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GRAFENWOEHR II: REALISTIC BATTLEFIELD SENSOR TRIALS. 'GRAF II' --ETC(U)
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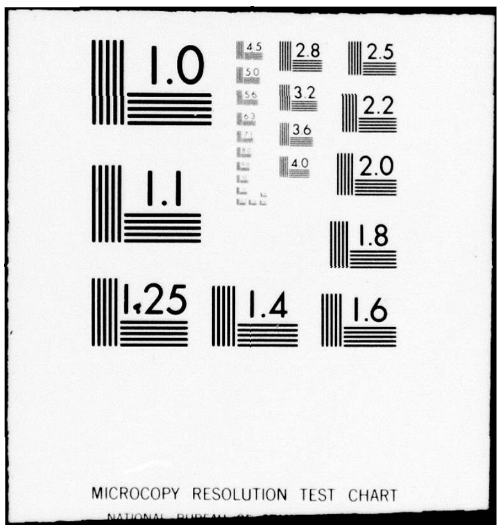
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U.S. ARMY ELECTRONICS R&D COMMAND

NIGHT VISION & ELECTRO-OPTICS LABORATORIES

FT. BELVOIR, VIRGINIA 22060

Final 6/1/79

(6)

GRAFENWÖHR II:

REALISTIC BATTLEFIELD SENSOR TRIALS

"GRAF II"

TEST PLAN

GRAFENWÖHR, GERMANY

JUNE 1979

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(9) Final rept.

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a cooperative US/GE effort

(15) under DEA 68-G-1110

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GRAF II SUMMER EXECUTIVE SUMMARY

1.0 Purpose

The GRAF II Summer Realistic Battlefield Sensors trials is being conducted from 18-30 June 1979 to determine effects of high explosive (HE) and smoke artillery barrages on E-O sensor performance and to quantify the optical propagation and transport properties of the obscurants created by such barrages. GRAF II Summer is a follow-on activity to the GRAF II Winter Trials completed 26 Nov 1978. These trials will again be a joint effort between the United States and the Federal Republic of Germany, and are coordinated under DEA68G-1110 and the US/GE General Staff Talks.

1.1 Introduction

The Night Vision and Electro-Optics Laboratory has just completed a significant exercise shock quantifies Electro-Optical Sensor performance in a typical Winter European environment (GRAF II Winter). The soil conditions and overall meteorological conditions had a significant impact on the results of the test. The data derived from this test will assist the DOD analysis community in directly assessing E-O system performance in the conditions tested. However, there is a lack of understanding as to the severity of HE obscurant effects on E-O sensors in the European Summer environment. An opportunity to examine realistically deployed smoke under high relative humidity conditions has also been made available to NV&EOL.

Coordination has been effected with USAREUR for test site locations in and around the artillery impact area at Grafenwoehr. In addition, the 7th ATC at Grafenwoehr is providing limited administrative, target, and site security support on a not-to-interfere with training basis. Without this assistance from USAREUR, the GRAF II Realistic Battlefield Sensors Trials could not be conducted.

The US portion of the field trials will be carried out by Night Vision and Electro-Optics Laboratory, the Atmospheric Sciences Laboratory, the Waterways Experiment Station, MIRADCOM, and a Dugway Proving Grounds team with technical assistance fom the Project Manager SMOKE, all from the Department of the Army, and the Avionics Laboratory at WPAFB from the Department of the Air Force. The Federal Republic of Germany is participating by fielding an additional Electro-Optics sensor station, transmissometer station and providing munitions and the artillery units to fire all munitions.

1.2 Test Plan Summary

1.2.1 OBJECTIVES

(1) Measure obscurant and clutter effects on imaging target acquisition and laser sensors at ground-to-ground and air-to-ground platforms due to artillery high explosive and smoke round barrages

(2) Measure the optical and IR and MM wave propagation through the resultant obscuration colinear with the recorded visible and thermal imagery.

(3) Conduct high explosive "Airburst" test to separate the dust effect from other obscurant effects.

(4) Investigate the effect of fuzing depth on obscuration produced.

(5) Measure obscurant modeling data; the cloud size, crater size, soil analysis, atmospheric stability, etc. for single round live fire and static detonated trials.

1.2.2 APPROACH

A broad class of E-O sensors and environmental measurement apparatus is being assembled at the NV&EOL in preparation for shipment to Grafenwoehr, Germany. The E-O sensors will undergo image quality and sensitivity test prior to deployment. The atmospheric and signature measurement apparatus will be fully calibrated at Fort Belvoir as well as periodically during the field test period. Most equipment is undergoing some degree of modification due to the unique nature of the test. Specifically, all imaging E-O sensors are being mated with TV cameras and video tape recorders which will provide a direct record of obscurant effects. Such imagers that are to be located adjacent to artillery barrages are further modified with remote controls for remote monitoring and sensor control adjustments.

The atmospheric transmissometers have been adapted to provide cloud transmission measurements as low as 0.1% in the optical and infrared spectral regions. In addition, several levels of sensitivity will be recorded for each spectral transmissometer in order to handle the extreme dynamic range in transmission expected.

