Bibliography for Corporate Author = Cornell Aeronautical Laboratory Inc., 2010

Requested date: 2009

Released date: 26-January-2010

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b. Proctor and Gamble – there were six documents located and all are unclassified.

c. General Mills, Inc. – there are 151 documents, the majority of which are classified.

d. Cornell Aeronautical Lab Inc. – there are 280 documents, the majority of which are classified.

e. Dow Chemical – there were 62 records located, six of which are still classified.

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Sincerely,

Kateni T. Leakehe
Major, US Army
Command Judge Advocate

Enclosures
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<td>Author(s): O'Connor, Arthur D.</td>
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Title: Project CHORD. Informal Monthly Progress Report No. 54, 1 June-30 June 1969.  
Author(s): Reinnagel, R. E.  
Report Number: IMPR-54 DTC-69-1191  
Publish Date: 19690630  
Abstract: (Abstract is unavailable.)  
Descriptive Note: Monthly Progress Report  
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY  
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.  
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CBRNIAC Number: CB-074467  
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AD Number:  
Title: Project CHORD. Informal Monthly Progress Report No. 34, 1 April-30 April 1964.  
Author(s):  
Report Number: IMPR-34 DTC-64-685  
Publish Date: 19640430  
Abstract: CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.  
Descriptive Note: Informal Monthly Progress Report  
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY  
Distribution Statement: Distribution limited to DoD agencies only.  
Subject Keywords: |
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CBRNIAC Number: CB-074480  
Site Holding: CB DW 524711  
AD Number:  
Title: Interim Progress Report on the Cal-Dita Program.  
Author(s): Klingaman, R. M. O'Connor, A. D.  
Report Number: WP-13 DTC-64-775 GM-1592  
Publish Date: 19640401  
Abstract: (Abstract is unavailable.)
CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

Descriptive Note: Informal Monthly Progress Report

Cornell Aeronautical Laboratory initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project is currently operating with six to eight scientific researchers and eight to ten supporting personnel. During this period, our activities were directed toward: Development of a work program for tactical incapacitating agent munitions (TIM). Preliminary experimentation in the DITA Special Study Area. Phase I effort on Concept No. 4 (POPCORN).

Descriptive Note: Informal Monthly Progress Report

Cornell Aeronautical Laboratory initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project is currently operating with six to eight scientific researchers and eight to ten supporting personnel. During this period, our activities were directed toward: Development of a work program for tactical incapacitating agent munitions (TIM). Preliminary experimentation in the DITA Special Study Area. Phase I effort on Concept No. 4 (POPCORN).

Descriptive Note: Informal Monthly Progress Report

Cornell Aeronautical Laboratory initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project is currently operating with six to eight scientific researchers and eight to ten supporting personnel. During this period, our activities were directed toward: Development of a work program for tactical incapacitating agent munitions (TIM). Preliminary experimentation in the DITA Special Study Area. Phase I effort on Concept No. 4 (POPCORN).

Descriptive Note: Informal Monthly Progress Report

Cornell Aeronautical Laboratory initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project is currently operating with six to eight scientific researchers and eight to ten supporting personnel. During this period, our activities were directed toward: Development of a work program for tactical incapacitating agent munitions (TIM). Preliminary experimentation in the DITA Special Study Area. Phase I effort on Concept No. 4 (POPCORN).
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| **Title:** Project CHORD. Informal Monthly Progress Report No. 37, 1 July-31 July 1964.  |
| **Author(s):**       |
| **Report Number:** IMPR-37 DTC-64-1276  |
| **Publish Date:** 19640731  |
| **Abstract:** CAL initiated performance on the subject contract (Code name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.  |
| **Descriptive Note:** Informal Monthly Progress Report  |
| **Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY  |
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| **Site Holding:** CB DW 524833  |
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| **Title:** Project CHORD. Informal Monthly Progress Report No. 38, 1 August-31 August 1964.  |
| **Author(s):**       |
| **Report Number:** DTC-64-1429 IMPR-38  |
| **Publish Date:** 19640831  |
| **Abstract:** CAL initiated performance in the subject contract (Code name: Project CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.  |
| **Descriptive Note:** Informal Monthly Progress Report  |
| **Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY  |
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Descriptive Note: Informal Monthly Progress Report

Subject Keywords:
Page Count: 33
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Supplemental Notes:

CBRNIAC Number: CB-074757
Site Holding: CB DW 524840
AD Number:
Author(s):
Report Number: DTC-64-1544 IMPR-39
Publish Date: 19640930

Abstract: This paper presents a detailed description of the Explosive Acceleration Test Unit constructed at this Laboratory under Contract DA-18-108-CML-6628-A Project CHORD. To present experimental results on a timely basis, test results and a complimentary discussion are presented in Sections IV and V, respectively. Although the work to date has been limited, some conclusions derived from the test data are presented in Section VI. Additional experimental work is needed and planned. These efforts will be presented as available. Working Paper No. 15 will be referenced in future publications so redundant equipment description can be omitted. The design, construction, and use of this facility are the direct efforts of Messrs. R. J. Sydow, H. Washburn, and C. J. Borkowski. The helpful suggestions of Mr. C. J. Schneider, Jr. also are appreciated.

Descriptive Note: Working Paper

Subject Keywords:
Page Count: 50
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
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Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

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<td>19650531</td>
<td>CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.</td>
<td>Informal Monthly Progress Report</td>
<td>CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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<td>DTC-65-1713 IMPR-4</td>
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<td>CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.</td>
<td>Informal Monthly Progress Report</td>
<td>CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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**Abstract:**
This summary report has been prepared in accordance with the provisions of Contract No. DA-18-108-CML-6628-A and covers the period from 15 June 1961 through 31 December 1964. This publication lists reference reports which describes the Phase I and Phase II efforts conducted by Cornell Aeronautical Laboratory, Inc (CAL) to determine effective means for delivery of lethal, incapacitating, flame, smoke, and incendiary chemical agents by air and ground weapons systems and to evolve new and novel chemical munitions which significantly enhance our military capability against any class of enemy in any type of conflict. In addition, a brief description and current status of the research and development program for each agent/munition/weapons system concept considered during the period covered by this report is presented.

**Descriptive Note:**
Summary Report

**Corp Author Name:**
CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:**
Distribution limited to DoD agencies only.

**Subject Keywords:**
Page Count: 51
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Media Type: CPDF
Document Classification: C
Supplemental Notes:

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**Abstract:**
CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

**Descriptive Note:**
Informal Monthly Progress Report

**Corp Author Name:**
CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:**
Distribution limited to DoD agencies only.

**Subject Keywords:**
Page Count: 47
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

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**Abstract:**
This project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts. In addition, a brief description and current status of the research and development program for each agent/munition/weapons system concept considered during the period covered by this report is presented.

**Descriptive Note:**
Informal Monthly Progress Report

**Corp Author Name:**
CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:**
Distribution limited to DoD agencies only.

**Subject Keywords:**
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Document Classification: C
Supplemental Notes:
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effectiveness means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 43
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

Abstract: On 1 January 1965 effort on this project was initiated to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 54
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Media Type: CPDF
Document Classification: C
Supplemental Notes:

Abstract: (Abstract is unavailable.)

Descriptive Note: Informal Monthly Progress Report

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 46
CB Collection: CA
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Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 40

CB Collection: CA

Media Type: CPDF

Document Classification: S/NOFORN

Abstract: The objective of the work conducted under this contract was to determine effective means for the delivery of lethal and incapacitating chemical agents by air and ground weapons systems. The program included the study of agents, tactics, weapons and targets to generate plans for weapon system feasibility studies and experimentation to be conducted under this contract. A total of twelve study tasks were conducted and are reported in Section 2 of this report. These tasks represented eight percent of the total program effort. Feasibility investigations relative to new techniques were conducted on ten concepts and are reported in Section 3. These investigations represented twenty-two percent of the total contract effort. Feasibility investigations relative to new weapons concepts were conducted on thirteen items and are reported in Section 4. These investigations represented forty-four percent of the total contract effort. Two weapons concepts were advanced to the engineering-development phase and are reported in Section 5. This effort represented twenty-six percent of the total effort. Each of the total of thirty-seven tasks are summarized and reference the reports generated under each task.
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<td><strong>Distribution Statement:</strong> Distribution limited to US Gov't agencies and their contractors; Administrative/Operational Use; Mar 1967. Other requests for this document shall be referred to the Air Force Armament Laboratory (ATCD), Eglin Air Force Base, FL 32542. This document contains export-controlled technical data.</td>
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<th>Author(s): Klingaman, Richard M. O'Connor, Arthur D.</th>
<th>Report Number: GM-1592-G-18</th>
<th>Publish Date: 19640515</th>
<th>Abstract: This Appendix to the Sixth Semiannual Progress Report for the CHORD Program contains information pertaining to Direct Injection Toxic Ammunition (DITA) studies performed and/or initiated during the period covered by the report.</th>
<th>Descriptive Note: Semiannual Progress Report No. 6, 1 Jan-15 May 1964</th>
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<td><strong>Distribution Statement:</strong> Distribution limited to US Gov't agencies and their contractors; Specific Authority; 15 May 1964. Other requests for this document shall be referred to Commanding Officer, US Army Chemical Research and Development Laboratory, Edgewood Arsenal, MD 21010.</td>
<td><strong>Subject Keywords:</strong> CASUALTIES; CHEMICAL PROJECTILES; CHEMICAL WARFARE; FRAGMENTATION AMMUNITION; IMPACT SHOCK; PROBABILITY; PROJECTILES; TOXICITY; VELOCITY; VULNERABILITY; WAR POTENTIAL</td>
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CBRNIAC Number: CB-034070
Site Holding: DT
AD Number: B316556
Title: Feasibility Study Plan for Concept Number 5 -- POPGUN.
Author(s): Schneider, C. J., Jr.
Report Number: CAL-GM-1592-G-15
Publish Date: 19631001
Abstract: (Abstract is unavailable.)
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Further dissemination only as directed by Department of the Army, Attn: Public Affairs Office, Washington, DC 20310, October 1963; or higher DoD authority.
Subject Keywords: ANTI GUERRILLA MUNITIONS; CHEMICAL WARFARE AGENTS; FEASIBILITY STUDIES; MILITARY REQUIREMENTS; ORDNANCE; POPGUN WEAPON; PROJECTILES; PROTOTYPES; PYROTECHNICS; TEST AND EVALUATION; WEAPON SYSTEMS
Page Count: 15
CB Collection: 
Media Type: 
Document Classification: U
Supplemental Notes: 

CBRNIAC Number: CB-040513
Site Holding: CB DT
AD Number: 833943
Title: Preparative Phase of the Agent CS Slurry Investigation.
Author(s): Schneider, C. J., Jr.
Report Number: CHORD-WORKING PAPER-20
Publish Date: 19641201
Abstract: The paper covers the preparative phase of the investigation into the dispersion of agent CS in slurries with characteristics useful in dissemination devices. Included are the results of the brief consideration given to the following items: choice of carrier liquid; surfactant hydrophile and lipophile balance; surfactant concentration; agent concentration; the use of a protective colloid; and the dissemination of slurries. The conclusion is reached that it is possible to prepare useful slurries containing high concentrations of agent CS and that these slurries possibly offer dissemination advantages. It is also conjectured that it should be possible by a similar investigation to develop a technique for the preparation of slurries of most other solid agents.
Descriptive Note: Working Paper
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: BIOLOGICAL SLURRIES; CHEMISTRY; COLLOIDS; CONCENTRATION; CS AGENTS; DENSITY; DISTRIBUTION; PREPARATION; SOLIDS; SURFACE ACTIVE SUBSTANCES
Page Count: 29
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Limitation Change Authority: US Army Edgewood Arsenal letter dated 13 Dec 71.

CBRNIAC Number: CB-040526
Site Holding: CB DT DW 518841 EDG E504523
AD Number: 832023
Title: Utilization of a Sensor Network for Reconstructing a Biological Warfare Attack.
Author(s): Salz, Norman P.
Abstract: This report describes a method of determining (from data supplied by an agent sensor network) the location and length of the agent release line, the source strength, the biological decay constant, and the time of a covert biological agent attack. These parameters are compatible with the PICNIC model and computer program developed by the University of North Carolina and are used in estimating casualties. The method is dependent on the availability of accurate and automatic total dosage and time-to-threshold dosage sensors in a network within the area traversed by the cloud during a period within which the agent decay rate remains constant. The methodology is based on use of a time-varying standard deviation with the ORG-17 gaussian distribution model for concentration from a uniform finite line source normal to the wind. The solution is based on a least squares fit of sensor data to predicted values of total dosages and threshold times. A function is formulated whose minimum provides a best estimate (in the sense of least squares) for the values of the unknowns. The mathematical procedures required are sufficiently complex to necessitate the use of an automatic computer.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies only. Other requests for this document shall be referred to Army MUCOM Operations Research Group, Army Edgewood Arsenal, Edgewood Arsenal, MD 21010.

Subject Keywords: BIOLOGICAL WARFARE AGENTS; BIOLOGICAL WARFARE CASUALTIES; COMPUTER PROGRAMS; DETECTION; DETECTORS; DISTRIBUTION; DOSAGE; LEAST SQUARES METHOD; MATHEMATICAL MODELS; METEOROLOGICAL PHENOMENA; NETWORKS; POINT-SOURCE DISSEMINATION; STATISTICAL PROCESSES

Page Count: 86

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
Abstract: The evolution of chemical agent ordnance testing is studied. The results obtained thus far have been primarily in the specific areas of meteorology, data analysis and chemical processing as presently performed in the Field Evaluation Division of CRDL. A test has been proposed to assist in the evolution of test accuracy and precision. It is planned that in the following period, (1) the results of this test be analyzed, (2) the meteorology study continue and the diffusion model presented be analyzed further, (3) data analysis study be continued in order to define further areas of improvement with emphasis on automation, (4) the sampling equipment and chemical processing be further analyzed to determine accuracy and precision and (5) that studies in the area of test design, process control, phase testing and the like now receiving emphasis be completed.

Descriptive Note: Quarterly Progress Report no. 1, 5 Jul-1 Oct 63
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: AMMUNITION; AREA COVERAGE; CHEMICAL ANALYSIS; CHEMICAL WARFARE AGENTS; CHEMICAL WARFARE LABORATORIES; DATA PROCESSING; DIFFUSION; DOSAGE; INSTRUMENTATION; METEOROLOGICAL PHENOMENA; PARTICLE SIZE; PARTICLES; SAMPLING; STATISTICAL ANALYSIS; TEST EQUIPMENT; TEST FACILITIES; TEST METHODS; WIND
Page Count: 48
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: 

CBRNIAC Number: CB-044098
Site Holding: CB DT
AD Number: 420472
Title: Radiological Target Analysis Procedures.
Author(s): Ryll, Ewald
Report Number: VP-1699-G1
Publish Date: 19630628
Abstract: System aspects of large scale decontamination of populated areas were studied to determine optimal decontamination procedures for small scale areas. Simple techniques have been demonstrated that a populated area of 700,000 people exposed to fallout from a 1 MT attack outside of the area can be restored in roughly 1 month. Analysis was conducted of scheduling the entry of operators into a radioactive field. Techniques similar to dynamic programming were applied, with the result that for certain circumstances specific optimal start times can be determined. Computational procedures and computer programs have been evolved for testing procedures in simulated environments. Substantial analysis was performed on the shielding effect of structures in a target area.

Descriptive Note: Procedures
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: CIVIL DEFENSE; DECONTAMINATION; DOSE RATE; FALLOUT; MATHEMATICAL ANALYSIS; OPERATIONS RESEARCH; OPTIMIZATION; PROGRAMMING (COMPUTERS); RADIOACTIVE DECAY; RADIOLOGICAL WARFARE; SCHEDULING; SHIELDING; URBAN AREAS
Page Count: 159
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: 

CBRNIAC Number: CB-044538
Site Holding: CB DT DW 536740
AD Number: 381951
Author(s):
Report Number: CAL-GM-1494-G-6
Publish Date: 19610901
Abstract: (Abstract is unavailable.)
Descriptive Note: Evaluation Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; NOFORN. Other requests for this document shall be referred to Army Chemical Corps Research and Development Command, Washington, DC. This document contains export-controlled technical data.
Subject Keywords: ARMY RESEARCH; SYMPOSIA
Page Count: 262
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes: See also Volume I, AD-381 950. Change Authority: S to C Group-3.

CBRNIAC Number: CB-044622
Site Holding: CB DT DW 536768
AD Number: 377615
Title: Evaluation and Development of Test Technology.
Author(s): Schneeberger, Richard F.
Report Number: CAL-GM-1956-E-4
Publish Date: 19661101
Abstract: This report presents a detailed review of the studies, research and experiments carried out in support of the development of test technology. Primary emphasis is given to the Field Evaluation problems but Wind Tunnel and Explosion Chamber testing have also been examined. The recommendations proposed denote areas in which improvement can be obtained and the modifications to methods and techniques considered to be necessary. Directions for continued improvement of the test system and for broader application of results are presented.
Descriptive Note: Final Report, Jul 64-Oct 66
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; No Foreign without approval. Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010. This document contains export-controlled technical data.
Subject Keywords: AEROSOL GENERATORS; AEROSOLS; ANALYSIS OF VARIANCE; CALIBRATION; CHEMICAL WARFARE AGENTS; CHEMICAL WARFARE LABORATORIES; CLOUDS; COMPUTER PROGRAMMING; DATA PROCESSING; DELIVERY TACTICS; DENSITY; DISTRIBUTION; DOSAGE; EFFECTIVENESS; ELECTROMAGNETIC PULSES; ENVIRONMENTAL TESTS; ERRORS; EXPERIMENTAL DESIGN; INSTRUMENTATION; LINE-SOURCE DISSEMINATION; MANUFACTURING; METEOROLOGICAL PHENOMENA; MODEL TESTS; OPTIMIZATION; POINT-SOURCE DISSEMINATION; QUALITY CONTROL; RADIATION EFFECTS; SAMPLERS; SCATTERING; STATISTICAL ANALYSIS; SURFACE TARGETS; TEST METHODS; VAPORS; WIND TUNNEL MODELS
Page Count: 298
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Change Authority: C to U Group-4.

CBRNIAC Number: CB-044732
Site Holding: CB DT DW 531456
AD Number: 374000
Title: An Investigation of the Thermal Decomposition of BIS (2, Ethyl Hexyl) Hydrogen Phosphite and Agent VX as Vapor at Elevated Temperatures.
This investigation has shown that both BIS (2, ethyl hexyl) hydrogen phosphite and agent VX undergo decomposition when exposed as vapors to elevated temperatures for millisecond intervals.
Abstract: This publication lists reference reports which describe the Phase I and Phase II efforts conducted to
determine effective means for delivery of lethal, incapacitating, flame, smoke, and incendiary chemical agents by air
and ground weapons systems and to evolve new and novel chemical munitions which significantly enhance our
military capability against any class of enemy in any type of conflict. In addition, a brief description and current
status of the research and development program for each agent/munition/weapons system concept considered during
the period covered by this report is presented. (Author).

Descriptive Note: Summary Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution Controlled. All requests for this document shall be referred to Commander,
Chemical Research and Development Laboratories, Attn: STINFO/Technical Library, Edgewood Arsenal, MD.
Subject Keywords: FEASIBILITY STUDIES; INCAPACITATING AGENTS; RELEASE MECHANISMS;
REPORTS; RESEARCH PROGRAM ADMINISTRATION; SCATTERING; VELOCITY

CBRNIAC Number: CB-045440
Site Holding: CB DT DW 524368
AD Number: 353008
Title: Project CHORD. Semi-annual Progress Report No. 6 Covering the Period 1 January-14 May 1964.
Author(s): Reinnagel, Richard E.
Report Number: GM-1592-G-18
Publish Date: 19640715
Abstract: Weapon system concepts, elements of concepts, or simply suggested techniques are considered in view of
the objectives and are carefully screened before the expenditure of any sizable effort. A primary interest is the
determination that a proposed system would be militarily useful. Effort is now focused in the area of exploratory
development on specific weapon systems or elements of systems. Naturally, a supporting operations analysis is
continued with each experimental program so as to have refined performance and use criteria available as the system
matures.

Descriptive Note: Semi-annual Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: AEROSOLS; ANALYSIS; CHEMICAL WARFARE; CHEMICAL WARFARE AGENTS;
DISTRIBUTION; INCAPACITATING AGENTS; PARTICLE SIZE; SPRAY NOZZLES; TOXICITY; VX
AGENT; WEAPON SYSTEMS

CBRNIAC Number: CB-045486
Site Holding: CB DT DW 524358
AD Number: 352050
Title: Project CHORD Concept Number 1 (STOMP).
Author(s): Schneider, C. J., Jr.
Report Number: GM-1592-G-13
Publish Date: 19640115
Abstract: This report describes an investigation made of the feasibility of adding a complementary chemical agent
capability to the XM22 mine. The STOMP designs described range from a simple, add-on agent container to a
sophisticated airburst adapter yielding high agent dispersion. It is concluded that no device evaluated provides
improvement of the mine sufficient to warrant the additional cost and complexity that would result. However, techniques developed for the study program appear to be of value for other munitions. (Author).

Descriptive Note: Summary Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; NOFORN. This document contains export-controlled technical data.
Subject Keywords: AIRBURST; EXPLOSIVE ACTUATORS; MINES (ORDNANCE); PERFORMANCE (ENGINEERING); SPRINGS
Page Count: 14
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-045516
Site Holding: CB DT DW 523573
AD Number: 351232
Title: An Analysis of Potential Roles and Missions for Chemical Incapacitating Agents, Using CS, BZ, and 4X as Examples.
Author(s): Gerber, B. V. Hodges, S. W. O'Connor, A. Reinnagel, R. Talley, R.
Report Number: CRDL-SP-5-5
Publish Date: 19640301
Abstract: The objective of this analysis was to list all the targets vulnerable to chemical incapacitants and to state the requirements for defeating each target, irrespective of weapon capabilities. The study lists targets, with their defeat criteria, for three categories of warfare: counterinsurgency and limited and general war. In addition, each of the targets listed is considered for neutralization with CS, BZ, or 4X; 4X being a hypothetical agent similar in properties to BZ but requiring one fourth the dosage of the latter. The analysis presents in tabular form all the targets, with their defeat criteria, against which any current or future incapacitating agents can be compared.
Descriptive Note: Special Publication
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: B AGENTS; C AGENTS; CHEMICAL WARFARE AGENTS; COUNTERINSURGENCY; EFFECTIVENESS; GUERRILLA WARFARE; HAZARDS; INCAPACITATING AGENTS; LIMITED WAR; MILITARY REQUIREMENTS; MILITARY STRATEGY; TARGETS; VULNERABILITY; WEAPONS
Page Count: 90
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-045554
Site Holding: CB DT DW 524380
AD Number: 350378
Title: Project CHORD. Semi-Annual Progress Report Covering the Period 1 July-31 December 1963.
Author(s): Reinnage, Richard E.
Report Number: GM-1592-G-16
Publish Date: 19640301
Abstract: This report delineates the progress and current status of studies, investigations, and analyses of new and novel agent/munition/weapons systems being conducted for the effective employment of chemical warfare agents.
Descriptive Note: Semi-Annual Progress Report, 1 Jul-31 Dec 1963
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: ANALYSIS; AREA COVERAGE; CHEMICAL WARFARE; CHORD PROJECT; DESIGN; FEASIBILITY STUDIES; INCAPACITATING AGENTS; INSTRUMENTATION; MINE WARFARE; MUNITIONS INDUSTRY; PENETRATION; SLURRIES; WEAPON SYSTEMS; WEIGHT
Abstract: Popgun is a man-portable, expendable weapon capable of extremely rapid area coverage with agent CS. The weapon, complete and loaded with 96 projectiles, is housed in a backpack, which incorporates a folding bipod for ground-emplaced firing. The device, suggested by CAL in response to requirements stated by CRDL on 23 July 1963, has been carried through the preliminary design and preprototype construction stages and was demonstrated at CRDL on 10 December 1963. This report describes the conceptual popgun weapon and provides detailed design and construction information for the preprototype model demonstrated.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution Controlled. All requests for this document shall be referred to Director, Chemical Research and Development Laboratory, Attn: STINFO/Technical Library, Edgewood Arsenal, MD.

