SUMMARY HISTORY OF CHEMICAL CORPS ACTIVITIES

9 SEPTEMBER 1951 TO 31 DECEMBER 1952

Prepared By

HISTORICAL OFFICE

Office of the Chief Chemical Officer

February 1953
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UNCLASSIFIED
INTRODUCTION

The mission of the Chemical Corps is officially defined as follows:

"To study and investigate toxicological warfare, including chemical and biological warfare and radiological defense; to provide technical supervision of the training of the Army in these fields; and to develop, manufacture, procure, and supply material and equipment pertaining to these types of warfare except as specifically assigned to other agencies." 1

During the period 9 September 1951-31 December 1962, the Chemical Corps was principally concerned with the support of the Korean War and with the improvement of the Bacteriological Warfare (BW) and Chemical Warfare (CW) capabilities of the Armed Forces in the event of an emergency and in defense against radiological attack (RW). The Department of Defense and the Department of the Army emphasized the need for speedily augmenting the capabilities for retaliation in these fields. Consequently, emphasis was placed on the development of facilities and on stock-piling. The advice of leading consultants, including engineers, was constantly sought in order to assure that the soundest and most up-to-date research knowledge and engineering practices were utilized.

In view of the need for rapid advance in the research and engineering field to support the programs assigned to the Chemical Corps, the Department of the Army studied and authorized certain strengthening in the organizational structure of the Chemical Corps. This

1 DA SR 10-350-1, 15 September 1949.

2 Combining the initials of these types of warfare, they were collectively referred to as CBR warfare.
strengthening pertained principally to the research program.

As early as 30 June 1950, five days after the outbreak of the fighting in Korea, the Department of the Army began to manifest an increased interest in chemical and biological activities. On that date a report compiled by Dr. Earl Stevenson recommending that more emphasis be placed on EW and CW was submitted to the Secretary of Defense. General George Marshall, the then Secretary of Defense, in October 1950 approved certain aspects of this report and withheld his approval of others. His action was authority for the Chemical Corps' securing funds and making preparations for the expansion of chemical, biological and radiological defense activities. This expansion, which was carried on in the period under consideration, 9 September 1951-31 December 1952, will be discussed in more detail below.

The Reorganization of the Chemical Corps, 1 November 1951

Certain memoranda and directives emanating from the President of the United States, the Bureau of the Budget, and the Department of the Army, stressed the need for delegating authority and conserving space in the national capital. This led to a reorganization of the Chemical Corps as of 1 November 1951 when three field commands (Research and Engineering, Training and Materiel) were activated. At the same time

3 These memoranda and directives are listed in Adm 0 34, OC Cnl 0, 1 Nov 51, sub: Changes in Organization and Functions, Chemical Corps Field Installations and Activities -- Chemical Corps Field Commands.

4 (1) DA GO 88, 12 Oct 51.
(2) Adm 0 34, OC Cnl 0, 1 Nov 51.
the administrative units in the Office of the Chief Chemical Officer became purely staff in character. There was only one exception to this, and that was in regard to plans and intelligence, where the nature of the functions made it impracticable to transfer them out of the Chief's Office. Chart 1 portrays the organization of the Chemical Corps as of 1 January 1952.

The command organization proved a great boon to the Chemical Corps in carrying out its increased work load in the period under consideration. It facilitated closer supervision of operations and more definite delegation of authority, with the result that it was possible to carry out in a more orderly and business-like manner the Chemical Corps functions of planning and obtaining additional facilities, increasing stock levels and training the Armed Forces in CBR Warfare.

Other Organizational Developments

Several other organizational developments, less elaborate in scope, had important repercussions on the administration of the Corps. One of these was the Department of the Army decision to provide the technical services with Inspector Generals and Provost Marshals. In the Chemical Corps, these officers through their checks and inspections brought to light a number of minor deficiencies which might not have otherwise come to the attention of the Chief Chemical Officer or his

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(1) Interv Hist O, OCCm10 with Brig Gen Charles E. Loucks, Dep Chief Cml O, 29 Jan 53.
(2) Interv Hist O, OCCm10 with Brig Gen H. M. Black, C G, Mat Com, 19 Jan 53.
(3) Interv Hist O, OCCm10 with Col. D. R. King, Exec O, OCCm10, 29 Jan 53.
Immediate staff. Another development was the activation of an Overseas Liaison Office in the Plans, Training and Intelligence Division.

The mission of this Liaison Office was to act as a clearing house for all Chemical Corps theater matters, to increase and expedite the flow of technical information to the theater, and to study theater supply problems.

Personnel Administration

Table 1 lists the personnel strength figures at the quarterly intervals from 31 August 1951 to 31 December 1952.

**TABLE 1 -- PERSONNEL STRENGTH FIGURES**

<table>
<thead>
<tr>
<th>Date</th>
<th>Off &amp; TD</th>
<th>Enlisted</th>
<th>Civilians</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 August 1951</td>
<td>814</td>
<td>2,121</td>
<td>10,882</td>
</tr>
<tr>
<td>31 December 1951</td>
<td>783</td>
<td>2,339</td>
<td>12,299</td>
</tr>
<tr>
<td>31 March 1952</td>
<td>777</td>
<td>2,685</td>
<td>12,470</td>
</tr>
<tr>
<td>30 June 1952</td>
<td>861</td>
<td>2,682</td>
<td>12,111</td>
</tr>
<tr>
<td>30 September 1952</td>
<td>756</td>
<td>2,708</td>
<td>12,604</td>
</tr>
<tr>
<td>31 December 1952</td>
<td>867</td>
<td>2,593</td>
<td>13,306</td>
</tr>
</tbody>
</table>

* These figures do not include troops overseas, nor Chemical Corps troops at installation in the Zone of Interior other than under Chemical Corps Jurisdiction, nor troops in General Reserve Units.

Personnel problems arose in connection with the procurement of military personnel, both officer and enlisted. Officers were furnished solely by the ROTC and OCS. While many of these young officers were

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*Interv Hist O with Col. D. R. King, Exec O, OC 01 O, 29 Jan 52.*

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*OC 01 O, 30 l, 5 Dec 52.*
extremely capable, they were naturally lacking in experience. Nor were the time limitations on their periods of service, twenty-four months for ROIC officers and eighteen for OCS graduates, conducive to their attaining the desired experience. To complicate the situation still more, various compulsory training courses for new officers delayed their assignment for at least seven months.

The assignment of field grade officers to duty in the theater presented another problem. The Chief Chemical Officer urged ACoS (G-4) to assist him in filling certain positions, particularly those of branch and section chiefs, with experienced officers. The Chemical Corps believed that an involuntary recall program for officers with critical MOS's, despite its inherent morale problem, would be the best solution. However, this was not possible because restrictions on the ACoS (G-1) prevented his increasing the strength of the Army.

Difficulties arose in obtaining a sufficient number of enlisted men of the non-scientific and professional category. The Corps was considerably overstrength in scientific and professional enlisted personnel, who were performing a most useful and valuable service. In allocating enlisted personnel to the Corps, ACoS (G-1) took into

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8 Interp Hist 0, OCSm10 with Lt Col J. B. Costello, Deputy Chief, Personnel Div, OCSm10, 30 Jan 53.

9 Ibid.
consideration the total number of enlisted men, and the overstrength of SFP's resulted in a shortage of non-SFP's.

Facilities

The volume of new construction of and the improvement in existing Chemical Corps facilities clearly demonstrates the increasing readiness of the Armed Forces for CBR. At the beginning of the Korean War the Chemical Corps had only one active construction project totaling $233,000 in progress. By 31 December 1952, 346 Military Construction Army (MCA) projects and 18 Expenditing Production Funds (EPF) projects had been initiated bearing a total cost of $323,911,599.

The greater part of appropriations for Chemical Corps construction and improvement went into long-range programs for research and development and industrial facilities. These long-range programs were initiated primarily to increase the CBR retaliation potential of the Armed Forces rather than to supply the Korean War.

