July 1996

Identification of CWC declarable facilities - Industry survey design

Chemical Weapons Convention Office - Australia

National implementation of CWC obligations requires the monitoring of activities with potentially thousands of chemicals, many of which are not currently subject to any monitoring on use or trade. For countries with at least a modest chemical industry, the national authority usually cannot rely on existing government records to identify and compile data on declarable activities, and must initiate a new information gathering exercise - an industry survey.

Australia's CWC national authority, the Chemical Weapons Convention Office (CWCO) has spent much of the last 18 months surveying relevant sectors of Australian industry, and other organisations which could be affected by the Convention. That experience has shown that good survey design is critical to achieving useful results. In particular, a survey questionnaire should seek information additional to that required for declarations, to enable validation of responses. Without such checks, there is a risk that a significant number of industrial facilities could be omitted from declarations.

This paper recounts the development of CWCO's survey methodology, notes the problems experienced, and sets out the solutions that have been used in developing a better approach.

Who was surveyed ?

The main focus of this paper is the design of a survey questionnaire. However, to give a fuller picture of how CWCO has gone about its task, the following information is included on how companies and organisations were selected for inclusion in surveys.

In identifying a list of survey recipients, CWCO benefited from knowledge gained through a survey carried out by the Department of Foreign Affairs and Trade in 1991 to estimate the impact of the then draft CWC for Australia. That survey targeted around 2000 organisations, selected primarily from telephone directory listings. The survey identified about 200 potentially relevant organisations. Other survey recipients were obtained from the following sources:

- membership lists of 10 chemical industry associations
- contact lists from other chemical regulators in Australia
- telephone directory listings on CD-ROM
- chemical industry directory listings.

The types of organisations that were selected included those identified as:

- chemical and pharmaceutical manufacturers and formulators
- chemical traders
- companies manufacturing fertilisers, pesticides and other agricultural chemicals
- companies in the paper and textile industries
- manufacturers of explosives
- manufacturers of food additives, spirits

- companies or institutions involved in chemical, pharmaceutical or medical research
- hospitals.

1995 Survey of the Chemical Industry

In its first survey in early 1995, CWCO contacted about 2600 companies or organisations. A second survey in early 1996 targeted about 600 companies, of which about 300 were newly identified (eg. from updated telephone listings).

To date, around 100 survey recipients have been found to be affected in some way by the CWC. Most of these were companies that produce Discrete Organic Chemicals (DOCs), and many were chemical importers or exporters. Perhaps ten will be declarable because of production, processing or consumption of Scheduled chemicals.

The 1995 survey sought information relevant to activities with Scheduled chemicals, and also information about DOC production. The form required a *yes/no* response on activities with each listed chemical, and for production of DOCs. Further details were required for each *yes* response, including the names of chemicals considered to be DOCs. The form was about 12 pages long.

Information was sought for calendar 1994, along with an indication of 1995 activities. The survey was based on reporting thresholds lower than those specified in the CWC text (typically 10%) to provide data for national monitoring of "sub-threshold" facilities.

In addition to the descriptions listed in the CWC schedules, the survey form explicitly listed a number of chemicals which belong to one of the families of chemicals in Schedule 2. To assist survey recipients, alternative chemical nomenclature was also given in many cases, as were some trade names.

Around 60% of the forms that were sent out were completed and returned without prompting, which by all accounts is a good response. We believe that a significant factor here was the effort put into ensuring accompanying documentation clearly explained the purpose of the CWC and the relevance to it of chemicals in commercial use.

In general, positive responses provided good and accurate information. Some difficulties appeared though, when checking found that, for a small but significant number of cases, apparent ‘nil returns’ proved to be in error. In retrospect, this was the case for nearly half of all declarable facilities. It was then necessary to contact many hundreds of companies to satisfy ourselves that survey questions had been properly understood and answers were accurate.

