

Introduction to Chemical Armament in the War Against People (the Russian's tragic experience)

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VOLUME I. A LONG WAY TO CHEMICAL WAR

Chapter 3. Creation of the Industry of a Chemical Warfare

The society has learnt about existence in Soviet Union the chemical warfare industries casually enough when the Soviet principal M.S.Gorbachev on meeting in Prague declared a stopping of the Soviet production of a chemical weapon on the 10th of April, 1987¹. And only on a boundary of the XX-XXI-st centuries it became clear to a society, that the Soviet management has undertaken the organisation of the industry of an offensive chemical warfare at once after the terminal of Civil War.

Desire of Red Army to have a chemical weapon and all concomitant raw cycle is yet all. It was necessary to frame in the country ruined by wars capacities on production not only raw materials, but also chemical warfare agents. Here so under the pretext of until now praised highly "industrialisation" in Soviet Union has actually been framed all infrastructure of an offensive chemical warfare. Thus Soviet power reacted simultaneously on all conceivable "fronts" - in working out new chemical warfare agents, in raw-material base building on chlorine, sulphur, arsenic, alcohols and to other raw stuffs, in building of numerous factories on production of known chemical warfare agents, in building of filling stations on equipment chemical warfare agents into chemical munitions, in a direction of the big parties chemical warfare agents in the state mobilisation reserve, in tare production, including bulk petrol waggons and puncheons, for transportation chemical warfare agents to a place of their battle "service".

Certainly, the Soviet military-economic and industrial directing bodies were under constant and most powerful pressure of a management of Red Army.

3.1. FORMATION OF THE INDUSTRY OF NITROGEN AND CHLORINE

In the first years of Soviet power the powerful incentive to development was received **by the nitrogen** industry necessary not only for production of explosives and dyes, but also for production of hydrogen cyanide, diphenylcyanoarsine, bromobenzyl cyanide, cyanogen chloride and cyanogen bromide, adamsite, chloropicrin, N-mustard. However, development of this industry³⁴ hardly could serve as the serious indicator of readiness of the Soviet industry to mass production of chemical warfare agents. Reverting to real practice of formation of the industry of nitrogen, we will specify, that after demarches of Red Army on April, 12th, 1928 there was decision Council of work and defence "About capital construction inspection in a chemical industry" (**anilino-dyes**, and also basic). In introduced in Council of work and defence the document of Military Chemical Directorate³⁷⁵ it was specified in a stoppage in building terms of "the factories having military-chemical value" (at Chernoreche-Dzerzhinsk, Berezniki and Rubezhnoe). It was emphasised also, that "absence of the accurate plan in development of the anilino-dyes industry deprives of possibility of use of this branch of a chemical industry in the military-chemical attitude" (requirements of production adamsite, diphenylchloroarsine and diphenylcyanoarsine meant).

Besides development anilino-dyes and the basic chemical industry (that is first of all nitrogen), the army did not forget about storm of the main height – the **chloric industry**^{74,379} - and in general the haloid industry. For maintenance of plans of an offensive chemical warfare the army "required" the industry on production of **chlorine** and so-called chloric products under which mark passed all chemical warfare agents - from mustard gas and lewisite to phosgene and chloroacetophenone⁷⁴. However, principals of army saw the future of the country in own way and consequently cared of development not only the chloric industry, but also in general the haloid industry. Anyway, besides chlorine, to it the need and in **bromine** (production of bromobenzyl cyanide and the bromous mustard gas) and in **fluorine** (fluorine mustard gas) saw. It is not surprising, that the fate of the Saksy bromic factory was discussed in August, 1923⁴⁴³. And in 1933 it was a question any more only of this factory (in 1932 this factory produced 116 tonnes bromines), but also three other bromic productions⁴⁰³.

The first commercial units for production of liquid chlorine have been constructed in Russia in 1915-1916 in connection with the chemical warfare beginning, however building of large electrolytic chloric

factories has begun only in Soviet Union. Questions of the industry of chlorine have risen in the agenda in connection with plans of the first five-years period. In February, 1928 the army has paid attention of control members of the country about dissatisfaction of its mobilisation demand (only 23 %). As a result of that demarche on the 9th of September 1929 there was decision Council of work and defence "About capital construction of the chloric industry". The cause has set up Military Chemical Directorate, specified in the introduced document, that for a year of conducting a chemical warfare of army it is required 40000 tonnes chlorine (other needs of the country: manufacturing of gunpowders and explosives - 20000 tonnes, civil needs - 20000 tonnes). The army not only ascertained backlog in building chloric workshops in 1926-1929 on plants at Berezniki, Moscow, Chernoreche-Dzerzhinsk, Rubezhnoe and Slavjansk, but also has demanded fulfilment of the plans within a year³⁷⁹. The next years the army declared still the big needs in chlorine. They have been formulated in mobilisation plan: for 1931 only for Military Chemical Directorate - 100000 tonnes (requirement of the peaceful industry - 26000 tonnes), for 1932 - 200000 tonnes ("peaceful chlorine" - 43000 tonnes), for 1933 - 300000 tonnes ("peaceful chlorine" - 60000 tonnes)³⁷⁹.

Actually production of chlorine came true with serious backlog from arrogant plans of military chemists: 1927 - 6500 tonnes (plants: "Donsoda", "Slavsoda", at Bondiuga, at future Chapaevsk), 1928 - 7450 tonnes (the factory in Berezniki was added), 1929 - 9150 tonnes, 1930 - 15000 tonnes (it was added plants at Rubezhnoe on Ukraine and two plants at Moscow - Olginsky and Ugreshsky), 1931 - 25955 tonnes (were added plants at Stalingrad and at Chernoreche-Dzerzhinsk)³⁷⁹.

As we see, chlorine was necessary to army for production of chemical warfare agents, however chlorine in many smaller degree was necessary to the country. This obvious contradiction was authorised simply - for obliging Supreme council national economy to plan actions for dilating of consumption of chlorine and its products separate industries (paper, textile and others). So the poor country have forced to follow a path of misshapen development of a chemical industry with a supernecessary level of development of chloric productions. Further the army has lobbied signing of decision Council of work and defence of the USSR from the 11th of March 1930 "About dilating of consumption of chlorine"³⁸⁰. After that there were concrete decisions. So, with decision Council of work and defence from October, 14th, 1931⁷¹ it has been decided to provide by 1st of April 1932 the terminal of building of chloric factories on total capacity 100000 tonnes per year. Simultaneously Supreme council national economy it was entrusted to provide by means of new buildings in 1932 capacity finishing on chlorine to 175000 tonnes per year. Some results of that activity are generalised in table 3.1. Dynamics of growth production of chlorine is obvious³⁷⁹.

Table 3.1 Soviet chloric industry on the boundary 1920-1930s³⁷⁹

Plants	Manufacture of chlorine-gas on years, tonnes			
	1927	1928	1929	1931
Plant "Donsoda"	3000	2900	3100	3524
Plant "Slavsoda"	1700	1750	1600	1722
Plant at Bondiuga	1200	1200	1500	1500
Plant № 2 at Chapaevsk (№ 102)	600	1000	1500	3000
Plant at Rubezhnoe (Ukraine)				2250
Plant at Berezniki		600	1250	5178
Plant at Ugreshi-Moscow (№ 93)				5022
Plant at Chernoreche-Dzerzhinsk				2592
Plant № 1 at Moscow (№ 51)				1000
Plant at Stalinogorsk (Bobriki)				67

Once again to this problem Council of work and defense of the USSR has returned in the decision from the 4th of July 1932³⁹³, in which there was a target date of the termination of construction chloric plants at Bobriki and Stalingrad - IV quarter 1932 Besides it was entrusted to department of the heavy industry to start in III quarter 1932 creation new chloric plants on the general capacity 40000 tonnes per year. And on it business has not stopped. On the 9th of October 1932 Council of work and defense has accepted one more special decision "About expansion of consumption of chlorine"³⁸⁰.

