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Note by the Secretary-General

The Secretary-General has the honour to transmit to the Security Council the fifteenth quarterly report on the activities of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) (see annex). It is submitted by the Acting Executive Chairman of UNMOVIC in accordance with paragraph 12 of Security Council resolution 1284 (1999) of 17 December 1999.

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Annex

Fifteenth quarterly report on the activities of the United Nations Monitoring, Verification and Inspection Commission in accordance with paragraph 12 of Security Council resolution 1284 (1999)

I. Introduction

1. The present report, which is the fifteenth submitted in accordance with paragraph 12 of Security Council resolution 1284 (1999), covers the activities of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) during the period from 1 September to 30 November 2003.

II. Developments

2. During the period under review, the Acting Executive Chairman has continued the practice of briefing the respective Presidents of the Security Council, representatives of Member States and officials of the Secretariat on the activities of UNMOVIC. He visited the International Atomic Energy Agency (IAEA) and the United Nations Office at Vienna in September, on the occasion of the IAEA General Conference. He also met officials in Stockholm, including the head of the Division of Nuclear, Biological and Chemical Weapons Defence of the Swedish Defence Research Agency and the former Executive Chairman of UNMOVIC.

3. During the period under review, no information was available to UNMOVIC on the results of the investigations of the United States-led Iraq Survey Group, other than the statement released to the public on the interim progress report made by the Group to the United States Senate Select Committee on Intelligence and other committees within the United States Congress. The actual report was not provided to UNMOVIC or to IAEA. The general impression from the statement released is that most of the findings outlined in the statement relate to complex subjects familiar to UNMOVIC, both from declarations and semi-annual reports provided by Iraq and from correspondence, meetings and the inspection reports of United Nations teams. In the absence of access to the full progress report and the findings, documents, interviews and materials supporting and underlying the report, the Commission is not in a position to properly assess the information provided in the statement.

III. Other activities

4. The Commission’s headquarters staff continues to work on tasks undertaken since inspectors were withdrawn from Iraq in March 2003, for example:

- The development of monitoring requirements to fit the new environment in Iraq following the lifting of sanctions, including (a) a review of the plan for ongoing monitoring and verification approved by the Security Council in its resolution 715 (1991), for the missile, chemical and biological disciplines; (b) the preparation of flow charts for chemical and biological processes and missile production identifying critical points for control and verification; and

(c) the identification of practical arrangements required at the national level to support an effective monitoring and verification system.

- The charting of what is known and understood by UNMOVIC of the nature and extent of Iraq's proscribed weapons programmes continues. The work is focused on specific issues, such as the origins of the programmes, their organizational aspects and financial allocations, indicators for particular stages of development, qualification and background of key personnel, indigenous capabilities and access to and availability of outside assistance.

5. Another activity has been the additional analysis of samples of biological weapons material (*Bacillus anthracis*) declared by Iraq to have been unilaterally destroyed at two locations: Al-Aziziyah firing range and Al-Hakam dumping site.

- In the Commission's thirteenth quarterly report (see S/2003/580), it was noted that *Bacillus anthracis* DNA had been identified in liquid samples taken from two R-400 biological bombs excavated earlier in 2003 at Al-Aziziyah. Molecular genotyping of that material has now been carried out by a laboratory within the UNMOVIC network of reference laboratories. The analysis confirms that the genotype of the *B. anthracis* strain in the R-400 samples was identical to the genotype of the *B. anthracis* strain which Iraq declared it had selected for weaponization and placed in R-400 bombs.

- In 1996, the United Nations Special Commission investigated and took samples from an area at Al-Hakam which had been declared to be a dumping site for material from the biological weapons programme, including bulk agent. Analysis of those samples indicated that certain areas of the site did contain elevated levels of *B. anthracis* spores. Recent genotypic analysis initiated by UNMOVIC has shown that those isolates from the site contain the strain of *B. anthracis* declared by Iraq as used for its agent production. Furthermore, the *B. anthracis* strain in the R-400 samples was indistinguishable from the *B. anthracis* strain found at the dumping site.

6. Appendix I to the thirteenth quarterly report provided information on the destruction of ballistic missile and chemical weapons in Iraq under international supervision during the period from 1991 to 1998, pursuant to Security Council resolution 687 (1991). The appendix contained limited information regarding biological weapons and their destruction. Recently, attention has focused on Iraq's past biological weapons programme and the possibility that the programme, or remnants of it, may still exist. In order to facilitate an understanding of what UNMOVIC knows of this complex subject, appendix I to the present report contains a detailed account of the destruction, removal or rendering harmless of relevant items and materials in the biological weapons area.

7. One of the technical evaluations completed during the reporting period concerned the Al-Samoud 2 missile programme. The evaluation outlines the knowledge gained by UNMOVIC, including the history and technical specifications of the missile, the testing programme, the destruction of the missile system under UNMOVIC supervision and a full description of the key sites involved in the programme. In addition, an assessment has been made of what Iraq could have developed in the future with such knowledge and technology. A summary of the assessment is presented in appendix II.