The main cause of problems here was that survey recipients had experienced difficulty in interpreting exactly what was required. At the nub of this was the need for otherwise busy people to give sufficient time to a relatively complex task. Key areas where difficulty occurred were:

- interpreting chemical names in the Schedules
- understanding terms other than as defined by the CWC, especially ‘production’

- respondents being overwhelmed by elements of the form (eg. obscure chemical names in Schedules 1 and 2) and not focussing sufficiently on aspects of the form more likely to be relevant - especially DOC production.

A further issue, which led to the need to recontact many companies was that, in the absence of some general information about their activities, it was difficult for CWCO to form a view about whether the respondent had understood all that was sought from them. In our opinion, we could not risk assuming that understanding, even though it had probably not led to errors in most cases.

The original survey form had asked respondents to indicate if they thought the survey was not relevant to them, and why. Information given in answer to this question was sufficient to allow assessment of responses in only a small proportion of cases. Sometimes also it showed a considerable misunderstanding on the part of the respondent. A not uncommon response (eg. from companies formulating products such as detergents or cleaners) was that the company doesn't handle 'chemicals'.

Improving on the 1995 survey form

The form used in CWCO's 1995 survey had many good features. In many cases the responses it elicited were accurate, and included a level of detail just short of that required for declarations. Where the design fell short, was in its assumption that recipients would understand clearly what was required of them. The form's size (and thus its apparent complexity) also worked against industry responding positively to it.

In light of these difficulties, a number of concepts were identified, to elicit more useful survey responses. These included:

- seeking a description of the company's activities, thus giving the national authority a basis for validating the company's assessment of the CWC's relevance to them
- simplifying the form's appearance and requirements
- as far as possible, including trade names for Scheduled Chemicals in commercial use
- giving a clear indication that activities such as captive production are to be reported (this is unlikely to be assumed by most respondents)
- to the extent practical, offering guidance on how particular chemicals are used so that respondents can focus efforts on relevant sections of the form (eg. indicating that Schedule 1 chemicals are most unlikely to have commercial uses other than in medicine or research, so that most companies do not need to closely examine that list).

1996 Industry Survey

Dealing with the problems mentioned above led a reformulation of how CWCO seeks declaration information. The 1995 form asked 'Are you affected by the CWC? If yes, please give details'. The approach now in use asks 'What does your company or organisation do, and in particular do you handle Scheduled chemicals or produce organic chemicals?'. If, after assessing the response, CWCO concludes that the respondent probably operates a declarable facility, a further approach is made to seek

actual declaration information, and to advise on rights and responsibilities under the CWC.

The 12 page form used in 1995 has now been replaced with a one page form (Attachment A), and a four page explanatory leaflet (Attachment B).

Questions 1 and 2 of the new form ask the same basic questions as the 1995 form, but use the leaflet to guide the respondent, and emphasise those aspects of the CWC most likely to be relevant: Schedule 3 is listed first; and DOC production is highlighted. It also describes the uses of, and lists trade names for chemicals known to be used in Australia.

Question 2 asks about production of organic chemicals more generally, as most respondents know if their company does this. Using other information in the response, or with a telephone call, CWCO can assess whether declarable DOC production is involved.
Answers to Questions 3 and 4 indicate whether the company or organisation has any activities which could suggest CWC relevance. On many occasions, it has been found that a company has ticked 'no' for both questions 1 and 2, but described activities that may be relevant (usually to DOC production).

Question 5 puts the entire response into context, and is especially useful where the respondent has answered 'no' to all other questions.

The particular value of this survey approach is that it elicits responses of much greater utility than was previously the case. CWCO has needed to make follow up contact with about 15% of respondents, rather than 60% as previously. That contact has also been simpler and less time consuming. Nevertheless, the new form appears to have had led only to a marginal improvement in response rates, although this may be a reflection of the different population it has been used for - about 30% of the forms were sent to non-respondents from the first survey.

It is clear that the design of the new form shifts the emphasis for assessing a company's obligations under the CWC toward the national authority. This does not of course absolve companies from meeting relevant legal requirements, and CWCO does not write back to survey respondents advising they are not affected.