Subject Keywords: BACKPACKS; BAGS (CONTAINERS); CHEMICAL WARFARE AGENTS; CONTAINERS; DESIGN; EFFECTIVENESS; FEASIBILITY STUDIES; FIRING MECHANISMS (WEAPON); PACKING MATERIALS; PORTABLE MAN-PORTABLE; PROJECTILES; PYROTECHNIC PROJECTORS; PYROTECHNICS; WEAPON; WEAPON SYSTEMS; WEIGHT

Page Count: 42

CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Change Authority: 990603 - Report declassified IAW OCA directions on the document. DOD Distribution security control statement F in effect.

Abstract: The basic objective of the Chord project is the development of new and novel agent/munition/weapons systems for the effective employment of CW agents. To accomplish this objective the program employs two distinct types of effort: (1) Phase I which considers requirements, use concepts, characteristics of currently available systems, and the generation of weapon system concepts to yield an improvement in military capability. (2) Phase II, which is concerned with the development of these concepts, such that the military usefulness of a concept can be adequately demonstrated. During this report period, Phase I effort has been concerned primarily with special studies in the following areas: (1) unconventional warfare, (2) tactical incapacitating agent/munition studies, (3) direct injection toxic agent studies, and (4) incendiary warhead for the Lance missile. In parallel with the systems analysis effort in the generation of new concepts, prefeasibility experimentation has been conducted on several concepts that suggested themselves in the course of the Phase II experimental efforts. (Author).

Descriptive Note: Semi-annual Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution Controlled. All requests for this document shall be referred to Commander, Chemical Research and Development Laboratories, Attn: STINFO/Technical Library, Edgewood Arsenal, MD.
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<td>Reif, Hans G. Scamurra, Robert M.</td>
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<td>Report Number:</td>
<td>GM-1494-G-7 EA-S-3729(67) CRDL-TL-63-S-739</td>
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<td>Publish Date:</td>
<td>19621201</td>
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<td>Abstract:</td>
<td>This report describes several studies derived from the analysis of the Project WASP RAND Guidance Seminar results. The studies deal with system studies of new B/C weapon system concepts and investigation of technical and operational aspects of weapon system concepts considered in the Seminar.</td>
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<td>Corp Author Name:</td>
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<tr>
<td>Title:</td>
<td>Preliminary Requirements for Incapacitating Agent/Munition Systems. Volume I.</td>
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<tr>
<td>Author(s):</td>
<td>O'Connor, Arthur D.</td>
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<td>Report Number:</td>
<td>GM-1592G9-VOL-I</td>
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<td>Publish Date:</td>
<td>19630331</td>
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<td>Abstract:</td>
<td>A preliminary evaluation of the requirements for future incapacitating agent/munition/delivery systems. Agents CS, DM and BZ are treated in detail; agents LSD and UC are considered but not in as much detail. Two broad areas of application of the presently known incapacitating agent family are defined, and potential system capabilities are presented in the detail permitted by available data within each area.</td>
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<td>Corp Author Name:</td>
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<td>Distribution Statement:</td>
<td>Further dissemination only as directed by US Department of the Army Public Affairs Office, Washington, DC; or higher DoD authority.</td>
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<td>Subject Keywords:</td>
<td>ACCEPTABILITY; BZ AGENTS; CHEMICAL WARFARE AGENTS; DM AGENTS; EFFECTIVENESS; LIMITED WAR; LYSERGIC ACIDS; SPECIFICATIONS; STAPHYLOCOCCUS; TOXINS AND ANTITOXINS; UC AGENT; WEAPON SYSTEMS</td>
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CBRNIAC Number: CB-045920
Site Holding: CB DT DW 524232
AD Number: 336536
Title: Preliminary Requirements for Incapacitating Agent/Munition Systems. Volume 2. VII. Technical Discussion Appendices.
Author(s): Dufort, Robert H. O'Connor, Arthur D. Reif, Hans G.
Publish Date: 19630331
Abstract: This report presents a mission analysis defining the potential applications of incapacitating chemical agents in tactical military roles, and an evaluation of a number of agents and delivery systems in combination with current as well as hypothetical munitions, in these roles.
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution Controlled. All requests for this document shall be referred to Department of the Army, Public Affairs Office, Pentagon, Washington, DC.
Subject Keywords: ANALYSIS; ANTIPERSONNEL AMMUNITION; AREA COVERAGE; ARTILLERY ROCKETS; BOMB CLUSTERS; BOMBLETS; CHEMICAL; CHEMICAL WARFARE; CLUSTER WARHEADS; DOSAGE; EFFECTIVENESS; HOWITZERS; LETHAL DOSAGE; LIGHTERS; M-456 CARTRIDGES (105-MM); MORTARS; NONLETHAL AGENTS; OPERATIONS RESEARCH; ROCKETS; TACTICAL WEAPONS; TARGETS; TRANSPORT AIRCRAFT; WEAPON SYSTEMS; WEAPONS
Page Count: 293
CB Collection: UA
Media Type: PDF
Document Classification: U


CBRNIAC Number: CB-045962
Site Holding: CB DT DW 524224
AD Number: 335373
Title: Project CHORD. Semi-annual Progress Report No. 3 Covering the Period 15 June 1962-1 January 1963.
Author(s): Reinnagel, Richard E.
Report Number: GM-1592-G-8
Publish Date: 19630201
Abstract: (Abstract is unavailable.)
Descriptive Note: Semi-annual Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; Specific Authority; 12 Apr 2000. Other requests for this document shall be referred to Army Chemical Research and Development Laboratory, Edgewood Arsenal, MD.
Subject Keywords: AEROSOL GENERATORS; AEROSOLS; ANTIPERSONNEL AMMUNITION; ANTITANK AMMUNITION; AREA COVERAGE; B FLAT MUNITION; BEEHIVE AMMUNITION; BOMBLETS; CHEMICAL BOMBS; CHEMICAL PROJECTILES; CHEMICAL WARFARE; CHEMICAL WARFARE AGENTS; CHORD PROJECT; COUNTERINSURGENCY; EFFECTIVENESS; FLECHETTES; GUERRILLA WARFARE; HARDENING; INSTRUMENTATION; LANCE MISSILES; M-23 MINES; M-55 ROCKETS (115-MM); MINE FUZES; NONLETHAL AGENTS; NOZZLES; PENETRATION; POPCORN PROJECT; PROTECTIVE CLOTHING; ROCKETS; SCATTERING; STING RAY; STOMP; SURFACE TARGETS; TARGETS; VASOL
Page Count: 196
CB Collection: UA
Media Type: PDF
Document Classification: U
### Munition System Engineering and Operations Research Study No. 2, Volume 1

**CBRNIAC Number:** CB-046014  
**Site Holding:** CB DT  
**AD Number:** 334507  
**Title:** Munition System Engineering and Operations Research Study No. 2, Volume 1  
**Author(s):**  
**Report Number:** CAL-603  
**Publish Date:** 19620601  
**Abstract:** (Abstract is unavailable.)  
**Descriptive Note:** Technical Report  
**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY  
**Distribution Statement:** Distribution limited to US Gov't agencies and their contractors.  
**Subject Keywords:** AIRCRAFT; ANTI PERSONNEL WEAPONS; BIOLOGICAL WARFARE; BIOLOGICAL WARFARE AGENTS; BOMBLETS; COSTS; DRONES; GUIDED MISSILES; HELICOPTERS; LOGISTICS; METEOROLOGICAL PHENOMENA; NON LEAKAGE PROBABILITY; NONLETHAL AGENTS; OPERATIONS RESEARCH; SCATTERING; TERRAIN  
**Page Count:** 192  
**CB Collection:** CA  
**Media Type:** CPDF  
**Document Classification:** C  
**Supplemental Notes:** Change Authority: ST-A per Chemical Research Development letter, 29 Feb 1968. See also AD334508.

### Munition System Engineering and Operations Research Study No. 1, Volume 1

**CBRNIAC Number:** CB-046015  
**Site Holding:** CB DT  
**AD Number:** 334505  
**Title:** Munition System Engineering and Operations Research Study No. 1, Volume 1  
**Author(s):**  
**Report Number:** CAL-602  
**Publish Date:** 19620625  
**Abstract:** (Abstract is unavailable.)  
**Descriptive Note:** Technical Report  
**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY  
**Distribution Statement:** Distribution limited to US Gov't agencies and their contractors.  
**Subject Keywords:** AGRICULTURE; AIRCRAFT; ANTIPERSONNEL AGENTS; BIOLOGICAL WARFARE; BOMBLETS; COSTS; DRONES; GUIDED MISSILES; HELICOPTERS; LOGISTICS; METEOROLOGICAL PHENOMENA; MICROORGANISMS; OPERATIONS RESEARCH; PIRICULARIA; RUSTS (MICROORGANISMS); SCATTERING; TERRAIN  
**Page Count:** 192  
**CB Collection:** CA  
**Media Type:** CPDF  
**Document Classification:** C  
**Supplemental Notes:** Change Authority: ST-A per Chemical Research and Development letter, 29 Feb 1968.

### Project Chord. Volume 2

**CBRNIAC Number:** CB-046031  
**Site Holding:** CB DT  
**AD Number:** 334223  
**Title:** Project Chord. Volume 2  
**Author(s):**  
**Report Number:** CAL-GM-1592-G-7-VOL-2  
**Publish Date:** 19620701  
**Abstract:** Stingray, Davy Crockett, M-55 Rocket Launchers, 115-MM, M-91 Rocket Launchers, 115-Mm, Stomp, Area Coverage, Vasol, Hornets Nests.
Abstract: This Progress Report summarizes all Project CHORD activities during the period 1 February 1962 to 15 June 1962. The purpose of this report is to provide, in a single source, a comprehensive summary of all phases of effort under this program during the report period. Although the project status at the beginning of this period is reviewed in some detail in the Summary to provide a starting point for the progress reported herein, details concerning work accomplished in the period 15 June 1961 to 31 January 1962 are presented only in the First Semiannual Progress Report and are not repeated herein.

Descriptive Note: Semiannual Progress Report No. 2, 1 Feb-15 Jun 62
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors;
Administrative/Operational Use; Jul 62. Other requests for this document shall be referred to Army Chemical Research and Development Laboratories, Attn: STINFO, Technical Library, Edgewood Arsenal, MD.
Subject Keywords: 105-MM; 105-MM ORDNANCE ITEMS; 115-MM; 155-MM; AEROSOL GENERATORS; ANTIPERSONNEL AMMUNITION; B FLAT MUNITION; BEEHIVE AMMUNITION; CANISTER PROJECTILES; CHEMICAL PROJECTILES; CHEMICAL WARFARE; CHORD PROJECT; DAVY CROCKETT; EFFECTIVENESS; ERRORS; FEASIBILITY STUDIES; FLECHETTES; GUERRILLA WARFARE; GUNS; HARDENING; HOWITZERS; LAND MINES; M-1 HOWITZERS (155-MM); M-2 HOWITZERS (105-MM); M-70 MORITZERS (115-MM); M-91 ROCKET LAUNCHERS (115-MM); MORTAR AMMUNITION; NOZZLES; OPERATIONS RESEARCH; RECOILLESS GUNS; SCATTERING; SPRINGS; STING RAY; STOMP; SURFACE TARGETS; TARGETS; TOXICITY; ULTRASONIC RADIATION; V AGENTS; VASOL

Page Count: 23

CBRNIAC Number: CB-046032
Site Holding: CB DT
AD Number: 334222
Title: Project Chord, Volume 1.
Author(s): O'Connor, Arthur D.
Report Number: CAL-GM-1592-G7-VOL-1
Publish Date: 19620701

Comparison of First-generation VX Vasol Munitions.

CBRNIAC Number: CB-046182
Site Holding: CB DT DW 531455
AD Number: 329633
Title: Comparison of First-generation VX Vasol Munitions.

Supplemental Notes: Change Authority: 31 Dec 69 per GDS document marking; 20040211 -- target created, S to C to U.
Abstract: The comparative effectiveness of the 155 MM howitzer and the M55 rocket as means of delivering the chemical agent VX in vapor/fine aerosol (VASOL) form against troops in both hard (protected) and soft (unprotected) environments was investigated. Calculations were made to determine the number of rounds of each type of weapon required to produce several stated dosages (expressed in milligram minutes per cubic meter) at a point on the battlefield. The ranges to target selected for comparison were varied from about 3000 to 10,500 meters the maximum range of the rockets. Wind was considered both in the direction of fire and normal to the direction of fire. The use of subcanisters in both munitions in order to improve the agent distribution efficiency, the attack of large linear and area targets, and rate of fire and mobility factors appropriate to the two systems were also considered.

Subject Keywords: 115-MM; 155-MM ORDNANCE ITEMS; AEROSOL GENERATORS; ANALYSIS; CASUALTIES; CHEMICAL PROJECTILES; CHEMICAL WARFARE; CHEMICAL WARFARE AGENTS; CHEMICAL WARFARE CASUALTIES; COSTS; DOSAGE; EFFECTIVENESS; HARDENING; HOWITZERS; M-55 ROCKETS (115-MM); PROBABILITY; ROCKETS; TARGETS; TOXICITY; UNDERGROUND STRUCTURES; V AGENTS; WARHEADS; WIND
Title: The Military Worth of BW-CW Weapons to the Tactical Air Force.

Author(s): Stein, Arthur

Report Number: CAL-GM-1170-G-4

Publish Date: 19590325

Abstract: (Abstract is unavailable.)

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: BIBLIOGRAPHIES; BIOLOGICAL WARFARE; BIOLOGICAL WARFARE AGENTS; CHEMICAL WARFARE; CHEMICAL WARFARE AGENTS; MILITARY REQUIREMENTS

Page Count: 207

CB Collection: CA

Media Type: CPDF

Document Classification: C


Title: High Speed Tests of a 1000 Pound Chemical Corps Bomb Model in the Cornell Aeronautical Laboratory 4-Foot Transonic Tunnel.

Author(s): Kobitz, N.

Report Number: AA-879-W-1

Publish Date: 19530501

Abstract: Two configurations of a 1/8 scale model, 1000-pound cluster bomb, modified for external storage, were tested in the transonic facility for the Army Chemical Corps. One model was the standard configuration; the other model was an alternate configuration with a transition ring between cluster and tail cone to increase the overall length. Each model was tested over a Mach number range from .7 to 1.20 at angles of attack, at each Mach number, ranging from -5 to 12 deg. These tests were made to obtain experimental data on the longitudinal stability characteristics of these two configurations. The results include three component ballistic coefficients in a stability axes system as well as in a body axes system. In addition, some analysis of the data is performed to obtain the variation of center of pressure, pitching moment coefficient slope and zero lift drag with Mach number.

Descriptive Note: Munitions Test Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors; Administrative/Operational Use; May 53. Other requests for this document shall be referred to Chemical Corps, Army Chemical Center, MD.

Subject Keywords: CHEMICAL BOMBS; MODEL TESTS; PITCH (MOTION); TRANSONIC CHARACTERISTICS

Page Count: 69

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes: Change Authority: May 65, Do DD 5200.10, 20030618 - target created C to U.

Title: Parametric Design Study for a Close Support Artillery Weapon, Armored, SP, 155mm Howitzer, XM179. Volume 1.

Author(s): Bakanas, V. Bilby, J. Capps, J. Cockrell, J. Hatheway, D.
Abstract: The methodology and results of a parametric design study of a close support artillery weapon system, self-propelled, 155mm, XM 179, which could be available in the 1970-1980 time frame are described in this report. Nine government-provided concepts and four reference weapon/vehicles were used as a data base from which parametric design relationships applicable to XM179 concepts could be established. Physical and performance requirements postulated in an approved qualitative materiel requirement were used to establish the spectrum of parametric values to be investigated. Ninety-five conceptual weapon/vehicle systems were synthesized using design relationships developed to establish a broader parametric base. The synthesized weapon/vehicles are defined in sufficient detail to identify all of the major dimensions, component weights and power requirements to permit cost and performance data to be derived. RDT and E, APE and PEA costs are estimated to obtain a total program cost which does not include costs of receipt, storage and distribution, troop installation, operation, maintenance and disposal. Trade-off analyses are conducted using the results of analysis of the synthesized concepts and the government provided concepts to provide the government with a large collection of data upon which to base decisions in selecting the best armored weapon/vehicle system concept for engineering development. Within the constraints imposed and assumptions made, the XM179 concept recommended for engineering development is a weapon/vehicle system that utilizes a composite armor to provide ballistic protection for the crew. (Author)

Descriptive Note: Final Report, 16 Feb-21 Jul 1968

Subject Keywords: 155-MM; ALUMINUM ALLOYS; ARTILLERY CREWS; ARTILLERY FIRE; BIOLOGICAL WARFARE AGENTS; BREECH MECHANISMS; CHEMICAL WARFARE AGENTS; CLOSE SUPPORT; COSTS; CUPOLAS; DESIGN; FEASIBILITY STUDIES; FIRE CONTROL SYSTEMS; GUN MOUNTS; GUN TURRETS ARMOR PLATE; HUMAN FACTORS ENGINEERING; M-179 HOWITZERS(155-MM); OPERATORS(PERSONNEL); PERFORMANCE(ENGINEERING); PROTECTION; RADIOLOGICAL WARFARE AGENTS; RANGE(DISTANCE); ROADS; RODS; SELF PROPELLED GUNS; SPECIFICATIONS; TRACKED VEHICLES; TRADEOFFS; VELOCITY; WEIGHT

Page Count: 359
CB Collection: U
Document Classification: U
Supplemental Notes: See also Volume 2, AD-392 500L.
Site Holding: CB DW 536168 EDG E499472
AD Number:
Author(s): O'Connor, Arthur D.
Publish Date: 19620228
Abstract: (Abstract is unavailable.)
Descriptive Note: Semiannual Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 556
CB Collection: CA
Media Type: CPDF
Document Classification: S/RD
Supplemental Notes:

CBRNIAC Number: CB-069824
Site Holding: CB DW 536170
AD Number:
Title: Joint USCONARC -- Plan for Integrated Systems Test of AN/USD-2 (XAE-2) Surveillance System.
Author(s):
Report Number: DPG-61-1391
Publish Date: 19610615
Abstract: (Abstract is unavailable.)
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 228
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-070622
Site Holding: CB DW 508365
AD Number:
Title: Project WASP. Summary Report, Volume 1.
Author(s):
Report Number: DPG-61-1418
Publish Date: 19610206
Abstract: (Abstract is unavailable.)
Descriptive Note: Summary Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 33
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074346
Site Holding: CB DW 525197
Title: Project CHORD. Informal Monthly Progress Report No. 54, 1 June-30 June 1969.
Author(s): Reinnagel, R. E.
Report Number: IMPR-54 DTC-69-1191
Publish Date: 19690630
Abstract: (Abstract is unavailable.)
Descriptive Note: Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 45
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-074467
Site Holding: CB DW 524705
AD Number:
Title: Project CHORD. Informal Monthly Progress Report No. 34, 1 April-30 April 1964.
Author(s):
Report Number: IMPR-34 DTC-64-685
Publish Date: 19640430
Abstract: CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 32
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074480
Site Holding: CB DW 524711
AD Number:
Title: Interim Progress Report on the Cal-Dita Program.
Author(s): Klingaman, R. M. O'Connor, A. D.
Report Number: WP-13 DTC-64-775 GM-1592
Publish Date: 19640401
Abstract: (Abstract is unavailable.)
Descriptive Note: Working Paper
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 234
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:
CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

Descriptive Note: Informal Monthly Progress Report

Subject Keywords:

Page Count: 24

CB Collection: CA

Media Type: CPDF

Document Classification: C

Supplemental Notes:

**Title:** Project CHORD. Informal Monthly Progress Report No. 28, 1-31 October 1963.

**Author(s):**

**Report Number:** IMPR-28 CRDL-63-S-1199 CRDL-TL-64-S-430

**Publish Date:** 19631001

**Abstract:** CAL initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop and graphic arts.

**Descriptive Note:** Informal Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

### Mathematical, Statistical, and Operation Research Services.

**Title:** Mathematical, Statistical, and Operation Research Services.

**Author(s):**

**Report Number:** CAL-P-187 DTC-63-360

**Publish Date:** 19630617

**Abstract:** (Abstract is unavailable.)

**Descriptive Note:** Proposal

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.


**Title:** Project CHORD. Informal Monthly Progress Report No. 33, 1 March-31 March 1964.

**Author(s):**

**Report Number:** DTC-64-507 IMPR-33

**Publish Date:** 19640331
**Abstract:** CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

**Descriptive Note:** Informal Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:**

**Page Count:** 31

**CB Collection:** CA

**Media Type:** CPDF

**Document Classification:** C

**Supplemental Notes:**

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**CBRNIAC Number:** CB-074569

**Site Holding:** CB DW 524822

**AD Number:**

**Title:** Project CHORD. Informal Monthly Progress Report No. 36, 1 June-30 June 1964.

**Author(s):**

**Report Number:** IMPR-36 DTC-64-1130

**Publish Date:** 19640630

**Abstract:** CAL initiated performance on the subject contract (Code name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

**Descriptive Note:** Informal Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:**

**Page Count:** 26

**CB Collection:** CA

**Media Type:** CPDF

**Document Classification:** C

**Supplemental Notes:**

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**CBRNIAC Number:** CB-074570

**Site Holding:** CB DW 524828

**AD Number:**

**Title:** Project CHORD. Informal Monthly Progress Report No. 37, 1 July-31 July 1964.

**Author(s):**

**Report Number:** IMPR-37 DTC-64-1276

**Publish Date:** 19640731

**Abstract:** CAL initiated performance on the subject contract (Code name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

**Descriptive Note:** Informal Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:**

**Page Count:** 26

**CB Collection:** CA

**Media Type:** CPDF

**Document Classification:** C

**Supplemental Notes:**

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**CBRNIAC Number:** CB-074742

**Site Holding:** CB DW 524833
Abstract: CAL initiated performance in the subject contract (Code name: Project CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 33
CB Collection: CA
Media Type: CPDF
Document Classification: C

Supplemental Notes:

CBRNIAC Number: CB-074757
Site Holding: CB DW 524840
AD Number:
Author(s):
Report Number: DTC-64-1544 IMPR-39
Publish Date: 19640930
Abstract: CAL initiated performance on the subject contract (CODE name: Project CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 50
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-074765
Site Holding: CB DW 524841
AD Number:
Title: Project CHORD. Working Paper No. 15.
Author(s):
Report Number: WP-15 DTC-64-1545
Publish Date: 19641016
Abstract: This paper presents a detailed description of the Explosive Acceleration Test Unit constructed at this Laboratory under Contract DA-18-108-CML-6628-A Project CHORD. To present experimental results on a timely basis, test results and a complimentary discussion are presented in Sections IV and V, respectively. Although the work to date has been limited, some conclusions derived from the test data are presented in Section VI. Additional experimental work is needed and planned. These efforts will be presented as available. Working Paper No. 15 will be referenced in future publications so redundant equipment description can be omitted. The design, construction, and use of this facility are the direct efforts of Messrs. R. J. Sydow, H. Washburn, and C. J. Borkowski. The helpful suggestions of Mr. C. J. Schneider, Jr. also are appreciated.