IV. Database, archive and information technology

8. The UNMOVIC database continues to be updated. In the last three months search capabilities were expanded and the electronic archiving of documents from the period of the Special Commission continued.

9. UNMOVIC has developed an integrated system to manage site data collected during inspections and received from other sources. The site database is coupled with the computerized archives. Every data element in the site database can be referenced by a document in the archives. All data entered are also stored in a "history system", allowing for the retrieval of all past data. The system can generate comprehensive site reports.

10. The site database contains data on both the capabilities and the organization of the site, as well as the underlying infrastructure of the site. The infrastructure consists of data on buildings, locations within buildings, equipment, materials etc. UNMOVIC uses special software to analyse this large data collection and to prepare graphical representations of the relationships within the data elements. The site database is also tied to the UNMOVIC geographic information system, thus permitting all data collected about sites to be represented on a map. The UNMOVIC inspection report system uses data from the site database.

11. All the information available in the UNMOVIC database (975 gigabytes) is searchable with a sophisticated search engine. The engine allows for searching using keywords and other techniques.

V. Non-inspection sources of information

12. The Office for Outside Information continues to maintain contacts with representatives of Member States which had provided information to UNMOVIC pertaining to Iraq's proscribed weapons programmes. Visits have been made to several capitals to discuss aspects of the information previously supplied and to obtain any new information that might be available. The Office continues to search for and analyse material from the media that may be relevant to the work of the Commission.

13. Photographic interpretation of post-war commercial satellite imagery of sites in Iraq relevant for inspection resumed with the acquisition of a set of images of Baghdad, Mosul and other areas where there have been concentrations of inspection sites. The Commission's experts are able to compare the new imagery with that obtained prior to the war. The identification of damage at the sites during the hostilities and post-war reconstruction and other changes make it possible to update site line diagrams needed to support the future planning of any monitoring activities.

VI. Field offices in Baghdad, Larnaca and Bahrain

Baghdad

14. After the attack on 19 August against the United Nations headquarters at the Canal Hotel in Baghdad, UNMOVIC dispatched three staff members from the UNMOVIC/IAEA Cyprus field office in Larnaca to Baghdad. The team met with the families of the two UNMOVIC local staff members who lost their lives in the attack,

as well as the injured personnel, and processed the necessary paperwork for insurance and other benefits. They also assessed the condition of the equipment on the premises and arranged for the transfer of almost all inspection-specific equipment to the Cyprus field office. The local staff managed to clean the offices, recover most of the equipment, and replace and secure office doors. However, non-expendable UNMOVIC property still remains at the Canal Hotel. It should be noted that, during the second terrorist attack near the Canal Hotel on 22 September, two UNMOVIC local staff were injured.

Larnaca

15. Most of the inspection and monitoring equipment is currently stored and maintained at the Cyprus field office. Owing to the proximity of Cyprus to Iraq, the Cyprus field office has taken on the additional responsibility of the management of the remaining UNMOVIC local staff in Baghdad. The field office has also provided support to United Nations staff evacuated from Baghdad in October. At the end of October, the Cyprus field office agreement with the Government of Cyprus was extended for another year through an exchange of letters between the Secretary-General and the Director General of IAEA and the Minister for Foreign Affairs of Cyprus.

Bahrain

16. On 13 October, the Government of Bahrain and UNMOVIC agreed to arrangements for closing down the UNMOVIC/IAEA field office in Bahrain and the transfer of the premises to the custody of the Government before the end of December 2003. The Commission is grateful to the Government of Bahrain for the support it has provided.

VII. Staffing

17. By the end of the year, the core staff of UNMOVIC in the Professional grades at Headquarters will total 51 weapons experts and other staff (of 24 nationalities). Of these, eight are women. This represents a further 10 per cent reduction since the last quarterly report (S/2003/844) was submitted to the Council. At the same time, UNMOVIC is mindful of the need to maintain a sufficient number of experts as a core staff at its headquarters to undertake ongoing activities and to maintain its preparedness to resume operations in Iraq and implement decisions of the Security Council.

18. None of the experts on the roster has asked to be removed from the list. The number of trained experts available to serve in Iraq therefore remains at the previously reported level of about 350 individuals from 55 Member States. Owing to the present conditions in the country, it may however be expected that some of the experts will hesitate to accept an assignment in the field without a change in those conditions. A survey concerning their anticipated availability will be conducted during the next reporting period.

19. As indicated above, the Commission continues to retain the services of a few local staff in Cyprus and Iraq who are needed for caretaker duties.

VIII. Participation in outside meetings and workshops

20. UNMOVIC headquarters staff participated in workshops conducted by the American Chemical Society and attended the Society's exhibition of chemical processing equipment, both in New York. They also attended the forty-seventh regular session of the IAEA General Conference, the eighth session of the Conference of the States Parties to the Chemical Weapons Convention and the annual meeting of the States Parties to the Biological Weapons Convention. Technical meetings and discussions relating to sample analysis and support were also carried out with the UNMOVIC network of laboratories in three Member States, namely, France, the Netherlands and Sweden.

