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REPORT OF THE SPECIALISTS APPOINTED BY THE SECRETARY-GENERAL
TO INVESTIGATE ALLEGATIONS BY THE ISLAMIC REPUBLIC OF IRAN
CONCERNING THE USE OF CHEMICAL WEAPONS

Note by the Secretary-General

1. On 3 November 1983, the Government of the Islamic Republic of Iran alleged for the first time in a communication to the United Nations that chemical weapons were being used by Iraq (S/16128). The reference to such weapons was made in the context of reiterating a request, made initially on 28 October 1983 (S/16104), that the Secretary-General should send a second mission to the area to ascertain damages to civilian targets. 1/
2. In accordance with the procedure used for the dispatch of the first mission, the Secretary-General consulted Iraq on Iran's request. Iraq indicated that the Security Council had, in the meantime, on 31 October 1983, adopted resolution 540 (1983), by which the Council, inter alia, condemned violations of international humanitarian law and called for the immediate cessation of all military operations against civilian targets, including city and residential areas. By that resolution, the Council also requested the Secretary-General to continue his mediation efforts. The position of Iraq was that the Council's resolution should be implemented in an integrated manner (see A/38/560-S/16120). Iran disassociated itself from the resolution for the reasons given in document S/16213.
3. In the circumstances, and mindful of the concerns expressed by the two parties, the Secretary-General proposed that a mission be sent to the area with a combined mandate to ascertain the authoritative positions of the parties on the issues of the conflict and to examine the damages to civilian targets, including the determination of the type of munitions that might have been used. The proposal was first made by the Secretary-General orally, and was subsequently contained in documents S/16337 and S/16338 as well as in private communications. The reactions of the parties to the Secretary-General's proposal are contained in documents S/16340, S/16342, S/16352 and S/16354.

1/ A previous mission, dispatched by the Secretary-General at the request of Iran and with the concurrence of Iraq, visited the area from 20 May to 2 June 1983 (see S/15834).

4. The Islamic Republic of Iran has reiterated allegations of the use of chemical weapons in a number of subsequent letters 2/ as well as in private discussions held by its Permanent Representative with the Secretary-General. Press reports indicated that the medical authorities in a number of countries in which Iranian nationals were being treated or relevant data were being analysed had not excluded the possibility that chemical weapons had been used. Those reports were accompanied by a growing call by Governments as well as by public and private organizations for an objective and impartial investigation.

5. Conscious of the humanitarian principles embodied in the Charter and of the moral responsibilities vested in his office, the Secretary-General felt duty-bound to ascertain the facts and, to that end, requested four eminent specialists in their respective fields to undertake a fact-finding visit to Iran. These specialists are:

Dr. Gustav Andersson, Ph.D.
Senior Research Chemist
National Defence Research Institute
Umea, Sweden

Dr. Manuel Dominguez
Colonel, Army Medical Corps and specialist in ABC
Professor of Preventive Medicine
Universidad Complutense de Madrid
Madrid, Spain

Dr. Peter Dunn, D.Sc., B.Sc. (Hons), FRACI
Superintending Scientist
Materials Research Laboratories
Department of Defence
Melbourne, Australia

Colonel Oberst. Ulrich Imobersteg, Dr. phil. chem.
Chief, NBC Defence Division
Ministry of Defence
Bern, Switzerland

6. The specialists travelled to Teheran on 13 March and returned on 19 March 1984. They were accompanied by Mr. Iqbal Riza, Principal Office in the Office of the Under-Secretaries-General for Special Political Affairs, who assisted them in the organization of their work and ensured liaison with the competent authorities. The specialists submitted a joint report to the Secretary-General on 21 March 1984.

2/ See documents S/16139, S/16140, S/16154, S/16220, S/16235, S/16331, S/16340, S/16346, S/16352, S/16378, S/16380, S/16384, S/16397, S/16408, A/39/132-S/16416.

7. The Secretary-General wishes to place on record his deep appreciation to the specialists for the dedicated manner in which they discharged their assignment despite constraints in time and resources, and under difficult and hazardous conditions.

* * * * *

8. In the light of the spirit of humanitarian concern which guided his decision to undertake this investigation, the Secretary-General, in transmitting the report of the specialists to the Security Council for its information, cannot but deplore that their unanimous conclusions substantiate the allegations that chemical weapons have been used. Only a few days ago the Secretary-General stated that he strongly condemns the use of such weapons wherever and whenever this may occur.

9. Indeed, the Secretary-General attaches paramount importance to the strict observance of all the principles and rules of international conduct accepted by the world community for the overriding purpose of preventing or alleviating human suffering, whether they relate to the use of specific weapons, the treatment of prisoners of war or any other aspects of military operations.

10. Having said this, the Secretary-General remains deeply convinced that these humanitarian concerns can only be fully satisfied by putting an end, to the tragic conflict that continues to deplete the precious human resources of Iran and Iraq. He therefore once again reiterates his readiness to assist in any endeavour that could lead to peace for the people of these two countries. The Secretary-General earnestly hopes that both Governments will give such efforts a chance, and that all other States will assist them by contributing towards that end in whatever peaceful way they see fit.

