

UNCLASSIFIED

AD NUMBER
ADB967782
LIMITATION CHANGES
TO: Approved for public release; distribution is unlimited.
FROM: Distribution authorized to DoD and DoD contractors only; Specific Authority; 30 APR 1990. Other requests shall be referred to Commander, Chemical Research, Development and Engineering Center, Attn: SMCCR-SPS-T, Aberdeen Proving Ground, MD 21010-5423.
AUTHORITY
ECBC memo dtd 27 Aug 2014

THIS PAGE IS UNCLASSIFIED

UNANNOUNCED

PHOTOGRAPH THIS SHEET

AD-B967 782

DTIC ACCESSION NUMBER

LEVEL

DTIC FILE COPY

INVENTORY

TRLR 33

DOCUMENT IDENTIFICATION

31 MAY 1944

~~limited~~ Distribution ^{outlet} to DOD and DOD contractors only; specific authority; (30 Apr 90). Other requests shall be referred to Commander, Chemical Research, Development and Engineering Center, ATTN: SMCCR-SPS-T, Aberdeen Proving Ground, MD 21010-5423.

DISTRIBUTION STATEMENT

ACCESSION FOR	
NTIS	GRA&I ☐
DTIC	TRAC ☒
UNANNOUNCED	
JUSTIFICATION <i>per ltr</i>	
BY	
DISTRIBUTION/	
AVAILABILITY CODES	
DISTRIBUTION	AVAILABILITY AND/OR SPECIAL
D-16	

DISTRIBUTION STAMP

CO.
INSPEC.

DTIC
ELECTE
MAY 03 1990
S E D

DATE ACCESSIONED

DATE RETURNED

90 05 0 098

DATE RECEIVED IN DTIC

REGISTERED OR CERTIFIED NUMBER

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-FDAC

AD-B967 782

~~CANCELLED~~

BY ADDRESS OF CHIEF
EDWARD ARSONAL, INC.
C.O.S. CWS Techn. Comm.

T.R.L.E. 35
Copy No. 1
Project: A 10.2

UNCLASSIFIED

Info. Div., CWS Techn. Comm. E.A.

A Memorandum Report

CYANOGEN CHLORIDE

LC 50 FOR RABBITS: 2 MIN. EXPOSURE

By

E. H. Krackow

I. Fuhr

DECLASSIFIED
DOD DIR #200.9

UNCLASSIFIED

Info. Div., CWS Techn. Comm., E.A.

31 May 1944

~~CANCELLED~~
~~SECRET~~

C.O.S. CWS Techn. Comm.

Best Available Copy

T.R.L.

SECRET

UNCLASSIFIED

T.R.L.R. 33
Project A 10.2
Copy No. 1

5/17/44 Rec.
date initial

By authority of the
Chief, Medical Division,
OC-CWS

CYANOGEN CHLORIDE

LC 50 for Rabbits: 2 Min. Exposure

by

E. H. Krackow
I. Fuhr

DECLASSIFIED
DOD DIR 5200.9

UNCLASSIFIED

Info. Div., UWS Tech. Comd., E.A.

Forwarded to Chief, Chemical Warfare Service

MAY 31 1944

CANCELED

By Authority of
O.C. [REDACTED]

~~SECRET~~
T.R.L.

CYANOGEN CHLORIDE
LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

T.R.L.R. 33

ABSTRACT

OBJECT:

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for rabbits exposed 2 minutes and observed 10 days.

RESULTS:

The LC 50 of cyanogen chloride for rabbits exposed 2 minutes has been determined:

The following data were obtained:

<u>Analytical Conc.</u> mg./l.	<u>Mortality</u>	
	<u>Fraction</u>	<u>%</u>
5.5	3/10	30
6.3	3/10	30
7.8	8/10	80
9.3	7/10	70
11.1	9/10	90
12.1	9/10	90

CONCLUSION:

The LC 50 of cyanogen chloride for rabbits exposed for two minutes and observed for 10 days is estimated to be 7.1 mg./l.

