CONFERENCE ON DISARMAMENT

CD/514
10 July 1984

Original: ENGLISH

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

VERIFICATION OF NON-PRODUCTION OF CHEMICAL WEAPONS

1. In a previous paper (CD/353 of 8 March 1983) the United Kingdom delegation made proposals for verification of non-production of chemical weapons including monitoring by routine random inspections of certain sectors of the civil chemical industry in order to ensure that it was not used as a source of agents for chemical warfare. Attention was focused on a list of key precursors for chemical weapons. Delegations were invited to furnish data on the production of these substances by the chemical industries of their own countries. In the light of the replies received and of preliminary discussion of the subject, the present paper suggests a way forward in the consideration of this subject.

2. The list of key precursors annexed to CD/353 had been drawn up during consultations on technical matters by the Chairman of the working group with experts in January/February 1983. In addition to the organic key precursors for nerve agents and for the glycollate incapacitants, the list also contained phosphorus trichloride and phosphorus oxychloride, the inorganic starting materials from which all nerve agents are made. These two substances pose special problems of monitoring because they are manufactured industrially on a large scale (tens of thousands of tonnes per annum in the United Kingdom). When the list of key precursors was drawn up it was widely assumed that apart from phosphorus trichloride and phosphorus oxychloride the key precursors on the list had only modest civil use. It has, however, become clear as a result of discussions of the earlier paper that some of the other key precursors on the list are manufactured to an appreciable extent industrially. For example, dimethylmethylphosphonate (DMMP) is manufactured in quantities of about 1 000 tonnes per annum in the United Kingdom alone. The Delegation of the Federal Republic of Germany has indicated that

methyldichlorophosphine is to be produced industrially for the herbicide glufosinate (CD/CW/CRP.90). Both of these substances fall into the important category of key precursors having a phosphorus-methyl bond, which have a special importance because of the close relationship of their structure to many nerve agents. The importance of this category of precursors has led to proposals by some Delegations that their manufacture should be banned altogether.

3. The United Kingdom Delegation would not propose to ban the manufacture of any substances with a legitimate civil use. The aim would be rather to monitor their manufacture in a way that provides confidence that there is no production of chemical weapons, and that the manufacture of any relevant precursors can be justified by their civil applications.

4. The verification of non-production would be carried out in co-operation with national chemical industries. In order to minimize the effect on civil industry it is clearly desirable to concentrate monitoring on compounds with fewest peaceful uses, but the application of this criterion should not provide a loophole whereby chemicals produced in industrial quantities which pose a real danger to the stability of the treaty remain unmonitored. It would be in the interests of all parties to the proposed convention to identify chemicals that might be used for the manufacture of chemical weapons and then to devise appropriate monitoring procedures. With this aim a classification of chemicals according to risk is proposed as a basis for further work.

Classification of chemicals and precursors

5. The chemicals listed below, be they chemical weapons or their precursors, are classified solely according to risk. It is important to remember that the word "risk" has two interpretations. First of all there is the biological risk (hazard) of poisoning associated with toxic chemicals. In addition there is the perceived risk (threat) to the convention if toxic materials and key precursors are manufactured industrially.

6. For the purposes of verifying the non-production of chemical weapons chemicals are placed in one of two categories according to the risk (hazard) associated with their chemical or toxic properties or according to the risk (threat) they pose to the convention. These two categories would, in the case of chemical agents themselves, correspond with the upper bands associated with the toxicity criteria. Associated with these categories of risk are appropriate verification procedures. Thus not all chemical production will be subject to the same degree or type of monitoring.

Categories

7. Reasons for including precursors in a particular category and their known civil uses are given in the manner illustrated by the Australian and Netherlands Delegations (CD/CW/CRP.81).

Category H 1: High risk chemical agents

Verification - regular reporting which will include description/ justification of the civil uses for which the chemical is produced

- routine, random on-site inspection as outlined in CD/353

(a) Supertoxic lethal chemicals, including sulphur mustard

(b) Other named compounds which warrant similar attention, e.g. nitrogen mustards, lewisite and glycollate incapacitants.

