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**Updated: June 8, 2002**

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**Central Intelligence Agency  
Department of Defense**

# **Modeling the Chemical Warfare Agent Release at the Khamisiyah Pit (U)**

*4 September 1997*

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## **Introductory Note**

As part of CIA's and DoD's continued work to support US Government efforts related to the issue of Gulf war veterans' illnesses, this paper highlights the joint CIA-DoD efforts to model the release of chemical warfare agents from the Khamisiyah pit. This modeling exercise has been a joint effort, with significant coordination among multiple agencies and hundreds of people, with expertise ranging from upper atmospheric conditions to soil characteristics. Since 21 July 1997 we have provided many briefings to Secretary Cohen and the Joint Chiefs, DCI Tenet, Senator Rudman, the staff of the National Security Council, the Presidential Advisory Committee, Congressional staffers, representatives from veterans' organizations, and the media. This report is our effort to make this information as widely available as possible.

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# **Modeling the Chemical Warfare Agent Release at the Khamisiyah Pit**

## **Background**

In September 1995, CIA analysts identified Khamisiyah as a key site that needed to be investigated because of its proximity to Coalition forces and the ambiguities surrounding the disposition of chemical weapons at the site; CIA informed DoD of its findings. On 10 March 1996, a CIA analyst heard a tape of a radio show in which a veteran described bunker demolition at a facility the analyst immediately recognized as Khamisiyah. He informed DoD the next morning and the PAC later that week. This identification prompted further investigation of the site, including discussions with UNSCOM.

### **Figure 1**

### **Khamisiyah Storage Site, Iraq**

In May 1996, Iraq told UNSCOM inspectors that US troops had destroyed chemical weapons in the pit near the Khamisiyah depot. After receiving details from UNSCOM in June, DoD was able to interview soldiers who confirmed the demolition of 122-mm rockets in the pit. We discussed this at the PAC meeting in Chicago in July 1996.

The PAC and NSC staff directed CIA to have one of its contractors model multiple chemical

warfare agent releases. *Modeling* is the science and art of using interconnected mathematical equations to predict the activities of an actual event, in this case the direction and extent of the chemical warfare agent plume. Modeling is necessary because we do not know what the plume actually did. In such cases, modeling uses obtainable data--the number of rockets, weather, and so forth--to develop a best estimate of the extent of potential exposure. Our modeling efforts apply state-of-the-art atmospheric models, which consist of global-scale meteorological modeling of observational data; detailed regional meteorological modeling using regional and global-scale observations and global-scale model calculations; and transport and diffusion models simulating the contaminant transport based on the flow and turbulence fields generated by the regional model.

We quickly realized that modeling the pit presented far greater challenges than modeling Bunker 73 at Khamisiyah and other releases. We were able to model the events at Al Muthanna, Muhammidiyat, and Bunker 73 largely because we had test data from the 1960s indicating how chemical warfare agents react and release when structures in which they were stored were bombed or detonated. However, when we began to model the pit, we had significant uncertainties regarding how rockets with chemical warheads would be affected by open-pit demolition. It became clear by October that, without testing the demolition in the open, these uncertainties would remain.

We informed the PAC in November of last year and March of this year, that the proximity of US troops and the prevailing winds at the time of the event identified the associated chemical warfare agent release as a priority for further study. However, we also noted that we had significant uncertainties in attempting to characterize the event:

- Very limited and often contradictory information from two soldiers.
- Questions on the date(s) of demolition.
- Uncertainties on the number of rockets, agent purity, and amount of agent aerosolized.
- Uncertainty on agent reaction in an open-pit demolition.
- Limited weather data.
- No single model that runs weather and chemical warfare agent data simultaneously.

**[Figure 2](#)**  
**[Khamisiyah Ammunition Storage Area](#)**

These uncertainties required a more intense study to determine the potential hazard area. DoD and CIA undertook an extensive effort to characterize as accurately as possible the demolition activities at the pit as well as the subsequent dispersion of the agent. This involved the aggressive analysis of any thread of information related to the noted uncertainties, as well as the formation and coordination of a technical working group consisting of modelers from the participating agencies in order to identify the extent of the release.

## **Reducing General Uncertainties**

### **Interviews With Veterans Invaluable**

Working with DoD's Investigation Analysis Division, we have been able to locate and jointly interview five soldiers involved in or claiming to have been involved in the pit demolition--three more than in October of last year. We believe this constitutes at least half of those involved at the time. The participants provided key information addressing our uncertainties, including the numbers of events, munitions, and charges, as well as the placement of the charges. This information was critical to our Dugway tests and to the completion of a meaningful model.

### **Eliminating Uncertainty Surrounding the Date**

The soldiers indicated that the pit demolition occurred on 10 March 1991, coincident with the documented demolition of about 60 bunkers and 40 warehouse buildings nearby. A 10 March demolition is also supported by the fact that some of the soldiers involved in the demolition left for Saudi Arabia on 10 March, as documented by military records. According to four of the five soldiers, the event started at 4:15 p.m. local time (1315Z); one soldier remembers the pit demolition starting a few minutes after the bunker demolition. On the basis of these interviews, we assess that 13 stacks were detonated simultaneously in two groups of stacks fuzed separately. (See figure 3 for the layout of the stacks.)

### **Troops Working With Limited Amount of Explosives**

On the basis of these interviews, we assess the soldiers used about four boxes of US C-4 explosives, which would have provided 120 charges. All soldiers indicated that there were insufficient numbers of charges to completely destroy the rockets, even with the anticipated sympathetic detonation of what they thought were high-explosive warheads. They had to use Czech detonation cord to complete the demolition.

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## Why the Limited Explosives Resources?

*The operational planning for the demolition of the main part of the Khamisiyah depot--60 bunkers and 40 warehouses--was done in accordance with standard explosive ordinance disposal (EOD) practices for the magnitude of the demolition. However, the rockets in the pit were discovered after most of the explosives had been allocated for that main demolition. Hence, the Army personnel had to collect ad hoc resources to conduct the pit demolition. Also, given the deadlines for departure, the pit demolition could not be delayed to allow additional explosives to be delivered. In addition, many EOD personnel were scheduled to be reassigned to other important facilities. At the time, the military personnel at Khamisiyah had not received warnings about chemical weapons there, and thought they were destroying high-explosive rockets. Such a demolition would not have been as high a priority as the much larger amount of weapons in the main part of the facility.*

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The interviews indicate that the thoroughness of the demolition varied by stack. All the soldiers indicated that the ends of crates were broken out and the charges were placed inside (although it is possible that some charges were simply affixed to the crate exterior for the sake of expediency). They also indicated that the orientation of the rockets varied--some pointing toward the embankment, some away. The soldiers' recollections from this point vary, however. One stated that charges were placed on the side opposite the embankment and only on warheads. Another contradicted that assertion, indicating that the charges were placed at both ends of the crate with some on warheads and some on rocket sections. A third soldier indicated that in the first stack he set as many as four charges on each rocket--two on both the warhead and booster. That would have required more charges than were available. Because different soldiers used different methods on different stacks, we must assess that the placement of charges varied by stack.

### [Figure 3](#) [Predemolition Photo of Pit Area Near Khamisiyah](#)

## IDA Panel Provided Meteorological Expertise

The uncertainties mentioned earlier brought modeling efforts to a halt. Former Deputy Secretary of Defense John White and former Director of Central Intelligence John Deutch asked the Institute for Defense Analysis to host a panel of experts to review the previous

modeling attempts at the pit and to make recommendations for proceeding. The IDA panel consisted mostly of meteorological experts. Their expertise served as the basis for important recommendations regarding the meteorological aspects of modeling the pit release.

## Refining the Modeling Input Parameters

### **Number of Rockets in Pit Exceed Iraqi Declarations**

Although the Iraqis declared to UNSCOM in May 1996 that 1,100 rockets were in the pit, we assess that the number was somewhat higher. The Iraqis indicated that 1,100 of the 2,160 rockets declared to have been at Khamisiyah were moved from Bunker 73 to the pit. Recent Iraqi press reports suggest that the pit contained roughly one-half of the 2,160 rockets moved to Khamisiyah (or about 1,080 rockets). However, based on the size of the crates, the varying heights of the stacks, and soldier testimonies, our best estimate of the number of rockets in the pit is 1,250. We derived an upper bound of 1,400 rockets by including uncertainty in stack width, using tight edge-to-edge packing, and assuming all stacks were the same height as the tallest of the 13.

### **Demolition Affected Less Than 40 Percent of the Rockets**

Sometime during the year following the demolition, the Iraqis bulldozed and handcarried the remnants of the 13 stacks into seven piles. In the process, they likely damaged more of the rockets and buried others. UNSCOM inspectors recovered a total of 782 undamaged rockets: 463 taken from the surface, including 389 that were filled, 36 that were partially filled (we attributed this partial leakage to the Iraqis in our modeling), and 38 that were unfilled; and 319 unearthed from the pit, all of which were filled. UNSCOM ensured that all were subsequently destroyed, either in place at Khamisiyah or at Al Muthanna where they were later moved.

Accordingly, our best estimate of the number of rockets damaged during the demolition is 500. This was derived by subtracting from 1,250 a total of 744 (782 found undamaged minus 38 of which were unfilled, conservatively assuming they released agent during the demolition). The result, 506, was rounded to 500. This estimate is primarily intended for illustrative purposes; the modeling effort used percentages and amounts of total agent in the pit--7,875 kg or 1,882 gallons. This means that 744 rockets' worth of agent--60 percent or 1,129 gallons--did not disperse during the demolition in March 1991 and was subsequently destroyed by UNSCOM.

### **Amount of Agent per Rocket**

Previous modeling efforts--completed for Bunker 73 and halted for the pit--estimated that each rocket contained 8 kg of chemical warfare agent. This was a conservative estimate based on subtracting the mass of an empty warhead from that of a full one (19 kg minus 11 kg). However, in preparation for ground demolition testing in May 1997, we analyzed Iraqi plastic inserts (figure 4) and found that they contained only 6.3 kg of agent. Our earlier estimate had included the mass of the 1.7-kg inserts.

**Figure 4**  
**SAKR-18 Inserts Obtained by UNSCOM**

## **Agent Purity**

Our best estimate of the agent purity at the time of demolition is slightly less than 50 percent (see figure 5). Iraqi production records obtained by UNSCOM indicated that the sarin/cyclosarin (GB/GF) nerve agent produced and transported to Khamisiyah in early January 1991 was about 55 percent pure. (The tests documented in the records showed purity levels ranging from 45 to 70 percent, with 55 percent being the average from 1990 test dates.) The agent subsequently degraded to 10-percent purity by the time laboratory analysis had been completed on samples taken by UNSCOM from one of the rockets in October. On the basis of the sample purity and indications that the degradation rate for sarin and cyclosarin are similar, we assess that the ratio when the munitions were blown up in March 1991 was the same as that sampled in October 1991--3:1. Assuming a conservative, exponential degradation of the sarin/cyclo-sarin, the purity on the date of demolition two months after production can be calculated to be about 50 percent.

**Figure 5**  
**Degradation of Combined G-Agent**

## **Establishing Initial Wind Direction**

The Khamisiyah plume analysis is a retrospective analysis; hence, the opportunity for direct comparison with weather observations is limited. Several sources of imagery data, however, are available for the period 10-11 March 1991 which may provide qualitative comparison. During the May 1996 inspection of Khamisiyah, UNSCOM took GPS coordinates in the pit and recorded the location as 30° 44' 32" N 46° 25' 52"E. An intense effort to find weather data for the area has netted good information on wind direction at the time of the explosion in March 1991. These include photography of the soot patterns created by the 10 March bunker explosions at Khamisiyah and regional-scale imagery of the Kuwaiti oilfield fire plumes.

## [Figure 6](#)

### [Khamisiyah Bunker Soot Patterns--10 March 1991](#)

## [Figure 7](#)

### [Helicopter Photo of Bunker 16--September 1992](#)

Using SPOT photography of 27 April 1991 (figure 6), analysts derived wind direction from distinct trails of windblown soot and ejecta from individual bunkers and corroborated their findings using UNSCOM helicopter color photos from October 1991 and September 1992 (figure 7). Using these sources, we have determined that the wind direction was  $335^\circ$  (from the north-northwest), thus initially blowing any chemical agent released from the pit to the south-southeast. The consistency of the azimuths within the 3.4-km spread of the bunker area destroyed allows us to reasonably translate the wind direction information to the pit area approximately 2 km from the bunkers. This wind direction is further corroborated by statements from one of the soldiers involved in the pit demolition, indicating that he was in a vehicle that drove through the smoke cloud in an area south to south-southeast of the pit. He reported no ill effects from the smoke.

## [Figure 8](#)

### [Khamisiyah Bunker Soot Azimuths](#)

In addition to the soot pattern photography, we used regional-scale imagery of the Kuwaiti oilfield fire plumes for the days immediately following the detonation to assist in corroborating modeled wind direction. These also provided an integrated measure of meteorological quantities such as low-level wind direction, low-level wind speed, vertical wind shear, and thermodynamic stability.

# [Dugway and Edgewood Testing](#)

## **Ground Testing Essential**

During last year's modeling efforts, we noted that without ground testing we could not estimate with any degree of certainty the amount of agent released at Khamisiyah or the rate of release. In the 1970s, the US conducted additional testing on US chemical rockets to characterize the impact of terrorist actions. Unfortunately, the US tests did not measure the amount of airborne agent downwind and did not help quantify probable release parameters. Thus modelers of the pit demolition were unable to assess whether the agent would be released nearly instantaneously or over a period of days. The later scenario obviously was more dependent on weather conditions.

To resolve these uncertainties, CIA and DoD agreed in April 1997 on the need to perform ground testing before a meaningful computer simulation could be completed. We cooperated to design and implement a series of tests in May 1997 at the Dugway Proving Grounds, which gave us a much better understanding of the events at Khamisiyah. DoD provided complete logistic and administrative support for the tests.

### Figure 9 Placement of C-4 Charge on Warhead, Dugway

The testing involved a series of detonations of individual rockets and some in stacks, with high-explosive charges placed the way soldiers say they placed them in March 1991. This was done to resolve questions like: how did the rockets break? what happened to the agent? were there sympathetic detonations? how much agent might have been released? We could not replicate the entire demolition of hundreds of rockets, but we did gain information critical to our modeling efforts.

First, we took special care in replicating the rockets in the pit, including:

- Using 32 rocket motors identical to those detonated in the pit.
- Manufacturing warheads based on detailed design parameters provided by UNSCOM, including precise wall thicknesses, materials, and type of burster tube explosive.
- Building crates based on precise measurements and UNSCOM photographs.
- Choosing a chemical agent simulant, triethyl phosphate, that closely simulates the volatility of cyclo-sarin and is often used as a simulant for sarin.
- Stacking the rockets as described by soldiers involved in the pit demolition.

### Figure 10 Representation of Charges

We performed six tests at Dugway using the 32 available rockets. We began with four tests on single rockets in preparation for tests involving nine and 19 rockets. We included a few dummy warheads to increase the size of the stacks. Finally, one of the unbroken rockets from the multiple tests was dropped from an aircraft to simulate a flyout.

## **Flyouts**

The results were very revealing. The only warheads that burst and aerosolized agent were those that had charges placed just beyond the nose of the warhead. Only the warheads immediately adjacent to the charges leaked agent. Even the rocket dropped to simulate a flyout did not disperse any simulant; it buried itself over 30 feet below the surface. The pie chart in figure 11 shows the distribution of agent from these tests among aerosolized vapor and droplets, spill into soil and wood, burning, and unaffected. Only about 32 percent of the agent was released, mostly leaking into the soil and wood. A total of 18 percent became part of the plume--two percent through aerosolization and 16 percent through evaporation (5.75 percent from soil and 10.4 percent from wood).

The Dugway testing provided a physical basis for estimating the effect of a charge on the surrounding rockets. We used pressure sensors to refine our gas dynamics models to approximate the threshold forces required to break a warhead. Gas dynamics modeling of the detonations and resultant pressure waves further bolstered our confidence that the results of the Dugway testing were realistic. This allowed development of a model to determine the effect of various placements of charges and orientations of rockets:

- Charges were placed on the ends of rockets opposite the embankment. (As cited in interviews with US soldiers.)
- Charges broke adjacent warheads but not warheads at the other end. (Dugway field testing)
- Evaporation in accordance with Dugway laboratory testing of a 3:1 mixture of sarin/cyclosarin agent at a temperature of 14 degrees C.
- Number of rocket flyouts is low (fewer than 12) with probability of leakage from the rockets minimal. (Soldier interviews and Dugway testing.)

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## Flyouts

*Several soldiers reported seeing up to a dozen rockets flying from the pit area during the demolition. We believe the number of flyouts was low because most of the charges were placed on the warhead area of the rocket, which would not have ignited the motor. Charges placed on the motor end probably would have caused most of the rockets to fly into the embankment. Those rockets that did fly out of the pit area generally would not have the*

*proper stability, optimum launch angle, or even the normal thrust in some cases to go any appreciable distance.*

*We modeled several rocket flyout possibilities. Although the maximum range of the rocket is 18 km, we don't believe any flew that far. Pictures after the demolition show most of the rockets have a band or clamp on the tail stabilizing fins--rockets launched without fin deployment probably would fly only 2 to 4 km. With the fins deployed, the rockets could reach 5 to 15 km.*

*The plume from the amount of agent released from the rocket flyouts should have been small. A drop test at Dugway Proving Grounds showed that the rocket would bury itself about 30 feet below ground level without spilling any agent. We believe that the longer range flyouts would have buried themselves also. If one of the rockets did spill the agent, the general population limit would be perhaps 50 m wide and extend downwind about 1 km. We have not shown any flyouts in our plumes because:*

- *US tests on 115-mm rockets showed that most flyouts went only 200 meters and that the maximum range was 2 km--within our estimated plumes.*
- *We do not believe any actually burst.*
- *We would not be able to determine where they actually impacted.*

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We feel confident that the model paradigm is consistent with UNSCOM information, soldier photos, and conservative assumptions. For example, the proportion of rockets whose agent was not affected during our ground testing (56 percent) closely matched the 708 filled rockets UNSCOM found after the demolition (56 percent). Also, examination of the three known postdemolition pit photos of the rockets show very little damage with only 4 out of 36 rockets (11 percent) showing obvious damage (figures 12 and 13).

## **Evaporation Testing Recognized as Critical**

The large percentage of agent leaking into the soil and wood increased the importance of additional work conducted at Dugway and Edgewood laboratories. The tests were initially planned at Dugway and Edgewood to be performed on soil but, on the basis of the Dugway ground testing results, were expanded to include wood. These tests began by spilling the sarin and cyclosarin mixture onto wood and soil, respectively, and then measuring the rate at which the agent evaporated. The tests also were designed to closely replicate conditions in

the pit, including:

- Sarin and cyclosarin--not simulants--were used in a 3:1 ratio.
- Soil, including some from Iraq, which was assessed to be similar to pit sand, was obtained for the tests. We tested pine, a common wood used for 122-mm rocket boxes.
- Tests simulated the wind speeds most likely present during the pit demolitions. Different temperature ranges were used to cover the range of daytime and nighttime temperatures in the pit.

### Figure 11 Agent Disposition in Gallons

The plot in figure 14 presents the results of the Dugway laboratory tests, which provided the more conservative results of the two laboratories. Of particular interest, most of the chemical warfare agent evaporated during the first 10 hours. Thereafter, with a significantly decreased surface area from spillage, the release was slow, and significant portions of the agent stayed in the soil and wood. In addition, tests of the soil at Edgewood indicated that about one-eighth of the agent degraded in the soil in the first 21 hours.

## Using an "Ensemble" of Models

While multiple efforts already discussed significantly reduced uncertainties in the input parameters for modeling the chemical warfare agent release, uncertainties in the results of long-range transport and diffusion also arose because of the relatively limited meteorological data in the region, the complexity of the modeled phenomena, and limitations and differences in the various models. To address these uncertainties, the DoD/CIA modeling team used a variety of models in several different combinations as recommended by the Institute for Defense Analysis review panel.

### Figure 12 Postdemolition Photo of Stack 9 in Pit at Khamisiyah

The models chosen are highly versatile advanced atmospheric and transport and diffusion modeling systems. Because all models have relative strengths and weaknesses, we used multiple models to reconstruct the event. This strategy also helped identify any model-induced (as opposed to data-induced) uncertainties. Figure 15 depicts the interrelationship of the models in this effort.

## Meteorological Reconstruction

Determining accurate regional-scale meteorological fields for several days is crucial for modeling the transport of nerve agent in the atmosphere. Because a comprehensive set of local and regional observed weather conditions was not available, the IDA panel recommended using several different wind field modeling techniques to assess the sensitivity and robustness of dispersion results. Accordingly, the DoD/CIA team attempted to reconstruct the weather conditions on 10 to 13 March 1991 to the highest fidelity possible. This reconstruction consisted of regional (mesoscale) weather model predictions with data assimilation of all available observations, including those from global-scale (synoptic) sources. The meteorological reconstruction drew upon the following:

- Operational global observational data (although relatively sparse in the Persian Gulf region) available during March 1991.
- Additional observational data from the Persian Gulf region not operationally available in March 1991. These data include delayed Saudi surface and rawinsonde (formerly known as *radiosonde*) data, declassified surface data collected by USAF and Special Forces in the Khamisiyah region, declassified Navy Ship Data, and satellite data.
- Archived global forecast fields generated by GDAS during March 1991 using operational data, or global reanalysis with a current model (NOGAPS) assimilating operational data mentioned in the first two bullets. These analyses combined observational data with results of global forecast models at six-hour intervals to predict wind fields at local and regional levels.
- Local and regional predictions, using three independent models: COAMPS, OMEGA, and MM5. These models use large-scale observations and calculations from the global GDAS and NOGAPS models to initialize and set boundary conditions. Using these initial constraints and local effects, these models predict the wind speeds and directions at any point in the region. (Local effects include such influences as moisture variations due to marshes, local terrain, and the Persian Gulf sea breeze.) All models used by the DoD/CIA team include planetary boundary layer dynamics because they dominate the transport and diffusion of the agent cloud.

**[Figure 13](#)**  
**[Debris From 9-Rocket Demolition at Dugway](#)**

## [Figure 14](#) [Total Sarin and Cyclosarin](#)

## [Figure 15](#) [Multiple Mathematical Models/Modelers Used in Various Combinations](#)

Several variations using the meteorological models were conducted to investigate the relative contributions of observational data and global-scale predictions to the dispersion of the agent from the pit. For example, NRL performed multiple variations of the meteorology with the NOGAPS/COAMPS pairing. These included a "baseline" run, where the NOGAPS global input to COAMPS was held constant; "data denial" runs, where meteorological observation data were ignored; and a "random perturbation" run, where generated local "observations" were randomly changed to represent observational error. In order to examine other model-induced effects, both OMEGA and MM5 were initialized with different global-scale drivers; OMEGA driven by GDAS (in addition to NOGAPS) and MM5 driven by GDAS and ECMWF.

## [Validation of Predicted Meteorological Results](#) [Against Observations](#)

The low-level wind directions generated by the multiple meteorological variations were compared to the soot vectors described earlier. The predictions from the models were generally consistent for a majority of variations.

Smoke dispersion from the Kuwaiti oilfield fires also was used to test the consistency of the meteorological variations with observed data. Figure 16 shows satellite imagery of these smoke plume trajectories over the Persian Gulf region on 11 March 1991. The heat from the fires caused the smoke to rise rapidly and to be transported in the planetary boundary layer as well as the troposphere. Because the smoke absorbed heat from the sun as well, only an indirect comparison could be made with the model predictions, which do not include this effect. Most of the resulting smoke trajectories capture the general characteristics of the oilfield fires.

On the basis of the results of the comparison to soot patterns and the oilfield fires, the NOGAPS/COAMPS, GDAS/OMEGA, and GDAS/MM5 linkages were chosen as the baseline simulations for the dispersion calculations. These simulations gave the most realistic predictions, given their consistency with observed weather conditions.

## **Modeling the Transport and Diffusion of Chemical Warfare**

## Agent

All transport and diffusion models used in this effort (SCIPUFF, VLSTRACK, and NUSSE4) characterized the detonation using 13 stacks distributed over a 300-meter-long line. For modeling purposes, the masses associated with each stack were considered to be spaced at even intervals. The initial release height was assessed to have been about one meter, or about halfway up the stacks. The release from all stacks was judged to have occurred simultaneously. Each of the 13 stack locations resulted in an initial 6-kg vapor puff and an initial 6-kg liquid droplet mass. The liquid droplets had a mean size of 550 microns. The models (SCIPUFF, VLSTRACK, NUSSE4) then followed the agent cloud according to their respective algorithms.

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## Model Selection

*We chose these models on the basis of several criteria. First, the level of fidelity had to be adequate to resolve important features of the event. For example, the transport and diffusion models had to be able to accept updates from weather models at intervals on the order of every hour. Also, operational regional weather models must handle planetary boundary layer transport and resolve the effects with sufficient fidelity to meet the requirements for the Khamisiyah event. Secondly, the models must have been subjected to various stages of validation against known analytic solutions, well-studied idealized atmospheric flows, and observational data. Where appropriate, nonlinear simulations from the models should have been compared with results from other models accepted in the meteorological community. Thirdly, the transport and diffusion models must have demonstrated previous application to chemical warfare agent dispersion problems and include a satisfactory agent database. Finally, the models must be off-the-shelf, configured to respond to the rapid timetable and data needs imposed by the humanitarian urgency of this project.*

*Establishing linkages between weather and transport models is critical and was emphasized by the IDA panel. Attempts by CIA's contractor, SAIC, in 1996 to model the pit used the analytical linkage between the OMEGA weather model and the VLSTRACK transport and diffusion model to drive the NUSSE4 transport and diffusion model. NUSSE4 had an established but unique ability to handle multiple agents, which was the case with the Khamisiyah rockets. Efforts to expand the analysis of the pit in 1997 focused on enhancing other linkages. The Defense Special Weapons Agency (DSWA) linked the OMEGA and COAMPS mesoscale models and SCIPUFF--a DSWA transport and diffusion model. SCIPUFF has been demonstrated and validated in a test series at the White Sands Missile Range. The Naval Research Laboratory (NRL) teamed with the Naval Surface Weapons*

*Center (NSWC) to link the COAMPS model with the VLSTRACK dispersion model, which is widely used in the Navy and elsewhere in the military for tactical analyses and can accommodate varying meteorology. VLSTRACK was validated against sets of field trial data from at least 60 reports on chemical and biological agent and simulation releases. Recently it has also been the subject of an independent review by the National Oceanographic and Atmospheric Agency (NOAA).*

*In response to the IDA Panel's suggestion that an established non-DoD local and regional weather model be included in the effort to provide comparative results, NRL was also able to secure 48 hours of meteorological reconstruction generated by the MM5 model from the National Center for Atmospheric Research (NCAR).*

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The relative droplet mass is small--about 19 gallons--and the liquid droplets that comprise about half the initial chemical warfare agent cloud settle to the ground quickly. Once the liquid droplets reach the ground they spread, and the surface area from which the agent can evaporate increases. The subsequent release of agent, which comprised the bulk of the agent released into the atmosphere at Khamisiyah, included the evaporation from the liquid contamination as well as the persistent (over several days) evaporation from the absorbed liquid pools and saturated wood at the stack locations. Evaporation from wood and soil has been incorporated into each of the models to reflect the evaporation curves from the Dugway/Edgewood test results. The specific results from the Dugway evaporation tests (rather than the Edgewood results) have been used in order to err on the side of conservatism.

**[Figure 16](#)**  
**[Meteorological Satellite Image of Kuwaiti Oil Fire Plumes, 11 March 1991](#)**

In addition, the diminution of the ground-level vapor agent concentration as it is transported downstream is entirely due to assessed changes in regional meteorological conditions, basically shifting winds and turbulent mixing. Depletion mechanisms such as agent degradation (for which modelers could not agree on a rate), photolysis, and vapor deposition were not used. The combined effect of these phenomena would be to diminish and limit the extent of the plume especially in the case of long-range transport, perhaps by as much as 40 percent. In addition, scattered rain showers in the area on 11 March, which could have caused additional hydrolysis, were not incorporated into our modeling effort because we could not be confident of their location. This more conservative approach is warranted, given that the primary value of the modeling effort was to provide medical and epidemiological researchers with this important tool.

## Estimate of the Plume: A Composite of Multiple Models

Uncertainties in the plume's trajectory are heavily dependent on the amount of meteorological data available. In addition, performing similar trajectory analyses with different dispersion models could lead to different conclusions. Therefore, the DoD/CIA modeling group chose to present a composite or union of five different meteorological/dispersion simulations--representing the outermost perimeter of all models overlaid--in order to define the extent of the plume. These five simulations, all of which use the baseline meteorological fields, are:

- NOGAPS/COAMPS/SCIPUFF.
- GDAS/OMEGA/SCIPUFF.
- GDAS/MM5/SCIPUFF.
- NOGAPS/COAMPS/VLSTRACK.
- GDAS/OMEGA/NUSSE4.