For this approach to work, however, the assessment of survey responses needs to be carried out by an officer knowledgeable about both the CWC and chemical industry. We have found however, that the issues that may arise in assessing responses do recur, and believe that someone with a background in any of the physical or biological sciences could handle most cases after a suitable learning period or if appropriate guidelines are available.

The utility of the one page form is at its greatest for smaller companies or organisations. For companies we know operate complex plant sites, we have retained an approach similar to that used in the 1995 survey.

Future surveys

The chemical industry changes constantly, and we expect some aspects of Australia's industry declarations (such as DOC production, or Schedule 2 processing) will change markedly over several years. CWCO plans to carry out minor surveys, of say 300 companies, in most years to cover any new arrivals, and companies previously identified as likely to commence declarable activities. A major survey, of say 1500 companies would be done each third year.

An important aim of the background questions used in the 1996 survey form was to elicit information allowing CWCO to determine if and when a company or organisation should be resurveyed.

We expect to further refine the approach used for the 1996 survey in the light of experience. The question form may be refined slightly. However it is more likely that we will try to update the guidance document once more is known about issues such as low concentrations for Schedule 2 and 3 chemicals, and refinements to the DOC definition are agreed.

Attachment A

CHEMICAL WEAPONS CONVENTION - 1995 INDUSTRY SURVEY

Please read the enclosed leaflet 'THE CHEMICAL WEAPONS CONVENTION - IS YOUR ORGANISATION AFFECTED?', answer these questions and return your response to CWCO.

AAA Chemical Company
10 Smith Street
Bourke NSW 2840

Any changes? (please print):

_____

_____

_____

Contact name:_____ Phone:_____ Fax:_____

1. During the 1995 calender year has your organisation produced, used, traded, imported or exported any of the CWC Scheduled chemicals ? No ☐ Yes ☐

- *for Schedule 3 chemicals, report only production, import or export*

If yes, please describe:_____

_____

2. During 1995 has your organisation produced any organic chemicals in tonne quantities (other than hydrocarbons or long chain polymers) ? No ☐ Yes ☐

If yes, please indicate approximate aggregate production: _____

3. Does your organisation No Yes

(i) produce any other chemical or manufacture any chemical formulation ? ☐ ☐

(ii) use, handle, import or export chemicals (other than retail products, but including laboratory supplies) ? ☐ ☐

4. IF YOU ANSWERED *YES* TO ANY OF THE QUESTIONS ABOVE : Please indicate which of the following activities involving use of chemicals is carried out by your organisation.

☐ any form of reaction chemistry
☐ blending or formulation of chemicals
☐ import of chemicals
☐ export of chemicals
☐ distribution/wholesaling of chemicals
☐ scientific research
☐ production is of hydrocarbons only
☐ production is of polymers only (monomers not produced, including as intermediates)

Please give a brief explanation of activities you have indicated :

_____

_____

_____

_____

5. Please briefly describe the nature of your organisation's business / activities:

_____

_____

_____

CWCO
CHEMICAL WEAPONS
CONVENTION OFFICE

September 1997

**DEPARTMENT OF
FOREIGN AFFAIRS AND TRADE**

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THE CHEMICAL WEAPONS CONVENTION

- IS YOUR ORGANISATION AFFECTED ?

The Chemical Weapons Convention (CWC) is an international treaty that bans the development, production, possession or use of chemical weapons, and requires the destruction of existing weapons.

A number of chemicals produced or used for normal industrial, medical or research activities can also have applications in the production of chemical weapons. Moreover, the types of chemical processes involved in the production of CW agents are also very commonly used in the legitimate production of commercial chemicals.

Each country which is a Party to the CWC must declare information on certain chemical activities to the international organisation established under the CWC, the Organization for the Prohibition of Chemical Weapons (OPCW), and permit inspection of relevant chemical facilities by that organisation. This provides assurance to the international community that the country is honouring its commitments not to engage in activities prohibited by the CWC.