ANNEX

Report of the specialists appointed by the Secretary-General
to Investigate allegations by the Islamic Republic of Iran
concerning the use of chemical weapons

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LETTER OF TRANSMITTAL

21 March 1984

Sir,

We have the honour to submit herewith our report on the investigation you requested us to undertake concerning allegations of the use of chemical weapons in Iran.

In order to undertake the investigation, we visited Iran from 13 to 19 March 1984 for the purpose of carrying out on-site collection and examination of evidence. The report was prepared following our return to Geneva.

We would like to record our sincere thanks to the Government of Iran for the co-operation and assistance provided throughout our mission.

We also wish to express our appreciation for the assistance we received from members of the Secretariat of the United Nations, particularly Mr. Iqbal Riza of the Office of the Under-Secretaries-General for Special Political Affairs. Our special thanks are also due to the two laboratories which assisted us in the technical aspects of this mission.

Although we were appointed in our individual capacities, we agreed to work together as a team and our conclusions were reached unanimously.

We wish, Mr. Secretary-General, to express our gratitude to you for the confidence you have reposed in us.

Yours sincerely,

(Signed) Dr. Gustav ANDERSSON
Dr. Manuel DOMINGUEZ
Dr. Peter DUNN
Colonel Oberst. U. IMOBERSTEG

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I. TERMS OF REFERENCE

1. The specialists were requested by the Secretary-General to determine, to the extent possible, whether chemical weapons had been used in Iran and, if so, the type and extent of their use.

II. METHODOLOGY

2. In order to carry out their task, the specialists adopted, as required, several approaches: (a) interviews were held with government officials, with a view to obtaining information regarding the alleged use of chemical weapons; (b) visits were paid to the war zone in order to examine evidence of weapons by which chemical substances had allegedly been delivered and to collect samples for laboratory examination in specialized laboratories located in Europe; (c) examinations were conducted in Teheran of weapons transported from the war zone to the capital; and (d) clinical examinations were made of a number of patients who were allegedly exposed to an attack of toxic agent. These examinations were undertaken both in the war zone, and in hospitals in Teheran to which such patients had been evacuated.

3. The specialists spent six days in Iran. The chronology of their activities is given in appendix I.

III. MUNITIONS ASPECTS

4. Survey area 1 (Shatt-e-Ali) was reached at 1240 hours on 14 March 1984. The area is marshland surrounded by firm ground (capable of supporting heavy armored cars) and interspersed with patches of water, moorlands and cultivated areas. An artillery unit, which was not visited, was located in the neighbourhood of the target area surveyed, which was in the order of 10,000 sq m. A number of bombs of a similar type were reported to be scattered in the area. Of those, seven partially damaged aerial bombs, whose casings were empty, were examined on the site.

5. Members of the Pasdaran (Revolutionary Guards) reported that the attacks had been made over the previous several days (dates were not specified) and involved three Iraqi aircraft, each of a different type (described, respectively, as MIG, SUKHOI and MIRAGE). The aircraft were said to have carried perhaps eight bombs each and to have flown at an altitude of from 200 to 300 m. The bomb craters in the target area were about 2 m deep and about 5 m in diameter.

6. Survey area 2 (Hoor-ul-Huwaizeh) was reached at 1430 hours on the same day. It is a completely open, flat desert area without vegetation or cover. The area was, as far as it could be ascertained, occupied by units of the Pasdaran. The attack by Iraq on Hoor-ul-Huwaizeh was said to have taken place on 13 March 1984 at about 1100 hours, allegedly resulting in a number of casualties, many of whom were examined during the evening of 14 March 1984. In the target area there were a number of bombs which had the same features as those of the bombs inspected in Shatt-e-Ali. Two partially damaged aerial bombs and one unexploded bomb were examined by the specialists.

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7. The specialists were not shown any unexploded artillery or rocket ammunition, or fragments from such ammunition, in the two areas inspected.

8. Neither area surveyed appeared to be of a type that would normally be selected as a target for conventional attack. Bombs containing chemicals might be used in an attempt to completely clear the area, so that it could, after a safe period, be occupied by an attacking force. It is also possible that in the reported attack on Shatt-e-Ali, the artillery position might have been the objective and was not correctly targeted.

9. The bombs found in the inspected areas were examined in situ. Three bombs were transported to Teheran by the Iranian authorities in order that they might be more thoroughly examined by the specialists. All the bomb casings examined carried the marking "BR 250 WP". They were of greenish colour and marked with a yellow band, 10 cm wide, near the conical nose section. There were no other markings of any kind. Each of the bombs had two suspension lugs, which would seem to indicate that they were transported on the exterior of the aircraft from which they had been released. Examination of the unexploded and damaged bombs showed that they contained a liquid substance. Since all the bombs examined were of the same type, it was concluded that all of them, including those which had exploded, were designed to carry liquid.

10. The measurement and weight of the bombs were as follows:

Total length: 2.26 m

Length of payload cylinder (without stabilizer and fuse): 1.34 m

Diameter of payload cylinder: 30 cm

Total mass: 135 kg (approx.)

