be used in a conflict to:

- deter an intruder?
- deny entry to an area (force protection)?
- control a crowd?

D. What do you think are the limitations of the ADS technology?

E. Do you have concerns about the effects of ADS energy on the weapon system operator?

If not mentioned, probe: Are you afraid that there may be long-term health or reproductive effects?

F. In addition to what you already know about the ADS, is there more information you need regarding concerns over:

- health?
- safety?
- operational effectiveness?

G. Given your real-world experience or experiences from your training; in what kind of situation would the ADS be:

- most effective?
- least effective?

H. Do you have concerns that the ADS may be misused, either by the military or by other agencies such as law enforcement departments who may eventually use the system?

I. Do you have any thoughts on the probable motivation of a hostile target to resist the effects of the ADS?

Do you think they would be effective in doing so?

3. Social and cultural factors like **religious values or political views, gender, and culture or ethnicity** may influence the motivation of hostile targets to resist the effects of the ADS.

A. First, do you think this is probably true?

B. In what ways might the following social or cultural factors of hostile targets influence their motivation to resist the effects of the ADS?
(Remind interviewee of factors.)

- religious beliefs:
- political agenda
- gender
- culture

Given these factors, could you rank order them from the ones most likely to motivate resistance, to the least likely to motivate?

C. Describe your attitude before the LMUA exposure; and after you were exposed.

D. What would your reaction be to being in a crowd, and having a person in front of you targeted? How would this affect you emotionally? Has your attitude changed in this respect since the LMUA?

Background Information Items

1. Age: _____

2. Gender (please check): _____ Male _____ Female

3. Duty Status (please check only one):
   - _____ Active Duty
   - _____ Reserve
   - _____ National Guard
   - _____ Military Retired
   - _____ Civil Service
   - _____ Contractor

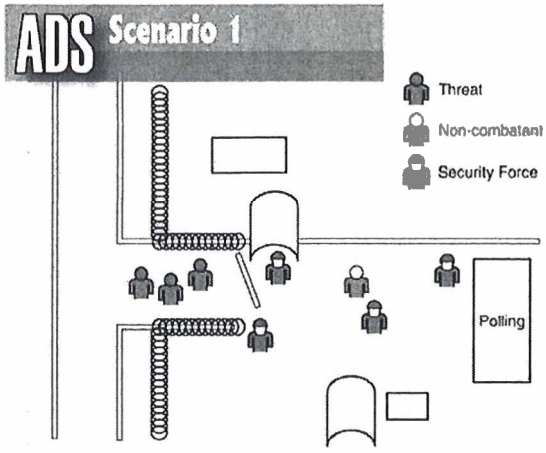
4. Branch of Service (please check): _____ Army _____ Navy _____ Air Force _____ Marines

5. Military Occupational Specialty (please spell out):
_____

6. Time in Service (in years and/or months): _____

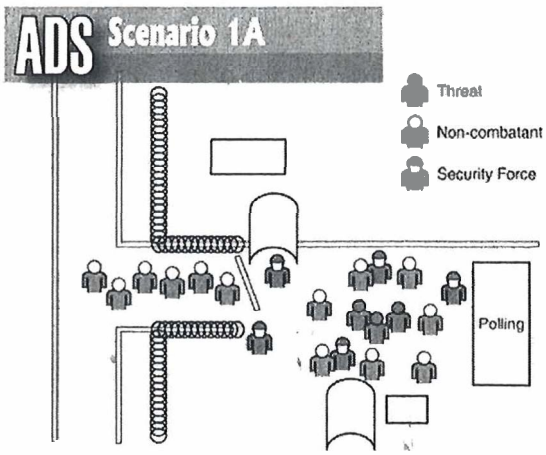
7. Highest Education Level (please check):
   - _____ High School
   - _____ Some College
   - _____ BS/BA
   - _____ Masters
   - _____ Doctorate
   - _____ Other (please state): _____

ADS Scenarios for Limited Military Utility Assessment 2



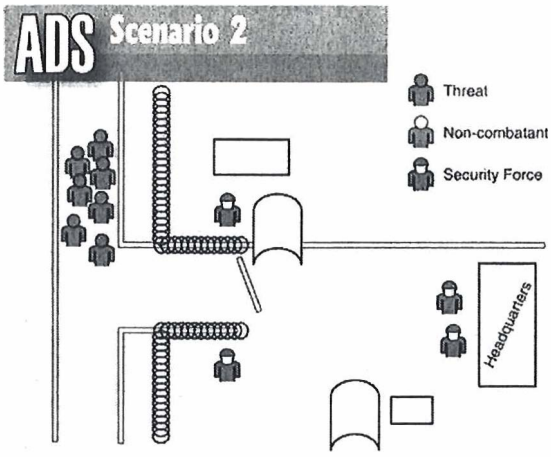
Scenario #1

A U.S. security force has been dispatched to a regional polling center in a Third World country to safeguard the electoral process. The security force is armed with non-lethal capabilities, to include dogs, tear gas, batons, bean bag shot, and ADS. The platoon has established a position next to the polling center, and emplaced a ring of concertina wire around the entire facility. People arriving from nearby villages are channeled into the polling center through a safe passage route constructed of more concertina wire. Intelligence has reported that the three political parties involved in the election all have radical elements that intend to disrupt the election and some members may be armed. Approximately 100M from the building, warnings are posted not to approach the building. A small number of individuals approach the polling site during voting. ADS is already deployed to a position supporting the perimeter and powered to standby. The security team warns IAW their ROE. Upon the individuals breaching the posted zone, the security team engages the individuals to repel them from further advance toward the building and prevent their entrance.