In all, there are eight measurement stations planned for the GRAF II Realistic Battlefield Sensors Trials located in and around the Grafenwoehr impact area as shown on the Test Station Layout in Figure 1. These stations with apparatus as currently planned are as follows:

(1) Observation Station

(a) Day Television .8-1.1um

(b) Tank Thermal Sight (8-12um) Narrow Field Of View

(c) NODLR (3-5um)

(d) LOHTADS FLIR (8-12um)

(e) CHOW CIRCUIT FLIR (8-12um)

(f) Day Television .4-.7um

(2) E-O Transmissometer Station

(a) .4-.7um Silicon Receiver

(b) .8-1.1um Silicon Receiver

(c) 3.4-4.1um InSb Receiver

(d) 8.0-12.0um HgCdTe Receiver

(e) Multicolor Source

(f) Meteorological Station

(g) 95 GHZ Transmissometer

(3) Cloud Size, Transport, and Temperature

(a) Calibrate Thermal Imager

(b) 2 Vidicons @ 90° to cover 250 meters of impact area

(4) Target Signatures

(a) Precision Radiometers

(5) Airborne Sensor Station

(a) Air Force High Res FLIR

(b) High Resolution Television

(6) Soil Analysis Station

(a) Soil Density and Wetness

(b) Crater Sizes

(7) Particle Size and Concentration

(a) ASL Knollenberg

(b) ASL Filter Samplers

(c) ASL Chemical Impactor Samplers

(d) DPG Aerosol Photometers

(e) DPG Dust Samplers

(8) GE Multi-Spectral Sensor Station

(a) Silicon Television

(b) NODLR 3-5um

(c) Tank Thermal Sight 8-12um

(d) Visible Television

(e) 9.5 GHZ Radar

(f) Transmissometers (.4-.7um,3-5um, 8-12um, 95GHZ)

(g) GE FLIR in MARDER

1.2.3 Experimental Plan and Expected Results

The realistic battlefield environment will be generated by live fire artillery barrages of several intensities at different times as shown in Figure 1. Infrared and day TV imagery will be recorded on video tape while viewing both moving and static tank targets. The dust clouds generated will be spatially characterized on television cameras recorded at 90° and the NV&EOL, E-O AND MMW transmissometers will record propagation properties ground-to-ground while GE transmissometers will record start data transmissions. In addition a 1.06 laser designator/seeker combination and a 10.6 beams rider combination will be assessed by MIRADCOM.

Fire plans that provide three minute slices of 30 minute prep firing of annihilation, neutralization and hard point barrages will be implemented. In addition, lesser intensity firings of one to three rounds will be used. The test schedule for the active portion of the trials is shown in Figure 2.

The primary data base expected from the GRAF II experiments is indicated in Figure 3. Such data should have significant impact on future generation sensor development as well as influence on tactical applicability of current and soon to go into production sensors. A draft report on the significant results obtained from GRAF II will be available for distribution by 31 Oct 1979. A final report describing the composite results will be completer by 30 Dec 1979.

Figure 1: WARSAW PACT FIRING DENSITIES

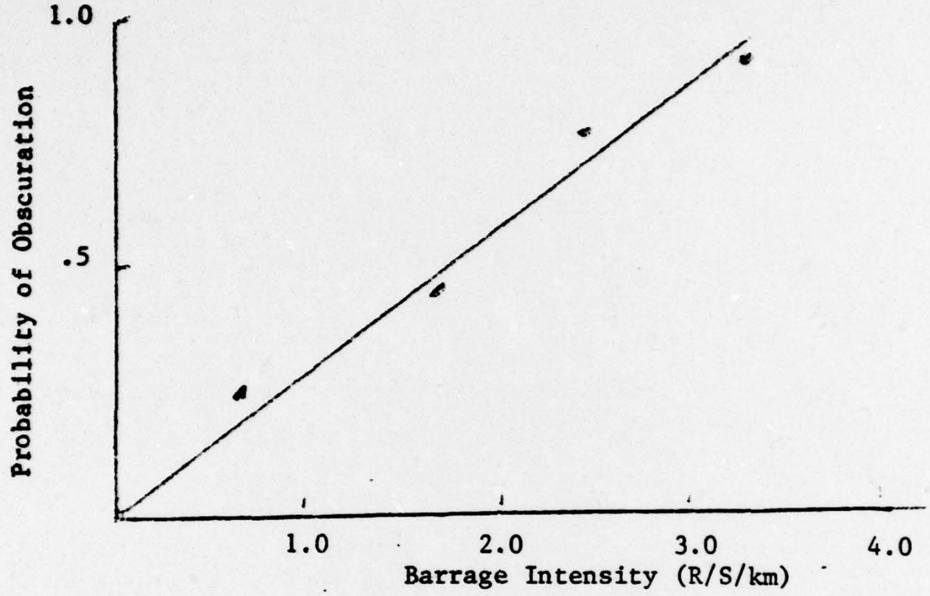
DENSITY	No. of Rounds/Sec/Kilometer Front
NEUTRALIZATION	.5 R/S/km
ANNIHILATION	1.5 R/S/km
HARD POINT	4.5 R/S/km