21. UNMOVIC biological experts met with representatives of leading companies in the area of field screening and analysis of biological threat agents to discuss recent developments in their respective technology platforms and to exchange experiences with the various techniques used during UNMOVIC inspections earlier in 2003 in Iraq. The companies offered to provide UNMOVIC with their newly developed techniques for field testing and applications.

IX. Training

22. During the reporting period, UNMOVIC started a round of enhanced training of its headquarters staff in techniques and equipment used in field operations. Over 30 training sessions were organized, covering subjects such as surveillance cameras, munitions examination equipment, chemical detectors, sampling tools, communications, navigation and recording equipment. As indicated in previous quarterly reports, advanced training of experts from the roster may be resumed in the near future as needed.

23. A review and assessment of UNMOVIC training activities was conducted to identify lessons learned to aid future inspector training. The results are summarized in appendix III.

X. College of Commissioners

24. There have been some changes in the composition of the College of Commissioners. On 6 November 2003, Li Junhua (China) resigned as a Commissioner and, the Secretary-General has since appointed Chen Weixiong (China) and Susan Burk (United States of America) to serve on the College of Commissioners. On 13 November, another Commissioner, Kostyantyn Gryshchenko (Ukraine) tendered his resignation to the Secretary-General following his appointment as Minister for Foreign Affairs of Ukraine.

25. The College of Commissioners convened in New York for its fourteenth session on 21 November. As on previous occasions, observers from the International Atomic Energy Agency and the Organization for the Prohibition of Chemical Weapons attended.

26. In his introductory statement to the College, the Acting Executive Chairman outlined the work done by staff within UNMOVIC since the previous meeting of the College. In addition, the College heard three oral presentations by technical experts

designed to inform the Commissioners of what was known to UNMOVIC with respect to a number of issues raised in the recent, publicly released statement on the briefing to United States congressional committees on the interim progress of the Iraq Survey Group.

27. The College noted the statement of the Acting Executive Chairman as well as the presentations and welcomed the considerable ongoing work in UNMOVIC. The College expressed its appreciation to the staff for maintaining readiness to resume operations, including the current review of the ongoing monitoring and verification plan. In so doing, the College recognized the considerable verification experience and expertise of UNMOVIC, as well as its multidisciplinary approach, and hoped that these would be given due recognition in any future discussions in the Security Council in the context of revisiting the UNMOVIC mandate of verification and monitoring activities in Iraq. The College reiterated its view that UNMOVIC should prepare a compendium of its experience and knowledge derived from its multidisciplinary inspections in Iraq, and welcomed the fact that that work had already commenced.

28. The date of the next meeting of the College was provisionally set as 24 February 2004.

29. In accordance with paragraph 5 of resolution 1284 (1999), the Commissioners were consulted on the content of the present report.

Appendix I

The destruction, removal or rendering harmless of proscribed items and materials in connection with Iraq's biological weapons programme since 1991

1. This paper provides an historical review of the destruction, removal or rendering harmless of items and materials in connection with Iraq's proscribed biological programme.

2. While much was destroyed either unilaterally by Iraq or under the supervision of the Special Commission, there still remained many outstanding questions and issues related to Iraq's biological programme at the time of the commencement of inspections by UNMOVIC in November 2002. The lack of documentation or other evidence to support Iraq's claims of unilateral destruction of biological weapons or agent, as well as concern about the possible continuation or resumption of the programme during the period 1998-2002 when no inspections were conducted, resulted in a lack of certainty as to the completeness and accuracy of Iraq's declarations relating to its biological weapons programme.

Iraq's initial declarations regarding biological weapons

3. In April and May 1991, Iraq did not include any biological facilities, materials or activities in its declarations pursuant to Security Council resolution 687 (1991).

4. In August 1991, Iraq declared to the Special Commission that one facility, under the control of the Technical Research Centre at Salman Pak, had actually conducted research activities on biological warfare agents. Iraq acknowledged that those military biological activities were aimed at familiarization with biological warfare agents and that their results could be used for both offensive and defensive purposes. However, Iraq maintained that the work did not go beyond laboratory research and that no bulk production of biological warfare agents or their weaponization had ever occurred.

5. In August 1991, the first biological inspection team of the Special Commission inspected Salman Pak. It found that laboratories in the building of the Forensic Department of the Technical Research Centre where such biological warfare activities had been conducted had been destroyed or heavily damaged by coalition aerial bombardment. At the facility only an underground cold storage bunker and a structure used as an animal house remained intact.

6. Iraq also handed over to the first biological inspection team the remaining bacterial isolates it had obtained from international culture collections. They comprised some 70 unused original vials with different microbial materials, including *Bacillus anthracis*, *Clostridium botulinum*, *Clostridium perfringens* and *Brucella*. All the materials were removed from Iraq by the first biological inspection team of the Special Commission.