Descriptive Note: Working Paper

Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Subject Keywords:

Page Count: 38
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-074793
Site Holding: CB DW 524884
AD Number:
Author(s):
Report Number: DTC-65-1296 IMPR-1
Publish Date: 19650131
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Subject Keywords:

Page Count: 49
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074796
Site Holding: CB DW 524885
AD Number:
Author(s):
Report Number: IMPR-2 DTC-65-1297
Publish Date: 19650228
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Subject Keywords:

Page Count: 47
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074798
Site Holding: CB DW 524889
AD Number:
Author(s):
Report Number: IMPR-3 DTC-65-1484
Publish Date: 19650331
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 61
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074875
Site Holding: CB DW 524894
AD Number:
Title: Determination of Candidate Incapacitating Munition -- Ground Delivery Systems for Feasibility Study.
Author(s): Eusanio, L. A. O'Connor, A. D. Talley, R. L.
Publish Date: 19641201
Abstract: (Abstract is unavailable.)
Descriptive Note: Feasibility Study
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 102
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074880
Site Holding: CB DW 524899
AD Number:
Title: Project CHORD II. Informal Monthly Progress Report No. 5, 1 May-31 May 1965.
Author(s):
Report Number: DTC-65-1793 IMPR-5
Publish Date: 19650531
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 57
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-074882
Site Holding: CB DW 524900
**AD Number:**
Title: Project CHORD II. Informal Monthly Progress Report No. 4, 1 April-30 April 1965.
**Author(s):**
Report Number: DTC-65-1713 IMPR-4
Publish Date: 19650430
Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.
**Descriptive Note:** Informal Monthly Progress Report
**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY
**Distribution Statement:** Distribution limited to DoD agencies only.
**Subject Keywords:**
Page Count: 55
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

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<td>AD Number:</td>
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<td>Author(s): Reinnagel, Richard E.</td>
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<td>Publish Date: 19641231</td>
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<td>Abstract: This summary report has been prepared in accordance with the provisions of Contract No. DA-18-108-CML-6628-A and covers the period from 15 June 1961 through 31 December 1964. This publication lists reference reports which describes the Phase I and Phase II efforts conducted by Cornell Aeronautical Laboratory, Inc (CAL) to determine effective means for delivery of lethal, incapacitating, flame, smoke, and incendiary chemical agents by air and ground weapons systems and to evolve new and novel chemical munitions which significantly enhance our military capability against any class of enemy in any type of conflict. In addition, a brief description and current status of the research and development program for each agent/munition/weapons system concept considered during the period covered by this report is presented.</td>
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<td><strong>Descriptive Note:</strong> Summary Report</td>
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<td>Publish Date: 19631231</td>
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<tr>
<td>Abstract: CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.</td>
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<td><strong>Descriptive Note:</strong> Informal Monthly Progress Report</td>
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<tr>
<td><strong>Corp Author Name:</strong> CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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Abstract: The following conclusions are made concerning armament for Army aircraft. Among possible HE armament, two types are the most suitable for the attack of tactical targets: shaped charge war head guided missile for hard-point targets and a repeating grenade-type weapon for area personnel targets. Rockets are not as effective as the weapons considered above, but are the best armament available for attack of hard-point targets from high-speed aircraft. Machine guns, though not as effective as the grenade weapon for personnel area fire, are the only light weapons immediately available which can be mounted on all aircraft. Warhead developments will improve the potential effectiveness of most weapons. No suitable missile exists for the attack of hard point targets from high-speed fixed-wing aircraft. Weapons available for high-speed fixed wing launch are not efficient in the attack of area targets. One ultimate concept for an air borne weapon system in the time period under consideration is an S/VTOL aircraft-borne missile system capable of destroying a hard-point target without the aircraft actually being within sight of the target when the weapon impacts.

Descriptive Note: Final Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: AIRCRAFT; MOBILE; RESEARCH MANAGEMENT; S/L CHANGE 8306; TACTICAL WARFARE; TACTICAL WEAPONS
Page Count: 88
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Change Authority: Limitation removed CRD, D/A letter 29 Feb 1968; S to C and declassified on 31 Dec 1982 USAAMRL notice 29 Dec 1972.

CBRNIAC Number: CB-075085
Site Holding: CB DT EDG E504804
AD Number: 339091
Author(s): Kamrass, Murray Heckroth, Erwin E.
Publish Date: 19620901
Abstract: (Abstract is unavailable.)
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 44
CB Collection: CA
Media Type: CPDF
Document Classification: S/RD
Supplemental Notes:

CBRNIAC Number: CB-076385
Site Holding: CB EDG E505748
AD Number: 339091
Author(s):
Report Number: CRDL-65-S-837 EA-S-1525(66) H0055720003
Publish Date: 19651210
Abstract: (Abstract is unavailable.)
Descriptive Note: Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 22
CB Collection: CA
Abstract: During the initial three weeks of this program, effort was concentrated on collection and preliminary review of the available classified and unclassified literature. Considerable progress has been made in this search and review phase, including visits to Frankford Arsenal, the Chemical Research and Development Laboratories, and the Army Biological Laboratories. Information collected during these visits has provided several points of departure for continuing search and review, and has helped to provide input to the generation of overall classification schemes. The literature search is continuing on schedule, as discussed more fully in the PLANS section. We currently estimate that the literature search is approximately 30 percent complete. Also accomplished during this report period were the initial scheduling of personnel and planning of specific tasks to be accomplished in the program. Although plans have been developed for the entire program, redirection, or at least re-emphasis, may well be required as a result of the findings and preliminary output of the literature survey, or as a result of coordination with the Project Officer, planned for the middle of next month. Development of the mission array and target definitions, and agent classification, will be initiated on schedule, next month. No slippage in the program is noted as of this date.
Abstract: Cornell Aeronautical Laboratory initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project is currently operating with six to eight senior researchers and eight to ten supporting personnel.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 23

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-076711

Site Holding: CB DW 522197 EDG E499465

AD Number:


Author(s):


Publish Date: 19630731

Abstract: (Abstract is unavailable.)

Descriptive Note: Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 44

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-076774

Site Holding: CB DW 524960

AD Number:

Title: Project CHORD II. Informal Monthly Progress Report No. 8, 1 August-31 August 1965.

Author(s):

Report Number: DTC-65-2190 IMPR-8

Publish Date: 19650831

Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 43

CB Collection: CA

Media Type: CPDF

Document Classification: C

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<td>Author(s):</td>
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<td>Report Number: DTC-66-288 IMPR-11</td>
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<td>Abstract: CAL initiated performance on the subject contract on 1 January 1965. The primary objective of the project is to develop effectiveness means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.</td>
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<td>Descriptive Note: Informal Monthly Progress Report</td>
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<td>Author(s):</td>
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Informal Monthly Progress Report No. 5, 1-31 August 1965

Abstract: (Abstract is unavailable.)

Descriptive Note: Monthly Progress Report

CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 17

CB Collection: CA

Media Type: CPDF

Document Classification: C

Supplemental Notes:

Informal Monthly Progress Report No. 24, 1 December-31 December 1966

Abstract: On 1 January 1965 effort on this project was initiated to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems.

Descriptive Note: Informal Monthly Progress Report

CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 74

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:

Informal Monthly Progress Report No. 25, 1 January-31 January 1967

Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-108-CML-6628A and continued under this contract through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Incremental funding under the contract has been handled on a calendar year basis. The objective of work under Project CHORD is to develop effective means for the delivery of lethal and incapacitating chemical agents by air and ground weapon systems, with primary emphasis placed on ground-to-ground systems.
Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-035-AMC-6628A and continued under this contract through 1 January 1965. The Project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract was received during the month which provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31650 man hours to be expended in CY 1967. The objective of work under Project CHORD is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground chemical weapon systems, with primary emphasis placed on ground-to-ground systems.
Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-035-AMC-6628A and continued under this contract through 1 January 1965. The Project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract was received during the month which provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31650 man hours to be expended in CY 1967. The objective of work under Project CHORD is to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground chemical weapon systems, with primary emphasis placed on ground-to-ground systems.
Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-035-AMC-6628A and continued under this contract through 1 January 1965. The Project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract was received during the month which provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31,650 man hours to be expended in CY 1967.

Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:
Page Count: 44
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:
Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-035-AMC-6628A and continued under this contract through 1 January 1965. The Project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract was received during the month which provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31,650 man hours to be expended in CY 1967.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 32

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-077490

Site Holding: CB DW 522208

AD Number:


Author(s): Reinnagel, R. E.

Report Number: IMPR-37

Publish Date: 19680131

Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-035-AMC-6628A and continued under this contract through 1 January 1965. The Project was continued under Contract No. DA-18-035-AMC-323A for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract was received during the month which provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31,650 man hours to be expended in CY 1967. A modification to the contract is currently in process to provide funding for the period 15 February 1968 to 15 September 1968.

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 39

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-077491

Site Holding: CB DW 522209

AD Number:

Title: Project CHORD. Informal Monthly Progress Report No. 38, 1 February-29 February 1968.

Author(s): Reinnagel, R. E.

Report Number: IMPR-38

Publish Date: 19680229

Abstract: (Abstract is unavailable.)

Descriptive Note: Informal Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
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<td>Author(s): Reinnagel, R. E.</td>
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Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 35
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-077507
Site Holding: CB DW 522213
AD Number:
Title: Project CHORD. Informal Monthly Progress Report No. 43, 1 July-31 July 1968.
Author(s): Reinnagel, R. E.
Report Number: IMPR-43
Publish Date: 19680731
Abstract: (Abstract is unavailable.)
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 44
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-077509
Site Holding: CB DW 522217
AD Number:
Title: Project CHORD. Informal Monthly Progress Report No. 47, 1 November-30 November 1968.
Author(s): Reinnagel, R. E.
Report Number: IMPR-47
Publish Date: 19681130
Abstract: (Abstract is unavailable.)
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 44
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Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-077511
Site Holding: CB DW 522218
AD Number:
Author(s): Reinnagel, R. E.
Report Number: IMPR-49
**Title:** Design Study of VX Aerosol Bomblet Employing the High-pressure, Single-fluid Nozzle Dissemination Technique.  
**Author(s):** Matheis, C. W.  
**Report Number:** GM-1592-G-29  
**Publish Date:** 19671101  
**Abstract:** The study is limited to an investigation of the effects on design resulting from the functioning of the high-pressure expulsion system only. Arbitrarily selected ranges of the variables involved are established to permit a parametric analysis of the concept to be conducted. The analysis is facilitated by a series of charts which permit the rapid evaluation of any given design configuration within the scope of the study. The results are presented in a series of figures which reflect the design implications and trends resulting from various combinations of the several interrelated parameters.  
**Descriptive Note:** Special Report  
**Distribution Statement:** Distribution limited to DoD agencies only.
CBRNIAC Number: CB-078131
Site Holding: CB DW 524788 EDG E499469
AD Number:
Author(s):
Report Number: IMPR-29 DTC-64-33 CRDL-64-S-10 CRDL-TL-64-S-431
Publish Date: 19631130
Abstract: CAL initiated performance on the subject contract (Code Name -- CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services, such as shop and graphic arts.
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
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Media Type: CPDF
Document Classification: C/NOFORN

CBRNIAC Number: CB-078137
Site Holding: CB DW 524926 EDG E499471
AD Number:
Author(s):
Publish Date: 19640131
Abstract: CAL initiated performance on the subject contract (Code Name: CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.
Descriptive Note: Informal Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords:
Page Count: 32
CB Collection: CA
Media Type: CPDF
Document Classification: C

CBRNIAC Number: CB-079857
Site Holding: CB EDG E505018
AD Number:
Title: Status Report for 155mm Howitzer VX Aerosol Program.
Author(s):
Report Number:
Publish Date: 19650801
Abstract: (Abstract is unavailable.)
Descriptive Note: Status Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
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| Title: Analysis of Requirements and Design Study for a Special Purpose 40 MM Cartridge (Code Name GEE). | Author(s): Bullerdiek, W. A. | Report Number: GM-1592-G-28 |
| Publish Date: 19670701 | Abstract: A proposed plan for the design, fabrication and test phases of the program is presented in outline form. The overall experimental effort is divided into three principal categories to be accomplished on a concurrent basis. These categories are flight stability, agent dissemination, and fuze modification. The final phase of the program involves the design, fabrication, testing, and assessment of the overall performance of a complete prototype round. | Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data. |
| Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY | Subject Keywords: | Page Count: 87 |
| Distribution Statement: Distribution limited to DoD agencies only. | CB Collection: CA | Media Type: CPDF |
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| Title: Project CHORD 2. Informal Monthly Progress Report No. 6, 1-30 September 1965. | Author(s): | Report Number: IMPR-6 |
| Publish Date: 19650930 | Abstract: (Abstract is unavailable.) | Distribution Statement: Distribution limited to DoD agencies only. |
| Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY | Descriptive Note: Monthly Progress Report |</p>
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<td>Author(s): Novy, E. O'Connor, A.</td>
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<td>Publish Date: 19650315</td>
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<td>Abstract: This working paper has been prepared at Cornell Aeronautical Laboratory, Inc. to supplement CRDL's response to the US Army Missile Command request of Reference 1. The CAL effort on this task, referred to as Ad hoc Study No. 1, under Contract DA 18-035-AMC-(323)A, was initiated 9 February 1965, with a completion date of 25 March 1965.</td>
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<td>Author(s): Heckroth, E. E. O'Connor, A. D.</td>
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<td>Abstract: This working paper summarizes the CAL effort on Ad hoc Task No. 4 under the CHORD 2 program. The task was initiated on 20 April 1965, in response to a request from CRDL as outlined in Reference 1. This working paper is intended to provide CRDL with the basic information required to allow CRDL's preparation of a technical response to the US Army Munitions Command request of Reference 2.</td>
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<td>Descriptive Note: Working Paper</td>
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<td>Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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<td>Distribution Statement: Distribution limited to DoD agencies only.</td>
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<td>Subject Keywords:</td>
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<th>CBRNIAC Number: CB-082268</th>
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<td>AD Number:</td>
<td></td>
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<td>Title: Special POPCORN Bomblet. CHORD Working Paper No. 37.</td>
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<tr>
<td>Author(s): Washburn, H. A.</td>
<td></td>
</tr>
<tr>
<td>Report Number: WP-37</td>
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Abstract: At the request of WDEL, the scope of the CAL effort was restricted solely to a design investigation, excluding all experimental fabrication and test work. It was recognized, therefore, that the resultant design would contain certain features which would require test verification before it could be considered ready for approval. The aerodynamic and flight characteristics are not considered in this study except as influenced by fabrication problems, since the external configuration is based on an existing bomblet design. However, consideration is given to the design and location of internal components to provide dynamic balance of the bomblet. The investigation and resulting bomblet design is designated "Special POPCORN Concept".

Descriptive Note: Working Paper

Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data. This document contains export-controlled technical data.

Subject Keywords:

Page Count: 127
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Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-082269
Site Holding: CB EDG E489328
AD Number:
Author(s): Klingaman, R. M.
Report Number: WP-39
Publish Date: 19691014

Abstract: Inherent limitations exist that preclude the reliable, successful destruction of massive petroleum stores. It is apparent that such storage facilities are vulnerable to weapons delivery. The problem must reside, therefore, in the response of the target to the weapons challenge. The classical mode of hydrocarbon fuel destruction is combustion. The combustion of hydrocarbons involves the rapid oxidation of the fuel in the vapor phase. The reaction is a chain-type mechanism that is dependent on free radical formation. Such a chain mechanism indicates: that the hydrocarbon must mix with the oxidant, the air; that there exist certain concentration limits associated with the fuel and air in order to maintain propagation; and that there must be sufficient energy introduced to initiate free radical formation. The proper delivery and address of incendiary weapons and materials can provide and satisfy conditions of flame initiation and propagation.

Descriptive Note: Working Paper
Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 10
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Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-082273
Site Holding: CB EDG E489330
AD Number:
Author(s): Klingaman, R. M. Washburn, H. A.
Report Number: WP-41
Publish Date: 19691101

Abstract: The purpose of this working paper is to present four design concepts for a 40-mm incendiary fragmentation cartridge which is compatible with the M79 Launcher. A complete discussion of both the rationale leading to the development of this material, as well as the research, development, and evaluation of the material, are
Abstract: Section 2 presents a discussion of the error sources and magnitude estimates. The effects of these errors in terms of horizontal and vertical probable errors at the target are derived in Section 3. These effects are combined in Section 4 to define hit probabilities and to determine the expected number of rounds needed to insure a hit on the target.

Descriptive Note: Working Paper

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.
Conventional cased ammunition is designed to produce a rapid build-up of chamber pressure shortly after ignition. This relatively high pressure acts directly on the base of the projectile thus imparting the desired muzzle velocity and energy. However, the pressure level necessary to produce the required velocity results in extremely high "g" forces on the projectile. This report is concerned with a high-low pressure round which is designed to produce equivalent performance with a substantial reduction in the maximum "g" forces on the projectile. The high-low pressure situation is achieved through the use of two chambers within the case which are separated by a series of orifices with appropriate area to maintain a pressure differential between the chambers once combustion is initiated.

Egan, Thomas W.

Data on munition costs, assuming quantity production, were obtained from a number of sources and have been reviewed to assure relative consistency. In addition, research and development expenditures required to complete CDC testing, and verify readiness for production commitment, have been estimated. The XM-925 and XM-28 systems have presently obtained this status; however, the other candidate systems would require an R&D phase with the cost and time requirements chargeable to these systems.

Egan, Thomas W.
## Project CHORD. Informal Monthly Progress Report No. 32, 1-29 February 1964

**Author(s):**

**Report Number:** DTC-64-405 CRDL-64-S-300

**Publish Date:** 19640229

**Abstract:** CAL initiated performance on the subject contract (Code Name CHORD) on 15 June 1961. The project continued to operate with an average of 14 engineering and scientific personnel, plus direct technical supporting services such as shop, publications, and graphic arts.

**Descriptive Note:** Informal Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:**

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**Author(s):** Reinnagel, R. E.

**Report Number:** IMPR-31

**Publish Date:** 19670731

**Abstract:** Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-108-CML-6628(A) and continued under this contract through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323(A) under sponsorship of the Weapons Development and Engineering Laboratory of the US Army Edgewood Arsenal for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract which was received during the month of February, provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31650 man hours to be expended in CY 1967. The objective of work under Project CHORD is to develop effective means for the delivery of lethal and incapacitating chemical agents by air and ground weapon systems, with primary emphasis placed on ground-to-ground systems.

**Descriptive Note:** Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

**Subject Keywords:**

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Abstract: Effort on the CHORD Program was initiated at CAL on 1 June 1961 under Contract No. DA-18-108-CML-6628(A) and continued under this contract through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323(A) under sponsorship of the Weapons Development and Engineering Laboratory of the US Army Edgewood Arsenal for a three-year period beginning 1 January 1965 and during 1966 was extended to 31 March 1968. Modification No. 10 to the Contract, which was received during the month of February, provided funding to 15 February 1968 and extended the time of the basic contract to 1 January 1969. Modification No. 10 provides for 31650 man hours to be expended in CY 1967. The objective of work under Project CHORD is to develop effective means for the delivery of lethal and incapacitating chemical agents by air and ground weapon systems, with primary emphasis placed on ground-to-ground systems.

Descriptive Note: Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.

Subject Keywords: 

Page Count: 45

CB Collection: CA

Media Type: CPDF

Document Classification: C/NOFORN

Supplemental Notes:
Author(s): Reinnagel, R. E.
Report Number: IMPR-45
Publish Date: 19680930
Abstract: Our Ashford Experimental Site, which has been in operation for approximately two years, has been of great value in the test and evaluation of chemical systems for these applications. Effort on the CHORD Program was performed at CAL under Contract No. DA-18-108-CML-6628(A) during the period 1 June 1961 through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323(A) under sponsorship of the Weapons Development and Engineering Laboratories, US Army Edgewood Arsenal, for a three-year period beginning 1 January 1965 and subsequently extended to 15 May 1969, with no increase in total effort. The program is currently funded to 15 February 1969. The CHORD Program has been conducted with incremental funding which mandates program planning based upon such funding. For calendar year 1968, the program was initially funded through 15 September 1958. A specific work program for the period 1 January through 15 September 1968, as tabulated was mutually agreed upon between representatives of WDEL and CAL at a Program Planning Meeting held at CAL on 25 January 1968. The actual conduct of the program for that period is also shown on the tabulation.
Descriptive Note: Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 60
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-085584
Site Holding: CB DW 522216
AD Number:
Author(s): Reinnagel, R. E.
Report Number: IMPR-46
Publish Date: 19681031
Abstract: Our Ashford Experimental Site, which has been in operation for approximately two years, has been of great value in the test and evaluation of chemical systems for these applications. Effort on the CHORD Program was performed at CAL under Contract No. DA-18-108-CML-6628(A) during the period 1 June 1961 through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323(A) under sponsorship of the Weapons Development and Engineering Laboratories, US Army Edgewood Arsenal, for a three-year period beginning 1 January 1965 and subsequently extended to 15 May 1969, with no increase in total effort. The program is currently funded to 15 February 1969. By Modification No. 13 to the contract, the CHORD Program is funded for the period 15 September 1968 through 15 February 1969.
Descriptive Note: Monthly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords:
Page Count: 50
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:

CBRNIAC Number: CB-085586
Site Holding: CB DW 522214
AD Number:
Author(s): Reinnagel, R. E.
Report Number: IMPR-44
Publish Date: 19680831
Abstract: Our Ashford Experimental Site, which has been in operation for approximately two years, has been of great value in the test and evaluation of chemical systems for these applications. Effort on the CHORD Program was performed at CAL under Contract No. DA-18-108-CML-6628(A) during the period 1 June 1961 through 1 January 1965. The project was continued under Contract No. DA-18-035-AMC-323(A) under sponsorship of the Weapons Development and Engineering Laboratories, US Army Edgewood Arsenal, for a three-year period beginning 1 January 1965 and subsequently extended to 15 May 1969, with no increase in total effort. The program is currently funded to 15 September 1968.
Descriptive Note: Monthly Progress Report
Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only. NOFORN. This document contains export-controlled technical data.
Subject Keywords: CB Collection: CA
Page Count: 37
Media Type: CPDF
Document Classification: C/NOFORN
Supplemental Notes:
CBRNIAC Number: CB-097898
Site Holding: CB DT
AD Number: A952500
Title: Project SQUID, Analysis of a Dilute Diffusion Flame Maintained by Heterogeneous Reaction.
Author(s): Markstein, George H.
Report Number: CAL-89-P
Publish Date: 19631201
Abstract: A simplified model of a dilute diffusion flame of spherical symmetry maintained exclusively by heterogeneous reaction has been analyzed. This study was suggested by recent experimental results which indicated that in magnesium-oxygen-argon dilute diffusion flames the reaction took place predominantly on the surface of growing oxide-smoke particles. The treatment is based on the usual assumptions of negligible convective transport of nozzle reactant, constant temperature and pressure in the flame zone, and absence of depletion of atmosphere reactant. Additional assumptions adopted for the present problem are: the reaction product is present only in form of condensed-phase spherical particles that are convected by the radial flow of inert carrier gas; the rate of reaction is controlled by collision of nozzle-reactant molecules with the particle surface; nucleation of particles occurs only within a small central region of the flame and is not considered in the analysis. This model leads to a nonlinear system of two first-order differential equations which is solved numerically. The solutions contain two adjustable parameters that are shown to be related to the nucleation process.
Descriptive Note: Technical Report
Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: ARGON; CONVECTION; DIFFUSION; FLAMES; MAGNESIUM; MATHEMATICAL ANALYSIS; NOZZLES; OXIDES; OXYGEN; PARTICLES; PRESSURE; SMOKE; SURFACES; TEMPERATURE; TRANSPORT PROPERTIES
Page Count: 48
CB Collection: UA
Media Type: PDF
Document Classification: U
CBRNIAC Number: CB-100723
Site Holding: CB DT
Abstract: This report presents a critical examination of the potential effectiveness of the 115-mm area rocket system with an agent BZ warhead. This examination was undertaken at the request of CRDL to assist in establishing technical requirements for the design study effort at the Illinois Institute of Technology Research Institute NTRI. The analysis examines the casualty-producing potential of this system in agent BZ delivery roles. Detailed consideration is given to aim and dispersion delivery errors and resulting round distributions, and to submunition distribution requirements from individual rounds. These parameters have a profound influence on predicted round and launcher requirements, and hence on overall system potential. Although the methods employed in this investigation may be easily generalized, the specific results are critically dependent on the dosage requirements and casualty-producing capabilities of the agent BZ fill. Therefore, it is imperative that inferences regarding the potential of this system with other fills be made with extreme care.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors.