Turbulence-induced uncertainty is inherent in an atmospheric modeling effort. It particularly affects the predicted dosage levels. Models generally account for this by predicting that there is a 50-percent probability that a specific dosage level will fall within a given contour. In our effort, we modified the models to broaden the contours so that they predict that there is a 99-percent probability that a specific dosage will fall within a given contour, further increasing our confidence in the outcome.

## The Plume and Potential Troop Exposure

### Dosages, Concentrations, and Limits

We decided to depict two levels of potential exposure in our modeling (note: a dosage is the amount or concentration of the agent to which a person at that location is exposed over a specific period of time):

- *First noticeable effects.* This is the dosage that would be expected to cause watery eyes, runny nose, tightness of chest, muscle twitching, sweating, and headache. Increasingly higher dosages would produce vision impairment, incapacity, and death.

- *General population limit.* The dosage below which the general population, including children and older people, could be expected to remain 72 hours with no effects. (See figure 17 on toxicity.)

### Figure 17 Sarin Toxicity

To understand the magnitude difference between the levels, note that the general population limit dosage (.01296 milligram-minute per cubic meter) is one-eightieth of the dosage expected to produce noticeable effects (1 mg-min/m<sup>3</sup>). But the area between these levels, which we will call the area of low-level exposure for this report, is the area for which medical research is needed. The exposure at Khamisiyah was relatively brief, measured in hours, not weeks, as would be the case with low-level occupational exposures. The coordinated efforts of VA, DoD, and HHS are ensuring research into better understanding this exposure issue.

## **Last Year's 50 Kilometers and 20,000 Troops**

Last October, when it became clear that meaningful modeling of a potential release from the pit had come to a halt, DoD used the first noticeable effects limit to define a circle around Khamisiyah. On the basis of available literature and discussions with experts, DoD determined that one would have expected to see noticeable effects within 25 km of the demolition. Given the uncertainties at the time, DoD doubled that, and it was assessed that roughly 20,000 troops were within the 50-km circle so defined. DoD used this assessment as a basis for mailing almost 20,000 surveys in an attempt to get additional information from the people that had been near Khamisiyah at the time of the demolition. DoD received 7,400 responses to the surveys, with over 99 percent showing no physical effects that could be correlated with exposure to the chemical warfare agent sarin.

Figure 18 depicts the Kuwaiti Theater of Operations with last year's 50-km circle around Khamisiyah and DoD's current understanding of military unit locations. Each dot represents where company-size units were located based on DoD's S3-G3 conferences. These conferences helped develop much better fidelity on the locations of troops, allowing DoD to move from battalion-level accounting to company-level accounting. While that has been completed for all of XVIII Airborne Corps, it is not complete for the VII Corps. The S3-G3 conference for VII Corps is scheduled for September. The analysis that follows uses battalion-level data for the VII Corps; with more refined data the numbers are likely to be slightly lower.

### Figure 18

## [Unit Locations](#)

### [10 March 1991](#)

#### [Khamisiyah Pit Demolition](#)

## **The Plume Over Four Days**

A closer look at the area with figure 19 shows the area of first noticeable effects on the first day (from 4:15 p.m. on 10 March 1991 to 3:00 a.m. on 11 March). This area is well within DoD's 50-km first-effects area from last year's survey effort.

The next map (figure 20) shows a closer view of the first-effects portion of the plume, which is about 20 km long and five km wide. No military units were located under the first-effects portion of the plume, which is consistent with the lack of reported effects and with DoD's survey results, which had over 99 percent of the respondents showing no signs of physical effects that could be correlated with exposure to sarin. The troops that performed the demolition had evacuated the area. As stated earlier, we know that one soldier involved in the demolition drove briefly through the smoke from the explosion. He had no ill health effects.

The small, 1.5-km-long peanut shape near the pit represents the area where DoD believes chemical alarms would have gone off had they been used. A note of caution, however: all plume areas depicted in this report are based on dosage levels--concentrations over time. The alarms are designed to go off based on concentrations, recycling every 20 seconds, that would cause incapacitation or death.

## [Figure 19](#)

### [Day 1](#)

#### [10 March 1991 Modeled Exposure](#)

#### [Khamisiyah Pit Demolition](#)

The offshoot portion of the plume is a product of using a composite or union approach in our modeling. While all five models produced first effects plumes for the first day that pointed south; one model also depicted a portion of the plume moving to the southeast. Our inclusion of the latter model graphically illustrates our approach in drawing the outer boundary of the overlaid plumes.

The next map (figure 21) shows the first-effects plume for the second day. It is an area about six km across and six km deep. This is the result of a smaller area being generated by the evaporation of agent from the soil and wood. This evaporation is a critical component of the plume, making up almost 90 percent of the plume. We would not have expected the

evaporation from the wood without the Dugway testing. We had thought there would be an instantaneous release into the atmosphere with some evaporation from the soil, but the Dugway testing showed that the spill into the wood and subsequent evaporation would be a very important factor.

By the third day, as the next map (figure 22) shows, the evaporation is not producing dosage levels above the first noticeable effects limit. However, the evaporation makes the low-level event last a few days.

## **Figure 20**

### **Day 1**

#### **10 March 1991 Modeled Exposure**

#### **Khamisiyah Pit Demolition**

Figure 23 depicts the low-level exposure area, extending to the general population limit, for the first day. The wind has driven the chemical cloud south-southwest, extending almost 300 km and into Saudi Arabia. This potentially exposed almost 19,000 troops to low levels of chemical warfare agent. Remember that this plume is the composite of five models; the plumes from each individual model predicted smaller exposure areas. We used the composite approach to increase our confidence that the resulting plume would be our best estimate of the potential area covered, taking into account individual model biases. This approach was critical for notifications and for future epidemiological studies. However, we do not expect that everyone under the composite plume was exposed.

The map for the second day (figure 24) shows the effects of significant wind changes, thickening the plume and shifting it toward the west. This is the day of the highest potential low-level exposure, possibly affecting 79,000 troops, including some at King Khalid Military City. The initial cloud continued to move downrange, and the constant evaporation of agent from the sand and wood continued to refresh the plume, sending new tendrils from the pit.

By the third day (figure 25), the agent in the atmosphere in the south had dispersed to levels below the general population limit. Evaporation continued to feed the plume, which, because of additional wind changes, was moving several directions, predominantly up the Euphrates valley. Up to 3,300 troops were exposed on this day.

## **Figure 21**

### **Day 2**

#### **11 March 1991 Modeled Exposure**

#### **Khamisiyah Pit Demolition**

The map for the fourth day (figure 26) shows a small plume from evaporation moving to the northeast, potentially exposing two battalions of troops there, about 1,600. After that, any additional evaporation did not exceed the general population limit.

## Figure 22

### Day 3

### 12 March 1991 Modeled Exposure

### Khamisiyah Pit Demolition

The table reflects the daily totals. As already indicated, no units appear to have been exposed to dosages causing first noticeable effects. Moreover, the daily numbers for low-level exposure do not sum to the total exposed population, because some troops would be counted on multiple days. The total, eliminating double-counting, is nearly 99,000.

---

**US Forces Potentially Exposed to Nerve Agent** *Number of troops by day*

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Date	Day	First Noticeable Effects	Low Level (a)
March 10	1	0	18,814
March 11	2	0	79,058
March 12	3	0	3,287
March 13	4	0	1,638

(a) Because people are counted on multiple days, the numbers do not sum to the total exposed population of **98,910**.

## Next Steps

### **Epidemiological Work**

The plume developed by our modeling efforts constitutes our best estimate of the potential exposure and will become a critical input for continued medical and epidemiological research. The concentrations and dosages people were potentially exposed to are essential to some of that work. The maps in this paper reflect only two levels of dosage and were developed using one location for a unit each day, even though we know they were moving. For the detailed epidemiological work ahead, each plume's dosage contours will be provided, and DoD will develop profiles for individual units that show their exposure over time--both with the concentration they had at any point in time and with the cumulative dosage. That will become a part of the ongoing medical research program. The number of troops who have been exposed to very low levels remain a concern, both immediately and in the long run. We need to understand, through our epidemiological and medical work, the effects of low-level chemical exposure for our veterans now and for the future.

### [Figure 23](#)

#### [Day 1](#)

#### [10 March 1991 Modeled Exposure](#)

#### [Khamisiyah Pit Demolition](#)

## **Continued Support to the Veterans**

DoD has sent two different letters of notification. The first were to the 99,000 that were under the composite plume, indicating that we believe they may have been exposed to low levels of chemical warfare agent. Current medical assessments suggest that there are no long-term health consequences, but that if veterans have any concerns, they should contact DoD or VA. The second letter went to those who received one of the 20,000 surveys last year but were not under our modeled plume. That letter indicates that our best assessment suggests that they were not exposed.

As we have stated, if anyone who served in the Gulf has any concern about their health, whether they were at Khamisiyah or not, they should be examined at a DoD or VA facility. Hotline numbers are 1-800-796-9699 and 1-800-PGW-VETS, respectively. We will answer questions and ensure that the callers get the medical treatment they need and deserve. Those desiring to contact CIA for questions on modeling or other issues in which intelligence support could help, call the Agency's Public Affairs number: (703)482-0623.

### [Figure 24](#)

#### [Day 2](#)

#### [11 March 1991 Modeled Exposure](#)

#### [Khamisiyah Pit Demolition](#)

**Figure 25**

**Day 3**

**12 March 1991 Modeled Exposure**

**Khamisiyah Pit Demolition**

**Figure 26**

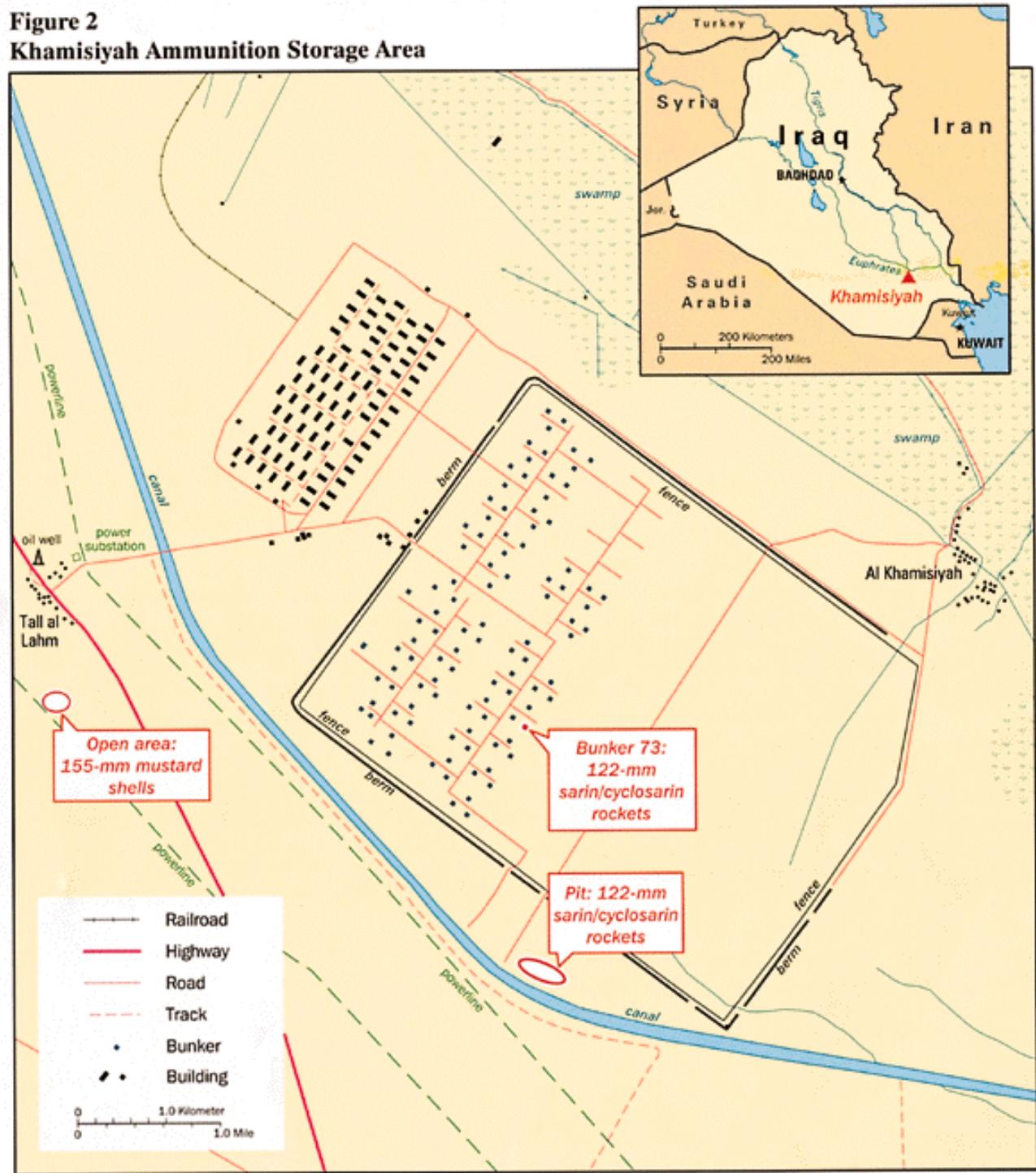
**Day 4**

**13 March 1991 Modeled Exposure**

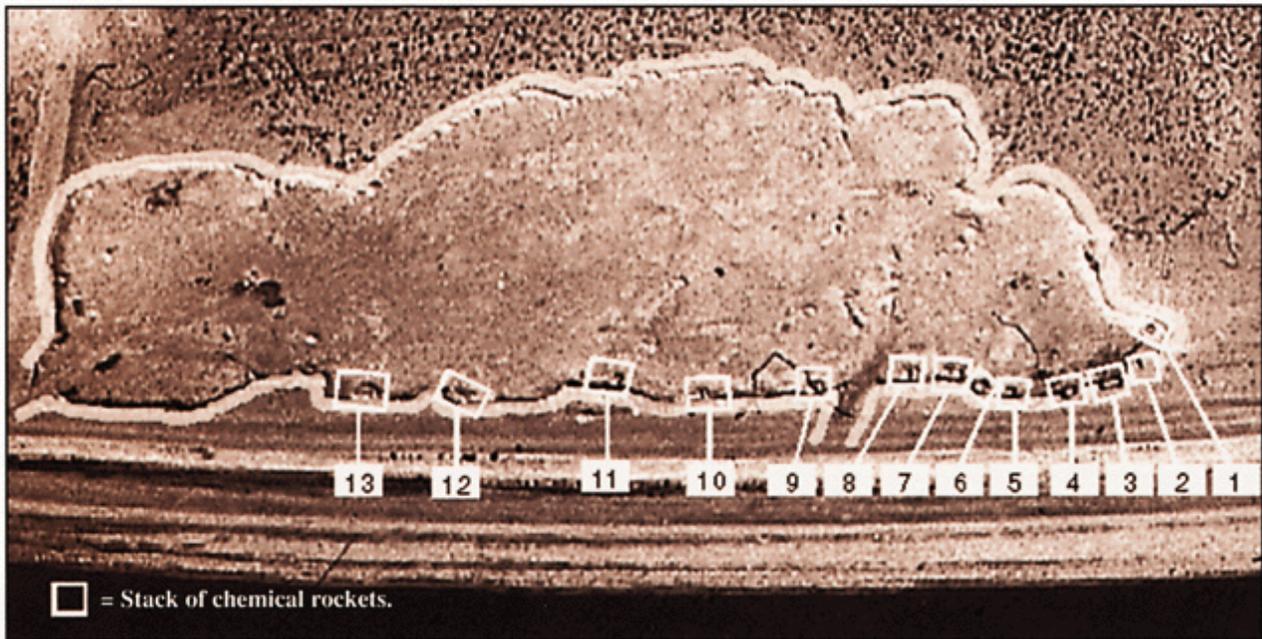
**Khamisiyah Pit Demolition**

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**Figure 2**  
**Khamisiyah Ammunition Storage Area**



**Figure 3**  
**Predemolition Photo of Pit Area Near Khamisiyah**



Unclassified

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**Figure 4**  
**SAKR-18 Inserts Obtained**  
**by UNSCOM**



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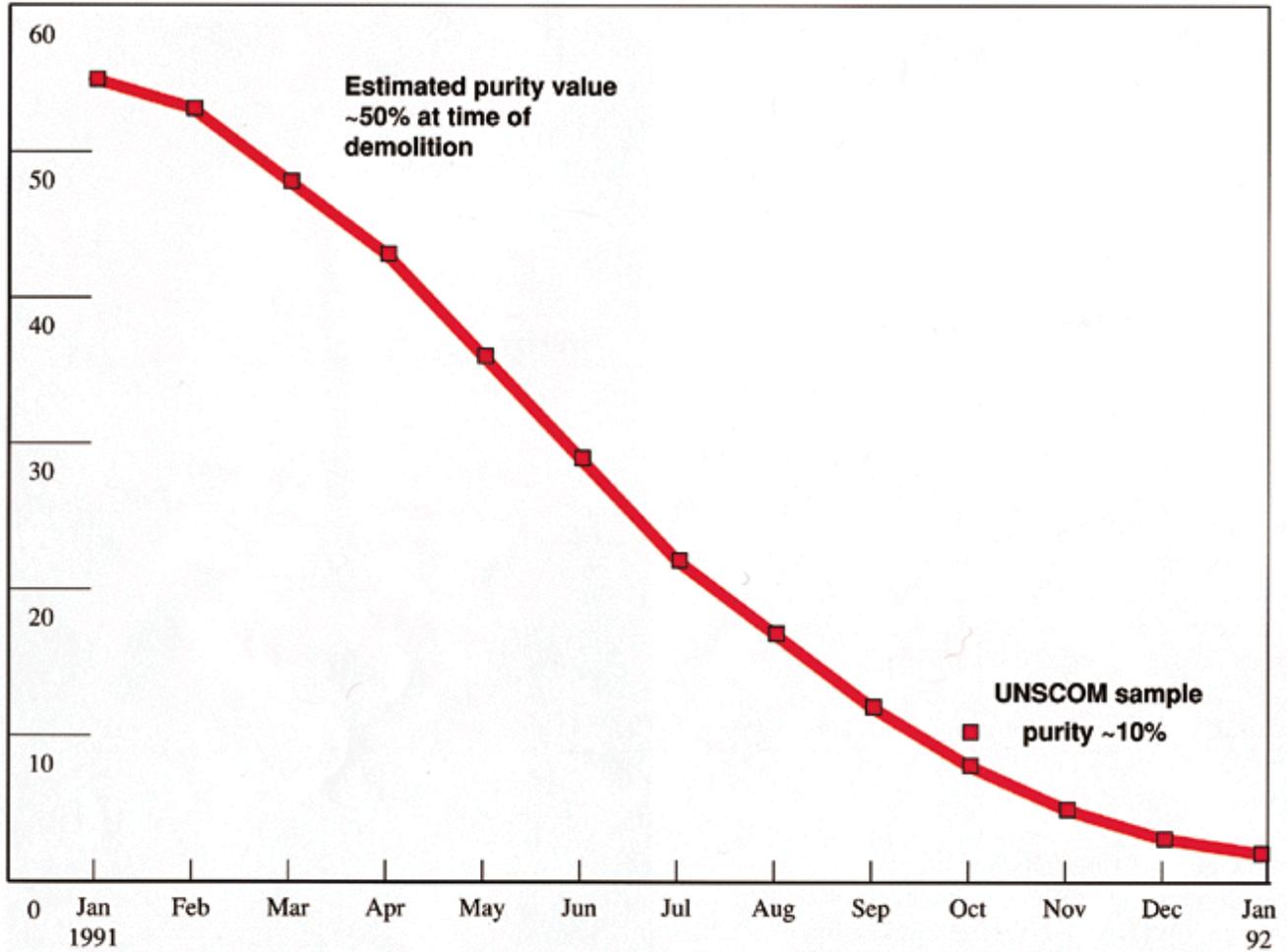


Unclassified

359459PM6 7-97

**Figure 5**  
**Degradation of Combined G-Agent**

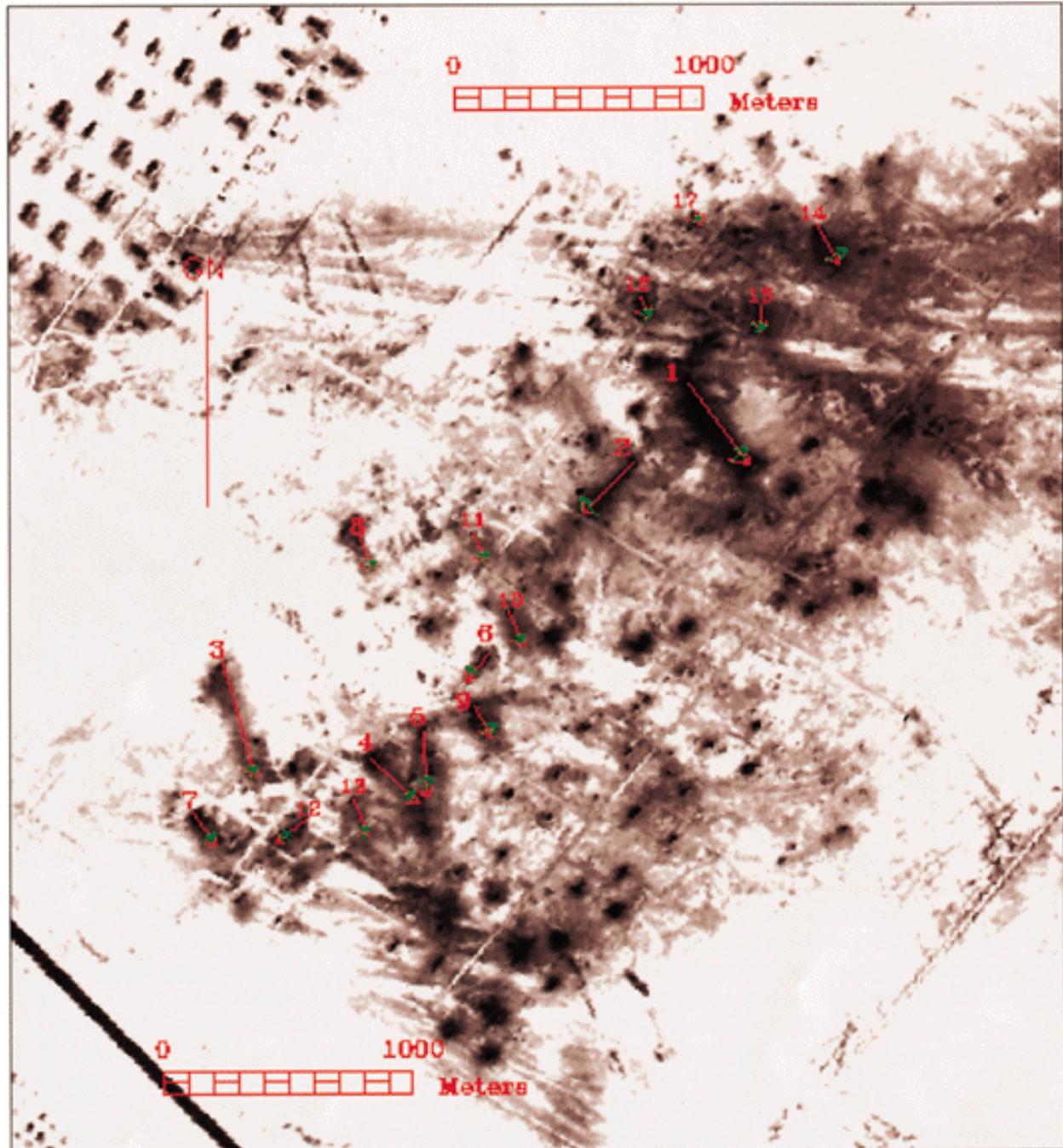
*Purity of agent*



Unclassified

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Figure 6  
Khamisiyah Bunker Soot Patterns—10 March 1991



Unclassified

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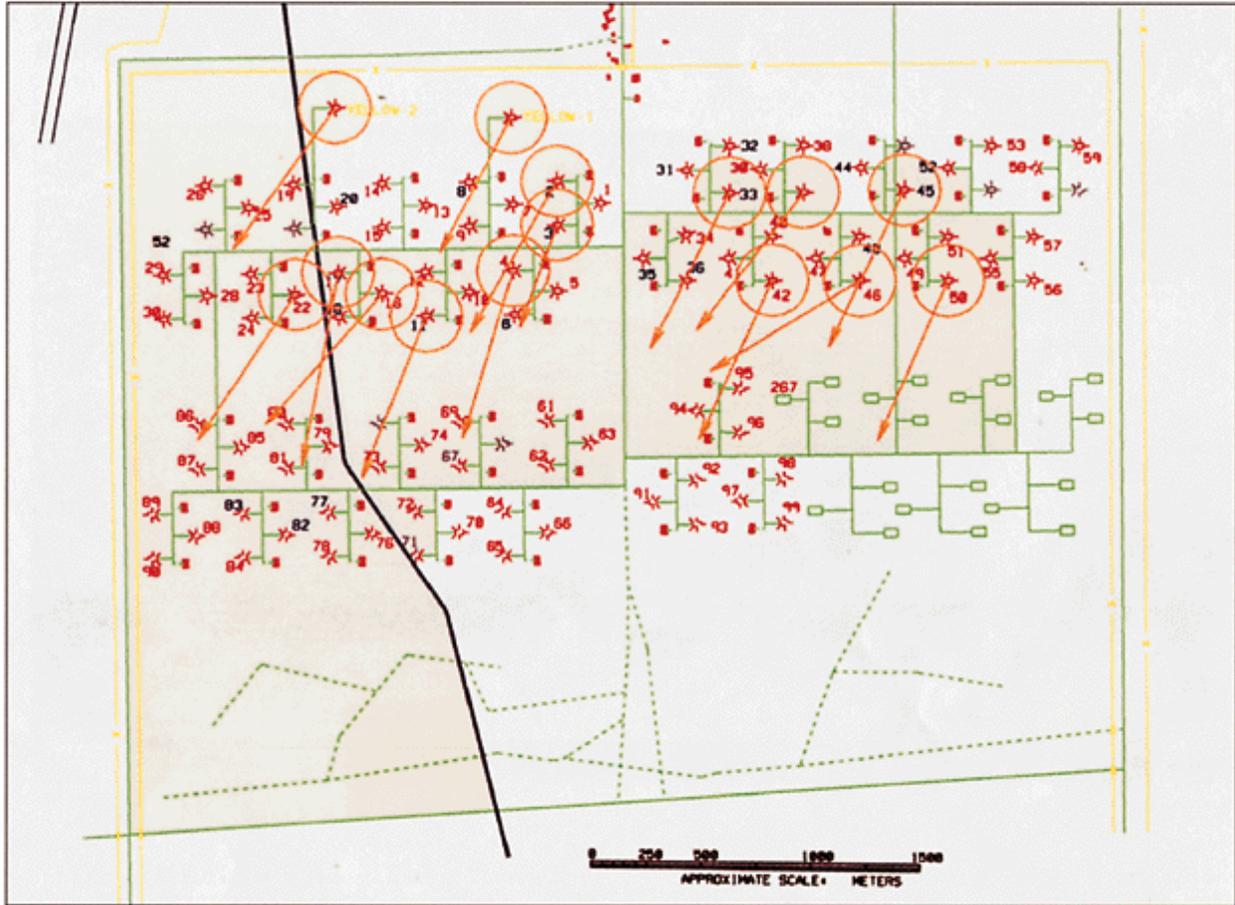
**Figure 7**  
**Helicopter Photo of Bunker 16—September 1992**