7. During 1991 and 1992, Iraq further declared and the Special Commission subsequently inspected several other biological facilities that, according to Iraq, had never been involved in biological warfare activities. These included Al-Hakam single cell protein production facility at Latifiyah, Al-Kindi Veterinary Vaccine Production Company at Abu Gharaib, the foot and mouth disease vaccine plant at

Al-Dawrah, the Amiriyah Serum and Vaccine Institute and the Agricultural Research and Water Resources Centre at Al-Fudhaliyah. The Special Commission noted the dual-use capabilities present at some of those facilities, but found no conclusive evidence of their affiliation to past biological warfare activities at that time.

8. In addition, in the same period, the Special Commission inspected a variety of sites not declared by Iraq and other locations referred to it by outside sources as having been allegedly involved in Iraq's past biological weapons programme. They included suspected facilities with possible underground structures. No such facilities matching the descriptions given were found in Iraq, however.

9. By 1995, the Special Commission, in the course of its continuing verification activities, collected much evidence suggesting that Iraq's biological weapons programme had not only been limited to research activities but had also included the production of bulk biological warfare agents and, possibly, their weaponization. The evidence included information received from former suppliers on Iraq's procurement of specific types of equipment and large quantities of bacterial growth media required for bulk production of biological warfare agents. In May and June 1995, Iraq was asked to clarify the evidence and to make final disclosure of the full extent of its biological weapons programme.

Further disclosure of the biological weapons programme

10. In July 1995, under pressure from the Special Commission, Iraq finally admitted the production of bulk biological warfare agents. Iraq stated that the biological weapons programme had been obliterated shortly after the 1991 Gulf war. Iraq acknowledged that it had decided not to declare the full extent of its biological weapons programme, to remove any evidence of its former existence but to retain all remaining associated facilities, equipment and materials. According to Iraq, a clean-up of the sites involved in the biological weapons programme began in June 1991 and continued until August 1991, prior to the arrival in Iraq of the first biological inspection team of the Special Commission.

11. Information on the weaponization of biological warfare agents was provided by Iraq following the defection of Lieutenant General Hussein Kamal from Iraq in August 1995. Iraq provided to the Special Commission documents including those related to its biological warfare activities, on research, production, field trials and weaponization.

12. With respect to weaponization, Iraq declared that warheads for the Al-Hussein missiles and R-400 aerial bombs had been filled with liquid biological warfare agents. It also provided information on other types of aerial and artillery munitions used in field trials with biological warfare agents or simulants. At that time Iraq declared the involvement of other major facilities in its biological weapons programme. The list of other facilities given below excludes sites used for field testing, storage or destruction:

- The Ibn Sina Centre of the Al-Hazen ibn al Haitham Institute was the first organization in Iraq to be involved in biological weapon research during the period from 1974 to 1978. Several old structures belonging to that organization remained abandoned and non-functional at Salman Pak.
- Laboratory buildings of the toxicological section of the Research and Development Department of the Muthanna State Establishment hosted a

biological weapon research group during the period from 1985 to 1987. Those structures and parts of the filling plant at the Muthanna State Establishment used to weaponize biological agents were destroyed by aerial bombardment in 1991.

- The single cell protein production unit at Al-Taji was used for pilot production of *Botulinum* toxin in 1988. All equipment at the unit was transferred to Al-Hakam by the end of 1988. The site was not operational after 1988 and contained no biological equipment or capabilities.

- The Al-Hakam complex was Iraq's major biological weapon research, production and storage site. It was constructed in 1988 as a dedicated biological weapon facility. By the time it was first inspected by the Special Commission in 1991, Al-Hakam had been converted into a civilian facility and stripped of any obvious signs of its former role. The equipment that had previously been used to produce biological warfare agents was producing, or attempting to produce, yeast for animal feed. Other equipment was used for the production of a bacterial insecticide. From 1991 to 1995, Al-Hakam continued to operate as a civilian complex and, in fact, underwent expansion.

- The Agricultural Research and Water Resources Centre (Al-Safah project) at Al-Fudhaliyah was utilized in 1990 for biological weapon research and production. Aflatoxin was produced there. The Centre was also used in 1990 for the storage and later destruction of wheat cover smut that had been produced during previous Technical Research Centre activities. When the Special Commission inspected the buildings associated with the proscribed programme at the Al-Fudhaliyah Centre in 1991, it was found to have been abandoned.

- The foot and mouth disease vaccine plant (Al-Manal project) at Al-Dawrah was acquired by the Technical Research Centre in 1990 and used for biological weapon research and the production of *Botulinum* toxin. By the time the Special Commission first inspected it in 1991, the plant had been returned to the Ministry of Agriculture and all trace of production activity of weapons of mass destruction had been removed.

- Al-Kindi Veterinary Vaccine Production Company at Abu Gharaib was not directly involved in biological weapon activities, but its fermentation and support equipment was transferred to Al-Hakam, and later used to produce biological warfare agents. The facility had also been used to train Al-Hakam personnel.

