3. Landing and Resupply Marking System for Day/Night Operations Task 04-C-63 (U)

(U) Description: Title of task has been changed from "Marking System" to that shown. The objective of this task is to provide an integrated system to be used for, (a) defining the perimeter of air strips in remote areas, and (b) defining drop zones for aerial resupply. Scope of work includes the design and evaluation of a landing and resupply marking system based on chemiluminescent compounds and the design and evaluation of a system for day/night identification of helicopter landing pads at company and higher level.

(U) Status: The feasibility of using chemi and electroluminescent panels and tapes for night operations and fluorescent cloth panels for day operations has been established and demonstrated.

Red, orange and yellow cloth panels in two sizes, 39 x 39 inches and of 39 x 60 inches have been tested. All panels were visible at a distance of two miles and an altitude of 500 feet. Markings in four colors (yellow, blue, red and orange) were placed on these panels. Marking could be identified at slightly less than 1/2 mile at an altitude of 500 feet with the blue marking on the yellow panel the most distinctive.

Two systems are currently being studied for use in night identification. The first is a chemiluminescent tape employing PR 155 and the second is an electroluminescent tape which is operated by batteries through an AC-DC converter. Tests have shown both to be identifiable at 1/2 mile and 300 foot altitude.

4. Individual Identification Kit - Task 05-C-63 (U)

(C) Description: To determine the feasibility of developing a kit for marking and identifying personnel. Work to be accomplished will include (a) assessment of fluorescors and carrier liquids under various field conditions; (b) determine optimum emulsifying system for fluorescors; (c) determine physiological effectiveness of skin penetrants; (d) search for a small, portable UV detection device, and (e) evaluate family of munitions for dissemination of fluorescors.

(C) Status: The toxicity of four organic fluorescors selected as candidate agents has been completed. The use of interdermal injections of a colorless fluorescent dye as a skin marking technique is promising. The fluorescors would be invisible except when viewed under ultraviolet light.

(C) Sample fluorescor suspensions have been prepared for field evaluation Some settlement of these suspensions occured upon long standing but the materiel is easily suspended again by merely shaking the container. These suspensions will be sprayed in the field to a contamination density of 1 gm/m^2. The evaluation of concentration efficiency will be predicated on 10 meters of travel in the sprayed area. A gas pressure (nitrogen) spray device containing 1,000 cc of suspension has been fabricated. The unit is a throwaway device, weighing 6 pounds, with only the nozzle and trigger being retained for attachment to a new cylinder of the suspension material. The nozzle is adjustable either for spray or stream of liquid. Field evaluation of this device has been scheduled.

(C) A second technique under study utilizes a 3.0 inch Neoprene grenade filled with a fluorescent paste composition.

(U) The above devices and systems will be demonstrated to the U S Army Combat Developments Command Military Police Agency at Fort Gordon, Georgia, during July 1964.

5. Personnel Detection, Chemical - Task 06-C-63 (U)

(U) Description: Search out and investigate promising concepts, principles and techniques for detecting concealed personnel by chemical means. Human beings, their material and equipment, exude minute quantities of chemicals which could be used in establishing the presence of concealed personnel, provided that these chemicals could be identified and the amount present quantitatively determined.

(U) Status: The status and scope of work of this project is classified Secret. Copies will be provided on request to those interested based on a "need-to-know" determination.

6. Anti-Crop Munition - Task 07-C-63 (U)

(C) Description: To investigate the feasibility of developing a simple, lightweight air droppable device which when functioned at a predetermined altitude will be capable of contaminating an area of approximately 5 - 20

[redacted]

acres with any of several herbicidal chemicals. This device is intended to be used in the destruction of small rice paddies, poppy fields, vegetation,etc.

Device under study will contain approximately 40 spheres, each containing 400 to 600 cc's of herbicidal agents.

The spheres will:

a. be compatible with all known herbicides

b. be independently actuated

c. disseminate the herbicide in 100 to 800 micron droplets

d. be capable of functioning within three feet of personnel in target areas without causing injury to personnel.

e. be contained in a polyurethane container capable of delivery by helicopter and low performance aircraft.

f. Dimensions:

(1) Spheres: Two types are being evaluated, a 3" and a 4-1/2 inch diameter

(2) Container: Approximately 32 inches long with overall diameter of 17 inches

(C) Status: Laboratory tests to determine optimum container size and functioning, sphere dimensions, and droplet size have been conducted. This data indicated that the 4-1/2 inch bomblets with the M206A2 fuze and burster will cover an area of 200 square feet with a contamination density in excess of 1.5 milligrams per square meter. The 3 inch sphere will give a similar density over 45 square feet. The 4-1/2 inch sphere contains 600 grams of herbicide and the 3 inch sphere 150 grams.

Field tests and evaluation to confirm the Laboratory data are nearing completion. The fabrication of operation prototype units is underway with delivery and testing scheduled for September 1964.

[redacted]

7. Chemical IR Emitter - Task 08-C-63 (U)

(U) Description: A study to explore the field of infra-red emitting chemicals, with particular emphasis on compounds which, upon contact with air or light, emit radiation in the infra-red region of 0.8 to 1 micron. Such chemicals might be used to develop IR surveillance and detection systems.

(U) Status: Task completed. No chemical IR emitting compounds were found as a result of the literature search and limited laboratory investigation conducted.

8. Signal Smoke - Task 09-C-63 (U)

(U) Description: An in-house investigation, assessment and demonstration of a means of concentrating smoke coloring materials for use as signalling devices in survival kits.

(U) Status: In conjunction with Picatinny Arsenal, Dover, New Jersey, several methods and/or devices have been investigated. One device that shows promise is a smoke cartridge which consists of a pellet of pyrotechnic materials formed by consolidation at high pressure. The pellets are approximately 1 inch high by 1 inch diameter and weigh 24 grams (0.9 ounces). The cartridge is wrapped in aluminum foil and contains its own igniter. Burning time is 10 to 12 seconds, and the smoke cloud is visible from the air at an altitude of 1,000 feet and a slant range in excess of 1500 meters. One-hundred and fifty prototype units have been requested from Picatinny Arsenal, with delivery scheduled during July 1964. Military potential tests are scheduled to be conducted by USATECOM.