The CWC's routine reporting and inspection requirements apply to the production, trade, or use of chemicals as specified in the Convention. In Australia, these requirements are implemented through the *Chemical Weapons (Prohibition) Act*. The Chemical Weapons Convention Office (CWCO) in the Department of Foreign Affairs and Trade administers that Act, which came fully into force in April 1997. Regulations covering export and import of CWC Scheduled chemicals also came into effect from November 1996 and January 1997 respectively.

Companies should be aware of whether they may have reporting and inspection obligations under the CWC and Australia's implementing legislation. Information here is intended to assist in that respect.

If you believe you may be affected, or if you have any queries, please contact Malcolm Coxhead or Geoff Shaw at CWCO on 02 6261 1920.

Who is affected?

For Australian industry, there are two main aspects of CWC related requirements. Details of these are given in the following pages.

- permits or licences may be needed for activities with, or trade in, chemicals listed in the CWC Schedules
- activities which produce organic chemicals may need to be notified to CWCO.

Activities with CWC Scheduled Chemicals

CWC related requirements apply only to certain activities with Scheduled chemicals. These are detailed below, along with some information about the chemicals in each Schedule, which may help to identify relevant activities. Please note that the CWC defines production of a chemical as its formation through a chemical reaction, and can include intermediates in a chemical reaction sequence as well as by-products.

A permit is required under the *Chemical Weapons (Prohibition) Act* to operate a facility in a year if an amount of **Schedule 3** chemical exceeding 30 tonnes is likely to be produced at a plant comprising, or comprising part of, the facility during the year. *(Annual production of 200 tonnes or less will not be subject to routine OPCW inspection.)*

A licence is required under Customs regulations for export of any Schedule 3 chemical.

Schedule 3 lists toxic chemicals and precursors that are considered to pose a risk to the purposes of the CWC, but which also have significant legitimate uses. Some schedule 3 chemicals, for example triethanolamine, are used extensively in Australian industry. Others such as phosgene and hydrogen cyanide may be produced as intermediates in other chemical production processes. Another Schedule 3 chemical, Chloropicrin is known to be used in fumigants.

A permit is required under the *Chemical Weapons (Prohibition) Act* to operate a facility in a year if an amount of **Schedule 2** chemical exceeding the relevant threshold for that chemical is likely to be produced, processed or consumed at a plant comprising, or comprising part of, the facility during the year.
(For chemicals listed in Schedule 2A, the permit threshold is 100kg, or 1kg where marked with an asterisk. For chemicals in Schedule 2B, the permit threshold is 1 tonne. The OPCW inspection threshold is ten times higher in each case.)

A licence is required under Customs regulations for export of any Schedule 2 chemical.

Schedule 2 lists toxic chemicals and precursors considered to pose a significant risk to the purposes of the CWC, many of which also have legitimate uses. Some chemicals fitting the description of item 4 in Schedule 2B are used in Australia, notably in flame retardants. Thiodiglycol is used in Australia as a carrier for dyes and inks. Other possible uses of Schedule 2 chemicals include: in medical and pharmaceutical preparations (eg. anticholinergics, arsenicals, tranquillisers, hypotensive agents), lubricants, colour stabilisers, paints, antistatic agents, metal plating preparations, epoxy resins, pesticides, defoliants, and perfumes, and as a byproduct in the production of fluorocarbons.

A permit is required under the *Chemical Weapons (Prohibition) Act* to operate a facility in a year if **Schedule 1** chemicals are likely to be produced, acquired, retained or used at, or transferred from the facility during that year. A permit is not required, however, if

- there is no production of Schedule 1 chemicals at the facility, and
- the total quantity of the Schedule 1 chemicals does not exceed 100g in the year, and
- they are intended only to be put to research, medical or pharmaceutical purposes.

(OPCW inspection requirements only apply to production, with a 100g per annum threshold for research, medical or pharmaceutical purposes.)

A licence is required under Customs regulations for import or export of any Schedule 1 chemical. Importers and exporters of Schedule 1 chemicals should note the particular requirement that any permit application must be at least 37 days in advance of any shipments to or from Australia.