- The Amiriyah Serum and Vaccine Institute was used for the temporary storage of bacterial isolates in 1991, prior to their being given to the first biological inspection team. The Rasheed Central Military Hospital at Zafaraniyah was involved in the acquisition of some bacterial isolates.

- The State Establishment for Heavy Engineering Enterprises produced 5-m^3 storage tanks and 1-m^3 mobile tanks used at the Al-Hakam complex for the storage and transport of biological warfare agents.

- The Nasser State Establishment was involved in the production of R-400 aerial bombs for biological and chemical warfare fill. According to Iraq, moulds for the production of R-400 bombs were destroyed unilaterally at the Muthanna

State Establishment in 1991. However, the Special Commission was not able to locate remnants of the destruction. Other general-purpose machinery used for the production of R-400 bombs remained intact.

- Project 144 was involved in the production of missile warheads for filling with biological warfare agents. All structures and equipment involved in the production of warheads were destroyed through aerial bombardment in 1991.

Unilateral destruction of biological weapons and agents

13. Iraq also declared that it had unilaterally destroyed all biological weapons and bulk agents during July and August 1991. After August 1995, Iraq recovered and provided for verification by the Special Commission and later UNMOVIC remnants of biological munitions (missile warheads and aerial bombs that had been filled with *Bacillus anthracis*, *Botulinum* toxin and aflatoxin), including several intact bombs, and locations of the unilateral destruction of bulk agent (*Bacillus anthracis*, *Botulinum* toxin, *Clostridium perfringens* and aflatoxin). These included a dumping site at Al-Hakam, Al-Aziziyah firing range and Al-Nibai desert.

14. In 1996, Iraq declared and identified the site of the unilateral destruction of biological bulk agent at Al-Hakam. Samples were taken by the Special Commission and analysis at that time indicated that the samples contained elevated levels of *Bacillus anthracis* spores. Genotypic analysis of the samples was recently conducted by the same laboratory contracted by UNMOVIC. The results of the analysis are reported in paragraph 5 of the report.

15. Although no complete documentation relating to the unilateral destruction was said to be available, Iraq's statements are consistent with the qualitative results obtained through sampling and analyses indicating that some of the biological weapons and agents were indeed destroyed at locations declared by Iraq.

16. Owing to the extent of the destruction carried out by Iraq and the stated lack of records relating to those activities, it was not possible to fully quantify all aspects of Iraq's account of its unilateral destruction, including quantities of bulk agents and numbers of munitions. During February and March 2003, however, Iraq presented to UNMOVIC initial findings on the study for the quantification of bulk agent and the number of R-400 bombs destroyed at Al-Aziziyah and Al-Hussein warheads destroyed at Al-Nibai.

17. Iraq declared that the "working seed stock" of microbial materials reproduced from bacterial isolates received from international culture collections and used for the production of bulk agents had also been destroyed unilaterally through autoclaving by the end of 1990. No positive verification of Iraq's statement was possible, however, owing to the absence of verifiable evidence or destruction records.

Destruction of biological weapon-related items under Special Commission supervision in 1996

18. In June 1996, in the light of new information revealed by Iraq, the following facilities, items and materials were designated by the Special Commission for destruction and were subsequently destroyed, removed or rendered harmless by Iraq under Special Commission supervision:

- The entire Al-Hakam biological weapon complex was destroyed, including all buildings, support infrastructures, utilities, equipment and materials. In total, over 300 pieces of equipment, instruments and laboratory accessories and all microbial cultures found at the facility were destroyed. They included equipment and materials acquired by Al-Hakam from the single cell protein plant at Al-Taji and Al-Kindi Company.
- Some 28 tons of bacterial growth media and chemical ingredients procured by Iraq for its biological weapons programme were destroyed. This included not only materials that remained at Al-Hakam but also the media collected from four other storage locations declared by Iraq.
- About 40 pieces of equipment used for the production of *Botulinum* toxin at the foot and mouth disease vaccine plant were destroyed. The equipment included various sizes of fermenters and vessels, as well as separators, centrifuges, autoclaves and refrigerators transferred from that plant to Al-Hakam for their destruction. The air-handling system at the plant was rendered inoperable.
- Four environmental chambers, a fume hood and an incubation oven used in connection with the production of aflatoxin at the Agricultural Research and Water Resources Centre were also transferred to Al-Hakam and destroyed.
- Seventeen pieces of laboratory equipment remaining in the Technical Research Centre laboratories at Salman Pak, including autoclaves, sterilizers and freeze dryers, were moved to Al-Hakam for destruction. Eight aerolization devices were removed from the Centre and taken into the custody of the Special Commission for further evaluation and analysis.

Destruction of biological items under UNMOVIC supervision in 2003

19. As noted in the Commission's thirteenth quarterly report (S/2003/580), in addition to the destruction of biological weapon-related items mentioned above, UNMOVIC observed and verified the destruction of 244.6 kilograms of growth media, declarable under the monitoring plan, that had exceeded its useful shelf life. The inspectors also observed and verified the destruction of 40 vials of expired toxin standards used in food testing and analysis.