9. Screening Materials and Techniques - Task 01-C-64 (U)

(U) Description: To investigate techniques, principles, and agents for generating large volumes of non-toxic, non-irritant smoke for tactical employment.

a. To find a low density bulk chemical that can be disseminated from military aircraft, including helicopter, to produce an obscuring, non-toxic, non-corrosive and non-irritating screening smoke.

b. To disseminate this chemical without auxiliary pumping equipment and/or heat source.

c. To use this chemical with available military hardware.

(U) Status: Requests for quotation were forwarded to potential contractors in February 1964. The proposals received from those interested were reviewed and evaluated and a contract awarded to Ethyl Corporation, Detroit, Michigan, to conduct a feasibility determination study.

Work by Ethyl Corporation is proceeding in accordance with the contract. Over thirty chemical mixtures have been tested. One mixture, consisting of an organo-metallic compound, HUMBLE neutral oil #75 and methyl naphthalene, has compared favorably with FM (titanium tetrachloride) in controlled laboratory tests. Additional tests are planned to assess the obscuration capability of the organo-metallic formulation under field conditions.

10. Grain Study (Rice Spoilage Method) - Task 02-C-64 (U)

(U) Description: To investigate and to determine a method to render rice unfit for human consumption, and/or a method to destroy rice found in caches in those instances where it is not practical to be removed from the cache site.

(U) Status: Requests for quotation were extended to potential bidders by the Aberdeen Proving Ground Procurement Office in May 1964, with a closing date for bidders of 30 June 1964.

Applied Physics Branch

1. Personnel Detector (Electronics) - Task 01-P-63 (U)

(U) Description: Search out and investigate means of personnel detection based on the physical and electronic sciences. The goal of this project is the determination of a technique for developing a system for detecting ambushes in dense vegetation.

(U) Status: The contract awarded Electronic Communications Corporation to investigate a radar system for detecting a man in "clutter" has been completed. The results were encouraging, although marginal. Two additional experimental approaches to electronic personnel detection will be conducted as experimental programs during early FY 65. The objective of these programs is to determine the feasibility of electronic detection of personnel and to provide data for potential development of a detection system.

2. Low Drain Sensors - Task 02-P-63 (U)

(U) Description: Investigate and develop a family of low-power-drain or self generating sensors, electronic switches and transducers for application where a sensor must remain activated for a long period of time. Intrusion, detection, ambush alert, alarm and clandestine listening and triggering devices are examples of operational uses for such devices.

(U) Status: Due to the low priority, no substantial in-house progress has been made during the report period. Accordingly, this task has been assigned to a supporting research services contract.

3. Position Locator - Task 03-P-63 (U)

(U) Description: Establish the technical and operational feasibility of a Position Locator Device for use in a jungle environment. This device would enable friendly forces to locate themselves geographically with respect to other known locations. Device to be a man-pack unit, weighing fifteen pounds or less with the required accuracy of 50 feet at one (1) mile range and 0.5 mile accuracy at ranges up to maximum of 100 miles.

(U) Status: A contract was awarded Ford Instrument Division of Sperry Rand to fabricate a prototype feasibility model based on a concept of mating an accelerometer, a pedometer with a flux gate compass and a computer. Delivery of prototype model and in-house testing is scheduled for August 1964. Follow on work will be based on the results of LWL tests.

[redacted]

4. Mechanical Earth Waves - Task 04-P-63 (U)

(U) Description: The title of this task has been changed from Communications by Mechanical Earth Waves to that shown. Seek out and exploit promising approaches for transmitting, detecting and recognizing mechanical earth waves for application to communications, warning and detection devices.

(U) Status: Due to the low priority, no substantial in-house progress has been made during the report period. Accordingly, this task has been assigned to a supporting research services contract.

5. Ultrasonics - Task 07-P-63 (U)

(U) Description: Investigate the utility of ultrasound in limited war situations. Experimental "silent" ultrasonic signalling and sensing devices will be investigated.

(U) Status: The fabrication of two types of ultrasonic "translators" or converters has been completed. These devices translate an ultrasonic band of frequencies to the audible region. Frequencies of operation for the two systems are 40 KC and 27 KC. A silent-signalling-unit for the 27 KC region has been designed and fabricated. All units are lightweight, self-contained and long lived on internal batteries.

Application of this unit will be incorporated in research on Personnel Detector under Task 01-P-63.

6. Acoustic Detection System - Task 08-P-63 (U)

(C) Description: Research and development of a helicopter, bullet-warning system capable of accurately indicating to helicopter crews the source direction of small arms fire, including rapid fire, fired from the ground toward helicopters in flight. Techniques to be investigated include, but are not limited to, such items as space diversity reception utilizing multiple detector array systems and muzzle blast versus projectile - ballistic-shock wave patterns. The goal is to provide a small arms bullet detector system with a detection reliability in excess of 95% in detecting source direction.

[redacted]

[redacted]

(C) Status: A contract was awarded to Thiokol Chemical Corporation's Bristol Division to develop a multi-array detector with the following characteristics:

Weight: 25 lbs excluding mount

Detection: Up to twenty projectiles per second by detecting the ballistic shock formed by the individual projectile passing through air. Detection distance of 150' required.

Recorder: Device to record the event (projectile passage), the time the event occured and intercom conversation.

Alarm System: Provide a visual ten second duration light and one light which flashes for each projectile at the moment of passage.

Provide an audible output signal upon projectile passage which may be fed into the intercom system as an audible alarm.

Provide an input to the recorder.

Aircraft: Be compatible with the Bird Dog and Mohawk aircraft and Iroquois helicopter.