Empty mass: 86 kg (approx.)

Payload: 49 kg (approx.)

11. The interior of each bomb contained a burster tube (approximate length 1.34 m, approximate diameter 53 mm). On Saturday, 17 March 1984, at about 1800 hours at the Padegan Shaheed Beheshti, Pasdaran Avenue, Jaharan Dalat, Teheran, in the presence of the specialists and at some personal risk, Pasdar volunteers opened the burster tube so that the contents might be examined. After the top 60-mm section of the steel tube had been cut off, a yellow painted aluminium cap was prised off to reveal a friable, off-white compacted powder. A small sample was removed and ignited. Because of the intensity of the flame, it was concluded by the specialists that the sample was an explosive, which is normally used to enhance the dispersal of the contents of the bomb.

12. The casings of the bombs were made of thin steel, from 1 to 2 mm thick, which would be broken by the explosive charge into large, mostly longitudinal sections. It was therefore surmised, with a high degree of certainty, that such bombs were not intended to be used as a conventional high-explosive weapon. They would appear

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to have been designed so that, when exploded, the liquid content would be dispersed over a relatively large area in the form of spray and vapour, thus producing a great variation in the size of the drops and the concentration of the vapour, and in their subsequent effects.

13. Each bomb was fitted with a timing fuse, indicating that it could be set to explode at an optional altitude to achieve maximum effect with the liquid contents. The fuses carried the following markings:

"PARA TIEMPOS DE ARMADO	["FOR ARMING TIME
INFERIORES A 6 SEGUNDOS	LESS THAN 6 SECONDS,
QUITAR EL TORNILLO	REMOVE SCREW.
VISOR ROJO PELIGRO	RED DIAL READING MEANS DANGER
Esp. MU 09	Type MU 09
LOT 83.01	LOT 83.01]*

* (Translation is uncertain because the Spanish text is unclear.)

IV. CHEMICAL ASPECTS

14. On 14 March, the specialists examined as a matter of priority an unexploded bomb found in Hoor-ul-Huwaizeh. It had been partially covered with soil in order to provide protection from liquid that was leaking from around the damaged fuse. Samples of the liquid-laden soil were taken by the specialists. Pasdar volunteers removed the fuse so that an authentic sample of the liquid could be taken for examination. With some difficulty (and some danger) the fuse was removed at 1605 hours. Several samples of the liquid were taken by the Pasdaran under supervision of the specialists. The samples - three in all - were packed by the specialists for safe transportation by them back to Teheran. The total volume of sample taken was 40-50 ml.

15. On the morning of Thursday, 15 March 1984, in the Clinical Laboratory of the Labafi-Nejad Medical Centre in Teheran, the samples were examined, tested and repacked for safe transportation to competent laboratories in Europe for critical analytical examination. The samples consisted of a dark brown, oily liquid which, when tested in Teheran, using the Paper Chemical Agent Detector system (Code 6665-21-858-8494), gave a strong red colouration indicating the presence of mustard gas. No positive test for Lewisite or nerve agent was obtained. Three samples, of one millilitre each, were taken and placed in individual dry, screw-capped bottles. Each bottle was repacked in a separate 250-ml screw-capped plastic jar containing active powdered charcoal as an absorbent. The jars were wrapped in heavy plastic film for safe transportation. All operations involving the handling of the liquid agent were conducted in an efficient fume cupboard.

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16. Two samples of the liquid were carried by safe hand, one to the National Defence Research Institute (FOA-4), Umea, Sweden, and the second to the AC Laboratory, AC Central, Spiez, Switzerland. The third sample was subsequently deposited in the safe custody of the latter laboratory.

17. The samples were examined at the two laboratories, using sophisticated instrumental analytical techniques, including gas chromatography-mass spectrometry, proton and carbon 13 nuclear magnetic resonance, and comparison with an authentic sample.

18. The samples were shown to be bis-(2-chloroethyl)-sulfide of high quality. There were several minor impurities and a trace of sulphur. The compound is commonly known as mustard gas and has the code designator (H). No evidence was found in either sample of the presence of mycotoxin. The results from the Swedish National Defence Research Institute and those obtained by the AC Laboratory in Switzerland, which are similar, are given in appendices II and III. Spectra, chromatograms and other experimental details can be obtained from the laboratories on request.

19. On Sunday, 18 March 1984, at the urgent request of the Iranian authorities that new evidence be examined, the specialists agreed to visit Ahvaz again. At the Tafti Stadium Infirmary they were shown samples of liquid and soil which it was alleged were associated with an aerial bombing attack on Iranian forces which was said to have taken place in the Jofair area at about 1115 hours on Saturday, 17 March 1984. The specialists were told that at the time of the attack the temperature had been warm and a light wind had been blowing. A Pasdar who had witnessed the attack stated that the casing of one unexploded bomb had ruptured and samples had been collected from the leaking bomb by a fellow Pasdar. He also stated that the bomb had the same appearance as those used in the previous attacks, evidence of which had been shown to the specialists in the preceding days. The specialists requested that components and fragments of the weapons used in the reported attack be brought to Ahvaz for examination. The Iranian authorities stated that that was not feasible owing to the shortage of time before the specialists were scheduled to depart.