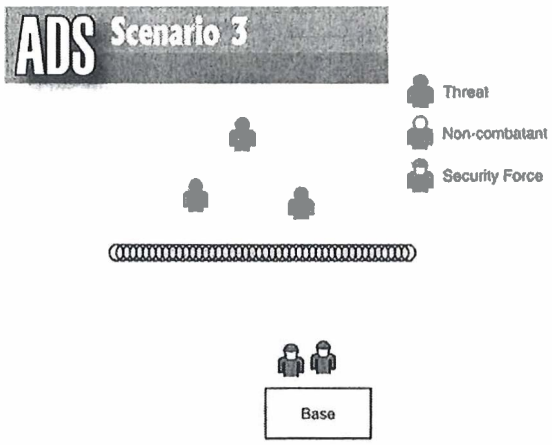
Scenario #1A

Similar situation to above, but before the security force arrives and sets up the perimeter, a mob occupies the building, ejects the voters and intimidates the poll tenders. There does not appear to be a hostage situation, but the mob is out of control and violent. They appear to be armed with expedient weapons (clubs, etc.), but no firearms or explosives. Other individuals are approaching the building. The US security force establishes a position to dominate the building while leaving the occupiers an escape route, deploys ADS to control access and exit points, and powers it to standby. The security force warns the occupiers to evacuate the building and denies access to the additional individuals approaching with ADS. The security force is armed with non-lethal capabilities, to include dogs, tear gas, batons, bean bag shot, and ADS.



Scenario #2

Scene is a new US deployment base in a Middle Eastern country. The host government supports US basing rights, but segments of the local populace voice strong resistance to the presence of U.S. troops on their soil despite their government's position. Anti-American sentiment has translated into violent demonstrations against the continued presence of the Americans. A crowd is approaching the base. Some members appear agitated, shouting anti-American slogans, and one individual is exhorting them to advance on the gate. Other members appear to be merely interested in what is going on. As soon as the crowd is detected, ADS is deployed to a position supporting the gate and powered to standby. The security team warns IAW their ROE. Upon the crowd approaching to within 100 meters of the gate and ignoring the warning, the security team targets the apparent leader(s) with ADS, prevents the agitated members from advancing, and clears the area of personnel.



Scenario #3

A small number of intruders approach a Special Weapons Facility/Weapons Storage Area. Intelligence has warned of their presence in the area, leading the security force commander to deploy ADS and power it to standby. At approximately 30-50 meters before the outer fence, the security force detects the intruders visually. They are advancing surreptitiously and carrying indiscernible objects. The security team warns IAW their ROE. On command, the security team engages the intruders and repels them.

Demographic Questionnaire

You are an important part of the evaluation of the Active Denial System. You represent those individuals who may use the system. The information you provide will not be released outside the scope of this Advanced Concept Technology Demonstration (ACTD).

Your job during this demonstration event (operator, red team, blue team, etc.) _____

_____

Do you have any experience with any other crowd control equipment or system? **YES** / **NO**

If yes, which systems and how many months experience?

Equipment/System	**Experience**
_____	_____ months
_____	_____ months
_____	_____ months
_____	_____ months

Please describe any previous experience you have had with any crowd control equipment or systems (type of system, employment, location, conditions, etc.)

_____

_____

_____

Operational Utility Questionnaire

Operator / Observer. The following questions ask you to evaluate the operational utility of the ADS. Please read each statement below and check the box that most applies to your level of agreement.

Scenario _____ Date _____

Have you experienced the effects of ADS? (Y / N)

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The reaction of an ADS target clearly indicates successful engagement.	☐	☐	☐	☐	☐	☐
The reaction of an ADS target is immediate.	☐	☐	☐	☐	☐	☐
The target's activities are unmistakably disrupted when engaged with ADS	☐		☐	☐	☐	☐
The target's activities are immediately disrupted when engaged with ADS.	☐	☐	☐	☐	☐	☐
Prior targets are likely to resume original activity when after ADS beam is suspended.	☐	☐	☐	☐	☐	☐
Most targets don't resume original activities after ADS engagement.	☐	☐	☐	☐	☐	☐
ADS is an effective deterrent in crowd control situations.	☐	☐	☐	☐	☐	☐
ADS is an effective deterrent in perimeter defense situations.	☐	☐	☐	☐	☐	☐
ADS can affect the movement of a crowd.	☐	☐	☐	☐	☐	☐
ADS can separate specific elements of a crowd.	☐	☐	☐	☐	☐	☐
ADS is effective at driving a group in a desired direction.	☐	☐	☐	☐	☐	☐
Because the ADS is non-lethal, I am not concerned about unintended targets.	☐	☐	☐	☐	☐	☐

Comments: _____

_____

_____

Operational Utility Questionnaire

LMUA 2 Participant. The following questions ask you to evaluate the operational utility of the ADS. Please read each statement below and check the box that most applies to your level of agreement.