So the ugly ("chloric") direction of development of the Soviet chemical industry has been fixed for many decades. As a way synthesis of chlorine has been selected electrolysis of table salt by a mercury method⁴⁰⁶, that has begun ecological troubles which should be overcome and in XXI century. In general of refusal of chlorine at clearing potable water to think have begun only in a new millenium.

3.2. SULFURIC INDEPENDENCE

Maintenance production of the important persistent chemical warfare agents (mustard gas and lewisite) has demanded from the country of even greater victims.

Owing to demands of Red Army on "the chemical map" of still the poor country there were powerful

productions of sulphur. Before occurrence Soviet power the sulfuric industry in the country in essence was not, however without sulfuric it was impossible production of ordinary S-mustard⁷⁴. And the army zealously initiated employment by sulphur. In October, 1925 Military Chemical Directorate has demanded from the Soviet foreign trade "to import 6500 tonnes sulfurs from which number 4000 tonnes to reserve on a war event". In September, 1927 to sector of defence State Planning Committee it has been specified in low level of extraction of own sulphur: 1200 tonnes per year instead of necessary 9000 tonnes per year. In December, 1928 Military Chemical Directorate has reminded Mobilization-planned management of necessity of creation of a mobilisation stock of sulphur. In October, 1929 the army has requested trust "Ural-Gold" how there is an extraction of gas sulphur on Kalatinsky copper-smelting group of enterprises. In February, 1930 at the initiative of Military Chemical Directorate at session of section of chemical defence of Committee on chemicalization at the government "the question on sulphur extraction" has been surveyed. "Necessity of all-round augmentation of extraction of mineral sulphur and the organisation of catching of sulphur from gases copper-smelting furnaces" has been ascertained.

These army attacks were followed by results. In decision Council of work and defence from the 23rd of June 1930³⁸³ problems on extraction of native and gas sulphur have been fixed: 1) by August, 1st, 1930 to complete building of **Kara-Kum** factory of native sulphur by power 3000 tonnes per year (Turkmenia); 2) by April, 1st, 1931 to complete building of a sulfuric factory at Shor-Su (Uzbekistan); 3) by January, 1st, 1931 to complete building of the Kalatinsky factory of gas sulphur (Sverdlovsk oblast) on power 4000 tonnes per year, and by January, 1st, 1932 - on 40000 tonnes per year.

And Presidium Supreme council national economy has decided on December, 19th, 1930 "to include building of sulfuric factories in number of shock prime buildings". Does not remain aside and department of Working-country inspection - in February, 1931 there have discussed a question "about a condition of production and capital construction of natural sulphur in Central Asia"³⁸⁷. The army pressure has been materialised and in two other decisions Council of work and defence of the USSR (from October, 14th, 1931⁷¹ and from July, 4th, 1932³⁹³), in which sound partitions "sulphur" contained. In particular, it has been decided to provide production of own (Soviet) mineral sulphur: 12000 tonnes in 1931 and not less than 32000 tonnes in 1932. And building of a factory of gas sulphur by power 80000 tonnes was scheduled for 1932 per year.

The cause of "sulfuric activity" was prosaic. According to mobilisation plans of those years, for the first year of conducting war if it was 1931, it was necessary for army for production maintenance mustard gas 12000 tonnes sulfurs per year. In case of a beginning of war in 1932 inquiries of army were much more - 30000 tonnes per year. Real position was that³⁸⁷. For 1932 the declared requirement of Red Army for sulphur for production of mustard gas was 14185 tonnes, however real production was much less. As to changing of import sulphur on own business was as follows.

Mineral sulphur mined those years in three deposits. The most powerful production existed at **Shor-Su** (Uzbekistan) on the basis of enough rich ores (25%). The close locating to Kokand (35 km) and presence of road to Kokand allowed to reduce this production seriously. In 1932 it was supposed to manufacture 8000 tonnes sulfurs, and on the future plans were even more serious³⁸⁷. Works on this deposit have been dilated in the course of war⁷²⁰. Sulphur has been found in Turkmenia in sands **Kara-Kum** near well Shinh (it more than in 200 km to the north from Ashkhabad). Sulphur from ores with the maintenance of 25% after manual "enrichment" melted in handicraft autoclaves then on camels delivered to station Geok-Tepe or to Ashkhabad. In 1932 at the plan 4000 tonnes have taken out only half sulphur³⁸⁷. In **Chekur-Kojash** in 45 km from Kerch (Crimea) sulphur in 1932 melted from ore from 15% the maintenance³⁸⁷.

Some deposits of sulphur were in a working out stage. Opened in 1926 at **Gaurdak** (Turkmenia) the richest deposit with the maintenance 20 % are grey was in 55 km from station Charshanga and has been bound to it a highway³⁸⁷. According to decision Council of work and defence from July, 4th, 1932 there has been begun construction of a sulfuric factory on 40000-50000 tonnes per year³⁹³. The deposit of sulphur which is arranged at **Alekseevskoe** near to Samara and which stocks have allowed to schedule a factory on melt 20000 tonnes per year has been besides, involved³⁸⁷.

The industry also actively worked on production of gas (passing) sulphur on copper-smelting groups of enterprises. In 1932 on Kalatinsky group of enterprises operated pilot plant on sulphur catching (power - 2000 tonnes per year) and the big factory on power 40000 tonnes per year with start-up in the second half of the year 1933 was under construction (start-up has not taken place). On the second five-years period the organisation of production of gas sulphur on three groups of enterprises was outlined by 1937: two in Sverdlovsk region (at Krasnouralsk and at Revda on power 80000 tonnes per year everyone) and one in Chelyabinsk (at Karabash on power 40000 tonnes per year)...

In general manufacture of sulfur which was necessary to army for production of mustard gas and it was not necessary in such scales to the country (a rubber industry, production of plastic), it has been provided. We shall list those 5 factories on which to the beginning of war it has been adjusted production of natural sulfur for maintenance of production of mustard gas: at Changyrtash, Gaurdak, Shor-Su, Kara-Kum and Alekseevskoe. These manufactures remained in mobilization readiness also long years after war⁴³¹.

3.3. BATTLE FOR ARSENIC

The fate of sulphur is inseparable from fate of arsenic. Without arsenic maintenance production not only lewisite, but also adamsite, diphenylchloroarsine, diphenylcyanoarsine, ethyldichloroarsine, piffikus is impossible⁷⁴. Independence of import of the arsenic occurring on a boundary 1920-1930s, was reached dramatically.