20. Using the facilities of the Ophthalmic Department of the Infirmary, the specialists took two samples of about 1 ml each of the liquid for detailed examination. The sample bottles were packed in dry soil, as no charcoal was available. They were transported back to Teheran by the specialists. The samples were then transported by safe hand to the laboratories already identified above.

21. The samples were shown to be ethyl N, N-dimethylphosphoramidocyanidate (constituting more than 75 per cent) and chlorobenzene (constituting approximately 12 per cent), with small quantities of volatile compounds as well as several other phosphorus-containing materials identified as triethyl phosphate (1-4 per cent) and diethyl N, N-dimethylphosphoramidate (3-10 per cent). This composition is consistent with the known nerve agent, Tabun, which has the code designator (GA). With this material, chlorobenzene is used as a stabilizer. The results from the National Defence Research Institute, Sweden, and the results obtained by the AC Laboratory, Switzerland, are similar; details are given in appendices IV, V and VI. Analytical details can be obtained from those laboratories on request.

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V. MEDICAL ASPECTS

22. The first set of medical examinations was carried out from 14 to 17 March 1984 in the Tafti Stadium Infirmary in Ahvaz (a field hospital); in the Golestan Hospital, which is the University Hospital of Ahvaz; in the Labafi-Nejad Hospital in Teheran; and in the Shadid-Motahari Hospital in Teheran (hospital for burn cases). Examinations were made of 37 patients and of 4 other persons who had not been hospitalized since they had only slight injuries. Examinations were made of the cadavers of 6 persons who had died in the above-mentioned hospitals and were deposited in the Coroner's Mortuary in Teheran, and of 6 other cadavers which had been returned from hospitals in Stockholm and Vienna. The autopsy of a cadaver in the University Hospital of Ahvaz was also witnessed on 18 March.

23. From the above examinations it was concluded that 32 cases presented a clinical pattern which, according to the patients, speaking through an interpreter, had developed after they had been exposed to the explosion of bombs dropped from aircraft. In some cases, the explosions had been detected by the flash produced, and in others by the presence of an odour which some described as acrid and others as resembling that of garlic.

24. According to the patients, the initial symptoms began from 25 minutes after exposure up to four hours later. After examining patients, with varying periods of time having elapsed since their exposure, it was concluded that in the majority of cases the clinical condition had commenced with conjunctivitis, which had increased in intensity, a sensation of a foreign body in the eye and photophobia. In many cases, the symptoms had persisted for at least 18 days, which was the maximum period between exposure and examination. Also, many patients had palpabral oedema, which impeded examination of the cornea. Many exhibited acute rhinorrhea.

25. Intense erythema had developed, in some cases slightly papulous, which had darkened and become wine-coloured or even melanin-coloured. Apparently the condition had developed a few hours after exposure, regardless of whether the skin was covered or not. The erythema covered varying areas of the body, in one case affecting 80 per cent of the skin surface. Although the condition can occur in any cutaneous area, the most frequently and acutely affected areas in the patients examined were found to be armpits, scrotum and penis, followed by the groin and the inner surface of the elbows and knees, possibly because of the greater sensitivity of the skin or the greater degree of sudation in those areas. Very dark lesions had appeared on the genitals.

26. Subsequently, blisters filled with a yellowish fluid, under pressure, had appeared, assuming a domed shape. They ranged from a few millimetres to several decimetres in size, in some cases reaching enormous proportions. They were usually round or elongated, but were, in some cases, irregular in shape. Normally, many appeared on a single patient; the only instance in which only one blister was observed was on a wrist of a technician responsible for defusing the bombs.

27. Many of the patients suffered from nasal obstructions, rhinorrhea and nasal scall. In quite a number of cases, tracheitis was found, as well as laryngitis accompanied by a hoarseness and haemorrhagic expectoration, with emission of mucosa. In some cases, there were clinical and radiological indications of bronchopneumonia and pneumonitis.

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28. The vast majority of patients were suffering from leucopenia, which, in one case, reached a level of 300 leucocytes per cu mm in the peripheral blood, the normal level being about 6,000. That rendered the patients highly susceptible to infections. Initially, the leucopenia was of the lymphopenic type. There was also evidence of thrombopeny, although less pronounced. In the cases examined, no anomalies of the red series were observed. The only pronounced biochemical anomaly was a high level of the lacticdehydrogenase enzyme.

29. The combined clinical and analytical results coincide fully with the descriptions of lesions caused by vesicant substances and, more specifically, with those caused by sulphur mustard. Only such vesicant agents are capable of producing a similar pattern.

30. The second set of examinations was carried out on 18 March 1984 of patients admitted to the Tafti Stadium Infirmary in Ahvaz the previous day. More than 40 were still in the Infirmary. Of those, 6 were examined in the time available. It was stated that they had been affected, together with about 400 others, in the area of Jofair as the result of an alleged chemical-weapon attack.

