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**SUMMARY OF MAJOR EVENTS AND PROBLEMS
United States Army Chemical Corps (U)**

Fiscal Year 1957

Excerpt

October 1957



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scientists attended the meetings. Scientists from the Chemical Warfare Laboratories, Engineering Command, Dugway Proving Ground, Biological Warfare Laboratories, Materiel Command, Chemical Corps Board, and Chemical Corps School contributed thirteen papers. ~~Mr. William C. Tank~~, Dugway Proving Ground, received one of the three \$500 awards for outstanding papers, his papers being, "Downwind Dosage Predictive Equations." Dr. Arthur J. Dziemian, Chemical Warfare Laboratories, received one of the six \$300 prizes. Dr. Dziemian's paper was entitled, "Wound Ballistics Assessment of Bullets." Four other Chemical Corps scientists, ~~Messrs R. M. Auker, E. W. Hartmeyer, R. H. McQuain, and Harvey S. Greenfield~~, were awarded certificates of achievement. All-in-all, Chemical Corps papers received four awards out of twenty-two, an excellent showing. 161

Technical Operations

V-Agents

The Corps placed major emphasis on the development of a class of compounds known as the V-Agents. The V-Agents, discovered in 1954, are the most promising potential agents that have appeared since the Germans found the G-Agents in the late 1930's. These compounds, judging by animal tests, are slightly more toxic than GB when inhaled, approximately fifty times more toxic when absorbed through the skin from a cloud, and several hundred times more toxic when absorbed through the skin from liquid droplets. It is this

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(1) 1957 Army Science Conference Fact Sheet. Chemical Corps Papers Accepted for the Concurrent Sessions. (2) Roster of Chemical Corps Personnel, Army Science Conference, West Point, N. Y., 26 - 28 Jun 57. (3) News releases, PIO, U. S. Military Academy, 22 Jun 57, 28 Jun 57.

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percutaneous toxicity that makes the compounds particularly important, since a mask alone will not protect a soldier. He will need protective clothing, protective ointments, and, if contaminated with V-Agents, prompt medical attention.¹⁶²

The agents that have received the most attention are given below, with their EA (Edgewood Arsenal) number and Chemical Corps symbols:

<u>EA No.</u>	<u>Symbol</u>	<u>Name</u>
1508	VG	O,O-diethyl-S-2-diethylaminoethyl phosphorothiolate
1511	VP	3-pyridyl 3,3,5-trimethylcyclohexyl methylphosphonate
1517	VE	O-ethyl-S-2(2-diethylaminoethyl)ethylphosphonothiolate
1664	VM	O-ethyl-S-(2-diethylaminoethyl) methylphosphonothiolate
1677	VS	O-ethyl-S-(2-diisopropylaminoethyl) ethylphosphonothiolate
1701	VX	O-ethyl-S-(2-diisopropylaminoethyl) methylphosphonothiolate

In February 1957 the Research and Development Command selected VX as the agent upon which to concentrate.¹⁶³ The Chemical Warfare Laboratories, however, continued their investigation of the V-Agents under the possibility that one or more compounds superior to VX might be found.

The V-Agents evaporate more slowly than G-Agents or mustard. The volatility of VX resembles that of lubricating oil. As a consequence the

¹⁶² U. S. Progress Report on CW Agents, Aug 56, Tech Lib, ERF 550-1173.

¹⁶³ Quart Hist Rpt, RDCOM, Jan - Mar 57.

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compounds will probably be disseminated as liquid droplets, as airborne clouds or in munitions especially designed to penetrate clothing and allow the liquid to reach the skin. Droplets from spray tanks can contaminate equipment, buildings, vegetation, the ground, and unsheltered soldiers. Airborne clouds, in which the particles must be large enough to impact effectively on the skin, but still small enough not to settle out, can find their way into buildings and field fortifications. The dissemination of V-Agents has required the establishment of new techniques and means of evaluation. For example, technicians must determine the most suitable particle size, taking into consideration the rate at which clouds will travel, the absorption through clothing and skin, and so on, and then try to adjust munitions to provide particles of the desired size. The Corps has been studying the dispersion of V-Agents by the so-called self-dispersing bomblets, which can be dropped from aircraft or guided missiles. To handle the problems that will arise in the testing and evaluation of V-Agents, Dugway Proving Ground organized a V-Agent team in April 1957.¹⁶⁴

