Jp 01226

MR POWELL

Collateral Damage in the Event of Allied Attacks on Iraqi CBW or Nuclear Facilities

At OPD(G) on Wednesday the Prime Minister asked about this subject.

2. The attached paper draws heavily on work done by the Ministry of Defence. It may need amendment in the light of next week's discussions with the Americans.

3. As you will see, the conclusions at this stage are that there might be considerable damage in the Baghdad area from CW or BW, subject to meteorological factors. Contamination from bombing of nuclear facilities seems likely to be confined to the sites concerned.

PERCY CRADOCK

7 December 1990

COLLATERAL DAMAGE IN THE EVENT OF ALLIED ATTACKS ON IRAQI CBW OR NUCLEAR FACILITIES

Introduction

1. We consider the collateral damage which could be caused in the event of allied attacks on Iraqi CBW or nuclear facilities.

CBW and Nuclear facilities

2. There are a total of 16 installations in Iraq that are associated with CBW and nuclear production, storage or training. These are listed at Annex A.

3. The main CW production site is at Samarra and it is thought that CW agents are also produced at Salman Pak. There are also three CW-related facilities near Habbaniyah, but it is not thought that CW agent is either produced or stored there. The largest CW storage site is also at Samarra, where there are nine bunkers; we believe that each bunker is likely to contain no more than 100 tons of agent.

4. Production and storage of BW agents, anthrax and botulinum toxin (BTX), takes place at Salman Pak. The quantities of stockpiled agent are unknown, but there could be some 100 tons each of anthrax and BTX.

5. Some of these facilities are located in isolated areas, but others are in, or relatively close to, major populated areas, including Baghdad (see map at Annex B).

Meteorological conditions

6. Meteorological conditions play an important part in the spread of any contamination. Peculiar desert effects also make the time of day quite important in terms of both wind velocity and direction; and both of these factors change materially with height.

Attack techniques

7. Attack techniques will vary the effect on the agents, but only marginally. A bomb delivered from high level will have greater penetration than a retarded bomb from low level and might have a greater chance of fracturing a bunker. Larger US bombs (2,000 lbs) might throw agent higher than smaller UK bombs; and this could increase the size of the contaminated area.

Effects of attacks on CW facilities

8. The total stockpile of chemical agents in Iraq is assessed to be 6,000-10,000 tonnes of sulphur mustard, tabun and sarin. (The proportions are unknown; but there is likely to be much more mustard than nerve agent.)

9. The precise effects of CW contamination after an attack are not known. But as an example, a daytime attack on Samarra, releasing 900 tons of agent, would create a downwind hazard covering 12 kms for nerve agent and 5 kms for mustard. At night, the downwind hazard would extend to 100-120 kms for both agents. As Samarra is about 100 kms north-west of Baghdad and the prevailing wind is from the north, some casualties in Baghdad might arise from a night attack. If larger amounts of agent were released, the area of the downwind hazard would be the same - not extending much beyond 120 kms - although the density of contamination would be greater.

10. But the 10,000 tons of agent assessed to be at Samarra would be unlikely to be released en masse. The storage quantities are usually restricted, for safety reasons, to about 100 tons in any single bunker. Further, a bunker could be struck and destroyed without the agent being released; for example, a bunker which collapsed could bury all or most of the agent contained within it. Which local towns and villages might be affected, would be largely determined by the wind direction and velocity; and the degree of contamination in Baghdad would depend on other complicating factors, such as rain and dust, the density of the inhabitation, and the precautions taken in terms of warning and other shelter procedures.

11. The risk of long-term contamination would depend on the type of agent and the prevailing weather conditions. In the winter months, there would be more rain than in summer, helping to disperse chemical agent. But we judge that there would be no permanent contamination.

Effects of attacks on BW facilities

12. Salman Pak is some 30 km south-east of Baghdad and its destruction could, if meteorological conditions were adverse, cause casualties there. The destruction of storage containing 100 tons of anthrax would release around 200 kg into the air. Lethal concentrations of spore could extend for up to 100 kms and this distance would be little influenced by time of day or quantity of material. Release of anthrax spore would cause ground contamination and it could be expected that some spores would persist in the ground and,

theoretically, present a risk of skin anthrax. The most likely downwind hazard distance for BTX would be 10kms.