Unclassified

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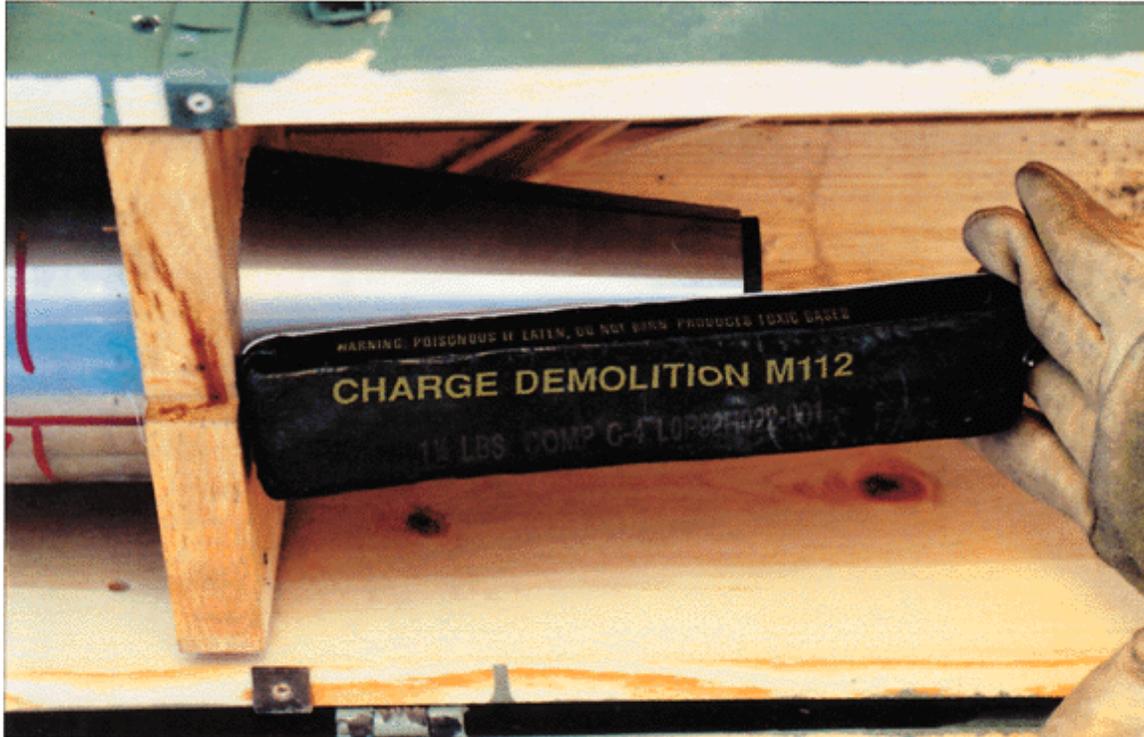
**Figure 8**  
**Khamisiyah Bunker Soot Azimuths**



Unclassified

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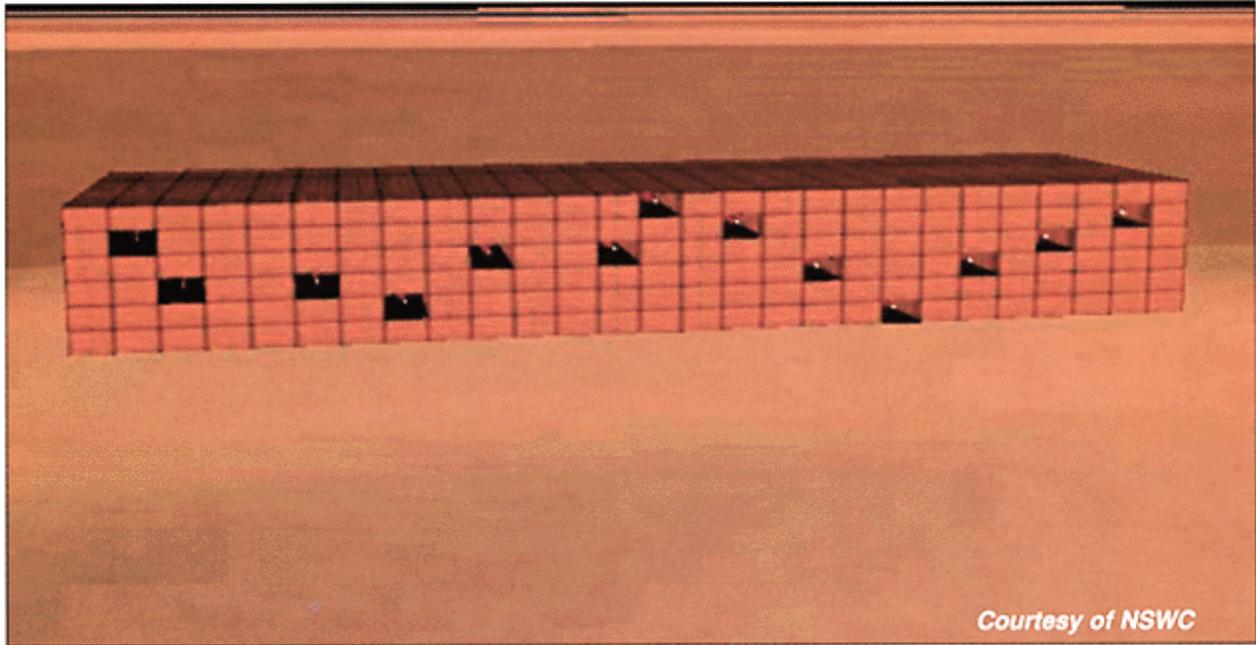
**Figure 9**  
**Placement of C-4 Charge**  
**on Warhead, Dugway**



Unclassified

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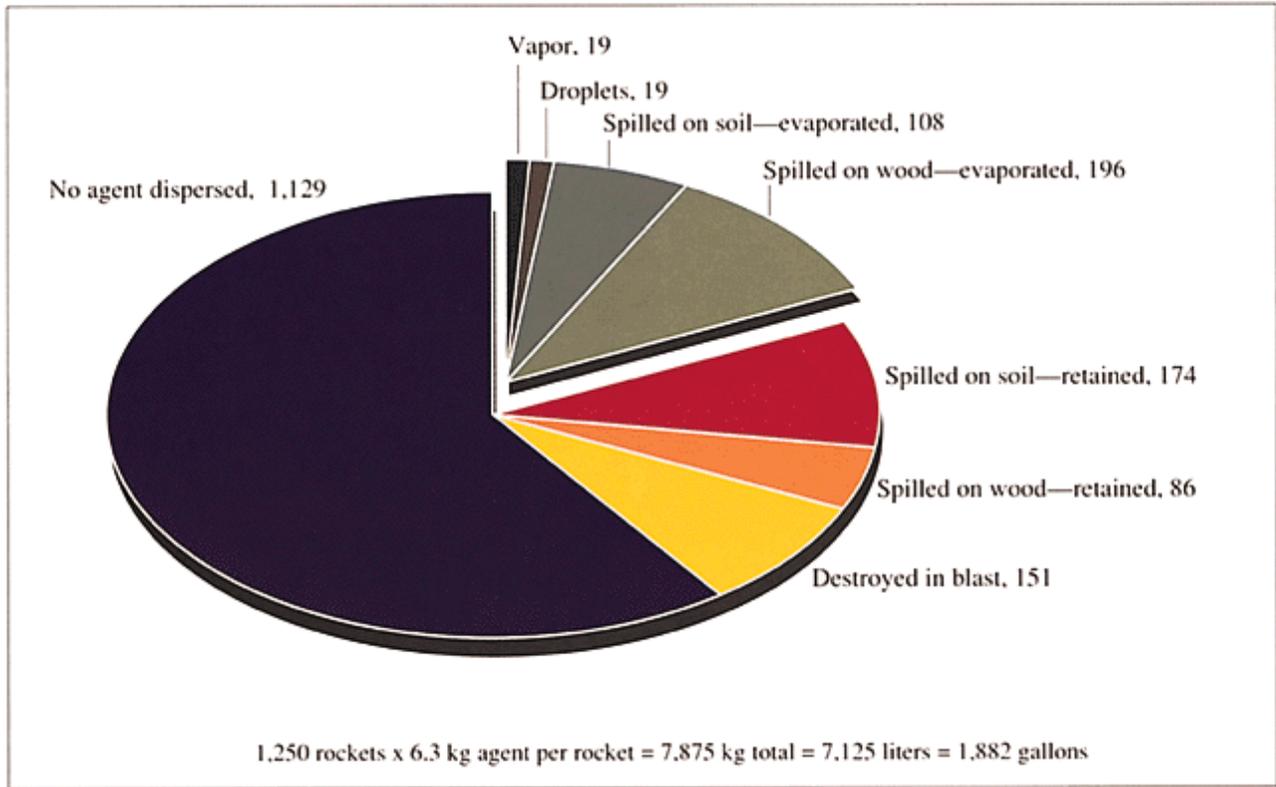
**Figure 10**  
**Representation of Charges**



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**Figure 11**  
**Agent Disposition in Gallons**



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**Figure 12**  
**Postdemolition Photo of**  
**Stack 9 in Pit at Khamisiyah**



Unclassified

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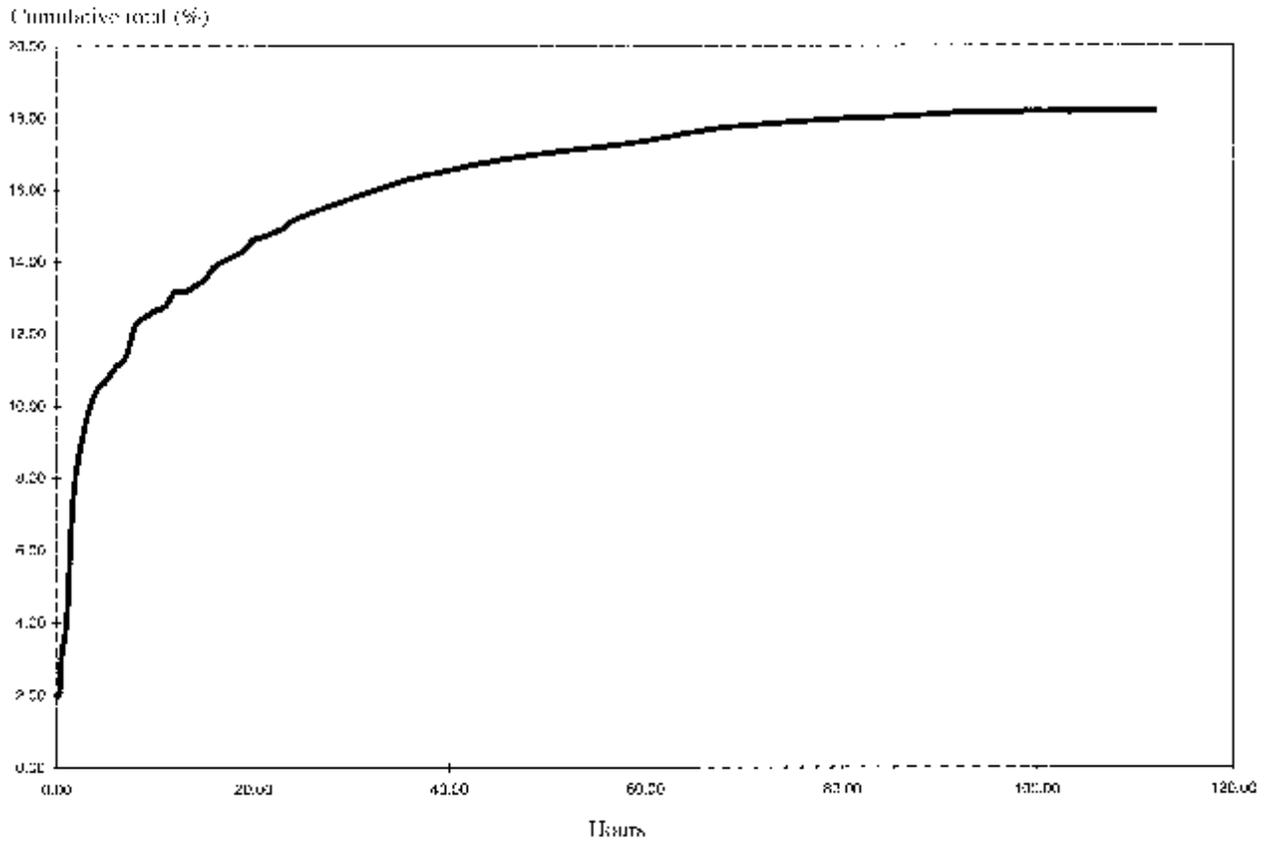
**Figure 13**  
**Debris From 9-Rocket Demolition at Dugway**



Unclassified

359468PM6 9-97

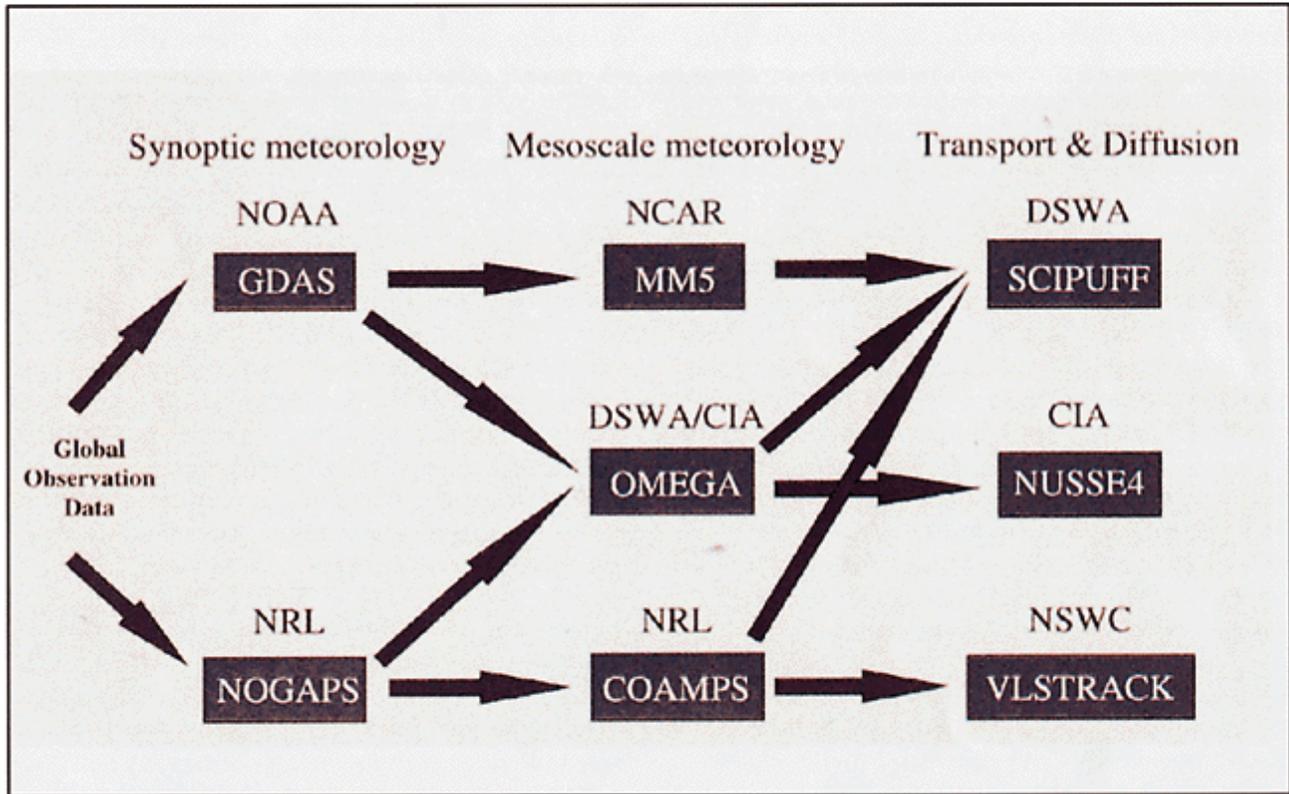
**Figure 14**  
**Total Sarin and Cyclosarin**



Unclassified

30/04/2003 12:47

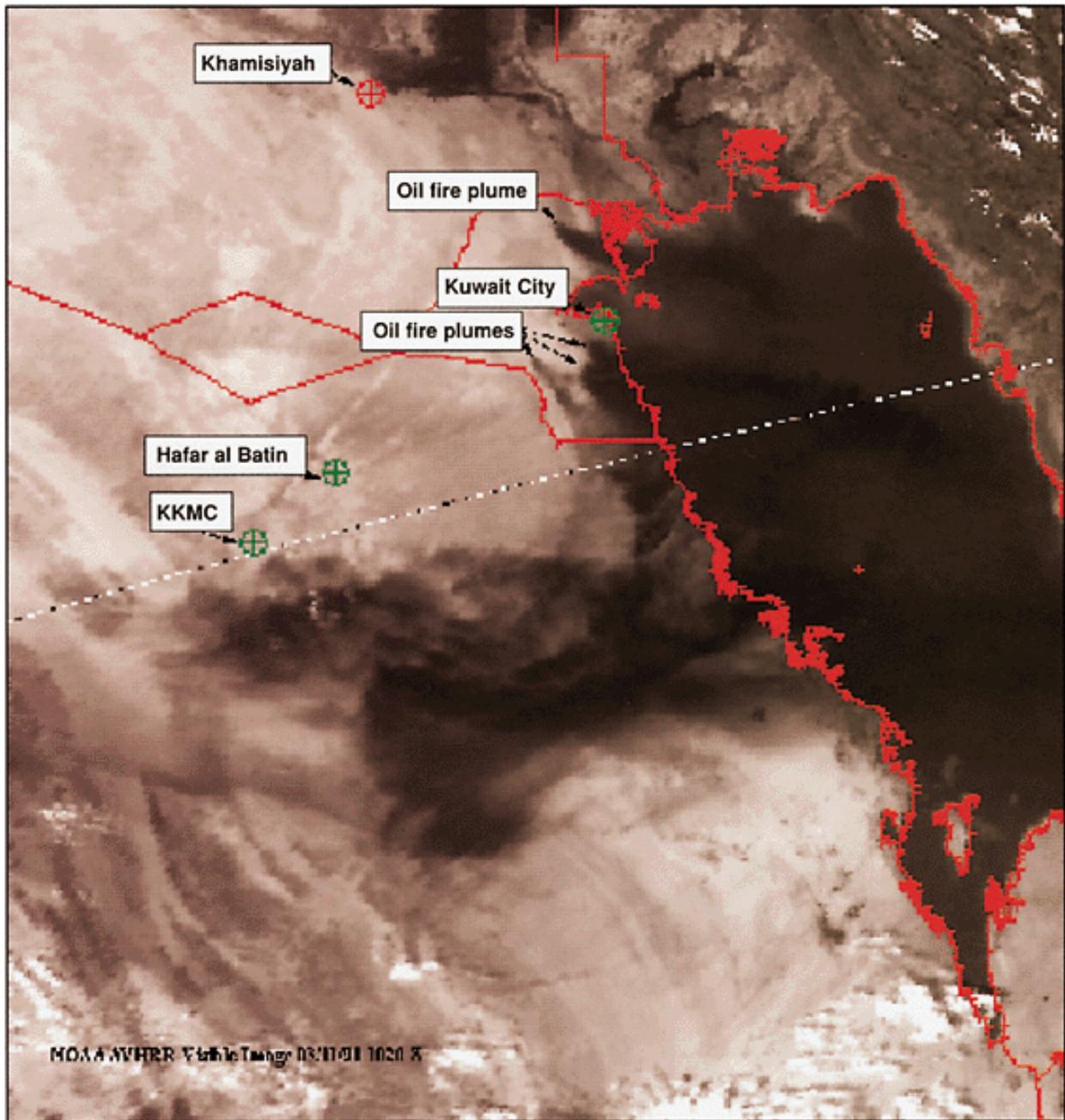
**Figure 15**  
**Multiple Mathematical Models/Modelers Used in Various Combinations**



Unclassified

359470PM6 9-97

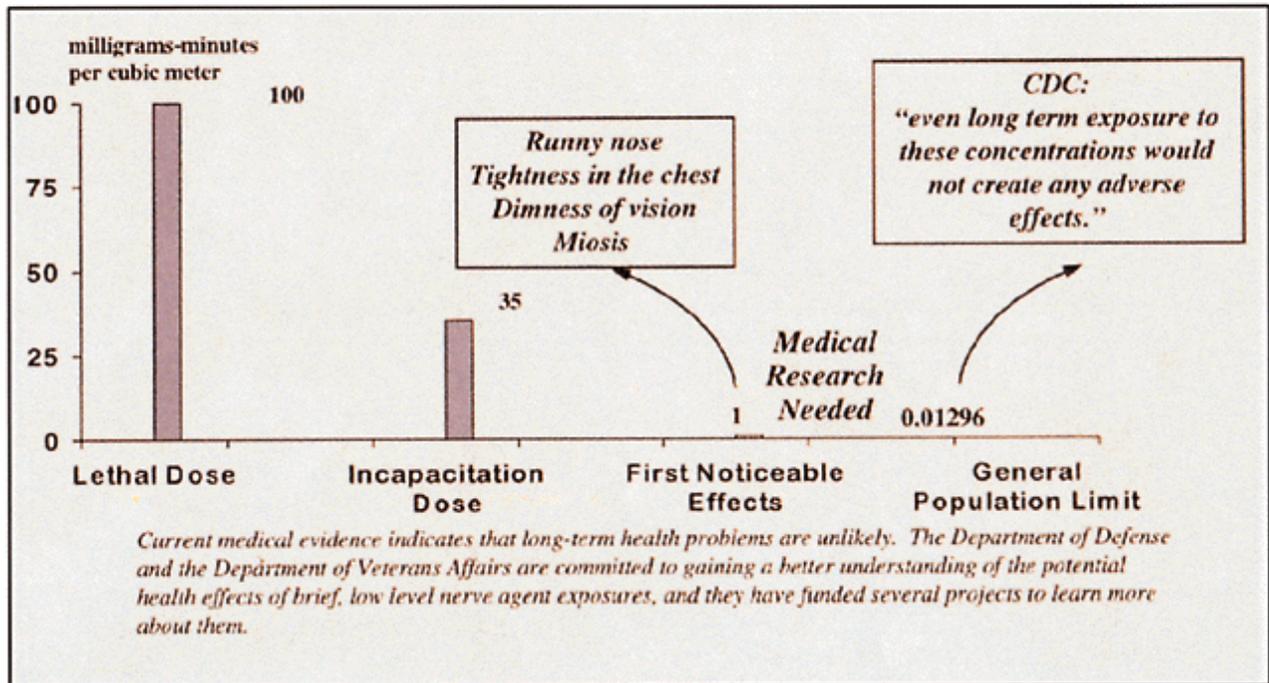
**Figure 16**  
**Meteorological Satellite Image of Kuwaiti Oil Fire Plumes, 11 March 1991**