Scenario _____ Date _____

Have you experienced the effects of ADS? (Y / N)

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I believe that the reaction to the ADS energy beam is uncontrollable.	☐	☐	☐	☐	☐	☐
A target's reaction to the ADS energy beam will be immediate.	☐	☐	☐	☐	☐	☐
I believe a target engaged by the ADS will not be able to continue with current activities.	☐	☐	☐	☐	☐	☐
A motivated target could complete a quick task while engaged by the ADS energy beam.	☐	☐	☐	☐	☐	☐
Most targets will not resume their original activities after ADS engagement.	☐	☐	☐	☐	☐	☐
ADS will not easily complement other existing crowd control techniques.	☐	☐	☐	☐	☐	☐
ADS is an effective deterrent in crowd control situations.	☐	☐	☐	☐	☐	☐
ADS is an effective deterrent in perimeter defense situations.	☐	☐	☐	☐	☐	☐
ADS can affect the movement of a crowd.	☐	☐	☐	☐	☐	☐
ADS can separate specific elements of a crowd.	☐	☐	☐	☐	☐	☐
ADS is effective at driving a group in a desired direction.	☐	☐	☐	☐	☐	☐

Because the ADS is non-lethal, I am not concerned about unintended targets.	☐	☐	☐	☐	☐	☐

Comments: _____

_____

_____

_____

_____

_____

ADS MEDICAL DOCUMENTATION FORM

FRONTAL EXPOSURES

KIRTLAND AFB

DATE/TIME: _____ **SUBJECT #** _____

VITAL SIGNS: R _____ **BP** _____ **P** _____

PRE-EXPOSURE HISTORY: circle if any apply. Otherwise circle history non-contributory.

1. Absolute DQ if: pregnant, large metal implants.

2. May require DQ, must check with medical monitor (or alternate) if:
   - Skin condition: ongoing disease, history of skin cancer, grafts, thick scars (Keloids), photosensitivity.
   - Other chronic medical problems: cancer, neuropathy, uncontrolled high blood pressure, stroke, heart problems, on heart medications.

3. Current medications:

4. Eye specific:
   - Do you currently have any eye complaints? No___ Yes___
   - Any foreign body sensation (like something is in your eye)? No ___ Yes ___
   - Any eye burning, dryness, discharge? No___ Yes___
   - Any condition requiring eye medication? No___ Yes____
   - Diabetes? No___ Yes___
   - Used contacts 12 hours before exposure? No___ Yes___
   - Impaired blink reflex? No___ Yes___
   - Eye surgery (PRK, LASIK, etc)? No___ Yes___

PRE-EXPOSURE EXAM:

1. Skin: circle if they apply.
   - color: redness, sunburned
   - moisture: dry, sweating, oily
   - texture: rough, smooth, crusty areas, other:
   - lesions: macules, papules, vessicles, other:
   - scars:

2. Heart:
   - RRR, other:

3. Face:
   - Any significant facial scars? No___ Yes___
   - Any pre-malignant looking lesions? No___ Yes___
     Sunburn? No___ Yes___
   - Other abnormalities on face? No___ Yes___ describe:

4. Eye exam

	OD	OS
Visual acuity		
Pupillary reflexes		
Contrast acuity	95% contrast	15% contrast
Color vision		
Amsler grid		

5. Clothing check: buttons, etc in the field: removed, N/A

Note: The next are quick external looks only!

TIME _____ EXPOSURE #1 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #2 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #3 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #4 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #5 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #6 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #7 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #8 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #9 Skin/Eye: redness, blisters, sweating, normal, other:

TIME _____ EXPOSURE #10 Skin/Eye: redness, blisters, sweating, normal, other:

FINAL POST EXPOSURE HISTORY: TIME _____

1. Concerns or complaints: none, other:

2. Eye specific:
   a. Do you currently have any eye complaints? No____ Yes____
   b. Any foreign body sensation (feel like something is in your eye)? No____ Yes____
   c. Any eye burning, dryness, discharge? No____ Yes_____
   d. Any complaints? No____ Yes____

FINAL POST EXPOSURE EXAM: circle if any apply. Otherwise circle normal exam.

1. Skin: redness, blisters, rash, sweating, other:
2. Heart: RRR, other:
3. Other worth noting:
4. Eye Exam:

	OD	OS
Visual acuity		
Pupillary reflexes		
Contrast acuity	95% contrast	15% contrast
Color vision		
Amsler grid		

Need for referral (symptoms > 15 minutes) to Dr. William Jones: 505-243-4066:

no____ yes____

Mbryce/mb/AFRL/HED/2 May 03