Director of
Central
Intelligence

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Use of Toxins and Other Lethal Chemicals in Southeast Asia and Afghanistan

Special National Intelligence Estimate
Memorandum to Holders

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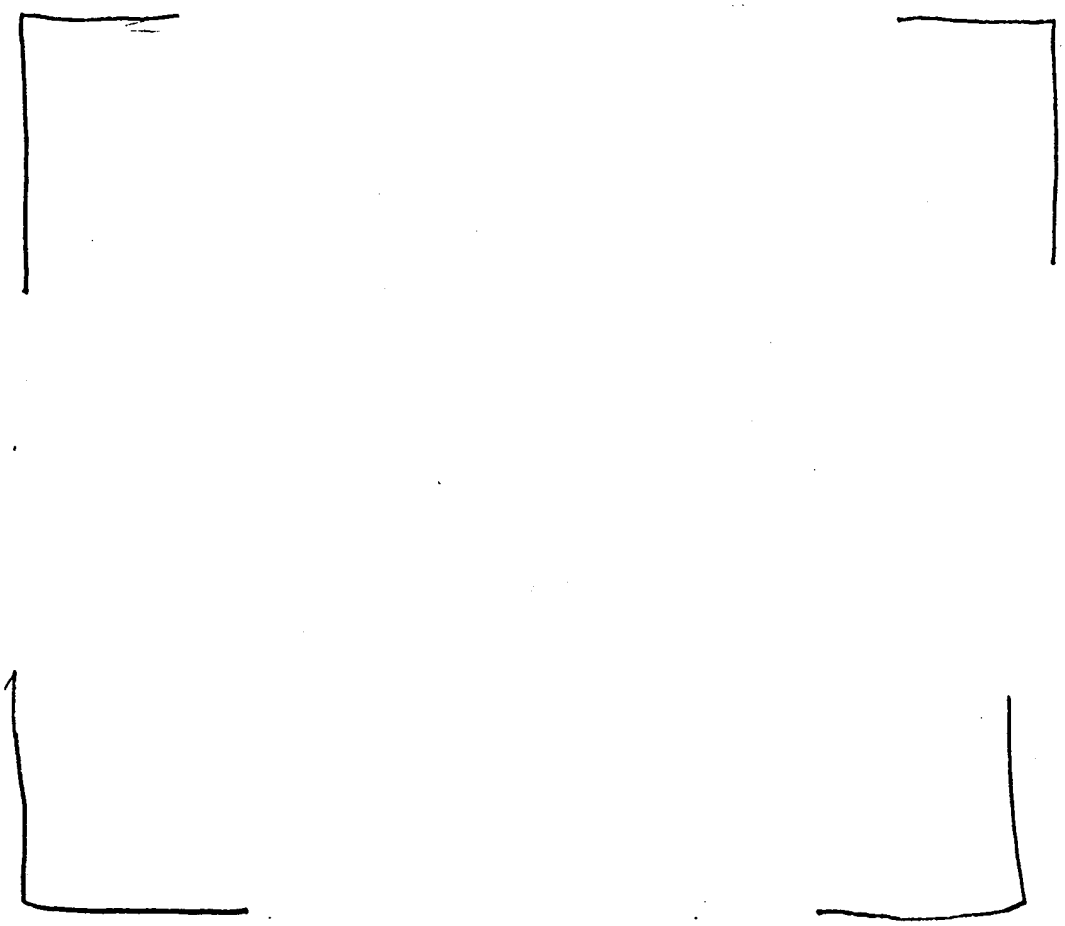

MEMORANDUM TO HOLDERS

SNIE 11/50/37-82

USE OF TOXINS AND OTHER LETHAL CHEMICALS IN SOUTHEAST ASIA AND AFGHANISTAN

Information available as of 2 March 1983 was used in the preparation of this Estimate.

THIS ESTIMATE IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

THE NATIONAL FOREIGN INTELLIGENCE BOARD CONCURS.

The following intelligence organizations participated in the preparation of the Estimate:

The Central Intelligence Agency, the Defense Intelligence Agency, the National Security Agency, and the intelligence organization of the Department of State.

Also Participating:

The Assistant Chief of Staff for Intelligence, Department of the Army

The Director of Naval Intelligence, Department of the Navy

The Assistant Chief of Staff, Intelligence, Department of the Air Force

The Director of Intelligence, Headquarters, Marine Corps

KEY JUDGMENTS

In the year that has elapsed since the publication of SNIE 11/50/37-82, the use of chemical and toxin agents has continued and we have found nothing in the evidence acquired since the beginning of 1982 that would contradict our earlier findings on any of the countries with which we are concerned. The evidence has continued to come from many different sources and has amplified our understanding of events of previous years as well as events occurring during 1982.

In *Afghanistan*, the Soviets have continued to use chemical agents selectively, through at least January 1983. Analyses of physical samples have, for the first time, provided evidence of mycotoxins. Chemical agents other than toxins have also been used, but we have not yet been able to identify them through sample analysis.

In *Laos*, Vietnamese and Lao troops, under Soviet supervision, have continued to use lethal and incapacitating chemicals and toxins against the H'Mong resistance, through at least December 1982.

In *Kampuchea*, the Vietnamese forces have continued to use lethal and incapacitating chemicals and toxins against the DK and KPNLF resistance forces, through at least February 1983.

In *Thailand*, in 1982, Thai villages near the Kampuchean border for the first time became targets of Vietnamese chemical attacks. Samples from these attacks have been analyzed and trichothecene mycotoxins have been identified.

Physical samples from both Laos and Kampuchea provide further confirmation that trichothecene mycotoxins are among the agents used. Our earlier conclusions on this have been reinforced by much better medical data and additional chemical analyses and [ ]. Toxins have been found in urine, blood, and tissues of victims of "yellow rain" attacks and in samples of material collected from attack sites.

Soviet implication in the provision and use of these weapons continues to be supported by [ ] and by reporting from defectors, resistance groups, and refugees.

In 1982, independent investigations conducted by other governments—notably those of Canada, the United Kingdom, France, and West Germany—as well as by private groups, yielded evidence and analysis broadly supportive of US conclusions.

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DISCUSSION

US Evidence of Chemical Warfare

In Laos

1. Throughout 1982 the Vietnamese and Lao continued their policy of using lethal agents and toxins against villagers and resistance forces in Laos. While the pattern of attacks remained consistent with that of previous years, the number of fatalities reported per attack decreased. The decrease suggests that less lethal chemical agents or lower concentrations of the same agents have been used. The decrease could, however, also be attributed to other factors:

- The H'Mong population had already been decimated by the high fatalities and refugee exodus caused by earlier attacks dating back at least to 1976.
- Surviving H'Mong people remaining in Laos were more wary and quick to take cover at the first indication of an attack.
- The H'Mong survivors were not taking time to count victims. This is supported by the very few reports that cite precise numbers for casualties in specific chemical attacks.

2. Descriptions of the attacks have not changed significantly. The H'Mong typically describe aircraft or helicopters as spraying a yellow rainlike material on villages and crops, causing in the human targets the familiar hemorrhaging symptoms characteristic of trichothecene toxin poisoning, as set forth in detail in the SNIE. In a number of cases, however, only abdominal pain and prolonged illness, and no bleeding, were reported. The divergence of symptoms, also observed in earlier years, suggests that other agents or combinations of agents are also being used. One likely explanation is that different solvents or carriers, exposure levels, and routes of absorption for the same agents alter their efficacy in individual attacks. The situation is further complicated by the fact that different groups—men, women, children, and animals—often exhibit different symptoms.

3. The trichothecene toxins that have been identified by the United States are only one of the components of "yellow rain." There is much that we do not know about the total composition of the material sprayed or dropped from aircraft, or about other chemicals that may be in use. For example, the H'Mong consider the red smoke they have observed in rocket/artillery munitions as more toxic than the "yellow rain." They have also reported the use of a green gas and described a white sticky substance that dried to a powder and produced smallpox-like rash and necrosis of the skin. These reports indicate that several different types of agents have been used both to inflict casualties on the resistance forces directly, and to drive the H'Mong from their villages by contaminating the environment.

4. [ ] acquired during 1982 extends and supports our earlier judgment that the Soviets are directly involved in chemical warfare support in Laos. This involvement includes training, storage and inspection, and supervision of use of chemical agents. *Conclusive* proof of Soviet supply of the chemical agents is still lacking. Indeed, given the limited collection possibilities and opportunities available to us, such proof is unlikely to be acquired.

In Kampuchea

5. In 1982 the Vietnamese demonstrated their indifference to the international concern over the use of chemical warfare by conducting a number of attacks near the Thai border (at least six occurred on Thai territory) and by continuing the attacks even while the UN investigating team was in Thailand. Proximity and visibility of the attacks made collection of fresh samples for analysis much easier than was the case in Laos and Afghanistan. That proximity also allowed other governments and international organizations to examine recent victims and collect evidence.

6. In 1982, Kampuchea provided a wider range of sources and kinds of information than in previous years. The earlier chemical attacks were conducted primarily against the Democratic Kampuchea (DK) troops, who served as the main source of information. At present, information is also obtained from the Khmer People's National Liberation Front (KPNLF),

Thai and other government representatives, Vietnamese defectors, and international organizations.

7. The number of deaths reported per attack also decreased in Kampuchea. As in Laos, the decrease may be explained by Vietnamese use of less toxic chemicals or less effective methods of dissemination or by improved countermeasures taken by DK forces and other intended victims. As in previous years, both Vietnamese and resistance forces claimed deaths and casualties from poisoned food and water.

8. The combat situation in Kampuchea is much different from that in Laos. There is a greater frequency of direct engagement of field combat forces, frequently involving exchanges of artillery fire. Chemical shells are often fired on opposing forces or their sanctuaries. A Western intelligence service has verified at least one such chemical attack in late 1982. According to Thai reports, the Vietnamese also spread chemicals along trails and the border. As in Laos, there are also confirmed reports of aircraft spraying "yellow rain."

9. Our first positive identification of trichothecene mycotoxins came in 1981 from a sample collected in Kampuchea. Since that time, samples of vegetation, residue, soil, and water, as well as human blood, urine, and autopsy tissue, have been collected and analyzed. These analyses have been positive, showing that the Vietnamese have continued to use toxins. Background control samples have continued to be negative. Other chemical agents or combinations are also being used, but we have not yet been able to identify them through sample analysis.

In Afghanistan

10. The Soviets have continued selective use of chemical agents throughout the past year against resistance forces and against villages that did not cooperate with the Afghan authorities. Reports during 1982 have amplified and added credibility to our earlier findings. In Afghanistan there is no question that the Soviets themselves are using chemical agents and possibly toxins. In addition, we continue to receive reports that the Soviets have provided chemical agents to the Afghan forces for use against the Mujahedin.

11. For the first time we have evidence of the presence of trichothecene mycotoxins in Afghanistan, through the discovery of toxin contamination of a piece of Soviet protective equipment. Laboratory analysis of a Soviet protective mask has revealed the presence of T-2 toxin (sample 7, annex D, table D-3), in a quantity of approximately 1 microgram on the area examined (one-fourth of the mask). This finding was confirmed independently by three different laboratories.