Two units are scheduled for delivery to LWL during August 1964. Environmental and "live-firing" tests and field evaluation are acheduled to be conducted.

7. Acoustic Telescope - Task 10-P-63 (U)

(U) Description: Investigate the capabilities for an application of long range determination and recognition of audio signals as applied to surveillance, ambush detection and covert listening. Research and development leading to a compact lightweight system to be used in a jungle environment is the ultimate goal.

(U) Status: System under consideration is lightweight (approximately 7-1/2 lb) having an omnidirectional area coverage of 30^{0} or less. A sensitive microphone element and array and electronic amplification with variable band-pass and band-reject controls is being employed. Two operational systems are scheduled to be delivered to LWL by August 1964 for field testing and evaluation.

[redacted] UNCLASSIFIED

[redacted]

[redacted]

8. Forest Sound Spectrum Analysis - Task 11-P-63 (U)

(U) Description: Determine the frequency spectrum, average energy level and pattern throughout the audio region of naturally occuring sounds in jungle environments. Studies and evaluations will be made of the changes in background signatures as the result of disturbing influences, i.e., people, animals, etc.

(U) Status: An initial study and analysis of the jungle sound spectrum has been completed. Data recording of naturally occuring jungle sounds in the sonic and ultrasonic frequency spectrum is to be undertaken in the Panama Canal Zone Area. Based on the results of data obtained in Panama, follow-on work will consist of: (a) the development of a personnel detection device to indicate the presence of personnel in a jungle environment, and (b) establishing a training procedure to instruct personnel in the meaning and interpretation of jungle acoustics.

[redacted]

Biological Sciences Branch

1. Personnel Detection (Biological) - Task 01-B-63 (U)

(U) Description: Perform research to establish the feasibility of detecting personnel in concealed positions utilizing biological techniques; A general requirement for any detection method is that it be capable of functioning under a variety of environmental conditions and have an effective range of at least 50 yards. Two experimental feasibility studies have been programmed under this task.

(U) a. To determine and demonstrate the feasibility of training and using dogs to range freely to distances up to 100 yards, search for hidden people, and to communicate information of detection to a control point.

(U) b. To determine and demonstrate the feasibility of training and using birds to conduct aerial surveillance, detect people and communicate to a control point.

(C) Based on successful completion of these studies, further effort will be directed along the following lines:

(C) a. To develop militarily acceptable hardware (transmitter-harness) for man-animal communication links.

(C) b. To adapt experimental training procedures to the requirements for operationally useful systems. This will include the preparation of manuals.

(C) c. Evaluation and field tests.

(C) Status: Contracts were awarded to the University of Maryland and General Atronics Corporation of Philadelphia to investigate the training of dogs and birds, respectively, for field reconnaissance use. Results of these studies to date indicate that the proposed concepts are feasible.

[redacted]

(C) The training of birds (pigeons) out-of-doors is underway. To date, several birds have been trained to leave the coop, which is mounted on a moving vehicle, fly out a distance of 50 to 100 yards and, upon command (an audible signal) return to the coop. Training for discrimination of human targets has been initiated.

2. Biological Agent System, Anti-Materiel - Task 02-B-63 (U)

Task has been cancelled.

3. Physiological Effectiveness of Tri-Ethyl Aluminum - Task 03-B-63 (U)

(U) Description: Tri-ethyl aluminum is a pyrophoric compound which ignites spontaneously in air and detonates in the presence of water. In order to determine the usefulness of this compound as an anti-personnel agent, controlled laboratory tests with clothing and standard test card materials and surface applications on animals to determine the physiological effects will be performed. Through field testing with simulated human targets, the laboratory data will be extrapolated to give estimates of human incapacitating effectiveness of prototype munitions for limited war use.

(U) Status: The basic laboratory testing has been completed and test data obtained. Results of tests and data obtained are being incorporated into a report in which the anti-personnel effectiveness of tri-ethyl aluminum, thickened gasoline (Napalm),and white phosphorus are compared.

4. Leech Repellent - Task 04-B-63 (U)

(U) Description: To investigate the leech repellent properties of selected compounds and incorporate these in a compatible, non-toxic, water-insoluble vehicle for surface application. It is required that the repellent protect effectively against aquatic as well as terrestrial leeches.

(U) Status: A formulation, consisting of 25% diethyl toluamide (DEET) and 75% lanolin was selected for field testing on the basis of laboratory test results. Field testing was accomplished in the Philippine Islands with the cooperation of the Armed Forces of the Philippines R&D Center. The results of the field tests supported the laboratory data on the effectiveness of the formula. Test quantities of the mixture, put up in 2-1/4 oz. polyethylene bottles, have been obtained for service test.

5. Personnel Discrimination Device - Task 05-B-63 (U)

(C) Description: Develop for field use a rapid interrogation system for preliminary screening of hostile indigenous people. The desired system should not require highly skilled operators or interrogators for successful employment. The possibility of adapting lie detection techniques to the screening of large numbers of people is being considered. The preliminary problem requiring solution appears to be one of devising a rapid, accurate and predictable way to establish effective communication with people of widely varying socio-economic levels within different ethnic groupings of foreign cultures in the presence of formidable language barriers. Secondary to this is the problem of detecting deception in interrogation.

(U) Status: Preliminary investigations have centered on the following aspects of the problem: (a) defining the essential military requirements for a rapid screening interrogation system to meet tactical and operational needs; (b) assessment of current state-of-the-art of interrogration procedures, including conventional lie detection methods and potentialities for refinement of instrumentation, in terms of possible application to the problem; (c) consideration of sociological and psychological factors that can be expected to have a direct impact on the success and effectiveness of the proposed system. As a result of the preliminary investigations, a contract proposal for a 12-month feasibility study has been prepared. If possible, this study will be conducted in an area of primary interest, utilizing people in controlled experiments under maximally realistic conditions.