Unclassified

359458PM6 9-97

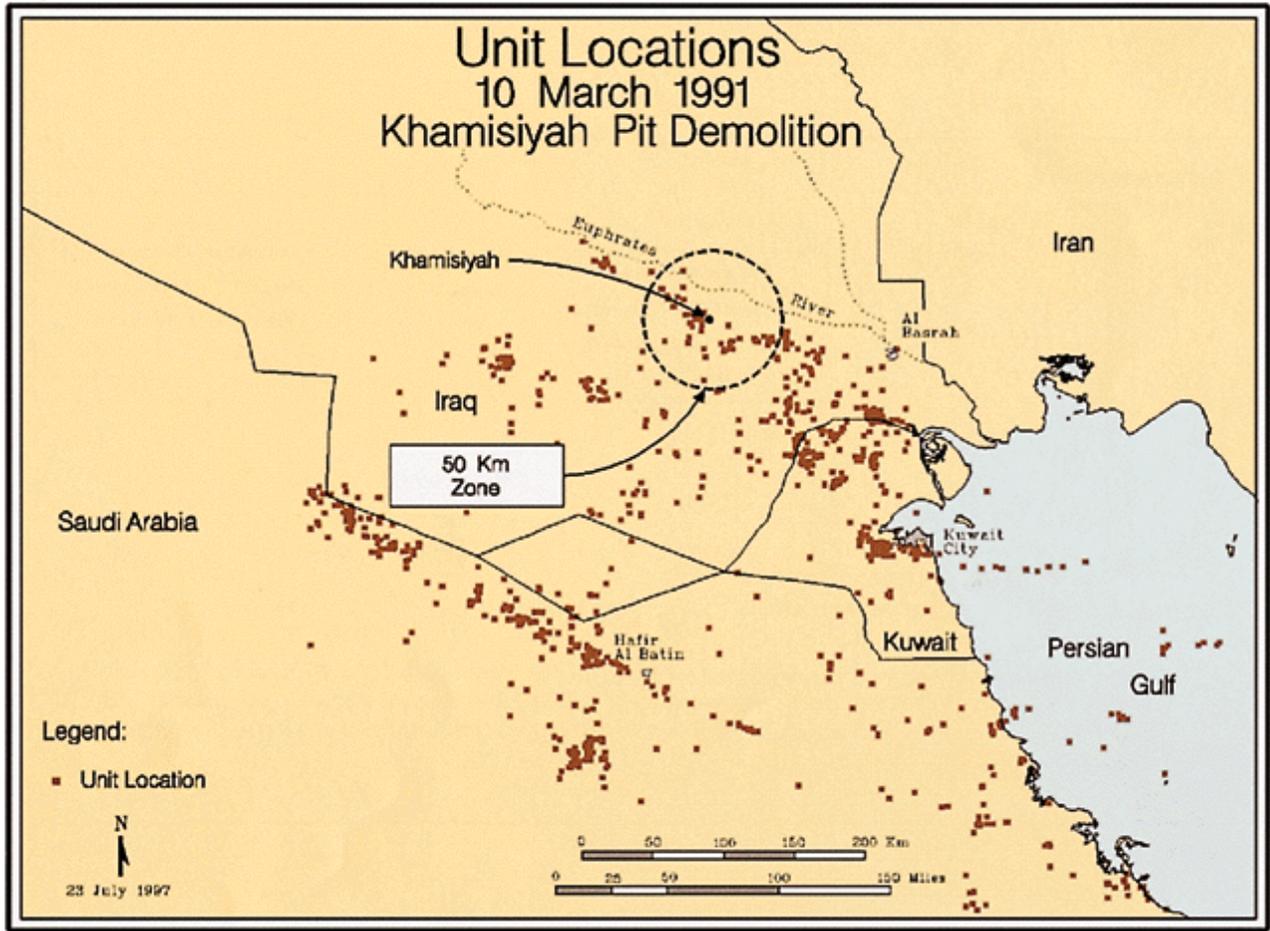
**Figure 17**  
**Sarin Toxicity**



Unclassified

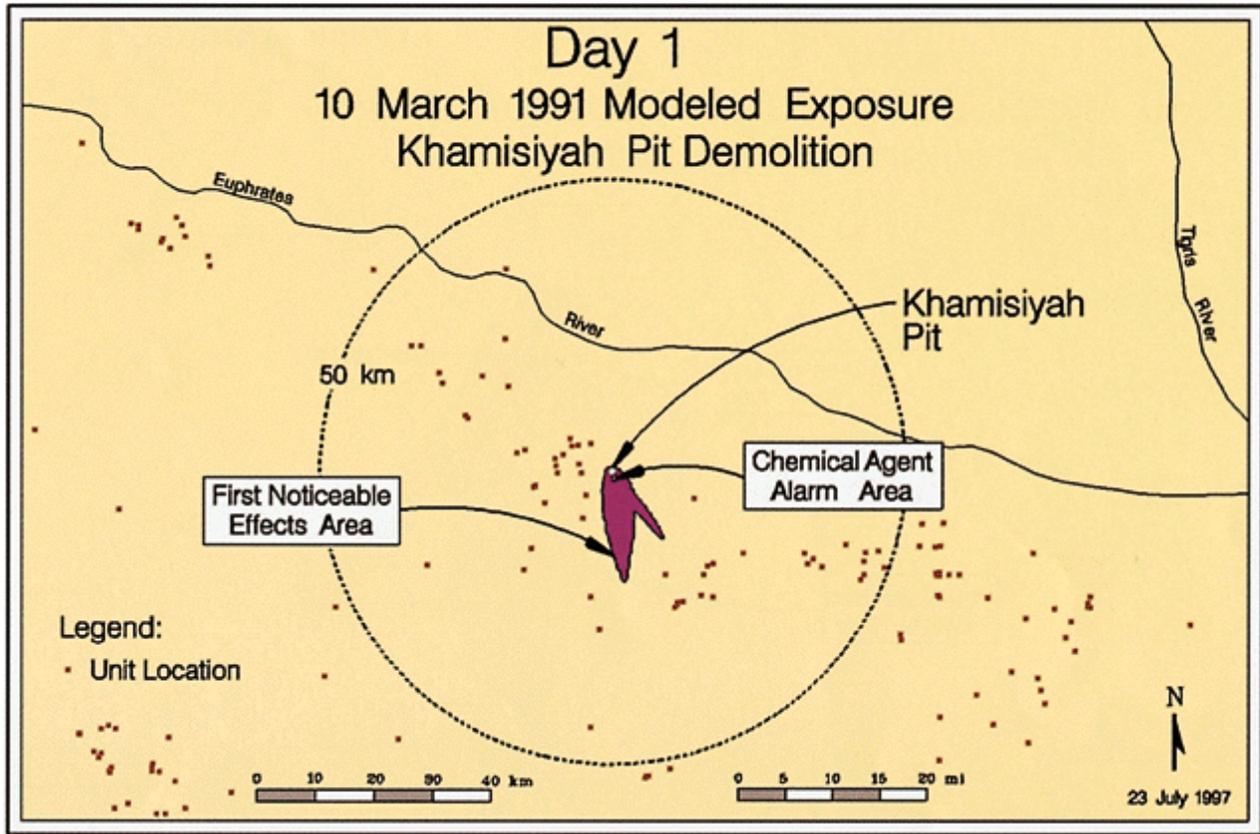
359457PM6 9-97

Figure 18



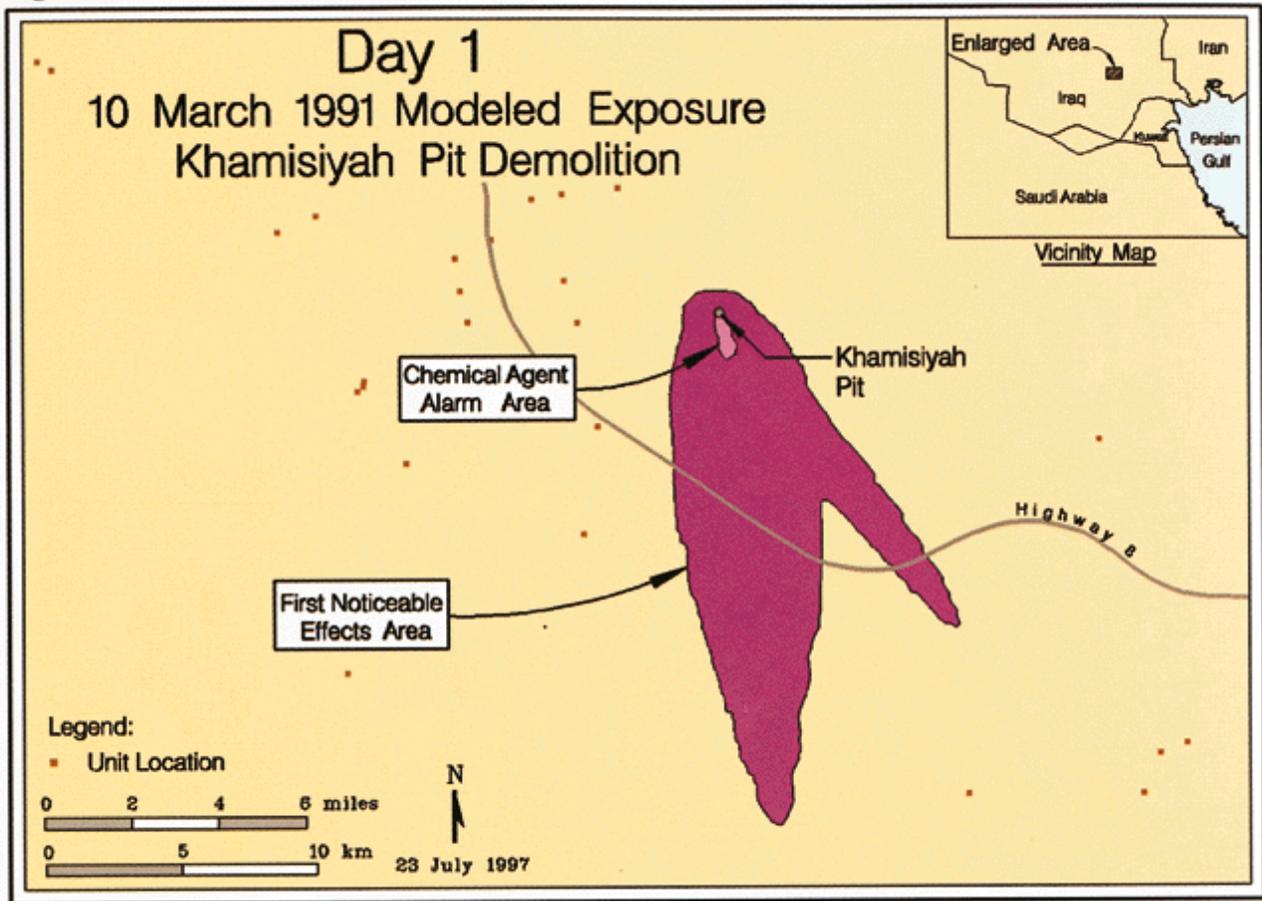
359472PM6 9-97

Figure 19



359473PM6 9-97

Figure 20



359474PM6 9-97

Figure 21

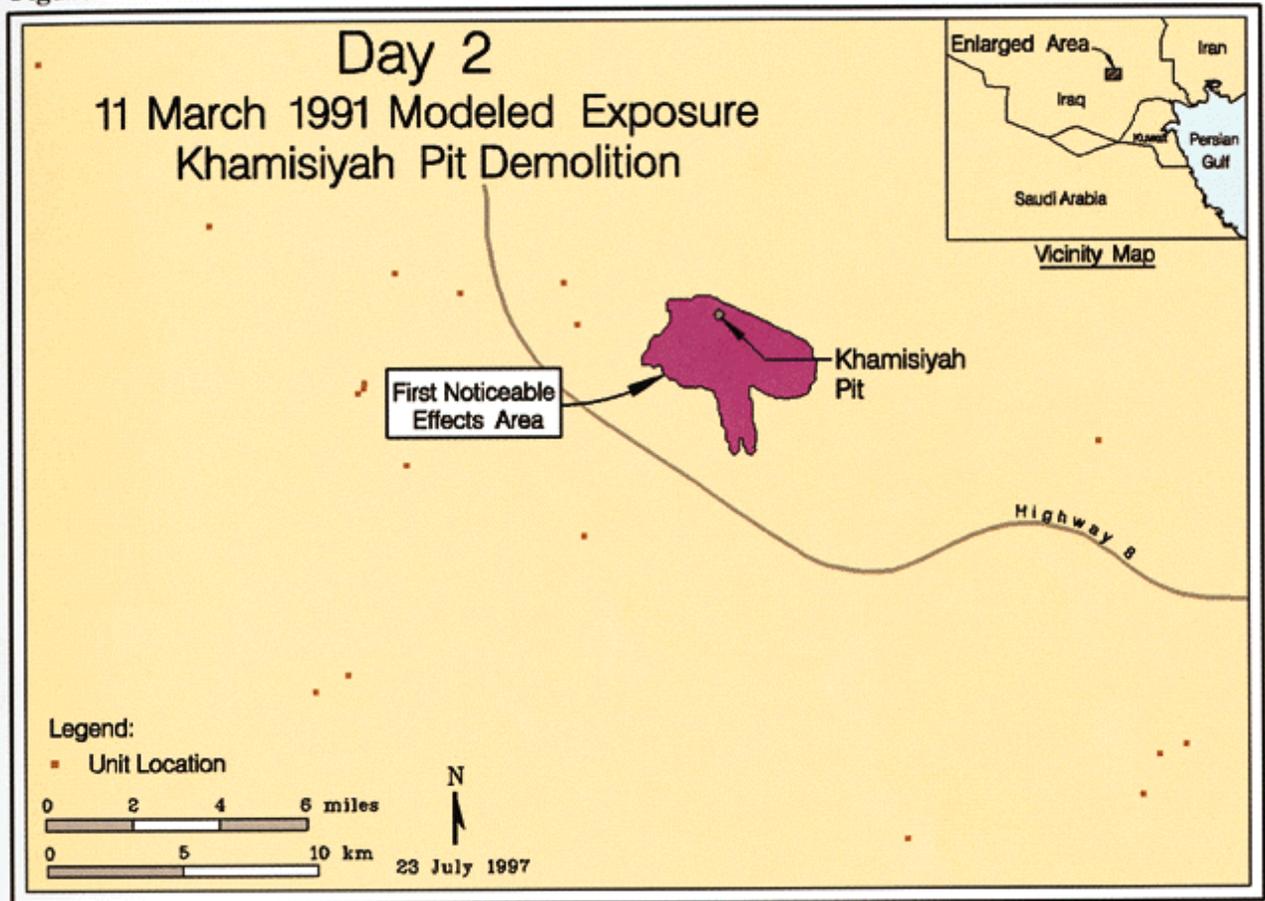
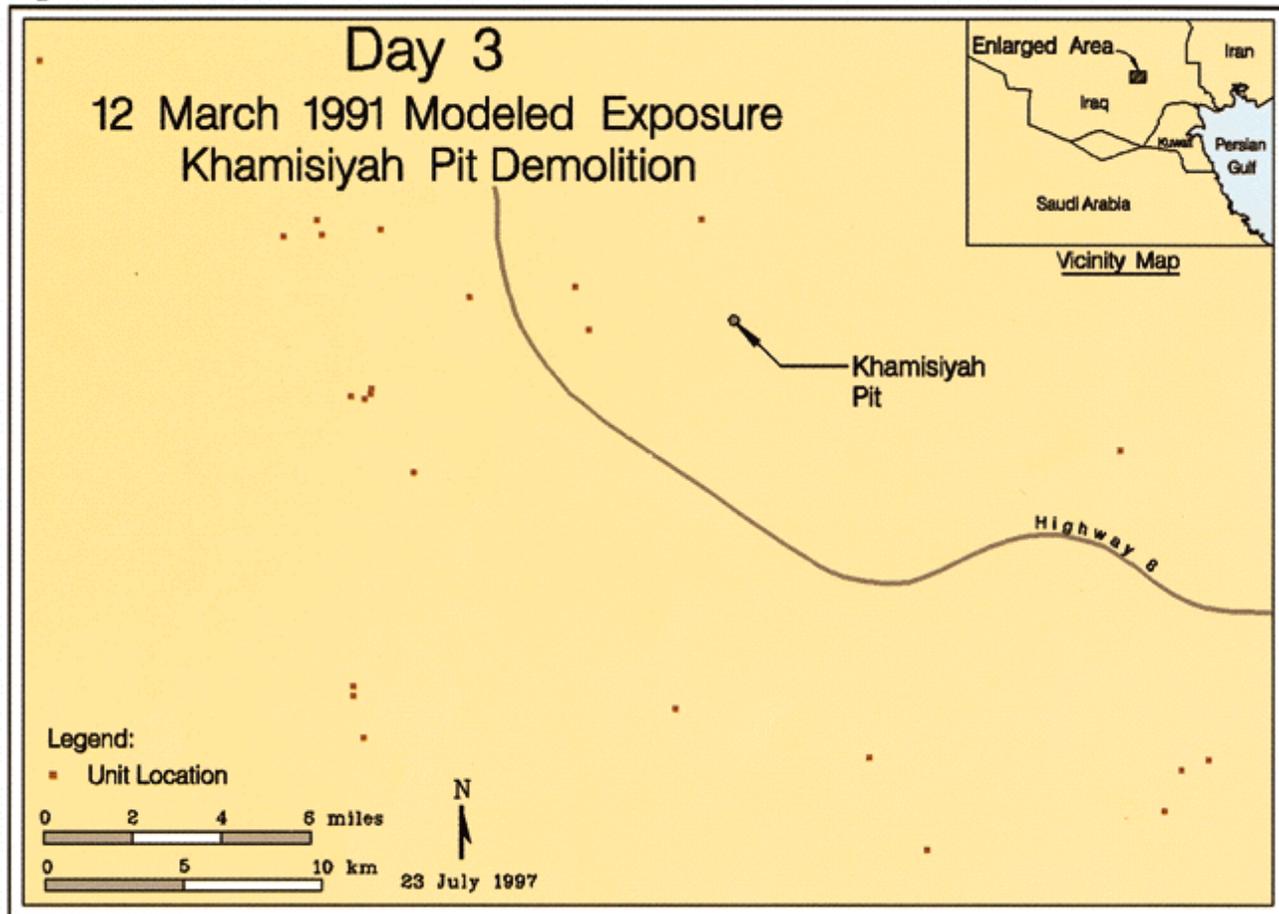
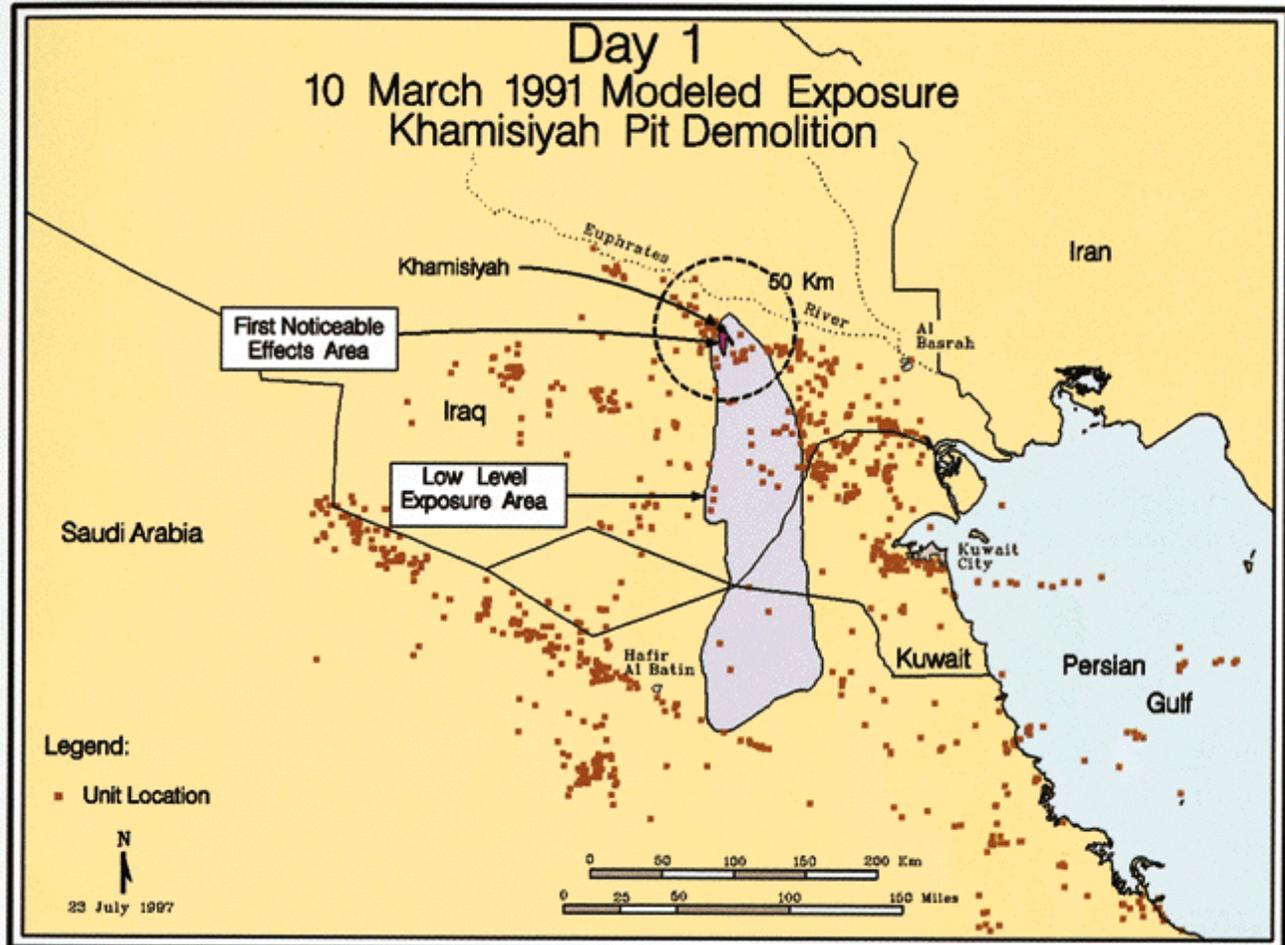


Figure 22



359476PM6 9-97

Figure 23



359477PM6 9-97

Figure 24

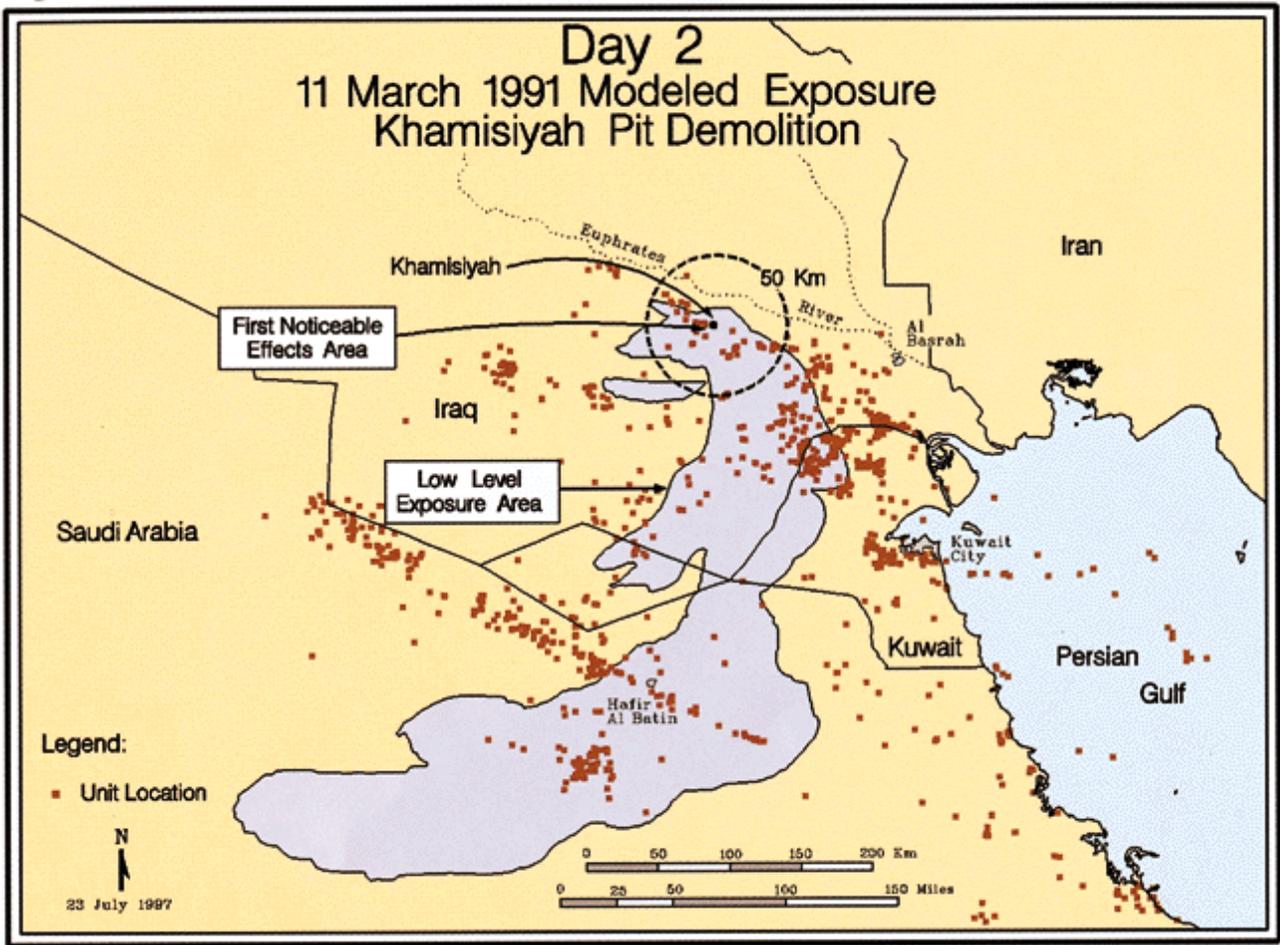


Figure 25

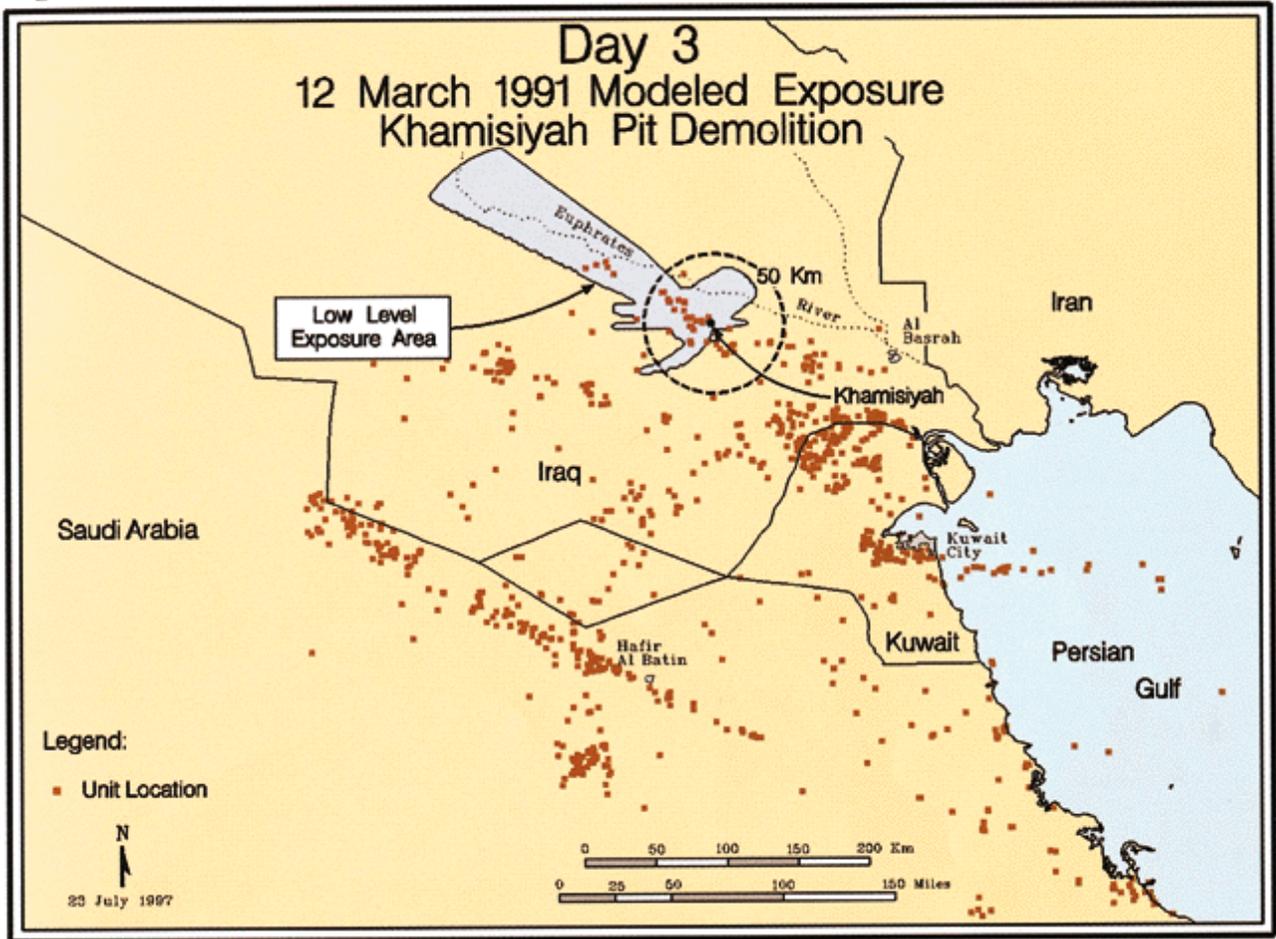
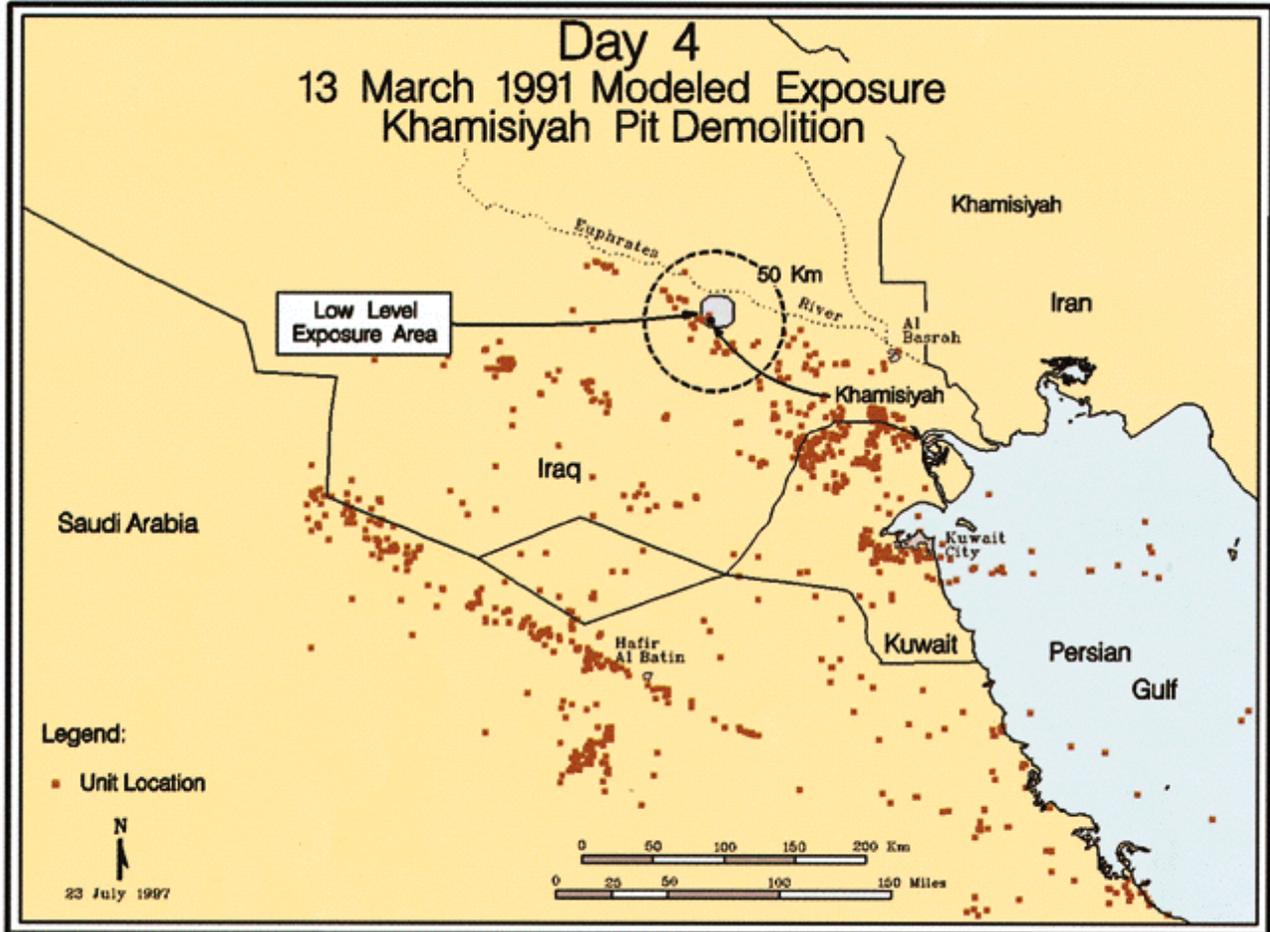


Figure 26



359480PM6 9-97



# **Status of the Efforts of the DCI Persian Gulf War Illnesses Task Force**

**A Statement for the Record by Robert D Walpole Special Assistant to the DCI  
for Persian Gulf War Illnesses Issues Central Intelligence Agency to the  
Presidential Advisory Committee on Gulf War Veterans' Illnesses  
4 September 1997**

When George Tenet appointed me his Special Assistant earlier this year, he tasked me with managing and reviewing all intelligence aspects related to the Persian Gulf war illnesses issue with the goal of "getting to the bottom" of it. I committed to him and myself that I would be completely honest and as thorough as humanly possible. I have stood by that commitment, sometimes brutally so. In the course of our efforts to date, we have:

- Reviewed the previous search criteria;
- Conducted broader searches;
- Ensured the passage of classified material to DoD and others;
- Supported ongoing modeling efforts;
- Implemented a comprehensive communications strategy with this committee and others;
- Continued to manage declassification efforts; and
- Provided and continue to provide analyses of relevant information.

Early on, we discovered that this effort could not be simply one of declassification. We must go beyond that, and measure our success by looking at the breadth of our efforts; counting only the number of documents released to date, or measuring how quickly we have done so, would be short-sighted.

This is the first time the Agency has fully integrated an analytical component into the task force. With this analytical team, we are able to run to ground every thread of interest uncovered on the issue and to prepare papers providing the analytical context surrounding relevant material. For example, the large amount of information we have released the past two months on Ukhaydir is based on UNSCOM information and new analysis of older raw intelligence. Releasing older documents on Ukhaydir that do not contain information pertinent to the illnesses issue would be of no value to the veterans. On the other hand, the analytical documents we have prepared are of significant value.

This broader approach is designed in part to discover and illuminate any evidence about the potential exposure of US forces to chemical weapons or other hazards; to facilitate inquiries into those potential exposures; and to ensure the honest review of the information surfaced in government investigations.

We directed components to conduct new searches for relevant documents employing broader search terms and time periods than previously used.