The Chemical Corps encountered problems unique to chemical and biological warfare in implementing Department of Defense policy for CBR readiness. Due to lack of development of items or techniques, or to lack of private industrial facilities, or to the reluctance of private industry to handle chemical and biological items, the Chemical Corps has found it necessary to design, build, and, in many cases, to operate its

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10 Rpt, Facilities Br, Mat Div, OCCnl0, 30 Jan 55; sub: Status of Programs (Facilities).
own research, testing and industrial facilities. The following table (Table 2, p. 8) presents the progress the Chemical Corps has made in several main categories to meet this need. Since these construction activities were stated in terms of long-range programs, it would be unrealistic to limit this table strictly to the months September 1951 through December 1952. Appropriations have therefore been stated for fiscal years 1951, 1952, and 1953 to reflect the activities of the subject calendar period.

Recommendations on Major Administrative Problems

The period September 1951 - December 1952, as has been pointed out, was one of considerable growth and expansion for the Chemical Corps. Additional personnel, both military and civilian, were being added to carry on the Corps' functions; new facilities were being planned and constructed; efforts were made to increase the supply level and to train the Armed Forces in the elements of CBR warfare. While the three commands greatly facilitated accomplishments, it was inevitable that some serious problems, particularly of an administrative nature, would arise. In the field of research and development, these problems were perhaps more pressing than elsewhere. The question came up, for example, as to the limits to which research might be carried before development commenced. Again, the proper administration of research and development became a matter of concern; who, for example, should be responsible for its direction, the military or a civilian director?
<table>
<thead>
<tr>
<th>PROJECT OR LOCATION</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capital Cost</td>
<td>Capital Cost</td>
<td>Total Replacements &amp; Adjustments</td>
<td>Principal Purpose of New Construction or Improvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A/0 30 June 51</td>
<td>A/0 30 June 52</td>
<td>Cost A/0 31 Dec 52</td>
<td>A/0 FY 51, 52, 53</td>
<td></td>
</tr>
<tr>
<td>Army Chemical Center</td>
<td>$42,507,129</td>
<td>$43,475,766</td>
<td>$96,065,047</td>
<td>$9,942,273</td>
<td>Research &amp; Development, Command Facilities, Pilot Production</td>
</tr>
<tr>
<td>Dugway Proving Ground</td>
<td><strong>n/a</strong></td>
<td>35,135,801</td>
<td>18,297,331</td>
<td>21,859,300</td>
<td>Research &amp; Development – Testing</td>
</tr>
<tr>
<td>Pine Bluff Arsenal</td>
<td>50,832,499</td>
<td>53,209,879</td>
<td>177,681,989</td>
<td>81,570,700</td>
<td>Production – Classified Projects</td>
</tr>
<tr>
<td>Rocky Mountain Arsenal</td>
<td>37,528,053</td>
<td>37,528,053</td>
<td>113,300,632</td>
<td>18,291,050</td>
<td>Production – Classified Projects</td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td><strong>n/a</strong></td>
<td><strong>n/a</strong></td>
<td><strong>n/a</strong></td>
<td>18,291,050</td>
<td>As stated</td>
</tr>
<tr>
<td>Testing &amp; Training sites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not otherwise covered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Activities</td>
<td><strong>n/a</strong></td>
<td>22,110,075</td>
<td>27,899,500</td>
<td>80,277,476</td>
<td>Production – Classified Projects</td>
</tr>
<tr>
<td>Other than Arsenal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactivations of Plants in</td>
<td><strong>n/a</strong></td>
<td>6,087,825</td>
<td>15,039,805</td>
<td>2,849,666</td>
<td>Production – Regular Items and Classified Projects</td>
</tr>
<tr>
<td>Standby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply &amp; Storage Installations</td>
<td><strong>n/a</strong></td>
<td>21,973,301</td>
<td>17,307,598</td>
<td>3,250,945</td>
<td>Increase space and Facilities</td>
</tr>
<tr>
<td>Total</td>
<td><strong>n/a</strong></td>
<td><strong>n/a</strong></td>
<td><strong>n/a</strong></td>
<td>$323,551,599</td>
<td></td>
</tr>
</tbody>
</table>

* est. estimated  
** not available

Column I -- From OCM, Report ENG 2361, 30 June 1951, sub: Inventory, Owned, Sponsored and Leased Facilities
Column II, III -- From OCM10, Material Division, Facilities Branch, Report 25 January 1953, sub: Status of Programs (Facilities), Section VIII.
Column IV -- From OCM10, Section T
Column V -- By decision OCM10 and OC MILITARY HISTORY, details of highly classified production projects are not considered applicable to this report.
In the early months of 1952 the EW and CW programs were the subject of review by the Secretary of the Army. In order that he might have the benefit of the knowledge and experience of outstanding civilian scientists, the Secretary requested a group of five outstanding authorities to serve as an ad hoc committee to study and to recommend action on the Army Scientific Advisory Report on biological and chemical warfare. This committee, headed by Dr. J. R. Killian, Jr., submitted the results of its findings on 17 April 1952. The conclusions which the committee arrived at can be summarized as follows:

1. The Department of Defense should "insure the flow of necessary funds and personnel to the Chemical Corps".

2. There should be a greater emphasis on the development of weapons and of procedures for testing the effectiveness of EW agents for anti-personnel use.

3. Every effort ought to be made to educate the Army on the effectiveness of EW and GB gases.

4. There should be a "strengthening" of the Chemical Corps organization "by 'thickening' the management layer of the Corps". In this connection, it was recommended that a civilian Vice Chief Chemical Officer be appointed to supervise research and development activities. The Vice Chief would be assisted by Deputy Chiefs, one for EW, one for toxic agents, and one for all other activities within the Chemical Corps.

5. Approval was given to the proposal for setting up an Inter-service Coordinating Committee for Chemical and Biological Warfare.

Upon receipt of the report of the ad hoc committee, generally referred to as the Killian Report, the Chief of Staff set up a committee
of four general officers to recommend specific action to be taken as a result of the report. This committee of general officers in a memorandum to the Chief of Staff on 6 May 1952 expressed general agreement with the Killian Report with two principal exceptions: (1) use of the title "Vice Chief Chemical Officer", which they felt should be changed to "Special Assistant to the Chief Chemical Officer"; and (2) the level of control of BW and toxic agents be not at the level of the Chief Chemical Officer as suggested by the Killian Report, but rather at the level of the Research and Engineering Command.

A beginning was made in the latter half of the calendar year 1952 to implement the Killian Report throughout the Corps, as will be discussed in more detail below. At the close of the year 1952, however, the changes coming as a result of the report were still largely in the planning stages.

These officers were: Maj Gen E. D. Nichols, Ch, of R&D Board; Maj Gen E. F. Bullene, C Col O; Brig Gen R. W. Colglazier, Jr., GACofS (G-4); Brig Gen G. J. Higgins, GACofS, (G-5).

See page 12 for specific effect of Killian Report on Research and Development and page 44 on procurement activities.
RESEARCH AND DEVELOPMENT IN THE CHEMICAL CORPS

Administration

Hardly had the period covered by this summary (September 1951 - December 1952) opened than there was a major reorganization of management in the Chemical Corps. This was brought about by a desire for better management by delegation of authority and decentralization of the activities of the Corps in order to minimize the effect of a major disaster in the Washington area.

The reorganization reduced the functions of the Office of the Chief Chemical Officer (CC Cml O) to a command and staff organization. In the CC Cml O a Research and Development Division was established for the purpose of providing staff direction, while in the field the Research and Engineering Command succeeded the earlier Research and Engineering Division but with increased responsibilities. With the establishment of Research and Engineering Command, activities such as the Chemical Corps Chemical and Radiological Laboratories were placed under Brigadier General William M. Creasy, Commanding General, R&E Command. The new command set-up provided more efficient management by interposing an additional command level between the CC Cml O and the operating agencies, thereby relieving the CC Cml O of all except command and staff responsibility. As a result of these changes definite progress was made toward

(1) Adm 0 33, CC Cml O, 31 Oct 51, sub: Changes in Organization and Functions, Office of the Chief Chemical Officer.
(2) Adm 0 34, CC Cml O, 1 Nov 51, sub: Changes in Organization and Functions, Chemical Corps Field Installations and Activities -- Chemical Corps Field Commands.
(3) Organization chart, R & E Command. (Chart 2, p. 11a).
CBR readiness in the field of research and development.