In October, 1925 in one of first reports I.M. Fishman, just headed Military Chemical Directorate, has demanded "to specify Supreme council national economy in necessity beyond all bounds the maximum intensifying of extraction of arsenic". In September, 1927 the army has caused anxiety sector of defence State Planning Committee with that is available having broken off in arsenic production (800 tonnes per year instead of necessary 3500 tonnes). In October the army has raised the question about necessity of accumulation of a mobilisation stock of arsenic. In April, 1928 Military Chemical Directorate has paid attention of the Revolutionary military council, that the demand of army for arsenic is not provided. In July the army has specified to Mobilizatsionno-planned management in a problem "an emergency with arsenic production in connection with a shaft inundation on the Kochkarsky deposit". In November the army has reminded chemical department of necessity to provide accumulation of a mobilisation stock of arsenic and sulphur. In 1929 "the arsenic siege" has proceeded. In March at meeting in Mobilizatsionno-planned management Military Chemical Directorate again "ascertained neediness of the mobilisation demand of sulphur, arsenic". The Same neediness on sulphur and arsenic was ascertained in August in a demarche from Revolutionary military council to the chief of the Main chemical management. In October military chemists informed State Planning Committee on absence of actions for working out of arsenic and about absence of maintenance of the mobilisation demand. And in November at session of section of defence of Committee on chemicalization at the government "the attention to the question on arsenic extraction has been brought in full. Full absence of actions for expansion of extraction of arsenic and investigation of new arsenic deposits" is ascertained.

1930 also was rich with events. At session Council of work and defence the decision not only on chlorine, but also "about expansion of extraction of arsenic" on March, 11th, 1930 was accepted. Decision Council of work and defence it was offered Supreme council national economy to enlarge import of import arsenic to the norms providing the minimum requirement of army. "The requirement" armies was transparent - production of adamsite, diphenylchloroarsine, diphenylcyanoarsine and lewisite. Simultaneously Supreme council national economy have obliged to introduce the plan of works on investigation, extraction and arsenic processing. And in 2 days presidium Supreme council national economy has made a decision "of prospecting works on arsenic, extraction and production of arsenic and production of white arsenic and arsenous drugs". Then all arsenic questions have been equal to military problems and in the country there was an arsenic management. Treating of an arsenic problematics has proceeded at session Council of work and defence on June, 23rd, 1930, completed by decision acceptance "About expansion of extraction of arsenic". In the introduced note the Revolutionary military council the requirement of army for white arsenic on the first five-years period - 8000 tonnes was reported³⁸³.

On August, 1st, 1931 Council of work and defence has made a decision about refusal of sulphur and arsenic import. On August, 25th there was order Supreme council national economy with which was scheduled to provide in 1931 extraction 1000 tonnes white arsenic from the sources (in 1930 only on the Kochkarsky factory has been received 500 tonnes). Simultaneously it was offered to test for arsenic in 1931 all operated and reconnoitered deposits black and non-ferrous metals, and in 1932 to construct the equipment on catching of arsenic of off-gases³⁸⁴.

Soon the rank of documents has been raised by efforts of army. The decision from October, 14th, 1931 Council of work and defence has decided to provide production in 1931 Soviet (not import) white arsenic 1000 tonnes (in 1932 - already 5500 tonnes) and also to strengthen rates of investigation of arsenic deposits⁷¹. Following decision Council of work and defence from July, 4th, 1932 it has been decided to put not later than October, 1932 into operation a little concentrating mills (Darasunsky, South Pokrovsk, Zapokrovsky and Dzhulfinsky), and also to complete per 1932 creation of the Angarsk factory³⁹³.

Let's survey, further, this activity on a boundary 1932-1933 when there were first results of battle for arsenic during the first Soviet five-years period³⁸⁵.

There were 4 factories on production of white arsenic (arsenolite As_2O_3). **The Kochkarsky factory** (Plast, Chelyabinsk oblast) has mined in 1932 800 tonnes the passing white arsenic formed in the course of processing on gold arsenopyrites gold-bearing of deposits of Kochkarsky mine. For 1933 scheduled to mine 1000 tonnes, have actually mined 644,6 tonnes³⁸⁵. Plant at **Djetyigara** (Kazakhstan) in the furnacing furnace has manufactured in 1932 60 tonnes white arsenic. For the next year scheduled doubling, but have manufactured 90 tonnes. Here constrained absence of the railway, however then it has been brought³⁸⁵. Plant at **Luhumi** (Georgia) has been launched in the end of 1932 and consequently has manufactured to the extremity of year only 15 tonnes white arsenic furnacing enough rich ores. For 1933 scheduled handing over 125 tonnes, however have actually let out 25,6 tonnes - the deposit was in remote mountain district³⁸⁵. Plant at **Darasun** (Chita oblast) has manufactured in 1932 200 tonnes white arsenic by furnacing of ores

with Pokrovsko-southern deposits (Nerchinsk). In 1933 it was scheduled production of 300 tonnes (actually - 189,3 tonnes), and then - with start-up concentrating mill (while ores "enriched" in the manual way) - to finish production white arsenic to 2500 tonnes in a year. The affinity of border with "unfriendly" Manchzhuria reduced pleasure of enthusiasts. This hurdle was overcome by that furnacing of Nerchinsk ores (after their enrichment in situ) scheduled on the giant of the arsenic industry "**Angarsk metal works on arsenic production**" (present Svirsk, Irkutsk oblast). Furnacing should begin in 1933, and the plan for that year made 200 tonnes white arsenic (planned power of a factory made 3000 tonnes per year) - the demand of the governmental order from July, 28th, 1933 was that. Actually a factory have started up in May, 1934, and there was a problem about transferring to new mining base (to use scheduled Berikulsky concentrating mill). On this battle post the arsenic factory at Svirsk has stayed till 1949 then has risen in a reserve where has stayed under supervision of the Soviet Army to its extremity. In new Russia about that factory have forgotten, no less than about the stocks of arsenic which were in its territory³⁸⁵.

Besides the started up factories of arsenic, at winter 1932-1933 went works on putting into operation of some new deposits. On a basis goldarsenic deposits at **Berikul** (Kemerovo oblast) assumed to put an arsenic factory into operation in the end of 1933. Plant at **Takeli** (Tajikistan) also scheduled to start up in 1933 (production of 150 tonnes; capacity - 1000 tonnes per year). In 85 km from Tashkent and in 12 km from a railway branch there is a deposit at **Burchmulla**, however to take arsenic from highly oxidised ores by furnacing it was impossible, so it was necessary to search for other decision (refinement). Besides the deposit at **Djulfa** (Azerbaijan) was discussed, where arsenic stocks then were estimated in 5700 tonnes (the centre maintenance of arsenic of 6%)³⁸⁵. As arsenic meets not in the form of independent mining bodies of industrial value and as of an accompanying element in ores of other metals, arsenic extraction on a boundary of the first and second five-years periods thought as a passing product at extraction of other metals from off-gases of kilns is more often. Perspective was considered copper-smelting group of enterprises at **Karabash** (Chelyabinsk oblast) where stocks of passing gas arsenic were estimated then in 40000 tonnes and where start-up workshop gas arsenic per 1932 has not taken place. A little smaller stocks of arsenic were surveyed in connection with work **Kalatskiy** copper-smelting a factory at Kirovgrad (Sverdlovsk oblast). And possibility of catching of arsenic in connection with working out of a deposit of hematites around **Kerch** was still discussed. Some other variants were surveyed also³⁸⁵.

In 1934 the army also has not been satisfied by rates of a development of industry of arsenic. Anyway for that moment to it backlog still saw (the arsenic industry left "in case of war of requirement of a national economy almost without satisfaction")³⁸⁵.