RECOMMENDATIONS:

None.

~~SECRET~~
T.R.L.

T.R.L.

CYANOGEN CHLORIDE
LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

T.R.L.R. 33

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
A. Object	1
B. Authority	1
II. HISTORICAL	1
III. EXPERIMENTAL	1
A. Materials and Equipment	1
B. Procedure	2
C. Results	2
1. Toxicity	2
2. Symptoms	2
IV. DISCUSSION	3
V. CONCLUSION	3
VI. RECOMMENDATIONS	3

T.R.L.

~~SECRET~~
T.R.L.

CYANOGEN CHLORIDE
LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2 T.R.L.R. 33

I. INTRODUCTION.

A. Object.

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for rabbits exposed 2 minutes and observed 10 days.

B. Authority.

Work was done by authority of Chief, Chemical Warfare Service, Project A 10.2.

II. HISTORICAL.

Little work has been done on the effects of cyanogen chloride on the rabbit. Marshall and Miller (PR 222) gassed rabbits as well as other species with several different concentrations of cyanogen chloride for varying periods of time. They found that the lethal concentration for rabbits exposed 7 1/2 minutes was 0.85 mg./l. Characteristic symptoms of cyanogen chloride poisoning were observed.

In Ph 1, XLVI, 1, 1918, a similar investigation was reported. The shortest exposure period was 5 minutes. For this time the following results were obtained:

<u>Conc.</u> mg./l.	<u>Exposure Time</u>	<u>Deaths</u>
.1.4	5 min.	4/4, 2/4
2.8	5 min.	2/2

III. EXPERIMENTAL.

A. Materials and Equipment.

Cyanogen chloride was obtained from the Protective Development Division, Technical Command, Edgewood Arsenal. The material was 96% pure. Rabbits were obtained from Orange and Black Farms, Hanover, Pa. They weighed between five and seven pounds.

The 386-1. chamber described in E.A.T.R. 376 was used in these gassings.

B. Procedure.

The techniques used in gassing and in determining the analytical concentration in the chamber have been described in T.R.L.R. 27. Ten rabbits were exposed to each concentration. Since the gassing cage held a maximum of six rabbits, two groups of five rabbits were exposed in immediate succession. Before gassing each group of five animals, samples of chamber air were drawn for analysis.

The rabbits were observed closely during and after each two minute exposure. The observation period was 10 days.

C. Results.

1. Toxicity

The following data were obtained:

Table 1

Toxicity of Cyanogen Chloride to Rabbits:
2 minute Exposure

<u>Analytical</u> <u>Conc.</u> mg./l.	<u>Room</u> <u>Temp.</u> °C.	<u>Rel.</u> <u>Hum.</u> %	<u>Fraction</u>	<u>Mortality</u> %
5.5	15	34	3/10	30
6.3	20	24	3/10	30
7.8	20	24	8/10	80
9.3	18	30	7/10	70
11.1	18	30	9/10	90
12.1	18	30	9/10	90

Data from Table 1 are plotted in Chart 1, from which the LC 50 for rabbits exposed to cyanogen chloride for two minutes is estimated to be 7.1 mg./l.

Only three of the 60 rabbits exposed were conscious when removed from the chamber. The other 57 rabbits were either dead or unconscious. Of these, 39 were dead within 25 minutes after they had been introduced into the cyanogen chloride. The remaining 18 rabbits recovered consciousness within 30 minutes after gassing.