Effects of attacks on nuclear facilities

13. There are two identified nuclear-related sites, Tuwaitha and Al Qaim, at which radioactive material other than natural uranium[1] is likely to be present in significant quantities.

14. Tuwaitha is a large and complex site, with a number of nuclear facilities within its earthwork perimeter; of prime interest are two reactors, the reprocessing plant and associated storage buildings, the pilot fuel fabrication facility, and the radio-isotope laboratory. (The Osirak reactor on the site has not been re-commissioned following the Israeli raid in 1981.) It is not possible to determine the amount of nuclear material present in any individual building; but the total radio-activity on the site is a few thousand curies[2], made up from fuel for the reactors.

15. There is no risk of fire causing thermals which could lead to fuel debris being introduced into the atmosphere and causing contamination on a continental scale. Indeed, release of radioactive material from an Iraqi nuclear facility is not likely to cause any radiological hazard outside Iraq.

16. But damage to or destruction of nuclear facilities at Tuwaitha would result in local contamination, probably confined to the site, unless there were unusual weather conditions. The likely maximum radiation dose to personnel within the facility would be some tens of rads per hour, and rapid evacuation of the site (within 5-6 hours) would be advised. Tuwaitha is situated 23 km south-east of Baghdad, and the maximum feasible release would result in a measurable, but not dangerous radiological hazard to anyone within the city.

17. In normal conditions, the site at Al Qaim would contain no radioactive material, other than natural uranium. There is a very slight possibility that

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1 Natural uranium can be considered a local hazard if it becomes airborne in a finely-divided particulate form, but it does not constitute a major radiological risk.

2 To place this in perspective, while the total site activity at Tuwaitha is a few thousand curies, the Windscale incident in 1957 released about 30,000 curies into the atmosphere and the Chernobyl accident released in the region of 50 million curies into thermal currents which resulted in long-range transmission.

fuel, irradiated in one of the reactors at Tuwaitha, may have been transported to Al Qaim for processing to extract enriched uranium. If this is the case, then the maximum radioactive inventory at this site will be approximately a thousand curies. Any release of this material would result in only local contamination and the maximum likely dose to any personnel would be in the low tens of rads per hour, again making early evacuation of the site advisable.

18. There has been a single, unconfirmed report that fuel, originally for the Osirak reactor, is being stored at another location near Baghdad. If this fuel were to be damaged, then a low-level hazard could be caused, making evacuation of the local area advisable.

Conclusions

19. Maximum downwind hazard distances following attacks on Iraq's chemical and biological facilities could extend to 120 kms for nerve agents and mustard, 10 kms for BTX and 100 kms for anthrax. The footprint areas would be much the same however much agent there was in the target area; but the density of contamination would be proportional to the amount dispersed.

20. The nature and extent of any downwind contamination will be highly dependent upon a number of factors, many of which can, at best, be only roughly predicted - eg meteorological conditions. Attack techniques will also vary the effect on the agents - but only marginally; and against some of the targets, bombs could cause storage bunkers to collapse and contain the agent.

21. It is impossible, in most cases, to assess the scale of civilian casualties that attacks will cause. Some facilities are sufficiently isolated for collateral damage to be minimal, whereas those close to Baghdad could potentially cause thousands of civilian casualties.

22. Contamination from attacks on Iraq's nuclear facilities seems likely to be confined largely to the sites concerned.

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ANNEX A

CBW AND NUCLEAR PRODUCTION, STORAGE AND TRAINING FACILITIES

1.	Samarra	- main CW production and storage facility
2.	Habbaniya CW facility	- produces chlorine and sodium hydroxide for use in the production of CW agents
3.	Salman Pak CBW facility	- has two research and production areas
4.	Habbaniyah CW facility	- has production and storage buildings, but does not appear to be operational
5.	Habbaniyah CW facility	- CW agent and precursor production, but does not appear to be operational
6.	Al Hadr CW test facility	- only occupied when tests are in progress
7.	Salah Ad Din CW training facility	- infrequently used, but has a test area
8.	Ban Al Sad CW school	- training facility for the Iraqi army
9.	Karbala	- storage depot for CBW
10.	Baghdad Nuclear Research Tuwaitha	- Iraq's principal nuclear facility
11.	Al Qaim Plant	- includes a hydrogen fluoride and possible uranium recovery facility
12.	Saad 4-6 South	- a small site at this facility is suspected of uranium enrichment
13.	Fallujah ammunition depot	- reports of suspect storage bunkers for CBW
14.	An Nasiriyah storage facility	
15.	Ad Divaniyah storage facility	
16.	Tikrit ammunition depot	