As a whole army pressing should crown "successes" at the front battles for arsenic. We will result dynamics production of arsenic in the first years of II five-years period, and in the first quarters, when production routinely least. In I quarter 1935 on all arsenic industry it has been manufactured 631,6 tonnes arsenic, and in I quarter 1936 - is more narrow 1073,8 tonnes (including on the Kochkarsky factory - 237 tonnes, at Karabash - 46 tonnes, at Angarsk - 458 tonnes, at Burchmulla - 81 tonnes, at Takeli - 26 tonnes, at Djulfa - 32 tonnes, at Luhumi - 47,6 tonnes, at Darasun - 130 tonnes, at Djetyigara - 49,3 tonnes). The Soviet industry should "surrender" on favour of army. So the "arsenic" direction of the industry has been consolidated though then it was not necessary for the country, except for maintenance of requirement of army in chemical warfare agents.

In summary we name 9 plants which to a beginning of war have adjusted supply of the country by white arsenic for maintenance of the military man production of lewisite and others chemical warfare agents on the basis of arsenic: at Karabash, Burchmulla, Darasun, Djetyigara, Takeli, Luhumi (Rachinskii), Tsanskii, Novo-Troitskii, Angarskii. These productions remained in a mobilisation reserve of the country also many years after war^{431,432}. The "arsenic" direction of the industry was useful to the country only after half a century of senseless expenses, during an epoch of bloom of the semi-conductor technics, gallium arsenide has appeared one of which elements.

3.4. THE GENERAL INFRASTRUCTURE OF A CHEMICAL WARFARE

By chemistry of nitrogen and chlorine, sulphur and arsenic of need of the Soviet industry of a chemical warfare were not depleted. Was required also development of industrial chemistry of some other elements - aluminium, phosphorus, fluorine etc. Besides, it was necessary to organise the organic productions not always necessary in time of peace, for example, the big gamma alcohols though human requirements were in many respects depleted only ethyl alcohol. Actually the question stood even more widely. In particular, in one of office letters of 1926 addressed Military Chemical Directorate, have been generalised data about "extraction and production of the raw products necessary for chemical warfare agents"⁴⁰⁴.

Formation of the Soviet **aluminium** industry concerned not only pilots, but also military chemists - without aluminium trichloride, serving catalyst at synthesis of chloroacetophenone, production of some chemical warfare agents was impossible³⁷⁷. First aluminium trichloride it was necessary to import. However

according to decision Council of work and defence from October, 14th, 1931 Supreme council national economy has received the task to organise production aluminium trichloride by January, 1st, 1932 (capacity -1000 tonnes per year)⁷¹. The following decision from July, 4th, 1932 had been defined a factory in Moscow where by December, 1932 it was planned to finish building of the pilot plant on production of aluminium trichloride³⁹³. That production organised on chemical plant № 93 (at Ugreshje-Moscow), provided production on the same factory of a larger unit chloroacetophenone which was manufactured before war⁴⁰⁴.

However it also was insufficiently. For maintenance scale production of chemical warfare agents raw materials new kinds of production were necessary: alcohols, wood charcoal, calcium carbide, potassium saltpeter, starch, sal ammoniac and talcum (for production of toxic smoke candles)⁴⁰⁴.

Production of alcohols has been adjusted in the USSR in 1930s first of all owing to remarkable "chemical" activity of a management of army.

Ethyl (wine) alcohol (ethanol) was necessary by manufacture mustard gas Levinstein as a source ethene. Therefore on this account the special decision of the Political bureau of Central Committee VKP(b) from the 17th of September 1930 was accepted, and under a kind of usual vodka a little alcoholic plants have been specially aimed at maintenance with raw material production of mustard gas (Dashuhin alcoholic plant - for chemical plant № 91 at Stalingrad, Kuibyshev alcoholic plant - for chemical plant № 102 at Chapaevsk)⁴⁰⁴.

Methyl alcohol (methanol) was necessary for maintenance production of diphosgene on the basis of phosgene. Therefore according to decision Council of work and defense of the USSR from the 4th of July 1932 it planned to finish in the summer of next year construction of plant methanol on chemical group of enterprises at Bobriki (Stalinogorsk). And up to that the army has been compelled to reserve instead of methyl alcohol the waste of timber-chemical manufacture³⁹³. Created on chemical group of enterprises at Stalinogorsk production before the war provided needs in methanol of diphosgene manufactures at Chapaevsk and Dzerzhinsk⁴⁰⁴. In first year Great Patriotic War group of enterprises has been destroyed, however the problem of its restoration has arisen right after the terminations of fight near Moscow, and in March 1942. Committee for the Defense of the State has accepted the decision about a reconstruction of manufactures methanol, chlorine, etc. Workshop methanol has renewed production since the 31st of July 1942⁷²⁰.

Adjustment in Leningrad in 1934 production of **propyl alcohol** has been proved by necessity of manufacture propyl mustard gas (mustard gas of V.S.Zajkov) which in a mixture with usual (ethyl) mustard gas Levinstein provided nonfreezing of this persistent chemical warfare agent. In first months of Great Patriotic War at a plant № 96 has been reconstructed workshop on production of isopropyl alcohol⁷²⁰.

Production of **isopropyl**⁴⁴⁵, **isobutyl**²⁰³ and **pinacoly**⁷²¹ alcohols became especially actual already after war when it was required to provide industrial production of phosphorous organic chemical warfare agents - sarin, Soviet V-gas and soman.

In table 3.2 the data 1938⁴⁰⁴ and 1948⁴³¹ are cited which show needs of the industry chemical warfare agents of the first generation in raw materials. These data to no small degree differ from calculations of Military Chemical Directorate executed in 1926⁴⁰⁴.

Table 3.2 Raw materials used by production Soviet chemical warfare agents^{404,431}

Chemical warfare agents	Materials	Expenditure	
		Gosplan, 1938	Chemical plants
Mustard gas Levinstein	Ethyl alcohol	85 dl/t	81,5-90
	Chlorine gas	0,35 t/t	0,38
	Sulphur	0,38 t/t	0,35
	Alumina	0,004 t/t	0,0025
Mustard gas V.S.Zajkov	Ethene		300 m ³ /t
	Propene		127 m ³ /t
	Caustic		0,1 t/t
	Sulphur		0,285 t/t
	Chlorine gas		0,5 t/t
Mustard gas nonfreezing	Mustard gas technical	0,5 t/t	
	Dichlorethane	0,5 t/t	
Mustard gas thickened	Mustard gas technical	0,682 t/t	
	Bitumen	0,114 t/t	
	Native paraffine	0,068 t/t	
Lewisite	Arsenic white		0,59-0,645 t/t
	Mercury bichloride		0,006-0,009 t/t
	Chlorine gas		0,88-0,91 t/t
	Calcium carbide		1,0-1,1 t/t

	Caustic		0,06-0,07 t/t
Phosgene	Coal wood	0,6 t/t	
	Chlorine	0,85 t/t	
	Coal activated	0,003 t/t	
	Sulphur acid	0,13 тн/т	
Diphosgene	Phosgene	0,8 t/t	
	Methyl alcohol	0,23 t/t	
	Chlorine (жидкий)	1,3 t/t	
	Sulphur acid	0,004 t/t	
Hydrogen cyanide	Цианплав	4,3 t/t	5,3-5,4
	Sulphur acid	2,3 t/t	2,4-2,8
Chloroacetophenone	Benzene	0,8 t/t	
	Хлорацетилхлорид	1,32 t/t	
	Aluminium trichloride	1,60 t/t	
	Ethyl alcohol	63 dl/t	
Adamsite	Arsenic trichloride	0,32 t/t	0,282
	Diphenylamine	0,65 t/t	0,617
	Arsenic white	0,23 t/t	0,21
Diphenylchloroarsine	Aniline	1,3 t/t	
	Arsenic	0,8 t/t	
	Diazotizing salt	1,05 t/t	
	Sulphur acid	5,5 t/t	
	Potassium iodide	1,35 t/t	