A major personnel and organizational problem facing R & E Command after May 1952, was the implementation of the Killian Committee Report with the recommended modifications. Some steps were taken, but the lack of full approval by the ACoFS G-4 and a lack of certain key personnel delayed the Corps-wide implementation. In August 1952, two main steps were taken at Camp Detrick in which the Director of the Biological Laboratories received additional responsibilities, control, and four Assistant Directors.

During the period covered there was a steady increase in personnel engaged in research and development of about 200 persons a quarter. The utilization of enlisted scientific and professional personnel (EFP's) contributed to the research and development work in the Command. In numbers only about 19% of the total military and civilian strength, the EFP's represented almost 50% of the total personnel engaged in professional scientific work. In December 1952, ACoFS G-1 authorized additional military spaces so that these men might be included on R/D's rather than being carried as overstrength. This move made promotions, which are a necessary morale factor, somewhat easier.

The FY 1953 research and development funding program called for roughly $42,500,000 of which some $6,000,000 was for installation support.

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14 For discussion of the Killian Report see pp. 7-10.

15 (1) Adm G 19, Oc Cmt 0, 21 Aug 52.
(2) Quart Adm Rpt, Cal C Bio Labs., Jul-Sep 52, p.19.

16 Intery Hist O CCOC10 with Controller, R & E Command, 2 Feb 53.
The program for FY 1962 had called for about $38,000,000, but at
that time the support had come from Maintenance and Operating appro-
priations. It was estimated that as of 31 December 1962 roughly 60% of
the 1963 budget had been expended or obligated. The Military
Construction Program for the Chemical Corps for FY 1962 included a
total appropriation and allocation at the four principal R & E Command
installations of some $34,680,000, while some $27,000,000 were ear-
marked for that purpose in the FY 1963 budget. A major accomplishment
in the field of construction during this period was the completion of
$24,000,000 worth of projects at Dugway Proving Grounds that had been
authorised in FY 1961.

Thanks to the world situation of limited war the research and
development programs were directed at the immediate completion of
short-term developments where immediate benefit to operational effec-
tiveness would result. Although some of these developments were admit-
tedly stop-gap measures, such as the ML4 biological bomb, they provided
something to use if it were required. At the same time developments
were accelerated in order to ease the greatest operational deficiencies.
The emphasis was therefore placed on end items in all fields, weapons
and munitions for the dissemination of the nerve gases (G-agents), and
the entire field of biological warfare.

(1) Interv Hist O 00 Gm1 G with Comptroller, R & E Comd, 2 Feb 53.
(2) Figures furnished by Office of the Comptroller, R & E Comd.

(1) Ibid.
(2) See p. 6, Table 2.

Opening Remarks, 7th Trinopie Meeting, by Brig Gen Wm M. Creazy,
17 Sep 52.
Chemical Research and Development

The Chemical Corps made significant progress in research and development during the period September 1951 - December 1952. The DMHP process for the manufacture of the nerve gas, GB, was improved, while progress was made in the problem of disposal of by-products from DMHP plants.

One of the major accomplishments by the Chemical Corps Chemical and Radiological Laboratories (CRL) in the dissemination of the G-agents was the completion of development of a 1000-lb cluster (E10LR3) containing 76 GB-filled bombs (E54R6). By December 1952 the final engineering tests and some suitability tests had been completed. A cluster of different dimensions and better aerodynamics was needed for high performance aircraft, however, and work was commenced on this. A kit for the conversion of fire bombs to spray tanks (E12) showed great promise. Advances in ground munitions for the dissemination of G-agents included GB-filled shells for the 105mm and 155mm howitzers which were nearing standardization. There was also work on a 4.5-inch GB rocket for use on area targets and a 4.2-inch mortar shell. Field tests were initiated to determine the feasibility of

(1) Interv Hist C 00 Cml 0 with Col Eugene G. Bennett, Ch, Research Div, R & E Comd, 6 Feb 53.
(2) The material in this section, in addition to those references given in footnoes, was taken from Monthly, Quarterly or Annual Historical reports and from the Monthly and Semi-annual project progress reports of R & E Comd.

(1) DF C Cml 0 to AGfS (G-4), 19 Jan 53, subj: Army Progress Rpt, Sec 7-a, Res & Dev.
(2) Interv Hist C 00Cml 0 with Lt Col R. C. Gordon, Research Br, R & D Div, CC Cml 0, 22 Jan 53.
of disseminating CW-GB agents by thermal generation. The possibility of guided missile warheads was also under study by the Chemical Corps as a result of USAF and AFF requirements. C-agent warheads were under development by the close of the period.

In flame warfare a new lightweight portable flamethrower gun reached the prototype stage. It was anticipated that a new plastic PPT, which was then under early development, would not weigh over 50 pounds as compared with the 70 pound weight of the M2A1 portable flamethrower. An integral mechanized flamethrower (TSO) mounted in an M47 type tank with the 90 mm gun removed, was under limited production for the USMC, and a pilot model for the newer T43 tank was under development. An outstanding development in the aerial incendiary field was the T50-1b fire bomb (274), and its standardization was expected by mid-1952.

The search for a more satisfactory thickener embodying non-critical chemicals available in the 21 led to the development of three new thickeners which were far superior from the points of view of gel formation in aviation gas, better mixture at low temperatures, and density of material.

During 1952 the M3 pulse-jet smoke generator was standardized. This was a new item in that it introduced fog oil into the exhaust system where it was expelled with the engine combustion products as an aerosol, rather than vaporizing it in steel coils as in the M2A1 smoke generator. This resulted in less maintenance and lower personnel requirements.

In the field of non-toxic agents an infrared screening agent was developed to prevent the efficient use of infrared guided weapons and
viewing devices. The Chemical Corps worked on an anti-radar agent to counter radar dependent items such as VT fuses, and search and scanning instruments.

**Biological Research and Development**

The field of biological warfare (BW) received more and more emphasis from every standpoint. Work on BW agents led to the standardization of an anti-personnel agent.

Plant pathogens received the most attention in the anti-crop field and one agent was standardized. Two chemical growth inhibitors were proposed for standardization.

Progress in the field of animal diseases was handicapped by a complete lack of facilities, and the bulk of research on anti-animal agents had to be conducted by contracts and by other government agencies such as the Department of Agriculture. It was hoped that the activation of Ft. Terry in the spring of 1952 would meet with success in the study of certain animal diseases when the work of rehabilitation and the new facilities there were completed.

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22 (1) Report of Cml C Bio Labs for 1 Jul 51 - 30 Jun 52, Rpt Series No. 6, 1 Sep 52.

23 (1) DA GO 45, 25 Apr 52.
(2) Hist Rpt of Ft Terry, 1 Jan 51 - 30 Jun 52.
(3) Public Law 496 (80th Cong) prohibited work with the agents of certain animal diseases on the U.S. mainland.
Work on BW munitions led to the standardization of the Milé bomb for dispersion from the M33 cluster. Development and engineering tests on other bombs were in progress. Furthermore, a number of field trials with BW agents took place during this period.

Large scale studies were made with aerosol cloud travel as well as the behavior of aerosol clouds over two U.S. inland cities. In OPERATION EWW a fluorescent chemical was released as an aerosol from a Naval minesweeper steaming along the southeast coast of the United States. The results indicated that it was possible to achieve long-range aerosol cloud travel and consequent coverage of thousands of square miles by the dissemination of relatively small amounts (250-lbs) of tracer material under low level temperature inversion.

The Biological Laboratories made a very detailed study in connection with the important problems of drying, grinding, and sizing of BW agents for the BW dry agent program. As a result of this study and of guidance in this area, a large program in the field of drying has been undertaken, largely by contract. That increased emphasis was given to the whole BW program can be judged by the considerable expansion of facilities and effort that took place during this period. At the close of 1952 there was a major construction program in progress at Camp Detrick, amounting to about $20,000,000 for FY 1953, which reflected the increased concentration on the development of end items.

