

The Chemical Weapons Convention

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The Chemical Weapons Convention (CWC) was opened for signature in mid-January 1993 after two decades of arduous negotiations and is expected to enter into force in early 1995.¹ A true disarmament treaty, the CWC bans the development, production, possession, stockpiling, transfer, and use of chemical weapons, with the long-term goal of eliminating this particularly cruel and abhorrent form of warfare (see box 2-A).

After the treaty enters into force, the participating states will have 10 years to destroy their existing stockpiles of chemical weapons and associated production facilities.² To prevent states from secretly reacquiring chemical weapons, the treaty imposes controls on “dual-use” chemicals that have both legitimate uses and can be illegally diverted to the production of warfare agents. Companies must file detailed annual reports about the nature of their production, processing, and consumption of these chemicals and, in many cases, host intrusive onsite visits by international inspectors: The purpose of this global monitoring regime is to verify the nonproduction of chemical weapons without unduly constraining the chemical industry’s legitimate commercial activities.

Implementation of the CWC will be administered by the Organization for the Prohibition of Chemical Weapons (OPCW), a new international agency to be established in The Hague,

¹Entry into force of the CWC will occur 6 months after the 65th country ratifies the treaty, but not earlier than 2 years after the treaty is opened for signature. Thus, the earliest date of entry-into-force is January 13, 1995. Since more than 145 countries have already signed the treaty, it appears likely that the 65 ratifications will be obtained by July 1994 so as to meet the targeted January 1995 deadline. A key unresolved question, however, is whether the United States would ratify the treaty if the Russian Federation does not.

²There are provisions in the CWC for (1) a 5-year extension of the chemical-weapons destruction deadline if absolutely necessary, and (2) the conversion of chemical weapons production facilities to civilian commercial use. Assuming Russia ratifies the treaty, it is likely to avail itself of both these options.



Box 2-A—Banning Chemical Warfare

Chemical warfare has been a scourge of the 20th century. The first chemical-warfare agent--chlorine gas--was introduced on the battlefield by Germany in 1915 during World War I. Over the next 3 years, both sides engaged in chemical warfare with a total of 17 different toxic agents, including phosgene, hydrogen cyanide, and sulfur mustard, which causes severe damage to the skin, eyes, and lungs. The physical and psychological effects of gas warfare were so horrifying that during the interwar period, countries negotiated the 1925 Geneva Protocol banning the use of chemical weapons in war.

Despite the ban on use, however, the major powers continued to develop, produce, and stockpile new poisonous agents; these activities were not prohibited by the Geneva Protocol. Before and during World War II, Germany developed and stockpiled potent nerve agents (e.g., tabun, sarin) capable of causing convulsions and rapid death, and the Allied powers followed suit. Although thousands of tons of mustard and nerve agents were stockpiled by both sides, they were not used in combat. During the Cold War, the United States, the Soviet Union, and their allies continued to accumulate vast quantities of chemical weapons, raising the spectre of chemical warfare in a NATO-Warsaw Pact conflict in Central Europe.

This threat, combined with the growing proliferation of chemical weapons in the developing world--particularly in the Middle East--prompted the Committee (later Conference) on Disarmament, a multilateral forum in Geneva affiliated with the United Nations, to begin work in the early 1970s on a treaty banning the production, stockpiling, and use of chemical weapons. Some 40 countries participated directly in the negotiations, and many others sent observers. Although the talks moved at a glacial pace for more than two decades, the waning of the Cold War created an opportunity for rapid progress, and Iraq's large-scale use of chemical weapons during its war with Iran gave renewed political impetus for a global ban.

During the 1991 Persian Gulf War, Saddam Hussein's threat to initiate chemical warfare against U.S. and other coalition forces also brought home the dangers of chemical-weapons proliferation for the United States and its allies. The negotiators in Geneva realized that they had a limited window of opportunity to bring the treaty to completion before international interest and consensus were lost. After a final push to resolve the most contentious issues (e.g., the conduct of challenge inspections), the negotiations were brought to a successful conclusion in early September 1992 and the treaty was opened for signature in mid-January 1993.

Netherlands. The OPCW will be an analogue at the international level of U.S. domestic environmental and safety regulatory agencies such as the Environmental Protection Agency. It will include a Technical Secretariat made up of international civil servants who will compile data on chemical plants and conduct onsite inspections. Furthermore, since the States Parties to the CWC are ultimately responsible for the treaty compliance of the relevant industrial facilities operating on their territories, each participating government must establish a "National Authority" whose

responsibilities include serving as a liaison between its domestic industry and the OPCW, collecting data from industry, and ensuring that inspections are carried out.³

VERIFICATION CHALLENGES

Close monitoring of the global chemical industry will be essential to ensure that commercial plants are not diverted to illicit production of chemical weapons. Unlike nuclear weapons, which require a large, specialized, and costly industrial base, chemical-warfare (CW) agents can be made

³The structure of the U.S. National Authority is still being developed. It will probably be based on the current responsibilities of U.S. Government agencies involved in CWC implementation (the Departments of Commerce, Defense, Energy, Justice, and State, and the Arms Control and Disarmament Agency).



Signing ceremony for the Chemical Weapons Convention, Paris, January 1993.