12. Also for the first time, the United States acquired a large quantity (34 sets) of new (unused) Soviet gas masks, canisters, and complete protective suits captured from a Soviet convoy by Mujahedin forces in August 1982. No information on the location of the attack or intended destination of the convoy is available. It is reasonable to hypothesize that the Soviets would not provide such protective gear to their forces in Afghanistan unless they anticipated a need for it—that is, for use in connection with employment of CW agents and weapons. Comprehensive protective gear of this sort would not be required as protection against the kinds of nonlethal riot control chemicals that the Mujahedin have been accused of using.

13. Reporting from Afghanistan had long included descriptions of events similar to the "yellow rain" attacks reported from Southeast Asia. However, because of the remoteness of attack sites and difficulties in sample collection, we have been unable to obtain physical evidence of the presence of mycotoxins in Afghanistan until the recent confirmation of the presence of T-2 on the Soviet gas mask. This now greatly strengthens our previous assessment that "toxins probably have been used since 1980."

14. The biggest mystery remains the identification of the other agents being used. Some familiar CW agents can be inferred from descriptions of signs and symptoms. For example, the medical effects resulting from some chemical attacks are consistent with the use of the nerve agent tabun. (Reportedly, tabun is one of the agents present in the CW stocks maintained by Soviet forces in Afghanistan.) Other reports indicate use of an incapacitating agent that causes unconsciousness for several hours.

15. As early as 1980 we began receiving reports of Soviet forces dropping or pumping one or more chemical agents into tunnels, caves, and underground waterways where resistance forces and their families take shelter. Reports of those incidents contain descriptions of symptoms that have puzzled the experts. Of particular concern are reports of rapid blackening and decomposition of tissue, a description that fits none of the CW agents known to us. The frequency

and consistency of these accounts from many different tribal groups have led us to conclude that they must be taken seriously and that we may be dealing with a new class of chemical or toxin agent or with combinations not previously known to the West. In one case, US intelligence officers interviewed eyewitnesses who reported that gasoline and probably diesel fuel were poured into tunnels and ignited with incendiary powder and shells. The number of deaths and condition of the bodies were consistent with fire and asphyxiation.

16. There has been no change in the manner of dissemination of the chemical substances. The predominant delivery system still appears to be helicopters firing CW rockets, dropping chemical-loaded bombs or canisters, or spraying chemicals directly.

Findings From Other Countries

17. There is a growing body of international evidence that supports the US findings of chemical weapons use. Non-US private experts and governments have collected and independently analyzed samples and have obtained testimony from witnesses of attacks and from medical personnel. A few examples follow.

18. Non-American physicians with good credentials in tropical medicine have testified that they have treated chemical warfare victims. For example, a French physician has provided testimony on his treatment of victims at a Kampuchean hospital. Similar testimony came from a Swedish International Red Cross worker in Kampuchea. A New Zealand doctor and his British associate at the World Vision Hospital at Ban Vinai refugee camp are convinced that H'Mong villagers are victims of repeated chemical warfare attacks in Laos. An increasing number of these physicians have made strong public statements and, to date, not one doctor who has examined victims claiming CW injury has publicly or privately disputed his claims after examination.

19. Two French physicians who worked in Afghanistan described the unusual wounds caused by what they believe were poisoned bullets. French scientists have found trichothecene toxins in samples from Southeast Asia. Thai scientists have reported finding mycotoxins in their samples.

20. [ ] acquired portions of gas masks from attack sites in Afghanistan. The tests conducted on them are as yet incomplete, but early indications and some signs and symptoms of persons handling the contaminated masks suggest that chemical agents were used in the attacks.

21. Several carefully done epidemiological studies have been prepared by Canadian governmental and academic institutions. Their findings are consistent with ours on all but technically minor points.

22. The December 1982 report of the UN Experts Group provided as much support as the United States could reasonably expect from such a multilateral entity. The document supported individual US claims in more than a dozen specific technical areas, faulted the Soviet "scientific explanation" in strong language, and declared other hypotheses (other than use of CW) to be remote and inconsistent with the human testimony and the laboratory data at hand. Its failure to support the US charges fully was attributed by most of the world press to the political—not scientific—inhibitions of the Experts Group.

Implications for Intelligence

23. The fact that chemical and toxin agents continue to be used in Laos, Kampuchea, and Afghanistan despite a highly publicized UN investigation, diplomatic pressure on the Soviet, Vietnamese, and Lao Governments, and growing international acceptance of the evidence suggests that the perpetrating governments do not believe that their activities are as yet sufficiently damaging politically to warrant their termination. This is not to say that Moscow, Hanoi, and Vientiane have ignored the charges being levied against them. But rather than stopping the illegal use of chemical and toxin agents, they have launched a major propaganda counteroffensive.

24. In May 1982 the Soviets submitted a "scientific" study to the UN blaming the toxin poisoning in Laos and Kampuchea on US use of herbicides during the Vietnam war. The Soviet study claims that widespread use of herbicides allowed toxin-producing fungi to flourish in Vietnam. Winds then allegedly blew the spores into Laos and Kampuchea, contaminating the environment. It is surprising that the Soviet Academy of Sciences would lend its name to the production of such a scientifically indefensible paper. Nevertheless, the overall Soviet counterpropaganda effort has not been without effect in diverting public attention away from the Soviet actions and focusing them on the

proposed US chemical warfare modernization program and on past US use of herbicides in Vietnam. An international scientific conference was held in Ho Chi Minh City (Saigon) in January 1983 to call attention to the long-term effects of herbicide use on nature and man.

25. The comprehensive assessment of the CW evidence that the United States has published and briefed worldwide in classified and unclassified form has helped to persuade many governments that lethal agents, including toxins, are being used and that the Soviet Union is implicated. There is a reluctance on the part of most governments, however, to levy such charges publicly. Governments are loath to take a public position on the issue because to acknowledge that the USSR has violated its international commitments is to call into question the trustworthiness of the USSR as a party to arms limitation agreements. Even the most conclusive and incontrovertible intelligence evidence is unlikely to galvanize other governments into forceful public positions on an issue that has such politically unpleasant implications.

ANNEX A

INCREMENTAL EVIDENCE

Laos

1. H'Mong refugees entered the camps in Thailand every month from January through December 1982, telling stories of chemical attacks and exhibiting severe medical symptoms from exposure to agents. They also brought more samples of material contaminated with the sticky yellow substance described as "yellow rain," dropped by aircraft and helicopters on their villages and crops. More stories of families, animals, and vegetation being killed by Vietnamese and Lao chemical weapons have been added to a list dating back to 1976. We know that the "yellow rain" contains trichothecene toxins and perhaps other substances which cause vomiting, bleeding, and blistering. Doctors at the Ban Vinai refugee camp observed victims in 1982 with far worse skin lesions than the small blisters noted in previous years. Moreover, many more survivors complain of latent illness long after the exposure. Annex C tabulates the attacks for this period.

2. Medical personnel in Thai refugee camps were much better organized to screen for victims than in past years. This is particularly true for the World Vision hospital in the Ban Vinai refugee camp, where doctors now routinely use comprehensive questionnaires and conduct medical examinations, including some on-site preliminary blood analysis. Skilled medical personnel also oversee preparation of blood and serum samples for chemical analysis in the United States or other countries. Therefore, the US Embassy reports now include far more detail than before. The Canadian Government has widely disseminated photographs of victims with severe skin lesions. Some patients with active and continuing symptoms are being treated in Thai hospitals.

3. We have noted differences in the symptoms described in reporting during the past year as compared with preceding years. Severe and prolonged vomiting, bloody diarrhea, and blistering are still commonly reported, while the dramatic descriptions of massive bleeding and rapid death have almost disappeared. Another set of symptoms, characterized by incapacitation and unconsciousness, but no blisters or bleeding and no deaths, has been noted in the past year. Both general categories of injury can also be accompanied by long-term physical damage.

4. A number of biological samples have been collected from Laos for analysis in the United States. Samples include, for example, blood specimens from 10 victims exposed to six different CW attacks during the period January through May of 1982. All specimens were drawn by medical personnel. Samples were refrigerated until analyzed in the United States. Analysis of these blood samples shows that trichothecene mycotoxins continue to be used against H'Mong villages. (See annex D, table D-1, for details.)

5. In addition to biological specimens from victims exposed to CW, six environmental and miscellaneous collections that included 14 individual samples were obtained. These included residue from a "yellow rain" attack, some vials of chemicals allegedly taken from a military warehouse in Vientiane and reportedly used to poison wells and small streams, and containers of environmental materials (such as leaves and pebbles) allegedly contaminated by CW agents. Analyses have indicated the presence of one or more trichothecenes in several powders and vegetation samples. In none of the samples thus far analyzed have we seen evidence of traditional chemical warfare agents.

6. In some "yellow rain" samples, pollen of a definite and discrete size range was found. The pollen grains ranged from 10 to 20 microns in diameter, a size that poses a significant inhalation hazard. Although 2 to 10 microns has traditionally been recognized as optimum for lung saturation and retention, 10- to 20-micron particles have a greater total retention in the upper respiratory tract (80 to 90 percent, as compared with 40 to 80 percent). The plant sources of most of the pollens were identified as flowers, and the pollens were of types that are not windborne. The limited size range, concentration, and dissemination of this pollen led to the suggestion that pollen may be a component of "yellow rain," serving as a carrier

structure to introduce the trichothecenes to the respiratory tract. Very few samples have been of sufficient quantity to check for the presence of pollens.

Kampuchea

7. To date the most persuasive scientific evidence of mycotoxin use has come from Kampuchea. Blood and other tissue taken from CW attack victims have been found to contain tricothecene toxins. For example, analysis of blood and urine taken from two victims within 24 hours of a CW attack showed traces of T-2 and HT-2. For details of this and other analyses, see annex D, table D-2. Autopsy data now available also support the conclusion that mycotoxins have been employed offensively (see annex E).

8. In February and March 1982, several attacks occurred just across the Kampuchean border in Thailand. Analysis of samples collected from the attacks was performed in Canada, Thailand, and the United States. Although differing sampling techniques give rise to significant sampling error and lead to slightly different analytical results, both the US and Thai analysts, using different analytical techniques, found trichothecene mycotoxins in their samples.[1] The Canadian team investigating these attacks has published a detailed medical assessment of the victims' symptoms; it concluded that illness had in fact occurred and was caused by a toxic agent, although preliminary tests for trichothecenes proved inconclusive in the Canadian sample.

9. Several Vietnamese military defectors have provided information on the use of chemical weapons and the Vietnamese chemical warfare program. They state that the Vietnamese have used Soviet chemical weapons in Kampuchea and Laos. They have also stated that Soviet-supplied chemical munitions were available to Vietnamese forces to use against the Chinese in 1979.

10. CW attacks were also conducted in 1982 against the Khmer People's National Liberation Front. On several occasions that year, in the March-May period and again in October, their camp at Sokh Sann was hit with chemical artillery shells and bombs. Samples of contaminated vegetation and yellow residue from the March 1982 attack have been partially analyzed and several special analyses will be done on them when they have been fully examined.