Subject Keywords: AMMUNITION; BZ AGENTS; DELIVERY; DISPERSING; DISTRIBUTION; DOSAGE; ERRORS; ILLINOIS; INCAPACITATING AGENTS; REQUIREMENTS; ROCKETS; WARHEADS

Page Count: 84

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
Abstract: Under Contract No. DAAA-21-69-C-0040 issued by the US Army Picatinny Arsenal, Dover, NJ, a program was conducted towards the advanced development of a weapon system concept of a very small, fragmentation submunition capable of rebounding on ground impact and airbursting at the altitude at which it is most effective against personnel targets. The final bomblet configuration was one having a polyurethane elastomer outer shell with a four-vane design (for in-flight rotation and dispersal) and a payload (inner) shell of sintered powdered iron. Separation of the outer shell and propulsion of the inner shell is accomplished through an explosive-spring technique. Although a specification fuze was not developed, tests conducted using modified GFE fuzes verified the feasibility of the weapon system concept. The recommendations are: (1) Continuation of development of a bomblet having the external configuration developed during this program, including the development of an optimized payload and an approved fuze; and (2) Adaptation of the POPCORN approach to several other classes of munitions to take advantage of the enhancement of effects produced by an air burst; smoke producers, incendiaries, chemical agents, markers and other payload categories would profit by the air-burst or on-surface deposition possible with a POPCORN-based design.
Abstract: This document investigates the technical problems involved in field tests to determine the motion of particulate matter in the atmosphere. Basically, these tests are to determine the effects of turbulent diffusion, fallout, and cross-isobaric flow on the motion of particulate matter in the atmosphere. A number of tracer materials have been considered and their characteristics are summarized. A simple method of ejecting particulate matter into the atmosphere at a high rate and without excessive agglomeration has been developed. Some data on atmospheric pollution have been reduced and summarized. Several methods of detection and analysis have been investigated. They are: 1) the use of fluorescent particles collected on a polyfibre filter paper, which is subsequently reduced to a film; 2) the use of pure iron particles (such as carbonyl iron) detected and sized on the basis of their magnetic properties; and, 3) the use of a radioautographic technique involving a carrier made radioactive after pickup on the filter paper. Before final recommendations can be made for a test to determine fallout rates, more data on atmospheric pollution must be obtained, and detailed experimental work on the three detection methods proposed must be carried out.

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY APPLIED PHYSICS DEPT

Subject Keywords: ATMOSPHERIC CONTAMINANTS; ATMOSPHERIC PHYSICS; ATMOSPHERIC POLLUTION; BETA PARTICLES; CARBONYL COMPOUNDS; CROSS-ISOBARIC FLOW; DETECTION; FALLOUT; FALLOUT RATES; FIELD TESTS; FLUORESCENCE; FLUORESCENT PARTICLES; ISOBARS (PRESSURE); PARTICULATE MATTER; PARTICULATES; RADIOAUTOGRAPH; TEST AND EVALUATION; TRACER STUDIES; TURBULENT DIFFUSION

Page Count: 92

CBRNIAC Number: CB-110265
Site Holding: CB DW 529143
AD Number: CB-110265
Title: Final Report on Motion of Particulate Matter in the Atmosphere.
Author(s): Anderson, N. Y.
Report Number: VC-733-Pl
Publish Date: 19510607
Abstract: This document investigates the technical problems involved in field tests to determine the motion of particulate matter in the atmosphere. Basically, these tests are to determine the effects of turbulent diffusion, fallout, and cross-isobaric flow on the motion of particulate matter in the atmosphere. A number of tracer materials have been considered and their characteristics are summarized. A simple method of ejecting particulate matter into the atmosphere at a high rate and without excessive agglomeration has been developed. Some data on atmospheric pollution have been reduced and summarized. Several methods of detection and analysis have been investigated. They are: 1) the use of fluorescent particles collected on a polyfibre filter paper, which is subsequently reduced to a film; 2) the use of pure iron particles (such as carbonyl iron) detected and sized on the basis of their magnetic properties; and, 3) the use of a radioautographic technique involving a carrier made radioactive after pickup on the filter paper. Before final recommendations can be made for a test to determine fallout rates, more data on atmospheric pollution must be obtained, and detailed experimental work on the three detection methods proposed must be carried out.

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY APPLIED PHYSICS DEPT

Subject Keywords: ATMOSPHERIC CONTAMINANTS; ATMOSPHERIC PHYSICS; ATMOSPHERIC POLLUTION; BETA PARTICLES; CARBONYL COMPOUNDS; CROSS-ISOBARIC FLOW; DETECTION; FALLOUT; FALLOUT RATES; FIELD TESTS; FLUORESCENCE; FLUORESCENT PARTICLES; ISOBARS (PRESSURE); PARTICULATE MATTER; PARTICULATES; RADIOAUTOGRAPH; TEST AND EVALUATION; TRACER STUDIES; TURBULENT DIFFUSION

Page Count: 92

CBRNIAC Number: CB-110834
Site Holding: CB DT DW 506763
AD Number: 008042
Title: Thundercloud Electrification Studies, II.
Author(s): Chapman, Seville
Report Number: VC-603-Pl
Publish Date: 19520620
Abstract: The investigation of the generation of electric charges in thunderclouds included experiments to determine the electrification generated by the disruption of rain drops, corona point strengths on the ground during blizzards, and the earth's upper air electric field during blizzards. Both positive and negative charges averaging from less than 10 to the -13 power to more than 10 to the -10th power coulombs/drop were generated by 4-mm drops of distilled water disrupted in a 4- x 8-in. vertical wind tunnel. These magnitudes were sufficient to account for either a negligible fraction or all of thundercloud electrification. Drop breaking experiments on 3-mm water drops supercooled to -6 deg and 14 deg C yielded average charges of 6.8 x 10 to the -12 power coulombs/drop, respectively. The magnitudes of electrification varied from drop to drop by a factor of 100 or more in all cases. Corona point records for 22 months showed currents of about 10 microamp and up to 20 microamp at points 32 and 54 ft above ground. The earth's field fluctuated markedly in magnitude and polarity over intervals of a few seconds in disturbed weather even in the absence of lightning. During a snow-storm, a variation from -10 to + or - 10 times normal was noted within a minute with no observable change in the storm. Corona-point records for lightning, rain, and snowstorms showed marked asymmetry in time and indicated horizontal inhomogeneities in storm-cloud structures. Radiosondes modified to measure the vertical component of the earth's electric field showed polarity reversals with altitude up to 10,000 ft. In one case the polarity was opposite to that of the fair weather fields...
as high as 10,000 ft.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Approved for Public Release; Distribution Unlimited.

Subject Keywords: ASYMMETRY; DISTILLED WATER; EARTH (PLANET); ELECTRIC CHARGE; ELECTRIC FIELDS; INTERVALS; LIGHTNING; MEAN; MEASUREMENT; POLARITY; RADIOSONDES; RAIN; RAINDROPS; REVERSIBLE; STORMS; UPPER ATMOSPHERE; VERTICAL ORIENTATION; WEATHER; WIND TUNNELS

Page Count: 1

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes: ST-A Per ONR Letter, 9 Nov 77.

CBRNIAC Number: CB-112639

Site Holding: CB DW 506765

AD Number:

Title: Study of the Earth's Electrical Field.

Author(s): Garber, David H.

Report Number: RA764P9

Publish Date: 19531125

Abstract: The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. Present project effort is largely in the instrumentation phase, with emphasis on establishing reliable automatic recording of field and conductivity fluctuations. The conductivity measuring system and the rainfall recording equipment were completed and installed. Partial records were obtained for the field, positive and negative conductivity, barometric pressure, temperature, humidity, solar radiation intensity, and rainfall. Further periodic observations were made of selected meteorological conditions, including state of weather, wind speed, wind direction, visibility, cloud type, cover, and ceiling. All recording was interrupted for an extended period during relocation of the project shack and instrumentation.

Descriptive Note: Quarterly Report No. 9

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: BAROMETRIC PRESSURE; CONDUCTIVITY; EARTH (PLANET); EARTH ATMOSPHERE; EARTH SCIENCES; ELECTRIC FIELDS; HUMIDITY; METEOROLOGICAL INSTRUMENTS; METEOROLOGY; RAINFALL; SOLAR RADIATION; TEMPERATURE; VOLTMETERS

Page Count: 14

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-114029

Site Holding: CB DW 506768

AD Number:

Title: Study of the Earth's Electrical Field.

Author(s): Garber, David H.

Report Number: RA764P13

Publish Date: 19540920

Abstract: The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. During the period June 21, 1954 to July 2, 1954, the recording instruments at the project field station were operated in order to obtain data before, during, and after the solar eclipse of June 30, 1954, which was approximately 83% total in Buffalo. The field and conductivity records did not reveal any significant deviations from normal fluctuations and average values. A substantial cloud cover obscured the sun during most of the eclipse. Data analysis continued for the records of 1953-1954. The analysis is still in progress.
Abstract: The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. On April 19, 1954, data recording was halted in order to conserve funds and to concentrate project efforts on the interpretation of data already accumulated. Data analysis continued for the records beginning about October 1, 1953. Essentially complete records were obtained up to April 19, 1954 for the following parameters: field, positive and negative conductivity, wind direction, solar radiation intensity, barometric pressure, temperature, and humidity. Partial records were observations were made of selected meteorological conditions, including cloud ceiling and type, cover, visibility, state of weather, state of ground, and wind speed.

Abstract: The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. The electric field meter system was calibrated using absolute values from independent measurements. Using the results of this calibration a tentative value of $2.3 \pm 0.3$ was obtained for the electrostatic form factor of the generating voltmeter assembly, including the shielding effects of grounded cables and supports. Detailed analysis continued for records accumulated beginning about October 1, 1953. Essentially complete data were recorded for the following parameters: field, positive and negative conductivity, wind direction, solar radiation intensity, barometric pressure, temperature, and humidity. Precipitation recording was abandoned during the winter season. Further periodic observations were made of selected meteorological conditions, including cloud ceiling and type, cover, visibility, state of weather, state of...
Abstract: The object of this project was to correlate measurements of the earth's electric field and positive and negative atmospheric electrical conductivity with other meteorological parameters.

Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: ATMOSPHERIC ELECTRICITY; EARTH; ELECTRIC FIELDS; ELECTRICAL PROPERTIES; MEASUREMENT; METEOROLOGY
Page Count: 222
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Illustrations.
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<td>Author(s): Dinolfo, R. S. Kline, J. Koegler, R. K. Schultz, R. W.</td>
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<td>Report Number: GM-1494-G-3</td>
<td>Publish Date: 19610123</td>
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<td>Abstract: This report is an extension of previous studies and presents two suitable factory or field modifications based on evaluative criteria. It is believed that the evaluation ratings as presented for the vehicle and powerplant and black box equipment are based on the same interpretation of the rating scale as were those of the other items considered in evaluating the documents. Thus, they may be included in the overall evaluation ratings.</td>
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<td>Descriptive Note: Technical Report</td>
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<td>Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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<td>Distribution Statement: Distribution limited to DoD agencies only.</td>
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<td>Subject Keywords: BW DELIVERY SYSTEM; CONTRACTORS; DATA LINKS; DELIVERY; DRONES; EQUIPMENT; MISSILES; MUNITIONS; NAVIGATION; NAVIGATION EQUIPMENT; NAVIGATION SYSTEM; SURVEILLANCE DRONES; TERRAIN AVOIDANCE; TEST AND EVALUATION; VEHICLES</td>
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<tr>
<th>CBRNIAC Number: CB-124362</th>
<th>Site Holding: CB DW 507687</th>
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<tr>
<td>Title: Notes for an Integrated AN/USD-5 Systems Test Plan.</td>
<td></td>
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<tr>
<td>Author(s): Hoffman, R. Giles, D. Hill, F. Dahm, D. B.</td>
<td></td>
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<tr>
<td>Report Number:</td>
<td>Publish Date: 19610927</td>
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<tr>
<td>Abstract: A research document pertaining to the AN/USD-5 surveillance drone system. Objectives, measures of effectiveness, criteria, and data to be recorded and data analysis, were performed and reported by Fairchild Strato Corp, USAISRDL, USAEPG, USCONARC. It was expected that functions performed by the use of airborne drone vehicles will place sensory or dissemination devices at specified target positions or areas. Concepts emerging from this work have been developed solely for testing the AN/USD-5 drone system as a means of collecting data and dissemination of BW-CW agents. Logistics described in final pages of this document.</td>
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<td>Descriptive Note: Surveillance Drone Paper</td>
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<tr>
<td>Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY</td>
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<td>Distribution Statement: Distribution limited to US Gov't agencies and their contractors.</td>
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<td>Subject Keywords:</td>
<td>Page Count: 274</td>
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<td>CB Collection: UA</td>
<td>Media Type: PDF</td>
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<th>CBRNIAC Number: CB-124592</th>
<th>Site Holding: CB DW 531451</th>
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<tr>
<td>Title: Feasibility Plan for a VX Vasol Munition.</td>
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<tr>
<td>Author(s): O'Connor, A. D. Reinnagel, R. E.</td>
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<td>Report Number: GM-159-2-G-1</td>
<td>Publish Date: 19611215</td>
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<tr>
<td>Abstract: This Feasibility Plan was developed specifically to evaluate the potential of a 155 mm VASOL munition in a hard target role. No attempt was made in the preparation of this plan to evaluate the merits of this system</td>
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<td>Supplemental Notes:</td>
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relative to any other potential munitions in a VASOL delivery role. Subsequent to generation of this plan, a decision was made by the Chemical Corps to define the most potentially effective first-generation VASOL delivery system. An evaluation to accomplish this aim is currently underway as a joint effort among ORG, CRDL and CAL.

Descriptive Note: Weapon Concept Report

Corp Author Name: CORNELL AERONAUTICAL LABS INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AEROSOLS; ARTILLERY AMMUNITION; CANISTER; CHEMICAL ORDNANCE; CHEMICAL WARFARE AGENTS; CHEMICAL WARFARE CASUALTIES; CLOUDS; DISSEMINATION; DOSAGE; EQUATIONS; FIRING TESTS (ORDNANCE); FUELS; FUZES (ORDNANCE); GB AGENT; HOWITZERS; INHALATION; NERVE AGENT; PARACHUTE DESCENTS; PARTICLE SIZE; PERCUTANEOUS; PHOTOGRAPHY; SARIN; TANKS (COMBAT VEHICLE); TOXICITY; VAPORS; VX AGENT

Page Count: 119
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-124593
Site Holding: CB DW 531452
AD Number:
Title: Feasibility Study Plan for a VX VASOL Munition for the M-55 Area Toxic Rocket.
Author(s): Reinnagel, R. E.
Report Number: GM-1592-G-1
Publish Date: 19611201
Abstract: This appendix to the Feasibility Study Plan considers the M55 as a VX VASOL delivery system using thermal generation so as to facilitate a direct comparison with the 155 MM howitzer.

Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: ALUMINUM; CHEMICAL WARFARE; DEFLECTION; FIRING TESTS (ORDNANCE); FUZES (ORDNANCE); GENERATORS; HANDLING; NOZZLES; PARACHUTE DESCENT; PARACHUTES; ROCKET WARHEADS; ROCKETS; SAFETY; SEPARATION; SOLID ROCKET FUELS; STATIC TESTS; STORAGE; TOXIC AGENTS; TOXICITY; TRAJECTORIES; VAPORS
Page Count: 50
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-124594
Site Holding: CB DW 531453
AD Number:
Title: Concept Analysis and Feasibility Study Plan for STOMP.
Author(s): Muzzey, Clifford L. O'Connor, Arthur D.
Report Number: CRDL-GM-1592G2
Publish Date: 19611215
Abstract: This Feasibility Plan presents a discussion of the STOMP munition concept and a plan for investigating its feasibility. The name STOMP, formed by the letters of the words Scatterable Toxic Mine, Persistent, is used to identify the concept. STOMP is a small, toxic antipersonnel mine obtained by adding a container of agent VX to the XM-22 high explosive mine developed by Picatinny Arsenal. The XM-22, presently undergoing Engineer Tests, appears to have many desirable characteristics as a barrier and harassment weapon. It is small, simple, and relatively cheap, and can be delivered from the air to remote locations not accessible to ground vehicles and personnel. Thus, the XM-22 mine can be employed for interdicting and harassing enemy movements deep within enemy territory where other mines requiring planting could not. STOMP is intended to exploit all of these useful features of the
XM-22 and to make the items even more effective by the addition of toxic agent to extend the effects radius to several times that of the HE version. The STOMP concept appears to be well suited to limited war and particularly guerrilla warfare situations.

Descriptive Note: Weapon Concept Report

Corp Author Name: CORNELL AERONAUTICAL LABS INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: ABSORPTION; AERIAL DELIVERY; ANTIPERSONNEL MINES; ARMING DEVICE; BARRIERS; CHEMICAL WARFARE AGENTS; CHEMICAL WARFARE CASUALTIES; CONTAMINATION; DESENSITIZING; DETONATIONS; DOSAGE; EQUATIONS; EVAPORATION; FEET; FLUIDS; FRICTION; FUZES (ORDNANCE); HIGH EXPLOSIVES; INHALATION; LAND MINES; NERVE AGENTS; ORDNANCE; PERCUTANEOUS; SAFING AND ARMING (ORDNANCE); SELF DESTRUCT DEVICES; STORAGE; TOXIC AGENTS; TOXICITY; VX AGENT

Page Count: 69
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-126081
Site Holding: CB DW 42770
AD Number:
Title: Combat Surveillance Project.
Author(s):
Report Number: CM-1212-G-28
Publish Date: 19621214

Abstract: A final report is presented on the Combat Surveillance Project, Contract DA 36-039 SC-74980, covering the period from 1 December 1957 to 14 December 1962. A summary of contract objectives is presented, and major technical effort expended under the contract is summarized briefly. A technical prospectus for future program planning in the area of combat surveillance is outlined.

Descriptive Note: Summary Report, 1957-1962

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AERIAL MAPPING; AERIAL PHOTOGRAPHY; AIRBORNE; AIRCRAFT; BIOLOGICAL WARFARE; CHEMICAL WARFARE; COMBAT SURVEILLANCE; CONTRACT ADMINISTRATION; ELECTROMAGNETISM; ENGINEERING; GUERRILLA WARFARE; LONG RANGE (TIME); MAPPING; MATERIEL; MID-RANGE (TIME); NUCLEAR DETONATION; NUCLEAR RADIATION; RADAR; SATELLITE NETWORKS; SPECIFICATIONS; STATE OF THE ART; SURVIVABILITY; TEST AND EVALUATION; TEST FACILITIES; THERMAL RADIATION; WEAPON SYSTEMS

Page Count: 49
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-126536
Site Holding: CB DT DW 512406B
AD Number: 358575
Title: Feasibility Study Plan For Concept Number 4 Popcorn.
Author(s): Schneider, C. J., Jr.
Report Number: CAL-GM-1592-G-11
Publish Date: 19630401

Abstract: The explosive spring is a unique device which can be added to an item such as a ball, grenade, bomb, mine, etc., for the purpose of projecting the item into the air to heights of 3 to 100 feet or more. This device, which adds less than 5% to the weight and volume of the projected object, has been demonstrated using articles which range in size from a golf ball to a bowling ball, and in shape from spherical to rectangular. A study is proposed
which will consider the feasibility of adding an air burst capability to typical warhead-scattered, ground functioning
bomblets, such as the E136, through the inclusion of an explosive spring mechanism. The study takes a two-fold
concurrent approach: (1) analysis to determine the improvement factor resulting from an air burst and an
optimization of the burst height for a typical device; and (2) the design, construction, test and evaluation of a pop-up
bomblet, based upon the E136 configuration.

Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: AREA COVERAGE; BOMBLETS; CONFIGURATION; DESIGN; EXPLOSIVE
ACTUATORS; FEASIBILITY STUDIES; MEASUREMENT; PARTICLES; POPCORN PROJECT;
PROJECTORS (ORDNANCE); SCHEDULING; SPRINGS
Page Count: 20
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-127222
Site Holding: CB DW 522189
AD Number:
Author(s):
Report Number: IMPR-21
Publish Date: 19630331
Abstract: This project was initiated to develop effective means for delivery of lethal and incapacitating chemical
agents by air and ground weapons systems. Project CHORD directs its efforts into the following gradiated listing:
Completion of the report on Incapacitating Agent/Munition Systems, GM1592G9, including coordination of study
results with CRDL and revision, editing and expansion of specific sections of the study; the completion of the
Incendiary Warhead for the LANCE Missile Report; the preparation of a Feasibility Study Plan for a pop-up
munition; Phase II effort on Concept 2, i.e. the preliminary design of the 155mm Howitzer B Flat munition, the
design and test of a high-pressure, single-fluid nozzle dissemination system was continued, and the supporting
systems analysis effort was continued; also Phase II type effort was continued on Concept 3 - the Airburst M23
Mine.
Descriptive Note: Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: AERIAL DELIVERY; AEROSOLS; AIRBORNE; AMMUNITION; BOMBLETS; CLOUDS;
CONTAMINATION; DISSEMINATION; DITA; FLIGHT TESTING; FRAGMENTS; GUIDED MISSILES;
INCAPACITATING MUNITIONS; MINE WARFARE; NOZZLES; PARTICLE SIZE; PARTICLES;
PENETRATION; POPCORN SYSTEM; PROJECTILES; SIMULATION; SUBMUNITIONS; TEST AND
EVALUATION; WARHEADS
Page Count: 22
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-127223
Site Holding: CB DW 522191
AD Number:
Author(s):
Report Number: IMPR-22
Publish Date: 19630430
Abstract: Project CHORD activities have shown emphasis on the following: publication and delivery of the report
on Incapacitating Agent/Munition Systems; hard target neutralization studies; dispersed target analysis; preliminary background studies in the new special study area concerned with DITA items; preliminary evaluation of the coverage and interaction effects of multi-source pop-up bomblets; Phase II type effort on Concept 2 (B-Flat); Phase II type effort on Concept 3 (Airburst M23 Mine); Feasibility Study Plan on Concept 4 (POPCORN); and preparation of inputs to the 4th Annual B/C Dissemination Research Symposium has been completed.