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24 Rpt of Cnl C Hil Labs for 1 Jul 51-30 Jun 52.
25 Interv Hist C OC Cnl C with Col M. Moree, Spec Asst for BW, R & E Cond, 16 Feb 53.
Radiological Research and Development

The Radiological Warfare program was a new one to the Chemical Corps, having begun in 1949 with the decision to conduct an operational evaluation of HW as a weapons system. Until 1951, however, the Chemical Corps was committed to the use of radioactive tantalum, thereby competing directly with atomic warfare work since both required pile neutrons. Progress in HW research was so rapid as to advance the date for supplying data to the Weapons System Evaluation Group (WSEG) for the evaluation of HW as a munitions system by one year. By the end of 1952 the Chemical Corps was also in the final stages of development of aerial munitions systems. There was a highly aimable 750-lb bomb carrying 500-lbs of radioactive hydroscopic pellets with an activity of about one megacurie. This bomb was capable of contaminating between 0.07 and 1.0 square miles. Work on this project was terminated for the moment, however, because of the desire for concentration on large area targets.

The most significant development in aerial dissemination came in the investigation of spherical munitions as a means of solving the biggest problem in aerial HW, that of dispersion. Since spheres lack good ballistic characteristics they provided far better dispersion.

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26 DA SR 10-350-1, 15 Sep 49.

EW likewise benefited from this work since it, too, requires adequate dispersion for maximum effectiveness. The use of ribbed spheres to impart a spin to the bomb further increased the pattern size. An additional modification called the composite sphere (E353A) enlarged the diameter of the pattern.

The problems of shielding aircraft crews, dissipating the heat due to self-absorption of radio-activity, and the mal-effect of radiation on primers and initiators were overcome. The ground handling equipment presented no problem since weight was not considered a critical factor.

From the 21 August 1952 briefing on EW for the Chief of Staff, General J. Lawton Collins, the Chemical Corps acquired the task of studying an EW ground dissemination weapon system to be employed by ground troops, and work was authorized by Chemical Corps Technical Committee action on 2 December 1952. Despite this direction for work no additional funds were provided. This led to the rescheduling of FY 1953 Chemical Corps funds in order to find the money for this phase of the EW program. A number of ideas resulted from this study. One envisaged a truck-trailer combination to contaminate important roads by metering the ‘hot’ agent into a liquid binder and spraying it onto the road. An aerosol munition or smoke generator was suggested as a means of contaminating key industrial buildings, power

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 Ibid.

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(1) DF, ACoS (G-3) thru ACoS (G-4) to OCO, 25 Aug 52, subj: 21 August Briefing on the Use of EW and 1st Ind. CG, EAF Command Information to G Cal 0, 8 Oct 52.

29

(2) OCG Item 2575, Meeting No. 5, 2 Dec 52.
facilities, mines, etc., while they are still in our possession in order to deny their use without physical destruction. A big problem here was the discovery of what makes particles stick to surfaces. The greatest potential of this ground BW is from the defensive aspect, notably in withdrawal.

Defensive Aspects of Research and Development

The fields of detection, protection, and decontamination of CBR agents showed some definite advances. Adequate methods of identification existed for all CW agents except the G-agents, and detection of the latter in time to prevent casualties was a continuing problem, for an automatic device is necessary. One of these automatic alarms had already been developed for fixed installations, and three field alarms for G-agents were under development. Meanwhile the Chemical Corps had improved the M8A2 Chemical Agent Detector Kit by the addition of indole and sodium pyrophosphate peroxide solution which were used with an air-sampling pump for the detection of G-agents. This did not provide a timely-enough warning of the presence of G-agents, however.

In the field of defensive BW the ability to detect rapidly and identify BW agents was a most urgent and elusive problem. Rapid warning devices to indicate an unusual increase in the atmosphere of bacteria, high protein count, or number of micron-sized particles

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Draft, Speech by Brig Gen Wm. M. Creasy, to be delivered at Fort McClellan, Ala., 13 Mar 53, subj: Research and Development in the Chemical Corps.
were under development and evaluation. Kits for the detection of CN agents in food and water were developed and sent to the Surgeon General for tests. Considerable progress was made toward the development of combined antigens for the purpose of mass immunization.

Although nothing superior to water or a mild alkaline solution was found for removing G-agents from the skin, a study of reaction between anticholinesterases with other compounds revealed a variety of compounds which react with the anticholinesterases or promote their hydrolysis. The application of these findings to measures for the prevention and/or treatment of nerve gas casualties was under study at the close of the period. The findings represented one of the most important advances in the field of medical treatment of G-agent casualties.

Work of the Chemical Corps Medical Laboratories further emphasized the need for aerosol detectors, identification and mechanism of action of G-agents, and the treatment of G-agent casualties. Perhaps the most important achievement, however, was in the field of wound ballistics with funds provided by Ordnance, and the new body armor for use in Korea was evolved from this study. A further outstanding accomplishment was the successful testing of a new means of artificial respiration which was officially adopted by the Department of Defense, American Red Cross, Bureau of Mines, United States Public Health Service, the Boy Scouts, and a number of industrial firms.

31 Rpt of Cal C Bio Labs for 1 Jul 51-30 Jun 52.
32 Interv Hist 01 C Med C with Dr. Florence J. Hylander, Cal C Medical Laboratories, 9 Feb 52.
Research was under way on an EW dosimeter program with basic research on chemical methods of measuring radiation. One dosimeter had reached the final engineering phase by the end of 1952.

Two items of significance in the field of collective protection development included the diffusion barrier and the tank collective protector (E26). The former embodied a radically new concept, still in the early development stage, that of a non-chemical protector utilizing a fiberboard-like material for protection against aerosol and non-persistent agents. This was for use in semi-fixed installations where it could be incorporated into the walls. The panels kept out the toxic agents and let out moisture and carbon dioxide. The collective protector for tank crews underwent combined final engineering-user tests late in 1952 and was nearly ready for standardization.

A civilian canister-less protective mask with a charcoal-bearing filter pad facepiece (E52) was under development. The intention was to provide equal protection at a lower cost for civilian employees and military dependents of the Army.

The development of methods and material for EW decontamination was a bright spot among the Chemical Corps' accomplishments. The use of ethylene oxide, a gaseous disinfectant harmless to materials, allowed the decontamination of objects as large as a 23-ton truck. Formaldehyde vapor was used in field tests for the decontamination of large enclosed spaces. Flowing steam was found useful on naval vessels where

33 Interv Hist O-OC Cal O, with Col Eugene G. Bennett, Ch, Res Div, R&E Comd, 6 Feb 53.
steam will not damage the contents of the compartment.

Proving Activities

On the recommendation of the Chemical Corps Advisory Council
the Environmental Surveillance Testing of Chemical Corps weapons,
munitions, and equipment was moved from Dugway Proving Ground to
Edgewood Proving Ground in February 1952, thereby permitting the
planning of more extensive and comprehensive tests. At the same
time Dugway was freed from diversionary efforts and allowed to con-
centrate on the toxic effects program. Under the Environmental Sur-
veillance Testing program the Chemical Corps was to participate in
the establishment of three permanent installations at Panama, Yuma
(Arizona), and Big Delta (Alaska) for army-wide use.

Flame, smoke, and non-toxic munitions continued to be tested at
the Edgewood Proving Ground. At Dugway in the spring of 1952 the
Chemical Corps made an important advance in the area of anti-crop
agent testing. That October an operational suitability test on CW
bombs was conducted in the most extensive test yet held. General
problems confronting the Dugway Proving Ground and the Environmental
Test Teams included a lack of suitable housing and recreation facili-
ties, thereby encouraging a high turnover of civilian personnel.

34 Rpt of Cal C Bio Labs, 1 Jul 51-30 Jun 52.

35 Interim Hist O OC Cal O with Lt Col Zim Lawhon, Ch, Proving Ground
Div, R & E Cond, 6 Feb 53.

36 Ibid.
PLANS, OPERATIONS, TRAINING, AND INTELLIGENCE ACTIVITIES

Plans and Operations

The Office of the Chief Chemical Officer, under the general direction of AGfS (G-3), prepared and reviewed plans, studies and surveys on CBR warfare. In carrying out these functions several significant developments occurred.