11. Before the October-November dry season there was evidence that the Vietnamese had chemical munitions and were equipping their troops with more protective equipment. It appeared that the Vietnamese were prepared to increase their use of lethal chemical/toxin agents and other relatively nonlethal agents during the dry season. Subsequent reporting confirmed that that indeed had happened.

Afghanistan

12. The evidence from Afghanistan is different from that from Southeast Asia. It has been impossible to obtain fresh samples of any type. However, reporting on chemical attacks comes from a wider variety of sources, and sensitive collection throughout the country provides evidence to corroborate HUMINT reporting.

13. According to a former Afghan Army officer, in September 1981 a Soviet helicopter sprayed a yellow mist in Paktia Province (Sheik Amir, 3315N 6949E) that caused 16 deaths. The survivors had bloody tears and noses; extensive bleeding was reported in those who died. The Afghan officer described a similar attack in Nangarhar Province in the same month, in which four persons were killed.

14. Since early 1980 we have had numerous reports of Soviet use of chemical agents on resistance forces and their families who were hiding in caves, tunnels, and underground waterways. A HUMINT source who has reported reliably in the past says that, on 20 September 1982, Soviet soldiers poisoned underground waterways in Lowgar Province south of Kabul where the Mujahedin were hiding. A Mujahedin commander in Pakistan reported a similar event in the same province on 13 September, which resulted in the deaths of 60 men and 13 children. Both sources described a chemical substance being pumped through a hose from an armored vehicle into the waterways. Furthermore, villagers who have witnessed Soviet operations against underground waterways have provided testimony at international meetings describing in detail how the Soviets have used chemical agents and explosives in this way. Moreover, a Cuban emigre

[1] It was thought initially that a harmless yellow powder had been dropped on Thai villages as part of a disinformation campaign attempting to discredit US sample analysis results. Within days of such an attack, the Thai Ministry of Health announced that only ground-up flowers had been found. However, Thai officials later stated that further analysis showed traces of toxin and that the earlier Health Ministry announcement was based on incomplete investigation.

trained in the use of Soviet chemical weapons has previously described a dissemination technique that involves pumping lethal gas through a hose.

15. In both of these September attacks, the victims' bodies reportedly decomposed rapidly, and the flesh peeled away when attempts were made to move them.[*] Since 1979 Mujahedin resistance leaders, refugees, journalists, and Afghan defectors have described chemical attacks that caused almost identical symptoms. Most reports have portrayed the skin as being blue-black after death. Such symptoms seem bizarre, but the large number of reports from a variety of sources suggests they cannot be dismissed as mere propaganda. For example, an Afghan physician working at a hospital in Kabul in 1981 observed a victim of what he believes was a chemical attack. The patient had blackened skin, which was very shiny except for a large number of spots all over the body. He and other doctors were told they could not attend the patient. More recently, a Soviet soldier who defected to the Mujahedin said in a press interview that a Soviet CW agent called "smersh," which is "100 percent lethal," causes the flesh to become very soft.

16. The defector also said that the Soviets had stores of "picric acid," "smersh," and an incapacitating agent in Qonduz and Kabul. In a subsequent interview it was determined that the "picric acid" referred to was chloropicrin, an extremely strong irritating agent with an inhalation lethality nine times greater than that of chlorine. The defector said that "smersh" was delivered by rockets fired from a helicopter and that chloropicrin and the incapacitating agent were contained in cylinders and released through a vent in the aircraft. Several Mujahedin have described tanks or cylinders outside helicopters from which chemicals are sprayed.

17. Further, the defector reported that chemical agents had been used in June 1982 on a highway between Termez and the Salang Pass north of Kabul. He stated that the Soviets have been preoccupied with protecting the roads and that chemicals were sprayed by planes along the areas adjacent to highways. Chemical grenades reportedly have been used. We suggest that the grenades contain toxic smokes, but the data are inadequate to allow us to hypothesize about the contents beyond that.

18. The British journalist who interviewed the Soviet defector cited above also reported on two attacks he had heard about from other sources. One was an attack in the spring of 1982 on Kaiba, where Soviet soldiers shot victims rendered unconscious by a gas. The other was near Herat in the summer of 1982 when Soviets reportedly loaded the bodies of victims of a gas attack on a truck and took them away, possibly for autopsy.

19. An Afghan physician based in Quetta, Pakistan, told US officials on 5 October 1982 that he had treated 15 Mujahedin for red skin lesions which he said were caused by Soviet CW attacks in Qandahar Province in May or June 1982. The Mujahedin claimed that Soviet helicopters fired rockets which emitted gases on impact—black, yellow, and white in color. Three Mujahedin died within 12 hours of one attack, in the general area of Maharijat south of Qandahar. The physician said that the victims did not respond to antibiotics or topical treatment and his blood analysis was inconclusive.

20. In early December 1981 a group of 15 refugees attempting escape to Pakistan were attacked by a helicopter using gas that killed four or five of them (youngest and oldest) and rendered the rest unconscious for five or six hours. The attack occurred about 60 kilometers northwest of Jalalabad.

21. An Afghan airport official saw 200 to 300 gas containers at Qandahar Airport that were painted in greens and browns. The containers generally were 35 to 40 inches high and about 26 to 30 inches in diameter. (This size generally matches that of containers known to be used by the Soviets to store CW agents in their chemical depots.) A friend of the official at the airport said that the containers held chemicals used against the Afghan resistance. He described three types. One caused burning in the throat and suffocation, one caused what looked like smallpox and blistering, and the third made victims tired and sleepy so that they could not run or fight. Further, the friend stated that the containers are put into special casings that are dropped from aircraft and explode on impact, emitting a large cloud of smoke, usually yellow, but sometimes other colors.

[*] In the late 1960s, the Soviets reportedly tested a chemical agent that killed dogs immediately and decomposed their flesh within a half hour.

22. Mujahedin sources described tanks firing grenades in August 1981 in the Arghandab Valley which produced a foggy mist that rendered 10 members of the resistance force unconscious. The Soviets carried their lifeless-appearing bodies away in armored vehicles.

23. Information received this year revealed that a Soviet adviser who, in March 1979, was inspecting sites for quartering Soviet contingency troops, before the invasion, indicated that Soviet chemical defense forces entering the country would bring stores of toxic materials. The adviser indicated that a proposed garrison near Kabul would be inappropriate for the Soviet chemical unit because the materials it transported would devastate the city if an accident occurred. a chemical defense unit possesses decontaminants that require care in handling, they are not toxic enough to cause a great number of casualties. The statement therefore suggests that chemical defense units, at least during contingency or wartime conditions, are responsible for offensive chemical warfare materials. This is supported by a former Soviet soldier stationed in the Baltic Military District in the mid-1970s. He said that the chemical defense battalion of his division was responsible for maintaining the chemical warheads for the division's FROG-7s.

ANNEX B

COMPOSITION OF "YELLOW RAIN"

1. The exact composition of the material known as "yellow rain" has not been determined. We are certain that one or more trichothecene toxins are included. These may be responsible in whole or in part for the symptoms reported by victims of the attacks. These victims experience severe and prolonged vomiting, nausea, and bleeding and often die (sometimes hours, sometimes days, later). In a few cases the victims have survived with only skin lesions. Those who have entered an area after an attack and contacted the dry, fine powder developed skin rashes. If they inhaled the powder, they developed abdominal pain, and various degrees of nausea, vomiting, disorientation, and other minor symptoms. Still others develop medical problems (and sometimes die) from ingesting contaminated food and/or water.

2. The descriptions of "yellow rain" as a wet, sticky substance when disseminated and as leaving a powdery residue afterward suggests that some type of liquid is present. If present, it may serve to facilitate dissemination, as from the spray tanks of airplanes. It may also serve to facilitate skin penetration of the toxins. There is also the possibility that such a chemical, if used, is itself toxic, and is responsible for some of the central nervous system effects which have been reported and which cannot be explained by the presence of trichothecenes alone. Preliminary identification of such material has been made through sample analysis.

3. Pollen of a definite size range has been found in a few "yellow rain" samples by US, British, and Australian personnel. The pollen grains were 10 to 20 microns in diameter, a size range that poses a significant inhalation hazard and which is significantly narrower than would be expected in a random sample. Plant sources of most of the pollens were identified as common flowers. The pollens were of a type that is not generally windborne, but rather is collected by insects. This type of pollen can be commercially collected. The limited size range, concentration, and dissemination of this pollen have led us to suspect that pollen may be a component of the "yellow rain" mixture, possibly serving as a carrier to introduce trichothecenes into the respiratory tract. In only one sample thus far have pollens and trichothecenes been linked. Too few samples have been analyzed for the presence of pollen to conclude with certainty that it is a usual constituent of "yellow rain." We continue to investigate the possibility.

4. The final, tantalizing possibility is that aflatoxin is a part of the mixture. The evidence for this is tenuous at best, but still worth considering. As noted in annex E, aflatoxin B1 was found in autopsy tissues of a "yellow rain" attack victim. This certainly could be the result of ingestion of naturally contaminated food sources; it also could have been acquired at the time of the attack. The second piece of relevant data is the finding in one residue sample of a component of purified aflatoxin from laboratory cultures of aflatoxin B1. The presence of this component suggests strongly that not all of the material in the residue was present naturally. Note, however, that no aflatoxin B1 has yet been identified in residue samples, but the number of analyses for that particular toxin have been few. We know that aflatoxin research has been conducted in the USSR and that the toxin is listed in the East German military manuals as a warfare agent. We also have (limited) intelligence reporting that the Soviets have conducted research on toxic extracts of mixed fungal cultures, although the strains of fungi were not specified. Finally, we know that the trichothecenes and aflatoxin act synergistically. That aflatoxin may be a component of "yellow rain" is at present only a hypothesis, but the bits of data are suggestive of this and we continue to look for evidence to prove or disprove the hypothesis.

5. Certainly the variation in symptoms reported after "yellow rain" attacks can be explained in part by the differences in physical condition, age, sex, and degree of exposure of victims. Some of the differences in severity of symptoms could also perhaps be explained by the possible admixture in "yellow rain" of other substances acting synergistically with the toxins.

6. Clearly we are not yet certain of the composition of "yellow rain" beyond knowing that trichothecenes are present. As indicated above, however, the accumulated evidence allows us some working hypotheses that may help us define the materials in the mixture more precisely.

ANNEX C

DETAILS OF CHEMICAL ATTACKS

This annex comprises four tables (C-1, C-2, C-3, and C-4) providing detailed information on CW attacks in Laos, Kampuchea, Thailand, and Afghanistan—location of attack, source of information, method of delivery, form of chemical, and number of casualties.