U.S. Secretary of State Lawrence Eagleburger expresses strong support for the treaty at the signing ceremony.

with commercial equipment generally available to any country. Moreover, nearly all of the chemicals used to make CW agents have legitimate commercial uses in the manufacture of

products such as pesticides, pharmaceuticals, plastics, and paints. For example, thiodiglycol, a sulfur-containing solvent used in ballpoint pen ink and other legitimate products, is easily converted to mustard agent in a one-step process.

The effectiveness of the CWC will depend on the signatories' faith in the verification regime, which is designed to assure all participating states that dual-use chemicals are not being illegally diverted to make chemical weapons. As then-Vice President George Bush told CWC negotiators in 1984:

For a chemical weapons ban to work, each party must have confidence that the other parties are abiding by it No sensible government enters into those international contracts known as treaties unless it can ascertain-or verify—that it is getting what it contracted for.⁴

Some analysts consider it likely that some current and future signatories of the CWC may eventually attempt to violate the treaty; it is also

⁴ Vice President George Bush, address before the Conference on Disarmament in Geneva on Apr. 18, 1984, *Department of State Bulletin*, vol. 84, June 1984, pp. #43.

possible that a rogue chemical company motivated by greed could produce CW agents under contract to a foreign power without the knowledge or approval of its national government.⁵ Given these potential threats, the CWC verification regime will serve five primary functions:

1. *assure the destruction* of existing chemical-weapons stocks and production facilities,
2. *detect violations* through rigorous accounting and monitoring,
3. *deter noncompliance* by increasing the economic and political costs of cheating,
4. *build confidence in the regime* by demonstrating that States Parties are abiding by their treaty obligations, and
5. *provide strategic warning* of a country's intent to violate the treaty so that the other Parties can take defensive measures.⁶

The intrusive monitoring needed to detect—and thereby deter—treaty violations will make unprecedented demands on private industry, and will entail some unavoidable costs.⁷ Unlike the Nuclear Non-Proliferation Treaty, which distinguishes between nuclear-weapon states and non-weapon states, the CWC is *nondiscriminatory* in that it imposes a uniform set of rights and obligations on all participants. Each State Party, whether or not it possesses chemical weapons,

will be subject to the same reporting and inspection requirements.

Because of the large size and economic importance of the U.S. chemical industry and allied sectors, the CWC has important implications not only for national security but also for the health of the American economy. The United States is home to roughly 20,000 chemical manufacturing plants, or about a third of the world's total chemical production capacity. Chemical manufacturers of varying size and capability are distributed throughout the country, with no state having fewer than 25 facilities. In 1991, U.S. chemical manufacturers sold more than 101 billion metric tons of raw materials and specialty organic chemicals valued at \$85.5 billion. That same year, the total value of shipments of primary, intermediate, and formulated chemical products was \$292.3 billion, and the U.S. chemical industry employed 846,400 people with a payroll of \$31 billion.⁹ The chemical industry is also important to U.S. competitiveness because of its positive trade balance. In 1992, *net* exports of U.S. chemical products were worth about \$16 billion, compared to the overall U.S. merchandise trade balance of -\$96.3 billion.¹⁰

Given the large size and importance of the chemical industry to the U.S. economy and to

⁵ Kathleen C. Bailey, "Problems With a Chemical Weapons Ban" *Orbis*, vol. 36, No. 2, spring 1992, pp. 239-251.

⁶ J. Aroesty, K. A. Wolf, and E. C. River, *Domestic Implementation of a Chemical Weapons Treaty*, report No. R-3745-ACQ (Santa Monica, CA: RAND Corp., October 1989), p. 45.

⁷ Previous arms control accords have affected U.S. industry only tangentially. The safeguards associated with the Nuclear Non-Proliferation Treaty (NPT) call for materials-accounting and inspection of a relatively small number of civilian nuclear facilities to ensure there is no diversion of plutonium or enriched uranium to illicit nuclear-weapons production. Since the United States is considered a nuclear-weapon state under the NPT, it is not required to adopt these standards; it has, however, voluntarily offered to place civilian nuclear facilities under safeguards. The 1987 Intermediate-range Nuclear Forces (INF) Treaty also entitles Soviet—now Russian—teams to inspect two contractor-operated U.S. aerospace facilities: Martin-Marietta's missile-launcher production plant in Middle River, MD, and Hercules Corp.'s missile production plant in Magna, UT.

⁸ U.S. International Trade Commission *Synthetic Organic Chemicals: United States Production and Sales, 1991*, USITC Publication 2607 (Washington DC: International Trade Commission February 1993), p. 3.

⁹ U.S. Bureau of the *Census, Annual Survey of Manufacturers 1991*, report No. M91(AS)-1 (Suitland, MD: Bureau of the Census, December 1992), p. 1-16.