2. Symptoms.

In most cases, the rabbits reacted violently 5-30 seconds after being introduced into the chamber. Irritation of the eyes and respiratory tract was evident. Excitement was at a maximum approximately one minute after the beginning of the exposure period, followed shortly thereafter by prostration, unconsciousness

~~REDACTED~~
T.R.L.

and death. Most of the animals had both tonic and clonic convulsions. Opisthotonos was observed in several of the rabbits. Those that recovered went through successive phases of intense activity and relative quiescence. During activity, the rabbits extended and flexed their limbs rapidly presenting a pattern of coordinated muscular reaction. During quiescence, the rabbits were flaccid and occasionally manifested slight tremors. A moderate amount of clear fluid was seen exuding from the nares of the majority of the animals.

After recovery, the rabbits were less active than normal for two or three days. The rate and depth of breathing appeared irregular during this time. After five or six days the animals appeared normal.

IV. DISCUSSION.

The consistency of the data indicates that the rabbit is a satisfactory animal for inhalation toxicity studies in spite of the facts that the exposure period was only two minutes and that cyanogen chloride is very irritating to the respiratory tract. During the two-minute gassing period the animals were observed closely, and breath-holding was not noted. However, the observations were visual and hence, not conclusive. It was of interest that, although most of the rabbits were greatly excited in the gassing chamber, an appreciable number sat quietly until consciousness was lost. It was of further interest that the three rabbits which remained conscious showed no excitement during exposure.

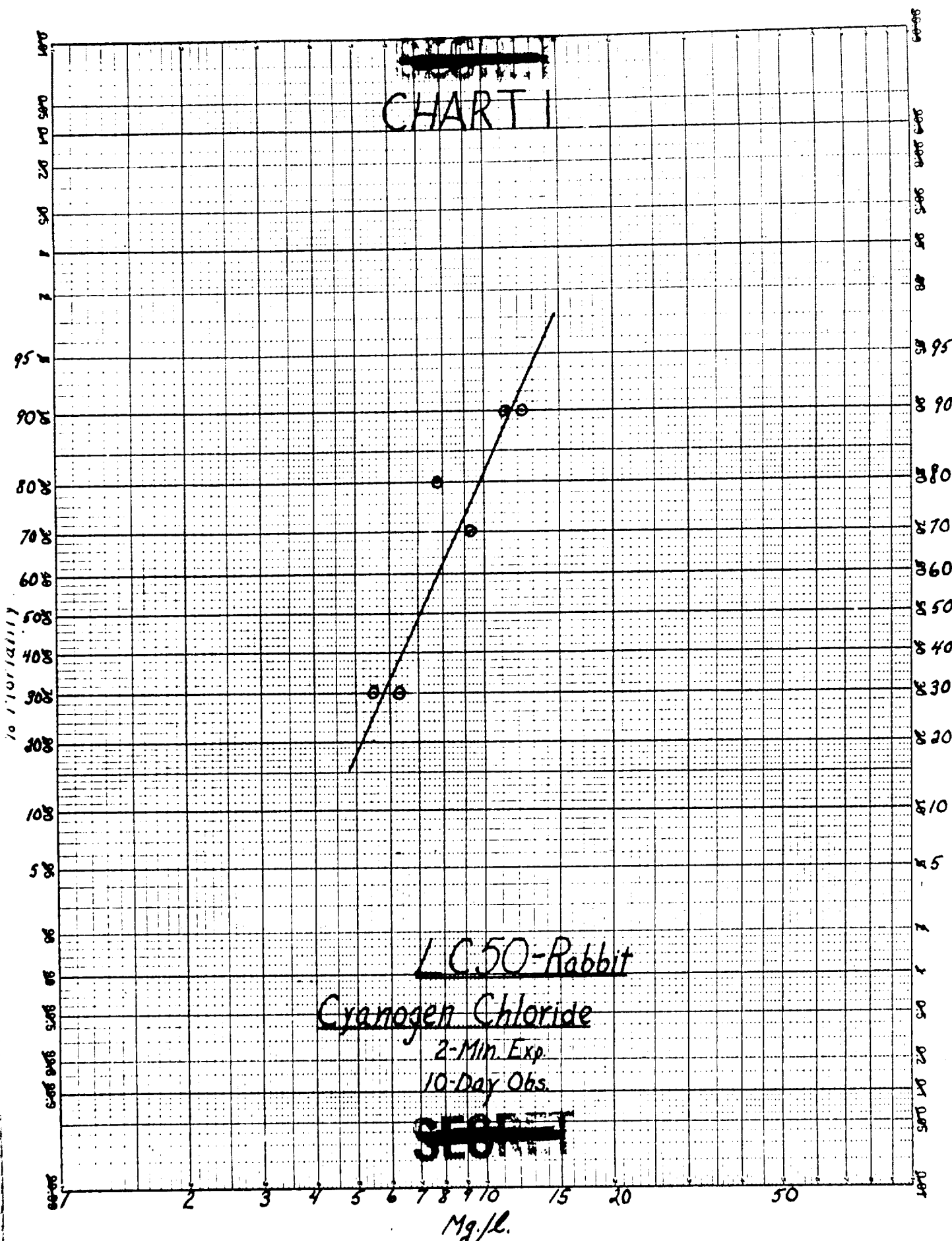
V. CONCLUSION.