Table C-1

Laos: Summary of Chemical Warfare Attacks, 1982-83

Date of Attack	Location	Source of Information	Delivery Method	Form of Chemical	Persons Killed	Persons Taken Ill
3, 6, 11 Jan 1982	Phou Bia	H'Mong refugee medical exam, Ban Vinai refugee camp	Helicopter spray	Yellow rain	0	?
4 Jan	Phou Bia	Refugee, Ban Vinai	Aircraft	Green chemical	?	?
9 Jan	Ban Dan Trung, Phou Bia	Refugee, Ban Vinai	Artillery	White/yellow cloud	?	?
13 Feb	Phou Bia	Refugee, Ban Vinai	Aircraft spray	"Yellow rain"	0	?
21-22 Feb	Phou Bia	Refugee, Ban Vinai	Helicopter	White powder	0	?
28 Feb	Phou Bia	Medical exam, Ban Vinai	Helicopter	Yellow powder	20	?
10 Mar	Phou Bia	Refugee, Ban Vinai	Helicopter, other aircraft	Red, yellow, white clouds	Many	Many
17 Mar	Phou Bia	Medical exam, Ban Vinai	Helicopter spray	"Yellow rain"	?	?
25 Mar	Phou Bia	Medical exam, Ban Vinai	Helicopter spray	"Yellow rain"	1	40 families
30 Mar	Phou Bia, Pha Ngune, Nam Yao	Medical exam, Ban Vinai	MI-8 helicopter, MIG-17	Red, yellow/ white	Many	Many
Late Mar or early Apr	Phou Bia	Medical exam, Ban Vinai, 214 refugees	Aircraft	"Yellow rain"	27	Many
1 Apr	Phou Bia (three villages)	Refugee	?	"Yellow rain"	Many	4
8, 10 Apr	20 km NE of Phou Khao airfield in central Laos	Refugee	Helicopter	Yellow powder	?	7
17, 18, 30 Apr	Phou Bia (three areas)	H'Mong refugees	Aircraft	"Yellow rain"	10	?
27 Apr	Samsen area	Thai official to US defense attache	Helicopter	"Yellow rain"	113	Many
Apr/May	Phou Bia	Medical exam, Ban Vinai	Aircraft, including helicopters	"Yellow rain"	0	Many
20 May	Phou Bia, Ban Pha Ngune	Medical exam, Ban Vinai	Jet aircraft	"Yellow rain"	4	100
24 May	Phou Bia	Medical exam, Ban Vinai	Aircraft	"Yellow rain"	9	Many
May	Phou Bia	Lao refugee	Poisoned river	?	0	Many
17 June	Phou Bia	Medical exam, Ban Vinai	Helicopter	"Yellow rain"	4	Many
17 Oct	Hills around village of Phu Me	Medical exam, Ban Vinai	Jet aircraft	Orange/yellow mist	2	Many
11 Dec	Champassak Province	Thai intelligence	Poisoned water	?	?	Many
23 Dec	SE Savannakhet Province	Thai intelligence	Aircraft spray	Yellowish liquid	?	Many

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Table C-2

Kampuchea: Summary of Chemical Warfare Attacks, 1982-83

Date of Attack	Location	Source of Information	Delivery Method	Form of Chemical	Persons Killed	Persons Taken Ill
13 Feb 1982	Khao Din, Thai border	DK/Thai	Artillery shells	?	1	100 (17 hospitalized)
23 Feb	Border near Pailin	Thai	Aircraft (powder blown over border)	Yellow powder	0	Many
3 Mar	Battambang Province	DK/Thai	Artillery	?	0	?
5, 7 Mar	Pailin area	DK/Thai	Aircraft spray, artillery	White powder	0	10
7-11 Mar	Sokh Sann	KPNLF	Aircraft spray, artillery	Yellow substance	0	Many
10 Mar	Battambang Province	DK	Aircraft	?	25	12
10-13 Mar	Battambang Province	DK/Thai	Aircraft, artillery	?	30	7
17 Mar	Sokh Sann	KPNLF	Artillery	Yellow/white powder	0	Many
24 Mar	Battambang Province	DK	Poisoned water	Yellow powder	4	?
24 Apr	Nong Chan (near Thai border)	KPNLF	60-mm mortar	Yellow cloud	0	4
29 Apr	Battambang	Thai	Aircraft spray	Yellow powder	3	7
25, 26 May	Sokh Sann	DK official	Aircraft spray	Chemical	0	?
June	Preah Vihear Province	DK commander	Poison food and water	?	2	Many
24 June	Border near Nong Chan	Thai intelligence	Mortar rounds	Yellow cloud	0	4
? Sep 82	Along Thai border	Physican near Kampuchean border	Chemicals spread on ground	?	?	?
Sep 82	Along Thai border	Physican near Kampuchea border	Ground spray	?	?	?
24 Sep	Nong Chan	KPNLF	60-mm mortar	Chemicals	0	4
29-31 Oct	Sokh Sann	KPNLF	?	Yellow droplets	?	?
31 Oct	Yaeng Dangkum	Correspondent	Artillery shells	Gas	6	60
1, 2 Nov	Phum Tuman	Thai	Howitzer shells	?	4	Many
1 Nov	Koh Kong City	DK/Thai	105-mm artillery	?	0	6
2 Nov	Ta Sanh	DK/Thai	Heavy weapons	?	?	?
3 Nov	Sokh Sann	KPNLF	?	White droplets	?	?
8 Nov	Anlong Reap	DK/Thai	?	?	0	7
25 Nov	Samrong	DK	?	Poison gas	6 families (civilians)	?
26 Nov	Battambang Province	DK	Spread around civilian homes	?	0	?

(continued)

Table C-2 (continued)

Kampuchea: Summary of Chemical Warfare Attacks, 1982-83

Date of Attack	Location	Source of Information	Delivery Method	Form of Chemical	Persons Killed	Persons Taken Ill
3 Dec	Thai-Kampuchean border	DK	Artillery rounds and release of chemicals into the Stoeng Metoek River	?	0	15
5 Dec	Stung Treng River	DK	Poison spread along river	?	Civilians died after eating fish	?
11 Dec	Northeastern Preah Vihear Province	DK	Poisoned water	?	Many	?
16 Dec (date of report)	Ban Hiang, Ban Pakxangholong, Ban Non Gnang	DK	Vietnamese sprayed two types of poison gas on edge of jungle and around wells	Poison gas	23 at first location, 7 at second (after eating animals or plants exposed to the spray), 8 at third	?
23 Dec	Kampot Province	Khmer Rouge	Helicopter spray	?	?	?
1 Jan 1983	Nong Chan	Singaporean intelligence	?	?	?	?
10 Jan	Koh Kong	DK/Thai intelligence	Artillery	?	6	?
12 Jan	Nong Chong	DK/Thai intelligence	?	?	?	?
18 Jan	Kompong Speu Province	Voice of DK in Kampuchea	Ground spray	?	?	10
17 Feb	Sokh Sann, O Totiek	KPNLF	?	"Rain"	?	?

~~Secret~~

Table C-3

Thailand: Summary of Chemical Warfare Attacks, 1982-83

Date of Attack	Location	Source of Information	Delivery Method	Form of Chemical	Persons Killed	Persons Taken Ill
19 Feb	Pong Nam Ron District	Thai, Canadian	Aircraft spray	Yellow powder	0	Many
3 Mar	Southeast of Pong Nam Ron District near border	Thai	Aircraft (powder windblown over border)	Powder	0	Many
5 Mar	Pong Nam Ron District	Thai	Mortars	Gray/black smoke	0	18 (Thai civilians)
6, 8 Mar	Southeast of Pong Nam Ron District near border	Thai	Aircraft spray	Yellow powder	0	Many
12 Jan 1983	Camp at Nong Ehan	KPNLF	Artillery	Poison gas	?	?

~~Secret~~

Table C-4

Afghanistan: Summary of Chemical Warfare Attacks, 1982-83

Date of Attack	Location	Source of Information	Delivery Method	Form of Chemical	Persons Killed	Persons Taken Ill
Jan	Lowgar Province	Mujahedin	Helicopter	?	?	?
Early Feb	North of Shindand	Mujahedin commander	Aircraft	Yellow substance	4	?
4, 5 Feb	South of Shindand	Mujahedin commander	Helicopter	Yellow substance	0	0
19 Feb	Badakhshan Province	British	Aircraft	Yellow substance	0	?
2nd week of Apr	Vardak Province	Afghan exile	Helicopters with bombs	Blue smoke	300	?
May	Badakhshan Province	Mujahedin	Helicopters	Smoke-producing bombs (blue-green)	?	?
May-Jun	Qandahar Province	Mujahedin	Helicopter rockets	Black, yellow, white gases	?	?
5-9 Jun	Lowgar Province	Afghan exile	After military attacks, Soviets used unknown chemicals on bodies killed in action	?	?	?
11 June	Qandahar Province	Mujahedin	Aircraft bombs	Poisonous gas	15	30
Jun	Northern Faryab Province	Pakistani press	Helicopters, bombs	Red, white, black gases	?	Many
Jun	Road between Kabul and Termez	MI-24 pilot (Soviet defector)	Helicopter	?	?	?
Jul	Panjsher Valley	Afghan defector	Aircraft	Tabun nerve gas	?	?
20 Jul	Syed Karom District	[redacted]	?	"Chemical gas"	3	?
13 Sep	Lowgar	Mujahedin	"Chemical gas" pumped from armored vehicle	"Chemical gas"	73	?
18 Sep	Kote Sangi	Mujahedin	Rockets	?	?	?
20 Sep	Lowgar	Afghan observer	Chemicals pumped from armored vehicle	Gas	?	?
Late Sep-early Oct	Baghlan Province	Mujahedin	Aircraft bombs	?	?	?
5 Nov	Near Kabul	[redacted]	Grenades thrown by Soviet soldiers	?	?	?
16 Nov	Dewaghal, in Konar Valley	Afghan observer	Chemical bombs dropped on rebel stronghold	?	?	?
3 Feb 1983	Kandar Province	Afghan military officer	?	?	25	?

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ANNEX D

COLLECTION AND ANALYSIS OF SAMPLES OF CHEMICAL WARFARE AGENTS AND TOXINS

1. Identification of the specific chemical agents being used in conflict areas (such as Laos, Kampuchea, and Afghanistan) depends on collection and analysis of at least one of the following: environmental samples contaminated with agent, the munitions used to deliver agents, or biological specimens from attack victims.

2. Obtaining contaminated samples that will yield positive traces of specific chemical agents is dependent on a number of factors. These include the persistency of the chemical; the ambient temperature, rainfall, and wind conditions; the media on which the chemical was deposited; and the time, care, and packaging of the sample from collection to analysis in a laboratory. Many standard chemical warfare agents are nonpersistent and disappear from the environment within a few minutes to several hours after being dispersed. These include, for example, the nerve agents sarin and tabun, the blood agents hydrogen cyanide and cyanogen chloride, the choking agents phosgene and diphosgene, and the blistering agent (urticant) phosgene oxime. Other standard CW agents—such as the nerve agents VX and thickened soman, and the blistering agents sulfur mustard, nitrogen mustard, and lewisite—may persist for several days to weeks depending on weather conditions. The trichothecene toxins are persistent but may be diluted to below detectable concentrations by adverse weather conditions. Although the trichothecenes are quite stable under controlled laboratory conditions, in the field they may be subject to microbial degradation.