Descriptive Note: Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: AERIAL DELIVERY; AEROSOLS; AIRBORNE; AMMUNITION; BOMBLETS; CLOUDS; CONTAMINATION; DISSEMINATION; DITA; FLIGHT TESTING; FRAGMENTS; GUIDED MISSILES; INCAPACITATING MUNITIONS; MINE WARFARE; NOZZLES; PARTICLE SIZE; PARTICLES; PENETRATION; POPCORN SYSTEM; PROJECTILES; SIMULATION; SUBMUNITIONS; TEST AND EVALUATION; WARHEADS
Page Count: 35
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-127224
Site Holding: CB DW 522193
AD Number:
Author(s):
Report Number: IMPR-23
Publish Date: 19630531
Abstract: Project CHORD's emphasis has centered on the following areas: hard target neutralization studies; dispersed target analysis; preliminary background studies concerned with DITA items; Phase II type effort on Concept 2 (B-Flat); Phase II effort on Concept 3 (Airburst M23 mine); and the Feasibility Study Plan on Concept 4 is being published and will be transmitted to CRDL in the near future.

Descriptive Note: Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: AERIAL DELIVERY; AEROSOLS; AIRBORNE; AMMUNITION; BOMBLETS; CLOUDS; CONTAMINATION; DISSEMINATION; DITA; FLIGHT TESTING; FRAGMENTS; GUIDED MISSILES; INCAPACITATING MUNITIONS; MINE WARFARE; NOZZLES; PARTICLE SIZE; PARTICLES; PENETRATION; POPCORN SYSTEM; PROJECTILES; SIMULATION; SUBMUNITIONS; TEST AND EVALUATION; WARHEADS
Page Count: 24
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-127227
Site Holding: CB DW 522321
AD Number:
Title: The Feasibility Study of an Incendiary Warhead for the Lance Missile.
Author(s):
Report Number: GM-1592-G-10
Publish Date: 19630401
Abstract: The conclusions of this study noted that the payload and accuracy of the LANCE missile makes a general-purpose incendiary warhead of marginal worth against the relatively low unit density targets normally encountered. The chemical warhead being developed for LANCE will employ submunitions dispersed over a radius of 500 ft. If immediate action is desired, an incendiary bomblet based upon the E136 could be built and tested. This
report summarizes a three-month program of study and experimentation. Uses for the weapon are as follows: Attack ammunition dumps; Attack POL dumps; Attack military depots; attack hard points of resistance occupying built-up areas; and Attack enemy assembly fire support elements utilizing forests for cover.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB
Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: BOMBLET; CHEMICAL AGENTS; CHEMICAL WARFARE AGENTS; EFFECTS; FRAGMENTATION WARHEADS; FUEL TANKS; INCENDIARY; INCENDIARY AMMUNITION; INCENDIARY BOMBS; INCENDIARY PROJECTILES; INCENDIARY WARHEAD; LANCE MISSILE; SUBMUNITIONS; TANKS (COMBAT VEHICLES); TARGETS; WARHEADS

Page Count: 95
CB Collection: UA
Media Type: PDF
Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-127441
Site Holding: CB DT DW 524379
AD Number: 350366
Title: Project CHORD.
Author(s): Klingaman, Richard M. O'Connor, Arthur D.
Report Number: GM-1592-G-16
Publish Date: 19631231
Abstract: (Abstract is unavailable.)

Descriptive Note: Appendix 1 to Semiannual Progress Report No. 5, 1 Jul-31 Dec 1963
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors; No foreign without approval. Other requests for this document shall be referred to Chemical Warfare/Chemical and Biological Defense Information Analysis Center (CBIAC), PO Box 196, Gunpowder Branch, Aberdeen Proving Ground, MD 21010-0196. This document contains export-controlled technical data.

Subject Keywords: AMMUNITION; CHEMICALS; DEHYDRATION; DESIGN; EFFECTIVENESS; FEASIBILITY STUDIES; FRAGMENTATION; PENETRATION; SHOCK (PATHOLOGY); TISSUES (BIOLOGY); TOXICITY
Page Count: 17
CB Collection: CA
Media Type: CPDF
Document Classification: C/NOFORN

Supplemental Notes:

CBRNIAC Number: CB-129015
Site Holding: CB DW 522320
AD Number: 
Title: Exploratory-Development Plan for the Expendable Launcher Munition.
Author(s):
Report Number: GM-1592-G-20
Publish Date: 19641201
Abstract: This report describes a man-portable, expendable weapon, the Expendable Launcher, which is capable of producing rapid area coverage with agent CS. The weapon, suggested by CAL in response to requirements stated by CRDL, has been carried through the preliminary design and preprototype stages. This report discusses the preprototype munition and current Expendable Launcher designs as well as tests conducted to date which prove the feasibility of this concept. A status of the munitions development and a planned program for exploratory development are also presented.

Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH DEPT
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: CS AGENTS; DIAPHRAGMS (MECHANICS); EXPENDABLE; EXPENDABLE LAUNCHER MUNITION; FIELD TESTS; FUZES (ORDNANCE); GRENADES; GUERILLA WARFARE; INCAPACITATING AGENT; KNAPSACK; LAUNCHERS; MUNITIONS; NON LETHAL AGENT; O-CHLOROBENZYLMALONONITRILE; PROJECTILES; PYROTECHNICS; SHORT RANGE (DISTANCE); TEAR AGENTS; TEST AND EVALUATION; TUBES

Abstract: This investigation consists of an assessment of the number of 115mm launcher loads required to affect neutralization of a number of target sizes appropriate to the system, which would be expected to occur over its operating range. The bulk of the calculations employ a simulation technique, wherein a set of round impact points is determined by sampling from the component aim and dispersion error distributions for the system, thereby allowing computation of casualties and coverage over a given target for that set of impacts. The process is repeated a number of times to derive estimates of an average expected casualty level and an indication of the variability in expected casualty levels from one trial to the next. Further, investigation of the influence of submunition distribution and delivery error components during the course of this analysis has led to rather specific conclusions with respect to the importance of these variables.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH DEPT

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: ACCURACY; BZ AGENTS; CASUALTIES; CHEMICAL AGENTS; CHEMICAL WARFARE AGENTS; COMPUTERIZED SIMULATION; DOSAGE; FIRING TABLES; LAUNCHERS; MILITARY TACTICS; MODELS; PSYCHOCHEMICAL AGENTS; RIPPLES; ROCKETS; SIMULATION; TARGETS; TEST AND EVALUATION; WARHEADS

Abstract: The main objectives of this program are the following stated items. (1) To provide the experiment design, experimental techniques, analysis, specifications of control, and equipment use or concepts that will lead to an improvement in the sensitivity and reliability of munition testing. (2) To provide through the same type of effort the methods and equipment concepts for a test system that will allow a significant reduction in test time and manpower requirements. In order to meet these objectives, we proposed that major effort be expended in the following areas: (1) Experiment Design; (2) Data Reduction Techniques; (3) Statistical Control; (4) Meteorology; (5) Instrumentation Control; (6) Development of New Instrumentation Techniques. (Author)

Descriptive Note: Technical Report
Abstract: This report presents a chronological summary of the conduct of the photographic tests on the second field trip to Thailand, 1 June 1965 through 10 July 1965. Of the 479 rolls of 70 mm film which were planned to be exposed, 352 rolls of imagery were obtained for analysis. (Author)

Descriptive Note: Special Interim Report No. 3, and Interim Technical Report No. 1

Abstract: Analyses have been made of a number of recent cases of lake effect snowfall along the southern and eastern shores of Lake Erie. Synoptic analyses are presented which show the largescale weather situations in which severe lake effect snowstorms occur, and also some of the mesoscale characteristics of the snow squall bands. Examples are included which show typical characteristics as they appeared in three different lake effect storms. Radar photographs taken from the US Weather Bureau radar at Buffalo have been analyzed to show the frequency of occurrence of the banded convective precipitation from the lake and the characteristics of the precipitation patterns. The results indicate that lake effect snow is quite common and that it may occur in any of several characteristic patterns. The most common patterns are single bands forming over the lake and single bands lying along a shoreline. Rates of heat exchange between the lake and the cold polar air masses in which lake effect storms
occur have been estimated from synoptic radiosonde data. Results of the calculations are presented for a two day period of lake effect weather.

Descriptive Note: Interim Report, 1 Jul 64-1 Jan 65
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors.
Subject Keywords: ATMOSPHERIC PRECIPITATION; ATMOSPHERIC TEMPERATURE; BAROMETRIC PRESSURE; GREAT LAKES; HEAT TRANSFER; MAPS; RADAR IMAGES; RADAR RECORDING CAMERAS; SNOW; WEATHER FORECASTING; WIND
Page Count: 65
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-130462
Site Holding: CB DT
AD Number: 665398
Title: LRTP Mathematical Model Brochure.
Author(s):
Report Number: CAL-VQ-2044-H-3
Publish Date: 19651030
Abstract: A brochure is presented to assist Headquarters, US Army Materiel Command in the application of the Long-Range Technical Plan choice model derived in Cornell Aeronautical Laboratory Report Number VQ-2044-H-2, 'The LRTP Process as it Relates to the US Army Materiel Command'. The brochure includes: (1) a mathematical description of the model; (2) a description of the computer program, including flow charts, FORTRAN listing, and a debugging log; and (3) numerical examples of program outputs using hypothetical input data. (Author)
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: ARMY OPERATIONS; COMPILERS; COMPUTER PROGRAMS; COSTS; DATA PROCESSING; FLOW CHARTING; INSTRUCTION MANUALS; LRTP (LONG RANGE TECHNICAL PLANNING); MATHEMATICAL MODELS; OPTIMIZATION; PLANNING; PROGRAMMING LANGUAGES; PUNCHED CARDS; RESEARCH MANAGEMENT; SUBROUTINES
Page Count: 94
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-131475
Site Holding: CB DT DW 524488
AD Number: 368081
Title: Ballistic Behavior of Projectiles in Vegetation.
Author(s): Eusanio, Lawrence A. Magorian, Thomas R.
Report Number: CAL-GM-1924-G-1
Publish Date: 19650601
Abstract: This report describes Project FIBRE, an exploratory research program conducted to provide methods and data for estimating effectiveness degradation of small projectiles caused by vegetation. Controlled experiments were conducted with fragments, flechettes and bullets in grasses, shrubs and trees. Velocity data were obtained for all projectile-vegetation type combinations tested. For some combinations, mathematical models for estimating velocity decay were developed with aid of the data. Yaw and deflection data were obtained for the stabilized projectiles in all three vegetation categories. Development of a world-wide vegetation data base (quantitative description of world vegetation in terms of the parameters which appear to be significant in effectiveness degradation) was initiated. The report contains maps of grass density and height for major geographic areas of the world. It also contains information on trees (such as heights, diameters, spacings, types and frequency of occurrence of types) for
geographic areas where information is available. The experimental setup, instrumentation, design objectives, and error analysis are treated in some detail. The results of experimentation and examples to illustrate application of study results are also presented. (Author)

Abstract: The main objectives of this program are the following stated items. (1) To provide the experiment design, experimental techniques, analysis, specifications of control, and equipment use or concepts that will lead to an improvement in the sensitivity and reliability of munition testing. (2) To provide through the same type of effort the methods and equipments concepts for a test system that will allow a significant reduction in test time and manpower requirements. In order to meet these objectives, we proposed that major effort be expended in the following areas: (1) Experiment Design; (2) Data Reduction Techniques; (3) Statistical Control; (4) Meteorology; (5) Instrumentation Control; (6) Development of New Instrumentation Techniques. (Author)
Abstract: The main objectives of this program are the following stated items. To provide the experiment design, experimental techniques, analysis, specifications of control, and equipment use or concepts that will lead to an improvement in the sensitivity and reliability of munition testing. To provide through the same type of effort the methods and equipment concepts for a test system that will allow a significant reduction in test time and manpower requirements. The current effort is directed toward a continued evaluation and updating of the test methods, techniques, and instrumentation presently employed in the testing of chemical agent munitions by the Field Evaluation Division (FED) of CRDL, and those methods, techniques and instruments which represent new approaches or state of the art advances. The scope of chemical munitions testing that forms a part of this effort includes the subjects of specification of test objectives, design of experiments, design of field facilities, application of facilities and equipment, test control, development of the fundamental models on which to base the munition analysis and the analysis itself. In this report a review of the progress made in each of the six task areas of the program is presented in Section III. Section IV contains a tabulation of the conclusions and recommendations reached during this period and Section V contains an outline of the plans for the following period. As in previous reports, detail discussions of areas treated during this period are presented in the appendices, with one notable exception. Because of the immediate pertinence of the meteorological investigations, they were reported in detail in interim reports (Status Reports 7 & 8). (Author/Modified)

Descriptive Note: Technical Report

Subject Keywords: AEROSOL MODEL STUDIES; ATMOSPHERIC PHYSICS; ATTENUATION; CHEMICAL ANALYSIS; CHEMICAL Munitions; CHEMICAL WARFARE AGENTS; COMPUTER APPLICATIONS; COMPUTER PROGRAMMING; CONTOURS OF CONSTANT DOSAGE; DATA REDUCTION; DIFFUSION THEORY; EDGEWOOD AEROSOL SAMPLER; ELECTROSTATIC FIELDS; EXPERIMENTAL DESIGN; EXPLOSIVES; GB AGENT; INSTRUMENTATION; INSTRUMENTATION TECHNIQUES; MANPOWER UTILIZATION; MATHEMATICAL MODELS; MATHEMATICAL THEORIES; METEOROLOGY; METHODOLOGY; MICROWAVE RADAR; MUNITION TESTING; OPTICAL PROPAGATION; PERFORMANCE (ENGINEERING); PLANNING; PROBABILITY; REPRODUCIBILITY; SARIN; SIMULANTS; SNOOT SAMPLER; SPECTRA; STATISTICAL ANALYSIS; STATISTICAL CONTROL PROCEDURES; TEST AND EVALUATION; TEST FACILITIES; TEST METHODS; VX AGENT; WIND TUNNEL TESTS

Page Count: 139

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes: Prepared for the Chemical R & D's Labs' Field Evaluation Division. Continuation of contract DA18108AMC229A.
Abstract: This project was initiated to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems. Project Chord II directs its efforts into the following graduated listing:
- Prefeasibility Studies and Experimentation;
- 155mm Agent VX Aerosol Munition;
- Velocity-Generator Dissemination;
- POPCORN; E8 Launcher.

Descriptive Note: Monthly Progress Report

Abstract: This project was initiated to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems. Project Chord II directs its efforts into the following graduated listing: Tactical Incapacitating Munitions (TIM); Prefeasibility Studies and Experimentation; 155mm Agent VX Aerosol Munition; Velocity-Generator Dissemination Subsystem; POPOCRN; E8 Launcher; ANTIGUERILLA (Special Study Task No. 5); HARASS (Special Study Task No. 6); CS RIOT Control Munition (Special Study Task No. 7).
This project was initiated to develop effective means for delivery of lethal and incapacitating chemical agents by air and ground weapons systems. Project Chord II directs its efforts into the following gradated listing: Tactical Incapacitating Munitions (TIM); Prefeasibility Studies and Experimentation; 155mm Agent VX Aerosol Munition; Velocity-Generator Dissemination Subsystem; POPCORN; E8 Launcher; COTAMS.
Munition; Velocity-Generator Dissemination Subsystem; POPCORN; E8 Launcher.

Descriptive Note: Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AERIAL DELIVERY; AEROSOLS; AGENTS; AIRBORNE; AMMUNITION; ANALYSIS; ARTILLERY; BALLISTICS; BURSTING CHARGES; CHEMICAL AGENTS; CHEMICAL WARFARE; CS AGENT; DISSEMINATION; EXPERIMENTAL DATA; FLIGHT TESTING; FUZES; GUIDED MISSILES; INCAPACITATING AGENTS; LAUNCHERS; MINE WARFARE; NERVE AGENTS; NON LETHAL AGENTS; O-CHLOROBENZYLMALONONITRILE; POPCORN SYSTEM; PROJECTILES; TACTICAL WEAPONS; TEAR AGENTS; TEST AND EVALUATION; VELOCITY; VELOCITY-GENERATOR; VX AGENT; WEAPONS

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CB Collection: UA
Media Type: PDF
Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-133685
Site Holding: CB DW 522190
AD Number:
Author(s):
Report Number: IMPR-22
Publish Date: 19661031
Abstract: A summarization of current effort includes the following: further effort with semi-explosive dissemination is being held in abeyance, while a program plan has been prepared for the M79 incendiary fragment round; a preliminary investigation of agent-explosive encapsulation and intimate mixtures has indicated that gaps exist in some of the fundamental areas of understanding; further experimental effort has thus been suspended temporarily until research into these areas allows a more meaningful experiment to be designed; a program was prepared for the development of an incendiary fragment round for the M79 grenade launcher which will consider analytical tradeoffs in powder metallurgical techniques and system considerations which dictate the payload-strength considerations.

Descriptive Note: Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AERIAL DELIVERY; AEROSOLS; AIRBORNE; AMMUNITION; ARTILLERY; BALLISTICS; BURSTING CHARGES; CENTRIFUGE SEPARATION; CHEMICAL AGENTS; CHEMICAL WARFARE; CS AGENT; DIAPHRAGMS (MECHANICS); EXPERIMENTAL DATA; FLIGHT TESTING; FUZES; GUIDED MISSILES; INCAPACITATING AGENTS; LAUNCHERS; MINE WARFARE; NON LETHAL AGENTS; PROJECTILES; TACTICAL WEAPONS; TEAR AGENTS; TEST AND EVALUATION; TRAJECTORIES; VELOCITY; WEAPONS

Page Count: 63
CB Collection: UA
Media Type: PDF
Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-133686
Site Holding: CB DW 522192
AD Number:
Author(s):
Report Number: IMPR-23
Publish Date: 19661130
Abstract: This project was initiated to develop effective means for delivery of lethal and incapacitating chemical
agents by air and ground weapons systems: Project CHORD II directs its efforts into the following graduated listing: Weapons Effects Study; Incendiary Fragment; Prefeasibility Studies and Experimentation; 155mm Agent VX Aerosol Munition; Velocity-Generator Dissemination Subsystem; POPCORN; E8Launcher; COTAMS; Chemical Fill Technique.

**Descriptive Note:** Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:** AERIAL DELIVERY; AEROSOLS; AGENTS; AIRBORNE; AMMUNITION; ANALYSIS; ARTILLERY; BALLISTICS; BURSTING CHARGES; CHEMICAL AGENTS; CHEMICAL WARFARE; COTAMS (CHEMICAL OPERATIONSTRAINING AND MANEUVERS SYSTEMS); CS AGENT; DISSEMINATION; EXPERIMENTAL DATA; FLIGHTTESTING; FUZES (ORDNANCE); GUIDED MISSILES; INCAPACITATING AGENTS; LAUNCHERS; MINE WARFARE; NON LETHAL AGENTS; O-CHLOROBENZYL MALONONITRILE; POPCORN SYSTEM; PROJECTILES; TACTICAL WEAPONS; TEAR AGENTS; TEST AND EVALUATION; VELOCITY; VELOCITY-GENERATOR; WEAPONS

**Page Count:** 72

**CB Collection:** UA

**Media Type:** PDF

**Document Classification:** U

**Supplemental Notes:**

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<td>Title</td>
<td>Feasibility Study Plan for CS 50-Caliber Round.</td>
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<td>Author(s)</td>
<td>Schneider, C. J.</td>
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<td>GM-1592-G-24</td>
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<td>Publish Date</td>
<td>19660215</td>
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**Abstract:** CRDL indicated to CAL that a mission existed for agent CS in the 200 to 1000 meter range, for both search and destroy operations, and close support of forward troops in siege operations. The .50 caliber CS round well fulfills the characteristics required for the 200 to 1000 meter range mission, if technical feasibility can be shown. Further, the most critical of the technical feasibility areas would be encountered early in a feasibility study, allowing timely decisions of further effort to be made.

**Descriptive Note:** Technical Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH DEPT

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:** 50 CALIBER ROUND; BALLISTICS; CS AGENT; FEASIBILITY STUDY; IGNITION; INCAPACITATING AGENT; MACHINE GUNS; MISSIONS; MUNITIONS; MUZZLE VELOCITY; NON LETHAL AGENT; O-CHLOROBENZYL MALONONITRILE; PYROTECHNICS; STABILITY; TEAR AGENTS; VELOCITY

**Page Count:** 11

**CB Collection:** UA

**Media Type:** PDF

**Document Classification:** U

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<td>Project Hawaii: An Investigation of Rain on the Island of Hawaii.</td>
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<td>Author(s)</td>
<td>Rogers, R. R. Jiusto J. E.</td>
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<td>Report Number</td>
<td>C-401 CALVC-2049-P-1</td>
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<td>Publish Date</td>
<td>19660201</td>
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**Abstract:** The primary task for this report was to measure updraft structure and raindrop-size distributions using a Doppler weather radar. Independently of the radar experiments, aircraft measurements were made of cloud liquid water content, cloud droplet-size distributions, the temperature aloft, and condensation nucleus concentrations.
Surface measurements were also made of condensation nuclei. (Author

Descriptive Note: Final Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: AIRCRAFT EQUIPMENT; CLOUDS; DIFFUSION; DISTRIBUTION CURVES; DOPPLER
RADAR; EQUATIONS; HAWAII; METEOROLOGY; RADAR EQUIPMENT; RAINFALL; STORMS;
TEMPERATURE
Page Count: 123
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAOC Number: CB-133985
Site Holding: CB DT DW
AD Number: 376383
Title: Assessment of Flame and Incendiary Munition Effects (Project Heat Wave).
Author(s): Heckroth, E. E.
Report Number: CAL-GM-2168-G-1
Publish Date: 19660901
Abstract: The objectives of Project HEAT WAVE were to (1) assess the present state of knowledge regarding the
effectiveness of flame and incendiary munitions in tactical employment, including identification of the data voids,
(2) establish a methodology for the evaluation of the capabilities of flame and incendiary weapons employed in both
the antimateriel and antipersonnel roles, and (3) specify the research needed to obtain the required data. A literature
search was conducted for data regarding the effectiveness of flame and incendiary munitions in tactical employment,
and discussions were held with personnel from various organizations that have been engaged in the testing and
evaluation of flame munition effects. It is concluded that data required for the quantitative evaluation of flame
weapons in tactical employment is lacking in all areas. Data needed for the quantitative evaluation of these weapons
in tactical employment are identified, and specific research is recommended to obtain this data. Both full-scale and
laboratory tests are needed to determine the principles, understand the process, and establish a methodology for the
quantitative evaluation of flame munition effects. Full-scale testing is required to determine distribution and ignition
characteristics, whereas laboratory investigations are necessary to investigate thermal output, heat transfer, ignition
and continued burning characteristics, and thermal degradation of various materials and target elements. (Author).
Descriptive Note: Final Report, Jan-Aug 66
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies only. Other requests for this document shall be
referred to Commander, Army Chemical Research and Development Center, Attn: DRSMC-CLJ-IR, Aberdeen
Proving Ground, MD 21010.
Subject Keywords: BOMB CLUSTERS; BOMBLETS; CALORIMETRY; COMBUSTION; DEGRADATION;
effectiveness; ENVIRONMENT; FIREBOMBS; FLAME WARFARE; FLAMETHROWERS; FUELS;
GRENADES; HYDROCARBONS; IGNITION; INCENDIARY AMMUNITION; INCENDIARY GELS;
INSTRUMENTATION; MILITARY OPERATIONS; PLASTICS; THERMAL PROPERTIES; THERMITE;
WHITE PHOSPHORUS; WOOD
Page Count: 216
CB Collection: CA
Media Type: CPDF
Document Classification: S
Supplemental Notes: Re-Grade per United States Army Edgewood Arsenal letter 25 Oct 73.