6. Lightweight Field Water Distiller - Task 10-B-63 (U)

(U) Description: To design, fabricate and test a lightweight water still for field use. A new concept involving use of all-plastic components will be tested. The desired unit would weigh under 6 pounds empty; would produce adequate quantities of high-quality distilled water from locally available fuel and could be packaged in a compact, air-droppable bundle.

(U) Status: An experimental prototype all-plastic still has been fabricated and tested. With the plastic (glass fiber-impregnated silastic rubber) boiler placed directly on burning charcoal, supplemented by the addition of twigs and small branches, approximately 1 quart of distillate has been obtained from ditch water in 1 hour. Modifications suggested by the first field test are being incorporated in a revised design now under preparation.

[redacted]

7. Individual Water Filtration Device - Collapsible Canteen System - Task 11-B-63 (U)

(U) Description: To develop a water filtration device and a compatible collapsible canteen for individual use. The water filter should be capable of removing particulate material greater than 10 micron diameter. The usable life of the filter is directly related to the particulate content of the water that is passed through it.

(U) Status: An all-plastic filtration unit, shown in Figures 26 and 27 incorporating a positive displacement pump has been developed. With a Pall Corporation Ultipor 2 filter cartridge as the final filter and a glass-wool pre-filter attached to the inlet, this unit is capable of filtering 4 to 5 gallons of heavily silted water (mud) and up to 30 gallons of natural pond water containing organic as well as inorganic particulate material. A prototype collapsible, plastic canteen, which screws directly into the outlet of the filter pump, is shown in Figure 27.

One hundred and fifty filter pump units, including 1 extra filter cartridge per unit, have been ordered for delivery to the John F. Kennedy Center for Special Warfare, Fort Bragg, North Carolina for service test under operational conditions.

[redacted]

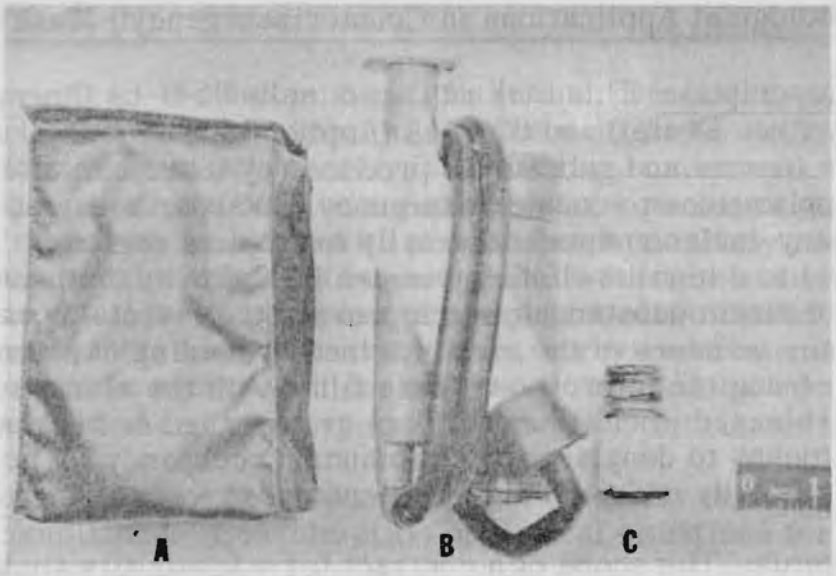

Figure 26

Individual Water Filter Pump
A. Carrier, B. filter-pump, C. iodine tablets

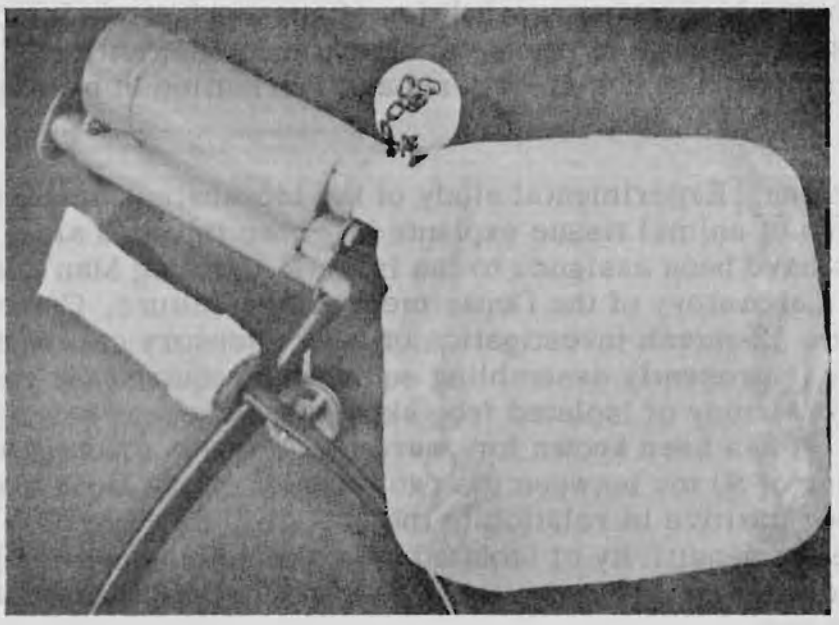

Figure 27

Individual Water Filter Pump and Plastic Canteen

8. Entomological Applications in Counterinsurgency - Task 01-B-64 (U)

(C) Description: This task replaced tasks 06-B-64 (Prevention of Ambushes by Area Denial) and 07-B-63 (Applications of Animal Attractants). It exploits insects and substances produced by insects in offensive and defensive applications to counterinsurgency. Wasps, bees and ants are abundant in many environments, especially in tropical regions. These insects are excited to a high level of aggressive behavior by the presence of minute amounts of alarm substances which provoke the insects to make fierce attacks on any invaders of the area. Selective seeding of potential ambush sites with frangible micro-containers filled with the alarm substance, which would be released when the containers are crushed or broken may be an effective means to deny such sites to human occupancy. The trigger agent would be virtually undetectable by an enemy.