3. To maximize the chances of identification and detection, sample collections should be made as rapidly as possible after a chemical assault, and with many agents this means minutes to hours. Under the circumstances of Southeast Asia and Afghanistan this has simply not been possible; nor has there been hardware specifically developed and disseminated to these areas to aid collection of perishable samples. While numerous samples have been collected, few of them held any realistic prospect for yielding positive results. Whenever random samples are collected, even under ideal conditions, there is a wide variability in the concentration of agents detected in the samples. This is not surprising when one considers the many factors that can affect sampling.

4. Samples have been collected from Southeast Asia since mid-1979 and from Afghanistan since May 1980. To date, about 350 individual samples—of greatly varying types and usefulness for analytical purposes—have been collected and analyzed for the presence of traditional CW agents, none of which have been detected. On the basis of recommendations by medical and toxicological experts and of findings by the US Army Chemical Systems Laboratory (USACSL), many of the samples have been analyzed for the trichothecene group of mycotoxins. Details concerning the samples, including the circumstances of their collection and results of their analysis, are provided in tables D-1, D-2, and D-3.

5. All environmental and nonbiological samples are submitted to USACSL for comprehensive analysis for unknowns, to include traditionally recognized chemical warfare agents and other possibly toxic materials. Tissue specimens and body fluids from victims of CW attacks are submitted to the Armed Forces Medical Intelligence Center (AFMIC). Before 1982, AFMIC was known as the US Army Medical Intelligence and Information Agency (USAMIIA).[1] Analyses of biological samples for trichothecene and other mycotoxins are conducted under the sponsorship of AFMIC by Dr. Chester Mirocha, University of Minnesota; Dr. Joseph Rosen, Rutgers University; and Dr. Tim Phillips, Texas A&M University. The US Food and Drug Administration has also assisted in analysis, as has a pollen expert from the Smithsonian Institute.

[1] Unless otherwise indicated, all human tissue and urine specimens listed in the sample set tables were refrigerated (5-8 degrees C) from the time of collection until they were received by the analytical laboratories.

Table D-1

Laos: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
1	Polyethylene plastic sheet, 4 square inches.	Collected in early 1979 after a chemical attack on H'Mong village. H'Mong refugee gave to Thai personnel, who in turn passed a small piece to US officials for analysis.	Thai preliminary analysis indicated the presence of a vesicant (blistering agent). Analysis by an independent US laboratory found no evidence of vesicant or any other CW agent.
2	Yellow powder residue on bambo thatching from roof of hut.	Chemical was sprayed from L-19 aircraft in Pha Mai Village in March 1979. All animals in village died. At least 28 people died after vomiting blood, coughing up blood, and suffering massive nosebleed, blurred vision, and difficult breathing. Dried yellow spots on bamboo thatching were about 2.0 millimeters in diameter. Sample given to US Army medical team in October 1979. Analyzed by US Army Chemical Systems Laboratory (USACSL).	Total sample of yellow material on bark was 2 milligrams. No evidence of known chemical warfare agents was present. Lauryl alcohol derivatives, primarily sulfate, indicating a possible surfactant or wetting agent for spreading other chemicals, was detected.
3	Human tissue samples from 20 H'Mong reportedly exposed to a CW attack and hospitalized in Bangkok. Twenty urine, 19 blood, and 20 sputum samples and 16 chest X-rays were received. Samples from H'Mong refugees not attacked with chemical agents were used as controls.	Samples were taken in July 1980 from H'Mong who had been exposed to a CW attack. Analyzed for cholinesterase. Control samples from H'Mong refugees not exposed to a CW agent were also analyzed. Samples being retained at USACSL for possible additional analysis.	Cholinesterase activity determinations in the blood of exposed individuals were not significantly different from normal/unexposed persons. Cholinesterase activity was very low in both test and control subjects. No evidence of known CW agents in any of the samples.
4	Yellow/orange powder from chemical attack in vicinity of Phou Bia.	Collected by H'Mong resistance fighter [redacted] on day of attack, 25 October 1980. Thirty of 100 people became ill; none died. Given on 21 April 1981 to medical officer of international organization, who transferred it to US custody. Sample sent to United States 30 April 1981. Container was not opened until received at USACSL.	No evidence of any known CW agent. (Sample contained only 1 to 2 milligrams of powder.) Not analyzed for trichothecene toxins. Tentatively identified as sesquiterpene, which has a structure similar to that of the trichothecenes. Also found were a quinone and aromatic hydrocarbons and carbonyls.
5	Yellow powder residue scraped from a banana leaf in vicinity of Ban Don.	Collected by H'Mong refugee [redacted] after a 1 April 1981 attack on north side of mountain near Ban Don. Sample received by a medical doctor from international organization 21 April 1981 and by US personnel on 30 April 1981. Container was not opened until received at USACSL.	No evidence of any known CW agent. Sample contained only 1 to 2 milligrams of powder. Not analyzed for trichothecene toxins. Analysis did detect sesquiterpene and carbonyl groups, which could be indicative of a trichothecene.

(continued)

Table D-1 (continued)

Laos: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
6	Yellow powder (about 550 milligrams) from village of Muong Cha in the Phou Bia region.	H'Mong refugee collected sample in scraping from rocks and leaves after a 15 March 1981 attack in the village of Muong Cha. Refugee arrived in Thailand on 28 April 1981 and gave sample to Thai police authorities, who turned it over to US Embassy officer. Sample forwarded to US on 21 May 1981. Analyzed for known CW agents at USACSL, then transferred to independent laboratory for trichothecene analysis.	No evidence of known CW agent. Aromatic hydrocarbons and carbonyls were present indicating possible trichothecene. Portion of sample analyzed for mycotoxins of the trichothecene group. T-2 toxin and diacetoxyscirpenol (DAS) were found at levels of 150 and 25 parts per million respectively. Nivalenol and deoxynivalent were not detected. Second analysis of sample showed a T-2 toxin level of 148 ppm and DAS at 27 ppm. No nivalenol or deoxynivalenol was detected. Analysis for aflatoxin was negative. Pollen was also identified.
7	Very small amount, less than milligram of solid in 5 milliliters of solution.	First sample taken by a H'Mong from site of a CW attack that occurred on 2 April 1981 at Ban Thong Hak. Twenty-four victims died. Sample was given to a journalist, who transferred it to a Congressman. It was given subsequently to USACSL on 11 June 1981. Sample transferred to US Army Medical Information and Intelligence Agency (USAMIIA) for analysis for trichothecene toxins. Second similar sample from same channel received on 30 June 1981.	Sample 1: No evidence of any traditional CW agents. Solvent was methanol. No T-2, nivalenol, or deoxynivalenol was present. Ten nanograms of diacetoxyscirpenol (DAS), a toxic trichothecene, were present in the sample. The small sample size precluded adequate analysis for other trichothecene toxins, and it cannot be determined if they were present or not. Sample 2: Indications of a steroid which could be indicative of a trichothecene. No evidence of known CW agents.
8	Five blood samples.	Samples were clotted. Sent to USAMIIA on 17 November 1981. No analysis for trichothecene toxins planned. Symptoms described by victims indicate that the chemical agent was CS or other riot control material.	No exploitation at this time.
9	Two samples: — Natural vegetation, stem and leaves. — Plastic bottle containing five samples, three of leaves and two of powder.	Sample of residue collected after a 6 December 1981 CW attack at Muong Phon, 20 kilometers west of Phou Bia. Victims suffered from bloody vomiting and diarrhea. Many deaths. H'Mong carried the sample out of Laos 8 December 1981 [redacted] received it 9 December 1981 and provided sample to Embassy. Received by USACSL on 5 January 1982. One-fourth of sample given to UK for analysis. One-fourth sample to USAMIIA for trichothecene analysis.	Sam12l2lSample 1: No evidence of known CW agents. Analysis incomplete. Sample 2: No evidence of known CW agents. Identified 2 methylfuran cyclooctatetraene, which could be indicative of a trichothecene. Analysis for trichothecenes were negative. Analysis in UK found pollens from plant indigenous to Southeast Asia. No trichothecene toxins were found.
10	Residue.	Sample collected by a H'Mong resistance leader immediately after a 12 December 1981 CW attack. Villagers suffered bloody diarrhea, some deaths. Sample given to Embassy official on 8 January 1982 and transferred to UK officials on that date. Sent to London on 19 January for analysis.	Pollen, flower parts, and Fusaria mold. No trichothecene toxins were detected. Toxogenic fungi—some trichothecene toxin species were found.

(continued)

Table D-1 (continued)

Laos: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
11	Residue of gray fuzz.	On 3 March 1982 this residue sample from Laos was provided to a Thai national who had been given the sample by a Lao in the Lao resistance force. Residue was obtained after a CW attack at the end of February 1982. Chemical was dropped from a small, unidentified aircraft. Four or five individuals in the area suffered fever on the first day, followed by vomiting of blood on second and third days before death. Cattle allegedly died within seven days after the attack. Received on 8 March 1982 by USACSL.	Sample had appearance of fuzz. No evidence of traditional CW agents. Analysis incomplete.
12	Two vials of white powder: —Vial A —Vial B	Vials allegedly taken from a military warehouse in Vientiane used to store CW equipment, including munitions. Powders reportedly were used to poison wells and small streams. Samples taken by a Lao who had access and given to Thai contact, who turned it over to a US citizen. Samples pouched to US on 15 April 1982. Analyzed by USACSL.	Vial A - penicillin-G Vial B - procain-penicillin.
13	Four tubes of blood: two heparinized (h) and two nonheparinized (nh) specimens from: A–man B–woman	Samples drawn from H'Mong refugees, man and wife on 21 March 1982. They and their six-month-old baby were exposed to CW attacks on 11 November 1981 and 4 January 1982. All were ill on 21 March 1982. In November attack an airplane dispersed yellow chemical. Wife coughed yellow sputum and had bloody diarrhea for five days. In January attack a green chemical was disseminated from an airplane. All were ill, but wife suffered most—blurred vision, swollen eyes, bloody cough, severe back pain. Sample to AFMIC and Dr. Mirocha on 24 March 1982.	Specimen / DAS / T-2 / HT-2 A-h / Negl / 14 ppb / Negl -nh / Negl / Negl / Negl B-h / Negl / Negl / Negl -nh / Negl / Negl / Negl (Note: Lag of two and a half months between exposure and drawing of blood.)
14	Three blood specimens, heparinized, unrefrigerated for eight hours, refrigerated remainder of time, from: A–Bloc Her, 8-year-old boy B–Tong Her, 6-year-old boy C–Xia Sue Xiong, young girl	Samples [redacted] on 17 April 1982 from three H'Mong refugees who were exposed to a CW agent (variously described as yellow-red-brown) in late March 1982. A total of 124 H'Mong reportedly were exposed. Three blood samples were taken—(A) 8-year-old boy who had been severely ill with bloody diarrhea and coughing of blood, (B) 6-year-old boy grossly anemic and splenomegally, and (C) a girl suffering from bloody diarrhea and abdominal pain. Arrived in US on 23 April 1982. Sent to AFMIC for analysis by Dr. Mirocha.	Trichothecene Toxins Subject / DAS / T-2 / HT-2 A / Negl / Negl / Negl B / Negl / 110 ppb / 296 ppb C / Negl / 46 ppb / Negl