31. According to the information provided, the patients had been admitted suffering from respiratory problems, acute agitation, nausea and vomiting, urinal and faecal incontinence and bradycardia. Only one of those observed was experiencing some respiratory difficulty. All were suffering from lachrymation, rhinorrhea, transpiration, slight tremours of the limbs, tongue and mouth, acute miosis and lack of accommodation of the eye. In two patients, acetylcholine esterase levels were reported to be well below normal. A number of patients were suffering from acute conjunctivitis.

32. It was reported to the specialists that the patients, members of the Pasdaran, had been equipped with self-injectable atropine which they had used immediately after the attack. This measure had probably diminished the intensity of the symptoms.

33. The clinical pattern, the analytical results and the adjuvantibus test with atropine demonstrated that those patients had been exposed to the action of acetylcholine esterase-inhibiting substances, probably chemicals of the organo-phosphorus type. The conjunctivitis observed is not attributable to these but to other, possibly associated, chemicals.

34. A case-by-case summary of the conditions observed in the patients examined is contained in appendix VII.

VI. CONCLUSIONS

35. The following are our unanimous conclusions.

(a) Chemical weapons in the form of aerial bombs have been used in the areas inspected in Iran by the specialists as indicated above.

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(b) The types of chemical agents used were bis-(2-chlorethyl)-sulfide, also known as mustard gas, and ethyl N, N-dimethylphosphoroamidocyanidate, a nerve agent known as Tabun.

36. The extent to which these chemical agents have been used could not be determined within the time and resources available to us.

Appendix I

Chronology of activities

Monday, 12 March 1984:

- Departure from Geneva

Tuesday, 13 March 1984:

- Arrival in Teheran
- Meeting in Ministry of Foreign Affairs
- Visit to Coroner's Mortuary of Teheran

Wednesday, 14 March 1984:

- Visit to war zone
 - . survey of two sites in war zone, examination of aerial bombs and collection of samples
 - . examination of and interviews with patients in field hospital and in Ahvaz

Thursday, 15 March 1984:

- Visit to hospitals in Teheran
 - . examination of patients
 - . preliminary laboratory tests of samples collected in war zone

Friday, 16 March 1984:

- Examination in Teheran of aerial bombs transported from war zone
- Visit to Coroner's Mortuary of Teheran

Saturday, 17 March 1984:

- Further examination of aerial bombs

Sunday, 18 March 1984:

- Visit to Ahvaz
 - . examination of patients in Tafti Stadium Infirmary
 - . receipt of samples
- Visit to hospital, Teheran
 - . interviews with patients

Monday, 19 March 1984:

- Departure from Teheran
- Arrival in Geneva

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Tuesday, 20 March 1984:

- Preparation of report

Wednesday, 21 March 1984:

- Preparation of report

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Appendix II

NATIONAL DEFENCE RESEARCH INSTITUTE
Department 4
S-901 82 Umea, Sweden

1984-03-18

REPORT ON ANALYSIS OF ALLEGED CW SAMPLE FROM IRAN

1. The sample was received in Umea 1984-03-18 at 10 a.m. Inspection of the package did not indicate any signs of tampering.
2. The package contained a plastic 250 ml vessel filled with activated charcoal. Embedded in the charcoal was a 20 ml screw-capped glass vessel filled with approximately 1 ml of a brownish-black liquid.

3. By analysis, the presence of the following compounds was demonstrated:

bis-(2-chloroethyl)-sulfide (1) constituting more than 98 per cent of the sample

bis-(2-chloroethyl)-disulfide (2) in traces

1,2 bis-(2-chloroethylthio)-ethane (sesquimustard gas) (3) in traces

bis-(2-chloroethylthioethyl)-ether (4) in traces

sulfur (5) in traces

Compound (1) was detected by GC/MS (Hewlett-Packard 5992 B), H-NMR and C13-NMR. Compounds (2)-(4) were detected by GC/MS. Compound (5) was detected by polarography. Some of the spectra are enclosed.

No other organic compounds, except for the above-mentioned, are present in concentrations higher than 0.5 per cent.

Traces of iron were detected by electron-induced X-ray emission analysis.

National Defence Research Institute
Division of Chemistry

Johan Santesson

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Appendix III

[Original: German]

Spiez, 19 March 1984

Group for Arms Services
AC Laboratory, Spiez

Analysis of a sample of a chemical-warfare material

- The sample to be analysed consists of about 0.5 ml of a dark-brown liquid.
- On the basis of the mass spectrum, the ^1H and ^{13}C nuclear-resonance spectra and thin layer-chromatographic and gas-chromatographic analysis, the main portion consists of sulphur yperite.
- Gas chromatography indicates an yperite content of just under 90 per cent.
- Oxygen yperite (T, O mustard gas) is suspected of being present as one of the minor components (about 5 per cent).
- The sample does not contain lewisite, CS or CN (not detectable by NMR spectroscopy or thin-layer chromatography).
- The pungent smell may possibly be due to one of the chlorinating agents (thionyl chloride, phosphorus trichloride) used in production.
- Mycotoxins: none. (Minimum value detectable by thin layer chromatography is 5 ppm).