Components captured over a million documents as a result. As you can imagine, searching a decade's worth of material using over 20 pages of broad search terms, we captured many documents that are not only unrelated to veterans' illnesses, they are not even related to the war. For example, the word 'facility' captured numerous unrelated documents. We used this broad approach to hedge against anything being missed.

One of the reasons we broadened the search criteria was to create a larger net to capture documents for DoD for its potential use in case studies of Gulf war illnesses issues. We have not read them for relevancy; rather, we are making them all available to DoD. In that manner, any documents that have not already been declassified that DoD wishes to use in unclassified studies in the future will be reviewed by CIA for release to the public.

Another reason the task force broadened the search criteria was to create a pool of documents for its own searches for additional documents pertinent to veterans' illnesses--most of the documents released to date relate to Khamisiyah. The task force is currently conducting analyses related to potential causes of the illnesses--biological, chemical, radiological, environmental factors, and foreign reported sicknesses. These analyses are being used to generate tailored search criteria to review the million-plus documents to identify those that contain information pertinent to illnesses issues. Pertinent documents will be reviewed for release. As necessary, additional analytical papers will be prepared by the task force to place released documents or other material into an understandable context.

Probably no one in this room could wish more than I that we had been able to move faster than we have. Six months ago I naively thought that we could complete our task in 60 days as originally announced. That simply has not been the case, but I believe anyone aware of our activities recognizes that we have proceeded at a rapid pace and accomplished a significant amount to date. While I do see a light at the end of the tunnel, completing the critical declassification efforts as described above will take more time.

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# **16 Suspect CW/BW Storage Sites Identified in 28 February 1991 MARCENT Message**

**A Statement for the Record by Robert D. Walpole Special Assistant to the  
DCI for Persian gulf War Illnesses Issues Central Intelligence Agency to the  
President Advisory Committee on Gulf War Veterans' Illnesses  
4 September 1997**

Dr. Lashof, Members of the Committee, my next remarks will focus on our efforts related to the 17 locations (actually only 16 because of a duplication) listed in a 28 February 1991 MARCENT cable your staff mentioned in the Buffalo meeting. The cable indicates these sites were suspected to have possibly contained chemical or biological weapons prior to the ground war. Your staff had asked that we review

intelligence related to the sites and to MARCENT's indication of suspected chemical or biological weapons storage.

We are continuing to search for intelligence that might help the Departments of Defense and Veterans Affairs, as well as others, determine possible causes of Gulf war veterans' illnesses. Our effort includes searching for information on any site that would indicate the presence of chemical or biological weapons. So far, having looked carefully at significant amounts of relevant intelligence reporting, and having analyzed Iraq's deployment of chemical weapons, we assess that Khamisiyah and An Nasiriyah are the only two sites within the Kuwait Theater of Operations at which chemical weapons were stored during Desert Storm. We will continue to assess information on suspected chemical and biological weapons sites, and will inform this Committee, as well as other interested parties, if we find new information changing this assessment.

Now to the list of 16 MARCENT locations. As I indicated in Buffalo, a search of the Gulflink internet site shows that during the war there were many lists of suspect CW and BW sites:

- Each list was the result of analytical efforts from available information;
- None of the lists was based on definitive information;
- It is unlikely that anyone putting together the lists was certain that chemical weapons would be found at all of the sites. Most often each site was suspected as a potential storage location, and as such was included for targeting purposes.

We do not know what information CENTCOM considered in formulating the MARCENT list of suspect CW munitions storage sites. A review of information available to the Task Force on the 16 locations listed uncovered no evidence of equipment, structures, or unusual security that suggested the presence of CW munitions. (Coordinates given for two of the sites on the list were for the same facility.) These locations may be grouped into the following categories:

- Four large Iraqi-built field storage facilities with 50 to 225 revetments each;

- Six Kuwaiti-built permanent facilities taken over by the Iraqis (none appeared to be used for storage of Iraqi munitions);
- Five deployment areas for Iraqi motor transport units associated with logistic support (one of these was outside the MARCENT area of responsibility, just west of the Kuwait-Iraq border); and
- One location where there were no indications of munitions storage.

Additional information on each location follows:

**1. Ammo Storage Depot--Al Jahra (291903N 0473752E)**

This Kuwaiti-built facility contained 21 revetted storage buildings, but we have no evidence that the Iraqis used the depot for munitions storage during Desert Shield/Desert Storm.

**2. Ammo Depot--Al Ahmadi-Mirzaini (291241N 0480059E)**

This Kuwaiti-built munitions depot contained 19 revetted storage buildings and six small bunkers; we have no evidence that the Iraqis used it for munitions storage or any other purpose during Desert Shield/Desert Storm.

**3. POL/Ammo Depot--Kuwaiti Barracks (291402N 0480211E)**

This Kuwaiti garrison and logistic base, taken over by the Iraqis, contained six ammunition bunkers, three revetted fuel bladders, and numerous warehouses.

**4. Ammo Site--Permanent Site (291900N 0480000E)**

The geographic coordinates listed are for a residential area of Kuwait City, and we have no information on munitions storage in this vicinity.

**5. Ras Al Qulayah Ammo Storage Area (285300N 0481700E)**

This is an Iraqi-built storage facility with 51 revetments containing crated munitions. The storage facility probably supported Iraqi infantry divisions deployed in southern Kuwait. This is the same location as number 10 below.

**6. Ras Al Qulayah Central Ammo Depot (284938N 0481048E)**

This was a Kuwaiti naval weapons storage facility that supported vessels based at Ras Al Qulayah Naval Base. Although the facility was taken over by the Iraqis,

they apparently did not store munitions there, but an Iraqi infantry division headquarters unit may have occupied it. The facility contained six large bunkers, six groups of five contiguous small bunkers, six other small bunkers, and a bunkered ordnance checkout/assembly building.

**7. 13 Revetted Trucks (290400N 0480400E)**

These trucks belonged to subunits of either the Iraqi 5th Mechanized Infantry Division or an infantry division deployed to defend the central coast of Kuwait.

**8. Al Ahmadi Ammo Storage Area (290600N 0480400E)**

This large ammo storage area, constructed by the Iraqis during Desert Shield, contained 225 revetments; by early 1991, at least 190 of the revetments were filled with crated munitions.

**9. 34 Trucks (285900N 0475400E)**

These trucks were at a logistic base that supported the Iraqi 29th Infantry Division.

**10. 50 Large Revetments (285256N 0481649E)**

This is the same location as number 5 above; the two sets of coordinates refer to the same site.

*Note: In addition to the confusion associated with numbers 5 and 10 above, the CENTCOM/MARCENT list also attributes security features actually at number 6, Ras Al Qulayah Central Ammo Depot, to number 10, the "50 Large Revetments."*

**11. Ammo Staging Point (291520N 0480130E)**

Installations occupied by Iraqi forces in the vicinity of these coordinates included a military garrison and recreation area. Three preexisting bunkers in the garrison were the only indication of munitions storage in the vicinity.

**12. Ammo Dump (294400N 0474100E)**

The nearest Iraqi munitions storage facility, actually at 2946N 04741E, contained about 130 revetments (not covered) filled with crated munitions.

**13. 111 Covered Revetments (294700N 0474100E)**

The revetments at this facility were not covered; munitions were stored in 129 of 132 open revetments here.

**14. 88 Trucks (291342N 0472525E)**

These trucks probably belonged to a motor transport unit subordinate to the Iraqi 21st Infantry Division.

**15. Dibdibba Munitions Storage Depot (291149N 0472511E)**

We have no evidence that this Kuwaiti-built munitions depot, containing 40 revetted buildings, was used by the Iraqis for munitions storage during Desert Shield/Desert Storm.

**16. 30 Trucks (292000N 0473400E)**

These trucks belonged to subunits of either the Iraqi 1st Mechanized Infantry Division or the 15th Infantry Division.

**17. 107 Trucks (294500N 0485200E)**

These are coordinates for a logistic base that supported the Tawakalna Republican Guard (RG) Mechanized Infantry Division, deployed just west of the Kuwait-Iraq border; the trucks belonged to the motor transport unit subordinate to that division. (This location is outside the MARCENT area of operations.)

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# Maymunah Munitions Depot

**Background:** In various declarations since 1991, the Iraqis have indicated that chemical warfare munitions were at Al Muthanna, Fallujah, An Nasiriyah, Khamisiyah, Ukhaydir, and Maymunah. With the exception of the last site, we have discussed these facilities in various unclassified testimonies and papers. The paragraph below provides details on Maymunah comparable to information declassified on other sites where no chemical warfare agent release is judged to have occurred.

## [Map of Iraq](#)

**Maymunah Munitions Depot.** This well-secured munitions depot, about 10 km south of Al Amarah, was constructed during the late 1970s. It contains 32 bunkers. The Iraqis declared in June 1996 that 4,100 sarin-filled rockets were transferred to the depot during Desert Shield/Desert Storm. On the basis of its accounting efforts, UNSCOM assesses that these rockets were eventually moved to Al Muthanna. Other than the Iraqi declaration, we have no evidence that chemical warfare

munitions were stored at the depot. It was not on intelligence lists as a suspect chemical warfare munitions storage site before the war. Finally, we have no evidence that the depot was bombed during Desert Storm.

*Produced by the DCI Persian Gulf War Illnesses Task Force.*

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# Update on Potential Mustard Agent Release at Ukhaydir Ammunition Storage Depot

4 September 1997

## A Brief Review

In April 1997 while at Ukhaydir, UNSCOM inspectors found three 155-mm artillery rounds, which contained mustard, near a bunker that had been bombed during the Gulf war. The three rounds were located near the road in front of the bunker. More significantly, the road had been patched from an apparent bomb impact during the war. We assessed that bombing during the Gulf war could have released some mustard agent from this site.

We have reconstructed the chain of events for the damaged road and bunker at Ukhaydir. The bunker was attacked successfully on the night of 20 January 1991, resulting in a large fire as shown by a massive soot deposit. Because it was obvious to the Iraqis that the Coalition forces were targeting the bunkers, they probably moved all of their mustard rounds into open areas, such as the road along the front fence of the bunker. UNSCOM has never found any mustard rounds in the bunker, after three different inspections. We assess that the rounds on the road were hit, or at least disturbed, by a bomb near midnight on 13/14 February 1991.

## Number of Rounds Involved

Through Iraqi declarations and other sources, including UNSCOM inspections, we believe that 6,394 rounds of 155-mm artillery containing mustard were stored at the Ukhaydir Ammunition Storage Depot during the period from mid-January 1991 to as late as May 1991. These rounds were later moved to the Fallujah Proving Ground where 6,380 were counted by UNSCOM inspectors. (They were ultimately destroyed.) Most of the rounds were undamaged and painted gray. Those found at Fallujah included 104 fire- or heat-damaged gray or green rounds, 10 of which still contained mustard; and 117 green rounds, 10 of which contained agent. The Iraqis asserted that the 104 burned rounds were damaged at the Muthanna State Establishment; they did not indicate where or when the green rounds had leaked. This leaves a potential for a maximum of 212 rounds to have been affected by the bombing, including 11 rounds not recovered by UNSCOM (6,394 minus 6,383).

## Current Thinking on Agent Release

We have applied multiple transport and diffusion models to this issue, although we have not completed the ensemble modeling with DoD comparable to the Khamisiyah effort. More significantly, so far we have used only one of the two regional-scale meteorological models from the Khamisiyah effort. Once the other model supplies its weather predictions, we will be able to complete the full ensemble and increase our confidence in the overall results.

**20 January.** Any mustard rounds near the bunker on 20 January would have been severely damaged by the Coalition air attack and subsequent fire, and probably would not have released much agent. The fire could have damaged the 104 rounds

observed by the UNSCOM inspectors at the Fallujah Proving Ground. Hence, if the 104 rounds were not damaged at Muthanna as the Iraqis say, they could have been near the bunker on 20 January. Because we do not yet have meteorological data for this date, we have not published a plume. Nevertheless, the direction of the bunker's soot pattern--suggestive of the initial wind direction--is to the southeast, which is parallel to the border 200 km away. Using this initial wind direction, we have modeled the potential release from the 94 rounds that did not contain agent when inspected. The concentration of mustard agent that likely survived the blast and fire would probably not have been above the general population limit beyond about 40 km. Even if the meteorological data change the wind direction, the plume will disperse hundreds of kilometers away from our troops.

**13/14 February.** For the rounds on the road in front on the bunker, both DoD and CIA believe that some could have released agent when bombed on the night of 13/14 February. The bomb crater did not show any evidence of fire or excessive blast damage. Therefore, we assume the bomb physically hit about 11 rounds before exploding underground. The 11 rounds would have burst and probably aerosolized about 70 percent of their contents--35 kg or 7 gallons. The size of the crater suggests that about 560 of the 700 rounds assessed to have been on that part of the road fell into the crater. [\(See illustration.\)](#) On the basis of US drop tests from a height of 7 feet, perhaps 1 in 40 rounds that dropped into the bomb crater would have leaked, or only 14 of the total of 560. The US drop tests showed that a drop height of 40 feet would increase the ratio to 1 in 8 leaking, or 70 of the 560.

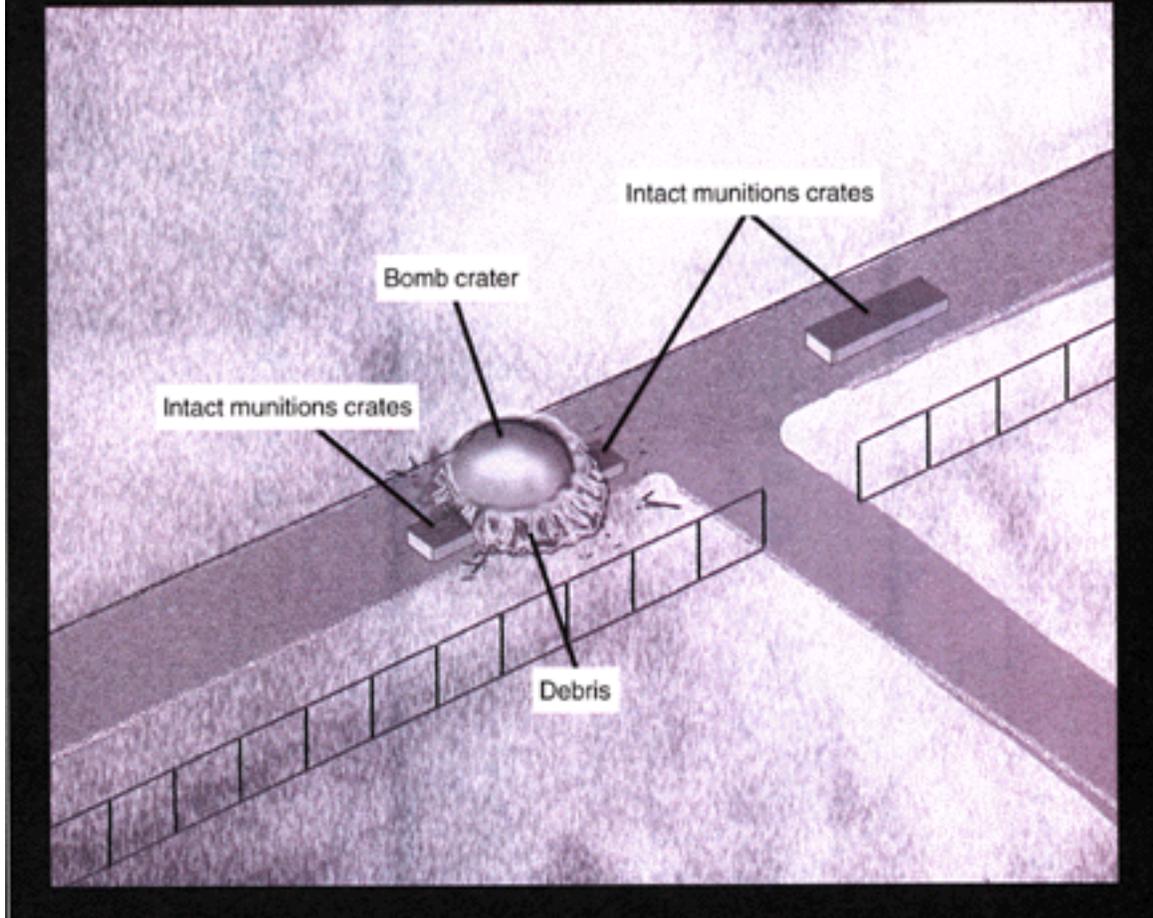
**Amount of Agent Released.** Although it is possible that no rounds were damaged--the bomb's angle of entry and subsurface detonation may have shielded the rounds from major damage--we modeled a more conservative situation. In fact, we assumed the 11 missing rounds took a direct hit and aerosolized 35 kg of mustard. We also assumed that 107 of the 117 green rounds leaked at Ukhaydir or 396 kg, instead of the more likely 14-70 gray rounds that would leak after falling into the crater, or 63-315 kg. (The 107 showed no signs of damage and could have leaked before any bombing occurred.) The total amount of mustard modeled was 431 kg, or about 90 gallons. The downrange extent of the mustard agent above the general population limit would result in a plume of about 125 km towards the southwest. The maximum width is estimated to have been 10-20 km. [\(See map.\)](#)

## Conclusions

Even with these very conservative assumptions, the potential plume from Ukhaydir did not reach Saudi Arabia, much less any of our troops. Indeed, as already indicated, it is possible that there was no agent release on 14 February 1991. As we have stated above, the only other possible mustard agent release was from the bombed bunker on 20 January 1991. And, again, any resulting plume would not have come within hundreds of kilometers of US or other Coalition forces.

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**Bombed Possible 155-mm CW Munitions Crates**  
**Ukhaydir Munitions Depot, Iraq**



### A Preliminary Estimate: Possible Mustard Release, 14 February 1991 (With Known US Forces Locations)



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# CIA Support to the US Military During the Persian Gulf War

16 June 1997

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*No combat commander has ever had as full  
and complete a view of his adversary as did our field  
commander. Intelligence support to Operations Desert  
Shield and Desert Storm was a success story.*

*Gen. Colin Powell, USA, Chairman  
Joint Chiefs of Staff*

One of the Central Intelligence Agency's primary functions is to provide intelligence support to US military forces. Since its creation in 1947, CIA has passed both "raw" intelligence information and in-depth "finished" intelligence reports of enemy vulnerabilities, capabilities, and intentions to US military forces deployed throughout the world. Operations Desert Shield and Desert Storm (1990-91) were no exception. From the moment Iraq invaded Kuwait, CIA officers in Washington and around the world worked to provide intelligence support for the soldiers, sailors, airmen, and Marines deployed to the Gulf.

CIA's activities are usually secret, and the Agency rarely publicizes its successes. Nonetheless, CIA believes that Gulf war veterans may benefit from knowing the

extent--albeit in summary--of CIA efforts to support Operations Desert Shield and Desert Storm. Clearly, other US Government agencies and the US military provided extensive intelligence support to US forces deployed in the Gulf. Those efforts would provide equally enlightening reading, but are beyond the scope of this paper.

### **Prelude to War**

Throughout 1990, CIA closely monitored Iraqi President Saddam Husayn's political and military moves. CIA notified US policymakers and the US military when, in July, Iraq began deploying forces near Kuwait's border. As the Iraqi buildup increased, CIA warned that Iraq was not bluffing and probably would attack its neighbor:

- The week before the invasion, CIA assessed that an Iraqi attack was "highly likely" within a few days if Kuwait failed to accede to Baghdad's demands and that Iraq had positioned an attack force large enough to march through all of Kuwait and deep into Saudi Arabia.
- On 1 August 1990--the day before the Iraqi invasion--CIA assessed that ". . . Baghdad almost certainly believes it is justified in taking military action to reclaim its 'stolen' territory and oil rights. It is also possible . . . that Saddam has already decided to take military action against Kuwait."

CIA formed round-the-clock task forces in its operations and intelligence directorates the day of the invasion. The Directorate of Operations augmented appropriate CIA stations overseas to handle anticipated increases in collection, reporting, and liaison requirements. The Directorate of Intelligence increased the number of "all-source" and imagery analysts dedicated to the effort, while maintaining its core of experienced Iraqi analysts:

- CIA resisted requests that its Iraqi analysts be fully incorporated into the Pentagon's Joint Intelligence Center (JIC) because CIA did not want to dilute its base of analytic expertise. Throughout the war, CIA relied on its small number of Iraqi experts to produce reports and briefings for policymakers in Washington and the US military.
- Nonetheless, CIA assigned several military analysts to the Pentagon's JIC.

The Iraqi experts at CIA Headquarters and the CIA military analysts at the Pentagon maintained daily contact with their counterparts at the Department of Defense.

CIA began its liaison with the US forces deployed in the Gulf when, in August 1990, a senior CIA Iraqi military analyst accompanied then Secretary of Defense Dick Cheney and Gen. H. Norman Schwarzkopf, Commander in Chief (CINC) US Central Command (CENTCOM), to Saudi Arabia and provided briefings and intelligence updates to General Schwarzkopf before his discussions with Saudi political and military officials.

Soon after CENTCOM established its headquarters in Saudi Arabia, CIA deployed JILE (Joint Intelligence Liaison Element) teams to CENTCOM headquarters. The JILE teams were CIA's primary conduit for providing intelligence information to the deployed US forces. They comprised CIA operations officers, analysts, and communications specialists who passed CIA intelligence information to the military and relayed the military's questions, commonly referred to as "requests for information" (RFIs), to CIA Headquarters. CIA routinely responded to urgent RFIs within 24 hours.

### **Intelligence Support for the Warfighters**

From August 1990 through February 1991, CIA operations officers, political analysts, military analysts, weapons analysts, economic/oil analysts, imagery analysts, and cartographers produced thousands of intelligence cables, reports, and briefings on Iraq. While taking measures to protect its sources, CIA shared its information on Iraq with the US military:

- The JILEs passed thousands of intelligence cables, photographs, maps, and numerous finished intelligence reports to military units in what had come to be known as the Kuwait Theater of Operations (KTO). Hundreds of these intelligence products addressed the probable locations and capabilities of Iraqi chemical weapons and their potential delivery systems.
- CIA analysts presented more than 100 briefings to US military audiences during the Gulf war period. Those audiences included, among others, officers from the US Army 24th Mechanized Division, the US Army War College, the US Marine Corps Command and Staff College, and senior Marine Corps officers preparing to deploy to the Gulf. The briefing topics

included Iraqi ground, air, and air defense forces; Iraqi tactics--including chemical weapons use--during the Iran-Iraq war; and Iraq's construction of minefields and other defensive barriers in southern Kuwait.

- Of the dozens of CIA employees called to active military duty in late 1990, several served in military intelligence. For example, a CIA analyst who was also an officer in the US Marine Corps Reserve deployed to Headquarters Marine Corps in Washington. From that point on, he shuttled daily between CIA Headquarters and Headquarters Marine Corps carrying the latest information and analysis from CIA. Another CIA military analyst on active duty briefly served as an aide to the Director of Intelligence (J2) for the Joint Staff.
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## CIA Research Paid Big Dividends

*CIA's support for US military forces in the Gulf war began long before Iraq invaded Kuwait. CIA carefully monitored Iraqi military developments throughout the 1980s and wrote hundreds of reports for US political and military leaders on the threat Iraq posed to its neighbors, Iraq's relations with terrorists and insurgents, and Iraq's acquisition of weapon systems and military technology. Much of CIA's basic research and reporting from before the invasion proved vital to US military forces deploying to the Gulf. Beginning in August 1990, CIA provided the US military copies of published CIA research papers on Iraq. Some of the topics included:*

- *The status and capabilities of Iraq's ballistic missile forces and its chemical, biological, and nuclear weapons programs.*
- *Iraq's use of chemical weapons in combined arms operations during the Iran-Iraq war (1980-88).*
- *The size and strength of Iraqi forces and the effect of Iraqi ground force restructuring that followed the Iran-Iraq war.*

***Strategic Warning.*** CIA intelligence information and assessments passed to the US military included warnings that:

- Iraq was likely to use chemical weapons in a defensive ground war with the Coalition. (In retrospect, CIA assessments that Iraq would use chemical weapons may have influenced President Bush's decision to warn Iraqi President Saddam Husayn of grave consequences for such use. To date, the US Intelligence Community has not uncovered evidence that Iraq employed chemical weapons during the Gulf war.)
- Iraqi ground force deployments in the KTO included chemical decontamination stations, a development that suggested Iraq might have been planning to use, or feared being attacked by, chemical weapons. (Iraqi documents captured during the ground war indicate that Iraqi regulations called for both offensive and defensive ground force deployments to include chemical decontamination stations.)
- Iraq had chemical warheads, and probably biological warheads, for its Scud missiles.
- Iraq was preparing to launch Scud missiles. CIA accurately predicted that Iraq would launch Scuds into Israel during the first 48 hours of the war.

**[Iraqi Order Of Battle, 4 October 1990](#)**

[Map 1 of 3](#)

**[Iraqi Order Of Battle, 4 October 1990](#)**

[Map 2 of 3](#)

**[Iraqi Order Of Battle, 4 October 1990](#)**

[Map 3 of 3](#)

***Actionable Intelligence.*** CIA also provided information that helped the US

military plan and execute the war. In August 1990, CIA published its analysis of the key strengths and weaknesses of Iraq's ground forces; strengths CENTCOM planners worked to neutralize and weaknesses they exploited. CIA continued to provide detailed, actionable intelligence information throughout the war. The list includes, but is not limited to:

- **Intelligence on Iraq's weapons of mass destruction.**

- The specific chemical and biological agents Iraq might have employed against US forces.
- The locations of known Iraqi ballistic missile and chemical, biological, and nuclear weapons production facilities.
- The locations of fixed Scud missile launchers in western Iraq and the size and composition of Iraq's Scud force.

- **Intelligence on Iraq's ground forces.**

- Iraq's military "order of battle" (the equipment holdings and structure of Iraqi military units).
- The precise, continually updated locations and activities of Iraq's Republican Guard divisions.
- The locations of Iraq's regular Army armored, mechanized infantry, infantry, and artillery units.
- The locations of Iraqi ground forces' headquarters and command and control facilities and equipment.

- **Intelligence support for the Coalition ground offensive.**

- A map of the road network in southern Iraq and Kuwait, including roads that Iraq constructed after the invasion.
- The locations of oil pipelines that may have restricted movements of

armored vehicles.

- The precise locations of passages through the minefields and barriers in southern Kuwait.
- The locations of coastal artillery, minefields, and obstacles to amphibious landings in southern Kuwait and on Faylaka Island.
- Information indicating that what was thought to be a huge minefield northwest of Kuwait--in the area where the US XVIII Airborne Corps would operate--was actually ground scarring from extensive oil exploration.

- **Intelligence on Iraq's air and air defense forces.**

- The precise locations and readiness levels of Iraqi aircraft, including the locations where Iraq was attempting to hide aircraft from Coalition airstrikes.
- The precise locations of Iraqi surface-to-air missiles and anti-aircraft artillery.
- The locations of Iraq's air defense forces' command and control facilities and equipment.
- Technical information on Iraqi aircraft and air defense equipment.

- **Intelligence on Iraqi threats to Coalition naval forces.**

- The locations and readiness levels of Iraqi "Silkworm" antiship missiles.
- Assessments of Iraq's capability to employ Exocet antiship missiles.
- The locations of Iraqi artillery deployed on the coast of Kuwait.

- **Intelligence on areas and facilities of interest to US military special**

## **operations forces.**

- For example, the most likely locations of Coalition pilots detained in Iraq.

### **Steps Taken To Improve CIA-US Military Cooperation**

CIA has taken steps to correct the shortcomings identified during the Gulf war and improve its support to the US military. Shortly after the war, CIA Headquarters improved communications with major US military commands. In 1992, CIA created the Office of Military Affairs (OMA) to enhance cooperation and increase information flow between CIA and the military. OMA is subordinate to the Associate Director of Central Intelligence for Military Support and is jointly staffed by CIA officers from all directorates and military personnel from all the services. OMA supports CIA-US military activities by:

- Posting Director of Central Intelligence (DCI) Representatives and staff, on a permanent basis, to some unified commands.
- Providing DCI Faculty Representatives to Senior Service Colleges.
- Deploying Office of Military Affairs/National Intelligence Support Teams (OMA/NIST) in support of US military forces overseas.
- Ensuring that CIA products are properly classified and formatted for military use.
- Providing timely responses to short-fused requests for information and analytical products.
- Hosting orientation seminars, intelligence exchanges, and briefings.
- Participating in a broad range of joint military exercises worldwide.