Before war calcium carbide, necessary for production of lewisite, entered from chemical group of enterprises at Yerevan⁷²⁰ and from a specialised factory of a chemical weapon at Chernoreche-Dzerzhinsk⁴⁰⁴. In days of war to them were added production on plant at Berezniki, and also the third furnace on plant at Chernoreche-Dzerzhinsk⁷²⁰. At the same time were provided welding works in various branches of a national economy. The potassium saltpeter necessary for maintenance production of toxic smoke candles YaM-11 and YaM-21 on plant № 12 at Electrostal, entered from Berezniki⁴⁰⁴. At the same time the Soviet agriculture received potash fertilizers. Benzol and anthracene which were necessary for maintenance production of chloroacetophenone and toxic smoke candles YaM-11, entered from bowels of coke chemistry⁴⁰⁴, providing additional stimulus for its development.

Let's add, that in 1930s also the industry of phosphoric substances actively developed. As a pretext named phosphoric fertilizers, the real purpose was supply of army by incendiary means on the basis of phosphorus. And for production of the chemical weapons this direction was useful in the end of war^{428,442} when works on creation of lethal chemical warfare agents the second generation on the basis of phosphorus have begun, and also such chemical warfare agent, as phosphine (phosphorous hydrogen, PH₃)¹⁹⁷.

As a whole the Red Army has achieved to what aspired: chlorine, sulphur, arsenic and aluminium became mass products of the chemical industry rising from knees⁷⁴. To the extremity 1930s the turn of creation of the industry of antimony (chemical analogue of arsenic)¹⁹⁵ also has come. On the basis of antimony have been framed chemical warfare agents which applied for the post in Red Army. Has not managed and without selenium directions - have been conducted experiences on creation mustard gas on the basis of analogue of sulphur - selenium. Certainly, after so hypertrophied interest of army to chlorine, sulphur, alcohols, calcium carbide, aluminium trichloride these products became common.

Besides creation of recent trends in a chemical industry, orientated on chemical warfare service, the army aspired to militarise other directions of a life of the country also. In particular, works with chemical warfare agents were inconceivable without attraction of various machine-building factories. Productions where devices for reversion with chemical warfare agents in peace and in battle conditions were framed Mean: tanks, filling stations, battle chemical cars and, of course, a chemical ammunition. In decision Council of work and defence of the USSR from the October, 14th, 1931⁷¹, devoted to affairs of a science and the chemical warfare industry, it has been decided to frame the industry of special tare as because of its absence all operations on storing and to transportation chemical warfare agents could be blocked, in particular with mustard gas. In development of it by decision Council of work and defence of the USSR from May, 11th, 1932 on departments of the heavy industry and railways creation by November, 1st, 1932 of park of 50-ton Ry tanks (500 pieces) for transportation liquid "special loads" has been assigned. The decision from June, 23rd, 1933 had been yielded the task about building by January, 1st, 1934 of 200 tanks lorry in container 5 tonnes. And decision Council of work and defence from July, 11th, 1933 it has been decided to construct in Detached Far East Army containers on 1000 tonnes chemical warfare agents and to fill them mustard gas with a view of creation of a mobilisation reserve on this major as the army considered,

chemical warfare agent.

In already summer of 1933 the Rostokinsky factory (Moscow) has made the first "5 tanks lorry suitcase forms on chassis JAG-5"¹⁰³. From those suitcase and cylindrical tanks lorry the epoch of devices for transportation mustard gas and others persistent chemical warfare agents which first were called BKhM-1 has begun, and then disappeared under a peace name as cars of class ARS. In a civil life on them transported benzine and to that similar loads. And also watered streets. The factory "Promet" in Leningrad where before war were framed car BKhM-1 for terrain contamination, and also portable terrain contamination device with extension pressure was occupied with the same affairs. And on a factory "Compressor" (Moscow) worked on modernisation BKhM, creation Ry BKhM, designing chemical tank, designing of the Ry tank for transportation chemical warfare agents, designing of chemical instrumentation for motorcycles etc.¹⁰³. At known aviation institute CAGI have improved a design aircraft spray tanks, framed bulk stations - bases for aviation military units, and by September, 1st, 1932 should even frame the specialised plane for a chemical attack ("the chemical insurgent").

Let's specify, in particular, factories № 145 (aviation chemical bombs, VAP-500, UKhAP-500, ampoule dispensers AK-1 and AK-2) and № 261 (terrain contamination vehicles) at Moscow, falling into to system of the aviation industry. In manufacturing of technical devices, in particular, VAP-4, VAP-6 and NPZ-3, also the factory "Volcano" (Leningrad) actively participated. Had corresponding capacities factories in Taganrog (KhAB-200) and in Rostov-on-Don (KhAB-25, KRAB-25). Was very active and until now remains many-sided Moscow plant № 67 (the former repair artillery factory "Mastyazart", subsequently GSKB-47, it - present "Basalt"). On its line there passed aviation chemical bombs KhAB-500 and KhAB-200, portable terrain contamination device NPZ-2, ampoule AZ-2, etc.⁵⁶⁰. And in post-war years through were plant № 67 there passed a modern chemical ammunition cluster type⁴⁴⁰. Let's emphasise what to do a qualitative ammunition for a chemical weapon - business very uneasy. Anyway in post-war years it was necessary to show consideration for a problem of capillary defects of a chemical ammunition (a crack, fistulas etc.) - responsibility for it was carried by mechanical manufacturer⁷²². And was them much (plants at Donetsk, Alexin, Izhevsk and many other things)^{119,449}. Table 3.3 yields representation about to what the industry on this direction of infrastructural development on a boundary of five-years periods has come⁴¹⁴.

Table 3.3 Manufacturing of the chemical weapons in the USSR per 1932-1934⁴¹⁴

Chemical weapons	1932	1933	1934
Mortars	-	259	190
Mines (filled)	21000	96500	76603
Battle chemical cars:			
BKhM -1	84	119	80
BKhM -3	20	57	300
BKhM -4	10	177	-
Artillery shells:			
Fragmentary-chemical	23000	61000	43939
Chemical	13675	13328	14254
Toxic smoke candles	184330	140450	399674
YaM-11 and YaM-2			

The result is that. Army pressing the industry for building maintenance has military-chemical plant crowned success. We are compelled to ascertain, that the Soviet industry of a chemical warfare sometimes set unduly serious development to a number of directions of the industry which for lack of army demands could not receive so hypertrophied development. In the conditions of the country with not the most powerful economy it was the expensive. Therefore there should be a question on occurrence of the opposite tendency - use of some equipment of a chemical warfare for something more useful, than sitting in an ambush in expectation of the big chemical warfare. Clearly, what to hold actually in inactivity huge mobilisation powers on production of chemical warfare agents was not under force even to the totalitarian state which has plundered during "collectivisation" and "industrialisation" all population of the country.

In connection with preparation of the second five-years period of 1933-1937 there was a problem about so-called assimilation, that is use of mobilisation powers for stopgap production not chemical warfare agents, and peace production. In particular, in workshops, aimed on production of mustard gas Levinstein (their power for 1.1.1933 made 26000 tonnes per year) it was possible initial raw materials (ethene and chlorine) to use for production not mustard gas, and a dichlorethane - a valuable dissolvent on those times (it could be used on powder and paint-and-varnish factories instead of benzine). And it was possible to carry out it in ordinary reactors for synthesis of mustard gas.