The LC 50 of cyanogen chloride for rabbits exposed for two minutes and observed for 10 days is estimated to be 7.1 mg./l.

VI. RECOMMENDATIONS.

None.

~~SECRET~~
CHART I



LC50-Rabbit
Cyanogen Chloride
2-Min. Exp.
10-Day Obs.

~~SECRET~~

~~SECRET~~
T.R.L.

T.R.L.R. 33

CYANOGEN CHLORIDE

LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

Experimental Work:

Began: 3 April 1944

Completed: 15 April 1944

Notebook: No. 1867

Distribution: 37 copies made

Copies 1-6, 31-35, Technical Library

Copies 7-14, Liaison Branch, OC-CWS

(7 for OC-CWS)

(8-9 for Canada)

(10 for microfilming)

(11 for Mr. Ainsan)

(12-13 for M.A. London)

(14 for Bureau of Medicine &
Surgery, Navy Dept.)

Copies 15-17, NDRC, Attn: Capt. Bacon

(15 for Washington Office)

(16 for Chicago Laboratory)

(17 for Dr. Homer Smith)

Copy 18, Medical Research Laboratory

Copy 19, Mass. Inst. of Technology

Copy 20, Toxicological Research Lab.

Copy 21, Toxicity Files, Inf. Div.

Copies 22, 28, Dr. Winternitz (Ch.C.T.G.C.)

Copies 23, 29, Medical Division, OC-CWS
Gravelly Point, Washington

Copies 24, 25, Surgeon General

(24 for file, Surgeon General)

(25 for file, Major Johnston)

Copy 26, Director, Toxicology

Edgewood Arsenal, Md.

Copies 27, 36, Dugway Proving Ground

Tooele, Utah

(27 for file, C. O.)

(36 for file, Major Graef, M.R.L.)

Copy 30, Major Sparks, C.W. School

Edgewood Arsenal, Md.

Copy 37, Capt. Geo. H. Mangun

Bushnell, Florida

Typed-15 May 1944 - drk

Submitted by:

E. H. Krackow

E. H. Krackow*

Chemist, P-2

I. Fuhr

I. Fuhr *

Toxicologist, P-2

* Authors

Supervised by:

S. D. Silver

S. D. Silver

Toxicologist, P-5

Edited by:

Maurice B. Strauss

Maurice B. Strauss

Major, M. C.

Recommending Approval:

Alfred Chanutin

Alfred Chanutin, PhD.

Civilian Consultant

Richard C. Carlisle

Richard C. Carlisle, Major, M. C.