CBRNIAOC Number: CB-134090
Site Holding: CB DW 533239
AD Number:
Title: Wall Deposition of Aerosol in the Edgewood Arsenal Sampler.
Author(s): Schneeberger, R. F.
Report Number: CALGM-1956-E-1
Abstract: Document #1: Introduction -- In the evaluation of the Edgewood Aerosol Sampler (Snoot) in the COTE wind tunnel, it was found that a substantial amount of aerosol was being collected on the internal wall surfaces in addition to that collected on the fibre filter. Field Evaluation Division ran a series of tests in the Carroll Island tunnel. A brief analysis of the data is described herein. In some of the trials the amount of agent disseminated was reported. A short analysis of the tunnel performance for measurement of efficiency was included. Document #2: Introduction -- As noted in Memo, R. Schneeberger, 13 Jan 1966, Aerosol Munition Efficiency Study, Test Plan 110 - Trial 2, the basic purpose of Test Plan 110 is to determine the precision with which the assessment of aerosol munitions can be carried out. In particular, the measurement of munition efficiency will be determined. Trial 3 is the second test in this series and differs from the above-named memo in that a large particle aerosol was generated in Trial 3, only a very small amount of agent being carried through the vertical grid. The same analytical techniques presented in the above memo were employed in this analysis. The Total Recovery in this trial was found to be 97.5% Vertical Grid. Document #3: This program has as its objective the determination of the precision with which the assessment of test results may be improved, and by which the time requirements for a test program or for single test can be reduced. The present methods, techniques, and equipment used by Field Evaluation Div. are being evaluated. Modified techniques and new or modified equipment are being studied and recommended. Also efforts are in areas of design of experiments, data handling, and computer programs.

Descriptive Note: Technical Documentary Report

Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AEROSOL MUNITIONS; AEROSOLS; AGENT DISSEMINATION; AIR MASS ANALYSIS; AIRBORNE; ATMOSPHERIC PHYSICS; CHEMICAL WARFARE AGENTS; COMPUTER PROGRAMS; CONTOURS OF CONSTANT DENSITY; COTE WIND TUNNEL; DATA ACQUISITION; DESIGN OF EXPERIMENTS; DIFFUSION THEORY; EDGEWOOD ARSENAL (SNOOT) SAMPLER; FIBRE FILTER; FLOW; INSTRUMENTATION; ISOKINETICS; MASS MEDIAN DIAMETER; MATHEMATICAL MODELS; MUNITION TESTING; PARTICLES; SAMPLERS; TEST AND EVALUATION; TEST EQUIPMENT; TEST FACILITIES; TEST METHODS; WALL DEPOSITION; WALL SURFACES; WALLS; WIND TUNNELS; WIND VELOCITY

Page Count: 25

CB Collection: UA

Media Type: PDF

Supplemental Notes: This is a compilation of three documents. Two are Memos for the Record and the last is a Status Report, all by the same author.

CBRNIAC Number: CB-134659

Site Holding: CB DT DW 518646

AD Number: 856243

Title: Characteristics of Vegetation at Field Test Sites and Various Geographic Areas, Volume II.

Author(s): Magorian, T. R.


Publish Date: 19670901

Abstract: The Joint Environmental Effects Program (JEEP) is a tri-service multi-agency effort to determine the influence of various environments on the effectiveness of munitions. This report describes part of the first-year support provided by Cornell Aeronautical Laboratory to the JEEP effort with US Army Ballistic Research Laboratories. Volume I (AD-389 922) of this report describes efforts in identifying significant vegetational parameters and in relating the behavior of fragments, bullets and flechettes to these parameters. Descriptions of mathematical models developed to date and of experiments conducted are included. Volume II is concerned with the problem of qualitatively and quantitatively describing vegetation at munition field test sites in terms of those parameters which are known to be significant and those factors which may affect munition performance. The problem of inferring these parameters and factors for remote areas of the world is also included in this volume.

(Author)

Descriptive Note: Final Report

Corporation Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors; No Foreign. Other
requests for this document shall be referred to Commanding Officer, Aberdeen Research and Development Center, Aberdeen Proving Ground, MD 21005. This document contains export-controlled technical data.

**Subject Keywords:** AERIAL PHOTOGRAPHY; ANTI-PERSONNEL AMMUNITION; DATA PROCESSING; EFFECTIVENESS; ENVIRONMENT; FLECHETTES; FRAGMENTATION AMMUNITION; JEEP; JOINT ENVIRONMENTAL EFFECTS PROGRAM; JUNGLES; KILL PROBABILITIES; MATHEMATICAL MODELS; MUD; PLANT CANOPIES; PLANTS (BOTANY); PROJECTILES; RAINFALL; REGRESSION ANALYSIS; TREE BRANCHES; TREES; TROPICAL RAIN FORESTS; WATER

**Page Count:** 236
**CB Collection:** UA
**Media Type:** PDF
**Document Classification:** U

Supplemental Notes: See also Volume I, AD389922.

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CBRNIAC Number: CB-134718

Site Holding: CB DT DW 518647

AD Number: 818975

**Title:** Ballistic Behavior of Projectiles in Vegetation Project Fibre II Volume II

**Author(s):** Magorian, T. R. Naylor, J. N.

**Report Number:** CAL.GM-2146-G-1

**Publish Date:** 19670201

**Abstract:** This report describes the second-year efforts on a program designed to provide methods and data for estimating the effects of the vegetation on projectile performance. Volume I of this report describes efforts in identifying the significant vegetational parameters and in relating munition performance to these parameters. Included are descriptions of mathematical models developed to date. Volume II is concerned with the problem of obtaining values of the significant parameters on a world-wide basis. Quantitative and qualitative descriptions of vegetation at field test sites, with particular emphasis on the significant parameters of trees, are included in Volume II. (Author)

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors; No Foreign. Other requests for this document shall be referred to Ballistic Research Laboratories, Aberdeen Proving Ground, MD 21005. This document contains export-controlled technical data.

**Subject Keywords:** DENSITY; EFFECTIVENESS; EXTERIOR BALLISTICS; FORESTS; KILL PROBABILITIES; MATHEMATICAL PREDICTION; MOISTURE; OPTIMIZATION; PERFORMANCE (ENGINEERING); PROJECTILES JUNGLES; TREES; TROPICAL REGIONS; VEGETATION; VELOCITY; YAW

**Page Count:** 206
**CB Collection:** UA
**Media Type:** PDF
**Document Classification:** U

Supplemental Notes: See also Volume I, AD383341.

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CBRNIAC Number: CB-135877

Site Holding: CB DT

AD Number: 653199

**Title:** Condensation Droplet Growth in Rarefied Gases.

**Author(s):** Kang, Sang-Wook

**Report Number:** CAL-AD-1672-A-3ARL-67-0049

**Publish Date:** 19670301

**Abstract:** An analysis is made of thermal and diffusion effects on the droplet growth phenomena in a supersaturated vapor and inert carrier gas (see also AD-646 669). Two cases are considered: 1) constant fluid conditions, and 2) changing fluid conditions due to condensation effects. The analysis is so formulated as to describe the continuous growth process as the droplet size increases from microscopic (free-molecular to rarefied, even to macroscopic (continuum). Equations for the conservation of mass and energy are derived by application of the Langmuir model in the rarefied (slip) regime and two correlation parameters for the mass transfer and the energy transfer are
introduced for analyzing this regime. Analytic solutions are obtained for the droplet growth with time by expressing the saturation vapor pressure as a linear function of temperature. The results indicate that the choice of these slip-regime parameters influence the droplet growth only when the ratio of the droplet size to the mean free path is of order one. However, when the droplet size is very small or very large compared to the mean free path, the values chosen for these parameters have a negligible effect on the droplet growth.

Subject Keywords: CONDENSATION; DIFFUSION; DROPS; HEAT TRANSFER; KINETIC THEORY; MASS TRANSFER; MERCURY; PARTICLE SIZE; RAREFIED GAS DYNAMICS; VAPORS

Abstract: This document is a response covering a proposed contract to furnish the requested mathematical, statistical, and operations research services. The proposed program is to be comprised of problems assigned by the sponsor rather than specific problems spelled out in the Request for Proposal. This document cites the interdisciplinary approach to many of the program tasks and calls upon extensive background and experience in the area of CB weapon systems. Test design and evaluation procedures are discussed as well as data analysis and project management. An extensive package of resumes on project personnel is included, as well as appendices on statistical analysis, grids, and samplers.

Subject Keywords: AEROSOLS; ATMOSPHERIC PHYSICS; BIOLOGICAL WARFARE AGENTS; CASUALTIES; CB MUNITIONS; CHEMICAL WARFARE AGENTS; CLOUDS; COMPUTERIZED SIMULATION; DATA ACQUISITION; DECAY; ENVIRONMENTAL MANAGEMENT; LABORATORY TESTS; LETHAL AGENTS; MATHEMATICAL MODELS; METEOROLOGICAL DATA; METHODOLOGY; MILITARY DOCTRINE; MILITARY TACTICS; NUMERICAL ANALYSIS; OPERATIONS RESEARCH; OPTICS; PERSONNEL; RESUMES; SIMULATION; STATISTICAL ANALYSIS; STATISTICS; TARGETS; TERRAIN MODELS; TEST AND EVALUATION; TOXICOLOGY; WEAPON SYSTEMS; WIND
successful conduct of approximately 250 complete round tests in which terminal velocity impact, unoriented rebound, and air burst were successfully demonstrated. The construction of the demonstration and test device is covered in some detail and a full set of working drawings is provided.


Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH DEPT

Distribution Statement: Distribution limited to DoD agencies only. Other requests for this document shall be referred to Commander, US Army Chemical Research and Development Center, Attn: SMCCR-SPS-IR, Aberdeen Proving Ground, MD 21010-5423.

Subject Keywords: AERODYNAMIC CHARACTERISTICS; AIRBURST; BOMBLETS; CONFIGURATION; CONSTRUCTION; DEGRADATION; DESIGN; DROP TESTS; EJECTORS (ORDNANCE); EXPLOSIVE CHARGES; EXPLOSIVE TRAINS; FAILURE; FEASIBILITY STUDIES; FIRING TESTS (ORDNANCE); HUMIDITY; IMPACT TESTS; INSTRUMENTATION; PAYLOAD; PYROTECHNICS; ROTATION; SIMULATION; STABILITY; SURFACE TO AIR; TACHOMETERS; VELOCITY

Page Count: 72

CB Collection: CA

Media Type: CPDF

Document Classification: C

Supplemental Notes:

CBRNIAC Number: CB-136365
Site Holding: CB DT DW 522759
AD Number: 389923
Title: Analysis of Fuze Burst Height Data for Vegetated Environments. Volume II.
Author(s): Zobel, S. P.
Report Number: CAL-GM-2338-G-2-Vol-II
Publish Date: 19670901

Abstract: The Joint Environmental Effects Program (JEEP) has included field tests of fuzes in vegetated environments. This report presents a preliminary analysis of the empirical height of burst distributions obtained for important artillery, mortar, grenade, and bomblet fuzes in temperate forest, tropical rain forest, jungle tangle, tropical grass, boreal forest, and corn crop environments. It is found that many of the cumulative distributions may be described by one of a set of simple models linear, second degree polynomial, exponential, normal, or log normal. Certain classes of models are found to be prevalent within broad fuze-munition-environment systems. An attempt is also made to relate the parameters of the models to the effects of vegetation and firing conditions. It was noted that the distributions in forests were generally stratified in rough correspondence to upper canopy, lower canopy, and trunk space. Vegetation has a pronounced effect on the height of burst of all fuze types tested except for the delay type fuzes which generally buried into the ground in all environments tests.

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors. Other requests for this document shall be referred to Ballistic Research Lab, Aberdeen Proving Ground, MD 21005.

Subject Keywords: AIRBURST; ALTITUDE; BOMB FUZES; DISTRIBUTION FUNCTIONS; ENVIRONMENTAL TESTS; FUZES (ORDNANCE); GRASSES; GRENADE FUZES; JUNGLES; MATHEMATICAL MODELS; MORTAR FUZES; PLANTS (BOTANY); TREES; TROPICAL REGIONS

Page Count: 142

CB Collection: CA

Media Type: CPDF

Document Classification: C

Supplemental Notes: See also Volume I, AD-389 922.
The Joint Environmental Effects Program (JEEP) has included field tests of fuzes in vegetated environments. This report presents a preliminary analysis of the empirical height of burst distributions obtained for important artillery, motor, grenade, and bomblet fuzes in temperate forest, tropical rain forest, jungle tangle, tropical grass, boreal forest, and corn crop environments. It is found that many of the cumulative distributions may be described by one of a set of simple models linear, second degree polynornial, exponential, normal, or log normal. Certain classes of models are found to be prevalent within broad fuze-munition-environment systems. An attempt is also made to relate the parameters of the models to the effects of vegetation and firing conditions. It was noted that the distributions in forests were generally stratified in rough correspondence to upper canopy, lower canopy, and trunk space. Vegetation has a pronounced effect on the height of burst of all fuze types tested except for the delay type fuzes which generally buried into the ground in all environments tests. (Author)

Descriptive Note: Final Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors. Other requests for this document shall be referred to Ballistic Research Labs, Aberdeen Proving Ground, MD 21005.
Subject Keywords: AIRBURST; ALTITUDE; BOMB FUZES; DISTRIBUTION FUNCTIONS; ENVIRONMENTAL TESTS; FUZES (ORDNANCE); GRASSES; GRENADE FUZES; JUNGLES; MATHEMATICAL MODELS; MORTAR FUZES; PLANTS (BOTANY); TREES; TROPICAL REGIONS
Page Count: 103
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes: See also Volume 2, AD-389 923.

CBRNIAC Number: CB-136459
Site Holding: CB DT DW 524553
AD Number: 383341
Title: Ballistic Behavior of Projectiles in Vegetation. Project Fibre II. Volume 1.
Author(s): Eusanio, Lawrence A.
Report Number: CAL-GM-2146-G-1-VOL-1
Publish Date: 19670201
Abstract: This report describes a program to provide methods and data for estimating the effects of vegetation on projectile performance. Volume I of this report describes efforts in identifying the significant vegetational parameters and in relating munition performance to these parameters. Included are descriptions of mathematical models developed to date. Volume II is concerned with the problem of obtaining values of the significant parameters on a world-wide basis. Quantitative and qualitative descriptions of vegetation at field test sites, with particular emphasis on the significant parameters of trees, are included in Volume II.
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors. Other requests for this document shall be referred to Ballistic Research Labs, Aberdeen Proving Ground, MD 21005.
Subject Keywords: BALLISTICS; EFFECTIVENESS; EXTERIOR BALLISTICS; JUNGLES; PERFORMANCE (ENGINEERING); PROJECTILES; STABILIZATION; TREES; VELOCITY; YAW
Page Count: 101
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-136479
Site Holding: CB DT DW 524547
AD Number: 382498
Title: B-Flat Munition System.
Author(s): Matheis, Charles W.
Report Number: CAL-GM-1592-G-27
Abstract: The purpose of this program was to generate a VX aerosol munition concept and to establish the feasibility and effectiveness of the evolved system based upon the 155mm Howitzer as the delivery vehicle. A detailed description of the design and test development of the several subsystems of the resulting munition, code named B-FLAT employing several unique concepts including a high pressure, single fluid nozzle dissemination technique is presented. A description of the methodological approach, critical assumptions and mathematical techniques, employed to determine system performance, together with a quantitative analysis of effectiveness against point and area targets, is included. Feasibility of the system is established and effectiveness estimates for both percutaneous and respiratory modes of entry are generated.

Descriptive Note: Final Comprehensive Report, Aug 1961-Dec 1966
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH DEPT
Distribution Statement: Distribution limited to DoD agencies only. Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.
Subject Keywords: AEROSOLS; AREA COVERAGE; BALLISTICS; CHEMICAL PROJECTILES; DISTRIBUTION; DROP TESTS; EFFECTIVENESS; EXPLOSIVE TRAINS; NOSE FUZES; PARACHUTES; PENETRATION; PROPELLANT GRAINS; SOILS; SPRAY NOZZLES; T-197 FUZES; VX AGENT
Page Count: 286
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-138115
Site Holding: CB DT
AD Number: 686293
Title: Identification of Parameters by the Method of Quasilinearization.
Author(s): Larson, Duane B.
Report Number: CAL-164
Publish Date: 19680514
Abstract: The method of quasilinearization is a combination of the properties of the high-speed digital computer with established linearization techniques in such a fashion that it can be used as a method of identifying parameters. The mathematics used in the program is developed in detail and an example is given of its use. Essentially the method is an efficient device of searching for unknown parameters existing in a set of algebraic or differential equations. The mathematical concepts are historical but the combination of historical mathematics with the high-speed digital computer yields new and useful results. (Author)
Descriptive Note: Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: APPROXIMATION (MATHEMATICS); COMPUTER PROGRAMMING; DIFFERENTIAL EQUATIONS; FLOW CHARTING; MATRICES (MATHEMATICS); NUMERICAL ANALYSIS; NUMERICAL INTEGRATION; QUASILINEARIZATION; SPLINE FUNCTIONS
Page Count: 24
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-138945
Site Holding: CB DT DW
AD Number: 667816
Title: Study of Nonequilibrium Flows.
Author(s): Rich, J. W.
Report Number: AFOSR-68-0240
Publish Date: 19680101
Abstract: The experimental part of the project concentrated on development and utilization of various spectroscopic
techniques for monitoring vibrational state populations in high-temperature relaxing gas flows. The theoretical part of the project centered on master-equation analyses of various models for systems of vibrationally relaxing molecules. Abstracts of reports and papers published under the contract are included. The most recent experimental data, which have not as yet been published, are also given.

Descriptive Note: Final Report, 1 Dec 1964-1 Dec 1967
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: ABSTRACTS; ANHARMONIC OSCILLATORS; ATOMIC ENERGY LEVELS; DIATOMIC MOLECULES; EQUATIONS OF MOTION; EXPANSION FLOW; INFRARED SPECTRA; LINE SPECTRA; NITROGEN; NONEQUILIBRIUM FLOW; NOZZLE GAS FLOW; OSCILLATORS; RELAXATION TIME; SHOCK WAVES; SPECTROSCOPY; THERMODYNAMICS; VIBRATION
Page Count: 22
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-139093
Site Holding: CB DT DW 524606
AD Number: 388233
Title: Investigation of the Velocity Generator as a Backup System for the B-Flat Munition.
Author(s): Wozer, John T.
Report Number: CALGM1592G26
Publish Date: 19680201
Abstract: This report describes the dissemination of an aerosol utilizing the velocity generator technique. It discusses the design, development and testing of a preprototype disseminator for use in a 155 mm projectile. The velocity generator was designed to minimize vaporization of liquid agent injected into the throat of a two-fluid nozzle and maximize the effects of aerodynamic forces on the liquid agent to obtain the smallest mass median diameter. The simple convergent-divergent nozzles located at either end of the disseminator were driven by a hot gas generated by the burning of a solid fuel grain. Dissemination tests were conducted in which Bis(2-ethylhexyl)Hydrogen Phosphite was disseminated by injection into the throat of the exit nozzles at liquid-to-gas weight flow ratios of 1.9, 1.56 and 1.09. The gas stream velocity and temperature at the throat were 3220 fps and 4690 R, respectively, for each test. It was determined that the particle size distribution appeared to be insensitive over the range of liquid to gas weight flow ratios since the observed particle sizes varied from 1-15 microns for all three tests. The thermal decomposition of about 45 percent for the tests is within the range of thermal decomposition associated with thermal generators operating at the same weight flow ratios. The techniques employed in the fabrication of the velocity generator showed that the disseminator is economically feasible.

Descriptive Note: Final Comprehensive Report, Jul 63-Dec 66
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only; Other requests for this document shall be referred others to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.
Subject Keywords: CHEMICAL PROJECTILES; COMPOSITE PROPELLANTS; DISTRIBUTION; GAS FLOW; IGNITERS; INJECTION; LIQUIDS; PHYSICAL PROPERTIES AEROSOL GENERATORS; PROPELLANTS; SPECIFICATIONS; VELOCITY; VX AGENT
Page Count: 192
CB Collection: MM
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-139146
Site Holding: CB DW 527874
AD Number:
Title: Aerosol Sampling In Laminar And Turbulent Flow.
Abstract: This program has as its objectives the evaluation of the merits of a number of aerosol sampling devices and the study and design of aerosol sizing devices in the particle size range of from 5 to 250 microns. Sampler efficiencies are to be measured in wind speeds of 4 to 20 miles per hour in both laminar and turbulent flow. Measurement of the efficiency of a recently developed Edgewood aerosol sampler is emphasized.

Descriptive Note: Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AEROSOLS; CASELLA IMPACTOR; DISTRIBUTION FUNCTIONS; EDGEWOOD AEROSOL SAMPLER; FIELD TESTS; LAMINAR FLOW; MICROPHOTOGRAPHY; PARTICLE SIZE; SAMPLERS; SAMPLING; TEST AND EVALUATION; TURBULENT FLOW; VELOCITY; WIND VELOCITY
instrumentation. The controlled aerosol distributions in laminar and turbulent flow using mass balance and optical techniques. Calibration curves for the samplers are presented. In the second area, particle sampling devices based on impaction phenomena were selected for and subjected to feasibility experiments. The results obtained showed that the approach selected offers significant promise for particles in the range of 10 to 250 microns.

Descriptive Note: Final Comprehensive Report, Jun 67-Jun 68
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies only; Test and Evaluation; 1 Jul 71. Other requests for this document shall be referred to Army Edgewood Arsenal, Attn: SMUEA-TS-TIT, Edgewood Arsenal, MD. 21010.
Subject Keywords: AEROSOLS; CALIBRATION; CHEMICAL WARFARE AGENTS; DISTRIBUTION; EFFICIENCY; FEASIBILITY STUDIES; HEATED INLET TESTS; IMPACT; INSTRUMENTATION; LAMINAR FLOW; MODEL TESTS; PARTICLE SIZE; PARTICLE TRAJECTORIES; SAMPLERS; SAMPLING; TURBULENCE; WIND TUNNEL MODELS
Page Count: 102
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: Change Authority: Auth: USAEA letter, 30 Jun 71 (T&E, 1 Jul 71)

CBRNIAC Number: CB-139723
Site Holding: CB DT DW 701771
AD Number: 690169
Title: Off-Road Mobility Research, Volume I.
Author(s): Bartlett, George E. Deutschman, Jerome N.
Report Number: CAL-VJ-2330-G3-VOL-1
Publish Date: 19681101
Abstract: A summary of research and engineering studies conducted on a long-range program of off-road mobility research is presented. These studies, some of which are only partially completed, are directed at providing technical knowledge which is required to match off-road vehicles with military mobility requirements. A hybrid computer model is described which will permit predicting vehicle dynamics performance of simulated vehicles traversing a broad spectrum of off-road situations. A critique of existing soil trafficability theories is made based on a review of the literature which treats the comparison of vehicle performance prediction with experimental results. Analytical and experimental studies of the velocity field and soil fabric in clay soil exposed to dynamic loads are summarized. A general method is discussed for processing mobility related environmental information and for mapping vehicle performance by computer methods. A concept is introduced for testing vehicles in relation to the total environment in order to define the vehicle performance envelope. Also a method is introduced for displaying potential vehicle performance in selected geographic areas and for producing testable specifications for off-road vehicles. Engineering studies of an off-road driving simulator for synthesizing dynamic visual displays and vehicle motion in the laboratory are reviewed. (Author)
Descriptive Note: Summary Technical Report No. 3, Aug 66-Oct 68
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Approved for Public Release; Distribution Unlimited.
Subject Keywords: COMPUTERIZED SIMULATION; INTERFACES; MATHEMATICAL MODELS; MILITARY REQUIREMENTS; MOBILITY; OFF ROAD TESTS; SIMULATOR; SOIL MECHANICS; TERRAIN; TRAFFICABILITY; VEHICLES
Page Count: 100
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: See also Volume 2, AD-690 170.