Figure 2. FIRING SCHEDULE

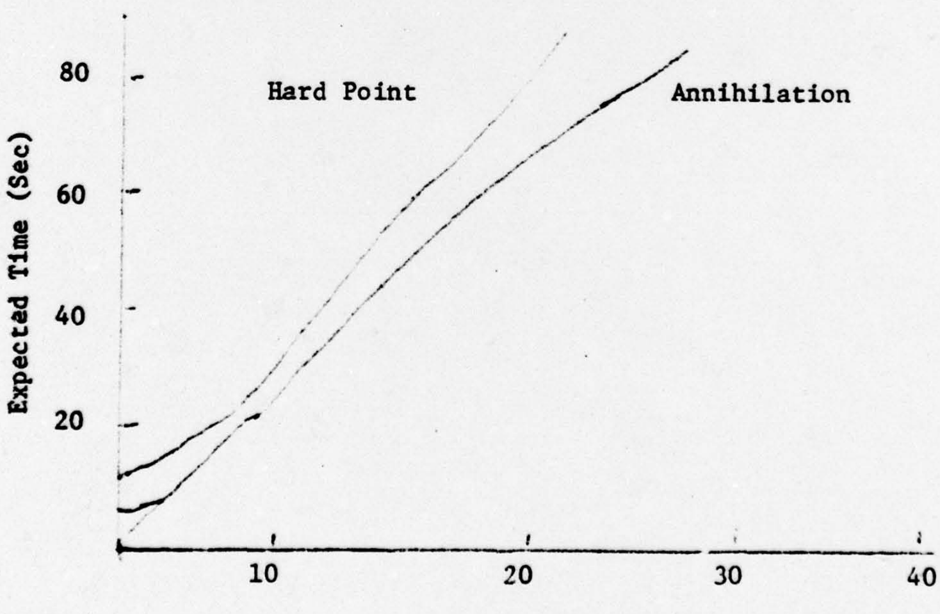
DATE	TIME	TYPE BARRAGE
18 June	1300 - 1500	Registration
	1500 - 1530	Practice Barrage
	2000 - 2030	Annihilation
19 June	0600 - 0700	Static HE
	2000 - 2030	Neutralization
20 June	0600 - 0700	Static WP
21 June	0600 - 0700	Static HC + Static Make-up
22 June	0600 - 0700	Neutralization HE Annihilation HE Hard Point HE
25 June	0600 - 0700	Neutralization HE Annihilation HE Hard Point HE
26 June	0600 - 0700	WP Smoke 1 Battery WP Smoke .5 Battery HE 1.5 Battery
27 June	0600 - 0700	HC Smoke 1 Battery WP Smoke .5 Battery HE Smoke 1.5 Battery
	2000 - 2030	HC Smoke 1 Battery VT Fused HE 1 Battery
28 June	To Be Scheduled As Test Progresses	
29 June	To Be Scheduled As Test Progresses	

Figure 3: **EXPECTED DATA**

Probability of Obscuration for Thermal Sight Ground-Ground



Expected Time to Get A Clear Line of Sight For A Given Time



1.2.4 Administrative Aspects (US Portion)

This program is primarily being carried out by the NV&EOL which has full responsibility for administrative and technical management of the program.

TEST METHODOLOGY

2.0 Background

A substantial amount of qualitative information is available on the effects of high explosive artillery dust on E-O sensor systems and the extinction and transport properties of the resulting dust cloud. The bulk of this data has come from the results of recent CONUS tests at Ft Knox, Ft Huachuca, Aberdeen Proving Ground and NATO experiments which have provided the basis upon which the GRAF II trials are structured. The recent GRAF II (Winter) test has served to give quantitative data on sensor performance in a typical European Winter environment. Other recent experiments such as the Atmospheric Sciences Laboratory Dirt I test and Ft Knox TAPATS test have also provided some quantitative data on artillery dust clouds in different environments.

Tests such as Smoke Week I and Smoke Week II have added some quantitative as well as qualitative data base of artillery generated dust and battlefield smoke obscurant characteristics and their effects on E-O sensor systems.

The GRAF II Summer trials are structured within the framework of a unique combination of predictive modeling, active battlefield testing, and model adaptation to achieve both E-O sensor performance characteristics and a unified E-O systems performance model for an active battlefield scenario.

2.1 E-O System Performance Characterization

The GRAF II Summer testing methodology can be separated into four functional catagories and such catagories as follows:

System Performance Characterization

- Ground sensors, IR and visible
- Helicopter airborne
- CO_2 Beam Rider
- Millimeter wave imagery (GE)

Active Battlefield Characterization

- E-O transmission
- Dust cloud size measurement and transport
- Dust cloud particle and concentration sampling
- Smoke cloud size and concentration sampling
- Meteorological sampling
- Millimeter wave propagation

Data Analysis and Modeling

- NV&EOL HE Dust, Smoke, and E-O systems performance models
- Data reduction and observer/system performance evaluation

All testing will be as a function of <u>Type and Density of Artillery Barrages</u>.

- High Explosive 155mm Rounds

  .5 R/S/km

  1.5 R/S/km

  4.5 R/S/km

- White Phosphorous 155mm Rounds

  3 tubes firing

  6 tubes firing

- Combined Smoke and HE 155mm Rounds

  HE 1.5R/S/km

  WP 3 tubes

- STATIC Rounds

  Collect analytical model data using HE or WP or HC

<u>2.1.1 Tank Thermal Sight AN/USG-2</u>

The Target Acquisition (TA) performance of the observer using a FLIR has been studied extensively over the last several years. Performance prediction models developed by NV&EOL make very good predictions concerning the effects of bulk extinction on FLIR TA performance. However, they do not take into account the other modes of obscuration of the target, such as thermal clutter from solar radiation heating of bushes, rocks, and terrain features or thermal clutter in the obscurant cloud itself. This latter clutter can be due to retention of the heat generated in the explosion by the obscurant, especially near the detonation point, or it can be due to continuing exothermal chemical action as in the phosphorous smokes. When this thermal obscuration occurs more or less uniformly throughout the cloud, it reduces the target contrast, and when it occurs locally within the cloud (patchy) it represents path radiance clutter and competing false targets.

The effects of background clutter have been considered at NV&EOL and as a result current performance models account for its degrading effect on sensor performance to some extent. The effects of path radiance clutter are currently being investigated (GRAF II Winter, Smoke Week II) and have played a major role in shaping the test methodology for GRAF II Summer.

Even where the path radiance clutter is not sufficiently intense (temperature variations within the cloud are too small relative to the ΔT between a hot target and its background, to seriously degrade system performance) the intervening bulk extinction properties of the dust or smoke frequently reduce the contrast sufficiently to make this path radiance clutter the dominating effect. While some of these effects are short lived, they still bear serious consideration and further study.