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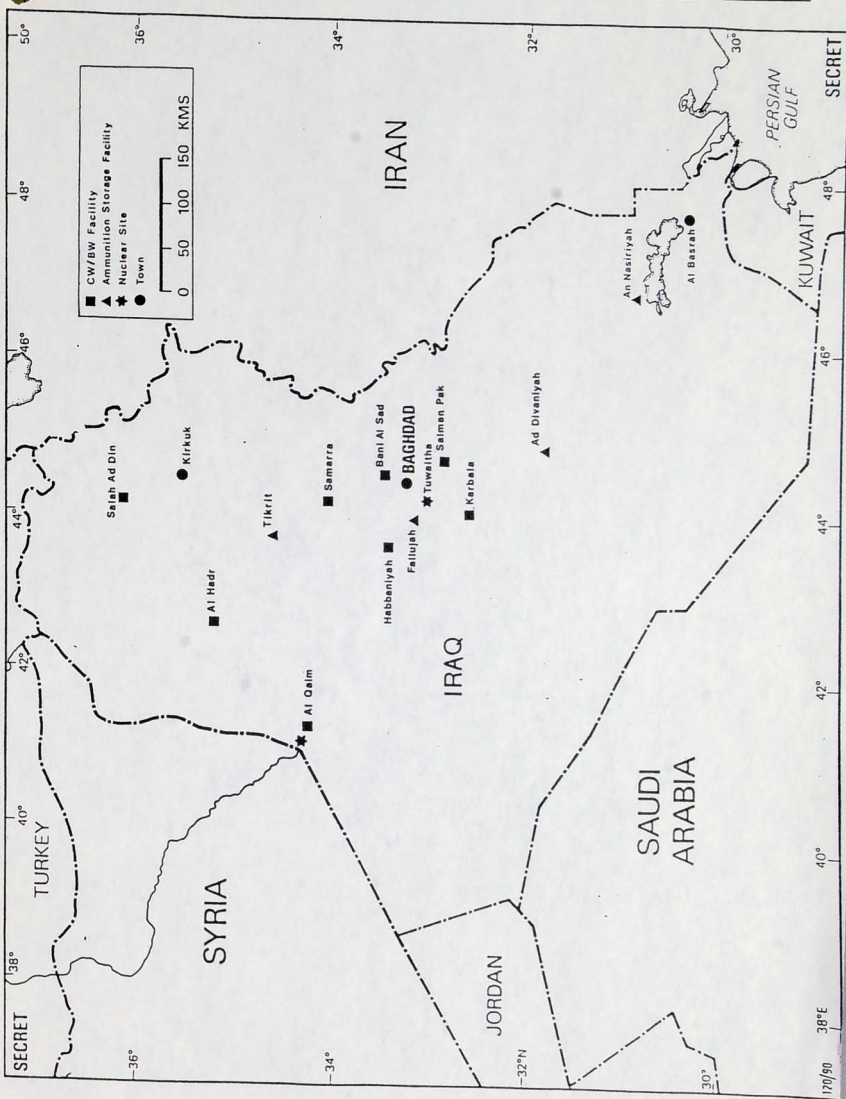
ANNEX B

CW/BW AND NUCLEAR PRODUCTION, STORAGE AND TRAINING FACILITIES IN IRAQ



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Prime Minister

CDR

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Iraqi CW/BW Capability

At OPD(G) this week the Prime Minister asked how much we knew about Iraqi capability in this field. He may wish to glance through the attached JIC paper, which provides the best up-to-date summary.

Thank you.

PERCY CRADOCK

7 December 1990

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