(continued)

Table D-1 (continued)

Laos: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
15	Blood specimens, one heparinized, one nonheparinized, from 25-year-old H'Mong who died following a GI hemorrhage.	Victim was admitted to Loei Hospital just before death. Blood drawn at hospital on 17 April. Victim claimed to have been exposed to a CW attack. Samples arrived in US on 23 April. Sent to AFMIC for analysis.	Trichothecene Toxins Specimen / DAS / T-2 / HT-2 Heparanized / Negl / 14 ppb / 19 ppb Nonheparinized / Negl / Negl / Negl
16	Two tubes of blood samples, one heparinized, one nonheparinized.	Blood drawn 26 April 1982 from H'Mong refugee, Neng Xiong, suffering the effects of CW exposure 25 March 1982 after an attack on Na Phong Village in Laos. Helicopter dropped a yellow chemical. All of population (40 families) reportedly suffered from vomiting, fever, backaches, headache, and chest pain. None suffered bleeding. Many developed swollen eyes. One woman died. Pigs, chickens, and buffalo also died. Blood, refrigerated since drawn, arrived in US on 30 April 1982. Sent to AFMIC for analysis by Dr. Mirocha.	Trichothecene Toxins Specimen / DAS / T-2 / HT-2 Heparinized / Negl / 100 ppb / 8 ppb Non-heparinized / Negl / 32 ppb / 34 ppb
17	A. Residue samples from areas of attack near Na Khouang: A-1—soil A-2—vegetation and pebbles B. Two air-monitoring badges, of the type included in sampling kits. Contain activated charcoal absorbent.	A. Residue samples were taken from three different areas in Laos that were separately attacked on 17, 18, and 30 April 1982. Sources of samples did not witness attacks, nor did they observe any victims. Ten persons reputedly died after suffering vomiting, bloody diarrhea, and headaches. Attacks were conducted by single jet planes. Sent to USACSL 11 May 1982. B. Charcoal from badges was reportedly exposed to environment and placed in the Na Khouang area in January 1982. They were retrieved in March after a CW attack. Sent to USACSL in May.	A. Analysis incomplete. A component of purified aflatoxin from culture was identified in one vegetation sample. This component is indicative of the presence of aflatoxin purified from artificially cultivated Asperguillus flavus. Aflatoxin acts synergistically with trichothecene toxins and may be a component of "yellow rain." However, no trichothecene toxin was found in the sample containing aflatoxin. B. Analysis incomplete.
18	Sealed glass ampule containing tan crystals.	Sample acquired in Laos and sent to USACSL 12 July 1982.	Vapor analysis - trace of dichlorobenzene. No evidence of known CW agents. Crystalline material is penicillin-G, identical to sample 12, vial A.
19	Tan granular solid, approximately 300 mg.	Sample acquired in Laos and sent to USACSL 15 June 1982.	25% O-hexachlorocyclohexane, 75% diatomaceous earth. Probably used as an insecticide, although hexachlorocyclohexane has been used as a smoke. Lindane—O-hexachlorocyclohexane—is an insecticide. No evidence of traditional CW agents or toxins.

(continued)

Table D-1 (continued)

Laos: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
20	Two tubes of whole blood, one heparinized (h), one nonheparinized (nh).	H'Mong refugee who was exposed to CW on 17 March 1982 in Laos. Blood drawn on 31 March 1982 and kept chilled from that time except for about four hours in transit. Blood drawn by Ban Vinai hospital physician and transported to Bangkok Embassy officer by [redacted]. Victim had symptoms similar to those associated with mycotoxicosis—bloody vomiting, bloody diarrhea. Arrived in USA at 1730 hours, 1 April. Sample sent to AFMIC for analysis by Dr. Mirocha.	Trichothecene Toxins Specimen / DAS / T-2 / HT-2 h: Negl / 19 ppb / Negl nh: Negl / 3 ppb / 2 ppb
21	Eight tubes of blood specimen, two heparinized (h), two nonheparinized (nh), from each of two H'Mong victims and from each of two control individuals.	Two H'Mong refugees, 22 and 28 years of age, were victims of a CW attack in Laos on 20 May 1982. Attack occurred at about 1700 hours near Ban Pha Ngum. These two were part of a resistance patrol of six men near the village of 100 inhabitants. Blood was drawn from victims and two controls on 19 June 1982. The chemical reportedly was disseminated from a jet aircraft. It appeared as a yellow syruplike substance and had fallen on this patrol and village. The drops dried quickly. Both victims suffered chest pain, coughing with pink mucous, sore throat, dyspnea, visual disturbance, vertigo, hemodiarrhea, weakness, anorexia, and abdominal pain. The older victim also suffered lower leg and pedal edema, facial edema, mild icterus, and dull mentum, some of which were still evident one month after exposure. Most of the villagers were sick and four died. The attack also killed pigs and chickens. Samples received on 22 June by AFMIC for analysis.	Lab results from Ban Vinai camp hospital: Blood / 22-yr-old / 28-yr-old WBC / 8,300 / 5,750 HCT / 42 / 18.5 Diff / S-57, L-36, E-10, M-2 / S-38, L-62 Negative malaria smear with adequate platelets. Smear showed med/severe microcytic hypochromaic anemia with moderate poikilocytes and anisocytes. Analysis: Pending
22	Gravel and cloth in four packages.	Samples were obtained by US Embassy officer in Thailand from Lao insurgents in August 1982. The samples reportedly were dangerous, poisonous, and related to CW substances. Samples were allegedly taken from a CW storage area in Laos. A US Army Technical Escort Team was dispatched to Thailand and transported samples to USACSL for analysis. Received by USACSL on 11 October 1982.	Vapor analysis from all samples contained p-chloronitrobenzene as the major component. Analysis incomplete.

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Table D-2

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
1	Clothing (two pairs of trousers, two shirts) from dead Democratic Kampuchea (DK) soldiers.	On 27 February 1980 a US Embassy officer obtained clothing sealed in heavy plastic bags from Thai official. Clothing reportedly taken from DK soldiers killed in chemical attack in the Pailin area. Clothing sample was obtained two weeks before being given to US officer. Analysis done by an independent laboratory.	No evidence of standard CW agents was detected. Not analyzed for mycotoxins. Cytotoxicity tests were negative.
2	Water sample (25 milliliters).	Sample taken in mid-January 1980 from a stream in the Thaphaya area of the Thai-Kampuchean border by Royal Thai Army (RTA) troops. It was passed to station officer by Thai who claimed that RTA troops and villagers became ill with swelling limbs and a red rash. Analyzed by independent laboratory.	No evidence of standard CW agents was detected. Not analyzed for mycotoxins. Cytotoxicity tests were negative.
3	Red corn (500 grams). Corn contained cob particles, broken kernels, and insects.	Sample obtained from Kampuchean refugee who entered Thailand in early 1980. The corn was provided by the Vietnamese and reportedly originated in Russia. Eating it caused people to vomit and cough up blood. Analyzed by independent US laboratory.	No evidence of known CW agents. Was not toxic to cell tissue culture. No toxic effect noted in rat receiving portion of sample orally. Not analyzed for trichothecene toxins.
4	Empty artillery shell.	Sample collected by DK refugee in early 1980. Received 5 May 1980. Sent to independent laboratory for analysis.	No evidence of presence of CW agents or their degradation products. Major constituent was TNT.
5	Shirt taken from DK victim of CW attack.	Attack occurred on 29 February 1980 about 15 to 20 kilometers southeast of Nong Pru. Victim reported symptoms of nausea, vomiting, weakness, and headache. Some victims reportedly died from internal bleeding. On 5 March 1980, RTA officer in Aranyaprathet delivered the garment sealed in a foil bag to a US Embassy officer. Sample was pouched to USACSL on 7 March 1980.	No evidence of any standard CW agent or agent breakdown product was detected on the sample. Two siloxane lubricants (hexamethylcyclotrisiloxane and octamethyltetrasiloxane) were identified. These are of interest because of the intensive studies of siloxanes by Soviet scientists. The presence of a component with a mass of 100 was detected but not identified. No unusual effects were noted in mice confined with the clothing for six hours. Biocultures proved negative.
6	Yellow corn packaged in plastic bag.	Obtained from Kampuchean refugee. Received by USACSL on 19 November 1979.	Arsenic was detected at a level of 43 ppm. Arsenic appears to be organically bound but is not in a known CW agent structure. Possibly a fungicide or rodenticide.
7	Water sample from area of CW attack (Control samples collected outside range of chemical attack did not contain any trichothecene toxins or known CW agents.)	Sample given to US Embassy officer by Thai chemical officer who acquired it on the Thai-Kampuchean border area near Phnom Mak Hoeum about 15 March 1981. Sample received by USACSL on 25 March 1981. Sample given to USAMIIA on 26 August 1981 for trichothecene analysis by independent laboratory.	Cyanide at 460 ppm. (Note: Control water sample also contained high cyanide levels.) No evidence of standard CW agents was detected. Analysis for toxins revealed presence of deoxynivalenol at level of 66 ppm, of solid material in water. Trace of another trichothecene toxin, diacetoxyscirpenol (DAS), also found.

(continued)

Table D-2 (continued)

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
8	Leaves and stem samples (Control samples collected outside range of chemical attack did not contain any trichothecene toxins or known CW agents.)	Sample obtained by Thai chemical officers about 15 March 1981 on Thai-Kampuchean border just south of Phnom Mak Hoeum. Given to US Embassy officer, who sent it to USACSL. Received on 24 March 1981. Transferred to USAMIIA on 29 April 1981 for trichothecene analysis by independent laboratory.	Sample was positive for cyanide (8.7 mg/leaf) and a trace of fluoride. No evidence of standard CW agents. Sample contained three trichothecene toxins: T-2 at 3.15 ppm, nivalenol at 109 ppm, and deoxynivalenol at 59.1 ppm.
9	Water samples	Six water samples reportedly from area of chemical attack were given to Embassy personnel by Thai officer who received them from DK sources. Collected 15 March 1981. Received by USACSL on 24 March 1981.	No evidence of standard CW agents. Not yet analyzed for toxins. Cyanide was found at levels between 210 and 590 ppm. (Note: Cyanide also found in control water samples.)
10	Negative control samples of water, soil, vegetation, corn, and rice	Received from field on 20 September 1981.	Analyzed for toxins. Negative results on all samples.
11	Blood samples (A14, A15, A16, and A17)	Four samples were drawn from DK personnel exposed to CW agent on 19 September 1981. Samples drawn on 7 October 1981. Samples were left unrefrigerated for 48 hours after collection and had begun to putrify, a condition that interferes with many assays. Sent to USAMIIA for analysis for trichothecenes at an independent laboratory.	Negative results on all samples. Samples were in poor condition for analysis.
12	Blood samples and blood smears. Total blood samples: 13 (B-1 through B-13)	Nine blood samples from DK personnel who had been subjected to a CW attack in fall 1981. Approximately 50 people were killed in the attack. Four samples from unexposed DK personnel. Samples drawn on 21 October 1981 by trained medical personnel. Sent to USAMIIA for analysis on 22 October 1981. Samples properly refrigerated and in good condition for analysis.	White blood cell count (WBC) was low in all victims but not significantly lower than in nonexposed individuals. A metabolite of T-2 toxin (HT-2) was tentatively identified in the blood of two victims having the lowest WBCs. No toxins were present in remaining blood samples from exposed subjects or unexposed personnel.
13	Two samples: — Bottle with leaves reportedly contaminated with CW powder agent — Bottle with small piece of bamboo reportedly contaminated with toxic agent	Powder spread by airplane over upper Koh Kong Province. Exposed individuals vomited blood. Also some deaths. Attack took place on 10 November 1981. Samples were given to Embassy contacts by DK escape representative in Bangkok on 12 November 1981. Sent 16 November 1981 in diplomatic pouch. Received by USACSL on 19 November. Portion of sample transferred to USAMIIA for trichothecene analysis.	Analysis in progress.
14	Glass bottle containing a powder, tinted pink.	Powder was obtained on 20 November 1981 by KPNLF (Khmer People's National Liberation Front) forces in Kampuchea. Received by USACSL on 8 December 1981. Portion of sample transferred to USAMIIA on 16 December 1981 for trichothecene analysis.	Sample is 98 percent talc. Other chemicals not identified. Results of analysis for trichothecenes were negative.