Thus, all equipment mustard gas workshops, except for the equipment for synthesis of mixture monosulphur chloride S₂Cl₂ and sulphur dichloride SCl₂ should be involved. The experiences proving this idea, have been carried out in the end of 1932 on chemical plant № 1 (№ 51) at Moscow. Realisation

sphere could become plants at Moscow, Chapaevsk and Stalingrad⁴¹⁰. And plant at Chapaevsk really manufactured a dichlorethane³⁹². In 1939 the assimilation problem was discussed already in connection with lewisite - more expensive chemical warfare agent. It was a question of use calcium carbide for production not lewisite, and vinyl chloride (by production lewisite vinyl chloride is formed as a by-product, and in a peace time it is possible to receive it as well as a main product). Vinyl chloride could be applied at manufacturing of plastic for gramophone records, that in turn freed the country from import dependence. It was a question of that workshops which should become operational per 1940-1941 for production lewisite, could be simultaneously equipped for peace use. Per 1940 all these efforts have received a necessary jerk. Workshops on chemical plants at Dzerzhinsk, Chapaevsk, Stalingrad and Berezniki, framed for production mustard gas and lewisite, have been aimed on production of a PVC. Workshops at Chapaevsk and Rubezhnoe, prepared for production phosgene, have tried to orientate on acetic anhydride production, and workshop of diphosgene at Chapaevsk - on production of the methyl chloride necessary at production of plastic. Even workshop of chloroacetophenone on plant № 93 at Moscow has been orientated on production of rose oil⁴¹⁰.

All this activity has ended with anything. War during which those capacities have been worn out on production and not necessary chemical warfare agents has soon begun. Only workshop on production of hydrogen cyanide on plant № 148 (Dzerzhinsk) it was possible to use before war on production of organic glass for military aircraft.

After war all installations on production of chemical warfare agents were not suitable any more on what.

3.5. The pre-WAR Soviet Industry of the Poison

Passing from sulfur and arsenic, casks and tanks to the most important - to chemical warfare agents, - we shall note, that desires of army was for authorities of the USSR the law. Accordingly, a unconditional priority became industrial production of the chemical weapon - chemical warfare agents, and also chemical munitions and devices. And the aspiration of army to possession was realized by the weapon of chemical war in parallel and irrespective of the Soviet-German activity 1923-1927 on a construction plant the chemical weapon at Ivashchenkovo (Chapaevsk)⁷⁴.

In August, 1923 at session Interdepartmental meeting on chemical means of struggle practical questions of the organisation in the country of productions chemical warfare agents have been discussed. Commissions on working out of methods production vesicant agents have been given: mustard gas - to V.J.Karpov Chemical institute (Moscow, professor A.N. Bach), lewisite - professor A.E.Favorsky (Petrograd university). It has been decided to develop also on Olginisky chemical plant (Moscow) production phosgene power in 10000 poods a month¹⁵⁰. In the end of September Interdepartmental meeting on chemical means of struggle has prescribed professor E.I. Spitalskij the principal of works on production of parties mustard gas pilot-scale on one of factories of Moscow³⁷⁰. Basic achievement has taken place between August, 30th and on September, 3rd, 1924 when the factory on the Triumphal square (Moscow) has manufactured the first party of mustard gas in number of 18 poods³⁷⁰.

After success with production of an experimental batch mustard gas decisions on the organisation of industrial productions chemical warfare agents began to be taken over much easier.

Let's survey, further, country leaders activity on its chemical arms. First of all it is a question about Council of work and defence of the USSR and its two subdivisions. First it was Administrative session Council of work and defence of the USSR to which Council of work and defence the decision from May, 13th, 1927 has given "as Council of work and defence to solve all questions of national defence". Army in Administrative session introduced K.I. Voroshilov and I.S.Unshliht. Then expressly framed Committee of defence - structure which in the future will be more known as the Military-industrial commission at the government of the USSR began to solve military affairs. Chemical warfare questions were discussed and dared also in other organs to which had to execute decisions - in Mobilizatsionno-planned management Supreme council national economy, in special management of All-union association of chemical industry Supreme council national economy, in sector of defence State Planning Committe, in the Main military-mobilisation management of department of the heavy industry, in Committee on chemicalixation at the government of the USSR. And when it was necessary, questions were transferred to the government.

It is necessary to emphasise, that preparation for an offensive chemical warfare, and not so chemical defence was a mainstream of aspirations of army. Activity of a management of Red Army has been aimed at it. It is known, that in realisation of the first five years' plan (since October, 1928 for 1933) when as if there was an industrial power of the country, jump to militarization of the economy at the expense of a robbery of productive forces of the country actually has been made.

So, how the problem those far years was put? In 1930 principals of the country believed, that the Red Army required for a year of conducting war 110-150 thousand tonnes chemical warfare agents⁴⁶⁵. In some years these digits both were specified, and have grown up: 1933 - 15152 tonnes chemical warfare

agents, 1934 - 202486 tonnes³⁷⁶.

Documents yield representation about the fantastic efforts undertaken for the decision of this problem^{381,394}. To introduce aggressiveness level the Soviet management at an industry overcoming of backwardness in the relation production of chemical warfare agents, it is enough to get acquainted with results of work of the meeting which have taken place on January, 11th, 1931 in All-union association of a chemical industry - a germ of the future department of a chemical industry³⁸⁸. In the relation mustard gas it was recommended to have in the ruined country to spring of 1932 capacities at a rate of 37600 tonnes per year: chemical plant № 1 at Moscow (Olginsky) - 2100 tonnes, plant at Ugreshje-Moscow - 2500 tonnes, chemical plant № 2 at Chapaevsk - 6000 tonnes, group of enterprises at Berezniki - 9000 tonnes, plant at Stalingrad - 9000 tonnes, new plant - 9000 tonnes. Powers on phosgene were recommended to be had to spring of 1932 a little smaller (13000 tonnes): plant № 1 - 1000 tonnes, № 2 - 2000 tonnes, plant at Chernoreche-Dzerzhinsk - 4000 tonnes, plant at Rubezhnoe (Ukraine) - 2000 tonnes, new plant - 4000 tonnes. Have not been forgotten diphosgene, adamsite, chloroacetophenone, diphenylchloroarsine³⁸⁸. Has not cunningly put only to hydrogen cyanide - it still stayed at a stage of tests.

We result those Bolshevik plans of times of ruin of peasantry due to industrialization to show scales of process. Some data about it are resulted in table 3.4.