¹⁰ Net chemical trade figure calculated from 1992 total export and import figures in U.S. Bureau of the Census, Economics and Statistics Administration *U.S. Merchandise Trade: Exports, Imports (C.I.F. Value), December 1992* (Suitland, MD: Bureau of the Census, Feb. 18, 1993), exhibit 4, p. 6. The merchandise trade balance in 1992 was obtained from U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, vol. 73, No. 3, March 1993, p. 73.

world trade, the implementation of the CWC must be perceived as fair and as not imposing heavier burdens on some nations than on others. To this end, the negotiators of the CWC sought to develop a verification system that would effectively negate the military potential of the industry without unduly constraining its legitimate commercial activities. This task proved to be a major challenge, and it took negotiators several years to hammer out an inspection regime that achieves a delicate balance between the intrusiveness needed for effective verification and the protection of legitimate national-security and trade secrets.¹¹

STEPS TOWARD IMPLEMENTATION

Before the CWC can enter into force and be implemented, two additional steps must take place. First, at least 65 countries must ratify the treaty six months before it can enter into force. Second, for implementation to occur, a Preparatory Commission (PrepCom), made up of representatives of the initial signatory states, must negotiate the details of treaty implementation (including reporting formats and procedures for conducting onsite inspections) and establish out of whole cloth the international organization that will administer the treaty regime. The PrepCom, in which the U.S. Government participates, has begun meeting in The Hague and is aiming to complete its work on verification procedures by the end of 1993.¹²

Since the CWC is binding on governments rather than private individuals and corporations, States Parties must pass enabling legislation that

translates the treaty obligations into domestic law and thus obligates companies to comply.¹³ The U.S. implementing legislation for the CWC will need to include provisions that, inter alia:

1. establish the organizational structure, powers, and responsibilities of the U.S. National Authority;
2. lay out the rights and obligations of the U.S. chemical and related industries with respect to declarations, reporting, and inspections;
3. impose penal sanctions on firms and individuals that violate the treaty;
4. protect classified information at government facilities and proprietary data at commercial plants;
5. satisfy the constitutional concerns of private companies with respect to protection from unreasonable searches and seizures, due process, and fair compensation for damages, while preventing companies from obtaining court injunctions to block inspections;
6. comply with Federal and State environmental regulations that cover the destruction of CW agents and inspections of chemical plants; and
7. modify U.S. export control regulations to harmonize them with treaty requirements.¹⁴

The Clinton administration is expected to include a draft of the U.S. implementing legislation along with the CWC when it submits the treaty to the Senate for its advice and consent to ratification. The first draft of the implementing

¹¹ See “The Spy in the Ointment for Negotiators,” *New Scientist*, No. 1647, Jan. 14, 1989, p. 27. Although U.S. negotiators often stressed industry concerns about protecting proprietary information, a much greater problem in the CWC negotiations was the need to shield sensitive national-security information from foreign spying, particularly during challenge inspections of military and intelligence facilities.

¹² For an overview of the PrepCom process, see Lois R. Ember, “Chemical Arms Treaty Makes Unprecedented Demands of Industry,” *Chemical and Engineering News*, vol. 71, No. 23, June 7, 1993, pp. 7-18. The Henry L. Stimson Center, a policy research institute based in Washington, DC, also publishes *The CWC Chronicle*, a periodic newsletter devoted to CWC implementation.

¹³ In the jargon of international law, some parts of the CWC are not “self-executing” because these provisions cannot enter into force without additional domestic legislation.

¹⁴ For example, current U.S. export control laws require the U.S. Government to issue an export license before certain foreign nationals can inspect any U.S. chemical plant. Obtaining such a license now takes as long as 6 months. As a result, the implementing legislation will have to create exceptions for OPCW inspectors with regard to export-control regulations that apply to inspections by non-U.S. nationals.

legislation will be prepared as a collaborative effort by lawyers from the Departments of Commerce, Defense, Justice, State, the Arms Control and Disarmament Agency, and others; this draft will then be introduced in Congress and considered by the congressional committees with jurisdiction. Unlike the treaty itself, which must be ratified by a two-thirds majority of the Senate, the implementing legislation must be approved by a simple majority of both the House and the Senate. To meet the planned entry-into-force deadline of January 1995, Congress will need to complete the treaty ratification process (including passage of the implementing legislation) by July 1994.

CHANGING INDUSTRY ATTITUDES

The attitude of the U.S. chemical industry toward a ban on chemical weapons has changed markedly over the past 70 years. During World War I, a segment of the industry was heavily involved in the production of chemical weapons and lobbied successfully against Senate ratification of the 1925 Geneva Protocol banning their use.¹⁵ During the Vietnam War, however, tie public outcry over the employment of napalm and the herbicide Agent Orange convinced U.S. chemical manufacturers that military production could seriously damage their public image. Since then, mainstream U.S. corporations have sought to avoid any association with chemical warfare and have taken a much more supportive attitude toward chemical arms control.

The Chemical Manufacturers Association (CMA), the U.S. industry's leading trade association, represents 180 chemical companies that own more than 90 percent of the nation's chemical production capacity. In 1978, the CMA began supporting the negotiation of a global ban on chemical weapons, for three reasons:

- The U.S. chemical industry was no longer involved in manufacturing chemical weapons and hence did not have an economic stake in military production.
- The association recognized that it would be better off participating in the negotiations and shaping the treaty proactively rather than being faced with an unsatisfactory *fait accompli*.¹⁶
- Industry representatives noted the positive public-relations benefits to be gained by strongly supporting a ban on chemical weapons, and the seriously adverse effects on the industry's image of opposing a ban.