(U) Status: The scope of a contract for a feasibility study has been prepared and should be awarded early in 1st quarter of FY 65.

9. Instrumented Biosensors - Task 02-B-64 (U)

(C) Description: To explore the feasibility of utilizing biological sensors as transducers for the detection of human beings. Experimental analysis of the biosensing capabilities of appropriate whole animals and animal tissue explants is needed to determine sensitivities will be followed by the formulation of design criteria and fabrication of prototype operational systems.

(U) Status: Experimental study of the biosensing capabilities of whole animals and of animal tissue explants has been initiated along two lines. (a) Funds have been assigned to the Insects Affecting Man and Animals Research Laboratory of the Department of Agriculture, Gainesville, Florida, to support a 12-month investigation of insect sensory capabilities. The laboratory is presently assembling equipment required for the experimental work. (b) A study of isolated frog skin as a biosensor has been undertaken in-house. It has been known for years that there is a potential difference, of the order of 50 mv between the two sides of the isolated frog skin, the inside being positive in relation to the outside. An attempt is being made to determine the sensitivity of isolated frog skin to human effluents as manifested by changes in the potential difference, or in the associated short-circuit current.

10. Applications of Selected CW Agents in Unconventional Warfare - Task 03-B-64 (U)

(C) Description: To define situations in unconventional warfare in which selected, non-lethal incapacitating agents might be utilized with significant effect against personnel. Data relating to numerous non-lethal incapacitating agents have been accumulated over a period of years. Among these agents there may be some with properties particularly suitable for use in unconventional warfare. Unconventional warfare situations need to be analyzed in detail for the purpose of defining specific modes of employment for agents of this kind. Concomitantly, a review of agents is required to match appropriate agents with desired uses. Methods of agent dissemination will be studied and prototype items designed, fabricated and tested.

(C) Status: A review of the properties of a variety of candidate agents has been accomplished. Consideration of tactical situations for the operational employment of chemical agents is underway. Village defense and tunnel and cave neutralization are examples of situations in which non-lethal incapacitating agents could be profitably employed.

SECTION III

TECHNICAL SUPPORT DIVISION

(U) The following task has been completed by the Laboratory's Technical Support Division.

Battlefield Illumination Device for M-113 Armored Personnel Carrier - Task 01-T-64 (U)

(U) Description: In January 1964, under ARPA Order 528, the Laboratory initiated a project to provide a searchlight capability for the M-113 Armored Personnel Carrier in Vietnam. The initial phase of the project was concerned with selecting a commercial off-the-shelf searchlight with desired characteristics which could be easily and quickly adapted to the M-113. Of primary concern was the adaptation of the light to the M-113 with the least amount of modifications to the vehicle.

(U) Status: This task has been completed. A commercial off-the-shelf 12 inch searchlight was selected. The light was modified and adapted for mounting through the right forward antenna access port on the M-113. Figure 28. The searchlight is designed to be controlled by one individual from the inside of the vehicle. The prototype searchlight and control system was tested by the Laboratory at Aberdeen Proving Ground. Slight modifications were required as the result of the tests. Six searchlights complete with spare parts, operation and installation instructions and installation tool kits will be shipped to Vietnam in July 1964.

Figure 28

Searchlight Mounted on M-113 Armored Personnel Carrier

SECTION IV

OPERATIONS AND ANALYSIS DIVISION

(U) The following study tasks are being conducted by the Evaluation and Analysis Branch, Operations and Analysis Division.

Evaluation and Analysis Branch

1. Study of Materiel Needs for Insurgency and Counterinsurgency - EA-1 (U)

(U) Description: A pilot study of the growth stages of insurgencies in order to gain a better understanding of the materiel needed to support or to suppress insurgency.

(U) Status: Completed studies on insurrections, guerrilla warfare and related topics, writings by communist revolutionaries and other source documents have been reviewed and analyzed. Post-WW II insurgencies have been examined particularly to determine the types of materiel which contribute to the growth or suppression of insurgency at each stage of its development. The culmination of this effort was the publication of LWL Technical Note - 3 entitled "The Growth Pattern of Insurgency and the Types of Materiel Needed for its Support or Suppression." This report has been distributed internally since it was originally intended for LWL use only. Study task is considered complete.

2. Study of Terrain and Vegetation - EA-2 (U)

(U) Description: Procure and analyze information concerning the specifics of terrain and vegetation in South Vietnam. These data are basic to the development of many items now being developed at LWL, e.g., munitions, communication equipment, equipment to improve mobility, etc.

(U) Status: Basic information concerning the distribution of terrain and vegetation in South Vietnam has been obtained. Some tests have been conducted to determine the decrease in penetration capability which occurs when small fragments are fired through grasses. This information is being correlated with data obtained previously by other organizations.

In order to increase the rate of output of information it is anticipated that a study contract will be awarded in the near future to obtain details pertinent to terrain and vegetation characteristics.

Liaison is being maintained with other organizations interested in the same general problem.

3. Study of Counterinsurgency Tactical Situations - EA-3 (U)

(U) Description: Procure information concerning counterinsurgency tactical situations in South Vietnam. This information is to be used as a basis for evaluating the effectiveness of various U. S. Army systems which could be considered for use in that area.

(U) Status: Although some work has been done on the defense of Strategic Hamlets during this reporting period, primary emphasis has been placed on the collection and analysis of data on ambush situations in South Vietnam. In the analysis of the ambush data all available records of ambush actions are being reviewed. Each ambush is broken down into numerous components, such as location, terrain and weather conditions, opening range, casualties (both friendly and enemy), etc. The LWL LGP-21 electronic computer is being utilized in this effort in the hope that cross-correlation and intensive analysis will yield results which will reveal critical parameters that will ultimately lead to the establishment of effective counterambush reaction systems.