Category H 2: High risk precursors

Verification - as for H 1.

(a) Chemicals containing one phosphorus-alkyl bond, where alkyl is methyl, ethyl or n- or isopropyl

Reason key precursors for V agents and some G agents (including binary weapon components).

Civil use: manufacture of flame retardants, pesticides, herbicides.

(b) Di- and tri-methyl/ethyl esters of phosphorous (P^{III}) acid

Reason: key precursors for V agents and some G agents

Civil use: same as H 2(a) as they are readily converted into phosphonates (P^{V})

(c) Pinacolyl alcohol

Reason: key precursor for G agents of the Soman type

Civil use: little or none.

(d) N,N- Diisopropylaminoethyl-2-halides,
N,N- diisopropylaminoethan-2-ol and
N,N- diisopropylaminoethane-2-thiol

Reason: key precursors for VX

Civil use: little or none.

(e) Aryl, alkyl and cycloalkylglycollic acids/esters

Reason: key precursors for psychotomimetic incapacitants listed in H 1(b).

Civil use: pharmaceutical intermediates.

(f) 2, 2'-dihydroxyethylsulphide (Thiodiglycol)

Reason: key precursor for sulphur mustard

Civil use: anti-oxidant, vulcanizing agent, solvent for textile dyes, synthetic intermediates

(g) Arsenic trichloride

Reason: key precursor for lewisite

Civil use: preparation of chloroarsines; ceramic industry.

(h) Other named compounds that warrant this level of monitoring.

Category M 1: Medium risk chemicals

Verification - Regular reporting to include information/data exchange on production statistics.

"Other lethal chemicals" which might be diverted to chemical warfare purposes:

(a) Hydrogen cyanide (HCN)

Reason: known chemical warfare agent

Civil use: feedstock for polymers, weedkillers, sequestrants, pharmaceuticals manufacture, grain fumigation.

(b) Phosgene ($COCl_2$)

Reason: known chemical warfare agent

Civil use: general chlorinating agent; synthesis of dyes, pharmaceuticals, herbicides, pesticides, resins, polyurethane foams and lacquers.

(c) Cyanogen Chloride (CNCl)

Reason: known chemical warfare agent.

Civil use: synthesis of organic compounds; warning agent in fumigant gases.

(d) Other named chemicals that warrant this level of monitoring.

Category M 2: Medium Risk Precursors

Verification as for M 1

(a) Phosphorus trichloride (PCl_3)

Reason: precursor for most types of G and V agents.

Civil use: manufacture of phosphorus oxychloride; chlorinating agent; catalyst; textile finishing agent; making intermediates for organophosphorus pesticides; making surfactants, phosphites, gasoline additives, plasticizers and dyes.

(b) Phosphorus oxychloride ($POCl_3$)

Reason: precursor for some G agents

Civil use: manufacture of cyclic and acyclic esters for plasticizers, gasoline derivatives, hydraulic fluids, organophosphorus compounds, chlorinating agent; catalyst; making trichlorophenols and fire retarding agents.

(c) N,N-disubstituted- -aminoethanols ($R_1R_2NCH_2CH_2OH$)

Reason: precursor for V agents (including binary weapon components).

Civil use: corrosion control; synthesis of fine chemicals, surfactants, ion-exchange resins, oil additives, thickeners and pharmaceuticals.

(d) N,N-disubstituted-β-aminoethylhalides ($R_1R_2NCH_2CH_2X$) X = Cl, Br

Reason: precursor for V agents and some psychotomimetic incapacitants listed in H 1(b).

Civil use: paper production, preparation of pharmaceutical intermediates.

(e) N,N-disubstituted-β-aminoethanethiols ($R_1R_2NCH_2CH_2SH$)

Reason: precursor of V agents.

Civil use: little or none.

(f) Quinuclidinols: 3- and 4-hydroxypiperidines

Reason: key precursors for psychotomimetic incapacitants listed in H 1(b).

Civil use: pharmaceutical intermediates.

(g) Sulphur monochloride (S_2Cl_2)

Reason: key precursor for mustard.