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Appendix IV

NATIONAL DEFENCE RESEARCH INSTITUTE
Department 4
S-901 82 Umea, Sweden

1984-03-20

REPORT ON ANALYSIS OF ALLEGED CW SAMPLE FROM IRAN

1. This (second) sample was received in Umea 1984-03-19 at 10 p.m.
2. The package contained a screw-capped glass jar filled with dry sand. Embedded in the sand was a screw-capped glass vessel, partly wrapped in adhesive tape, containing approximately 0.5 ml of a dark liquid.
3. By analysis, the presence of the following compounds was demonstrated:

ethyl N,N-dimethylphosphoroamidocyanidate (tabun) (1), constituting more than 75 per cent of the sample

chlorobenzine (2), constituting approximately 12 per cent of the sample.

Compound (1) was detected by GC/MS (Hewlett-Packard 5992 B), H-NMR, C13-NMR and P31-NMR. Compound (2) was detected by GC/MS, H-NMR and C13-NMR and quantified by GC. Some of the spectra are enclosed.

Small quantities of highly volatile compounds might be present. The presence of two yet unidentified phosphorus-containing compounds in small amounts is evident from the P31-NMR spectrum.

The sample contains a solid residue which has not yet been analysed.

National Defence Research Institute
Division of Chemistry

Johan Santesson

Appendix V

NATIONAL DEFENCE RESEARCH INSTITUTE
Department 4
S-901 82 Umea, Sweden

1984-03-21

ADDITIONAL REPORT ON ANALYSIS OF ALLEGED CW SAMPLE FROM IRAN

The sample described in our analysis report dated 1984-03-20 has been subjected to further analyses. In addition to ethyl N, N-dimethylphosphoroamidocyanide and chlorobenzene, the following compounds have been identified:

triethyl phosphate (3), constituting approximately 1-4 per cent of the sample

diethyl N,N-dimethylphosphoramidate (4), constituting approximately 3-10 per cent of the sample.

Compounds (3) and (4) were identified by GC/MS (Hewlett-Packard) 5992 B) and P31-NMR.

National Defence Research Institute
Division of Chemistry

Johan Santesson

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Appendix VI

[Original: German]

Spiez, 22 March 1984

Group for Arms Services
AC Laboratory, Spiez

Chemical-warfare material, sample II

- The sample to be analysed consists of about 0.5 ml of a brown liquid.
- On the basis of the mass spectrum, the ^1H , ^{13}C and ^{31}P nuclear resonance spectra, and gas chromatographic analysis, the sample contains about 50 per cent Tabun and about 20 per cent chlorobenzene. The remainder seems to consist of hydrolysis products and other impurities.
- No other chemical-warfare materials are detectable.

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Appendix VII

[Original: Spanish]

REPORT ON PATIENTS EXAMINED BY DR. MANUEL DOMINGUEZ,
WITH THE RELEVANT CLINICAL DATA

Patients examined between 14 and 17 March 1984

1. Hamid Reza Rezayee, age 30.

Exposed to chemical-warfare agents the preceding day at Zeid Station.

Admitted to the Tafti Infirmary, Ahvaz.

Exhibits two large irregularly shaped blisters on the outer surface of the left arm. Others on the penis and smaller ones at the outer corner of the right eye. Intense palpebral oedema.

2. Mostafa Hezardastan, age 40.

Exposed to chemical-warfare agents the preceding day at Zeid Station.

Admitted to the Tafti Infirmary, Ahvaz.

Large blisters on the left wrist, very large oval blisters, about 10 cm long, on the left arm. Palpebral oedema. Enormous oedema on the penis. Dark erythema in the armpits.

3. Mohsen Sharif, age 28.

Exposed to chemical-warfare agents the preceding day at Zeid Station.

Admitted to the Tafti Infirmary, Ahvaz.

Photophobia, conjunctivitis, palpebral oedema; large blisters on the inner surface of the right thigh, left arm and scrotum.

4. Mohamad Abbas Asi, age 24.

Exposed to chemical-warfare agents five days ago at Majnoon.

Admitted to the Tafti Infirmary, Ahvaz.

The skin of the entire back separated, although not detached from the subcutaneous cellular tissue; that is to say, this is a huge blister whose contents have been lost.

5. Ragabi Samad, age 22.

Exposed to chemical-warfare agents five days ago at Majnoon.

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Admitted to the Tafti Infirmary, Ahvaz.

Exhibits respiratory distress, intense tracheal irritation and congestion. Coal-black necrosis of the skin of the scrotum and penis. Facial sphacelus. Black erythema in the left armpit. Intense erythema starting from a transversal line just below the navel and including the posterior surface of the body and the upper thighs. Genitals are black. No leucopenia but does exhibit lymphopenia. Lymphocytes 300 per mm³.

6. Hojat Dastanjani, age 22.

Admitted to the Tafti Infirmary, Ahvaz.