2.1.1.1 HE Barrage Sequences

The sequence of artillery fire modes to be performed is as follows. First there is an individual gun single round rapid series to establish and verify correct aiming. Then follows a series of three types of barrages - Neutralization, which consists of 0.5 rounds per second per kilometer square, Annihilation, which is 1.5 rounds per second per km^2, and Hard Point, which is 4.5 rds/sec/km^2. The video taped TTS imagery taken during this sequence will be analyzed to determine the probability of detection for moving and fixed tank targets in the narrow field of view as a function of barrage intensity, and specifically relating to summer conditions of soil and atmosphere. Also, target acquisition profiles across time-into-barrage as functions of barrage intensity and studies of continuous line of sight will be extracted.

2.1.1.2 Smoke Barrage Sequences

The smoke barrage will consist of initial firing by all guns, and replenishment every 30 seconds for the duration. The TTS imagery generated during the smoke sequence will be used to determine the probability of detection for moving and fixed targets in the narrow field of view. Of special interest are the characteristics of phosphorous smoke in the GRAF II Summer atmospheric conditions including high humidity. Expected waiting times and probability density functions for continuous line of sight will be extracted, and verification and comparison with smoke model predictions will be made using this data.

2.1.1.3 Combined Smoke and HE Barrage

The combined Smoke and He barrage will consist of an annihilation type HE barrage and statically detonated WP Smoke. In addition there will be an HE Airburst barrage combined with statically detonated WP smoke rounds. The data generated during this trial will be used for the same purposes as the HE and Smoke trials, but with additional concern with the possibility of synergistic effects.

2.1.2 NODLR (3-5u) AN/TAS-2

In addition to the modes of obscuration described for the 8-12u system, the 3-5u system image may also be obscured by solar radiation reflected from the obscurant cloud or glare. The effect would be similar to the thermal radiation from an obscurant cloud, i.e., either patchy clutter or uniformly bright loss of scene concrast.

2.1.3 LOHTADS (8-12u Airborne FLIR)

This unit, normally mounted in an attack helicopter, will be operated in a slightly elevated position and will be used identically to the TTS. Its imagery, however, will be recorded directly from its electronics and will be used for high quality high dynamic range thermal image reference.

2.1.4 Daylight Vidicons

The daylight vidicon TV cameras (RCA NUVICONS) are being used for visible target acquisition (matched to the field of view of the TTS), target acquisition in the photopic and 0.72 to 1.0u regions of the spectrum using filters, and for cloud size measurement. Transmissometer measurements will be made within each of these regions.

2.1.5 CHOW Circuit FLIR (8-12u, AFGAL)

This common module 8 to 12 micron FLIR employs circuitry to minimize the brightness level depression effect which is due to sensor saturation by local thermally intense sources.

3.0 Active Battlefield Characterization

The purpose of this activity is to gather data such that the results of the test may be expanded to other conditions through analysis and modeling.

3.0.1 Transmission/Meterological Data

Transmission histories for gound-ground and slant path will be recorded in the visible (.4-.7um, near IR (.8-1.1um) and IR (3-5um) FAR IR (8-11um) and the millimeter bands (9.5 GHZ and 94 G112). These transmissions will be measured along as near a coincident line as possible.

In addition in order to characterize the atmospheric stability and other optical properties, the following meterological measures will be made at either end of the transmissometer lines.

Wind Speed, Wind Direction @ 4 Altitudes (2,4,8,16 Meters)

Air Temperature @ 4 Altitudes (2,4,8,16 Meters)

The following will be collected from the receiver end of the transmissometers: Visibility, ceiling, pressure, precipatation, relative humidity.

Additional meterological data will be collected from local Air Weather Service Surface Charts, Radiosonde Measurements, and Satellite Weather Maps.

3.0.2 Cloud Size Data

Two video cameras will be located at right angles to one another in addition a thermal system will be co-located with one of the vidicons. All information will be put onto video tapes - the apparent size information for cloud height, cloud width, and cloud centroid height with both type of sensors.

3.0.3 Particle Size and Composition of Clouds

Composition analysis and refractive index estimates for explosive debris collected by cascade impactors, membrane filters, and flat plates will be collected by the Atmospheric Sciences Laboratory (ASL), in addition particle size distribution as a function of time at a distance of too meters above ground, obtained with a Knollenberg counter operating in the 2 to 47um particle diameter range will be collected by the ASL.

3.0.4 Soil and Crater Analysis

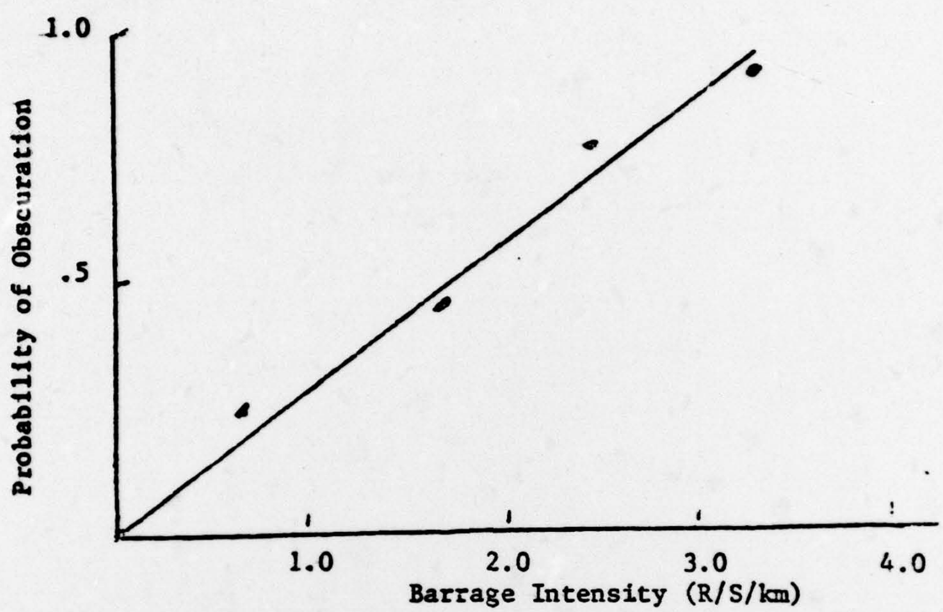
The Waterway Experimentation Station (WES) will provide data on the following soil, characteristics: grain size distribution, cone index, soil density, soil moisture content, soil type, vegatation type and density. WES will also assist NV&EOL in taking crater size measurements.