During World War II the CWS prepared periodic evaluations, known as the Status of Readiness Reports, on the ability of the service to wage chemical warfare. These reports were of a logistical nature. Feeling that a similar but more inclusive study would be very useful at this time, Brigadier General Loucks, by a DF dated 24 November 1951, approved the preparation and publication of an Estimate of the CBR Situation which was to appear every six months. The first in this series, dated 1 July 1952, was distributed by a TAG letter dated 1 December 1952.

This document consists of two parts: a basic section (of about ten pages) and a group of six supporting annexes. The first part is a short, concise estimate of the CBR situation prepared by the Chief Chemical Officer for distribution to high level staff and command officers. The six annexes include the documentation and an expansion of the ideas expressed in the main portion. They concern Chemical Corps

The section on Plans and Operations is based on:

(1) Interv Hist 0, OCM10 with Lt Col Martin L. Denlinger, PT&W Div, OC Cml 0, 30 Jan 53.

(2) Historical Reports, PT&W Div, OCM10, for the period covered by this report.
support troops, training, personnel, supply, research and development,
and intelligence.

The Department of Army recommended that barrier plans be prepared
for the American area of responsibility in Europe to aid in retarding
any possible attack, and the Office of the Chief of Engineers volunteered
to make the necessary preliminary surveys. That office sent a team to
Europe which prepared plans for the erection of a barrier consisting of
minefields, wire, and demolitions, including estimates of the require-
ment in material and man hours. These plans were submitted to the Chief
Chemical Officer so that they could be augmented with chemical annexes.
The entire area to be so defended was divided into three sections. By
the close of the calendar year the chemical annexes of two of the
sections were virtually complete, and the Chief of Engineers had commented
favorably on the one he had reviewed. The chemical annexes indicate
the location of mustard land mines and bulk mustard to be used to
reinforce the barrier and provide an estimate of the amount of material
and labor necessary to accomplish the mission.

A Department of Army AGOCS (G-3) staff study of August 1962
recommended that all chemical mortar battalions be converted to infantry
heavy mortar battalions. This recommendation particularly affected
the 2nd Chemical Mortar Battalion which, broken down into its component
companies, had given valuable support to those UN and ROKA units in
Korea which lacked organic artillery. Early in 1963, as a result of the
staff study, the 2d Chemical Mortar Battalion was transferred less personnel and equipment to the Zone of Interior. The physical part of the unit, which remained in Korea, became the 461st Infantry Battalion (Heavy Mortar). In the case of the two remaining chemical mortar units, both stationed in the Zone of Interior, one, a reserve unit, reverted to the ORC, and the other was deactivated and its personnel transferred to the new 2d Chemical Weapons Battalion.

Korea

The Chemical Corps' principal weapons in Korea were flame, smoke and the 4.2-inch mortar. Flame warfare in Korea substantially increased during this period. The shift from a limited offense to a more or less static line in the summer of 1951 led to greater emphasis on the defensive use of flame. Three weapons which saw the most use were the portable and mechanized flame throwers and the napalm mines. While the first two are standard Chemical Corps items, the napalm mine is a field improvisation which will cover an area approximately 20-30 yards in diameter with burning napalm particles. Other field improvisations included a napalm satchel charge and a napalm bunker bomb, used in rooting out the entrenched Chinese and North Koreans, and an emplaced flame thrower. The latter utilizes a 25-gallon fuel tank from the M3-4-3 mechanized flame thrower, 50 to 100 feet of high pressure hose, and the gun group of the M2A1 portable flame thrower.

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38 The Second Chemical Weapons Battalion was activated at Dugway Proving Ground in January 1953 as a replacement for the "lost" mortar units.

39 EUSAK Staff Study, 24 Sep 52, sub: Flamethrower Servicing.
By March 1952, combat experience in Korea had led to the pro-
mulgation of WD T/A 80-10 which authorized 108 portable flame throwers
per Eighth Army infantry division. While mechanized flame throwers
saw far less action than the portable type they proved their worth
wherever the terrain permitted the employment of tanks against enemy
positions. As in World War II the use of MFT's permits a close approach
to enemy bunkers with a minimum of danger to the flame thrower operation.
The lst Marine Tank Battalion, equipped with a number of long range,
large capacity flame throwers manufactured by the GWS in Hawaii in
World War II, had considerable success in reducing enemy positions.

Between December 1950 and September 1952 some 410,000 gallons of
thickened fuel had been mixed by the lst Chemical Decontamination
Company teams. Interest in flame rose so high that a EUSAK staff study
recommended that the T/O&E 3-600 for Chemical Service Companies be
amended to provide for thickened fuel mixing cells. However, it was
from the air that the largest amount of napalm was delivered against
the Communist forces. Although the Chemical Corps no longer mixed the
thickened fuel for the Air Force, it continued to provide the Air Force
with the napalm powder and mixing units.

A EUSAK staff study had criticized the failure to make portable
flame throwers Class II items because the existing classification
produced serious deficiencies such as a lack of qualified operators.

40
1st Marine Tk En Spec Action Rpt, period 11-13 Aug 52.

41
EUSAK Staff Study, 6 Jul 52, sub: Thickened Fuel Mixing Teams.

- 27 -
with knowledge of tactical employment. Other problems included those of proper training in the operation, servicing, and fuel mixing for all types of flame throwers, and progress was made along all these lines.

During this period four chemical smoke generator companies, the 68th, 69th, 375th and 388th, operated in Korea. Prior to the summer of 1952 all units in Korea were assigned to the Eighth Army, but in order to separate logistical from tactical functions for administrative purposes, an intermediary zone, K Com Z, was established. In October 1952, three of the companies were assigned to this zone, while EUSAK retained the 388th in the forward areas.

The activities of these units were centered in the important Pusan port area and the strategic Inchon-Seoul section, including the vital Han River railroad and highway bridges. In order to protect adequately the forward areas, separate chemical smoke generator sections were designated, beginning in December 1951, that were to be responsible for the concealment of troops and installations under all operating conditions. To insure further the rapid mobility necessary for maximum protection of the front lines, a full strength alert section was organized in March 1952 which could move out within two hours after notification of the

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42 EUSAK Staff Study, 24 Sep 52, subj: Flame Thrower Servicing.

43 The material on smoke was based on generator company monthly reports for September 1951 through June 1952 and on quarterly reports for July through December 1952.
imminence of a smoke mission. These sections were utilized by virtually all combat units and thus, in the variety of their activities, provided cover for the engineers during bridge construction, screened artillery units to prevent enemy observation, obscured the movement of tanks in and out of firing positions along the main supply road, and employed smoke to lessen the glare from a fire at the vital Tongduchon-ni rail head.

In order to make increased use in the forward areas of the Corps' potential, the 38th Chemical Decontamination Company (reduced strength) was attached to the 388th Chemical Smoke Generator Company on 14 August 1952. However, while the 388th was maintained at 100% strength in an attempt to meet increased smoke demand, a shortage of units, caused by a limitation of personnel spaces, continued to be the primary factor limiting smoke activities. There was a vast difference in the number of smoke generators assigned to EUSA and to K Com 2 as indicated in the ratio 80 to 240, but the strategic importance of the rear areas warranted this distribution.

Continual research activities during this period resulted in furthering the tactical efficiency of these units. The pulse-jet generator was tested and improved until its reliability under combat conditions made practical the utilization of the improved principles it employs. Late in the period plans were being made, under projects assigned to the Cal C Board, to send a test team, consisting of one
officer, a few NCO's and some civilians, to Korea in connection with
operational and organizational tests with this new generator.

Training of personnel represented a significant phase of the
activities of the smoke generator companies, due, in part, to the
continuing problem of inadequate preparation received by a large
portion of the replacements assigned to these units. While such
training was conducted concurrently with other activities at the
company level, a school for instructing personnel from all smoke units
in Korea was established by the 69th Smoke Generator Company at Inchon
in the fall of 1951. To alleviate further the personnel problem, Korean
Nationals were trained as smoke generator mechanics.