Exposed five ago at Majnoon. Estimated that he was 5-6 metres from the explosion of the bomb. Noted the explosion and the emission of dark gas with a strong odour. After 20 minutes he developed nausea and vomiting. Exhibits intense conjunctivitis with photophobia. Respiratory distress from tracheal injury and acute pulmonary oedema with dyspnoea.

Blisters on both arms. Diarrhoea with rectal bleeding. On the day of the observation the patient had 2,500 leucocytes with 6 lymphocytes.

7. Aliyar Eslampanau.

Exposed five days ago at Majnoon.

Admitted to the Tafti Infirmary, Ahvaz.

Intense melanoderma on the armpits, penis, scrotum and somewhat less on the inner surface of the thighs. Blisters with detachment of the skin on the left arm. Crusted lesions on the nose. Bronchopneumonia confirmed by X-ray. On the day of the observation he had 6,400 leucocytes but no lymphocytes in the leucocyte formula.

8. Sourab Noroozy, age 24.

Exposed five days ago at Majnoon.

Admitted to the Golestan Hospital, Ahvaz.

Separation and detachment of parts of the skin surface over a very wide area, specifically on the forehead, neck, chest, arms and abdomen, with blisters present in other places. Pulmonary oedema with substantial dyspnoea. General condition very grave. Crepitation due to gas in the chest wall, probably resulting from gas gangrene. On the day of the examination (14 March 1984) the leucocyte count was 300. The patient died the same night.

9. Hassan Ali.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejhad Hospital, Teheran.

Complains only of itching of the chest and hands. No blisters or erythema.

10. Ali Deldar, age 30.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejhad Hospital, Teheran.

Photophobia, lachrymation, conjunctivitis. Dark erythematous lesions on the neck, chest, armpits, scrotum, abdomen and inner surface of the knees. No blisters.

11. Hassan Sangari, age 43.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejhad Hospital, Teheran.

Exhibits dark erythematous lesions, almost melanic, on the back, armpit, scrotum and inner surface of the knees. Leucocytes 4,400, with 30 per cent lymphocytes.

12. Hassan Jaridan, age 27.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejhad Hospital, Teheran.

Dark erythema on the armpits and arms; remnants of blisters on the trunk, leaving a wine-coloured base. On the day of the observation, he had a leucocyte count of 4,100, with 35 per cent lymphocytes.

13. Eshtagh Deldar, age 16.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejhad Hospital, Teheran.

Severe conjunctivitis. Melanic erythema and blisters on the anterior surface of the scrotum. Papules on the hands.

14. Hassan Pordel, age 26.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejjhad Hospital, Teheran 18 days ago.

Dark wine-coloured erythema in the armpits, on the inner surface of the elbow, on the neck and on the left thigh.

15. Hossain Baghshizadeh, age 18.

Exposed 18 days ago.

Admitted to Labafi Nejjhad Hospital, Teheran.

Intense melanodermic lesions on the scrotum and penis.

16. Homayoun Amirkhani, age 22.

Exposed 8 days ago.

Admitted to Labafi Nejjhad Hospital, Teheran.

Wine-coloured erythema on the face, armpits, chest and abdomen extending to a transversal line across the navel. The groin and scrotum were also affected. Sore throat. Enanthema with blisters on the roof of the mouth. The leucocyte count on the day of examination was 4,100.

17. Hosseynaly Alibabai, age 33.

Exposed six days ago.

Admitted to Labafi Nejjhad Hospital, Teheran.

Extensive purple erythema on the trunk, armpits and face. Leucocyte count of 12,800 on the day of the observation. (Amoebae present in faeces).

18. Eskandar Heydari, age 18.

Exposed to chemical-warfare agents 18 days ago.

Admitted to Labafi Nejjhad Hospital, Teheran.

Wine-coloured erythema on the inner surface of the elbow.
Leucocytes 5,200.

19. Abbas Nadimi, age 58.

Exposed to chemical-warfare agents 18 days ago.

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Admitted to Labafi Nejhah Hospital, Teheran.

Intense conjunctivitis. Livid erythematous lesions on the neck, posterior part of armpit, inner surface of elbow, scrotum and arms.

20. Abdelsarch Alhamidavy, age 40.

Exposed 17 days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Cutaneous detachment of the skin on the hands and separation of the epidermis over 40 per cent of the body surface. Tracheal obstruction. Crusted lesions on the lower lip. Necrosis on the buttocks and scrotum. Leucocytes 2,000.

21. Hassan Tayi, age 16.

Exposed to chemical-warfare agents 15 days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Intense erythema on the right arm, with denudation of the skin, and wine-coloured erythema on the left shoulder and arm, scrotum, penis and lower abdomen. Blisters on the upper part of the right arm and shoulder. Leucocytes 16,000.

22. Ghdamera Rezerzaden, age 16.

Exposed to chemical-warfare agents five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Very intense conjunctivitis. Ulcers on the eyelids. Wine-coloured erythema on the interior surface of the thighs, scrotum and penis. Great pain if touched or moved. Erythema on the chest formed by elementary lesions a few millimetres in diameter and slightly raised, mostly confluent. At the time of examination the patient had 5,700 leucocytes.