(continued)

Table D-2 (continued)

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
15	Blood and urine samples: [redacted] A-1—urine A-2—blood A-3—blood [redacted] B-1—urine B-2—blood, syringe	Samples taken from DK victims [redacted] exposed to CW attack on 19 September 1981 and 13 February 1982. Blood and urine samples taken on 14 and 15 February 1982 [redacted] exposed to CW on 13 February 1982. Blood and urine specimens taken 14 and 16 February 1982, respectively. Samples were kept refrigerated. Received by AFMIC on 4 March 1982 for analysis. The 13 February 1982 exposure occurred during a fire fight with Vietnamese forces in area north of Khao Din, approximately 300 meters from the Thai-Kampuchean border. The Vietnamese disseminated chemical with artillery bombardment. Approximately 100 DK soldiers reportedly were made ill by the CW agent, suffering from burning eyes, blurred vision, shortness of breath, chest pains, vomiting (no blood), and vertigo. Some victims also felt weak and were trembling.	Trichothecene Toxins Specimen / DAS / T-2 / HT-2 A-1 / Negl / Negl / Negl A-2 / Negl / 18 ppb / 22 ppb A-3 / Not analyzed B-1 / Negl / Trace / 18 ppb B-2* / Negl / 11 ppb / 10 ppb *Liquid components were extracted from syringe and analyzed.
16	Blood: 12 samples, six heparinized, six nonheparinized	Samples [redacted] from DK soldiers exposed to CW attack on 13 February 1982 (see No. 15). Blood was drawn on 4 March 1982, 19 days after the attack. Victims were still showing some effects of CW attack and were being treated in Nong Pru Hospital. Victims were numbered as follows: [redacted] Samples received for analysis by AFMIC 5 March 1982.	Heparinized / Nonheparinized 1. Negl* / Negl 2. Negl / 7 ppb of T-2 3. Negl / Negl 4. Negl / Negl 5. Negl / Negl 6. Negl / 3 ppb of T-2 *Victim 1 had blood content of T-2 toxin at 18 ppb and HT-2 toxin at 22 ppb in blood drawn one day after attack (see No. 15).
17	One bottle of white substance	White substance was provided by Thai component of Armed Forces Reserve Institute of Medical Sciences. Substance described as a poison which was put into water to kill fish. Received 12 March 1982. Sent to USACSL on 26 March for analysis.	Sodium hydroxide with 0.5% CN- and 0.5% Cl-. The size and analysis suggest a technical-grade caustic pellet. This does not preclude the possibility of higher concentrations of cyanide originally in the sample but lost through hydrolysis in the presence of moisture from the air or elsewhere.

(continued)

Table D-2 (continued)

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results		
			Trichothecene Toxins		
			DAS	T-2	HT-2
18	Three samples each of blood, urine, and hair from three Khmer victims exposed to CW. Blood was in two tubes, one heparinized (h), one nonheparinized (nh)	Tissue specimens were taken from three Khmer inhabitants of the Nong Pru area who allegedly were exposed to CW agents disseminated by Vietnamese forces in two CW incidents on 6 and 7 March 1982 in the Pailin area. Blood and urine were taken on 13 March, hair on 18 March. Samples, kept chilled with ice, were received by AFMIC on 22 March. Hair sample given to USACSL on 26 March for analysis. The victims were made ill on 6 March after walking through area known as Sala Krah, which had been sprayed with white powder by a jet fighter plane. Ten of 15 men in one unit were unable to continue moving to the front because of illness. Symptoms included nausea, vomiting, shortness of breath, blurred vision, diarrhea, bloody discharge from nose, burning sensation in chest and abdomen. The second exposure occurred on 7 March when Khmer units were attacked with chemical/toxin artillery shelling.	Urine Samples		
			Victim 1	Negl	5 ppb 1 ppb
			Victim 2	Negl	4 ppb 1 ppb
			Victim 3	Negl	22 ppb 7 ppb
			Blood Samples:		
			Victim 1 h	Negl	7 ppb Negl
			nh	Negl	Negl Negl
			Victim 2 h	Negl	Negl 8 ppb
			nh		Negl
			Victim 3 h	Negl	Negl Negl
			nh	Negl	Negl Negl
			Hair Samples: Analysis complete. No arsenic or other heavy transition elements were detected. Hair was not analyzed for organic compounds.		

(continued)

Table D-2 (continued)

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
19	Tissue Specimens: Heart Lungs Esophagus/stomach Liver Kidney Large intestine	Autopsy tissue from DK fighter who died on 15 March 1982 after being exposed to CW on 13 February (see samples 15, 16, and 17). Victim was being treated for exposure and malaria at Nong Pru since 13 March. Victim developed high fever, became jaundiced, and vomited foul-smelling blood shortly before death. Urine was tinged with blood. Death due to kidney failure. Tissue samples taken kept refrigerated and arrived at AFMIC on 22 March. Tissue analyzed for trichothecene toxins and aflatoxin.	Trichothecene Toxin* Wgt. of Sample (g) / Tissue / DAS** / T-2 / HT-2 Heart 7.9 — — 1.2 ppm Stomach 13.5 — 25 ppb 4 ppm Liver 9.5 — — — Kidney 10.4 2.6 ppm 6 ppb — Lung 4.5 — 8 ppb — Intestine 5.3 — 88 ppb 9 ppb *Dashes indicate toxins were not detected. Concentrations of DAS (diacetoxyscirpenol) were no greater than the added internal standard. **DAS was used as an internal standard—that is, it was added to each tissue sample to check accuracy of analysis. Only the kidney had a concentration of DAS that was greater than the amount added. Aflatoxin Tissue / Wgt. of Sample (g) / Concentration ng/g* / Adjusted ng/g** Stomach 3.0 20 23 Liver 3.0 20 23 Kidney 7.5 15 17 Intestine 3.0 11 13 *Nanograms per gram of sample **Values adjusted on basis of 88% recovery
20	Vegetation—leaf samples.	Sample obtained after a 7-11 March 1982 CW attack at Sokh Sann. Received 22 March by AFMIC. Transferred to USACSL on 26 March for exploitation. (See sample 22, from same attack area)	Analysis incomplete.
21	Allegedly poisoned rice.	Rice sample was given to the Thai by Khmer refugees who claimed that the sample was relief rice distributed by the Phnom Penh PRK government. The Thai military stated that the rice is "pearl grain" and not grown in Kampuchea. Refugees did not define symptoms or the location and date of distribution. Sample received by USACSL on 22 March for analysis.	Sample contained carbon disulfide, styrene benzonitrile, and less than 0.41 ppm arsenic. No evidence of standard CW agents or trichothecene toxins. The rice sample did not contain any poisonous compounds at effective levels.

(continued)

Table D-2 (continued)

Kampuchea: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
22	Yellow residue.	KPNLF and other sources reported that a moist yellow substance was delivered by artillery on four villages at Sokh Sann. Attacks occurred 7-11 March 1982. Exposed personnel reported itching and swelling in areas of the body coming in contact with the substance. Many also experienced nausea, vomiting, diarrhea (no blood). Chickens died or became feverish when given the substance orally. There were no human fatalities as of 11 March. Effect on vegetation included wilting of younger leaves and stems of plants. Older leaves showed some browning and burned spots. [redacted] Sample was given to USACSL for exploitation on 22 March.	Chloroform, d-terpinene, 4 compounds similar to terpenes were detected. Analysis incomplete.
23	Vegetation sample with yellow spot.	Sample from area of 19 February 1982 attack in the Pong Nam Ron district near the Thai-Kampuchean border. A Vietnamese aircraft sprayed a yellow powdery substance. Sample given to US by the Armed Forces Institute of Thailand. Sent to USACSL for analysis on 4 March. Transferred to AFMIC on 2 June. Analyzed by Dr. Mirocha. French also received sample.	No evidence of known CW agents. Trichothecene toxin T-2 and DAS were present at levels of 86 ppb and trace amounts, respectively. Analysis for HT-2 was negative. Sample was insufficient to analyze accurately for nivalenol and deoxynivalenol. French scientists reportedly found T-2 at a level of 96 ppb and DAS at a level of 639 ppb.
24	Gas mask (Chinese).	Democratic Kampuchea forces operating near Phnom Melai claim they captured the mask from Vietnamese forces during fighting on 1 March 1982. USACSL received mask for exploitation on 4 June.	No standard CW agents or other toxic compounds were detected.
25	Tail fins from 60-mm mortar rounds.	Tail fins were from mortar rounds employed against KPLNF forces at Nong Chan on 24 September 1982. Received by USACSL on 1 October.	Analysis incomplete.