The utilization of smoke generators became recognized as a requisite
component of virtually all combat and tactical operations, yet the
number of companies available to the forward areas was not adequate.
Corps commanders repeatedly requested additional smoke support, but only
maximum utilization of available resources was possible. There were
no more smoke generator companies available in EUSAK. By November 1952
an operational necessity for three additional smoke generator companies
was recognized.

Two chemical service companies were in Korea throughout this period.
Until Korea was divided between Eighth Army and E Com Z, the 95th Chemical
Service Company was assigned to the 2d Logistical Command (B) in Pusan
for the purpose of operating a base chemical depot with a thirty-day
replacement level of Chemical Corps items. Since the division of Korea, the 96th has operated under Korean Base Section, which succeeded the 2d Logistical Command. As a result of the considerable tasks accomplished by this company, it received a Meritorious Unit Citation in April 1952. As of December 1952 the other chemical service company, the 92nd, was still assigned to Eighth Army and was operating the EUSAK main field depot at Song-dong, near Seoul as well as two sub-depots, chemical sections at forward ASP's, and a field chemical maintenance section at Seoul.

Training

Administrative Order Number 54, Office of the Chief Chemical Officer, 1 November 1951, set forth in detail the objectives, mission and composition of the new Chemical Corps Training Command. The two major activities of this command were The Chemical Corps School and the Chemical Replacement Training Center, both at Fort McClellan, Alabama. In addition, the command included all Chemical Corps troop units at Fort McClellan and the supervision of training of all units at their various stations.

The functions of the command were, broadly, to plan, supervise and coordinate the execution of the training program for the Chemical Corps, including RTOC, ORC and NO components, to assist in detailed planning.

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UNCLASSIFIED

The material for this section has been based upon the following:
(1) Intery Hist 0, OCMnl0 with Mr. Delbert Flint, PTH1 Div, OCMnl0, 29 Jan 53.
(2) Historical Reports of PTH1 Div, OCMnl0, for period covered by this report.
(3) Historical Reports of Training Command, OCMlC, for period covered by this report.
for the CBR training of personnel of the Army and of the other services
of the Department of Defense, to develop and publish training programs,
and to develop and prepare training and tactical doctrine for publication.
The PT&I Division, Office of the Chief Chemical Officer, was responsible
for the staff supervision of the Training Command.

The first major construction planner for Fort McNair, home of
the command, was the building of new facilities for The Chemical Corps
School. The School functioned, meanwhile, in existing facilities to
permit with minimum interruption the continuance of instruction of
CBR for officers and EM of all services. The Replacement Training
Center meanwhile expanded, so that it functioned not only to instruct
specialists, but also as a basic training group receiving trainees
directly from induction centers.

The basic organizational work of the new establishment included
setting peace-time personnel allotments for the Class II activities of
the post, thus providing a permanent center for the training and instruc-
tion of the Chemical Corps and the Army in CBR warfare. This Training
Command organization was functioning efficiently at the end of the year
1952 and was providing a foundation for the expansion of these activities
in the event of a national emergency.

Technical training, in both theory and practice of CBR warfare,
was given emphasis by the Training Command and plans were completed
for new courses. Some of these stressed theory as did the projected
two-year course in nuclear effects engineering, some emphasized practical
reviews on latest developments in CBR warfare for chemical staff
officers in Class I assignments, and some included both aspects by
combining class lectures with field exercises.

The Training Command dealt not only with courses of instruction,
but also was concerned with the publication of the training literature
of the Corps. The Training Command was later given the responsibility
for the development and preparation for publication of field service
doctrine on CBR warfare. The technical doctrine, involving publication
of technical bulletins and technical equipment manuals, was placed
under the Research and Engineering Command. Thus the responsibility for
all but the technical doctrine became a staff function of the Training
Command. The Doctrine Board, before this time an activity of The
Chemical Corps School, was elevated to the level of a staff office of
the Training Command. In this way steps were taken toward centralized
responsibility for field doctrine and toward an integrated literature
program for the promulgation, development and publication of the
concepts, tactics and techniques of CBR warfare.

In addition to regular training activities, the Chemical Corps took
part in exercises and tests involving other branches of the Army. During
the period covered by this report the 218th Chemical Service Company
went to the Test Command, AFSC, Nevada Test Site to assist in radi-
ological activities. After the company participated in the tests, a

46
Administrative Order No. 1, OCCm10, 31 Jan 52.

47
Administrative Order No. 7, OCCm10, 24 Mar 52.
Information

detachment from the unit remained there to assist in various post-test operations, and a personnel rotation policy was established for this group in order to provide for the training of a greater number of men.

It was anticipated that a provisional chemical unit would be formed in 1953 to support Sixth Army requirement for Desert Rock while the 216th Chemical Service Company would continue in support of the AFGHP. In addition to this support by units, the Chemical Corps School usually sent observers or monitors to these exercises.

The first major maneuver of this period was in the LONGHORN exercise, which took place in Texas in the spring of 1952. Mortar, smoke generator, service and intelligence elements of the Chemical Corps were on both fighting forces. The original plans calling for biological warfare play and for air spray missions were modified, so that only land phases of Chemical Warfare were employed. These were generally thought to be successful, though the elimination of the biological warfare play and the spray exercises were thought to have left a gap in the testing of the CBR training program. For this reason, operation SHORTHORN, a small scale maneuver to feature biological warfare play, took place at Fort McCallian in September 1952. A second reason for this SHORTHORN exercise was to provide a stage for filming and documenting doctrine on biological warfare to be presented as part of a course for high level officers.
The planning and preliminary action for what was to become the Commanders Chemical-Biological Warfare Orientation Team was begun in the fall of 1951. Early in 1952 a AGofS (G-3) directive approved the course for flag and general officers, and conferences were held so that the other services could contribute personnel and material to the team and could plan on their representatives to take the course. A separate staff element of the Training Command was established in the fall of 1952, and it assumed the responsibility for the completion of the course, with an anticipated date for presentation of April 1953.

**Intelligence**

Between September 1951 and December 1952 three new intelligence publications were begun in order to insure the maximum dissemination of intelligence information throughout the Chemical Corps. These were the Chemical Corps Intelligence Review, Intelligence Briefs, and the Intelligence Branch Studies.

The Chemical Corps Intelligence Review, a quarterly, was designed to furnish the Corps with finished intelligence studies on any of the various phases of CBR. The Intelligence Briefs, prepared monthly, included spot items of current and unfinished intelligence. The Intelligence Branch Studies were not periodicals but were prepared upon the request of a Chemical Corps agency or were initiated by a researcher upon the acquisition of enough material to cover adequately a particular subject. As of December 1952 two of these studies were

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The Intelligence Sec. is based on an interview with Maj Frank L. Schaf, Jr., PT&I Div, OCCm10, 30 Jan 53.
underway, one on Russian protective shelters and another on Russian conventional signs and symbols for CBR.

The period under consideration was marked by an increased emphasis, Army wide, on technical intelligence considered primarily as a means of increasing the Army's limited knowledge of the Russian economic life. The objective was to gain a truer estimate of the Soviet's potentialities.

In order to implement the collection of technical intelligence several measures were taken. New techniques were developed, such as the detailed analysis of the name plates on captured enemy equipment. To insure a broader coverage for the collection of technical intelligence, an increased number of chemical technical intelligence detachments were sent to a wider variety of places. Moreover, military attaches were trained in the intelligence requirements of the technical services.
The Materiel Command, headed by Brigadier General H.M. Black, was organized as shown in Chart 4. To effect an orderly transition from the old organization to the new, an activation group was set up in General Black's office in late August 1951. By January 1952 segregation of personnel and functions between the new Materiel Command and General Bullene's staff Materiel Division in Washington had been effected. By the close of the calendar year 1952 the new organization was functioning very effectively.

During the period under consideration the Materiel Command was faced with four problems of considerable proportions. These were as follows:

1. The working out of details in connection with the setting up of the new command.
2. The activation of the Army Industrial Fund at Rocky Mountain Arsenal in July 1951 and at Pine Bluff Arsenal in July 1952.
3. The drawing up of plans dealing with the reorganization of the arsenals and procurement districts.