Status of facilities involved in Iraq's biological weapons programme after 1996

20. The foot and mouth disease vaccine plant has not been operational since 1992. As the facility was originally constructed for the production of animal vaccines and, according to Iraq, was only being temporarily used in the biological weapons programme, its buildings, infrastructures and remaining equipment not directly involved in biological weapon-related activities were not designated for destruction by the Special Commission. It must be recalled that equipment destroyed under Special Commission supervision at that plant was largely identified on the basis of Iraq's declarations and the recollections and testimonies of personnel regarding its past use, as well as sampling and analysis. In addition, the sewage treatment system, steam generator and water plant used in the past to support the production of *Botulinum* toxin had not been destroyed, as the facility had already been rendered harmless through the disablement of the air-handling system.

21. Equipment remaining at the plant, including autoclaves, a steam sterilizer, an incinerator, stainless steel fermenters with exhaust air filtration, stainless steel mixing tanks with exhaust air filtration, a dozen mobile stainless steel tanks, a variety of centrifuges and filter presses and several freeze driers, were tagged. The facility was placed under monitoring by the Special Commission and inspected by UNMOVIC.

22. A similar approach was taken by the Special Commission with regard to the Agricultural Research Centre at Al-Fudhaliyah. In the mid-1990s, it was transformed into the State Company for Water Resources Research under the Ministry of Irrigation. The Special Commission decided not to destroy its buildings and infrastructure, which had not been directly involved in the production of aflatoxin. Some equipment was taken to Al-Hakam for destruction. The remaining equipment comprised one centrifuge, shakers, shaking incubators and biosafety cabinets. The facility was also placed under monitoring by the Special Commission.

23. There was no dual-use biological equipment left at the former single cell protein plant at Al-Taji. UNMOVIC inspected the facility and found that recently, with certain structural modifications, the building of the former plant had been rehabilitated and occupied by two petrochemical laboratories belonging to the Baghdad liquid petroleum gas filling plant of the Ministry of Oil.

24. Other facilities and equipment declared by Iraq in connection with its biological weapons programme that had not been directly involved in biological weapons research and production, including the Al-Kindi Company, the Amiriyah Serum and Vaccine Institute, the Rasheed Hospital, the State Establishment for Heavy Engineering Enterprises and the Nasser State Establishment were not designated for destruction, but placed under monitoring. UNMOVIC inspected all these facilities in 2003 and found no evidence of proscribed activities.

25. Several structures belonging to the Al-Hazen Institute and the Forensic Department of the Technical Research Centre, including an underground bunker, still remain abandoned at Salman Pak.

Appendix II

The development of Iraq's missile capabilities

1. Since the end of inspections in mid-March 2003, UNMOVIC staff have spent considerable effort in collating and assessing the results of inspections to provide an understanding of the development of Iraq's missile capabilities as at March 2003. Some of the findings were not overtly apparent in March but emerged after careful analysis of missile and multidisciplinary inspection reports, documents obtained from Iraq and interviews of Iraqis involved in the missile development programme.

Liquid propellant missiles

2. Most of the knowledge developed by Iraq on liquid propellant missile technology was based on its earlier activities in using or in the reverse engineering of the foreign-made Scud and SA-2 missile systems. In the 1990s, Iraq started to develop different versions of a non-proscribed surface-to-surface missile based on the SA-2 liquid propellant engine. When UNMOVIC started its inspections in 2002, the missile programme had reached the production stage, and the version being produced was referred to as the Al-Samoud 2. As compared to the previous version, this missile featured an increase in airframe diameter from 500 mm to 760 mm. Iraq had imported, without going through the United Nations export/import regime, around 380 SA-2 engines and a number of guidance and control systems for the programme, in addition to scavenging the same items from around 180 of its own SA-2 missiles.

3. UNMOVIC focused a large number of inspections on evaluating the Al-Samoud 2 programme, especially since Iraq had declared that several flight tests had exceeded the permitted range limit of 150 km set by the Security Council in resolution 687 (1991). Following the conclusions of an international panel of experts convened in February 2003, UNMOVIC declared the Al-Samoud 2 missile prohibited and subsequently supervised the destruction (not fully completed by 17 March 2003) of the missile and its related major components.

4. Although the Al-Samoud 2 design was inherently capable of ranges greater than 150 km, during inspections UNMOVIC was vigilant in looking for any evidence of possible projects to use or modify the missile in a configuration that would achieve even longer ranges. Iraq could have pursued a number of ways to achieve longer ranges, such as the development of a larger engine, the use of extended fuel tanks and longer engine operation times, clustering two SA-2 engines or using a first-stage drop-off boost motor. A new, larger engine would also have required the development of a new, larger turbo pump. No evidence was found by inspectors indicating such activities. Furthermore, although Iraq had, in the past, acquired the technical knowledge for the design of such items, Iraq had struggled with the production and modification of the SA-2 engine used in the Al-Samoud and, therefore, it is deemed unlikely that those new items had been produced or could have been successfully produced in the near future.