Schedule 1 lists chemicals that are considered to pose a high risk to the purposes of the CWC. Some of the chemicals listed have small-scale legitimate uses. Chemicals such as ricin, saxitoxin and the nitrogen mustards are known to be used, and sometimes produced, in Australia in small quantities in research. Nitrogen mustards are also used in medical treatment (mustine).

CWC Scheduled Chemicals (some trade names are shown in italics)

Schedule 3

(1) Phosgene: Carbonyl dichloride
(2) Cyanogen chloride
(3) Hydrogen cyanide
(4) Chloropicrin: Trichloronitromethane
(5) Phosphorus oxychloride
(6) Phosphorus trichloride
(7) Phosphorus pentachloride
(8) Trimethyl phosphite
(9) Triethyl phosphite
(10) Dimethyl phosphite
(11) Diethyl phosphite
(12) Sulfur monochloride
(13) Sulfur dichloride
(14) Thionyl chloride
(15) Ethyldiethanolamine
(16) Methyldiethanolamine
(17) Triethanolamine

Schedule 2A

(1) Amiton: O,O-Diethyl S-[2-(diethylamino)ethyll phosphorothiolate
and corresponding alkylated or protonated salts

(2) PFIB: 1,1,3,3,3-Pentafluoro-2-(trifluoromethyl) 1-propene
(3) BZ: 3-Quinuclidinyl benzilate (*)

Schedule 2B

(4) Chemicals, except for those listed in Schedule 1, containing a phosphorus atom to which is bonded one methyl, ethyl or propyl (normal or iso) group but not further carbon atoms,

e.g. Methylphosphonyl dichloride
Dimethyl methylphosphonate
Fyrol DMMP
Ethyl Phosphinyl Dichloride
Ethyl Phosphonyl Dichloride
Diethyl methylphosphonate
Dimethyl ethylphosphonate
Diethyl ethylphosphonate
Levagard VP AC 4048 DEEP (Bayer)
Diphenyl methylphosphonate
Levagard VP AC 4028 MPDPE (Bayer)
Ethyl Phosphinyl Difluoride
Methyl Phosphinyl Difluoride
Phosphonic acid, methyl-, compd. with (aminoiminomethyl)urea (1:1)
Phosphonothioic dichloride, ethyl-
Phosphonic Acid, methyl-,dimethyl ester
Antiblaze 19 flame retardant
Amgard CT, V490 flame retardants (A&W Specialities)
Flovan CGN (Ciba-Geigy)

Exemption: Fonofos: O-Ethyl S-phenyl ethylphosphonothiolothionate

(5) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic dihalides

(6) Dialkyl (Me, Et, n-Pr or i-Pr) N,N-dialkyl (Me, Et, n-Pr or i-Pr)-phosphoramidates

(7) Arsenic trichloride

(8) 2,2-Diphenyl-2-hydroxyacetic acid

(9) Quinuclidine-3-ol

(10) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl-2-chlorides and
corresponding protonated salts

(11) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-ols and corresponding protonated salts

(11 ctd.) Exemptions: N,N-Dimethylaminoethanol
and corresponding protonated salts
N,N-Diethylaminoethanol
and corresponding protonated salts

(12) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-thiols and corresponding protonated salts

(13) Thiodiglycol: Bis(2-hydroxyethyl) sulfide
Glyezin A (BASF)
Basazol C Yellow 50L (30% TDG) (BASF)
Basazol C Orange 54L (30% TDG) (BASF)

(14) Pinacolyl alcohol: 3,3-Dimethylbutane-2-ol

Schedule 1

(1) O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates
e.g. Sarin: 0-Isopropyl methylphosphonofluoridate
Soman: O-Pinacolyl methylphosphonofluoridate

(2) O-Alkyl ($\leq C_{10}$, incl. cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocyanidates
e.g. Tabun: O-Ethyl N,N-dimethyl phosphoramidocyanidate