4.0 Data Analysis and Modeling

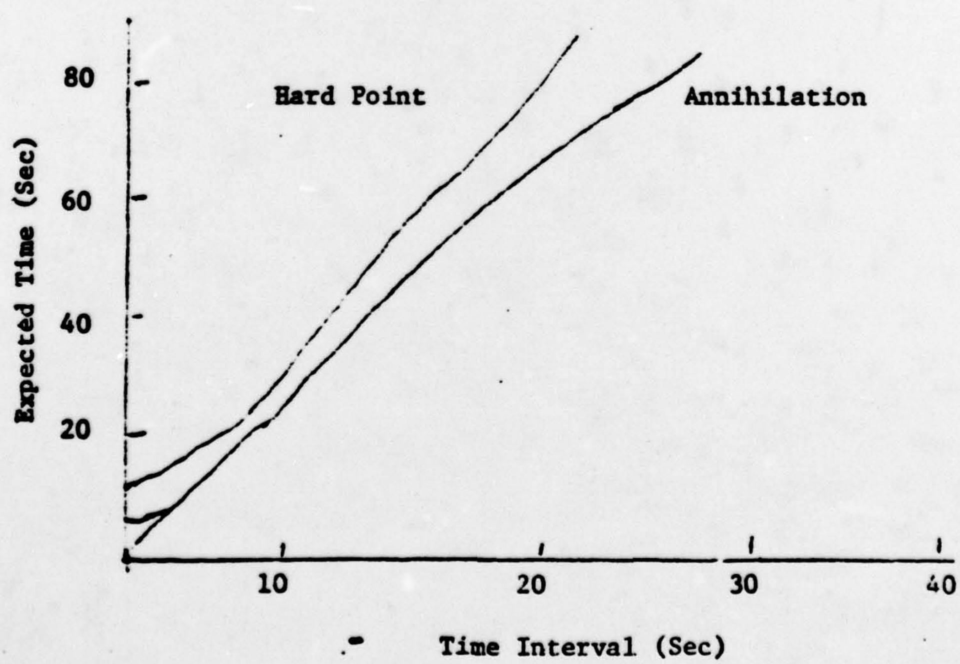
The data from the trials will be analyzed in two ways. The first method will be to directly assess E-O sensor performance as a function of artillery barrage type and artillery barrage intensity as illustrated in Figure 4.

Figure 4 DATA ANALYSIS

Probability of Obscuration for Thermal Sight Ground-Ground



Expected Time to Get A Clear Line of Sight For A Given Time



The second set of analysis will take the analytical models developed and/or altered from this test and attempt to predict the results measured during the barrages: an example of such an attempt is given in Figure 5.

5.0 Range Layout

A schematic of the overhead range layout with places that equipment will be located is given in Figure 6. The impact area is located 1300 meters from REM-1 and 1000 meters from REM-2 . The impacts are 3300 meters from TAC-5 and some 50 meters lower in elevation. This means that the line of sight from TAC-5 to REM-2 will be approximately 40 feet off the ground.

5.1 Fire Plan

There are four types of firing activities planned. They are:

- Static detonated HE rounds in known locations
- Static detonated smoke rounds in known locations
- Various intensity smoke barrages
- Various intensity HE barrages
- Smoke and HE mixed barrages

5.1.1 Fire Plan Sequences

The planned barrages for the test are given in Figure 2.