The following LWL internal reports have been prepared utilizing the tentative data that are presently available:

a. Convoy Data Relating to Choice of Counterambush Weapons - E&A Technical Note #10

b. Criteria for Evaluation of Limited War Tactical Situations - E&A Technical Note #9

4. Effectiveness Evaluation of Materiel for Counterinsurgent Use - EA-4

(U) Description: This study, formerly Effectiveness Evaluation of Weapons and Munitions Systems, EA 64-4, has been expanded to include the evaluation of the effectiveness of presently available, conceptual and newly-developed systems associated with all the multi-varied aspects of limited war situations. The following areas of interest have been studied in some detail in support of LWL activity. Findings of these studies have been reported in numerous LWL internal memoranda and E&A Branch Technical Notes. Studies such as these are made on a continuing "as required" basis. Representative examples are listed as follows:

a. Comparison of Claymorette and Multiple Shotgun Systems - E&A Technical Note #14 (In support of LWL Tasks 03-F-63 and 05-F-63)

b. Analysis of Thiokol Acoustic Detection System Tests - E&A Technical Note #7 (In support of LWL Task 08-P-63)

c. Determination of Shot Patterns of the M-79 Grenade Launcher with Various Adapters

d. Study of Optimum Shapes for Free Drop Water Containers - (In support of LWL Task 05-S-64)

e. Measurement of Droplet Size Distribution in Chamber Tests - E&A Technical Note #8 (In support of LWL Task 07-C-63)

f. A Quasi-Random Walk Cloud Travel Model for Jungle Environment - E&A Technical Note #11 (In support of LWL Task 06-C-63

g. Tagging by Chemical Techniques - E&A Technical Note #12 (In support of LWL Task 05-C-63)

h. Annex D to Staff Study on Defense of Strategic Hamlets (Performed for Ass't. Secretary of the Army for R&D)

i. Cloud Model Development - E&A Technical Note #13 (In support of above Staff Study)

j. Anti-Materiel Biological Agent System - (In support of LWL Task 02-B-63)

k. Available Information on Techniques for Ground Location of Air-Dropped Bundles (In support of LWL Task 06-E-63)

l. Completed Study and LWL Report on "Captive Balloon-Borne Communication Systems" - to be published in the near future (In support of LWL Task 08-E-63)

m. Continuing State-of-the-Art Surveys of IR Techniques, Night Viewers and Lasers and Possible Limited War Applications

TASKS FOR WHICH DEVELOPMENT PHASES ARE COMPLETE

Task Number	Task Title	Status
04-E-63	AN/PRC-64 Radio	Vietnam Aug 1964
08-E-63	Captive Balloon Borne Communications System	Vietnam Aug 1964
01-F-63	Grenade Dispenser	Vietnam Apr 1963
02-F-63	Squeezebore	Report Feb 1964
01-M-63	Load Carrying Device, Man Propelled	ST Jun 1964
04-M-63	Personnel/Cargo Lowering System for Helicopters	ST May 1964
06-M-63	Device to Rapidly Refuel Helicopters from 55 Gallon Drums	Vietnam Jan 1964
01-S-63	Individual Aid and Survival Kit (Hot-Wet)	LP Jun 1964
12-S-63	Packet Subsistence, Long Range Patrol	LP Jan 1964
04-B-63	Leech Repellent	ST Jul 1964
01-T-64	Battlefield Illumination Device for M113 Armored Personnel Carrier	Vietnam Jul 1964

TASKS TERMINATED

(Reasons for termination vary, but include: desired information acquired; approach lacked promise; or work incorporated into other tasks of broader scope)

Task Number	Task Title
02-E-63	Lightweight Radio for Guerrilla
03-E-63	Thermoelectric Battery Charger
06-E-63	Ground Location of Air Dropped Supplies
09-E-63	Emergency Signalling Communication Kit for Army Aviators
02-F-64	Tunnel Detection Munition
04-F-63	Timing Device for Fuzes
05-F-64	Mechanical Delay Firing Device
02-M-63	Lightweight Power Unit
03-M-63	Direction Indicator for Troops Debarking from Helicopters
05-M-63	Man-Powered Generator
02-S-63	Improved Machete
03-S-63	Flashlight for Special Forces
04-S-63	Personal and Germicidal Cleanser
05-S-63	Clasp Knife
06-S-63	Collapsible Canteen
07-S-63	Lightweight Pioneer Tools
08-S-63	Tree Climbers

Task Number	Task Title
10-S-63	Lightweight, Man, Portable Shelter
06-S-64	Riot Shield
03-C-63	Chemical Agent System, Anti-Materiel
08-C-63	Chemical IR Emitters
10-C-63	Large Volume Screening Smoke Disseminator
05-P-63	Non-electric Projector
06-P-63	Communication by Earth Currents
07-P-63	Ultrasonics
09-P-63	Acoustic Detection Device (ARPA)
02-B-63	Biological Agent System, Anti-Materiel
06-B-63	Ambush Prevention by Area Denial
07-B-63	Application of Animal Attractants
08-B-63	Unconventional Food Sources - Food Conversion Kit
09-B-63	Use of Luminescent Organisms for Marking

DISTRIBUTION LIST

	Copies
Chief of Research and Development Department of the Army Washington, D. C. 20310	50
Office Chief of Staff Special Assistant for Special Warfare Washington, D. C. 20310	1
Deputy Chief of Staff for Military Operations Department of the Army ATTN: Director, Special Warfare Washington, D. C. 20310	1
Deputy Chief of Staff for Logistics Department of the Army Washington, D. C. 20310	1
Assistant Chief of Staff for Intelligence Department of the Army Washington, D. C. 20310	1
Assistant Chief of Staff for Force Development Department of the Army Washington, D. C. 20310	2
Assistant Chief of Staff for Force Development Department of the Army ATTN: Liaison Officer, ACTIV Washington, D. C. 20310	1
Director Advanced Research Projects Agency Office Director of Defense Research & Engineering ATTN: Assistant Director, Remote Area Conflict Washington, D. C. 20310	3
Director Advanced Research Projects Agency Department of Defense ATTN: Technical Information Service (Mr. Fred A. Koether) Washington, D. C. 20310	1