The Central Intelligence Agency remains dedicated to supporting US military forces in peacetime and during war. As part of that mission, CIA is searching its

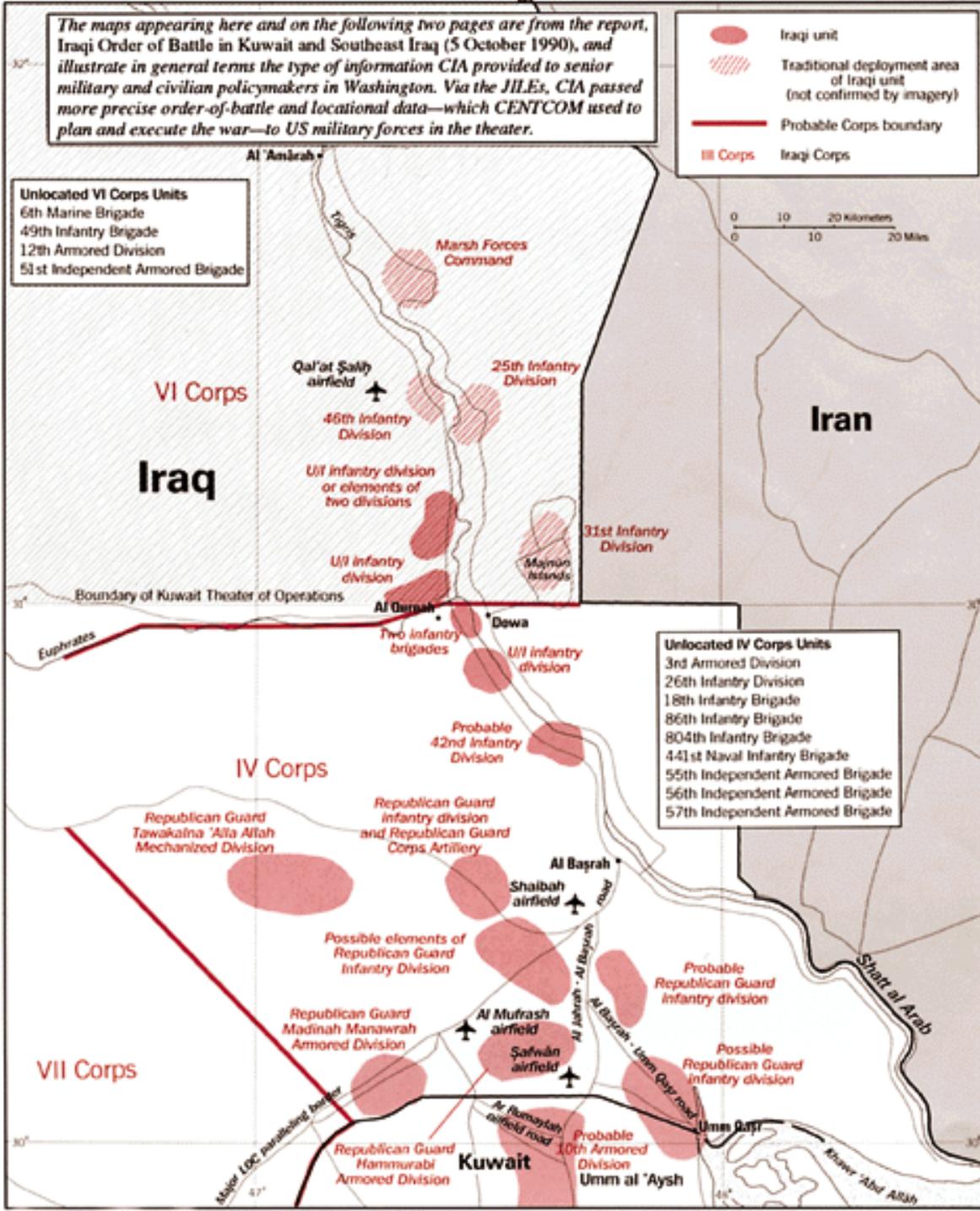
files and databases for intelligence information that may help identify potential causes of Gulf war veterans' illnesses. CIA will continue to research this issue, explore any leads that surface, and make its findings available to the public. Finally, CIA will make every effort to ensure that, both now and in the future, the United States maintains the best informed military in the world.

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[Return to Persian Gulf War Illnesses Task Force](#)

### Iraqi Order Of Battle, 4 October 1990

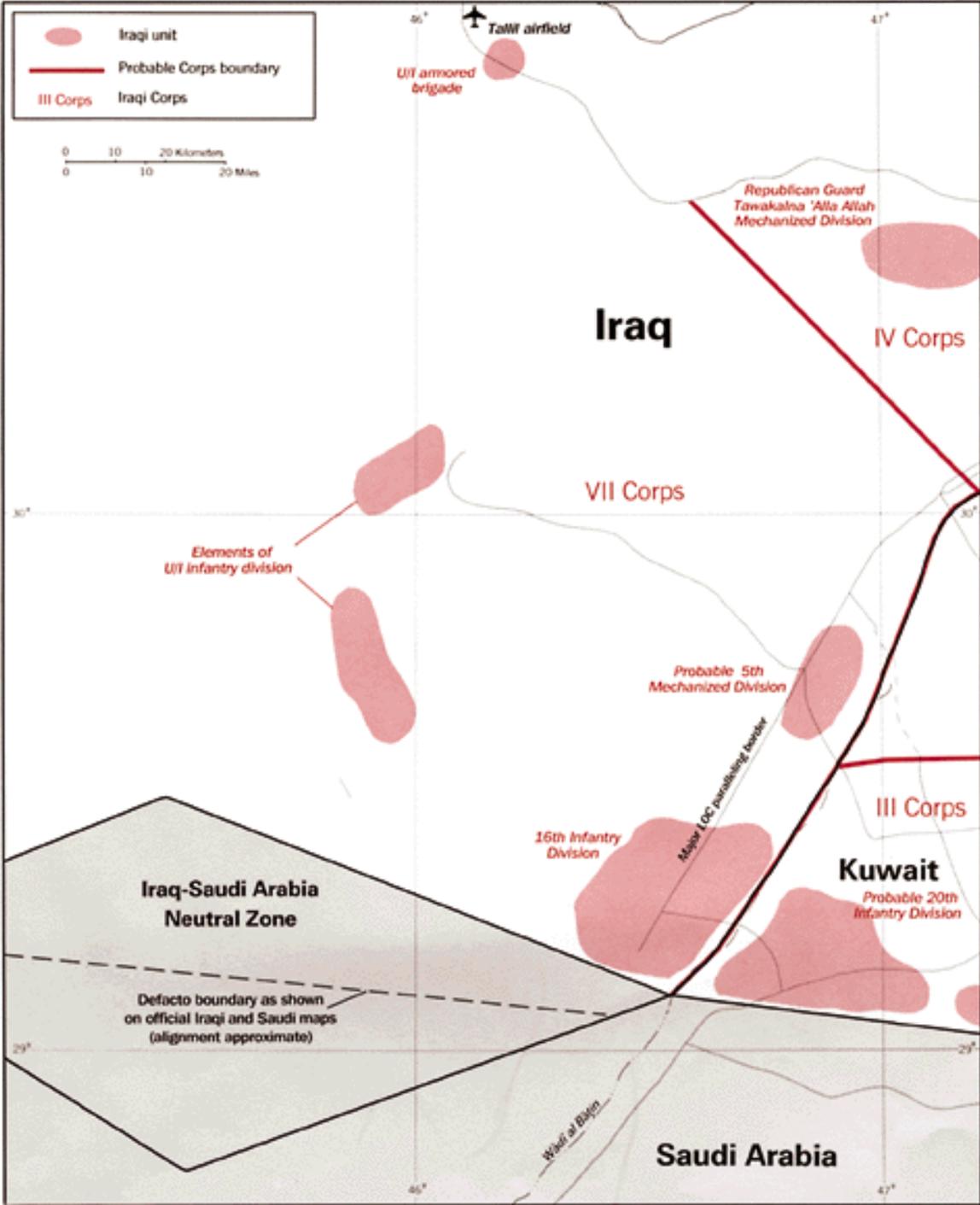
The maps appearing here and on the following two pages are from the report, Iraqi Order of Battle in Kuwait and Southeast Iraq (5 October 1990), and illustrate in general terms the type of information CIA provided to senior military and civilian policymakers in Washington. Via the JILES, CIA passed more precise order-of-battle and locational data—which CENTCOM used to plan and execute the war—to US military forces in the theater.



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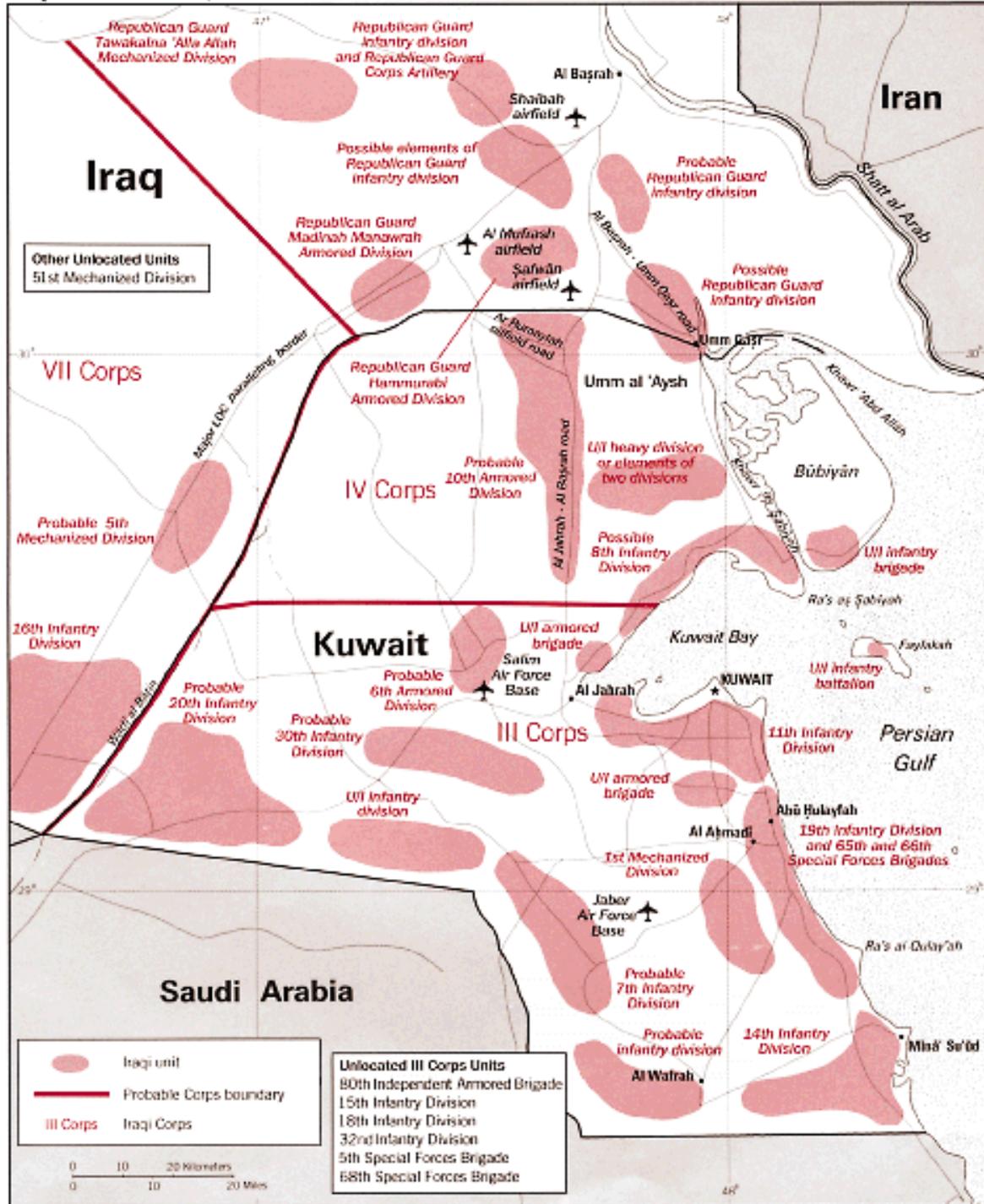
### Iraqi Order Of Battle, 4 October 1990

1  
2  
3  
Map 2 of 3



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### Iraqi Order Of Battle, 4 October 1990



## Introduction

Chairman Shays and members of the subcommittee, I am pleased to appear before you today to discuss CIA's and the Intelligence Community's efforts on the issue of Gulf war veterans' illnesses and the possible exposure of some of those veterans to chemical weapons agent. We know how important this issue is to the veterans, and that our intelligence is essential to understanding what occurred during and immediately after the war.

In response to President Clinton's tasking to his Advisory Committee (PAC) on Gulf War Veterans' Illnesses, and after determining that the issue required additional resources, George Tenet, Acting Director of Central Intelligence, appointed me his Special Assistant on this issue on 27 February, and asked me to have a Task Force running by 3 March. Since that time, we have kept the staff of this subcommittee, as well as several other committees, apprised of our findings and actions. The purpose of our efforts is to help find answers to why the veterans are sick. We are supporting numerous government efforts on this issue, and are searching files for any intelligence that can help.

First I will discuss the mission and scope of the task force, and our progress to date, including our modeling and search efforts, and the recent release of documents and publication of our paper on Khamisiyah.

## Mission and Scope

The mission of this Task Force is to provide intensive, aggressive intelligence support to the numerous US Government efforts currently investigating Persian Gulf war illnesses issues. Fifty officers are serving on the task force, drawn from across the Intelligence Community--CIA, NSA, DIA, and NIMA--and from DoD's Offices of the Special Assistant for Gulf War Illnesses and Assistant to the Secretary for Intelligence Oversight. We have made considerable progress in addressing this mission during our first several weeks.

The task force is managing and reviewing all intelligence aspects related to this issue with the goal of "getting to the bottom" of it. Specifically the task force

provides intelligence support across several fronts:

- Documents--search, declassification, and sharing;
- Modeling support;
- Communications with DoD, the PAC, the Hill, veterans' groups, and others; and
- Supportive analysis.

This is the first time we have fully integrated an analytical component into a task force on this issue to run to ground every thread we uncover on the issue, and to prepare papers providing the analytical context surrounding relevant material.

An example of this group's efforts was disseminated a few weeks ago in Salt Lake City at the Presidential Advisory Committee meeting. It is a one-page paper concerning the release of chemical warfare agent at Khamisiyah during March 1991. The day after the meeting, DoD received numerous calls on the 1-800 number, some from veterans who recall being at Khamisiyah. This is an important step forward in trying to determine exactly what happened at Khamisiyah and to address veterans' concerns about their possible exposure to chemical agent.

## **Modeling Support**

I am aware that this subcommittee in particular has been very interested in CIA's modeling efforts. Several developments have occurred in this area that I would like to elaborate on. To begin with, in the past, we were able to model the events at Al Muthanna, Muhammadiyat, and Bunker 73 at Khamisiyah largely because we had US test data indicating how the agent would react and release when structures in which it was stored were bombed or detonated. However, when we turned to modeling demolitions at the pit, we quickly realized we had significant uncertainties regarding how rockets with chemical warheads would have been affected by open-pit demolitions. We were also uncertain about the number of demolition events and the weather conditions at the time of the demolitions. We believed, on the basis of the limited and often contradictory data we had, that two demolition events were more likely than one. These data included a military log entry for destruction on March 12, the contradictory stories from two soldiers, and an UNSCOM video tape.

CIA and DoD have devised a joint plan which will reduce some of these uncertainties in order to more accurately identify the extent of the release. This plan includes additional soldier interviews and simulation testing. We have conducted several interviews with soldiers who recall important information about the demolition event, particularly how and when it occurred. These interviews called into serious question the log's credibility; we learned it was prepared after the fact and that we should not rely on the 12 March date. With the log's credibility in question, the prudent approach would be to model one event that occurred on March 10; from a modeling perspective, this would be true whether the demolition occurred as two events at the same time. If we receive further information on what actually happened in the pit, we will modify this approach. We are also jointly developing tests with the Department of Defense to destroy rockets containing CW agent simulants. We expect this to provide us invaluable data on how the agent would react in an open-pit demolition, similar to the data earlier testing had provided for detonations in buildings. We plan to publish the modeling results by the end of July.

## **Khamisiyah Paper**

During our initial efforts on Khamisiyah, we determined that certain intelligence documents were critical to answering the questions--what did the Intelligence Community know when, and what did we do with that information. We began briefing these documents to the PAC and appropriate Congressional Committees. We also began simultaneous efforts to declassify key papers and to search for other material relevant to the questions. As this work progressed, we determined that a paper detailing the historical perspective would be useful to accompany the release of the documents we were declassifying. The paper, released on 9 April, provides details about the Intelligence Community's knowledge of Khamisiyah before, during, and after the war.

The documents released and the Khamisiyah paper written to accompany them do not change our judgment that Iraq did not use chemical weapons during Desert Storm; nor our warnings that Iraq would likely deploy chemical weapons to the theater and be prepared to use them, and did not mark its chemical munitions. In detailing the historical perspective, the paper and documents illustrate warnings the Intelligence Community provided to CENTCOM elements--including J-2, targeting, ARCENT, and US Marine Corps and Air Force representatives prior to demolition activities in March 1991. At the same time, the paper illustrates that

intelligence support—particularly in the areas of information sharing and analysis—should have been better. The Task Force is preparing recommendations to address these problems and will continue to assess how we ensure they will not occur in the future.

## **Document Efforts**

We are conducting document searches on other Iraqi CW sites as well as any intelligence related to potential biological warfare and radiological exposure, and environmental issues. We are using search criteria developed by previous task forces and expanding them by adding related topical search terms and increasing the range of dates to be searched. Intelligence we find that sheds light on or can help the Presidential Advisory Committee, Persian Gulf Veterans Coordinating Board, veterans and public understand Gulf war illnesses issues will be identified and declassified. Any documents that cannot be released for reasons of national security will be delivered to relevant US Government agencies, the Presidential Advisory Committee, and Congressional Committees that are following this issue. We also plan to write analytic papers to try to help the readers put all of the information into context. The first of these papers was released two weeks ago.

## **Conclusion**

In conclusion, I want to reiterate George Tenet's and the Intelligence Community's commitment to the men and women who served this country in the Persian Gulf. We owe them a full and accurate accounting of what happened during the final days of Desert Storm and in the following days and weeks before their return to the United States. To that end, the intelligence material we released on Khamisayah, including the paper outlining the related historical perspective, gives the veterans and American citizens a clearer understanding of what we knew, and how we used this material to prepare and to warn our forces. Helping relevant agencies determine what is making some of our Gulf war veterans ill is critical and will remain our central focus. We stand behind our contributions to national security and are working to enhance our support for the future.

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# **Creation of Director of Central Intelligence Persian Gulf War Illnesses Task Force**

## **Statement of Robert D Walpole Special Assistant to the ADCI for Persian Gulf War Illnesses Issues Before the Presidential Advisory Committee on Gulf War Veterans' Illnesses**

**Persian Gulf War Illnesses Task Force**

**18 March 1997  
Salt Lake City, Utah**

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# Talking Points on Creation of DCI Persian Gulf War Illnesses Task Force

To support the President in his goal of getting to the bottom of questions regarding Persian Gulf War veterans' illnesses and to be as helpful as we can to this Advisory Committee in its intensified effort, the Acting Director of Central Intelligence, George Tenet, established a Persian Gulf War Illnesses Task Force, which began its work on March 3.

Its mission is to provide intensive, aggressive intelligence support to the numerous US government efforts to address Persian Gulf War Illnesses issues.

As to its scope, this task force will manage all intelligence aspects of the issue with the goal to "get to the bottom" of it and to be "forthcoming" in our efforts. Throughout this 60-day effort, and by the conclusion thereof, the task force will ensure that every conceivable stone has been overturned.

The task force includes 50 personnel drawn from across CIA's Directorates, as well as from DIA, NSA, NIMA, and others in the Department of Defense.

As George Tenet's Special Assistant on Persian Gulf War Illnesses issues, I serve as Chief of the task force. As such, I attend his morning senior agency staff meetings to apprise him of our progress.

Responsibilities and activities of the task force include:

- reviewing previous search criteria and conducting addition required;
- managing and accelerating and ongoing declassification efforts;
- ensuring the passage of related classified material to DOD and others in a useful manner, from which users can retrieve information quickly;
- supporting ongoing modeling efforts;

- implementing a comprehensive process for communications with DOD, the NSC, the Presidential Advisory Committee on Gulf War Illnesses, appropriate Congressional committees, and the media and public. This strategic perspective developed will drive the completion of our efforts in a timely manner; and
- providing analysis of relevant information.

This final point is particularly important. While the Agency has had other task forces involved in this search and declassification effort, this is the first time we have fully integrated an analytical component into the task force. This component will run to ground every thread of interest we uncover in the issue, and will prepare papers providing the analytical context surrounding relevant material.

One of the task force's initial efforts has been to ensure that we can answer the following questions, particularly as they relate to Khamisiyah; we must be able to answer clearly, accurately, thoroughly, with high confidence, and for the most part, unclassified:

- What did the Intelligence Community know about the possibility of chemical weapons at Khamisiyah, and when?
- What did we do internally with the information collected and when?
- What did we do externally with the information collected and/or analyzed, and when?

During the task force's first two weeks, we have focused on:

Reviewing previous search criteria

Passing additional classified material to DOD, the Hill, and PAC

Declassifying additional material

Analyzing every thread we can find on Khamisiyah

Meeting with DOD, the NSC, the Presidential Advisory Committee, and appropriate Congressional committees.

Decreasing uncertainty for modeling inputs, including through our efforts with DOD to pursue ground truth testing

Implementing elements of a comprehensive communications strategy

During coming weeks, we will:

Pursue new search efforts

Continue declassifying material

Continue analysis of interesting, relevant threads

Continue regular meetings with DOD, the NSC, the Presidential Advisory Committee, and appropriate Congressional committees.

Prepare unclassified analytical and contextual papers on issues discovered during search and declassification efforts

Continue implementing elements of communications strategy, including addressing veterans' groups, the media, and public

Develop and support further plans to reduce uncertainty of modeling inputs

By the end of 60 days, we will have ensured the release of as much information as possible. We will do this from the strategic perspective just cited; there will be no more dripping of information.

Also, by the end of the 60-day running, the task force will prepare a list of lessons learned and recommendations for CIA and the Intelligence Community regarding enhancing intelligence support, especially before, during, and after a conflict.

In conclusion, I want to stress the Agency's and Community's commitment to providing this Committee and other appropriate US Government agencies with the

intelligence support you require. To do any less would be a disservice to the men and women who served this country in the Persian Gulf. We owe them a full and accurate accounting of what happened during the final days of Desert Storm and the following days and weeks before their return to the United States. Mr. Tenet and I intend to do everything in our power to ensure the maximum amount of information is released to you, to the many concerned veterans groups, and the public at large.

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**Status of Director of Central  
Intelligence  
Persian Gulf War Illnesses Task  
Force Support  
to Efforts for Modeling the  
Chemical Release  
from the Khamisiyah `Pit' Area**

**Statement of Robert D Walpole  
Special Assistant to the ADCI  
for Persian Gulf War Illnesses  
Issues**

**Before the Presidential Advisory  
Committee  
on Gulf War Veterans' Illnesses**

**Persian Gulf War Illnesses Task Force**

**18 March 1997**  
**Salt Lake City, Utah**

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Dr. Lashof, Members of the Committee, I am pleased to appear before you today to discuss our efforts related to reports that US troops may have been exposed to chemical warfare agents in the Persian Gulf. We strongly believe that the committee is making an important contribution to the public's understanding of this issue, and we have given high priority to your requests for support. We know how important this issue is to the Gulf War Veterans, and that our intelligence is essential to understanding what occurred during the war.

This afternoon, I will review our past modeling efforts, provide a report of recent intelligence support to efforts to model the release from the Khamisiyah pit area, and explain our plans for the future.

## **Previous Modeling Efforts**

Last year we identified and modeled chemical releases from three locations. We were able to model these events largely because we had test data that established a reasonable upper bound for the release of agent during the events, as well as other contributing information:

- For example, we were able to use military testing from the 1960s as ground truth for our source modeling on Bunker 73. In addition, we had a video and photographs from the time of the Bunker 73 demolition. These gave definitive corroboration to weather modeling and increased our confidence in the results.
- We were uncertain about the date and weather conditions for modeling at Muhammadiyat and Al Muthanna. Therefore, we used unreasonably worst case assumptions about weather and dispersion conditions and still obtained results that fell well short of troops at Rafha, which is the nearest position reported to have had a concentration of troops.

## Khamisiyah Pit Release Modeling

The modeling for the pit poses far more difficult challenges. Let me lead with a review of the areas of greatest uncertainty. As we briefed them to you in November, they are:

- The number of demolition events.
- The weather conditions at the time of the demolitions.
- How chemical rockets would have been affected by open pit demolitions.

We have been aggressively analyzing any thread of information related to these uncertainties in order to more accurately identify the extent of the release. I will discuss each individually.

***Number of events.*** We remain uncertain about many of the activities surrounding the demolition of chemical rockets in the pit area at Khamisiyah. Nonetheless we have constructed a scenario that is most consistent with the information we have acquired so far. Late last year we reported the possibility that there were two demolition events in the pit; we now believe this to be more likely than a single event. Let me explain why.

We have spoken with two of the soldiers who performed demolition activity in the pit area. Both reported performing demolition on March 10. However, they recall seeing different numbers of stacks. One states that there were nine stacks of rockets and the other states that there were three. We have determined there were actually a total of 13. Interestingly, SPOT imagery confirms that demolition activity occurred at 12 of the 13 stacks. A video of the area that UNSCOM has recently made available to us confirms that demolition occurred at both ends of the pit.

A log entry states that 840 rockets (which corresponds with nine stacks) were detonated on 12 March 1991. The soldier who reported he rigged three stacks left the Khamisiyah area after the 10th, so he could not have been involved in the demolition of 840 rockets on the 12th. Both soldiers indicated that they saw no other stacks of munitions and no other individuals performing demolition

activities.

The pit is 400 meters long. It is unlikely that the soldiers could have been performing demolition activities at the same time and not have seen each other. We therefore currently assess that they performed demolition activities in two different areas of the pit, on two different sets of stacks, and most likely on two different days. While there is still a possibility of a single or even additional events, the assessment of two events is most consistent with currently available information. If additional veterans recall participating in this activity, and can supply further information, we would be able to increase our confidence in this assessment.

In fact, in conjunction with this presentation, we have prepared an information paper in coordination with DOD's Office of the Special Assistant for Gulf War Illnesses. This paper briefly describes what we know and assess about activities at the Khamisiyah pit area. It also provides photographs in an effort to help locate any veterans who can help shed light on the activities there in March 1991. We have numerous copies here available for the committee, veterans, media and public.

***Number of rockets involved.*** Based on imagery and a log entry, we have also reassessed the total number of rockets in the pit to be 1400, vice 1300. This new assessment increases our estimate of the maximum number of rockets destroyed or damaged in the pit to 650.

Recalling the uncertainties I mentioned earlier, and using the previously mentioned assessments as a guide, we estimate that the maximum number of rockets destroyed on March 10 and 12 were 260 and 390, respectively. We are working hard to use the UNSCOM video and photographs to refine these estimates further. A number of factors support our assessment that some of the rockets involved in the demolitions did not release agent. They include photographs of post-demolition rockets showing little or no damage, burial of rockets due to the demolition, and comments by the demolition experts that there were not enough charges to complete the demolition even with the expected secondary explosion of the rockets' high-explosive warheads.

***Weather conditions.*** The Institute for Defense Analysis (IDA) is managing the effort to determine the weather conditions at the time of the pit demolition operations. To support their efforts, we have sought to accurately estimate one key variable--the wind vector at detonation. Our exhaustive search of available

photography has resulted in one promising lead, which we will analyze thoroughly. Recently acquired photographs from April 1991 show soot marks near the destroyed bunkers at Khamisiyah. Since earlier studies identified the dates when these bunkers were destroyed, we soon may be able to confidently estimate the initial wind vector for the 10 March event.

***No relevant testing.*** We do not know how chemical rockets would have been affected by an open-pit demolition. This is perhaps the greatest uncertainty we have. It affects our ability to determine how many rockets would have released agent, how much agent would have been released, the immediate dispersion patterns, the duration of the release, and any degradation factors directly related to the demolition rather than to subsequent atmospheric effects. For example, leakage and soil effects alone could affect the projection of the amount of agent released by a factor of a hundred.

Given the importance of significantly reducing this uncertainty in order to complete a meaningful model, we are currently helping the Department of Defense develop tests to destroy rockets containing CW agent simulants. We expect such testing to provide us with some of the ground truth confidence we were able to apply to modeling the chemical release at the bunker demolition.

## **Next Steps**

We will continue working to reduce the uncertainties in the inputs for modeling the demolition activities at the Khamisiyah pit area. We now expect that our current analytic effort will enable us to refine input parameters and to make modeling possible, although some uncertainties will still remain. These efforts to develop meaningful inputs for a model will take time. We and the Department of Defense are expediting the effort. We will be providing our inputs to DOD and the Institute for Defense Analysis. We will also keep your Committee informed of our progress.