The V-Agents are similar to GB in general physiological action. Casualties caused by aerosol or liquid agents may occur within hours or minutes depending upon the amount that comes in contact with the soldier. If the soldier should happen to inhale V-Agents, he would be a casualty in a few minutes. The indicated treatment for the V-Agents is the same as for the

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(1) Considerations in the Employment of V-Agents, CCB, Aug 56, Tech Lib, ERF 550-1192. (2) Quart Hist Rpt, Dugway Proving Ground, Mar - Jun 57.

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G-Agents; that is, by injections of atropine and artificial respiration. Laboratory experiments indicated that M5 ointment is as effective against V as it is against mustard. The Corps endeavored to improve its ointments to provide better protection against both G- and V-Agents.¹⁶⁵

~~167~~ As is the case with the G-Agents, a field alarm and an area scanning alarm are extremely important for the rapid detection of V-Agents. The Corps has been investigating the possibility of using LOPAIR (Long Path Infrared) equipment originally developed for G-Agents for V-Agent detection.¹⁶⁶

~~167~~ While the standard mask is sufficient protection against vapor-borne V-Agents, standard protective clothing is less satisfactory. One of the problems facing the personnel engaged in the development of protective items is the design of clothing which will give soldiers much more protection against the new agents.¹⁶⁷

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~~167~~ During the year the Corps prepared to produce V-Agents in Chemical Corps plants. The methods of production and the raw materials needed in the

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CmLC Consolidated R&D Annual Proj Rpt, Project 4-08-06-032.

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Potential Detection System for V-Agents, Aug 56, Tech Lib, RTF 550-1212.

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CmLC Consolidated R&D Annual Proj Rpt, Project 4-80-04-013-01.

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other technical services to be reduced by attrition. Dispersed stockage locations were reduced from twenty-eight to nineteen during FY 1957 without the expense of inter-depot shipment.²⁴³

Toxic Planning and Production

On 1 July 1956 the Chemical Corps Phosphate Development Works (PDW) at Muscle Shoals, Alabama, was transferred from the Chemical Corps Engineering Command to the Chemical Corps Materiel Command.²⁴⁴ PDW manufactured "dichloro" (formerly dichlor) the intermediate product for the manufacture of GB nerve gas by the dimethyl hydrogen phosphite (DMHP) process. Engineering Command assigned a project engineer to the supervision of the Phosphorus Oxychloride Reduction Facility where the only remaining principal production problem remained to be solved. This facility which reduced production step III by-product phosphorus oxychloride to step I raw material, phosphorus trichloride, had never been able to keep pace either with the amount of material requiring reduction or with the demands for raw material.²⁴⁵

During FY 1957 optimum operating conditions for reduction furnaces using modified refractory furnace linings were established in the phosphorus oxychloride reduction facility. Data thus collected permitted calculation of

²⁴³

(1) Ibid. (2) Richardson interv, 19 Jul 57. (3) Interv, Hist Off with Lt Col D. W. Dick, Supply Div, MATCOM, 19 Jul 57.

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OCCmLO GO 15, 8 Jun 56.

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Summary of Major Events and Problems, FY 56, pp. 172 - 74.