Each of these items will be discussed in more detail below.

49 OC Cnl O, Materiel Div, Hist Rpt, for Dec 51 and Jan 52.
50 Interv Hist O OC Cnl0 with Brig Gen H. M. Black, 19 Jan 52.
51 Ibid.
Setting up of New Command Structure

Although the period of transition from the former organization to the new command set-up was necessarily one of considerable confusion, the reorganization, in the judgment of General Black, was rewarding. Under the new organization the accomplishments were far greater than formerly. This is not to reflect on any individual or group, but rather to point out that the former organizational structure did not permit the adoption of desirable administrative reforms. Among the outstanding benefits which resulted from the new command set-up were the following:

1. Each and every person employed in the Materiel Command became conscious of a common mission and expended his efforts towards accomplishing that mission.

2. The Personnel Office of Materiel Command had surveyed the classification system rather closely and was able to eliminate many inequities, thus improving management.

3. Visits were made to army installations in connection with the inspection of supply procedures of chemical material and equipment and a number of corrections were made. Although this had long been an army requirement it was often impossible to carry out the inspection before the setting up of the Materiel Command. 52

Army Industrial Fund At Rocky Mountain Arsenal and Pine Bluff Arsenal

In conformity with the provisions of Public Law 216, 81st Congress, 53 approved 10 August 1949, the Department of Defense initiated Working-capital Funds at several installations under its jurisdiction including

52 Ibid.

the Chemical Corps' Rocky Mountain Arsenal. The system of Working-
capital Funds was one of several innovations adopted by the Congress
as a result of the Hoover Commission Report on Organization of the
Executive Branch of the Government, all of which innovations were
aimed at providing more business-like operation of government
activities. The Work-capital Fund, according to the law, was
to be used by the Secretary of Defense to (1) finance "inventories
of such stores, supplies, materials, and equipment as he may design-
ate" and (2) to provide "working-capital for such industrial type
activities... as he may designate". Public Law 216, 81st Congress,
authorized and directed the Secretary of the Treasury "to establish
on the books of the Treasury Department at the request of the Sec-
retary of Defense" the necessary working-capital funds.

There were several reasons why Rocky Mountain Arsenal was
chosen as one of the installations where the Working-capital Fund,
generally referred to as the Army Industrial Fund, would be established.
For one thing, the installation had been in stand-by condition and
good material records had been established. Again, Rocky Mountain
Arsenal had developed very good cost data on a number of its opera-
tions. A survey on the feasibility of setting up the fund at the
installation was made by representatives of the Comptroller of the
Army, the Office of the Chief Chemical Officer and Rocky Mountain
Arsenal. This survey indicated that it was feasible to establish
the fund and on 1 July 1951 the Arsenal was placed under the Indus-
trial Fund. A charter was drawn up and a working-capital fund of
$9,000,000 was set up.
The initiation of the Army Industrial Fund revolutionized the management concepts and practices of the installation. The Fund provided for single funding of activities with absolute control of funds as opposed to the previous system of multiple funding under the traditional appropriation budget structure. This control of funds, however, brought with it certain obligations, such as the need for setting up a system of accounting with special emphasis on cost accounting. Within six months of the establishment of the Fund at RMA everyone at the installation apparently became more cost conscious, as is indicated by the Report of Financial Condition and Operations at Rocky Mountain Arsenal for the Month of January 1952 which stated:

It is ever interesting to note... the growing cost-consciousness and those little evidences of improvement in its business management which came subsequent thereto. The Rocky Mountain Arsenal awareness of the importance to get our bills paid in time in order to save discounts for the Government is being acknowledged by the elements of commercial industry in that vicinity... .

This consciousness of costs led the management of the installation, the report went on to say, to initiate the following steps:

(a) reduce all overtime to a minimum,
(b) discontinue recruiting effective immediately with the exception of the replacement of required skills and professions.
(c) take full advantage of all normal attrition in the direct labor force, and
(d) encourage the use of annual leave by all employees during the next three to five months - thus insuring their availability during the next fiscal year's high production period.

The problem of setting up a system of cost accounting on materials and labor was of necessity time-consuming because of the...
need for gathering experience data. Other problems also had to be met and solved. After some nine months experience under the Fund it was decided that these problems could be generally classified under the following two headings:

(1) the need of overcoming a shortage of key components arising from failure on the part of suppliers to deliver these components and from technical difficulties, and
(2) the achieving of maximum efficiency during periods of declining production.

In addition to the means already mentioned above to overcome such difficulties, the following actions were initiated. First, the cooperation of suppliers was sought to deliver components of high priority before those of lower priority. Second, the Departmental Operating Statements, "which were the real barometers of the Arsenal's efficiency," were continually studied to achieve economies wherever possible and responsible officials were thoroughly indoctrinated in an awareness of cost consciousness. Third, all maintenance at the Arsenal, except motor vehicle, was consolidated under a Maintenance Division, which resulted in improved efficiency and reduced costs. Fourth, a cataloguing program for all maintenance and operating supplies was completed by March 1952. During the first six weeks this catalogue was in use, approximately $6,000 (twice the cost of the catalogue) of dead issue stocks were utilized through selective substitutions.

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54 Analysis of Army Industrial Fund Operations, Rocky Mountain Arsenal, Month Ending 30 April 1952.
It is almost superfluous to remark that the outcome of these innovations and experience made Rocky Mountain Arsenal a much better managed installation at the end of the year 1952 than it had been eighteen months previously. During this very period the Arsenal was being called on to produce more and more of the munitions of war and the expanded production program grew up side by side, so to speak, with the Army Industrial Fund.

The Industrial Fund was extended to a second Chemical Corps Arsenal, Pine Bluff, on 1 July 1952. Although Pine Bluff Arsenal received some of the benefit of Rocky Mountain Arsenal's previous experience, the installation nevertheless had to meet its own problems and work out solutions to them. Pine Bluff Arsenal had completed half a year's experience under the Fund at the close of December 1952.

Plans for Reorganization of the Procurement Set-Up

The setting-up of the Army Industrial Fund at Rocky Mountain Arsenal and later at Pine Bluff Arsenal gave rise to certain organizational problems. The arsenals were responsible for the assembly or filling of certain munitions for which components had to be procured through the procurement district offices. The commanding officers of the arsenals, however, had no authority over the procurement districts. This led to poor administration, with the headquarters Materiel Command expending much effort to properly coordinate the procurement programs.

In an effort to improve this situation both the Material Division
of General Hillen's office and the Industrial Division of General Black's office made studies. After considering several possible changes, it was decided that the following reorganization of the arsenals and the procurement districts be effected:

1. The Chicago District, which buys the components for Rocky Mountain Arsenal, be made a sub-post of Rocky Mountain Arsenal.
2. The Dallas District, which buys the components for Pine Bluff Arsenal, be made a sub-post of Pine Bluff Arsenal.
3. The Boston Procurement District to be deactivated as soon as possible.
4. The New York District to take over the functions of the Boston District as well as the industrial procurement functions of the Chemical Corps Procurement Agency, which will be turned over to the Research and Engineering Command in conformity with the recommendations of the Killian Committee.
5. The activities of the Atlanta and San Francisco Procurement Districts to be confined to procurement planning and the administration of any contracts which might be let by another procurement district in their geographical vicinities.

The above suggestions were submitted to AGoS (3-4) and just before the close of the calendar year 1982 were approved. Only the planning in connection with this significant reorganization was done in the period under consideration; the actual implementation of the plans was to be carried out later.

Effects of the Killian Report on the Material Command

Although the Killian Report was concerned with the Chemical

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55 Copies of the studies made by Ind Div, Mat Comd are in GMLHC.