5. The increase in airframe diameter of the Al-Samoud 2 from 500 mm to 760 mm would permit the airframe to accommodate two SA-2 engines clustered in a side-by-side configuration. This, together with extended propellant tanks, could extend the range of the missile to prohibited ranges. Again, no evidence was found by UNMOVIC inspectors that Iraq was attempting this modification. In addition, the

configuration would require a guidance and control system more capable than the one used in the Al-Samoud 2. Although research and development was actively being pursued on more sophisticated guidance and control systems, the work did not appear to be well advanced.

6. A third possible configuration to increase range would be to add a first-stage boost motor. While no direct evidence was found by inspectors that Iraq was pursuing such a project, there was circumstantial information that would have warranted a closer investigation of the issue had inspections continued. First, Iraq had declared in its most recent monitoring declarations projects to develop a new, more powerful boost motor for the SA-2 missiles and to use SA-2 boost motors with the SA-3 missiles. Both the projects would include studies of staging and separation mechanisms and those technologies would, hence, be available for transfer to other systems. In addition, some items that were observed during inspections required explanation, although they could not be investigated before the inspectors' withdrawal. Those items could conceivably be linked to the use of a first-stage boost motor with the Al-Samoud 2.

7. Several activities relating to liquid propellants were observed during inspections, all consistent with Iraq's declarations. Both research and some production were being pursued on the regeneration or manufacture of IRFNA liquid oxidizer, as well as the regeneration of TG-02 fuel. These propellants are used in several of Iraq's missiles. No evidence was found pointing to the manufacture of the fuel that is specific to the Scud missile. Pilot plant production of UDMH, a more energetic and advanced fuel, was also observed. Iraq declared that it had tested a fuel containing UDMH in SA-2 engines but because it was unsuccessful the project had been terminated. No evidence was found of any new, undeclared missile development using UDMH fuel. Iraq however continued its work on pilot plant production of UDMH, which is a component of the fuel used in other non-proscribed missiles it possessed.

Solid propellant missiles

8. Since late 1998, Iraq's activity and progress in solid propellant systems had increased substantially, particularly involving composite propellant, the preferred system in the world today. New missiles which were in development included (a) Al-Nidaa, a composite propellant variant of an earlier rocket, with a range increased from 50 to 70 km; (b) the Al-Raad, which is the foreign-made FROG missile, modified by replacing the original propellant in the sustainer motor with composite propellant; (c) the Al-Ubour, with a new composite propellant motor of 500 mm diameter and designed for use in a surface-to-air role with a stated range of 70 to 80 km (compared to the SA-2 range of 45 km); and (d) the Al-Fatah, the latest version of the former Ababil-100 (solid propellant). The latter missile has a diameter of 500 mm and a stated range of 144 km. Some of the initial unguided versions of the Al-Fatah had already been deployed to the army at the time of inspections. The international panel of experts UNMOVIC convened in February 2003 made an initial assessment of the Al-Fatah missile to determine if it complied with the 150 km-range limit. The panel concluded that further information was required before a proper assessment could be made. Time did not permit this additional information to be acquired before mid-March 2003.

9. As a consequence of the volume limits placed by the UNMOVIC monitoring regime on propellant mixers (210 litres), production by Iraq of larger size motors required the use of multiple batches of mixed propellant. For example, the Al-Fatah motor required five batches. Iraq did locally produce several new mixers that complied with the volume limit. UNMOVIC noted that Iraq was still having problems with the successful production of motors made using multiple batches, in large part owing to inconsistent quality of propellant raw materials. During UNMOVIC inspections, two large casting chambers were found. Because they were refurbished remnants from the former proscribed Badr-2000 missile project they were destroyed under UNMOVIC supervision. Although those chambers were large enough for the production of larger motors that could provide ranges of more than 150 km, no evidence was found that such production had occurred.

Missile launchers

10. Iraq had developed launchers for its new missile systems, the Al-Samoud 2, the Al-Fatah and the Al-Ubour. The Al-Samoud 2 launchers, one version with a single arm and the other with two arms, were based on knowledge Iraq acquired while developing Scud launchers before 1991. The two versions of the Al-Fatah launchers, one launching the missile from within the transport canister and the other from the launcher arm, were based on modified SA-2 launchers. Different declarations about the Al-Ubour launchers had been provided to UNMOVIC but the inspectors were not able to explore further the development of this launcher before their withdrawal. During the inspection process, UNMOVIC observed another type of launcher, similar to the Al-Fatah launcher, but with an extended arm. Inspections ceased before the purpose of this launcher could be ascertained.

Guidance and control systems

11. Iraqi engineers and scientists used their knowledge from Scud and several earlier projects for surface-to-air missile systems as the basis for their design, development, production and testing of the Al-Samoud 2 and Al-Fatah guidance and control systems. Only the Al-Samoud 2, however, had been fitted with a guidance and control system at the time of inspections. Hardware components were obtained from various other missiles in the army's inventory. Gyroscopes, batteries, actuators and high-pressure gas bottles from SA-2s and SA-3s were used, as well as several parts from the R-40, an old air-to-air missile. As a result, the guidance and control systems had a relatively poor performance but did permit stable flight.