CBRNIAC Number: CB-139739
Site Holding: CB DT DW 701799
AD Number: 847961
Title: Coatings for the Protection of Ammunition from Solar Heating; Volume II.
Abstract: Presently, artillery ammunition is, in effect, subloaded to accommodate the possibility of being fired after reaching elevated temperatures due to solar heating. Thermal control coatings having low solar absorptance and high thermal emittance are studied as a means for reducing solar heating, particularly in 175mm charges in metal shipping containers. In an initial phase, a mathematical heat transfer analysis of general utility in solar heating problems was developed, and used in conjunction with outdoor tests to determine that white (TiO2-epoxy) paints are very effective in reducing solar heating at the earth's surface. In the present work, it is shown that the visibility of white paints can be decreased by gloss reduction and by small additions of colored pigment, without degrading solar heating reduction excessively.

It is shown that laboratory tests of absorptance and emittance can be used with analysis to minimize the need for outdoor testing. The analysis is used to calculate the temperature of coated and uncoated ammunition exposed to the most severe desert solar heating conditions, taking into account conduction and convection as well as radiation.
Abstract: The objective of this study was to develop a technique for liquid-droplet detection and size analysis based on the ability of liquid droplets which impact on pre- (or post) recorded magnetic tape to interact with the binder, thereby distorting or obliterating the recorded signal and permitting the distortion to be interpreted as droplet count and size on tape readout. The droplet size range of concern was 50 to 500 microns. Detailed aspects of droplet counting and sizing from magnetic tapes were investigated experimentally, and the useful aspects were synthesized into a sizing technique. Feasibility of this technique was established using commercially available magnetic tapes and chemical agent simulants BIS and TOP, but not over the complete size spectrum of interest. Recommendations for future research on tape-based size analysis systems are made. (Author)

Descriptive Note: Final Report, Feb-Sep 69

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY SYSTEMS RESEARCH DEPT

Distribution Statement: Distribution limited to US Gov't agencies only. Other requests for this document shall be referred to Commanding General, Deseret Test Center, Fort Douglas, UT 84113.

Subject Keywords: AEROSOLS; CHEMICAL WARFARE AGENTS; COUNTING METHODS; DETECTORS; DROPS; FEASIBILITY STUDIES; INTERACTIONS; MAGNETIC TAPE; PARTICLE SIZE; SIGNAL-TO-NOISE RATIO; SPECTRUM SIGNATURES

Page Count: 65

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
Multiband remote sensing provides a means of obtaining signatures for natural earth objects and backgrounds. Data were collected from four humid tropical environments in Puerto Rico. Irradiance spectral reflectance, surface temperature, soil moisture, soil granularity, air temperature, humidity, wind speed and direction measurements and ground photographs were obtained. The limited analysis resulted in the development of bi band methodology for determining whether variations in film image density of soil is caused by surface moisture or surface structure. It is concluded that an electro-optical multiband analysis system using bi band techniques can be developed to facilitate the task of terrain analysis and at the same time provide the tools necessary to extend the utility of multiband remote sensing to obtain spectral signatures for other earth objects and backgrounds.

Subject Keywords: AERIAL PHOTOGRAPHS; ATMOSPHERIC TEMPERATURE; BEACHES; HUMIDITY; INFRARED RADIATION; MOISTURE; MULTIBAND SPECTRAL RECONNAISSANCE; PHOTOGRAMMETRY; PHOTOGRAPHIC IMAGES; PLANTS (BOTANY); PUERTO RICO; REFLECTIVITY; REMOTE SENSING; SOILS; SPECTRUM SIGNATURES; SURFACE TEMPERATURE; TERRAIN; TROPICAL REGIONS; WIND
The object of the CHORD Program is the development of improved means for the delivery of lethal and incapacitating chemical agents by air and ground weapon systems, with primary emphasis placed on ground-to-ground systems. While the overall effort of the program encompasses all aspects of weapons development, emphasis has been directed toward the development and test of weapons systems which will find immediate use in the current conflict in Southeast Asia and in riot control operations. This document contains the lists of the reports and working papers which are outstanding as of 1 September 1969, their current status, and either the planned publication date or the planned submission date to WDEL for approval.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY WEAPONS RESEARCH LAB

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: CHEMICAL AGENTS; DISSEMINATION; INCAPACITATING AGENTS; INCENDIARY PROJECTILES; LETHAL AGENTS; RIOT CONTROL AGENTS; SCHEDULING; SOUTHEAST ASIA; TACTICAL WEAPONS; TEST AND EVALUATION; WEAPON SYSTEM EFFECTIVENESS; WEAPON SYSTEMS; WEAPONS; WORK; WORKLOAD

Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings. (Author)

Descriptive Note: Second Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AEROSOLS; ASSAYING; EQUATIONS; PARTICLES; TEST AND EVALUATION; WIND
Abstract: The program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings. (Author)

Descriptive Note: Eighth Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LABS BUFFALO NY

Subject Keywords: AEROSOLS; FIELD TESTS; PARTICLES; TEST AND EVALUATION; WIND TUNNELS

Page Count: 5

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
### Aerosol Sampling for Particle Size Analysis

**Author(s):** Springston, D. P.

**Abstract:**

Studies updated are on the following: 1) Vertical wind tunnel test section; 2) Microflash instrumentation system; 3) Cup impactor data analysis.

**Descriptive Note:** Monthly Progress Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:** CAMERA COMPONENTS; COLLECTING METHODS; CUP IMPACTOR; DATA ACQUISITION; INSTRUMENTATION; MICROFLASH; OPTICS; TEST AND EVALUATION; WIND TUNNEL TESTS

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**CBRNIAC Number:** CB-141627

**Site Holding:** CB DW 511211

**AD Number:**

**Title:** Aerosol Sampling for Particle Size Analysis.

**Author(s):** Springston, D. P.

**Report Number:**

**Publish Date:** 19690105

**Abstract:**

This program has, as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5- to 300-micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings. The rotating cup impactor collection efficiency was determined in the vertical wind tunnel for one particle size at a constant tunnel and rotational velocity. The newly designed AK sampler probe was calibrated in the horizontal wind tunnel and preliminary evaluation tests were conducted on two cylindrical impactors.

**Descriptive Note:** Progress Report No. 9

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only.

**Subject Keywords:** AEROSOL PLUME; AEROSOLS; ASPIRATED SAMPLERS; DISSEMINATOR; PARTICLE SIZE; ROTATING CUP IMPACTOR; SAMPLERS; TEST AND EVALUATION; VERTICAL WIND TUNNEL; WIND TUNNEL TESTS

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**CBRNIAC Number:** CB-141646

**Site Holding:** CB DW 510937

**AD Number:**

**Title:** Aerosol Sampling for Particle Size Analysis.

**Author(s):** Springston, D. P.

**Report Number:**

**Publish Date:** 19690531

**Abstract:**

This program designs, develops, and calibrates an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5-to 300-micron diameter. An analytical method based on
the quantitative assay of particles captured in various segments of the device will be developed to provide the size
distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be
provided with a final report that includes design theory, analytical method, test summaries, and drawings.

Descriptive Note: Monthly Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: AEROSOLS; CENTRIFUGAL IMPACTOR; IMPACTOR CUPS; MICROPHOTOGRAPHY;
PARTICLE VELOCITY; STATIC PORT; TRAJECTORIES; TURBULENCE; WIND TUNNEL TESTS
Page Count: 16
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-141749
Site Holding: CB DT DW 522317
AD Number: 509907
Title: Design Feasibility Study of a 152mm Flame Round.
Author(s): Klingaman, Richard M. Matheis, Charles W. Keller, Arnold C. Vassallo, Francis A. Gowin, Norman E.
Report Number: CAL-GM-1592-G-35
Publish Date: 19691201
Abstract: (Abstract is unavailable.)
Descriptive Note: Final Comprehensive Report, Jan-Jul 69
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY SYSTEMS RESEARCH DEPT
Distribution Statement: Distribution limited to US Gov't agencies and their contractors. Other requests for this
document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood
Arsenal, MD 21010.
Subject Keywords: ACCURACY; COMPATIBILITY; DESIGN; FEASIBILITY STUDIES; INCENDIARY
PROJECTILES; INTERIOR BALLISTICS; PROJECTILE FUZES; PROJECTILE TRAJECTORIES; RANGE
(DISTANCE); STRESSES; STRUCTURAL PROPERTIES; TERMINAL BALLISTICS
Page Count: 136
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes:

CBRNIAC Number: CB-141767
Site Holding: CB DT DW 511902
AD Number: 507794
Author(s): Talley, Robert L.
Report Number: CAL-GM-1592-G-37
Publish Date: 19691201
Abstract: The techniques and concepts investigated, tests conducted, results obtained and considerations made
relative to achieving improved assessment techniques and dissemination schemes are discussed in this report.
Descriptive Note: Final Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY SYSTEMS RESEARCH DEPT
Distribution Statement: Distribution limited to DoD agencies only. Other requests for this document shall be
referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.
Subject Keywords: AEROSOLS; AIRBORNE; CHEMICAL WARFARE AGENTS; DESIGN; DISTRIBUTION;
eFFECTIVENESS; RECOVERY; SAMPLERS; SAMPLING
Page Count: 93
CB Collection: CA
Media Type: CPDF
Document Classification: C
The objective of the work conducted under this contract was to determine effective means for the delivery of lethal and incapacitating chemical agents by air and ground weapons systems. The program included the study of agents, tactics, weapons and targets to generate plans for weapon system feasibility studies and experimentation to be conducted under this contract. A total of twelve study tasks were conducted and are reported in Section 2 of this report. These tasks represented eight percent of the total program effort. Feasibility investigations relative to new techniques were conducted on ten concepts and are reported in Section 3. These investigations represented twenty-two percent of the total contract effort. Feasibility investigations relative to new weapons concepts were conducted on thirteen items and are reported in Section 4. These investigations represented forty-four percent of the total contract effort. Two weapons concepts were advanced to the engineering-development phase and are reported in Section 5. This effort represented twenty-six percent of the total effort. Each of the total of thirty-seven tasks are summarized and reference the reports generated under each task.

**Descriptive Note:** Summary Report

**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO NY

**Distribution Statement:** Distribution limited to DoD agencies only. Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010. NOFORN. This document contains export-controlled technical data.

**Subject Keywords:** CHEMICAL BOMBS; CHEMICAL PROJECTILES; CHEMICAL WARFARE AGENTS; DISTRIBUTION; FEASIBILITY STUDIES; TACTICAL WEAPONS

**Page Count:** 38

**CB Collection:** CA

**Media Type:** CPDF

**Document Classification:** C/NOFORN

**Supplemental Notes:** See also Volume 1, AD-507689L. Change Authority: 19980311 -- S to C per OCA and Group-3, Nov 1981.
Abstract: The Joint Environmental Effects Program (JEEP) is a tri-service multi-agency effort to determine the influence of various environments on the effectiveness of munitions. This report describes part of the first-year support provided by Cornell Aeronautical Laboratory to the JEEP effort. Volume I of this report describes efforts in identifying significant vegetational parameters and in relating the behavior of fragments, bullets and flechettes to these parameters. Descriptions of mathematical models developed to date and of experiments conducted are included. Volume II is concerned with the problem of quantitatively describing vegetation at munition field test sites in terms of those parameters which are known to be significant and those factors which may affect munition performance. The problem of inferring these parameters and factors for remote areas of the world is also included in Volume II.

Descriptive Note: Final Report, Aug 66-Sep 67
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors. Other requests for this document shall be referred to Commanding Officer, Aberdeen Research and Development Center, Aberdeen Proving Ground, MD 21005.
Subject Keywords: AMMUNITION FRAGMENTS; DAMAGE; DEFLECTION; DRAG; EXTERIOR BALLISTICS; FIRING TESTS (ORDNANCE); FLECHETTES; FRAGMENTATION AMMUNITION; GRASSES; IMPACT TESTS; INTERFERENCE; JUNGLES; PENETRATION; PERFORMANCE (ENGINEERING); PLANTS (BOTANY); PROJECTILE TRAJECTORIES; SMALL ARMS AMMUNITION; TERMINAL BALLISTICS; TREES; VELOCITY

Page Count: 199
CB Collection: CA
Media Type: CPDF
Document Classification: C
Supplemental Notes: See also Volume 2, AD-856 243. Revision of report dated Sep 67.

Abstract: The Office of Aeronautical Research of the National Aeronautics and Space Administration has authorized this Laboratory, under Contract No. NAS-156, to investigate warm fog properties and possible fog modification concepts. Analytical and experimental work during the first four years of research led to the development of a concept for fog dispersal by seeding with carefully sized hygroscopic nuclei. During the fifth contract year that concept was thoroughly tested in the laboratory and preparations were made for a series of field experiments. One of the objectives of this year's research has been to evaluate the effects of seeding dense natural fog. This quarterly report summarizes the results of the field experiments and of the subsequent data analysis.

Descriptive Note: Quarterly Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: CLIMATOLOGY; DROP SIZE; FOG; FOG DEPTH; FOG DISPERAL; GROUND
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings. (Author.)

Descriptive Note: Third Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY ELECTRONICS RESEARCH DEPT

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords: AEROSOLS; CENTRIFUGE SEPARATION; PARTICLE SIZE; PARTICLE TRAJECTORIES; PARTICLES; SAMPLING; TEST AND EVALUATION; TRAJECTORIES; WIND TUNNEL TESTS
AD Number: 878044
Title: Ricochet of Unstabilized and Stabilized Projectiles off Various Surfaces.
Author(s): Lewandowski, Gregory M.
Report Number: CAL-GM-2338-G-5
Publish Date: 19701101
Abstract: Experiments are reported on the ricochet characteristics of various small projectiles as a function of impact angle, impact velocity, projectile mass and shape, and target surface parameters. Target materials include water and several types of clay and sand. The report contains descriptions of the tests performed and a compilation of the test results.
Descriptive Note: Final Technical Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY SYSTEMS GROUP
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; Administrative/Operational Use; Nov 70. Other requests for this document shall be referred to the Army Materiel Command, Attn: AMCPA-SA, Washington DC 20315. This document contains export-controlled technical data.
Subject Keywords: ANALYSIS OF VARIANCE; ANGLE OF ARRIVAL; CLAY; COMPUTER PRINTOUTS; COMPUTER PROGRAMMING; EXPORT CONTROL; IMPACT; IMPACT ANGLE; PROJECTILES; RICOCHET CHARACTERISTICS; SAND; STABILIZED PROJECTILES; STATISTICAL PROCESSES; SURFACES; TERMINAL BALLISTICS; TEST EQUIPMENT; TEST METHODS; UNSTABILIZED PROJECTILES; VELOCITY; WATER
Page Count: 279
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:

CBRNIAC Number: CB-142499
Site Holding: CB DT DW 512313
AD Number: 868175
Title: Sensitivity Enhancement Techniques for FMIR Liquid Droplet Detection.
Author(s): Baier, Robert E. DePalma, Vito A. Bujalski, Robert L.
Report Number: CAL-RG-2818-P-2
Publish Date: 19700401
Abstract: The first quarterly report summarized successful methods for cleaning and surface chemical characterization of FMIR prisms, demonstrated spontaneous agent spreading on specially-treated surfaces for at least 40 hours, and advanced the concept that volumetric efficiency of an FMIR field alarm could be maintained indefinitely if surface modification of the prisms with monomolecular coupling agents could be achieved. This second quarterly report describes advanced work with glow discharge cleaning techniques, details the preparation, application to prisms, and evaluation of polyoxyrrolidone surface films which semi-permanently promote agent spreading, and discusses preliminary studies of new prism materials and better simulants for device testing. The major conclusion presented is that surface-modified FMIR cells demonstrate excellent volumetric efficiency indefinitely, even after severe outdoor exposure. There no longer exists any surface chemical bar to the development of a sensitive field alarm based on the FMIR method. (Author)
Descriptive Note: Quarterly Progress Report No. 2, Sep-Dec 69
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY APPLIED PHYSICS DEPT
Distribution Statement: Distribution limited to DoD agencies only; Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.
Subject Keywords: CHEMICAL WARFARE AGENTS; CLEANING; DEGRADATION; DETECTION; DROPS; EFFICIENCY; FMIR (FRUSTRATED MULTIPLE INTERNAL REFLECTION); GERMANIUM; GERMANIUM ALLOYS; GLOW DISCHARGES; INFRARED DETECTORS; INFRARED SPECTRA; INTERFACIAL TENSION; PLASTIC COATINGS; POLYAMIDE PLASTICS; POLYPYRROLIDONES; PRISMS (OPTICS); SENSITIVITY; SURFACE ACTIVE SUBSTANCES; SURFACES; TOXIC AGENT ALARMS; WARNING SYSTEMS; WETTING
Page Count: 82
CB Collection: UA
Media Type: PDF
Abstract: The program had as its objective the development and test of a device capable of providing estimates of particle size and particle size distribution in aerosol clouds for particles in the range of from 10 to 150 microns. The device, designated the Rotating Cup Impaction Sampler (RCIS), is based on impaction theory, wherein the sampling efficiency is a function of the impaction parameter, K, which is in turn a function of cup radius, cup velocity, and particle size. By employing several cups of differing sizes and speeds, a range of impaction parameters, and therefore sampling efficiencies can be achieved. Then by measuring the amount of aerosol material collected in each cup and comparing the collections between cups, mass median diameter and particle size distribution may be estimated. The experiments performed have demonstrated the particle sizing capability, though problems principally in the area of aerosol cloud definition in the test facility employed have tended to mask these results. Limitations in the design and application have been established and an outline of the data acquisition and processing procedures have been developed. Directions for further research are indicated.

Descriptive Note: Final Comprehensive Report, Jan 69-Jan 70

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY ELECTRONICS RESEARCH DEPT

Distribution Statement: Distribution limited to US Govt agencies and their contractors; No foreign without approval. Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSFE-A, Edgewood Arsenal, MD 21010. This document contains export-controlled technical data.

Subject Keywords: AEROSOLS; DESIGN; DISTRIBUTION; EFFICIENCY; OPERATION; PARTICLE SIZE; RCIS (ROTATING CUP IMPACTION SAMPLERS); SAMPLERS; WIND TUNNEL MODELS
Abstract: The terrain environment in which a munition is to be employed can be an important factor in calculating its potential effectiveness in terms of velocity degradation, function height, yaw, and dispersion as a result of munition interaction with vegetation elements. This volume contains information on vegetation parameters to which effectiveness is related and the ecologic and geographic distribution of types of vegetation. Several applicable predictive measures of vegetation are developed. The most general is biomass density, the total mass of plant material in a suitably chosen unit cube. The growth curve of biomass density is a function of climate and site but is nearly independent of vegetation type. In addition, distributions of foliage leaves, twigs and larger branches by size and angle along direct and refracted-look angles have been compiled for a variety of forest, tangle (jungle) and grassland stands. Genetic factors in growth rates, forms, and maturities are closely adapted to environment in competitive trees. Study of a few common types such as beech, oak, mahogany, and cuipo is sufficient to define most broadleaf forest growth. Forest canopy branch data is analyzed to relate test sites to growth parameters independent of tree species. Knowing general branch-growth relations, estimates are made of significant canopy variables for a given site specified by regional terrain and climatic data. A relation of branch diameter to canopy area is developed.

Descriptive Note: Final Report

Abstract: The terrain environment in which a munition is to be employed can be an important factor in calculating its potential effectiveness in terms of velocity degradation, function height, yaw, and dispersion as a result of munition interaction with vegetation elements. This volume contains information on vegetation parameters to which effectiveness is related and the ecologic and geographic distribution of types of vegetation. Several applicable predictive measures of vegetation are developed. The most general is biomass density, the total mass of plant material in a suitably chosen unit cube. The growth curve of biomass density is a function of climate and site but is nearly independent of vegetation type. In addition, distributions of foliage leaves, twigs and larger branches by size and angle along direct and refracted-look angles have been compiled for a variety of forest, tangle (jungle) and grassland stands. Genetic factors in growth rates, forms, and maturities are closely adapted to environment in competitive trees. Study of a few common types such as beech, oak, mahogany, and cuipo is sufficient to define most broadleaf forest growth. Forest canopy branch data is analyzed to relate test sites to growth parameters independent of tree species. Knowing general branch-growth relations, estimates are made of significant canopy variables for a given site specified by regional terrain and climatic data. A relation of branch diameter to canopy area is developed.

Descriptive Note: Final Report

Abstract: The terrain environment in which a munition is to be employed can be an important factor in calculating its potential effectiveness in terms of velocity degradation, function height, yaw, and dispersion as a result of munition interaction with vegetation elements. This volume contains information on vegetation parameters to which effectiveness is related and the ecologic and geographic distribution of types of vegetation. Several applicable predictive measures of vegetation are developed. The most general is biomass density, the total mass of plant material in a suitably chosen unit cube. The growth curve of biomass density is a function of climate and site but is nearly independent of vegetation type. In addition, distributions of foliage leaves, twigs and larger branches by size and angle along direct and refracted-look angles have been compiled for a variety of forest, tangle (jungle) and grassland stands. Genetic factors in growth rates, forms, and maturities are closely adapted to environment in competitive trees. Study of a few common types such as beech, oak, mahogany, and cuipo is sufficient to define most broadleaf forest growth. Forest canopy branch data is analyzed to relate test sites to growth parameters independent of tree species. Knowing general branch-growth relations, estimates are made of significant canopy variables for a given site specified by regional terrain and climatic data. A relation of branch diameter to canopy area is developed.
Title: Sensitivity Enhancement Techniques for Liquid Droplet Detection.
Author(s): DePalma, Vito A. Baier, Robert E. Lewczyk, Mary V.
Report Number: CAL-RG-2818-P-3
Publish Date: 19701001
Abstract: The objective of the contract continues to be the application of advanced surface chemical methodology to the characterization and improvement of detection and alarm devices for aerosolized liquid agents. These techniques are currently being applied to FMIR cells, to pigment papers, and to conductive strip detectors. This quarterly report describes the results obtained with a miniaturized and simplified glow discharge device and also discusses its addition to the FMIR infrared device fabricated for field use. It has also been demonstrated that the application of microfabric coatings to the prism surfaces completely masks the FMIR cells from interference by dust and other particulates. Thus, all known technical difficulties with the FMIR approach to efficient detection of liquid aerosols have been overcome. (Author)
Descriptive Note: Quarterly Progress Report, Jun-Aug 70
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies only; Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.
Subject Keywords: AEROSOLS; CHEMICAL WARFARE AGENTS; COATINGS; DETECTION; FILMS; FMIR (FRUSTRATED MULTIPLE INTERNAL REFLECTION); FMIR ALARMS; GERMANIUM; GLOW DISCHARGES; INFRARED DETECTORS; INFRARED FIELD ALARMS; INFRARED SPECTROSCOPY; INTERFACES; LIQUID AGENT DETECTORS; POLYAMIDE PLASTICS; SURFACE CHEMISTRY; SURFACE PROPERTIES; TOXIC AGENT ALARMS; WEAR RESISTANCE
Page Count: 52
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: See also Quarterly Progress Report, AD868175L.