Table 3.4 Production of chemical warfare agents in Soviet Union in 1930s³⁹²

Chemical plants	Production, tonnes					
	1931	1932	1933	1934	1935	1936
Mustard gas Levinstein (XX)						
Plant № 91, Stalingrad			336,5	530,2	681,44	
Plant № 102, Chapaevsk				591,5		
Plant № 51, Moscow	61,2	745,4				
Lewisite (XXI)						
Plant № 51, Moscow		19,5				
Plant № 102, Chapaevsk					106	
Phosgene (XIII)						
Plant № 91, Stalingrad				165,1		
Plant № 51, Moscow	80,7	106,9				
Plant № 102, Chapaevsk					329	
Hydrogen cyanide (XV)						
Plant № 51, Moscow		2,2				
Chloroacetophenone (II)						
Plant № 51, Moscow	21,7	14,7				
Adamsite (III)						
Plant № 51, Moscow				35,1		
Diphenylchloroarsine (IV)						
Derbenev plant, Moscow						135
Bromobenzyl cyanide (VI)						
Plant № 51, Moscow		1,3				

The discussion bound to plans production of of a chemical weapon and in general with plans of preparation of the country to an offensive chemical warfare, has taken place on October, 14th, 1931 at session of the Commission of Defense at Council of work and defence of the USSR. At that session the problem "About state military-chemical art" has been comprehensively surveyed⁷¹. In the report it was ascertained, that powers on production of chemical warfare agents as of May, 1st, 1931 have made: on mustard gas 1800 tonnes per year on chemical plant № 1 (Moscow) and 5000 tonnes per year on chemical plant № 2 (Chapaevsk), on phosgene - 1000 tonnes per year on plant № 1, 4000 tonnes per year on plant at Chernoreche-Dzerzhinsk, 2000 tonnes per year on chemical plant at Rubezhnoe. It has been ascertained also, that the stock artillery chemical shells has made for May, 1st, 1931 in filling of mustard gas - 90000 pieces (including 76 mm - 59000, 107 mm - 22000, 122 mm - 9 000), and in filling of phosgene and diphosgene - 340000 pieces (including 76 mm - 250000, 107 mm - 31000, 122 mm - 59000). The stock aviation chemical bombs was 7600 pieces (calibre - 8 kg). Besides, there were two filling stations for artillery chemical shells: on main chemical depot № 136 (Ochakovo-Moscow) with mobilisation power of 1130000 pieces per year and on plant № 2 at Chapaevsk – with power of 4000000 pieces per year. In the taken over decision it has been fixed, that "chemical agents should take a paramount place in all defence system of the country"⁷¹. Accordingly, measures on an intensification of all directions of preparation for a chemical warfare, including in creation of powers on chemical weapon production, in improvement of all

agents of a chemical attack, in development of chemical preparation in Red Army, in creation of a net of exploratory laboratories and design offices etc. have been planned

Addressing to the chemical weapon, we shall note, that decision Council of work and defense from the 31st of October 1931 has been planned to finish capacities on production of new group chemical warfare agents - cyanic salts and hydrogen cyanide - up to 1500 (counting upon hydrogen cyanide). Soon in Moscow the site for construction of a factory on manufacture of cyanic salts has been picked up. However, then heads of the heavy industry have mobilized the care and they have transferred dangerous construction to Urals Mountains³⁹⁰. The decision from the 31st of October 1931 Supreme council national economy it was entrusted to finish in 1932 construction powerful plant on production of mustard gas Meyer (plant at Ugreshje-Moscow)³⁹⁰. The same document for army it was offered to enter on arms aviation chemical bombs calibre 25 kg and 100 kg, and also to finish relative density chemical and fragmentary-chemical aviation bombs in total aviation bombs to 25 %. Have not forgotten also about creation of capacities on production of raw material for manufactures chemical warfare agents (chlorine, arsenic, sulfur, aluminium trichloride).

On those problems which have not found the decision at session on the 31st of October 1931, additional decisions have been made in decision Council of work and defense of the USSR from the 4th of July 1932³⁹³. There were, in particular, target dates of the termination (October, 1933) constructions of plant on production of mustard gas on group of enterprises at Bobriki (Stalinogorsk, Tula oblast). Start-up of manufacture adamsite on aniline-dye plant at Kineshma (Ivanovo oblast) has been planned for January, 1933. In September, 1932 should begin production of diphenylchloroarsine on Derbenev plant at Moscow. And in III quarter 1932 it was necessary to begin, at last, for a long time an outlined construction plant on manufacture of cyanic salts and hydrogen cyanide (that it was not possible to erect in Moscow). By the same document it has been solved on plant at Stalingrad to begin construction of station on filling of chemical warfare agents (term of start-up - on the 1st of January 1933), and on plant at Chapaevsk - to finish re-equipment station for filling munition. As we see, the army continuously insisted on the organization and expansion production of means of a chemical attack. And, if in 1928 plans of chief Military Chemical Directorate I.M. Fishman on development of capacities on production of mustard gas looked rather modestly (as of the 1st of October 1928 - 5000 tonnes per year, for the 1st of October 1929 - 8000 tonnes, for the 1st of October 1930 - 15000 tonnes, for the 1st of October 1931 - 18000 tonnes, for the 1st of October 1932 - 22000 tonnes) appetites Military Chemical Directorate have sharply increased in the further.

Actual figures on production of mustard gas were more modest - to develop more quickly the industry simply not could. Table 3.4 gives representation about dynamics of escalating of quantity mustard gas which the army received those years.

In communication with the second five-year plan 1933-1937 in imperious Soviet cabinets many plans in the field of preparation for offensive chemical war were born also⁴⁰⁵. In table 3.5 for an example the minimal variant of scheduled bastings of the State Planning Committee of the USSR accepted on the 7th of August 1933 on escalating manufactures chemical warfare agents during a five-years period is resulted. There were also others.

Table 3.5 Minimal variant of the plan of production of chemical warfare agents on the second Soviet five-years period⁴⁰⁵

Chemical warfare agents	Capacity for the 1st of January of year, thousands tonnes					
	1933	1934	1935	1936	1937	1938
Mustard gas	26,0	35,0	41,0	59,0	86,0	104,0
Lewisite	-	-	-	4,0	7,0	10,0
Phosgene	7,0	9,0	13,0	18,0	18,0	23,0
Diphosgene	1,9	1,9	1,9	1,9	1,9	1,9
Hydrogen cyanide	-	-	1,5	1,5	5,0	5,0
Chloroacetophenone	1,5	1,5	1,5	1,5	3,5	3,5
Adamsite	0,13	3,13	3,13	3,13	6,13	6,13
Diphenylchloroarsine	-	2,5	2,5	2,5	2,5	2,5
Ethylidichloroarsine	0,10	0,10	0,10	0,10	0,10	0,10

"Chemical activity" authorities of the country those years was so great, that it is not necessary to be surprised to issue in the beginning of September 1933 at once two decisions Council of work and defense which have been aimed at escalating of capacities on production of means of a chemical attack^{407,408}.

The decision from September, 5th, 1933 has defined prospects of creation of powers on equipment chemical munitions. For plant № 12 at Electrostal (Moscow oblast) the task to have by January, 1st, 1934 new powers on filling of chemical warfare agents into fragmentary-chemical munitions (76 mm and 122 mm artillery chemical shells - 3870000 pieces in a year has been positioned; aviation chemical bombs AOKh-10

- 17040 pieces; large aviation chemical bombs - 23000 pieces) and toxic smoke candles (to 3500000 pieces per year over already available power on 1000000 pieces). And to a plant № 80 at Dzerzhinsk has been defined to erect powers on filling into fragmentary-chemical an ammunition (270000 pieces per year artillery chemical shells calibre 122 mm and 152 mm and 5400 aviation chemical bombs KhAB-100). And the next years new tasks have been yielded⁴⁰⁷.