As a result, the CMA actively supported the multilateral chemical weapons negotiations in Geneva, while seeking verification measures that would reasonably deter illicit military production without unduly burdening legitimate commercial activities. In October 1987, the CMA's Board of Directors formally adopted a policy committing the chemical industry to work on behalf of the treaty.¹⁷ The Association also established a Chemical Weapons Work Group made up of senior executives from 10 major chemical companies. This body has since met on a regular basis with U.S. Government officials to discuss outstanding issues in the negotiations.

The Government-Industry Conference Against Chemical Weapons, held in September 1989 in Canberra, Australia, was another watershed event. Attended by some 400 delegates from more than 60 countries, this conference brought diplomats engaged in the Geneva talks together with representatives of about 95 percent of the world's chemical production capacity. During the conference, trade associations from the United States, Australia, Canada, Japan, and Western Europe jointly issued a formal statement pledging "to

¹⁵ The United States finally ratified the Geneva Protocol in 1975.

¹⁶ Kyle B. Olson, "Disarmament and the Chemical Industry," in Brad Roberts, ed., *Chemical Disarmament and U.S. Security* (Boulder, CO: Westview Press, 1992), p. 99.

¹⁷ Kyle B. Olson, "The Proposed Chemical Weapons Convention: An Industry Perspective," *Chemical Weapons Convention Bulletin*, No. 3, autumn 1988, p. 2.

work actively with governments to achieve a global ban on chemical weapons, and . . . to contribute additional momentum to the Geneva negotiating process. ’

The Canberra Conference also spawned a new international industry forum that subsequently met regularly in Geneva to provide practical input to the CWC negotiating process.¹⁹ Participation by this industry forum resulted in a number of treaty provisions designed to limit the intrusiveness of inspections and to safeguard proprietary information. In particular, chemical industry experts helped shape the procedures for inspections of commercial plants. According to Will Carpenter, chairman of the CMA’s Chemical Weapons Work Group: “We were able, through very good, effective communications, to bring the diplomats to reality as to what needed to be involved in the treaty for it to be technically sound. ’ ”²⁰

For example, in June 1991 the CMA and its foreign counterparts urged the negotiators to expand the verification regime beyond plants producing dual-use chemicals—which are located primarily in Western countries—to cover a wide variety of chemical plants throughout the world. According to this proposal, all chemical plants with the capability to produce CW agents or their precursors would be subject to randomized inspections.²¹ Industry was prepared to accept such a broad verification regime if the CWC negotiators developed inspection proce-

dures that would allow companies to safeguard their legitimate business interests.²² Although the probability would be low that any given plant would be inspected, the expanded coverage would distribute the burden of inspections more equitably among the States Parties and help deter proliferants from using ordinary chemical plants for illicit CW agent production. In response to this proposal, the CWC negotiators expanded the scope of the inspection regime considerably, although not as much as industry had suggested.²³

Now that the treaty has been concluded, the CMA plans to support the treaty through the ratification process. The chemical industry’s endorsement of the CWC is not unconditional, however. As one analyst has observed: “The chemical industry believes that the convention will not be unduly injurious to its interests, but only if the inspection procedures are carefully developed and scrupulously honored. ’ ”²⁴ If chemical companies perceive the treaty’s verification provisions as too onerous, they could trigger a political backlash that would make it more difficult for the United States and other countries to implement the treaty regime.

Because of strong public support for banning chemical weapons, U.S. chemical producers are unlikely to go on record opposing Senate ratification of the CWC. Instead, they will try to ensure that their interests are protected in the implementing legislation and during the deliberations of the

¹⁸ Cited in Julian Perry Robinson, “The Canberra Conference,” *Chemical Weapons Convention Bulletin*, No. 6, November 1989, pp. 18-19.

¹⁹ The participating industry associations were the CMA, the Council of European Chemical Industry Federations, the Japan Chemical Industry Association, the Canadian Chemical Producers Association, the Chemical Confederation of Australia, and the Chemical Industries Association (UK).

²⁰ “Chemical Industry Rallies Behind Chemical Weapons Bin,” *Chemecology*, vol. 21, December 1992/January 1993, p. 4.

²¹ Will Carpenter, “Completing the Chemical Weapons Convention: An Industry View,” *Chemical Weapons Convention Bulletin*, No. 15, March 1992, p. 3.

²² Olson, “Disarmament and the Chemical Industry,” *op. cit.*, p. 10².

²³ The U.S. Government, after initially favoring the industry proposal, became concerned about a number of highly sensitive military facilities that produce or store treaty-controlled chemicals. In order to avoid exposing such sensitive sites to routine international inspections, U.S. negotiators narrowed the definition of the facilities covered by the routine-inspection regime. Some developing countries also sought to narrow the definition to minimize what they perceived to be the negative impact of the inspection regime on their nascent chemical industries.

²⁴ Brad Roberts, “Framing the Ratification Debate,” in B. Roberts, ed., *Chemical Disarmament and U.S. Security* (Boulder, CO: Westview Press, 1992), p. 145.