23. Khodanorad Hemati, age 35.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Dark erythema extending upward to the pubic-hair line and covering the upper thigh, scrotum and penis. The chest exhibits lesions with separation of the epidermis. Detachment of the skin on the face in several areas. Intense conjunctivitis. Leucocytes 4,500, platelets 50,000.

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24. Ahmad Esmalli, age 20.

Exposed to chemical-warfare agents five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Very intense palpebral oedema. Erythema with oedema and blistering on the face, scrotum, penis and buttocks. Leucocytes 5,000, platelets 120,000.

25. Mohamed Hassan-Koukabian, age 18.

Exposed to chemical-warfare agents five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

General condition very grave. Intense dyspnoea. Multiple blisters and cutaneous detachment over the entire surface of the skin. The penis is completely black. Bilateral bronchopneumonia and pneumonitis on left side visible on X-ray. Leucocytes 250, platelets 50,000.

26. Abdolkorim Reaisi, age 30.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Intense conjunctivitis. Palpebral oedema. The face, neck and arms exhibit erythema and blisters. Penis and scrotum are also affected. Voice hoarse, with laryngotracheal injury. Bilateral bronchitis, rectal bleeding. On the day of the examination, the patient had 600 leucocytes.

27. Keranatolan Soleinavi, age 17.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Wine-coloured erythema on face, trunk and arms. Blisters on arms and hands. Leucocyte count 5,350. Platelets 100,000.

28. Ghorboneili Karinion, age 20.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Detached epidermis on face, arms, chest, thighs and genitals, with only a narrow strip (about 2 cm wide) between navel and pubis remaining free. Leucocyte count 6,400. Platelets 60,000.

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29. Kazem Maydabadi, age 19.

Denudation of epidermis on face. Skin completely detached from testicles. Blisters at the side of the nose and on the back of the neck. Very dark, almost black, erythematous lesion on armpits. Intestinal bleeding. Leucocytes 7,400. Platelets 130,000.

30. Ali Akbou Soltoni, age 28.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Intense dyspnoea. Bloody expectoration with pieces of mucosa. Erythema and blisters on the hand. Denudation of the epidermis on the face, trunk and arms. Leucocyte count 2,100.

31. Baghen Nodavi, age 21.

Exposed five days ago.

Admitted to Shadid-Motahari Hospital, Teheran.

Epidermis detachment and scabs on the face. Wine-coloured erythema over the entire body. On the posterior surface of the left thigh the patient has seven blisters, the largest about 4 cm in diameter and 3 cm high at the apex.

Leucocyte count on the day of the study was 6,600, but two days earlier it had been 2,000.

Patients examined on 18 March 1964 (Ahvaz)

32. Mehran Kafashan Toosi, age 22.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz.

Conjunctivitis, lachrymation, rhinorrhoea, salivation. Slight tremor in arms and tongue. Pupillary rigidity. Mydriasis (atropine had been administered). Slight respiratory distress. The acetylcholine esterase concentration in the blood was 470 (normal 1,900 to 3,800).

33. Moharam Forghany, age 38.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz.

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Nausea, vomiting, colic pains; sweating; miosis. The pupil measured about 1.2 mm. Bradycardia, 59 beats, despite the intensive atropine therapy.

34. Hosein Saidi, age 23.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz.

Tremor; lachrymation; miosis. Bradycardia, 55 beats per minute.

35. Abas Saidi.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz.

Tremor in the lips and extremities. Intense sweating, with perspiration running down the face and body. Intense lachrymation. Vomiting, intestinal colic pains, intense miosis in spite of the atropine therapy.

36. Asghar Resayut.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz. Miosis, 1.5 mm. Paralysis in accommodation. The acetylcholine esterase was 703 (he had already been given 30 mg of atropine).

37. Asadolah Ashrafi.

Exposed the preceding day.

Admitted to the Tafti Infirmary, Ahvaz.

Nausea. Conjunctivitis, miosis, paralysis in accommodation (he had been treated intensively with atropine).

Patients not hospitalized but seen and studied in the
Hoor-ul-Howaizeh zone, on 14 March 1984

1. Explosives technician.

On the outer rim and anterior surface of the forearm the patient had a reddish-brown erythema about 12 cm long and 8 cm wide, in the centre of which was a denuded area about 2 cm in diameter produced by a drop of liquid contained in a bomb which had not exploded upon defusing.

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2. The technician's assistant.

Had two blisters about 2 cm long, one of them 0.5 cm wide and the other 0.5 or 0.25 cm wide, on the left thumb, with smaller blisters on the second, third and fifth fingers of the left hand, and another blister about 1.5 cm in diameter on the left foot, in front of the astragalus.

3. A soldier

Exhibited papulous lesions about 2 cm in diameter on the face, neck and hands, dark around the edges; these had appeared two days after the explosion of a bomb about 150 metres from the soldier, who had smelled a strong odour of garlic.

4. Another soldier

Exhibited only an area of intense melanoderma on the back of the neck.