Figure 5 BARRAGE TRANSMISSION HISTORY

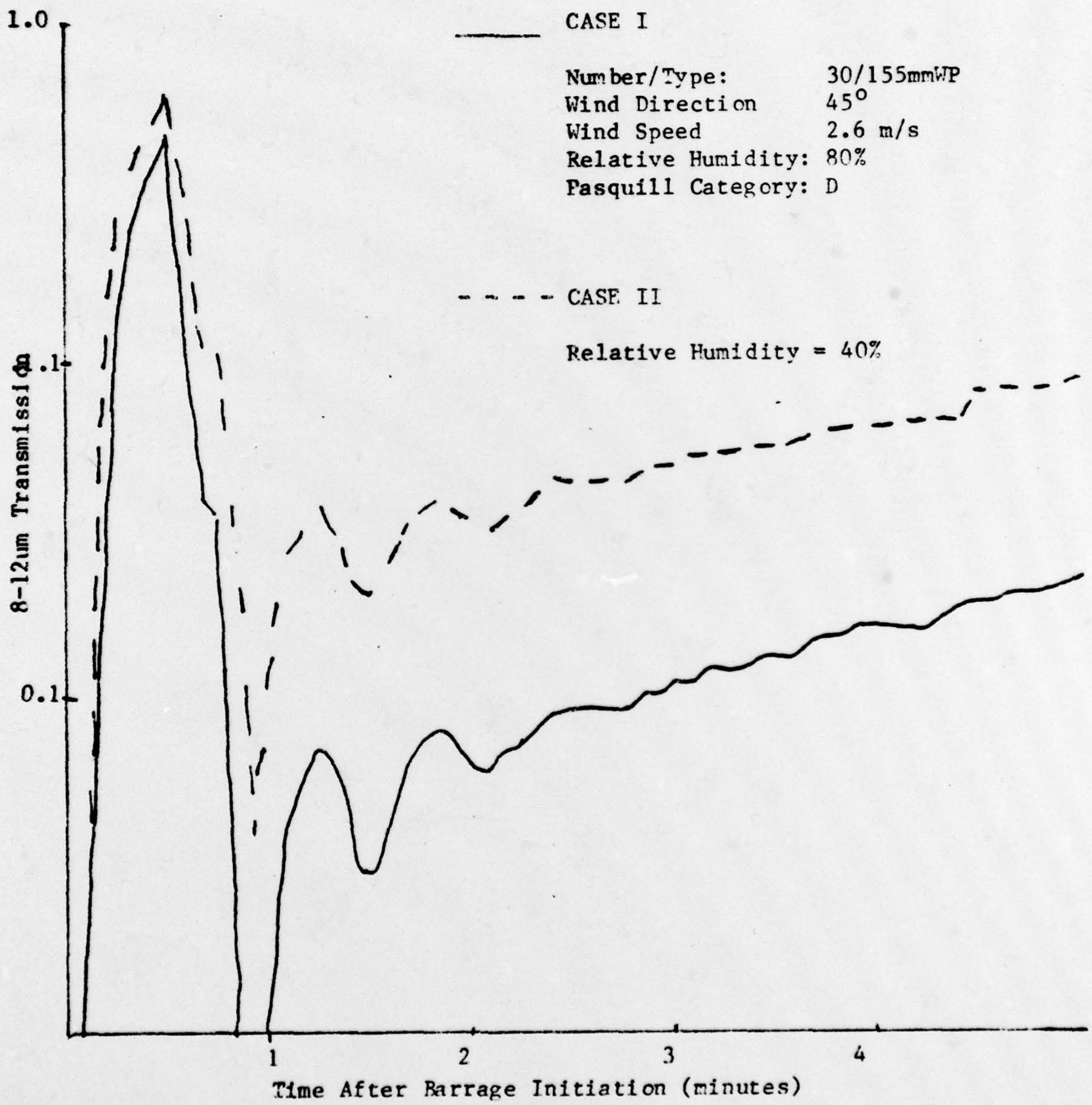
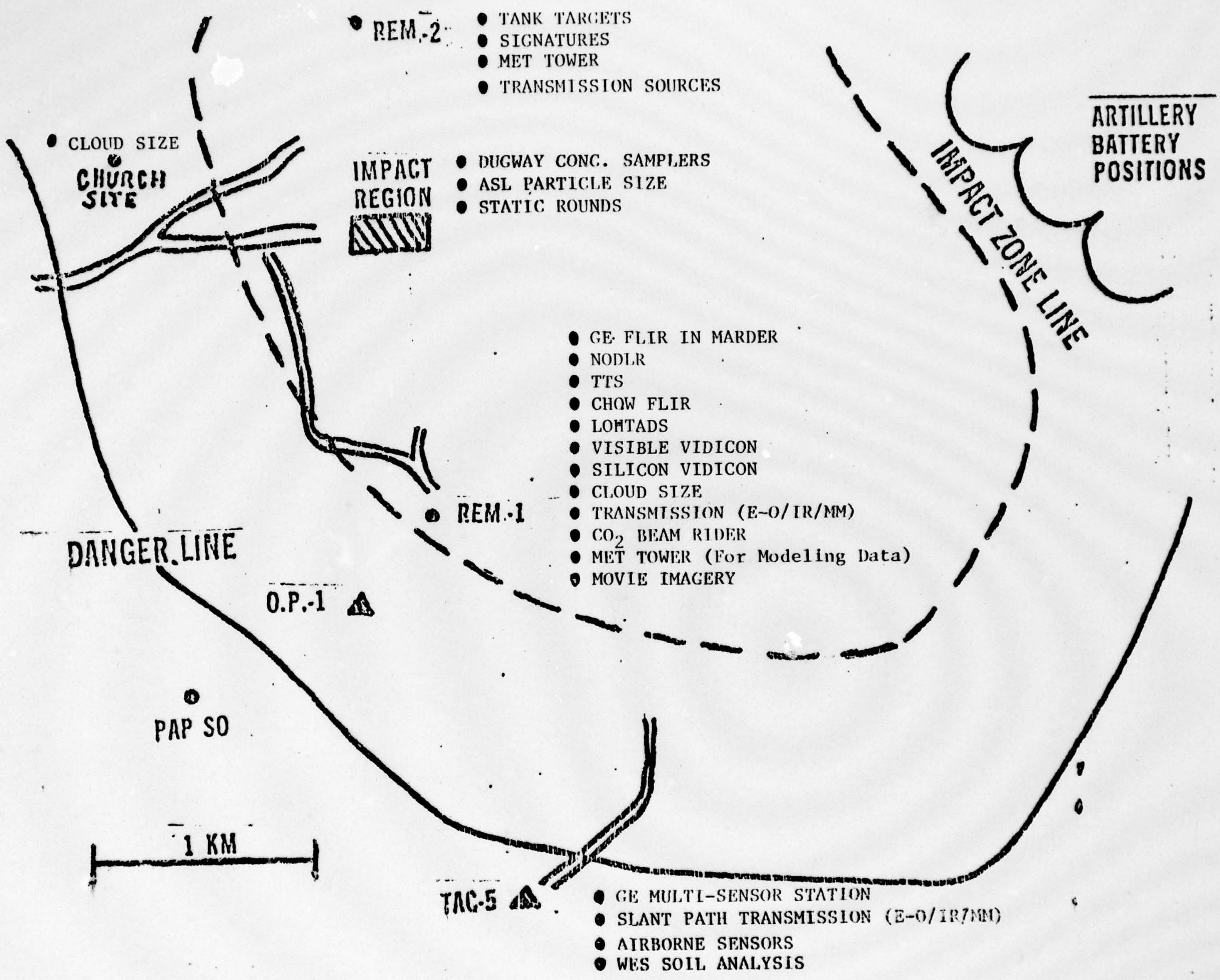