Table 2-I—Chemical Schedules and Associated Treaty Obligations

| | Schedule 1 | Schedule 2 | Schedule 3 | Other relevant |
|---|--|---|--|--|
| Agents | CW agents, key final-stage precursors. | Potential CW agents, other key precursors. | Old CW agents, other precursors. | Discrete organic chemicals and organic chemicals containing phosphorus, sulfur, or fluorine (PSF chemicals). |
| Commercial uses | Low or none | Low to moderate | High | High |
| Annual production threshold for reporting | 100 g | 1 kg (for BZ), 100 kg (for other potential CW agents), 1 metric ton (for precursors). | 30 metric tons | 200 metric tons for non-PSF chemicals; 30 metric tons for PSF chemicals. |
| Activities to be reported annually | Production, processing, consumption, acquisition, import, and export data for the previous calendar year, and anticipated for the next year. | Production, processing, consumption, import, and export data for the previous calendar year, and anticipated for the next year. | Production, import, and export data for the previous calendar year, and anticipated for the next year. | Production data for the previous calendar year. |
| Deadline for initial declaration | 30 days after entry into force. | 30 days after entry into force. | 30 days after entry into force. | 30 days after entry into force. |
| Deadline for annual reports | 90 days after end of previous calendar year. | 90 days after end of previous calendar year. | 90 days after end of previous calendar year. | 90 days after end of previous calendar year. |
| Production threshold for inspections | 10 kg | 10 kg, 1 metric ton, or 10 metric tons, depending on subclass | 200 metric tons | 200 metric tons |

PrepCorn. The upcoming debate over the implementing legislation in both houses of Congress is likely to attract extensive participation by corporate general counsels and industry lobbyists, including chemical trade associations such as the CMA, the Synthetic Organic chemical Manufacturers Association (SOCMA), the National Agricultural chemicals Association (NACA), and the Pharmaceutical Manufacturers Association (PMA). Another possible channel for industry dialogue with U.S. Government policymakers on CWC implementation may be the Industry Sector Advisory Committee for Chemicals and

Allied Products (ISAC-3), a private-sector panel reporting to the U.S. Trade Representative Office.²⁵

COMPANIES AFFECTED BY THE CWC

The CWC bans any toxic chemical agent, regardless of origin, that interferes with life processes and does not have legitimate civil applications in the quantities in which it is produced. This so-called “general-purpose criterion” allows the treaty to apply to all conceivable CW agents, including production of novel chemicals that might be developed in the future, even if

²⁵ The Trade Act of 1974 established a private-sector advisory system for the Office of the U.S. Trade Representative (USTR). The primary forum is the Advisory Committee on Trade Policy and Negotiations, which reports directly to USTR. Subordinate to the Advisory Committee are 17 industry sector advisory committees (ISACS) and 3 functional committees (on standards, customs, and intellectual property rights). There is some question, however, about whether ISAC-3 has the legal authority to advise the U.S. Government on CWC matters.

Table 2-1—Cent inued

| | Schedule 1 | Schedule 2 | Schedule 3 | Other relevant |
|--|---|--|--|--|
| Initial inspection & facility agreement | Mandatory | Mandatory (unless State Party and OPCW agree to waive it) | Optional | Optional |
| Notice of routine Inspections | 24 hours | 48 hours | 120 hours | 120 hours |
| Duration of routine inspections | As specified in facility agreement. | 96 hours | 24 hours | 24 hours |
| Access during routine inspections | Automatic access to declared plants. | Automatic access to plant site and specified areas within declared plants; agreed access to other areas and plants at plant site. | Automatic access to plant site and specified areas within declared plants; agreed access to other areas and plants at site for clarification of ambiguities. | Automatic access to plant site; managed access to declared plants; agreed access to other plants at site for clarification of ambiguities. |
| Maximum number of routine inspections | Determined based on characteristics of facility. | 2 per year per plant site. | 2 per year per plant site, plus limit on the combined number of inspections of Schedule 3 and “other relevant” sites.¹ | 2 per year per plant site; plus limit on the combined number of inspections of Schedule 3 and “other relevant” sites. |
| Restrictions on exports | Exports to States Parties only | For first 3 years, exports only to States Parties and to non-Parties that file certifications of non-prohibited use; after 3 years, to States Parties only. | Exports only to States Parties and non-Parties that file certifications of non-prohibited use; possibility of stricter controls after 5 years. | No restrictions. |

SOURCE: Arms Control and Disarmament Agency, Office of Technology Assessment, 1993.

¹ The combined number of annual inspections shall not exceed 3 plus 5 percent of the total number of plant sites declared by a State Party, or 20 inspections, whichever is less.

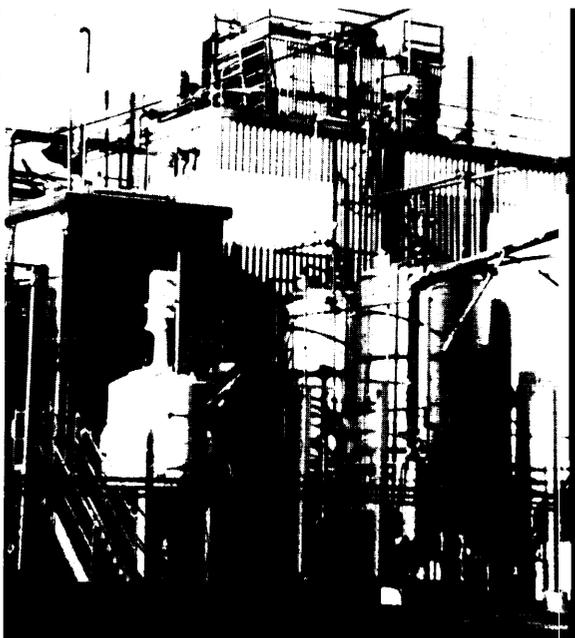
they are not now listed in the treaty itself. Further, the CWC bans or controls certain intermediate compounds, or ‘‘precursors,’’ that can be converted to known CW agents in one or a few reaction steps. The treaty also bans the military use of biological toxins, which can be purified from living matter, produced by microbial fermentation, or synthesized chemically.