12. UNMOVIC also found that, in parallel to the production of these guidance systems for the Al-Samoud 2 and Al-Fatah missiles, Iraq was working on the development of advanced digital guidance systems utilizing modern components, such as inertial navigation systems with fibre-optic gyroscopes, GPS navigation and more sensitive accelerometers. A number of these modern components had been acquired since 1998 from foreign sources, together with other newly procured test equipment and related spare parts. Iraq declared several projects involving improvements to the guidance and control systems of its missiles. The development of new systems using modern equipment and technology would have given Iraq the capability to improve greatly the performance of its missile systems, particularly in accuracy and, if desired, in range extension through the gliding effect. No evidence of any project to extend range by these means was found during the inspection period. Although UNMOVIC was paying considerable attention to this area, a full

exploration of Iraq's capabilities and projects in guidance and control was not possible by mid-March 2003.

Cruise missiles

13. Iraq possesses the ground-launched HY-2 anti-ship cruise missile and the similar air-launched versions, the C-601 and C-611, all of which use a liquid propellant engine. Iraq declared two projects in relation to the HY-2 missile that had been conducted since December 1998. The first was a project to increase the missile's range from the design range of 95 km. From the information provided, it appears that the project was based on placing the engine from the C-611 into the HY-2, perhaps with an extended burn time. Two tests were declared: the first was said to have resulted in engine failure shortly after launch and the second (13 August 2001) was stated to have been successful, achieving a range of 150 km, more than the expected 130 km. The second declared project was to change the guidance and control system of the HY-2 to enable the missile to attack ground targets by using GPS navigation. Only one test (12 August 2001) was declared. It was stated that the test was unsuccessful and that the project had recently been terminated. Time did not allow the investigation and verification of the declared information and activities.

Appendix III

UNMOVIC training

1. UNMOVIC training has been an intensive and innovative effort and achieved expected results in implementing the objectives set forth by the Security Council in its resolution 1284 (1999), namely, to provide high quality technical and cultural training for United Nations inspectors to be deployed in Iraq.

2. UNMOVIC training has been carried out on a continuous basis through a series of training courses. UNMOVIC conducted 22 training courses from June 2000 to April 2003. There were two main categories of training courses: basic and follow-up. The main emphasis of the basic training courses was on providing future inspectors with an understanding of the UNMOVIC mandate, UNMOVIC ongoing and anticipated activities and monitoring/inspection concepts, procedures and basic tools, as well as an overview of Iraq's proscribed weapons programmes and dual-use capabilities. Special efforts were made to underline the United Nations identity of UNMOVIC activities. UNMOVIC conducted seven basic training courses, which were attended by 381 persons from 59 countries. Upon completion of a basic course, a trainee was included in the UNMOVIC roster of inspectors available to serve in Iraq or at Headquarters.

3. Follow-up courses were organized for the roster personnel to upgrade their preparedness for inspection activities in Iraq. One set of courses (advanced courses) was aimed at developing practical skills to conduct on-site inspections. Eight such courses were held from May 2001 to December 2002, attended by 150 persons.

4. Another set of follow-up courses (enhanced courses) was organized to develop inspectors' capabilities to monitor dual-use equipment in Iraq. Four courses were conducted from May 2002 to March 2003, and one more course was conducted on dual-use biological production technologies. A total of 74 persons attended the enhanced courses.

5. Two specialized courses were also held for selected roster personnel, one on sampling procedures and the second on the use of chemical analytical laboratory equipment.

6. UNMOVIC has gained valuable experience and unique expertise in training international personnel to perform — effectively and professionally — inspection, monitoring and verification activities in the areas of weapons of mass destruction, in particular biological and chemical weapons and missiles. UNMOVIC has created specific programmes, curricula, study materials, manuals, handbooks and videos for various types of training; developed a unique set of training exercises, tutorials and drills to develop required inspectors' skills; identified and adapted a number of facilities worldwide suitable for training activities, including mock inspections, practical exercises and familiarization visits; and established administrative, logistical and supporting infrastructure for effective training.

7. UNMOVIC training has been conducted mainly through the efforts of the UNMOVIC staff. The Governments of Argentina, Austria, Brazil, Canada, China, Finland, France, Germany, Sweden, Switzerland, the United Kingdom of Great Britain and Northern Ireland and the United States of America provided excellent support for training courses conducted by UNMOVIC in their respective countries. The costs of the training courses were relatively low as a result of specific

arrangements established by UNMOVIC with the host States. The majority of the training expenses (some 97 per cent) for 22 courses during three years has been spent on participants' travel and daily subsistence allowance payments.

8. UNMOVIC training strengthened roster personnel readiness and willingness to participate in inspection and monitoring activities in Iraq as United Nations inspectors. It would be highly beneficial for future inspection and monitoring activities in Iraq if most of the personnel on the roster completed both advanced and enhanced courses.