Title: A Study of Atmospheric Reactions of O2((a superscript 1) delta sub g)), O((superscript 1) D)) and N((superscript 2) D, (superscript 2)p)). Final Summary Progress Report No. 1, 31 July 1970.
Author(s): Fluegge, Robert A. Headrick, Dale
Report Number: CAL-RM-2777-P-1 DASA-2551
Publish Date: 19700731
Abstract: A molecular beams machine has been used as a detector of O2 (a singlet Delta(g)) formed by gas-phase reactions using an rf discharge and its flowing afterglow. This direct sampling technique has 'indicated' that the measured concentrations of the molecular-oxygen O2 (a singlet Delta(g)) metastables are considerably greater than would be predicted by other researchers using similar afterglows. The O2 (a singlet Delta(g)) concentration appears to be controlled by the O atom concentration or as an alternate to a two step process that forms vibrationally excited O2 as an intermediate. The transfer of this vibrational energy to form the O2 (a singlet Delta(g)) could be a result of O-atom quenching. Due to the lack of alternatives we find this reaction, or its equivalent two step process, is probable and necessary to explain our increasing O2 (a singlet Delta(g)) concentrations as a function of reaction time in the flowing afterglow.
Descriptive Note: Final Summary Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to US Gov't agencies and their contractors; Administrative/Operational Use; 1 Sep 1999. Other requests for this document shall be referred to Defense Threat Reduction Agency, 45045 Aviation Drive, Dulles, VA 20166-7517.
Subject Keywords: AERONOMY; AFTERGLOWS; ATOMS; CHEMICAL REACTIONS; CONCENTRATION (CHEMISTRY); ELECTRIC DISCHARGES; EXCITATION; MOLECULAR BEAMS; MOLECULAR ENERGY LEVELS; OXYGEN; OZONE; REACTION KINETICS; UPPER ATMOSPHERE
Page Count: 51
CB Collection: UA
Media Type: PDF
Abstract: The prime objective of this contract continues to be the application of advanced surface chemical methodology to the improvement of aerosolized liquid agent detectors and alarms. These techniques have been successfully applied to frustrated multiple internal reflection (FMIR) cells and are currently being applied to pigment tapes as LAD (Liquid Agent Detector) devices and conductive cell ALAD (Automatic Liquid Agent Detector) devices. This fourth quarterly report describes surface properties of three pigment tapes and of specially prepared conductive cell materials. It is shown that, in spite of good surface spreading on the pigment tapes, a bulk volume effect apparently dominates and limits the reaction rate. A detailed study of the raw materials used to fabricate the pigment tapes is required to achieve the desired sensitivity to aerosolized liquid agents and to improve the abrasion resistance of the tapes. Preliminary tests on conductive cells indicate that their surface properties and electrical response are not uniform. Thus, further study of the raw materials used in fabrication of the conductive cell is also required. New schemes incorporating surface active agents and thin modifying films are proposed to achieve both high sensitivity to liquid agents and high abrasion resistance.

Descriptive Note: Quarterly Progress Report, Sep-Nov 70

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only; Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.

Subject Keywords: AEROSOLS; ALAD (AUTOMATIC LIQUID AGENT DETECTORS); AUTOMATIC; CHEMICAL AGENTS; CHEMICAL WARFARE AGENTS; COATINGS; COLORIMETRIC ANALYSIS; DETECTION; DETECTORS; DROPS; DUST; ELECTRICAL CONDUCTIVITY; FMIR (FRUSTRATED MULTIPLE INTERNAL REFLECTION); GAS DETECTORS; INFRARED DETECTORS; INTERFACIAL TENSION; INTERFERENCE; LAD (LIQUID AGENT DETECTORS); MICROFABRIC TAPES; NYLON; PAPER; PARYLENE C POLYMERS; PIGMENTS; PLASTIC PAINTS; POLYPROPYLENE PLASTICS; PROTECTIVE TREATMENTS; SENSITIVITY; SURFACE ACTIVE SUBSTANCES; SURFACE PROPERTIES; TAPES; TOXIC AGENT ALARMS; WEAR RESISTANCE; WEATHERPROOFING; WETTING; XYLYLENE

Page Count: 66

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-145178

Site Holding: DT DW

AD Number: 890228

Title: Instrumentation for Automatic Liquid Agent Detection (ALAD).

Author(s): Hodgson, Edward W., Jr.

Report Number: CAL-SD-5017-E-1

Publish Date: 19711001

Abstract: The research is concerned with automatic liquid agent detection by conductivity changes. Progress is reported in the development of detector elements and of a droplet collector based on a rotating cup impactor. A detector configuration consisting of parallel lines connected electrically in series has been shown to provide good response to single droplets of agent or simulant, and a plug-in-type construction for such an element has been conceived. Methods of producing detector elements have been investigated. A major problem has been encountered in the tendency of current conductive paint formulations to become insoluble in simulant and agent with age. Parameters for the droplet collector have been determined theoretically on the basis of desired device dimensions.
and collection efficiency equipments.

**Descriptive Note:** Quarterly Report No. 1, Jul-Sep 71
**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO N Y ELECTRONICS RESEARCH DEPT

**Distribution Statement:** Distribution limited to US Gov't agencies only; Test and Evaluation; 6 Jan 72. Other requests for this document shall be referred to Commanding Officer, Army Chemical R&D Center, Attn: DRSMC-CLJ-IR, Aberdeen Proving Ground, MD 21010.

**Subject Keywords:** ALAD (AUTOMATIC LIQUID AGENT DETECTION); CELLULOSE ACETATES; CHEMICAL WARFARE AGENTS; COLLECTING METHOD; CONDUCTIVE PAINTS; DETECTORS; DROPS; ELECTRICAL RESISTANCE; IMPACTORS; LIQUID AGENT DETECTORS; METAL FILMS; PLASTIC PAINTS; SILVER; TOXIC AGENT ALARMS

**Page Count:** 53
**CB Collection:**
**Media Type:**
**Document Classification:** U

**Supplemental Notes:**

**CBRNIAC Number:** CB-145227
**Site Holding:** DT DW
**AD Number:** 886721
**Title:** Sensitivity Enhancement Techniques for Liquid Droplet Detection.
**Author(s):** DePalma, Vito A. Baier, Robert E.
**Report Number:** CAL-RG-2818-P-6
**Publish Date:** 19710801
**Abstract:** The prime objective continues to be the application of advanced surface chemical methodology to the improvement of aerosolized liquid agent detectors and alarms. Early reports summarized successful surface chemical experimentation on infrared detector surfaces, including maintenance of agent spreading, activation by glow discharge techniques, and masking from interference by dust and other particulates. The report presents an evaluation of the abrasion resistance offered by several silicone fluids. Three of these silicone fluids offer good abrasion resistance without sacrificing sensitivity to agent detection; however, they are undesirable as coatings because they make the detectors wet and highly reflective. Additional research on a Parylene and protein films which give a dry coating is underway. A planar detector has been developed which consists of only two electrodes separated by a thin dielectric. The capacitance of this detector changes during the application of agent, but it is expected that capacitance changes produced by agent will be negligible compared to temperature effects.

**Descriptive Note:** Quarterly Progress Report No. 6, Mar-May 71
**Corp Author Name:** CORNELL AERONAUTICAL LAB INC BUFFALO N Y
**Distribution Statement:** Distribution limited to US Gov't agencies only; Test and Evaluation; Aug 71. Other requests for this document shall be referred to Commanding Officer, Army Edgewood Arsenal, Attn: SMUEA-TSTI-T, Edgewood Arsenal, MD 21010.

**Subject Keywords:** AEROSOLS; CHEMICAL WARFARE AGENTS; DESIGN; ELECTRODES; GAS DETECTORS; GERMANIUM; INFRARED DETECTORS; INFRARED FIELD ALARMS; LIQUID AGENT DETECTION; PLASTIC COATINGS; REFLECTIVITY; SILICONES; SURFACES; TOXIC AGENT ALARMS; WEAR RESISTANCE; WETTING

**Page Count:** 27
**CB Collection:**
**Media Type:**
**Document Classification:** U

**Supplemental Notes:** See also Quarterly Progress Report No. 5 dated Apr 71, AD-885 282L.

**CBRNIAC Number:** CB-145532
**Site Holding:** DT DW
**AD Number:** 734887
**Author(s):**
Abstract: The manual is intended to help and guide the user in the preparation and proper program operation for the Phase I System Assessment Model (SAM) developed under Cornell Aeronautical Laboratory, Inc. (CAL) Project Mobile Army Surveillance System (MASS). (Author)

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Approved for Public Release; Distribution Unlimited.

Subject Keywords: AERIAL RECONNAISSANCE; ARMY OPERATIONS; COMBAT SURVEILLANCE; COMPUTER PROGRAMS; CONTROL SEQUENCES; DIGITAL SIMULATION; INSTRUCTION MANUALS; MATHEMATICAL MODELS; MISSION PROFILES; NIGHT WARFARE; PROGRAMMING (COMPUTERS); SIMULATION; STANO; TARGET ACQUISITION; TARGET ACQUISITION AND NIGHT OBSERVATION; TERRAIN INTELLIGENCE

Page Count: 284

CB Collection: U

Document Classification: See also Volume 1, Part 1, AD-734 885 and Volume 1, Part 2, AD-734 886.

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Abstract: The ST ANO Phase I SAM is designed to simulate a brigade or smaller ST ANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual ST ANO sensors and subsystems. It will facilitate the formation of improved candidate ST ANO systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of ST ANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests. (Author)

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Approved for Public Release; Distribution Unlimited.

Subject Keywords: AERIAL RECONNAISSANCE; ARMY OPERATIONS; COMBAT SURVEILLANCE; DATA PROCESSING SYSTEMS; DIGITAL SIMULATION; ELECTRONIC EQUIPMENT; MATHEMATICAL MODELS; METEOROLOGICAL PARAMETERS; NIGHT WARFARE; PROGRAMMING (COMPUTERS); RELIABILITY ELECTRONICS; SENSORS; SIMULATION; STANO; SUBROUTINES; SURVEILLANCE TARGET ACQUISITION AND NIGHT OBSERVATION; TARGET ACQUISITION; TERRAIN INTELLIGENCE; WAR GAMES

Page Count: 554

CB Collection: U

Document Classification: See also Volume 1, Part 1, AD-734 885 Volumes 2, and AD-734 887.

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Abstract: The ST ANO Phase I SAM is designed to simulate a brigade or smaller ST ANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual ST ANO sensors and subsystems. It will facilitate the formation of improved candidate ST ANO systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of ST ANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests. (Author)

Descriptive Note: Final Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Approved for Public Release; Distribution Unlimited.

Subject Keywords: AERIAL RECONNAISSANCE; ARMY OPERATIONS; COMBAT SURVEILLANCE; DATA PROCESSING SYSTEMS; DIGITAL SIMULATION; ELECTRONIC EQUIPMENT; MATHEMATICAL MODELS; METEOROLOGICAL PARAMETERS; NIGHT WARFARE; PROGRAMMING (COMPUTERS); RELIABILITY ELECTRONICS; SENSORS; SIMULATION; STANO; SUBROUTINES; SURVEILLANCE TARGET ACQUISITION AND NIGHT OBSERVATION; TARGET ACQUISITION; TERRAIN INTELLIGENCE; WAR GAMES

Page Count: 554

CB Collection: U

Document Classification: See also Volume 1, Part 1, AD-734 885 Volumes 2, and AD-734 887.
### Abstract
The STANO Phase I SAM is designed to simulate a brigade or smaller STANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual STANO sensors and subsystems. It will facilitate the formation of improved candidate STANO Systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of STANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests. Volume 1 contains a model description. (Author)

### Keywords
- AERIAL RECONNAISSANCE
- ARMY OPERATIONS
- COMBAT SURVEILLANCE
- DATA PROCESSING SYSTEMS
- DIGITAL SIMULATION
- GAME THEORY
- MATHEMATICAL MODELS
- NIGHT WARFARE
- PROGRAMMING (COMPUTERS)
- RELIABILITY (ELECTRONICS)
- SENSORS
- SIMULATION
- STANO
- SUBROUTINES
- SURVEILLANCE
- TARGET ACQUISITION
- WAR GAMES

### Page Count
466

### CB Collection
UA

### Media Type
PDF

### Document Classification
U

### Supplemental Notes
See also Volume 1, Part 2, AD-734 886.
Abstract: Work performed in an investigation of Automatic Liquid Agent Detection (ALAD) during the three-month period from Jan 72 through Mar 72 is reported. Collection efficiency of the droplet collector fabricated for the proposed device has been experimentally determined, and final scavenger parameters have been identified. A design for detector elements has been achieved and its feasibility demonstrated. Performance of electronics previously fabricated has been verified.

Descriptive Note: Quarterly Report No. 3, Jan-Mar 1972

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY ELECTRONICS RESEARCH DEPT

Distribution Statement: Distribution limited to US Gov't agencies only; Test and Evaluation; May 1972. Other requests for this document shall be referred to Commanding Officer, Army Chemical Research and Development Center, Attn: DRSMC-CLJ-IR, Aberdeen Proving Ground, MD 21010.

Subject Keywords: AEROSOLS; ALAD (AUTOMATIC LIQUID AGENT DETECTORS); AUTOMATIC; CHEMICAL AGENTS; CHEMICAL WARFARE AGENTS; COMPATIBILITY; DETECTORS; DROPS; EFFICIENCY; ELECTRIC CONNECTORS; ELECTRIC CURRENTS; ELECTRIC MOTORS; ELECTRICAL CONDUCTIVITY; IMPACT; INTERFACES; LIQUIDS; M-42 AGENT ALARMS; M-8 AGENT DETECTORS; MASS MEDIAN DIAMETER; MATHEMATICAL MODELS; MODULAR STRUCTURES; PARTICLE SIZE; PARTICLES; POWER SUPPLIES; PRINTED CIRCUITS; RESPONSE; SAMPLERS; SENSITIVITY; SIMULATORS; TOXIC AGENT ALARMS; VOLTAGE

Page Count: 34

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
Abstract: The prime objective of the research was the improvement of aerosolized-liquid-agent detectors and alarms by the application of surface chemical methodology. Investigative techniques included contact angle measurements, internal reflection infrared spectroscopy, and thin film characterization using an automated surface balance. Spontaneous wetting and spreading of agents was guaranteed by the use of a novel radio frequency glow discharge cleaning device. All technical problems which limited the utility of the Frustrated Multiple Internal Reflection (FLMIR) detector element were solved including the elimination of dust interference by providing a porous microfabric screen. Liquid Agent Detectors (LADs) made by the rotogravure process and all raw materials used in their fabrication were surface-chemically characterized. A new porous plastic substrate for the agent sensitive resins overcomes the problem of abrasion-caused false alarms. Automatic Liquid Agent Detectors (ALADs) were also surface-chemically characterized. Silver particles used in these detectors were found to have an undesirable low energy coating, and they also exhibited poor abrasion resistance.

Descriptive Note: Final Report, Jun 69-Aug 71
Abstract: The canopy growth model has been validated as a general method of vegetation characterization. It is capable of simulating conifer as well as temperate and tropic hardwood forests from rainforests to open woodland. The approximate parameters for common tree types are discussed, sample simulation runs shown and related to the problem regional data base methodology. Validation is included for a test stand without underbrush in the temperate hardwood forest at Jefferson Proving Ground, Indiana. Sample data is presented for Germany and South Vietnam.

Descriptive Note: Technical Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to US Gov't agencies and their contractors.

Subject Keywords: AGING (PHYSIOLOGY); BIOMASS; DENSITY; DIAMETERS; EQUATIONS; FOLIAGE; FORESTS; FORTRAN; GERMANY; GRASSES; GROWTH (PHYSIOLOGY); HARDWOODS; METHODOLOGY; MODELS; RAINFALL; STORAGE; TREE CANOPY; TREES; VEGETATION; WATER

Page Count: 132

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes: See also NTIS Document PB-217843.
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for the period ending February 28, 1969.

Descriptive Note: First Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 7

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-180820
Site Holding: CB EDG E491232
AD Number:
Title: Aerosol Sampling for Particle Size Analysis.
Author(s): Springston, D. P. Schneeberger, R. F.
Report Number:
Publish Date: 19690416
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for the period ending March 31, 1969.

Descriptive Note: Second Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 16

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-180821
Site Holding: CB EDG E491233
AD Number:
Title: Aerosol Sampling for Particle Size Analysis.
Author(s): Springston, D. P. Schneeberger, R. F.
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending April 30, 1969.

Descriptive Note: Third Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 19

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-180823

Site Holding: CB EDG E491234

AD Number:

Title: Aerosol Sampling for Particle Size Analysis.

Author(s): Springston, D. P. Schneeberger, R. F.

Report Number:

Publish Date: 19690401

Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending 31 May 1969.

Descriptive Note: Fourth Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 13

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-180826

Site Holding: CB EDG E491235

AD Number:

Title: Aerosol Sampling for Particle Size Analysis.

Author(s): Springston, D. P. Schneeberger, R. F.

Report Number:

Publish Date: 19690501

Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending 30 June 1969.

Descriptive Note: Fifth Progress Report
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending 31 July 1969.

Descriptive Note: Sixth Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: 
Page Count: 10
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes: 

CBRNIAC Number: CB-180851
Site Holding: CB EDG E491237
AD Number:
Title: Aerosol Sampling for Particle Size Analysis.
Author(s): Springston, D. P. Schneeberger, R. F.
Report Number:
Publish Date: 19690801
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending 31 August 1969.

Descriptive Note: Seventh Progress Report
Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
Distribution Statement: Distribution limited to DoD agencies only.
Subject Keywords: 
Page Count: 11
CB Collection: UA
Media Type: PDF
Document Classification: U
Supplemental Notes:
Abstract: This program has as its objectives, the design, development, and calibration of an aerosol particle sizing device capable of selective separation and retention of particles in the size range of 5 to 300 micron diameter. An analytical method based on the quantitative assay of particles captured in various segments of the device will be developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for field test usage will be provided with a final report that includes design theory, analytical method, test summaries, and drawings for period ending September 1969.

Descriptive Note: Eighth Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 4

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:
analytical method based on the quantitative assay of particles captured in various segments of the device will be
developed to provide the size distribution of the polydisperse aerosol. A calibrated particle sizing device suitable for
field test usage will be provided with a final report that includes design theory, analytical method, test summaries,
and drawings for period ending 30 November 1969.

Descriptive Note: Tenth Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only. Other requests for this document shall be
referred to Commander, US Army Soldier and Biological Chemical Command, ATTN: Technical Library, Aberdeen
Proving Ground, MD 21010-5423.

Subject Keywords:

Page Count: 5

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-181485

Site Holding: CB EDG E490953

AD Number:

Title: Aerosol Sampling in Laminar and Turbulent Flow.

Author(s): Springston, D. P.

Report Number:

Publish Date: 19670811

Abstract: This program has as its objectives, the determination of the performance of a number of aerosol sampling
devices in wind speeds between 4 and 20 miles per hour in both laminar and turbulent flow and for a wide range of
particle sizes and densities. Particular emphasis will be placed on the development of performance characteristics of
a recently developed Edgewood aerosol sampler. In addition, research and development will be undertaken first to
design a sampler in which isokinetic sampling can be maintained with changing meteorological conditions.
Secondly, the design of particle sizing devices of high efficiency and isokinetic performance will be undertaken.

Descriptive Note: First Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:

Page Count: 3

CB Collection: UA

Media Type: PDF

Document Classification: U

Supplemental Notes:

CBRNIAC Number: CB-181486

Site Holding: CB EDG E490954

AD Number:

Title: Aerosol Sampling in Laminar and Turbulent Flow.

Author(s): Springston, D. P.

Report Number:

Publish Date: 19670919

Abstract: This program has as its objectives, the determination of the performance of a number of aerosol sampling
devices in wind speeds between 4 and 20 miles per hour in both laminar and turbulent flow and for a wide range of
particle sizes and densities. Particular emphasis will be placed on the development of performance characteristics of
a recently developed Edgewood aerosol sampler. In addition, research and development will be undertaken first to
design a sampler in which isokinetic sampling can be maintained with changing meteorological conditions.

Descriptive Note: Secondly Monthly Progress Report

Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY

Distribution Statement: Distribution limited to DoD agencies only.

Subject Keywords:
Abstract: This program has as its objectives, the determination of the performance of a number of aerosol sampling devices in wind speeds between 4 and 20 miles per hour in both laminar and turbulent flow and for a wide range of particle sizes and densities. Particular emphasis will be placed on the development of performance characteristics of a recently developed Edgewood aerosol sampler. In addition, research and development will be undertaken first to design a sampler in which isokinetic sampling can be maintained with changing meteorological conditions. Secondly, the design of particle sizing devices of high efficiency and isokinetic performance will be undertaken.
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Corp Author Name: CORNELL AERONAUTICAL LAB INC BUFFALO NY
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Supplemental Notes:
Title: Aerosol Sampling in Laminar and Turbulent Flow.
Author(s): Springston, D. P.
Report Number:
Publish Date: 19680510
Abstract: This program has as its objectives the evaluation of the merits of a number of aerosol sampling devices and the study and design of aerosol sizing devices in the particle size range of from 5 to 250 microns. Sampler efficiencies are to be measured in wind speeds of from 4 to 20 miles per hour in both laminar and turbulent flow. Measurements of the efficiency of a recently developed Edgewood aerosol sampler is emphasized.
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CBRNIAC Number: CB-181503
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AD Number:
Title: Aerosol Sampling in Laminar and Turbulent Flow.
Author(s): Springston, D. P.
Report Number:
Publish Date: 19680624
Abstract: This program has as its objectives the evaluation of the merits of a number of aerosol sampling devices and the study and design of aerosol sizing devices in the particle size range of from 5 to 250 microns. Sampler efficiencies are to be measured in wind speeds of from 4 to 20 miles per hour in both laminar and turbulent flow. Measurements of the efficiency of a recently developed Edgewood aerosol sampler is emphasized.
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CBRNIAC Number: CB-181504
Site Holding: CB EDG E490964
AD Number:
Title: Aerosol Sampling in Laminar and Turbulent Flow.
Author(s): Springston, D. P.
Report Number:
Publish Date: 19680719
Abstract: This program has as its objectives the evaluation of the merits of a number of aerosol sampling devices and the study and design of aerosol sizing devices in the particle size range of from 5 to 250 microns. Sampler efficiencies are to be measured in wind speeds of from 4 to 20 miles per hour in both laminar and turbulent flow. Measurements of the efficiency of a recently developed Edgewood aerosol sampler is emphasized.
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