Civil use: manufacture of lubricating oil additives and agents for cold vulcanization of rubber products.

8. For the G and V agents both the phosphorus and the alcohol or aminoethyl moieties contribute to the character of the chemical agents. This is particularly so for Soman and VX and both moieties have accordingly been listed; namely pinacolyl alcohol and the appropriate N,N- diisopropylaminoethyl compounds respectively.

9. In considering the psychoactive glycollate incapacitants both the amine and glycollic acid moieties contribute to the biochemical action. However such pharmacological activity is not confined to quinuclidinyl or piperidinyl esters of glycollic acids - other amine esters can elicit it. The glycollate moiety is thus considered to be the most important precursor to monitor and placed in category H 2; the heterocyclic alcohols are nonetheless, important for the precise characteristics of these incapacitating weapons and are still included, but in category M 2.

10. Mustard can be prepared by two processes; from thiodiglycol using hydrogen chloride or from ethylene using sulphur monochloride. Hydrogen chloride and ethylene are employed on such a large scale industrially that it would be more logical to monitor the other reaction constituents - thiodiglycol and sulphur monochloride. The route from thiodiglycol is technically easier than the Levinstein process from ethylene; consequently thiodiglycol is put in category H 2 and sulphur monochloride in M 2.

11. Similarly, of the two precursors for lewisite, arsenic trichloride is produced in a much lower quantity industrially than acetylene and is consequently selected as the precursor to monitor, as an H 2 Key precursor.

12. Quantity of production per se should not be a criterion for rejecting particular compounds for monitoring. But where one precursor of a pair is made in much smaller quantities than the other it could be argued that the prudent action would be to monitor that with the lower production rate. This reasoning has been applied to the compounds in paragraphs 10 and 11.

Modifications to the lists of chemicals

13. Any agreed list for the purpose of verification of non-production may need to be modified in the future, by agreement, to take account of technological advances. It would therefore be desirable for the convention to provide for the possibility of amendments to the list through the machinery of the Consultative Committee.

Declarations and Verification

14. All states in which any company or organization produces materials in the high and/or medium risk categories on a scale of one tonne or greater should declare:

(a) Chemical name and formula of the material.

(b) Name of the company or organization operating the plant in the state making the declaration.

(c) The full postal address of site where the plant is located together with unequivocal grid references (geographical co-ordinates).

(d) Whether the chemical is solely for domestic use or for export as well.

(e) The state(s) to which the chemical is exported (if appropriate).

(f) Whether the chemical is made in dedicated plant or by a batch process.

(g) If by a dedicated plant, the maximum annual capacity in tonnes per annum.

(h) If by a batch process, the weight in tonnes produced in the last calendar year.

(i) Whether the chemical is stored on site and the maximum storage capacity (tonnes) if it is.

(j) Whether the chemical is used "on stream".

15. The declarations 14(d) and 14(e) are important because a correlation should be observed between exporting and importing states. States should also declare whether or not any of the materials in the high or medium risk categories are imported in quantities of one tonne or greater by any one company or organisation and whether they are used in that state or re-exported.

Verification and monitoring

16. The need to describe the reason(s) why a compound in the H 1 (high risk chemicals) or H 2 (high risk precursors) should be manufactured for permitted purposes places the responsibility to provide this information on to the manufacturer. However this requirement would also enable the bona fide production of a high risk chemical or key precursor to continue if a legitimate purpose for such a compound were revealed and the manufacturer submitted to an appropriate monitoring scheme.

17. The declarations in paragraph 14 would be made to the appropriate body of the Consultative Committee. The substance in the high risk categories would be subject to stringent monitoring including on-site inspection on a random basis. The same degree of stringency would not be appropriate for the medium risk category. Much could be done by exchanging information and data about the production process with the appropriate organ of the Consultative Committee.

18. While it is important that confidence in the convention should rest as far as possible on routine methods of verification, it would of course be open to any party to the convention to challenge another party suspected of non-compliance with any aspect of the convention, including the provisions on non-production, in accordance with the proposals in the United Kingdom paper CD/431 and other proposals on the table.