Let me assure you that we are doing all we can to characterize the events at Khamisiyah. We will continue to pursue this analysis on a priority basis.

I would like to close by emphasizing that the Acting Director of Central Intelligence has underscored his commitment to the American public to leave no stone unturned. The efforts I have discussed here are but a part of his initiative.

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# Continuing Support for Gulf War Veterans' Illnesses Research: Request for Veterans' Help

[Chemical rockets destroyed in pit area, March 1991.](#)

[Predemolition photo of pit area near Khamisiyah, Iraq.](#)

**Support Efforts.** No US troops reported symptoms, or were treated for chemical agent exposure at Khamisiyah. In response to veterans' concerns about Gulf war-related health problems, however, the Central Intelligence Agency and the Department of Defense are searching intelligence and other reports for any information that might address the illnesses of Persian Gulf Veterans.

In 1996, a joint CIA-DoD investigation concluded that in March 1991 US troops had unknowingly destroyed Iraqi chemical munitions at two locations near Khamisiyah, Iraq:

- **Bunker 73.** US troops destroyed 122-mm (five inches in diameter and eight feet long) chemical rockets stored in one of the 102 bunkers at the Khamisiyah ammunition depot. Subsequent sampling indicates that the rockets contained the nerve agents sarin and GF. Iraq referred to that bunker as "Bunker 73."

- **The "Pit" South of Khamisiyah.** US troops destroyed some of the several hundred 122-mm chemical rockets in numerous stacks that had been placed in a 400-meter-long shallow sand pit two kilometers south of the Khamisiyah ammunition depot (see overhead image of the pit, above). Subsequent sampling indicates that the rockets also contained sarin and GF. In May 1996, Iraq told UN inspectors that, just before the Gulf war, it moved about 1,100 chemical rockets from Bunker 73 to the pit.

**Modeling Exposure Areas.** Last year, CIA and DoD employed computer modeling to help determine how large an area near Bunker 73 was exposed to chemical agents following the demolition of chemical rockets in the bunker:

- The model, which estimated the effects of prevailing winds and other factors, projected an exposure area extending approximately 25 kilometers east and northeast of the bunker.

We are continuing research on events in the pit area in March 1991 so that we can more accurately model how large an area may have been exposed to chemical agents.

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**Veterans May Be Able To Help.** Gulf war veterans who either participated in the demolition activities, or who saw the pit either before or after the demolition, could provide valuable information. We are particularly interested in exactly how and when the rockets were destroyed in the pit near the Khamisiyah ammunition depot. If you have any information about the ammunition depot at Khamisiyah, Iraq, also known as "Tall al Lahm" or by US forces as "Objective Gold," please call the Department of Defense, Office of the Special Assistant for Gulf War Illnesses, Incident Reporting Line, at: **1 (800) 472-6719**.

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*Produced by the DCI Persian Gulf War Illnesses Task Force in coordination with DoD's Office of the Special Assistant for Gulf War Illnesses.*

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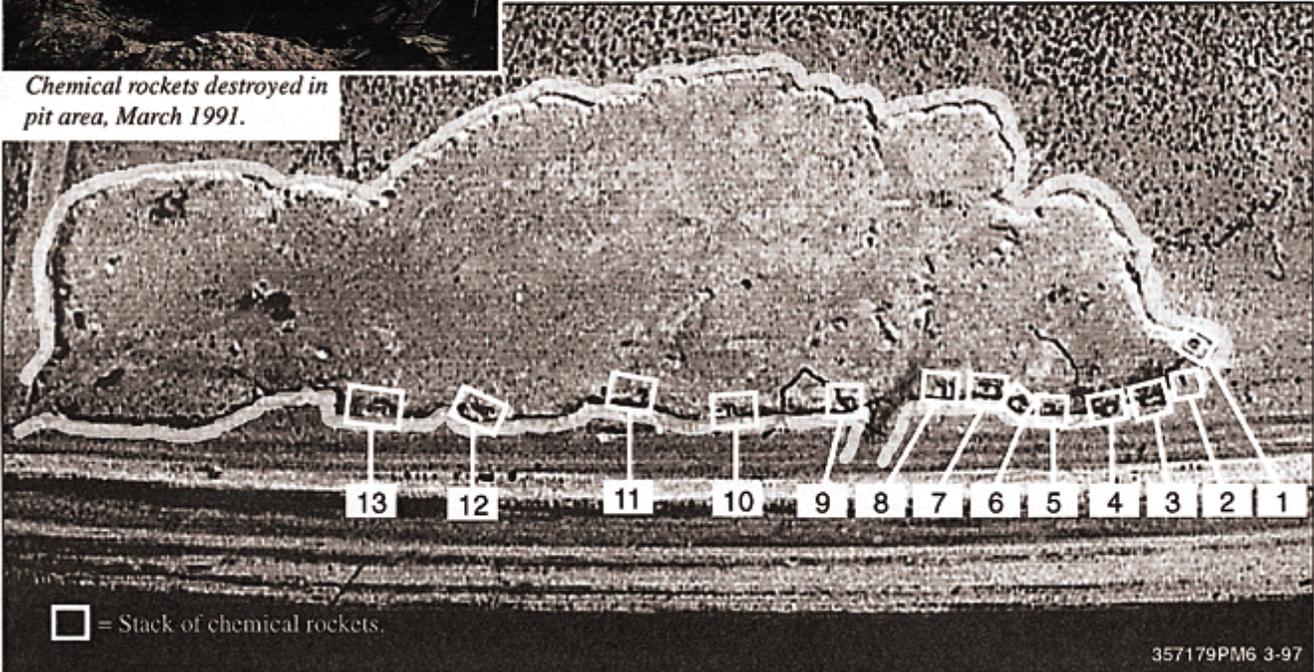
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*Chemical rockets destroyed in pit area, March 1991.*

## **Continuing Support for Gulf War Veterans' Illnesses Research: Request for Veterans' Help**



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*Predemolition photo of pit area near Khamisiyah, Iraq.*

# Khamisiyah: A Historical Perspective on Related Intelligence

## Persian Gulf War Illnesses Task Force

*9 April 1997*

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## Introductory Note From the Acting Director of Central Intelligence

On February 27, in response to President Clinton's tasking to his Advisory Committee (PAC) on Gulf War Veterans' Illnesses, I appointed Robert Walpole to be my Special Assistant for this issue. I asked him to have a Persian Gulf War Illnesses Task Force running by 3 March. One of its first tasks was to determine what the Intelligence Community knew about the Khamisiyah storage facility, when we knew it, and what we did with that information. Former task forces had focused on identifying areas of potential exposure to chemical agents and on assessing what had happened in March 1991 at Khamisiyah.

This paper and the accompanying documents do not contradict previous intelligence warnings before Desert Shield/Desert Storm: that Iraq was likely to have chemical warfare (CW) munitions in the theater of operations and that Iraqi CW munitions might not be marked. It also does not change our judgment that Iraq did not use chemical weapons during Desert Storm.

The paper does, however, illustrate that intelligence support associated with Operations Desert Shield and Desert Storm--particularly in the areas of information distribution and analysis--should have been better. Key issues include problems with multiple databases; limited sharing of "sensitive" but vital information; and incomplete searches of files while preparing lists of known or suspect CW facilities. This Task Force is preparing recommendations to address these problems and will continue to assess how we can improve. We will move aggressively to implement those recommendations.

Finally, I would like to thank the United Nations Special Commission for its part in this public release of information. I also want to reiterate my commitment to the men and women who served this country in the Persian Gulf. We owe them a full and accurate accounting of what happened. This paper is a part of that commitment. But this commitment also extends to enhancing intelligence support to men and women who will serve in the future.

George J. Tenet

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# Khamisiyah: A Historical Perspective on Related Intelligence

The US Intelligence Community (IC) [\(1\)](#) has assessed that Iraq did not use chemical weapons during the Gulf war. However, based on a comprehensive review of intelligence information and relevant information made available by the United Nations Special Commission (UNSCOM), we conclude that chemical warfare (CW) agent was released as a result of US postwar demolition of rockets with chemical warheads in a bunker (called Bunker 73 by Iraq) and a pit in an area known as Khamisiyah.

## Iraq's Chemical Warfare Program

Before the Persian Gulf war, the IC assessed that Iraq had a significant chemical weapons capability, including chemically armed Scuds. The IC also assessed that Iraq had used chemical weapons on numerous occasions against Iran and its own citizens. At the time of the US deployments to the Persian Gulf, the IC had reached consensus that Iraq had chemical weapons in its arsenal, had likely forward-deployed these weapons, and was prepared to use them against Coalition forces.

When Desert Shield began, our concerns about the Iraqi use of weapons of mass destruction became the focus of our chemical weapons analytic and collection efforts. IC analysts sought to identify possible Iraqi CW facilities for targeting purposes. Sites throughout Iraq were identified, albeit on incomplete information.

Several CIA chemical and biological warfare analysts maintained internal 24-hour coverage during the start of the air war and later through the ground campaign to provide support to senior CIA officials and key policymakers. Although there were many reports of chemical weapons use, analysis of all-source information indicated that these were false alarms and that chemical weapons were not used. CIA later published an assessment concluding that Iraq had never deployed chemical weapons to its frontline units, subsequently decided to move them out of the theater prior to war, and never used them against Coalition forces.

### [Map of Iraq](#)

In the months immediately following the Gulf war, the IC turned its assets to identifying and characterizing Iraq's surviving CW and other weapons-of-mass-destruction capabilities. As the following intelligence chronology demonstrates, the IC did not focus on the possible release of chemical agent until after veterans' health concerns surfaced.

### [Predemolition photo of Khamisiyah ammunition storage area showing Bunker 73 and pit area.](#)

## Intelligence Chronology of the Khamisiyah Depot

When viewed with the clarity of hindsight, the history of events at the Khamisiyah facility appears relatively simple. The following intelligence chronology, however, underscores the complexity of the issue and the ambiguity intelligence analysts face in piecing together sometimes conflicting information.

The IC has access to a large volume and multiple sources of information, but individual analysts rarely have access to all information on a given topic. Furthermore, not all information we receive is clear or correct. Analysts normally must sort through large volumes of reporting, much of which is contradictory, inaccurate, incomplete, or ambiguous, to reach a single analytic judgment. Finally, resource constraints and conflicting priorities limit the number of intelligence issues that can be addressed in depth. [\(2\)](#)

Intelligence on Khamisiyah was buried in a large volume of reporting that needed to be sorted and analyzed. Only after a massive interagency effort was this evidence identified, isolated, analyzed, and prepared for release. The sheer volume of reporting on Iraq greatly complicated our ability to single out this one facility--which was only a small part of the Iraqi CW effort--and properly exploit information once received. We will continue to search for relevant documents and to release useful information.

## The Intelligence Record: 1976-90

Before its demolition by US forces in 1991, the Khamisiyah facility was a large ammunition storage depot in southeastern Iraq, approximately 100 kilometers (km) from the Kuwaiti border. The facility we now call Khamisiyah was first identified in intelligence information from September 1976, while it was under construction. The IC identified the facility as a conventional ammunition depot. In June 1977, it was assigned the name Tall al Lahm--after a nearby town--in our imagery database. [\[1\]](#) This remained the most common name the United States used for the facility until mid-1996, when the name used by the Iraqis--Khamisiyah--was adopted to avoid confusion. Information available to the IC identified the facility's location as 304700N/0462615E. [\[1\]](#)

The first known reference to the depot using the Iraqi name Khamisiyah occurred in intelligence reporting in April 1982, when the "Al Khamisiyah ammunition depot" was mentioned in connection with the transfer of munitions in support of Iraqi military operations during the Iran-Iraq war. [\[2\]](#) This report did not specify the facility's location, but subsequent reporting associated it with the geographic coordinates of the nearby town of Khamisiyah (3046N/04629E). [\[3\]](#) Neither this reporting nor the intelligence from 1976 hinted at any connection with chemical weapons. This facility was maintained in a National Security Agency database as Khamisiyah, and in the imagery database as Tall al Lahm. No apparent effort at the time was made to reconcile the facility names.

While not discovered until 20 March 1997, intelligence acquired in July 1984 currently provides the earliest potential indication that chemical weapons or chemical warfare activities might have been associated with the Khamisiyah depot at the time. As part of an ongoing review of historical files on Khamisiyah, we discovered information indicating that a decontamination vehicle normally associated with tactical chemical defense was at the depot. This activity was not associated with any specific bunker or other storage structure and, by itself, does not provide confirmation of chemical weapons storage.

The first recognized connection between Khamisiyah and chemical weapons--and the only such evidence prior to Iraq's August 1990 invasion of Kuwait--appeared in a CIA human-source report obtained in May 1986. [\(3\)](#) This report was a translated copy of an Iraqi CW production plan and discussed the transfer of chemical weapons to Khamisiyah:

3,975 155-mm mustard-loaded artillery grenades [sic] have been issued (from June 1984 to March 1985) to al-Khamisiyah warehouses. We do not have official data about using this quantity by the third army corps. The warehouses currently have 6,293 150-mm mustard bombs [sic], enough to meet

front demands for four days on a 15-minute mission. [\(4\)](#) [4]

### Khamisiyah Ammunition Storage Area

This report was made available to select individuals in the policy and intelligence communities--including DoD officials--but did not receive broad distribution because of its sensitivity. [\(5\)](#) Of note, the munitions mentioned above were artillery shells containing mustard agent. Thus, they were different from those blown up by US troops at Khamisiyah in 1991; those were 122-mm rockets containing the nerve agents sarin and GF, which--according to Iraqi declarations--were moved to Khamisiyah in January 1991.

A CIA assessment in November 1986 used the above information to conclude that chemical weapons were stored during the Iran-Iraq war "at the southern forward ammunition depot located at Tall al Lahm." [\(6\)](#) This assessment shows that a connection had been made at that time between Khamisiyah and what we knew as Tall al Lahm. It also stated that "a new generation of 16 bunkers will expand Iraq's capability to store CW munitions at six airfields and at three ammunition storage depots that are strategically located throughout the country." [5] Subsequent analytic efforts focused on this new generation of bunkers--dubbed "S-shaped" bunkers by the IC because of their unusual shape--as the most likely storage sites for forward-deployed Iraqi chemical weapons. [5] None of these bunkers was located at Khamisiyah: the nearest were located at Tallil Airfield and the An Nasiriyah Southwest depot. Over time, the IC developed a bias toward the S-shaped bunkers as intended for CW storage. By 1991, this bias led analysts to conclude, erroneously, that reporting about Khamisiyah referred to the An Nasiriyah SW depot.

Reporting from early 1988 with the same high reliability, sensitivity, and handling as the May 1986 report, stated with regard to Iraqi chemical weapons storage locations:

As of early 1988, Iraqi artillery shells, bombs, and rockets loaded with chemical warfare (CW) materials were stored either at Samarra or in a large ammunition dump near the town of Muhammadiyat. This facility was located about 12 [sic] kilometers outside of Baghdad. Additionally, 122-mm rockets temporarily were stored at the airbase in Kirkuk for further transport to Sulaymaniyah. [6]

This report, especially with the "either-or" construction, suggested that chemical weapons were not stored at Khamisiyah or any other location in southern Iraq at that time. In addition--because we had previously identified an S-shaped bunker at Kirkuk airfield--mention of CW storage at "the airbase in Kirkuk" in the 1988 report further strengthened the IC's focus on S-shaped bunkers and the assessment that they would be used for forward deployment of chemical munitions, but were not intended for long-term storage.

This information, the strengthened analytic bias toward S-shaped bunkers, and several other factors may have played a role in Khamisiyah's omission from CW facility lists generated by the IC between 1986 and 1991. For example, following the May 1986 report and the November 1986 assessment, some analysts believed the reported activity at Khamisiyah represented temporary, forward-deployed storage. [\(7\)](#) We have located no additional reporting suggesting chemical weapons were stored at Khamisiyah from May 1986 to the end of the Iran-Iraq war in 1988--a period in which Iraq used thousands of tons of CW agents against Iran.

## **Operations Desert Shield/Desert Storm: August 1990--**

## February 1991

Additional information concerning possible chemical weapons storage at Khamisiyah was obtained shortly after Iraq invaded Kuwait, but was not recognized until early 1996 during a review of the Khamisiyah facility as a possible CW agent release site. Intelligence acquired on 18 August 1990 showed what was reported only as munitions transloading activity. Because CW analysts did not carry Khamisiyah on their lists of CW-related facilities in 1990, the information was not reviewed by chemical weapons specialists at the time. We now judge that this activity might have been a chemical weapons transfer under way outside a bunker at Khamisiyah; we have determined that this was not Bunker 73.

Khamisiyah was not mentioned as a chemical weapons storage location in any finished intelligence document or list of facilities produced during the months leading up to Desert Storm. At the time, the IC unanimously identified S-shaped bunkers as the most likely locations for forward deployment of chemical weapons when tasked to identify Iraqi CW facilities. As a result, Khamisiyah was not added to IC lists of suspect Iraqi CW facilities. Analysts emphasized at the time, however, that chemical weapons could be stored anywhere--even in the open. [7] Nevertheless, the Tall al Lahm facility was mentioned in 28 February 1991 military intelligence information requests as suspected to have possibly contained chemical munitions prior to the ground war. [8]

A report pertaining to chemical weapons at a location we now know to be Khamisiyah was obtained during Desert Storm. On 23 February 1991, a CIA reporting cable indicating potential storage of chemical weapons was sent to CIA Headquarters and Desert Storm support elements in Saudi Arabia. This cable reported the location to be 3047N/04622E. The cable did not provide the name of the facility or any details about the chemical weapons, but mentioned the information corresponded to a storage area "east of Juwarin." The chain of acquisition of this report was quite tenuous. The source was reportedly in the Iranian Air Force or Air Force--related industry; he apparently passed the information through foreign intermediaries. [9] In Saudi Arabia, this report was immediately made available to Central Command (CENTCOM) and some subordinate US military elements in Riyadh. [10] Review of the cable shows the coordinates to be at or near the town of Tall al Lahm on various maps, and the storage area (unnamed) on the Joint Operations Graphic (JOG) series map to be near "Al Khamisiyah." This storage area is the Khamisiyah storage facility.

On 24 February, CIA was informed that CENTCOM/Collections tasked its assets to investigate this facility. On 25 February 1991, CIA/DO telephoned a CIA analyst and relayed some of the information in the cable. The analyst noted that the coordinates were close to the An Nasiriyah depot and Tallil airfield, both of which were carried as suspect CW storage facilities because of the presence of S-shaped bunkers. The analyst consulted with the National Photographic Interpretation Center (NPIC) and learned that CW-related activity had been reported at An Nasiriyah in mid-January 1991. On the basis of this activity, the analyst suspected that the report referred to the An Nasiriyah depot. (8) [11] Nevertheless, this misidentification was never relayed to DoD. Instead, CIA indicated that "WE ARE UNABLE TO IDENTIFY SPECIFIC CHEMICAL STORAGE FACILITY AT [referenced] LOCATION." [12] The second paragraph of the 23 February 1991 cable was subsequently sent to select CIA analysts.

During 23-25 February 1991, Army Central Command (ARCENT) issued a collection emphasis for the coordinates mentioned in the 23 February CIA cable; this emphasis, however, requested confirmation that Iraqi troops were present and did not mention chemical weapons. [13] In addition, it is unclear if there is any direct relationship between this information and a 26 February 1991 XVIII Airborne Corps log entry stating that there were "possible chemicals on Objective Gold," a location at or near Tall al Lahm. (9) [14]

Also in February 1991, DIA completed a review of nonrefrigerated "12-frame" bunkers. (Just as the previously mentioned S-shaped bunkers were associated with the storage of chemical weapons, 12-frame bunkers were believed to be potential storage sites for biological and possibly chemical weapons.) In late February, DIA notified CENTCOM that such bunkers were at Tall al Lahm and at five other facilities. [15]

On 28 February 1991, CENTCOM's National Military Intelligence Support Team (NMIST) requested that ARCENT determine by 4 March whether chemical or biological weapons were present at 17 suspected CBW storage locations occupied by ground forces. The request stated that "THESE SITES WERE SUSPECTED TO HAVE POSSIBLY CONTAINED SPECIAL MUNITIONS PRIOR TO THE GROUND WAR." The Tall al Lahm depot and the adjacent revetted storage area were included in this list. [8] A response from VII Corps on 1 April states that no chemical weapons were found at either part of Tall al Lahm or at 11 other sites on the list occupied by US troops. Four of the facilities were not occupied by US troops and could not be surveyed. [\(10\)](#) [16]

## The Postwar Period: March-April 1991

Postwar reports received by the IC indicated that no chemical weapons were found in the Kuwaiti Theater of Operations (KTO). [17] These reports were generally accepted by the IC. While most national-level sources said that Iraq's chemical munitions were probably not marked, lower-level tactical units were disseminating information on markings that was gathered from enemy prisoner of war (EPW) interrogations and other local sources. [17] As a result, either the standard US CW marking system or incorrect markings data gleaned from EPWs were mistakenly used by some CENTCOM troops as the basis for determining if captured Iraqi munitions contained chemical agents. On 6 March 1991, in an attempt to gain clearance to enter the KTO, CIA analysts relayed concerns about the markings issue to CENTCOM J-2 and J-3 officers in Saudi Arabia through the Joint Intelligence Liaison Element in Saudi Arabia (JILE/Saudi):

ALTHOUGH THERE HAVE BEEN EPW REPORTS THAT IRAQ'S CHEMICAL MUNITIONS HAVE COLORED BANDS [or] OTHER MEANS OF IDENTIFICATION, OUR EXPERIENCE WITH THE MUNITIONS IRAQ USED IN ITS WAR WITH IRAN INDICATES THAT THE IRAQIS DID NOT/MARK THEIR CHEMICALLY FILLED MUNITIONS. WE BELIEVE THE EPW REPORTS ON MARKINGS MAY REFLECT TRAINING CLASSES ON CHEMICAL MUNITIONS USING SOVIET EXAMPLES...IF PERSONNEL IN THE KTO ARE NOT AWARE OF THIS POSSIBILITY, OPPORTUNITIES TO SUCCESSFULLY IDENTIFY CHEMICALLY FILLED MUNITIONS MAY BE MISSED. WHEN CACHES OF UNMARKED MUNITIONS ARE DESTROYED, THERE IS ALSO THE POSSIBILITY THAT INDIVIDUALS COULD BE EXPOSED TO CHEMICAL WARFARE AGENTS. [18]

Although not known to analysts at the time, US forces had destroyed Bunker 73 at Khamisiyah two days earlier.

As reported by UNSCOM inspectors, the Iraqi chemical weapons inadvertently demolished by US troops at Khamisiyah had no CW-specific marking or colored bands. Furthermore, Iraqi munitions at Khamisiyah that did bear colored markings--as seen on US military photography--can be readily identified as non-CW munitions.

In April 1991, the United States intercepted an Iraqi report that claimed American forces blew up the Khamisiyah depot on 1 and 2 April 1991. [19] In fact, according to DoD, US forces had demolished the

majority of the facility during 4-10 March 1991, although additional demolition continued to occur until US forces withdrew in mid-April. Additional reporting, distributed widely within the IC, indicated that Khamisiyah was later surveyed by Iraqi forces seeking to salvage usable munitions. This reporting indicated that the Iraqis believed "MOST OF THE AL KAMISIYAH [sic] AMMUNITION DEPOTS WERE DESTROYED BY `AMERICAN' AIRCRAFT BOMBING OR DETONATION . . ." [20] None of this reporting mentioned the presence of chemical weapons, however, and they were not reviewed by CW analysts.

## Supporting UNSCOM: May 1991-93

The first indication that damaged chemical munitions were located at Khamisiyah appeared in Iraq's 16 May 1991 declaration to the United Nations. In that declaration, Baghdad listed 2,160 destroyed sarin-filled 122-mm rockets at "Khamisiyah stores" and 6,240 intact mustard-filled 155-mm artillery shells at "Khamisiyah stores (Nasiriyah)." [21] Because of the previous assessment that An Nasiriyah was a suspect CW storage facility, the IC assumed at the time that this was the facility Iraq was referring to, and that what the Iraqis called Khamisiyah, we called An Nasiriyah. A follow-up Iraqi declaration from 17 May reported that "Khamisiyah stores (Nasiriyah)" was located at 3046N/04630E. (11) These declarations to the UN were obtained through the Department of State and were given broad distribution throughout State, DoD, and the IC.

In August 1991, CIA published a highly classified intelligence assessment on Iraqi noncompliance with UN Security Council Resolution 687, which mandated the elimination of Iraq's chemical, biological, and nuclear weapons and ballistic missile programs. This report, which received limited distribution within the intelligence and policy communities, (12) compared Iraq's grossly inadequate declarations with what we knew about its programs to develop weapons of mass destruction. Khamisiyah was listed in this document as a known CW storage site:

*We know . . . that chemical weapons have been stored at three declared sites--Samarra', Muhammadiyat, and Khamisiyah--for several years . . . Chemical weapons were stored at the Khamisiyah site as early as 1985 . . . Iraq declared that chemical munitions are stored at the Khamisiyah storage facility, near the city of An Nasiriyah...reporting indicated in 1986 that several thousand mustard munitions were stored at the Khamisiyah site. The Iraqi coordinates are close to those of a storage facility near An Nasiriyah that contains one S-shaped bunker. The bunker was extensively damaged by Coalition attacks. [Emphasis added.] [22]*

### Some Iraqi munitions at Khamisiyah--such as this high-explosive squash head (HESH) round--had colored markings but were readily identified as non-CW munitions.

While drafting this paper, CIA analysts reviewed the May 1986 report. At that time, they interpreted Khamisiyah to be An Nasiriyah in light of the wording in Iraq's May 1991 declaration, as well as the analytical emphasis placed on S-shaped bunkers. In addition, the quote cited above contains several inaccuracies:

- We *knew* that chemical weapons had been stored at Samarra and Muhammadiyat *for several years*; that part of the August 1991 paper was correct. However, we did *not know*--and still do not have evidence--that chemical weapons had been stored at Khamisiyah or Nasiriyah *for several years*. At the time the paper was written, we *knew* that chemical weapons had been stored at a site named

Khamisiyah during 1984 and 1985, and we had known that *for several years*.

- The negation date of 1985 was inaccurate; the May 1986 report--from which this quote was extracted--clearly indicated that chemical weapons were moved to Khamisiyah in June 1984.

On the Khamisiyah issue, in short, this paper not only perpetuated the erroneous connection with An Nasiriyah, but it also generated some additional inaccuracies. [22]

During the UNSCOM 9 (CW 2) inspection from 15 to 22 August 1991, Iraq stated that Coalition troops still occupied Khamisiyah on 18 April 1991--the date of Iraq's first declaration--and that Iraq was unable to account for the chemical weapons stored there until after Coalition forces departed. This information was first obtained by the US Government in September 1991 but was not widely available until June 1992. [23]

The US Government continued to confuse Khamisiyah with Nasiriyah until after October 1991, when UNSCOM 20 inspected Khamisiyah and documented the location and disposition of chemical weapons at the site. (13) [24] Continuing to bolster the erroneous connection between An Nasiriyah and Khamisiyah, a DIA analyst using an IC presentation briefed the UNSCOM 20 team on An Nasiriyah before the inspection, believing this to be the site Iraq called Khamisiyah. The Arms Control Intelligence Staff (ACIS) (14) later determined--on the basis of a description of the facility and better locational information obtained through Global Positioning Satellite (GPS) receivers--that Khamisiyah was actually the facility known to the United States as Tall al Lahm. [25, 26]

#### Demolition of bunkers at Khamisiyah, 4 March 1991.

The Iraqis claimed that Coalition forces had destroyed buildings and munitions at Khamisiyah. At the time, many analysts believed that the chemical weapons found at Khamisiyah might have been placed there after the ground war as part of the Iraqi effort to conceal aspects of its weapons-of-mass-destruction programs. In hindsight, the April 1991 intercept of similar information mentioned earlier should have added credibility to the Iraqi claim and should have led the US Government to conclude much sooner that Khamisiyah was a potential CW release site. The IC requested DIA review available imagery of the facility for preinspection activity that would suggest that the Iraqis staged the inspection. However, no images immediately prior to the inspection were available. That review covered only a short period prior to the inspection and did not extend to a review of intelligence that included the 18 August 1990 information described earlier.