Known treaty-relevant chemicals that are explicitly covered by the verification provisions of the CWC range from actual chemical-warfare agents to key final-stage precursors and more distant precursors. Depending on their utility for producing chemical weapons and the extent to

which they have legitimate commercial and industrial uses, these compounds (or families of compounds) are listed in three ‘‘schedules’’ in an annex to the treaty. Each schedule is associated with a different set of reporting requirements and inspections, which are structured so that the most hazardous compounds are subject to the most stringent controls (see table 2-1).

. *Schedule 1* covers 12 toxic chemicals or groups of chemicals that have no or low commercial use. These compounds include standard CW agents (e.g., sulfur and nitrogen mustards, lewisite, and the nerve agents tabun, sarin, soman, and VX), and key

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Plant that produces the “dual-use” chemical thiodiglycol, which is both a key ingredient of ballpoint pen ink and an immediate precursor of mustard agent.

final-stage precursors used in “binary” chemical weapons.²⁶ Two biological toxins are also included on the list: ricin (extracted from castor beans) and saxitoxin (purified from contaminated shellfish). Although large-scale production of Schedule 1 chemicals is banned and existing stockpiles must be destroyed, States Parties may maintain a total of 1 metric ton (about 2,200 pounds) of Schedule 1 chemicals for the development of defenses and for medical, pharmaceutical, or research purposes.²⁷

Schedule 2 covers toxic chemicals and precursors that have low to moderate commer-

cial use. The list includes three chemicals with warfare potential that have never been used in combat (the pesticide Amiton, the hallucinogen BZ, and the toxic gas perfluoroisobutene), and several precursor chemicals or groups of chemicals that are one or more steps removed from CW agents but are produced commercially in volumes for legitimate industrial applications. An example of a Schedule 2 precursor is thiodiglycol, the immediate precursor of sulfur mustard. Producers of Schedule 2 chemicals above an annual threshold quantity must declare the relevant plants and production volumes, and all such facilities will be subject to an initial (baseline) inspection and no more than two routine inspections per year.

- *Schedule 3* covers “dual-use” chemicals produced in high commercial volume. It includes precursor chemicals that are several reaction steps removed from CW agents, such as phosphorus trichloride. This category also covers some highly toxic gases (e.g., phosgene, hydrogen cyanide, cyanogen chloride) that were used as warfare agents in World War I but are currently produced in the millions of tons annually for industrial purposes. Facilities producing 30 metric tons per year of any Schedule 3 chemical must be declared; those producing 200 metric tons or more are subject to randomized inspection.
- Reporting obligations also apply to “other relevant” facilities that produce more than 200 metric tons per year of any discrete organic chemical, with the exception of pure hydrocarbons (to exclude oil refineries) and

²⁶ “Binary” chemical weapons contain two separate **cannisters** filled with relatively nontoxic precursor chemicals that must react to produce a lethal **agent**, such as **sarin** or **VX**. The two components are either mixed together manually immediately before use or are brought together automatically while the **binary** bomb or shell is in flight to the target.

²⁷ According to the CWC, production of Schedule 1 chemicals for protective purposes may take place only at a **Single** small-scale **Facility** and at one other designated facility, both of which are subject to systematic inspections. Synthesis of Schedule 1 chemicals for **research**, medical, or pharmaceutical purposes, but not for protective purposes, may be carried out at laboratories in aggregated quantities of less than 10 kilograms per year per facility. Laboratories that produce more than 100 grams of agent per year will be subject to reporting and inspection obligations.

explosives (which are covered by other regulations).²⁸ A lower production threshold for reporting (30 metric tons) applies to facilities that produce so-called "PSF" chemicals, that is, organic chemicals containing phosphorus (P), sulfur (S), or fluorine (F), the basic building blocks of CW agents.

The CWC covers all companies and other relevant facilities on the territory of a State Party that *manufacture, process, or consume* Schedule 2 chemicals or that *manufacture* Schedule 3 and other treaty-controlled chemicals beyond the specified threshold quantities. For this reason, various "downstream" users of Schedule 2 chemicals may have to file declarations and accept routine inspections, including firms in such diverse sectors as plastics, automobiles, aerospace, electronics, pharmaceuticals, paper, mining, and photographic materials.