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a predictable furnace run of 100 days at an average reduction rate of 50 tons per day which would support a 100 tons per day production rate of dichloro. Such maximum performance represented full operation of the plant without the necessity for sale of phosphorus oxychloride to private industry.²⁴⁶

Other production accomplishments at PDW included the installation of a vacuum jet system to replace centrifugal vacuum pumps in step I and the operation of the entire plant on production capability runs at a rate exceeding mobilization objectives. The jet system allowed operation of step I at peak rates of 77 tons per day at qualities as high as 92.5 percent. The production capability runs demonstrated that dichloro production rates of 75 tons per day or better were possible in sustained production. A 45 ton per day rate was considered acceptable for round-out purposes.²⁴⁷

5) Round-out of the facility at Rocky Mountain Arsenal where the last two steps of the agent production process take place was substantially complete in the first quarter of fiscal year 1957. There were no significant production difficulties although modification of equipment, major and minor repair work, and maintenance work proceeded throughout the year. Demands did not require agent production on a sustained basis, but production during the 2d and 3d Quarters was 6,055,877 pounds of agent at a yield of 88.03 percent for the

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Annual Hist Rpt, US Army CalC Phosphate Development Works (PDW), CY 56, pp. 7 - 8.

²⁴⁷

Ibid.

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2d Quarter and 91.17 percent for the third. During the 2d Quarter the plant operated 85.4 percent and during 3d Quarter 90.2 percent of the available time, notably exceeding the sustained run of fiscal year 1956 when the plant was inoperable 17.7 percent of available time. The average feed rate for the 2d Quarter was 170 percent and for the 3d Quarter 197.6 percent of the round-out schedule. Two peaks of 240 percent feed rate were attained; the sustained rates and the peaks were clear indication of high mobilization potential.²⁴⁸

Enlisted Scientific and Professional Personnel made significant contributions to production and operations accomplishments both at Muscle Shoals and at Rocky Mountain Arsenal.²⁴⁹

[REDACTED] The two waste disposal facilities planned at Rocky Mountain Arsenal in FY 1956 were put into operation during FY 1957, the evaporative waste disposal lake on 27 October and the chlorine plant reduction of by-product hydrochloric acid during the 2d Quarter production run. Both methods of disposal were successful although there was storm damage to the disposal lake during the year. As of the end of the year plans were being made to designate the chlorine plant as an operating adjunct of the GB plant.²⁵⁰

[REDACTED] Agent produced during fiscal year 1957 and that carried over from fiscal year 1956 was used to fill ton containers, M360 shells and M121 shells.

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Quart Hist Rpts, US Army Cml Arsenal, Rocky Mountain, FY 57.

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(1) Ibid. (2) Annual Hist Rpt, PDW, CY 56.

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(1) Quart Hist Rpts, US Army Cml Arsenal, Rocky Mountain, Oct - Dec 56; Jan - Mar 57; Apr - Jun 57. (2) Quart Hist Rpts, MATCOM, Oct - Dec 56; Jan - to Mar 57; Apr - Jun 57.

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Production to meet total requirements for these purposes was near completion at the end of the fiscal year. An attempt to revise these requirements to provide for a larger mobilization agent stockpile was not successful. The principal problem was that there has been no agreement on a basic day-of-supply for toxic munitions. The Assistant Chief Chemical Officer for Planning and Doctrine was working to establish the criteria for a day-of-supply calculation at the end of the fiscal year, but, meanwhile, the Deputy Chief of Staff for Logistics ordered the cessation of agent production early in FY 1958 since Budget-Supported Force requirements would be met.²⁵¹

During FY 1957 a new agent was being considered for production. The Chief Chemical Officer, on the advice of a committee appointed to consider V-Agent production plans, directed that the target for operation of a continuous process ten ton per day V-Agent production plant be moved up from June 1962 to January 1960. Slightly more than \$36,000,000 was requested from higher authority for the accomplishment of this goal. As of the end of the fiscal year the Deputy Chief of Staff for Logistics had directed that \$29,900,000 of this sum, representing actual construction of a plant, be deferred from fiscal 1958 to fiscal 1959 programming. It was expected that a reconsideration of this decision would be requested early in fiscal 1958.²⁵²

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(1) Mullen-Van Sant-Katz interv, 31 Jul 57. (2) George-Abbruscato interv, 26 Jul 57.

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(1) Mullen-Van Sant-Katz interv, 31 Jul 57. (2) Readiness Position of Selected Chemical Corps Items, Log Pl Div, OCCm10, 1 May 57, pp. 23 - 24. (3) Quart Rev, Class Sup p. 31, Apr - Jun 57.

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