Figure 6


REM.-2
TANK TARGETS
SIGNATURES
MET TOWER
TRANSMISSION SOURCES
CLOUD SIZE
CHURCH SITE
IMPACT REGION
DUGWAY CONC. SAMPLERS
ASL PARTICLE SIZE
STATIC ROUNDS
ARTILLERY BATTERY POSITIONS
IMPACT ZONE LINE
GE FLIR IN MARDER
NODLR
TTS
CHOW FLIR
LOHTADS
VISIBLE VIDICON
SILICON VIDICON
CLOUD SIZE
TRANSMISSION (E-O/IR/MM)
CO_2 BEAM RIDER
MET TOWER (For Modeling Data)
MOVIE IMAGERY
REM.-1
DANGER LINE
O.P.-1
PAP SO
1 KM
TAC-5
GE MULTI-SENSOR STATION
SLANT PATH TRANSMISSION (E-O/IR/MM)
AIRBORNE SENSORS
WES SOIL ANALYSIS

6.0 Main Observation Station

6.0.1 Methodology

The sensor station consists of a manned instrument van at Rem 1, 1300 meters from the impact zones, containing a variety of sensors, transmissometer source, and monitoring and recording systesm. This station will also function as the remote range communication center. All sensor systems are paraxially aimed toward Rem 2, establishing the primary line of sight.

The imaging systems functioning at this site are:

1) TI-TTS, 8-12u imager in narrow field of view
2) NODLR, 3-5u imager
3) AFGAL (CHOW CIRCUIT) common module Flir, 8-12u
4) LOTADS Flir, 8-12u
5) Target acquisition NUVICON TV Camera, 2.5° FOV
6) Cloud size measuring NUVICON TV Camera
7) TV Cameras (2) for windspeed and direction monitoring
8) Film Cameras

Each image is mixed through a time code generator and recorded in the sensor van. In addition, some of the images will be transmitted via RF data links to other locations. Systems will be adjusted for peak image quality just prior to each test.

Microphones will be mounted so that the barrage sounds can be recorded on the audio tracks of the TTS and target acquisition video recorders.

The function of the film cameras will be to get maximum quality sample imagery from each IR imager, and to photograph some aspects of the obscurant clouds directly.

All systems will be powered up, warmed up and adjusted for best image before artillery firing begins. Recorders will be started at least one minute before initial impact, at station leaders instruction, and run until at least one minute after the line of sight is visually clear. Recording tapes will be labelled with the time, date, and system identification upon insertion, and time and date upon removal from the recorders. A master log of this information will be kept and entries made each time a tape is changed. This log will include essential information concerning the barrage type and characteristics, obscurant type, time and comments.

Whenever possible, personnel will observe the monitors during artillery firing and note times of target obscuration and recovery in a log kept for this purpose.

6.0.2 Expected Data

Raw data generated by the sensor station will consist of the video tapes from each sensor, and the written logs to identify events and observer comments as described. In addition, transmissometry data will be recorded.

The data will be anlyzed to extract at least the following information:

1) Percent probability and duration of target acquisition (TA) versus barrage intensity.

2) Probability of TA versus atmospheric transmission

3) Cumulative duration of target visibility versus barrage intensity.

4) Target acquisition profiles across time-into-barrage as functions of barrage intensity.

5) Verification and comparison with smoke model predictions, especially with respect to phosphorous smokes under high humidity condition.

6) Expected waiting time to attain continuous line of sight to the target as functions of time intervals and barrage types.

7) Probability density functions of continuous line of sight versus time intervals.

6.1 E-O Transmission/Meteorological Station

6.1.1 Methodology

Transmission measurements will be made in four different bend-widths. No silicon receivers will have a .4 to .7 micron filter and a 0.8 to 1.1 micron filter. The third receiver will have a 3.0 to 5.0 micron filter and the fourth receiver will have an 8.0 to a 12.0 micron filter.

The four receivers will be set up and calibrated using the multi-color sources, prior to the test. They will be placed in shelters located at either end of the range separated by a distance of 2300 meters.

Meteorological station will consist of independent standard met equipment to collect and record standard meteorological weather phenomena. The two meteorological test sites located northwest of Rem 2 and southeast of Rem 1 will each have a 16 meter high tower. Its purpose is to provide 2,4,8, and 16 meter high locations for measuring wind speed, wind direction, and temperature profile. A surface observation site will be erected at REM 1 to measure cloud cover, surface temperature, visibility, wind speed, wind direction, surface air pressure and rate of rainfall. Soil temperatures will also be measured, using a thermocouple inserted 8 inches into the ground.

6.1.2 Expected Data

The transmission data taken will be reduced each day and turned into the test director. A daily log will be kept of all calibration data as well as the daily measurements taken with the transmissometers (a sample data sheet is enclosed).