	Copies
Commanding General U. S. Army Materiel Command ATTN: Director of Research and Development Washington, D. C. 20310	2
Commanding General U. S. Army Materiel Command ATTN: Project Manager, Special Warfare Washington, D. C. 20310	1
Commanding General U. S. Army Combat Developments Command Fort Belvoir, Virginia 22060	1
Commanding General U. S. Army Combat Developments Command ATTN: Special Warfare Group Fort Belvoir, Virginia 22060	4
Commanding General U. S. Continental Army Command ATTN: UTR-Tng Fort Monroe, Virginia 23351	3
Commanding General U. S. Army Mobility Command ATTN: AMSMO-RL Centerline, Michigan 48015	1
Commanding General U. S. Army Electronics Command Fort Monmouth, New Jersey 07703	1
Commanding General U. S. Army Missile Command Redstone Arsenal, Alabama 35808	1
Commanding General U. S. Army Weapons Command Rock Island, Illinois 61200	1

	Copies
Commanding General U. S. Army Munitions Command Picatinny Arsenal Dover, New Jersey 07801	1
Commanding General U. S. Army Test and Evaluation Command Aberdeen Proving Ground, Maryland 21005	1
Commanding General U. S. Army Quartermaster Research and Engineering Command Natick, Massachusetts 01760	1
Commanding General U. S. Army CBR Agency Edgewood Arsenal, Maryland 21040	1
Commanding General U. S. Army Ordnance Center and School Aberdeen Proving Ground, Maryland 21005	1
Commanding General U. S. Army John F. Kennedy Center for Special Warfare Fort Bragg, North Carolina 28307	1
Commanding General U. S. Army Tank-Automotive Center ATTN: Director of Research and Engineering Centerline, Michigan 48015	1
Commanding Officer U. S. Army Combat Developments Command Combined Arms Agency ATTN: CAGCA-CJ Fort Leavenworth, Kansas 66027	1
Chief U. S. Army Concept Team in Vietnam APO 143 San Francisco, California 94100	2
Commanding General U. S. Army Support Command APO 143 San Francisco, California 94100	1

	Copies
Chief OSD/ARPA RDFU-V APO 143 San Francisco, California 94100	1
Director Joint Research and Test Activity APO 143 San Francisco, California 94100	1
Commanding General 11th Air Assault Division Fort Benning, Georgia 31905	2
The Commandant National War College Fort Lesley J. McNair 4th and P Streets, S. W. Washington, D. C.	1
The Commandant Industrial College of the Armed Forces Building 25 Fort Lesley J. McNair 4th and P Streets, S.W. Washington, D. C.	1
The Commandant U. S. Army War College Carlisle Barracks, Pennsylvania 17013	1
The Commandant U. S. Army War College ATTN: Library K-2083 Carlisle Barracks, Pennsylvania 17013	1
The Commandant The Armed Forces Staff College Norfolk, Virginia	1
The Commandant U. S. Army Command and General Staff College Fort Leavenworth, Kansas 66027	1

	Copies
Office of the Provost Marshal General Room 1801 Main Navy Building ATTN: Chief, Plans Division Washington, D. C.	1
Office Chief Signal Officer ATTN: SIGES-2 Washington, D. C. 20310	1
Office of the Surgeon General ATTN: Special Assistant to the Surgeon General for R&D Room 2536, Main Navy Building Washington, D. C.	1
Chief U. S. Army Security Agency Arlington Hall Station ATTN: IADEV Arlington 12, Virginia	1
Chief Training Evaluation and Control Group Organization and Materiel Division Fort Benning, Georgia 31905	2
Institute of Defense Analysis Washington, D. C.	2
The Commandant U. S Army Artillery School Fort Sill, Oklahoma 73503	1
The Commandant U. S. Army Aviation School Fort Rucker, Alabama 36362	1
The Commandant U. S. Army Chemical Corps School ATTN: AJMCL-A Fort McClellan, Alabama 36205	1
The Commandant U. S. Army Engineer School Fort Belvoir, Virginia 22060	1

	Copies
The Commandant U. S. Army Infantry School Fort Benning, Georgia 31905	3
The Commandant U. S. Army Medical Field Service Brooke Army Medical Center Fort Sam Houston, Texas 78234	1
The Commandant U. S. Army Military Police School Fort Gordon, Georgia 30905	1
The Commandant U. S. Army Ordnance School Aberdeen Proving Ground, Maryland 21005	1
The Commandant U. S. Army Quartermaster School Fort Lee, Virginia 23801	1
The Commandant U. S. Army Signal School Fort Monmouth, New Jersey 07703	1
The Commandant U. S. Army Special Warfare School ATTN: Director of Instruction Fort Bragg, North Carolina 28307	6
Commandant U. S. Army School, Europe ATTN: PMA Department APO 172 New York, New York	1
Commanding Officer U. S. Army Foreign Science and Technology Center Munitions Building Washington, D. C. 20310	1
Commanding Officer U. S. Army Transportation Engineering Command ATTN: Research Reference Center Fort Eustis, Virginia 23604	1