56 See above p. 9 for discussion of this report.
Corps research and development program, certain of its recommenda-
tions also had an effect on organization and procedures in the
Materiel Command. It was concluded by the Office of the Chief
Chemical Officer that all research contracts and all research proc-
curement should come under the jurisdiction of Brigadier General
William M. Creasy, Commanding General of Research and Engineering
Command. Therefore, plans were made to transfer the Chemical Corps
Procurement Agency from the command of General Black to the command
of General Creasy. The Materiel Command procurement activities
which this agency conducted would, as stated above, be transferred
to the New York Procurement District. All procurement for research
and development throughout the Corps was placed under the Research
and Engineering Command. The implementation of these plans was to
await the period under consideration in this report.

Procurement Activities

During the period under consideration there was a considerable
expansion in procurement planning activities and in the procurement
activities of the Corps. This was the result primarily of the
Korean situation and secondarily of the various preparedness programs
undertaken by the Government to stockpile equipment and assist the
nations friendly to the interest of the United States. Table 3
lists the principal items procured by the Corps in the period from
September 1951 to December 1952. Table 4 indicates the dollar
value of procurement initiated during the same period for the Air
<table>
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</table>
Force, the Army, the Navy, and miscellaneous programs including the Mutual Defense Aid Program, the National Guard Chemical Procurement Program, etc.

**TABLE 4 -- PROCUREMENT INITIATED, ARMED FORCES AND OTHER**

September 1951 - December 1952 *

<p>| | |</p>
<table>
<thead>
<tr>
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<tr>
<td>Air Force</td>
<td>$310,087,000</td>
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<td>Army</td>
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<td>Navy</td>
<td>$17,150,857</td>
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<td>(Including MDAP, Nat'1 Guard, etc)</td>
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</tr>
</tbody>
</table>

*Based on figures supplied by the Procurement Branch, Materiel Division, OC Cml O

**Supply Activities**

Demands of the Korean War and expanded preparedness within the Army caused the Chemical Corps to handle increasing amounts of material during the period of this report. Due to the preparedness program and the transfer to the Chemical Corps under DA SR 700-51-118 and DA SR 700-51-119 of logistic responsibilities for commercial chemicals used by the Army, it was anticipated that storage space and distribution would be major problems.

Although direct handling of materiel from producer to user was being emphasized, and "open-end" or "call" type contracts were

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57

1. Interview with Lt Col V.J. Koebelzaki, Exec O, Materiel Div, OCM10, 9 Feb 53.
2. Interview with Mr. G.I. Rhorer, Supply Branch, Materiel Div, OCM10, 9 Feb 53.
encouraged, it was forecast that 17,000,000 sq. ft. of covered storage would be required by the end of FY 1955. Since the Chemical Corps had available in general and branch depots only 2,500,000 sq. ft. of covered storage as of 30 June 1952, the need for additional construction was obvious, and the building programs undertaken in FY 1951 were expanded to all depots with especially large allocation to the Chemical Corps' Midwest and Desert Depots.

Pending permanent construction temporary measures were necessary to decrease costs of preservation and care for material presently in storage. The preservation and care process was analyzed, and, in cooperation with other services, the Chemical Corps proposed to ACoS (H-4) that temporary metal-clad wood framework shelters be provided. The proposal was awaiting formal approval at the end of 1952.

Storage for Chemical Corps spare parts again became an acute

58

(1) "Open-end" or "call" type contracts designate definite quantities of articles at a definite price to be called for by specified officials (usually the user).

59


(2) Interv Hist O OCCm/0 with Mr. J.F. Taylor, Ch Storage Branch, Supply Div., Material Cond., 16 Feb 53.

60

(1) Hist Hist O OCCm/0 with Mr. J.F. Taylor, Ch Storage Br., Supply Div., Material Cond., 16 Feb 53.

(2) Hist Rpt, Materiel Div., OCCm/0, 22 Jan 53.
problem when industrial facilities at Edgewood Arsenal temporarily used as a spare-parts depot were required for production. After several possible sites for a spare parts depot had been considered, Memphis General Depot was selected as the most advantageous spot. On 15 October 1951, the Chemical Supply Section of that Depot assumed accountability for storage and distribution of all chemical spare parts. The central location of Memphis General Depot and the facilities available there made it an ideal permanent location for spare parts activities. Although the process of assembling, recording, and evaluating spare parts was still going on at the close of the year following transfer of responsibility, spare parts supply had substantially improved.

Theater Supply

Supervision of Korean chemical supply was largely a function of Chemical Section, Japan Logistical Command and Chemical Section, Far Eastern Command. Chemical Section, Japan Logistical Command, processed all requisitions to the Z/I, supervised all local chemical procurement, and supervised maintenance, repair and rehabilitation of chemical materials.

DA SR 780-11-1, Cl, 28 Sep 51.

(1) Interv Hist O OCCmio with Mr. B.H. Daniel, Ch, Supply Br, Materiel Div, OCCmio, 9 Feb 53.
(2) Hist Rpt, Cml Supply Sec, Memphis General Depot, 31 Dec 51.
(3) Interv Hist O OCCmio with Mr. R. Buckingham, Ch, Spare Parts Sec, Supply Div, Materiel Comd, 16 Feb 53.
equipment in storage and returned from Korea.

The World War II difficulty of securing transportation and priority for the small amounts of chemical supplies relative to those of other services was not experienced in Korea. The supply system operated without critical end-item shortages and with only two major problems. One of these problems was the lack of current technical and supply information in the theater, and the other was a critical shortage of spare parts. A probable solution to the first problem was provided by the appointment of an Overseas Liaison Officer in the Office of the Chief Chemical Officer although there was insufficient time in 1952 to evaluate results of the establishment of this office. No such ready solution appeared for the second problem, that of furnishing the theater with sufficient quantities of spare parts.

In the judgment of the Chemical Officer, FECOM, the spare parts shortage was due to the system basing spare parts and end-item resupply factors on World War II experience. Sufficient Korean experience had been gained by July 1952 for him to recommend that resupply factors be adjusted. Plans for readjustment which would fill all requirements were made in the latter half of 1952, and it was hoped that supply of spare parts in the theater would no longer be a problem in 1953.

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63
Interv Hist O OCCm1C with Col E.J. Collins, formerly Col G, Japan Logistical Command, 6 Feb 53.

64
(1) Ibid.
(2) See above p. 4.

65
(1) Staff Section Rpt, Col Sec, FECOM, 1 July to 31 July 52.
(2) Interv Hist O OCCm1C with Mr. J.L. Rhorer, Supply Br, Materiel Div, OCCm1C, 9 Feb 53.
(3) Interv Hist O OCCm1C with Mr. R. Buckingham, Ch, Spare Parts Sec, Supply Div, Materiel Comd, 16 Feb 53.
The period, 9 September 1951 - 31 December 1952, was one of marked activity in the Chemical Corps. The Department of Defense and the Department of the Army, during this period, emphasized the need for the Corps' speedily implementing its assigned mission of studying and investigating CBR warfare, supervising the training of the Army in this type of warfare, and furnishing the Armed Forces with material and equipment pertaining to CBR warfare.

In order to carry out properly the Corps' increasing functions a major reorganization was effected in the fall of 1951, whereby three major commands were activated in the Corps and the units in the Office of the Chief Chemical Officer were generally made staff in nature. The general consensus was that this new organization facilitated the administration of the Corps.

Problems of an administrative nature, nevertheless, were bound to arise. This was true particularly in the field of research and development. Early in 1952 the Secretary of the Army appointed a committee, headed by Dr. J. R. Killian, Jr., to make a study and report its findings. The Killian committee was convinced that there was need for expansion of research and development in the Chemical Corps and it offered a number of suggestions aimed at accomplishing this expansion. As of 31 December 1952 a beginning had been made towards carrying out the
suggestions of the Killian committee.

Problems of the future as well as those of the present faced the Chemical Corps as the period under consideration came to a close. For example, there was an anticipated need for more storage space due to the ever-expanding procurement of Chemical Corps items and the transfer of many commercial chemicals used by the Army to the Corps. In EUSA there was a shortage of smoke generators although the prospect of supplying these generators was somewhat uncertain. The arduous task of implementing the recommendations of the Killian Report and the supplementary report of the four general officers, particularly with regard to the procurement of qualified personnel, was evident at the close of 1952.