(3) O-Alkyl (H or $\leq C_{10}$, incl. cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonothiolates and corresponding alkylated or protonated salts

e.g. VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate

(4) Sulfur mustards:
2-Chloroethylchloromethylsulfide
Mustard gas: Bis(2-chloroethyl)sulfide
Bis(2-chloroethylthio)methane
Sesquimustard: 1,2-Bis(2-chloroethylthio)ethane
1,3-Bis(2-chloroethylthio)-n-propane
1,4-Bis(2-chloroethylthio)-n-butane
1,5-Bis(2-chloroethylthio)-n-pentane
Bis(2-chloroethylthiomethyl)ether
0-Mustard: Bis(2-chloroethylthioethyl)ether

(5) Lewisites:
Lewisite 1: 2-Chlorovinyldichloroarsine
Lewisite 2 : Bis(2-chlorovinyl)chloroarsine
Lewisite 3: Tris(2-chlorovinyl)arsine

(6) Nitrogen mustards:
HN1: Bis(2-chloroethyl)ethylamine
HN2: Bis(2-chloroethyl)methylamine (*mustine)*
HN3: Tris(2-chloroethyl)amine *(trimustine)*

(7) Saxitoxin
(8) Ricin

(9) Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldifluorides
e.g. DF: Methylphosphonyldifluoride

(10) O-Alkyl (H or $\leq C_{10}$ incl. cycloalkyl) 0-2-dialkyl (Me, Et, n-Pr or i-pr)-aminoethyl alkyl (Me, Et , N-Pr or i-Pr) phosphonites and corresponding alkylated or protonated salts

e.g. QL: O-Ethyl 0-2-diisopropylaminoethyl methylphosphonite

(11) Chlorosarin: 0-Isopropyl methylphosphonochloridate
(12) Chlorosoman: O-Pinacolyl methylphosphonochloridate

Notification of organic chemical production

Australia is also required to declare to the OPCW all chemical facilities producing above threshold quantities of discrete organic chemicals[†]. In fact it is this aspect of the CWC which probably has the most widespread impact for Australian industry. That impact is, however, very much less than for facilities handling Scheduled chemicals. Certain activities and facilities are also exempt.

Rather than requiring a permit, Other organic Chemical Production Facilities (OCPFs) are subject to simpler annual notification procedures. The priority the OPCW is expected to give to inspection of OCPFs is quite low, and no such inspections are expected until the year 2000 at the earliest.

The operator of a facility must make a notification under the *Chemical Weapons (Prohibition) Act* if the amount of unscheduled discrete organic chemicals produced at the facility was more than 200 tonnes in the previous year, or if an individual plant at the facility produced during the year more than 30 tonnes of an unscheduled discrete organic chemical containing one or more of the elements phosphorus, sulphur or fluorine.

These requirements do not apply, however, for facilities that exclusively produced hydrocarbons or explosives during the year.

It should be noted that production of a discrete organic chemical (DOC) as an intermediate in, or as a byproduct of a process may also be included in the coverage of the CWC and the Act. Coverage may also extend to activities that are normally referred to by industry as formulation, but which do involve chemical reaction (such as conversion of glyphosate to its isopropylamine salt).

Examples of DOC production occur across a range of industries. The following are just a few examples:

- production of components of cosmetics, detergents, fuel additives etc
- production of pharmaceuticals, inks and dyes, organic fertiliser (eg. urea), pesticides
- synthesis of flavours for the food industry
- synthesis of monomers for polymerisation
- production of alcohols (including through fermentation).

As mentioned, there are specific exemptions from the CWC's coverage. Major hydrocarbon producers, such as petroleum refineries are unaffected, provided they don't produce any organic chemicals other than hydrocarbons. Facilities which produce only explosives are also exempt, as long as non-explosive intermediates are not produced. Production of long chain polymers (such as plastics) is also excluded, however production of organic chemicals (other than hydrocarbons) as intermediates in such processes is not excluded.

[†] **'Discrete organic chemical (DOC)'** is defined as any chemical belonging to the class of chemical compounds consisting of all compounds of carbon, except for its oxides, sulphides and metal carbonates, identifiable by chemical name, by structural formula, if known, and by Chemical Abstracts Service (CAS) registry number, if assigned. Long chain polymers are not included in this definition.