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Table D-3

Afghanistan: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
1	Rocket and bomb fragments with Soviet markings	Fragments were obtained in Konarha Province, sent to USACSL on 18 April 1980.	No evidence of standard CW agents.
2	Soviet gas mask and canister	Purchased in Kabul. Sent to USACSL on 18 September 1980.	No evidence of standard CW agents. Dioctylphthalate, which probably was used to test gas mask filter, was identified.
3	Knit polyester cap, a polyester knit jacket, badly worn shirt, which appeared to be recently washed.	Obtained in Islamabad, Pakistan, from an Afghan refugee, who claimed he was subjected to a gas attack. Collected on 2 November 1980, shipped from field on 19 November 1980, received by USACSL on 8 December 1980.	Analysis showed no evidence of any known CW agent but detected a high molecular weight ester, which could be indicative of a trichothecene, and adipic acid esters. Also detected malathion, an organic phosphate insecticide.
4	Human tissue (two bottles)	Same as sample 3.	Not analyzed because of deterioration of sample enroute.
5	7.62-mm cartridges	The cartridges, which reputedly were coated with a poison, were carried by special Afghan police and some Soviet advisers. Samples were collected in November 1980 and received for analysis at USACSL on 4 February 1981.	No evidence of standard CW agents was found on bullet coating or scrapings from slug. Not analyzed for toxins.
6	Cotton garment and socks	Clothing appeared to be very dirty. Clothing obtained from Afghan refugee in Islamabad, Pakistan. Refugee reportedly subjected to CW attack. Received by USACSL 12 February 1981. Transferred to USAMIIA for toxin analysis.	No evidence of known CW agents. Results on trichothecene pending completion of analysis.
7	Soviet Shlem gas masks	Five masks were procured in Kabul at various times and were sent as received to USACSL for analysis between 24 August 1981 and 21 December 1981. No background information is available with these masks.	No evidence of traditional CW agents. An analytical sample from the external surface of one-quarter of a mask, obtained in September 1982, showed the presence of toxin T-2 (approximately 1 microgram). The result was verified by two independent laboratories.
8	Expended Soviet 5.45-mm cartridge case	Obtained by Mujahedin about 1980. The bullets had been captured from the Soviets and used by Afghan Islamic insurgents. During a firefight, insurgents using the bullets became ill, with severe vomiting and nausea for several hours. They suspected that the Soviets had contaminated the powder charge. Sent to USACSL on 25 August 1981.	No evidence of any generally recognized agent or toxic compound was found. Was not analyzed for toxins.
9	Soviet gas mask with canister	Item was reportedly taken from a Soviet after a Soviet gas attack in early 1981. Item was collected by an Afghan, who is associated with the Mujahedin and who loaned the item to US personnel for analysis. USACSL received the mask on 18 December 1981.	Preliminary analysis by thin-layer chromatography (TLC) of material from hose connection of the mask indicated the presence of T-2. This could not be confirmed. No evidence of traditional CW agents.

(continued)

Table D-3 (continued)

Afghanistan: Sample Collection and Analysis for Presence of Chemical Warfare Agents

Sample No.	Sample Description	History of Sample	Analytical Results
10	Grain	Sample was collected by a reliable source, who reported that it may have been poisoned. USACSL received sample on 24 February 1982. Portion of sample to be analyzed for toxins.	Preliminary analysis by TLC indicated the presence of trichothecene toxins. Three alternate methods of analysis were used but none were confirmatory. No evidence of traditional CW agents.
11	Yellow crystals	Alleged CW sample taken from the site of a 19 February 1982 CW attack on Badakshan. British military attache in Islamabad provided the sample to the US briefing team during its visits to Pakistan (1-5 April 1982). One-half the sample retained by the UK. Remaining sample given to USACSL for analysis.	High-purity tetryl (trinitrophenyl methylnitramine). Tetryl is a high-velocity initiator used to detonate TNT. It burns at 295°C when unconfined and explodes at 180-190°C when confined. No evidence of traditional CW agents.
12	(1) Wheat (2) Cartridges reputedly poisoned	The samples were received [redacted] from a US citizen of Afghanistan extraction who received it in Peshawar from a Mujahedin [redacted] The cartridges reportedly caused discoloration of the face (purple and green), choking sensation, and death within 15 minutes. This occurs even when similar injuries from ordinary cartridges were not lethal. The material was captured during an attack on a Soviet convoy between Ghazni and Zabol Provinces on its way to Qandahar. Sent to USACSL on 31 March 1982 for analysis.	(1) Wheat sample: Vapor analysis showed traces of unidentified compounds (molecular weights 413 and 460) less than 0.26 ppm As, and hydrocarbon carbonyl. No evidence of traditional CW agents. TLC supportive of T-2 toxin or diacetoxyscirpenol. Not confirmed by additional analysis. (2) Cartridges: X-ray identified bullets as tracer type. Analysis showed no evidence of known CW agents or suspect toxins.
13	Wheat	Sample received on 7 July 1982 and submitted to USACSL on 8 July for exploitation.	Vapor sample: biphenyl, dimethylquinoline. Unidentified mass 141. No standard CW agents present. No trichothecenes were present. Analysis complete.
14	Wheat	Afghan recipient of political asylum in West Germany obtained sample from a relative, who got it from contacts in Nimruz Province. USACSL received August 1982.	Analysis incomplete.
15	Black powder	Insurgent from Panjsher brought powder to Kabul. Powder reportedly was used by Soviets in the Panjsher Valley to contaminate food and water; also dropped from aircraft. USACSL received on 15 July 1982.	Primarily carbon. Vapor sample contained biphenyl, dimethylquinoline, and possible cyclic polysulfides. Also found inorganic salts, possibly perchlorates. Probably residue from munitions. No evidence of CW agents or poisons. TLC was negative for trichothecenes.

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ANNEX E

RESULTS OF AN AUTOPSY ON A KAMPUCHEAN CHEMICAL WARFARE ATTACK VICTIM

1. Following an artillery CW attack on 13 February 1982 in the area of Khao Din, Kampuchea, a number of DK soldiers became ill and one subsequently died. Blood, urine, and autopsy specimens were obtained by a Canadian team of experts. The manner in which the samples were preserved and transported under the supervision of the Canadians and international voluntary workers leaves no doubt that the materials analyzed came from victims of a CW attack. (U)

2. The victim from whom autopsy specimens were obtained was being treated at Nong Pru. He was reported to have made a brief recovery on 12 and 13 March, but this was followed by a relapse when he became anuric, feverish, restless, and slightly jaundiced. On 16 March, he lapsed into a coma and died. A urinary catheter was inserted approximately four hours before death, but only minimal blood-tinged urine was obtained. Shortly before death the victim vomited blood. Necropsy was performed by DK physicians. Tissue sections of heart, esophagus/stomach, liver, kidney, and lung were taken and fixed in formaldehyde for autopsy analysis by US and Canadian officials. US samples were refrigerated at about 8 degrees C from time received until given to the laboratory. (U)

3. Samples given to the United States were submitted to several US laboratories for gross, microscopic, histopathological, and chemical-toxicological analyses. All tissues were analyzed for the trichothecene toxins T-2, HT-2, and diacetoxyscirpenol (DAS). Samples of the stomach, liver, kidney, and intestine also were analyzed for aflatoxins, another group of mycotoxins. (U)

4. A trichothecene toxin, T-2, or its metabolic product, HT-2, was found in all of the tissue specimens except the liver (table E-1). Diacetoxyscirpenol, another trichothecene toxin, was found only in the kidney

Table E-1

Results of Analysis of Tissue Samples for DAS, T-2, HT-2 [a]

Material	Amount (g)	Toxins (parts per million or billion)		
		DAS [b]	T-2	HT-2
Heart	7.9	— [c]	—	1 ppm
Stomach	13.5	—	25 ppb	4 ppm
Liver	9.5	—	—	—
Kidney	10.4	3 ppm [d]	7 ppb	—
Lung	4.5	—	9 ppb	—
Intestine	5.3	—	88 ppb	10 ppb

[a] T-2 is a trichothecene toxin; HT-2, a metabolic product of T-2; and DAS (diacetoxyscirpenol), a trichothecene toxin. Tissues were analyzed for trichothecene toxins by Dr. C. J. Mirocha, University of Minnesota. A parallel analysis performed by Dr. J. Rosen, Rutgers University, also showed the presence of high levels of trichothecene toxins.

[b] DAS was used as internal standard—that is, added to each tissue sample as a standard to check accuracy of analysis. Only the kidney had a concentration of DAS that was greater than the amount added.

[c] Toxins were not detected. Concentration of DAS was no greater than the added internal standard.

[d] Endogenous DAS in sample detected in concentration greater than the standard.

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tissue. Aflatoxins were found in the stomach, liver, kidney, and intestine samples (table E-2). (U)

5. The levels of aflatoxin detected in the tissues were so high that it seemed prudent to investigate the possibility that the exposure was not due to a natural contamination, but may have been related to the chemical attack. To this end, portions of the sample of "yellow rain" from Laos that had previously shown to contain 143 parts per million (ppm) of T-2 toxin and 27 ppm of DAS were submitted to Dr. Mirocha and Dr. Phillips for analysis for aflatoxin B1. Analyses were negative for aflatoxin, supporting a hypothesis that this toxin is not always a component of "yellow rain" samples and that the victim's exposure to aflatoxin may have been due to natural contamination of the food source. A high incidence of aflatoxin contamination of food in Southeast Asia has been well documented. (U)

6. This negative finding does not, however, rule out the possibility that aflatoxin is a component of some "yellow rain" CW attacks. The stability of aflatoxins under these conditions is unknown. It is possible, considering the time lag between collection of the sample and its analysis for aflatoxin, that the aflatoxin had undergone degradation. (U)

7. Furthermore, the finding of aflatoxin in the tissues is important regardless of its origin—that is, as the result of exposure to natural outbreaks or of CW attacks—because it may induce an enhanced response to trichothecene exposure. Researchers have shown that aflatoxin and T-2 toxin in combination have a synergistic effect. Thus, a population having aflatoxin already present in body tissues would be more susceptible to damage from T-2 exposure. (U)

8. Portions of each tissue sample were submitted to Dr. Charles Stahl, University of Tennessee Medical School, for histopathological examination. The pathology found included hemorrhage into the heart tissue with evidence of cell destruction and inflammation, cirrhosis of the liver, hemorrhage and cellular destruction of kidney tubules, hemorrhage in the bronchi, and congestion and destruction of the lung. The details of these results and similar findings by other pathologists

Table E-2

Results of Analysis of Samples for Aflatoxin [a]

Material	Weight of Sample (g)	Sample (ng/g) [b]	
		Actual	Adjusted [c]
Stomach	3.04	19.8	22.5
Liver	3.00	20.2	23.2
Kidney	7.50	15.3	17.4
Intestine	3.02	11.2	12.7

[a] Aflatoxin analyses were conducted by Dr. T. Phillips, Texas A&M University.

[b] Nanograms per gram.

[c] Values adjusted on basis of 88-percent recovery—that portion of aflatoxin found when a known amount is added to the sample.

Unclassified

are consistent with results of analysis of animals exposed to trichothecenes. (U)

9. No single post mortem finding proves cause and effect of toxin exposure and death. These data taken together, however, provide objective evidence of the following:

- Reports from witnesses of "yellow rain" attacks are valid; and bleeding sometimes occurs in the lung, stomach, intestine, and kidney or bladder.
- Persons who are already debilitated by disease or exposure to other toxins have a greater risk of death from trichothecene toxicosis.
- Tissue damage occurs in humans after heavy-to-moderate exposure to trichothecenes. The damage is similar to that found in experimental animals.
- Microscopic damage persists over a period of one month or longer.
- Trichothecenes are known to cause long-term damage to rapidly dividing tissue. These toxins accumulate and persist at least in the organs that were examined.
- Aflatoxin found in the tissues may be foodborne and is not necessarily a component of "yellow rain." However, aflatoxins and trichothecene toxins act synergistically, and they could be components of a toxic crude extract mixture. (U)

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