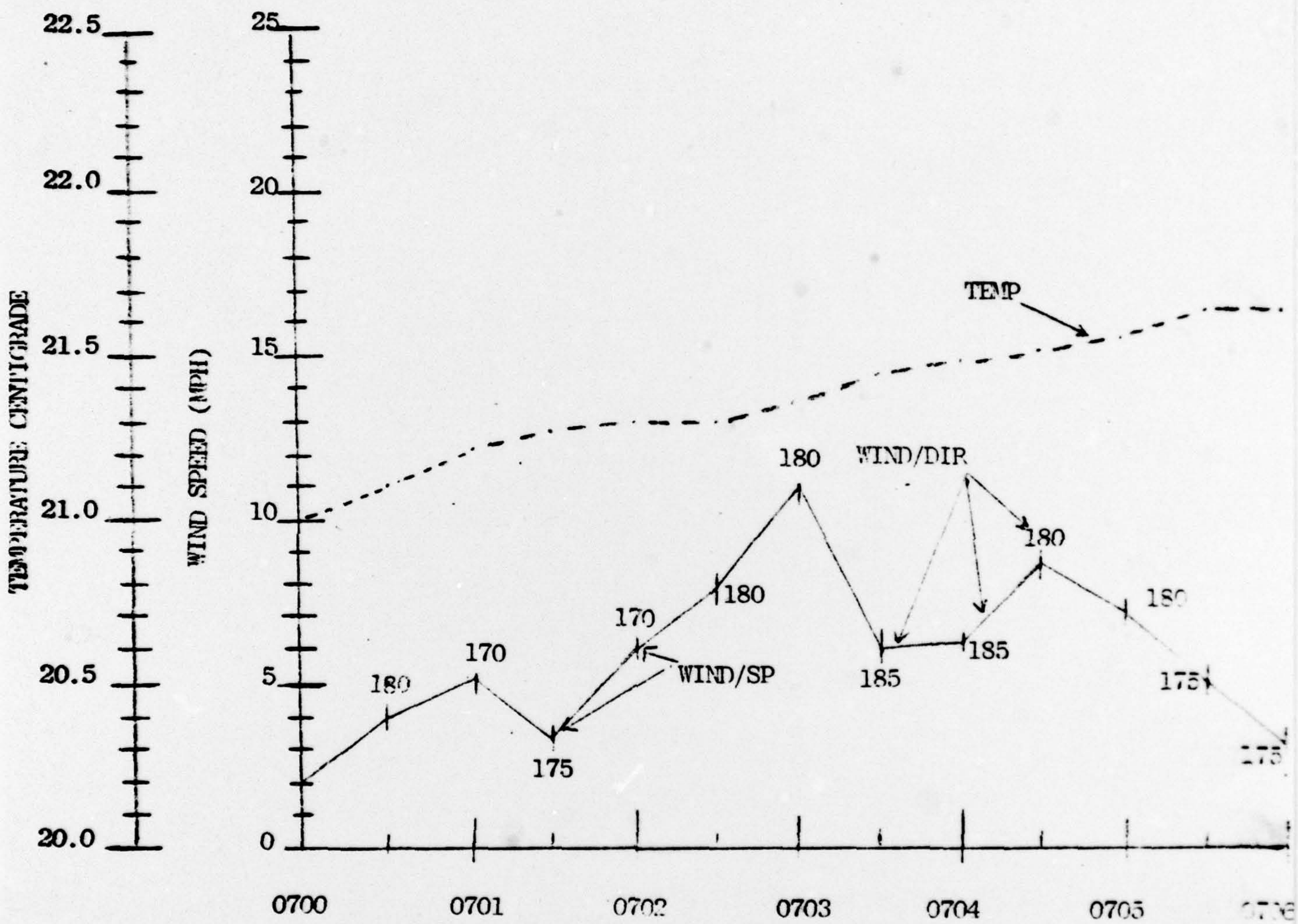
Meteorological data collected will represent weather conditions during the period of actual firing. The data will be collected on strip charts and graphical representation of tower data as depicted in the graph, Figure 7. Both transmissometer and meteorological information will be used in conjunction with imaging data from the main observation station.

6.2 Cloud Size, Transport And Temperature

Figure 7. WIND SPEED --- WIND DIRECTION

AND

TEMPERATURE PROFILE DATA



TRANSMISSOMETER DATA TABULATION SHEET

DATA	LOCATION
PERSONNEL	SITE

	Hg Cd Te SN/153 ____ μ						InSb SN/152 ____ μ						Silicon SN/122 ____ μ						Silicon SN/218 ____ μ						Me
Time	Ch	Volt	DB	Gain	Sens	Trans	Ch	Volt	DB	Gain	Sens	Trans	Ch	Volt	DB	Gain	Sens	Trans	Ch	Volt	DB	Gain	Sens	Trans	Temp °C

6.2.1 Methodology

Cloud growth overall size and motion will be monitored in the visible by two vidicon cameras, one at the main observation station at REM 1 and the other at the church site, an angle of 90° centered at the impact area. During one or more of the trials the obscurant cloud will also be photographed on movie film.

Particular constitution and concentration will be measured using a Knollenberg particle counter, chemical impingers and vortex samplers, spaced along a sampling line.

Obscurant cloud temperatures will be determined mainly from thermiscope line scan data. The thermiscope is sensitive to 7.5 to 12 micron radiation and is calibrated each scan by black body sources in its field of view.

6.2.2 Expected Data

Both film and video imagers will be measured directly and scaled to determine cloud size as a function of time. Particle size and concentration, and cloud temperatures will also be plotted as a function of time.

6.3 Target Signatures Station

6.3.1 Methodology

The target Signature Station will be located at REM 2 during the firing periods. The two-person radiometric team will maintain the insulation devices located at REEM 2 (or other locations as required) and collect and reduce the data for the test periods. The team will also take PRT-5 radiometer measurements of the target vehicle at REM 2, both before and after the test periods and will reduce the PRT-5 data after the testing is finished each day. The team will also coordinate the movements of the target vehicles from their parking areas to REM 2, and will take PRT-5 measurements of special threat vehicles at location other than REM 2 if required.

6.3.2 Expected Data

The data will consist of total daily solar radiation impinging on the site (insolation) for the overall test period and target signature of the vehicles at REM 2 before and after each trial.

6.4 Airborne Sensor Station

6.4.1 Methodology

The Airborne Sensor Station will consist of a video camera and an Air Force FLIR 8-12u imager. The function of this station will be to record imagery in the visible and IR from an elevated location, simulating low flying helicopter airborne relative to the main sensor station. Timing and method of operation will be the same as the Main Sensor Station TTS.

6.4.2 Expected data

While the data will be analysed for the same information as the ground TTS, the aspect of greatest interest is the duration of line of sight from the elevated position.