Only a few pharmaceutical companies that produce toxic anticancer drugs are covered under Schedule 1. According to preliminary estimates, however, between 200 and 300 U.S. plants produce, process, or consume more than the threshold quantity of Schedule 2 chemicals, and roughly 1,000 produce more than the threshold quantity of Schedule 3 chemicals. Finally, at least 10,000 plants are believed to produce more than the threshold quantity of discrete organic chemicals.²⁹ These rough estimates suggest that because of the broad scope and relatively low production thresholds of the CWC, a majority of U.S. chemical manufacturers and some processors and consumers will face declaration and/or inspection obligations under the treaty.

Many smaller, privately owned producers, formulators, processors, and downstream users of scheduled chemicals are not yet aware that they are covered by the CWC. Although the Chemical Manufacturers Association has kept its members well informed about the treaty, it represents only a portion of the U.S. chemical industry. The great majority of smaller firms and their respective trade associations have not had the time or resources to track the negotiations in Geneva or to assess the full implications of the concluded treaty. Small chemical companies may not even subscribe to the Federal Register, and informing them of regulatory changes has been a serious problem in the past.

Since the U.S. Government will be held legally accountable for industry compliance with the CWC, it will be necessary to prepare a national register containing a complete inventory of all companies and facilities on U.S. territory that are subject to treaty obligations. Developing such a register is a challenging task that still remains to be accomplished, despite preliminary attempts.³⁰ Given the widespread ignorance of the CWC among smaller chemical companies, effective implementation of the treaty will require an extensive program of industry education and outreach.

As a first step in this outreach process, in February and March 1993 the U.S. Arms Control and Disarmament Agency (ACDA) sponsored one-day seminars in five cities across the United States to inform chemical manufacturers, pharmaceutical companies, and other downstream processors about their treaty obligations.³¹ Although ACDA sent invitations to 2,400 compa-

²⁸ The treaty defines a discrete organic chemical as a compound of carbon other than an oxide, sulfide, or metal carbonate. The extent to which this definition covers polymers is not yet clear.

²⁹ Interview with Sigmund R. Eckhaus, consultant to the U.S. Arms Control and Disarmament Agency, Dec. 23, 1992.

³⁰ Other participating countries face a similar challenge, although on a smaller scale. The Japanese Trade Ministry has conducted an initial survey of Japanese factories that will be subject to CWC reporting and inspection obligations. Rough estimates are that about 100 chemical manufacturing facilities in Japan will be liable to inspection, while between 2,000 to 3,000 plants—about half of all chemical factories in Japan—will have to file annual reports on their operations to the government. See "Chemical Plants Face Inspection Under CW Convention" *KYODO* (Tokyo) in English, Mar. 27, 1993, reprinted in JPRS-TAC-93-007, Apr. 13, 1993, p. 1.

³¹ The seminars were held in Washington, DC, New Brunswick, NJ, Houston, TX, Los Angeles, CA, and Chicago, IL.

Table 2-2—Selected List of U.S. Chemical Trade Associations

| Name of Association | Number of Active Members |
|--|--------------------------|
| Adhesive and Sealant Council..... | 180 |
| Adhesives Manufacturers Association..... | 22 |
| American Coke and CoalChemicals Institute, | 75 |
| American Wood Preservers institute..... | 150 |
| Chemical Manufacturers Association..... | 180 |
| Chemical Specialities Manufacturers Association..... | 440 |
| Chlorine institute..... | 190 |
| Compressed Gas Association..... | 221 |
| Cosmetic, Toiletry and Fragrance Association..... | 230 |
| Drug, Chemical and Allied Trades Association..... | 600 |
| Dry Color Manufacturers Association..... | 50 |
| Formaldehyde institute..... | 57 |
| Metal Finishing Suppliers Association..... | 225 |
| National Agricultural Chemicals Association... .. | 85 |
| National Association of Printing Ink Manufacturers..... | 150 |
| National Paint and Coatings Association..... | 500 |
| Pharmaceutical Manufacturers Association... .. | 100 |
| Powder Coating institute..... | 97 |
| Roof Coatings Manufacturers Association..... | 43 |
| Soap and Detergent Association..... | 140 |
| Society of the Plastics Industry..... | 2000 |
| Synthetic Organic Chemical Manufacturers Association..... | 225 |

NOTE: Companies may belong to more than one association.

SOURCE: Council of Chemical Association Executives, 1993 Staff and Issues Directory (Washington, DC).

nies that deal in chemicals listed in the treaty, attendance at the seminars was disappointing, with a total of only 110 companies participating. Many chemical manufacturers appear to be waiting for the domestic implementing legislation to learn about their treaty obligations. Another way of reaching smaller firms might be through specialized trade associations, which often alert their membership to new regulations (see table 2-2). The U.S. Government also plans to launch a major public-affairs campaign both before and

after the CWC enters into force to explain the purpose and modalities of the treaty.

I Industrial Sectors

The CWC will affect the various segments of the chemical industry in different ways. Although the industry is often viewed as a coherent sector, in fact it is a highly heterogeneous group of manufacturing companies whose operations differ both qualitatively and quantitatively. Some chemical firms produce feedstock and intermediate compounds, while others chemically convert or mechanically process and formulate these basic chemicals into products such as plastics, pesticides, detergents, pharmaceuticals, dyes, inks, flavors and fragrances, and gasoline additives.³²

In general, chemical products are divided into two broad classes: *commodity chemicals*, or basic chemicals that are produced in vast quantities and where firms compete mainly on the basis of price; and *specialty chemicals*, more complex molecules with unique properties that allow them to command higher prices and require a major investment in research and development. Whereas commodity chemicals are manufactured continuously by feeding raw materials into a process reactor and simultaneously removing the reaction product, specialty chemicals are usually produced through a batch process in which raw materials are introduced intermittently into a reactor under changing process conditions and the product removed at the end.