	Copies
Commanding Officer U. S. Army Ballistic Research Laboratories Aberdeen Proving Ground, Maryland 21005	2
Commanding Officer U. S. Army Biological Laboratories Fort Detrick, Maryland 21701	1
Commanding Officer U. S. Army Chemical Research and Development Laboratories Edgewood Arsenal, Maryland 21040	1
Commanding Officer U. S. Army Chemical Research and Development Laboratories ATTN: SMUCR-T (TI-3) Edgewood Arsenal, Maryland 21040	1
Commanding Officer U. S. Army Coating and Chemical Laboratory Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer U. S. Army Electronics Research and Development Laboratory Fort Monmouth, New Jersey 07703	1
Commanding Officer U. S. Army Engineer Research and Development Laboratory Fort Belvoir, Virginia 22060	1
Commanding Officer U. S. Army Human Engineering Laboratories Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer U. S. Army Medical Equipment Research and Development Laboratory Fort Totten, New York 11359	1
Commanding Officer U. S. Army Harry Diamond Laboratories Washington, D. C. 20310	1
Commanding Officer U. S. Army Electronics Research and Development Activity Fort Huachuca, Arizona 85613	1

	Copies
Commanding Officer U. S. Army Combat Developments Command CBR Agency ATTN: CAGCG-P Fort McClellan, Alabama 36205	1
Commanding Officer U. S. Army Combat Developments Command Infantry Agency Fort Benning, Georgia 31905	1
Commanding Officer U. S. Army Combat Developments Command Military Police Agency Fort Gordon, Georgia 30905	1
Commanding Officer U. S. Army Combat Developments Command Ordnance Agency Aberdeen Proving Ground, Maryland 21005	1
Commanding Officer U. S. Army Combat Developments Command Special Warfare Agency Fort Bragg, North Carolina 28307	2
Commanding Officer U. S. Army Research and Development Office, Panama PO. Drawer 942 Fort Clayton, Canal Zone	1
Commanding Officer Springfield Armory Springfield, Massachusetts 01101	1
Commanding Officer Watervliet Arsenal Watervliet, New York 12189	1
Commanding Officer Watertown Arsenal Watertown, Massachusetts 02172	1
Commanding Officer Frankford Arsenal ATTN: SMUFA-1000 Philadelphia, Pennsylvania 19137	1

	Copies
Commanding Officer Piactinny Arsenal Dover, New Jersey 07801	1
Commanding Officer Army Research Office Box CM Duke Station Durham, North Carolina	1
Commanding Officer 1st Special Forces Group (Airborne) 1st Special Forces APO 331 San Francisco, California	1
Commanding Officer 3d Special Forces Group (Airborne) 1st Special Forces Fort Bragg, North Carolina 28307	1
Commanding Officer 5th Special Forces Group (Airborne) 1st Special Forces Fort Bragg, North Carolina 28307	1
Commanding Officer 6th Special Forces Group (Airborne) 1st Special Forces Fort Bragg, North Carolina	1
Commanding Officer 7th Special Forces Group (Airborne) 1st Special Forces Fort Bragg, North Carolina 28307	1
Commanding Officer 8th Special Forces Group (Airborne) 1st Special Forces APO 387 New York, New York	1

	Copies
Commanding Officer 10th Special Forces Group (Airborne) 1st Special Forces APO 108 New York, New York	1
Director Development and Proof Services Aberdeen Proving Ground, Maryland 21005	1
President U. S. Army Aviation Board Fort Rucker, Alabama 36362	1
President U. S. Army Transportation Board Fort Eustis, Virginia 23604	1
President U. S. Army Airborne, Electronics and Special Warfare Board Fort Bragg, North Carolina	1
President U. S. Army Infantry Board ATTN: STEBC Fort Benning, Georgia 31905	1
President U. S. Army Maintenance Board Fort Knox, Kentucky 40120	1
Deputy President U. S. Army Materiel Command Board Aberdeen Proving Ground, Maryland 21005	1
Senior Representative U. S. Army Standardization Group, Canada c/o Directorate of Equipment Policy Canadian Army Headquarters Ottawa 4, Canada	2
U. S. Army Liaison Officer U. S. Air Force Special Air Warfare Center Eglin Air Force Base, Florida 32542	2

	Copies
Chief, Bureau of Naval Weapons (RMMO-3) Department of the Navy Washington 25, D. C.	1
Commander U. S. Naval Weapons Laboratories Dahlgran, Virginia	1
Commander U. S. Naval Ordnance Test Station ATTN: Dr. G. W. Leonard China Lake, California	2
Commander U. S. Naval Ordnance Test Station ATTN: Mr. R. Gray (Code 121) China Lake, California	1
ISA Policy Planning Staff Special Operations Division Room 4D-832 ATTN: Captain Blocker, USN Washington, D. C. 20310	1
U. S. Navy Liaison Officer Aberdeen Proving Ground, Maryland 21005	1
The Commandant U. S. Marine Corps Headquarters, U. S. Marine Corps Washington, D. C. 20310	1
Director Marine Corps Landing Force Development Center Marine Corps Schools Quantico, Virginia	2
U. S. Marine Corps Liaison Officer Aberdeen Proving Ground, Maryland 21005	1
Headquarters USAF (AFXPD-PY-CW) Washington, D. C.	4

	Copies
Headquarters, USAF (AFRDP, Lt Col T. B. Lindahl) Washington, D. C. 20310	1
Headquarters, USAF (AFOOP-CO, Col J. W. Basks) Washington, D. C. 20310	1
Commanding General Rome Air Development Center ATTN: RAWC Griffiss Air Force Base, New York 13442	1
AFAPL (APF, Mr. Vasiloff) Wright Patterson Air Force Base, Ohio 45433	1
Commander Air Force Systems Command ATTN: SCS-6 Andrews Air Force Base Washington 25, D. C.	1
Commander Research and Technology Division ATTN: RTN Bolling Air Force Base Washington 25, D. C.	1
Commander Aeronautical Systems Division ATTN: ASJ Wright Patterson Air Force Base, Ohio 45433	1
Special Air Warfare Center ATTN: 1st CAG Eglin Air Force Base, Florida 32542	2
Detachment 4 RTD (ATW) Eglin Air Force Base, Florida 32542	1
U. S. Air Force Liaison Officer Aberdeen Proving Ground, Maryland 21005	1

	Copies
United States Army Element Joint Operations Group Room 1B945, The Pentagon Washington, D. C. 20310	2