The decision accepted on the 9th of September 1933 provided creation in the country of fantastic capacities on production of chemical warfare agents with total amount: for the 1st of January 1934 - 55480 tonnes per year, for the 1st of January 1935 - 87950 tonnes, for the 1st of January 1936 - 107600 tonnes. We shall decipher last number: mustard gas - 79000 tonnes per year, lewisite - 500 tonnes, phosgene - 16200 tonnes, diphosgene - 3400 tonnes, hydrogen cyanide - 2500 tonnes, adamsite - 6000 tonnes. In number of new manufactures, which creation it has been stipulated by this decision with a termination date in 1935, two factories on production of hydrogen cyanide (at Voskresensk - capacity 1000 tonnes per year and at Sverdlovsk - capacity 1500 tonnes) have entered, and plant in Sverdlovsk should provide with cyanic salts both manufactures. The document supposed to create experimental installation on production of lewisite on plant at Chapaevsk with a termination date in 1935. Expansion of some manufactures was planned also: mustard gas - at Dzerzhinsk, Slavyansk, Kemerovo, lewisite - at Dzerzhinsk, diphosgene - at Slavyansk, adamsite - at Berezniki⁴⁰⁸.

The "review of forces" on a line of mustard gas has been accomplished in 1934. Council of work and defense of the USSR on the 4th of April 1934 have decided to prepare the batch 1000 tonnes mustard gas (400 tonnes at Chapaevsk and 600 tonnes at Stalingrad) by the 1st of May. The task has been executed, however simultaneously it was necessary to ascertain absence of mobilization readiness of plants the chemical weapon to manufacture mustard gas^{397,398}. It has soon been decided to seize new top. On the 27th of June 1935 in Council of work and defense of the USSR have decided to finish capacities on production of all chemical warfare agents up to 200000 tonnes per year. In particular, has been stipulated among persistent chemical warfare agents creation of serious capacities on production of nonfreezing mustard gas (40000 tonnes/year)⁴⁰⁹.

In 1936 in a management of the Soviet country have proceeded discussions about a condition of the industry of the chemical weapon⁴¹¹. It has been connected with planning creation in army of chemical divisions^{139,140}, chemical corps¹³⁴ and in general with creation of chemical military units of a Reserve high general commands. In February, 1936 Council of work and defense of the USSR has disposed to make next 1000 tonnes mustard gas which were necessary for army for protection of east boundaries of the country³⁹⁹, and it has been made⁴⁰⁰.

In March people's commissar for defence K.I. Voroshilov has complained to principals of Communist party J.V. Stalin and governments V.M. Molotov about disadvantages of chemical equipment of army¹³⁴. During the developed discussion⁴¹¹ it was found out, that the heavy industry not only manufactures, along with mustard gas, also "old" chemical warfare agents (phosgene, chloroacetophenone, diphenylchloroarsine), but also schedules to dilate production of some "new" (lewisite, hydrogen cyanide, diphosgene, adamsite). Among these plans it is especially convex ideas about production of mustard gas in new battle forms (nonfreezing and viscous) were looked. Discussion in June, 1936 when it was accepted three decisions on a chemical weapon - on chemical warfare agents⁴⁰⁹, on means conducting a chemical warfare⁹⁶, and also on means chemical protection was materialised. In particular, the decision from June, 27th, 1936 had been planned the big program on creation of a series of new chemical planes and tanks⁹⁶. And the decision from June, 4th⁴⁰⁹ provided sharp escalating of powers on production chemical warfare agents, and also chemical munitions (only on lewisite it was supposed to finish power to 1.1.1939 to 25000 tonnes per year). In general to army "have listened", and its napoleonic plans of expansion of mobilisation powers have been concretised on 8 types chemical warfare agents. It has been decided to finish by January, 1st, 1937 powers on production of chemical warfare agents to 73560 tonnes per year (on mustard gas - 42750 tonnes, lewisite - 910 tonnes, phosgene - 14500 tonnes, diphosgene - 1900 tonnes, hydrogen cyanide - 1500 tonnes, adamsite - 9000 tonnes, chloroacetophenone - 1200 tonnes, diphenylchloroarsine - 1800 tonnes). It was supposed to have also powers on equipment toxic smoke candles in number of 3500000 pieces in a year⁴⁰⁹.

In execution of this decision the head of Soviet heavy industry G.K. Ordzhonikidze has published on the 10th of July 1936 the order⁴¹¹ in which even more serious tasks by kinds chemical warfare agents and on plants have been concretized. Creation by the 1st of January 1939 of capacities on production of mustard gas in quantity 129000 tonnes per year (including 71000 tonnes - technical, 40000 tonnes - nonfreezing, 18000 tonnes - viscous), lewisite - 25000 tonnes, phosgene - 23000 tonnes, diphosgene - 10700 tonnes, hydrogen cyanide - 6000 tonnes, adamsite - 17000 tonnes, diphenylchloroarsine - 1000 tonnes, chloroacetophenone - 1000 tonnes has been stipulated. Especially big development should receive erected at Dzerzhinsk chemical plant № 96 on which by the 1st of January 1939 capacities on production should be created: mustard gas - 40000 tonnes per year, lewisite - 8000 tonnes, phosgene - 3000 tonnes. Plans concerning chemical plant at Berezniki were so serious. On it by the 1st of January 1939 capacities on manufacture should be organized: mustard gas - 9000 tonnes per year, lewisite - 8 000 tonnes,

phosgene - 6 000 tonnes, diphosgene - 6000 tonnes.

The Army watched execution of decisions captiously⁴¹².

It is not meaningful to discuss problems of chemical war in connection with the third five-year plan for 1938-1942. This plan was not carried out in connection with beginning World War II.

Among pre-war documents we will specify the decision of Committee of defence (which by then has passed from abolished Council of work and defence directly in government conducting) at the government from December, 14th, 1938⁴¹⁹. For plant № 96 at Dzerzhinsk commissioning workshops of the first turn (mustard gas, lewisite) has been planned. On plant № 102 at Chapaevsk it has been decided to complete in March, 1940 reconstruction workshop of lewisite on power 4000 tones per year. On chemical group of enterprises at Stalinogorsk creation workshop for filling of chemical warfare agents into artillery chemical shells and aviation chemical bombs (commissioning - in January, 1940) has been planned. For plant at Chernoreche-Dzerzhinsk there was a delivery target date workshop of hydrogen cyanide - May, 1940, and for chemical group of enterprises at Rubezhnoe - input term workshop of chloroacetophenone - January.

In summary we shall analyse a divergence between plans on production of chemical warfare agents and their real embodiment. In pre-war years the Red Army and a management of the industry of the USSR were uniform only in one with intelligence the USA and Germany. Both those and others reported on authorities of the countries, as a rule, very overestimated (false) data about opportunities of the USSR on production of the chemical weapon. In particular, one of variants of the Soviet plan 1936 achievement by the 1st of January 1941 was expected of obviously unreal capacity on manufacture of chemical warfare agents per 240000 tonnes per year, including on mustard gas - 145000 tonnes and on lewisite - 26000 tonnes. Actually the USSR has entered war with less serious capacities: on mustard gas - 50000-60000 tonnes per year, on lewisite - 12000 tonnes. However even these capacities could not be used in full.

* * *

So, numerous military-chemical requirements of the Red Army have not gone to waste. In the Soviet Country the traditional direction of development of all extractive and chemical industry has actually been changed and under a kind of industrialization the most powerful infrastructure of a chemical attack included all necessary for it elements has been created. Then the Soviet industry have learned to make everything, everything, - from initial raw material for manufacturing various chemical warfare agents and means of their storage and transportation up to chemical warfare agents and a chemical munition.

Thus, the history of creation of the secret Soviet industry of a chemical attack is a classical example of the appendix of the most powerful forces on absolutely unnecessary business.

* * *