Chief

Toxicological Research Laboratory

APPROVED:

Thomas Hale Nam
Major, M.C.

for Cornelius P. Rhoads, Colonel, M. C.
Chief

Medical Division, OC-CWS



DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
EDGEWOOD CHEMICAL BIOLOGICAL CENTER
5183 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5424

REPLY TO
ATTENTION OF

RDCB-DPS-RS

AUG 27 2014

QMB 27 AUG 14

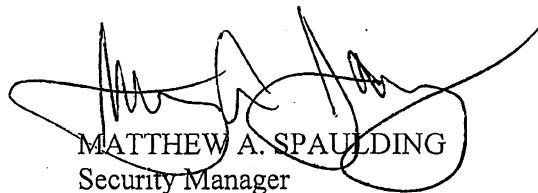
MEMORANDUM THRU Director, Edgewood Chemical Biological Center, (RDCB-D/Mr. Joseph Wienand), 5183 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5424

FOR Defense Technical Information Center, 8725 John J. Kingman Road, Ft Belvoir, VA 22060

SUBJECT: Internal Request for Change in Distribution

1. This action is in response to an Edgewood Chemical Biological Center (ECBC) Internal Request for a Change in Distribution on documents related to cyanogen chloride.
2. The listed documents in the attachment have been reviewed by ECBC Subject Matter Experts and deemed suitable for the change in distribution to read "Approved for Public Release; distribution unlimited."
3. The point of contact is Adana L. Eilo, ECBC Security Specialist, (410) 436-2063, adana.l.eilo.civ@mail.mil.

Encl


MATTHEW A. SPAULDING
Security Manager

Cyanogen Chloride References

- [1] Armstrong, GC, *Toxicity of Cyanogen Chloride to White Mice by Inhalation*, War Department, Chemical Warfare Service, Edgewood Arsenal, MD, 03 March 1933. Unclassified, Dist. D, DoD/Contractors. AD# B956466.
- [2] Fuhr, I., Krackow, E.H., *Cyanogen Chloride LC 50 for Rats: 2 min. Exposure*, **TRLR-27**, . Edgewood Arsenal, Aberdeen Proving Ground, MD, 12 April 1944, Unclassified, Dist. D, DoD/Contractors. AD# B967754
- [3] E.H. Krackow, Fuhr, I., *Cyanogen Chloride LC 50 for Rabbits: 2 min. Exposure*, **TRLR-33**, Edgewood Arsenal, MD, 31 May 1944, Unclassified, Dist. D, DoD/Contractors. AD# B967782.
- [4] Bass, A.D., Tucker, V.J., *Cyanogen Chloride, Informal Progress Report No. 37*, **CB-186516**, National Defense Research Committee of the Office of Scientific Research and Development, Washington, DC, 22 June 1943, Unclassified, Dist. E, DoD Only.
- [5] Kolls, AC, Kuhn, HA, and Todd, AJ, *Report on Toxicity Tests on Mice*, **Report No. 33** in Marshall, EK ed., **Pharmacological and Research Section Monographs**. War Department Chemical Warfare Service, Research Division, American University Experiment Station, Washington, DC, c. 1917. On file with the Historical Research and Response Team, Research, Development and Engineering Command, Aberdeen Proving Ground, MD. Unclassified, Dist. E, DoD Only.
- [6] Franklin, R.C., Wilding, J.L., Stone, W., Franklin, R.T., *A Study of Short Interval Exposures of Goats to Cg, Ck, and Ac*, **CB-004057**, Dugway Proving Ground, UT, 28 November 1945, Unclassified, Dist. B, U.S. Gov't Agencies Only.
- [7] Kolls, AC, Kuhn, HA, and Todd, AJ, *Report on Toxicity Tests on Mice*, **Report No. 41** in Marshall, EK ed., **Pharmacological and Research Section Monographs**. War Department Chemical Warfare Service, Research Division, American University Experiment Station, Washington, DC, c. 1917. On file with the Historical Research and Response Team, Research, Development and Engineering Command, Aberdeen Proving Ground, MD. Unclassified, Dist. E, DoD Only.