Batch production ranges in sophistication from “tolling” (in which the customer provides a raw material and receives a product, often after a single reaction step) to “custom” syntheses of complex intermediates or end-products made to order for large manufacturers of drugs, pesticides, and other specialty chemicals.³³ The roughly 230 custom chemical companies in the United States

³² M.L. Burstall, “The Industrial Context of Chemical Warfare,” in Julian Perry Robinson, ed., *The Chemical Industry and the Projected Chemical Weapons Convention: Proceedings of a SIPRI/Pugwash Conference*, SIPRI Chemical & Biological Warfare Studies No. 4 (New York, NY: Oxford University Press, 1986), p. 36.

³³ Synthetic Organic Chemical Manufacturers Association “The Batch Chemical Industry: Fact Sheet,” April 1993.

generally have fewer than 100 employees (many of whom perform several different jobs) and annual sales of less than \$40 million each.³⁴ As discussed below, small to medium-sized batch producers may have more difficulty in complying with CWC reporting requirements because they have smaller staffs and must change their production processes more frequently.

I Foreign Ownership

Another characteristic of the U.S. chemical industry that is relevant to CWC implementation is the fact that foreign-owned companies account for roughly a third of U.S. chemical production.³⁵ Numerous U.S.-based chemical manufacturers also have overseas branches and subsidiaries, some of which operate plants in developing countries. The CWC holds the U.S. Government responsible for the treaty compliance of all the companies on its territory (including foreign-owned branches and subsidiaries) but not for treaty violations committed by a U.S.-owned company located on foreign soil. Nevertheless, the treaty does make the United States responsible for violations committed by U.S. citizens living abroad and requires the government to take action against them.

Although it is widely agreed that a state has broad powers to enforce rules on the persons and property within its borders, international law is not settled with regard to "extraterritoriality," or a government's claim of authority to control companies outside its national borders. Foreign

courts have rejected attempts by the United States to apply export controls to overseas companies that are owned or controlled by U.S. nationals or that process goods of U.S. origin.³⁶ The CWC clearly states that its obligations apply extraterritorially with respect to individuals but is silent with respect to companies. Some legal scholars contend, however, that the U.S. Government should prosecute all U.S.-owned entities that engage in treaty-prohibited activities, regardless of their location.

The issue of extraterritoriality is important because a State Party might seek to circumvent the treaty by colluding with a foreign subsidiary of one of its domestic companies to manufacture chemical weapons on the territory of a non-Party to the treaty.³⁷ (If the weapons were subsequently given to the host state, however, the State Party would violate the treaty's ban on assisting another state to acquire chemical weapons; if they were shipped to the State Party's own territory, that would violate the ban on possession.) In order to close such potential loopholes, some analysts argue that States Parties should be encouraged to extend their extraterritorial jurisdiction as far as possible in an effort to induce overseas subsidiaries to comply with the treaty.³⁸

A potential source of leverage may derive from the fact that the CWC will ban exports of Schedule 2 chemicals to non-Parties 3 years after the treaty comes into force; until then, exporters must obtain end-use certificates ensuring that recipients employ the chemicals only for legiti-

³⁴ Stephen C. Stinson, "Custom Chemicals," *Chemical and Engineering News*, vol. 71, No. 6, Feb. 8, 1993, p. 35. Of the 230 batch producers in the United States, 95 produce specialty fine chemicals and the other 135 are diversified companies that perform some batch production of intermediates or fine chemicals for sale or internal use. Because most large chemical manufacturers also engage in some batch processing, however, the total number of batch-processing facilities in the United States is more than 2,000.

³⁵ Michael P. Walls, Chemical Manufacturers Association *personal communication*. In 1987, the book value of European chemical companies' assets in the United States reached \$26.5 billion, the largest investment of foreign-owned assets in any one industry. "World Chemicals: The Challenge of Asia," *The Economist*, vol. 326, No. 7802, Mar. 13, 1993, p. 28.

³⁶ Charles Doyle, "Extraterritorial Application of American Criminal Law," *CRS Report for Congress (U.S. Congress, Congressional Research Service, Report No. 92-713A, Sept. 11, 1992)*.

³⁷ David A. Koplow, "Imng Arms and Chemical Arms: Extraterritoriality and the Draft Chemical Weapons Convention," *Yale Journal of International Law*, vol. 15, No. 1, winter 1990, p. 68.

³⁸ *Ibid.*, p. 70.

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mate commercial purposes. Export of Schedule 3 chemicals to non-Parties may also be banned 5 years after the treaty enters into force, although a final decision on this proposal has yet to be made. Thus, a U.S.-owned subsidiary located in a

country that refines to sign or comply with the CWC could eventually lose its ability to import key precursor chemicals from treaty adherents and might have to cease operations.³⁹

³⁹ Gordon **Burck**, senior policy analyst, **EAI** Corp., personal communication.