On 12 November 1991, DoD disseminated a report drafted by ACIS, which included Iraq's claims about Coalition destruction of chemical munitions and offered some supporting evidence:

THE IRAQIS CLAIMED THE BUILDINGS AND MUNITIONS WERE DESTROYED BY OCCUPYING COALITION FORCES. IN THE TEAM'S ESTIMATION, THE DESTRUCTION OCCURRED AS A RESULT OF LOCALLY-PLACED EXPLOSIVES AS OPPOSED TO BOMBING. [27]

The report was widely disseminated, including to DoD. The same day, additional information suggesting that US forces conducted demolition activities in the areas inspected by UNSCOM 20 appeared in an internal ACIS administrative cable, which was not distributed outside CIA:

THE INSPECTORS ALSO NOTED THAT THE BUILDINGS [at Khamisiyah] WERE

DESTROYED BY DEMOLITIONS AS OPPOSED TO AERIAL BOMBARDMENT. THEY ALSO FOUND AN EMPTY U.S. CRATE LABELED AS M48, WHICH ARE SHAPE CHARGES USED BY THE U.S. MILITARY. [We] NOTIFIED ARMY CENTRAL COMMAND (ARCENT) [G-2 Forward in Dhahran] OF THE LOCATION AND EVIDENCE FOUND AT TALL AL LAHM. WE RECEIVED INFORMATION FROM ARCENT TO THE FACT THAT 24TH MECHANIZED INFANTRY DIVISION WAS LOCATED IN THE VICINITY OF TALL AL LAHM, BUT WE ARE UNABLE TO CONFIRM IF U.S. TROOPS DID IN FACT DESTROY BUILDINGS AT THIS PARTICULAR SITE. WE ARE SENDING THIS INFORMATION TO YOU IN ORDER TO TAKE APPROPRIATE ACTION AS YOU SEE FIT AS THE RISK OF CHEMICAL CONTAMINATION BY 24TH ID PERSONNEL IS A POSSIBILITY. [28]

Internal documents show that ACIS contacted an individual in the office of the G-2, 24th Mechanized Infantry Division, on 20 November 1991. [29, 30] Subsequent information identified by DoD's Office of the Special Assistant for Gulf War Illnesses indicates that G-2 asked G-3 whether the 24th found chemical weapons, or was at Khamisiyah. ACIS did not pursue this issue with JCS, DIA, or OSD at that time. We have seen no evidence yet that ARCENT included the findings in reports to higher authorities.

The UNSCOM 29 inspection in February and March 1992 involved the destruction of hundreds of chemical munitions at Khamisiyah. During the inspection, the Iraqis repeated their claim that Coalition forces destroyed chemical munitions in 1991. [31] After leaving Iraq, one of the UNSCOM team members informally requested additional background information before further destruction activities at Khamisiyah. This involved details pertaining to Coalition force activities at Khamisiyah: who was there, when they were there, and what actions were taken. [32] UNSCOM never made a formal request for this information and never followed up on the informal request, perhaps because UNSCOM decided no further destruction activity at Khamisiyah was necessary.

### [Remnants of Bunker 73 at Khamisiyah, February/March 1992.](#)

In February 1996, CIA began a search for documents relating to the Khamisiyah facility as a possible chemical agent release site in 1991. Early in that search, an undated working paper was found in an Iraqi chemical weapons inspections file in the Nonproliferation Center (NPC). (15) Further queries indicated that an NPC officer drafted the working paper in May 1992, intending it to be included with a formal action requirement to DoD after determining that no action had been taken on the earlier informal request. [33] In the paper he suggests the possibility that US forces unwittingly destroyed CW munitions at Khamisiyah. He does not recall taking any further action on the draft, and he did not maintain a copy in his personal files. [34] CIA cannot find any record of it being attached to a tasking, distributed within NPC or CIA, or sent to the IC or DoD. It is possible that no further action was taken because the issue of the presence of Coalition forces at Khamisiyah had already been raised with DoD in November 1991. In addition, as stated earlier, UNSCOM had decided that no further destruction at Khamisiyah was necessary, and the IC continued to focus on the large portions of Iraq's CW program that Baghdad had hidden.

## **Gulf War Illnesses Concerns: 1993-Present**

From 1993 through mid-1995, CIA efforts focused on providing intelligence support to DoD investigations, since most of DoD's efforts involved operational issues.

During a Senate Banking Committee hearing on 25 May 1994, Senator Don Riegle focused on the issue of

potential CW agent fallout from bombed Iraqi facilities, including the "An Nasiriyah" depot. The Director of NPC addressed the issue of chemical weapons in the KTO:

The coalition forces did not find any CW agents stored in the Kuwaiti theater of operations, with the exception of some the UN found near An Nasiriyah.

This reference to An Nasiriyah, and others made by DoD officials at the hearing, demonstrate that there was still some confusion at the time about where chemical weapons were found in the KTO. [35]

In August 1994, DIA responded to a series of questions related to Gulf war illnesses that were posed by the Senate Banking Committee. Distrust of Iraq and continuing confusion surrounding Khamisiyah are reflected in DIA's response on the issue of chemical weapons in the KTO:

Finally, it has been widely circulated that UN inspection teams found thousands of destroyed and intact chemical rounds in an ammunition depot at Nasiriyah, and that this discovery contradicts our statement in paragraph one of this answer. Nasiriyah technically is outside the KTO, being north of 31°00' N and the Euphrates River. More importantly, it was not in the territory occupied by Coalition forces after the war. Moreover, the following points are relevant because UN inspectors did not really "find" the subject munitions. In reality, the Iraqis declared the munitions to the UN and the inspectors eventually went to that location to check what the Iraqis had reported:

- 1) The UN inspection occurred at least eight months after the war;
- 2) The location of the "found" chemical rounds was 15 miles from the widely discussed CBW bunkers bombed at Nasiriyah (the site which was originally expected to be inspected). The bombed bunkers were not inspected until one year later in Oct 1992 and found to contain no chemical or biological weapons . . . [36]

Because of the increased focus on Gulf war illness issues by both the public and Congress, as well as concerns raised by two CIA analysts, Acting Director of Central Intelligence Studeman authorized a comprehensive review of intelligence by CIA on the issues related to the Gulf war in March 1995. Throughout the summer of 1995, CIA conducted a study to evaluate the possibility that US forces could have been exposed to fallout from US bombing of Iraqi CW production and storage facilities. As part of this study, a CIA analyst constructed a comprehensive summary of Iraqi CW-related facilities, focusing on the status and disposition of CW agents at these sites. Separately, an NPC officer reviewed UNSCOM information. The Khamisiyah facility emerged as a key site that needed to be investigated because of its proximity to Coalition forces and the ambiguities surrounding the disposition of chemical weapons at the site. [37] CIA informed DoD's Persian Gulf Investigative Team (PGIT) (16) in September 1995 of Khamisiyah's importance and requested additional information about US troop activities there to which PGIT responded in October. [38, 39]

CIA's research of Khamisiyah intensified in 1996 as evidence of unwitting US involvement in CW-related destruction activities began to be recognized. On 26 January 1996, as part of a preliminary briefing to National Security Council staff on CIA's declassification initiative and ongoing study about potential exposure to chemical, biological, and radiological agents during the Gulf war, CIA mentioned the possibility of CW storage and agent release at the Khamisiyah facility. [40] NSC Staff indicated that this needed to be pursued aggressively together with DoD. Between 8 February and 7 March 1996, analysts conducted an intensive search of historical files, imagery, and other records, uncovering more evidence linking US troops

to destruction of chemical weapons at Bunker 73 at Khamisiyah. A retrospective search of imagery, for example, revealed that a row of bunkers at Khamisiyah had been destroyed between 1 and 8 March 1991--after the cease-fire. Analysts also uncovered cables indicating UNSCOM inspectors had found evidence of US demolition charges at Khamisiyah. [28] On 5 March 1996, CIA informed a Presidential Advisory Committee (PAC) staffer that a probable release of chemical agent occurred at Khamisiyah in conjunction with US troops. On 10 March 1996, a CIA analyst heard a tape recording of a radio show in which a veteran of the 37th Engineering Battalion described demolition activities at a facility the analyst immediately recognized as Khamisiyah. PGIT was informed on 11 March, and the PAC was notified the same week.

CIA and DoD personnel met with UNSCOM officials on 19 March 1996 to begin a dialogue regarding Gulf war illnesses issues. At this meeting, UNSCOM indicated that it planned to revisit Khamisiyah to resolve newly raised munitions accounting issues. As a result of this dialogue, UNSCOM agreed to make public appropriate relevant information. At the 1 May 1996 PAC meeting, CIA publicly announced that the 37th Engineering Battalion had destroyed munitions at Khamisiyah in March 1991 and that CIA was "working with the DoD Investigative Team to resolve whether sarin-filled rockets were destroyed at Bunker 73 and whether some US personnel could have been exposed to chemical agent."

During UNSCOM's inspection of Khamisiyah on 14 May 1996, it was determined that some of the destroyed rockets in Bunker 73 were chemical weapons. This was based on the presence of high-density polyethylene inserts, burster tubes, fill plugs, and other features characteristic of chemical warheads for Iraqi 122-mm rockets. In addition, Iraq claimed for the first time that Coalition troops also destroyed the rockets in the nearby pit area at Khamisiyah. [41] In light of this information, CIA and DoD determined that US forces destroyed chemical weapons in Bunker 73 on 4 March 1991 along with more than 30 bunkers containing conventional weapons. DoD publicly announced these conclusions on 21 June 1996. CIA efforts since then have focused on modeling the effects of agent releases at the bunker and on investigating the pit area demolition.

By August 1996, CIA had completed its study of potential exposure caused by US bombing of Iraqi chemical facilities and by the demolition of Bunker 73 at Khamisiyah. The results were made available to the public. Several critical data points necessary for a more accurate estimate of the potential chemical hazard resulting from demolitions in the pit, however, were not available. The details surrounding destruction of chemical weapons in the pit area are less certain than events at Bunker 73. Recent analysis of the evidence suggests that two destruction events at the pit--the first on 10 March 1991 and the second on 12 March--are more likely than a single event.

### [Predemolition photo of pit area near Khamisiyah](#)

Ongoing investigations related to Gulf war illnesses have shed light on the sequence of events at Khamisiyah. DoD--including DIA and the Defense Humint Service (DHS)--and CIA have recently acquired several pieces of information. UNSCOM has made available selected videotapes, photographs, and sample analysis taken from destroyed munitions from the UNSCOM 20 inspection in 1991. In addition, we have spoken with two of the soldiers who performed demolition activity in the pit area. These data strongly suggest that munitions in the pit were destroyed by US troops and provide evidence that demolition might have occurred on two separate occasions. [\(17\)](#)

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## Efforts To Help Address Gulf War Illnesses Issues

*Several IC task forces have been created since the initial DoD emphasis in 1994 on identifying intelligence information that may be related to Gulf war illnesses. DIA formed a search and declassification effort in March 1995, followed in October 1995 by CIA's Persian Gulf War Illnesses Task Force. These groups were tasked with identifying, declassifying, and publicly releasing intelligence information that might shed light on potential causes of Gulf war illnesses. In October 1996, DIA formed a Persian Gulf Focus Group to support Gulf war illness--related efforts in other DoD offices and CIA. Most recently, on 27 February 1997, Acting DCI George Tenet created an IC task force on Persian Gulf war illnesses in parallel with President Clinton's 60-day directive to the Presidential Advisory Committee. One of the purposes of this task force, which began its work on 3 March, is to ensure all documentation relevant to Khamisiyah and Gulf war illnesses is made available promptly to the many governmentwide offices now involved in the issues.*

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[Chemical rockets destroyed in pit area, March 1991.](#)

## Some Lessons Learned

Even though CENTCOM listed the Khamisiyah facility as a potential CW storage site before the ground war, and additional concerns about the facility were transmitted in February 1991, this historical perspective highlights several areas that need attention:

- *Intelligence agencies must reconcile information in databases to eliminate confusion about facilities.* For example, different agencies' information on munition storage sites needs to be analyzed to generate a common list. This would minimize the type of confusion and misconceptions made on the Khamisiyah issue and may have prompted an earlier review of older intelligence for evidence of possible CW storage or transfer activities.
- *Intelligence components handling sensitive information must review their procedures for deciding how to share vital information with others who have a need to know.* For example, intelligence analysts in Washington were not told that the original source of the 23 February 1991 report was someone in the Iranian Air Force or Air Force--related industry. [50] This cable and others related to subsequent UN inspections were not shared with DIA.
- *Intelligence analysts must remain increasingly careful to avoid "tunnel vision" in crafting their judgments.* The culture during the late 1980s stressed making definitive judgments and eschewed alternative outcomes or analysis. The IC in recent years has made important strides in addressing these problems, including changing its culture and instituting analyst training programs to stress inclusion of alternative scenarios and conclusions.
- *Finally, as intelligence agencies support defense and policy efforts on specific issues, they must ensure that searches are more thorough in order to provide the fullest possible answers.* For example,

a search of CW files dating back to Iraqi use of CW in the Iran-Iraq war would have revealed the 1986 Khamisiyah-Tall al Lahm connection and its association with chemical weapons, and at a minimum should have placed the facility on the IC's list of suspected CW sites for targeting and warning. It might also have prompted a more thorough search for other information.

The DCI Persian Gulf War Illnesses Task Force will be providing a paper on the lessons learned through its studies. That paper will include recommendations to address concerns discovered in this study, as well as any others discovered by the Task Force in the course of its work. In this regard, the Task Force's intent is not only to assist US Government efforts on Gulf war illnesses issues, but also to help the IC enhance its efforts for the future.

[Chronology \(September 1976 - March 1991\)](#)

[Chronology \(March 1991 - March 1996\)](#)

[Chronology \(March 1996 - February 1997\)](#)

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## References

- 1 First identification of Tall al Lahm, 1976
- 2 First indication of Khamisiyah depot, April 1982
- 3 Reported coordinates of Khamisiyah, August 1982
- 4 Report indicating chemical weapons at Khamisiyah, May 1986
- 5 Iran-Iraq: Chemical Warfare Continues, November 1986
- 6 Reported Iraqi CW storage locations, August 1988
- 7 DIA assessment of Iraqi CW storage possibilities
- 8 Military intelligence information request, 28 February 1991
- 9 CIA cable on suspected chemical storage area, 23 February 1991
- 10 CENTCOM informed of 23 February 1991 CIA cable, 24 February 1991
- 11 CIA Desert Storm CBW activity report, 25 February 1991
- 12 CIA response to 23 February 1991 cable, 26 February 1991
- 13 ARCENT collection emphasis, 25 February 1991

- 14 XVIII Corps log entry, 26 February 1991
- 15 DIA suspect BW/CW facilities cable, 28 February 1991
- 16 ARCENT response to 28 February 1991 military intelligence information request, 1 Apr 91
- 17 Cable relaying CENTCOM information on CW, 8 March 1991
- 18 CIA relays concerns about unmarked chemical munitions, 6 March 1991
- 19 Report describing US demolition of Khamisiyah, 3 April 1991
- 20 Report describing US destruction of Khamisiyah, 21 April 1991
- 21 Iraqi declaration, 16 May 1991
- 22 Iraq's Noncompliance With UN Security Council Resolution 687, August 1991
- 23 Answers to questions posed by UNSCOM 9 on chemical agents and synthetic processes
- 24 Site descriptions from UNSCOM 20 inspection report, 13 November 1991
- 25 Memorandum of phone call, 15 November 1991
- 26 ACIS on facility identification and tasking, 15 November 1991
- 27 UNSCOM 20 inspection results of Kamisiyah ammunition storage facility, 12 November 1991
- 28 Situation report on Tall al Lahm ammunition storage depot, 12 November 1991
- 29 Record of phone call, 20 November 1991
- 30 Cable version of record of phone call, 20 November 1991
- 31 Chemical rocket destruction in Khamisiyah, 1992
- 32 UNSCOM member questions about Coalition activity, 1 April 1992
- 33 Working paper mentioning possible CW exposure, 1992
- 34 Internal memorandum on Persian Gulf war veterans' illnesses, 30 May 1995
- 35 Hearing before the Committee on Banking, Housing, and Urban Affairs; United States Senate; 103rd Congress; 2nd Session,

25 May 1994

- 36 DIA response to Riegle Committee questions, August 1994
  - 37 Internal memorandum describing uncertainties about Tall al Lahm, 6 September 1995
  - 38 Internal memorandum requesting information to support study of potential exposure issues, 13 September 1995
  - 39 Unit location listing provided by PGIT
  - 40 CIA briefing to NSC on study of potential exposures, 26 January 1996
  - 41 Iraqi Fallujah, Khamisiyah, and An-Nasiriyah chemical warfare related sites, 1996
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## Footnotes

**(1)** The Intelligence Community comprises the Central Intelligence Agency, Defense Intelligence Agency, Bureau of Intelligence and Research (State), National Security Agency, National Imagery and Mapping Agency, and several other organizations within the Departments of Defense, Treasury, Justice, and Energy.

**(2)** Although monitoring Iraq's CW program in general remained a high priority, available collection and analytic resources were focused on key production-related facilities rather than storage sites. In addition, CW analysts were also responsible for monitoring critical developments in countries such as Libya, Iran, and Russia.

**(3)** Two previous efforts by CIA to describe its assessment of what we knew about Khamisiyah were imprecise, and were contradictory with the fact that we had associated chemical weapons with the Khamisiyah facility in 1986. These previous efforts were a chronology transmitted to DoD on 24 January 1997 for its preparation of the Khamisiyah Case Narrative, and a 26 February 1997 Fact Sheet. One of the purposes of this paper is to set the record straight.

**(4)** At the time these weapons were first moved to Khamisiyah, Iraq had just begun to use large numbers of chemical weapons on the battlefield, although the Iran-Iraq war had been under way for nearly four years. Analysts viewed Iraqi CW practices in the early years of its CW program to be haphazard, and not indicative of routines established once the program matured.

**(5)** Limiting access to very sensitive reports is an important measure in ensuring anonymity of the report's source, whose life would almost certainly be at risk if his government discovered his identity. Because of such sensitivity, however, this report and other sensitive reports cited in this chronology were not available electronically and were not easily retrievable by analysts doing retrospective analysis.

**(6)** This assessment was one of many routine IC reports on Iraq's CW program and was distributed to DoD

and other elements of the policy and intelligence communities.

**(7)** Forward-deployed storage, by definition, is deemed to be temporary; that is, for use during wartime-related operations. Nevertheless, analytical judgments about the forward-deployed usage of Khamisiyah, either at that time or currently, should not be misinterpreted as a justification for the facility's not being listed as a potential chemical weapons storage site prior to Desert Storm. Given the uncertainties at the time about locations of Iraq's CW stockpile, IC lists of suspected chemical weapons storage facilities should have been broader and should have included sites at which chemical weapons had previously been stored.

**(8)** Later information suggests that An Nasiriyah actually was a CW storage facility at the beginning of Desert Storm. According to Iraqi declarations, the undamaged mustard rounds stored in the open near Khamisiyah were moved there from Nasiriyah after the air war began.

**(9)** This paragraph was prepared in coordination with DoD's Office of the Special Assistant for Gulf War Illnesses.

**(10)** This paragraph was prepared in coordination with DoD's Office of the Special Assistant for Gulf War Illnesses.

**(11)** These coordinates fall near but not directly on the Khamisiyah depot. The geographic coordinates declared by the Iraqis for other CW sites known to us were in error by as much as 30 minutes (about 50 kilometers), however, so the accuracy of declared coordinates was questionable. As a result, the declared coordinates were viewed by the IC as consistent with the An Nasiriyah depot. In addition, the Iraqis were less than forthcoming and sometimes misleading in this and other declarations, which tended to bring to question the overall credibility of Iraqi information.

**(12)** External distribution: The President, Assistant to the President for National Security Affairs, Assistant to the President and Deputy for National Security Affairs, The Secretary of State, The Secretary of Defense, The Secretary of Energy, Chairman, Joint Chiefs of Staff, The Director, Defense Intelligence Agency, The Director, National Security Agency, The Director, Arms Control and Disarmament Agency, Assistant Secretary of State for Intelligence and Research, Assistant Chief of Staff of Air Force Intelligence

**(13)** Additional information about Khamisiyah was obtained by two UNSCOM inspection teams later in 1991, but this information was not passed to the United States until after information from the UNSCOM 20 inspection. During the UNSCOM 11 (August 1991) inspection, the correct coordinates of Khamisiyah were acquired by UNSCOM from the Iraqis. UNSCOM 17 became the first inspection team at Khamisiyah when it very briefly visited the site on 25 October 1991.

**(14)** ACIS is an interagency organization that, at the time, was the IC focal point supporting US Government efforts vis-a-vis Iraq.

**(15)** In December 1991, NPC took over the former ACIS role of IC focal point supporting US Government efforts vis-a-vis Iraq.

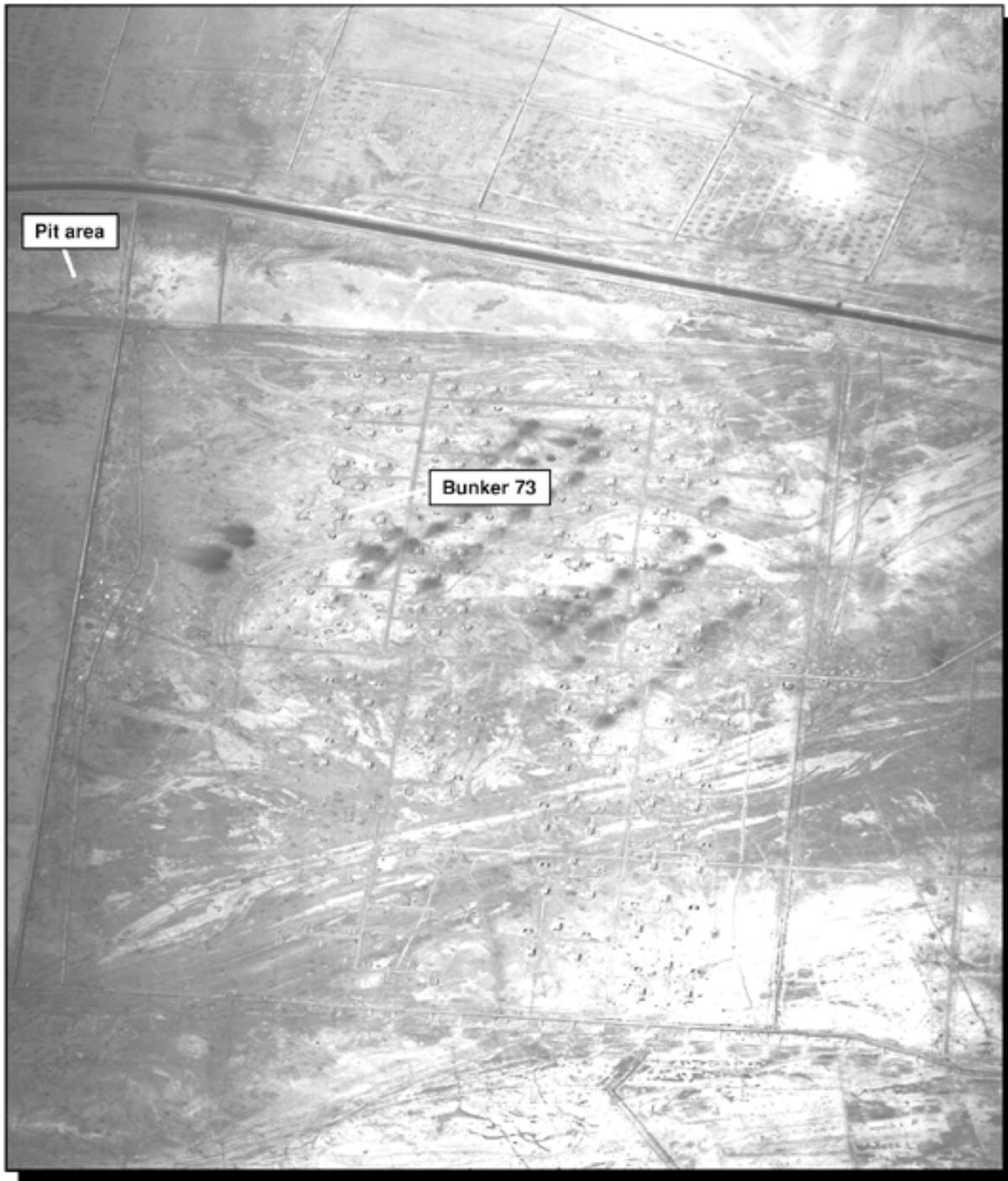
**(16)** Established in June 1995.

[\(17\)](#) DIA searched for tactical imagery of Khamisiyah taken after the demolition but found none; this imagery was not systematically archived. The Army IG acquired a ground photograph that, upon analysis, appears to have been taken in the pit after demolition. This is only the third known photo of Khamisiyah taken immediately after the demolition. It has already been released publicly and, in fact, has been used on flyers written by CIA and DoD to provide and seek more information on Khamisiyah.

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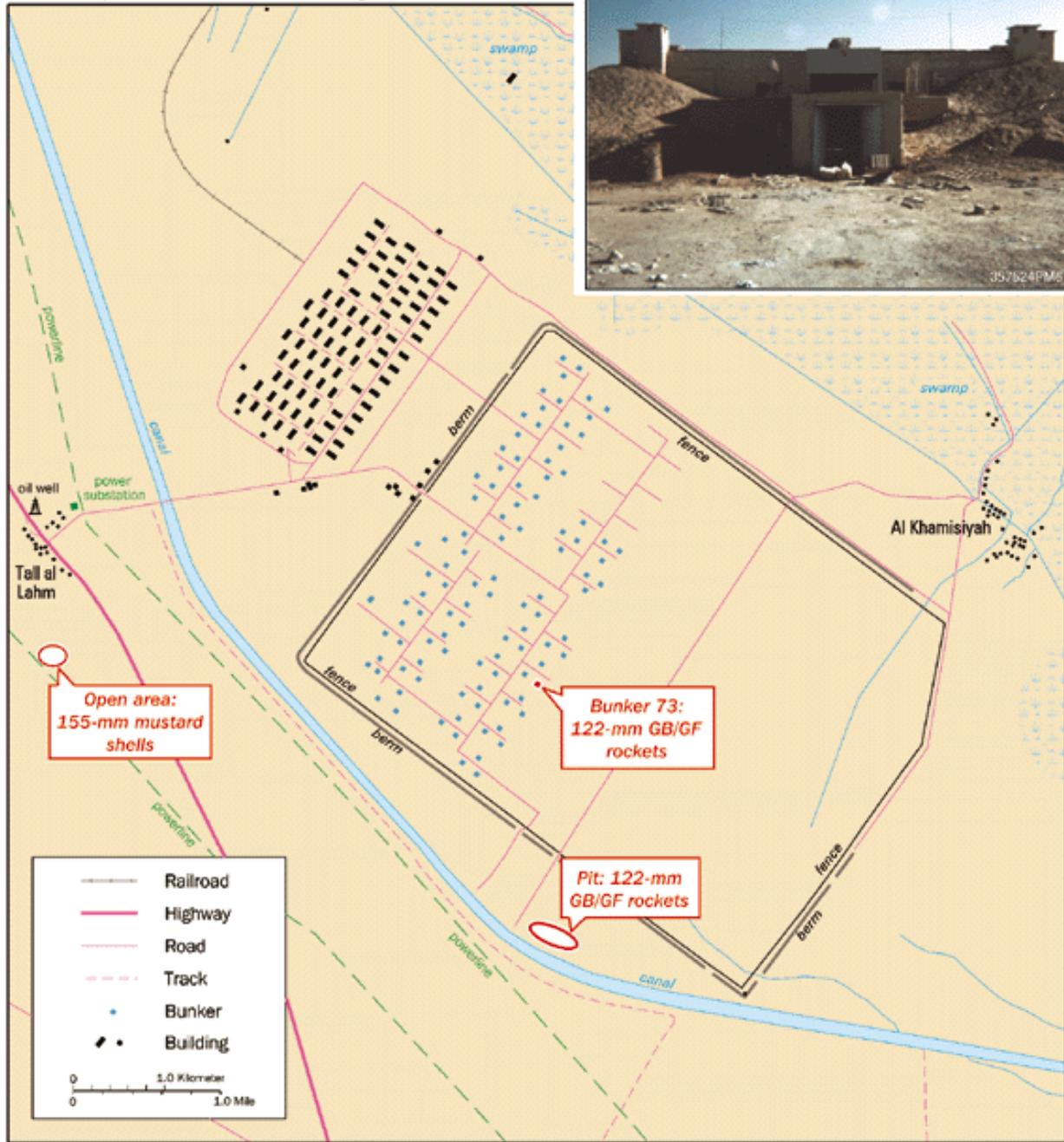
742423 (R02324) 4-97



**Figure 2.** *Predemolition photo of Khamisiyah ammunition storage area showing Bunker 73 and pit area.*

357571PM6 4-97

### Khamisiyah Ammunition Storage Area



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**Figure 4.** Some Iraqi munitions at Khamisiyah—such as this high-explosive squash head (HESH) round—had colored markings but were readily identified as non-CW munitions.

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*Figure 4. Some Iraqi munitions at Khamisiyah—such as this high-explosive squash head (HESH) round—had colored markings but were readily identified as non-CW munitions.*



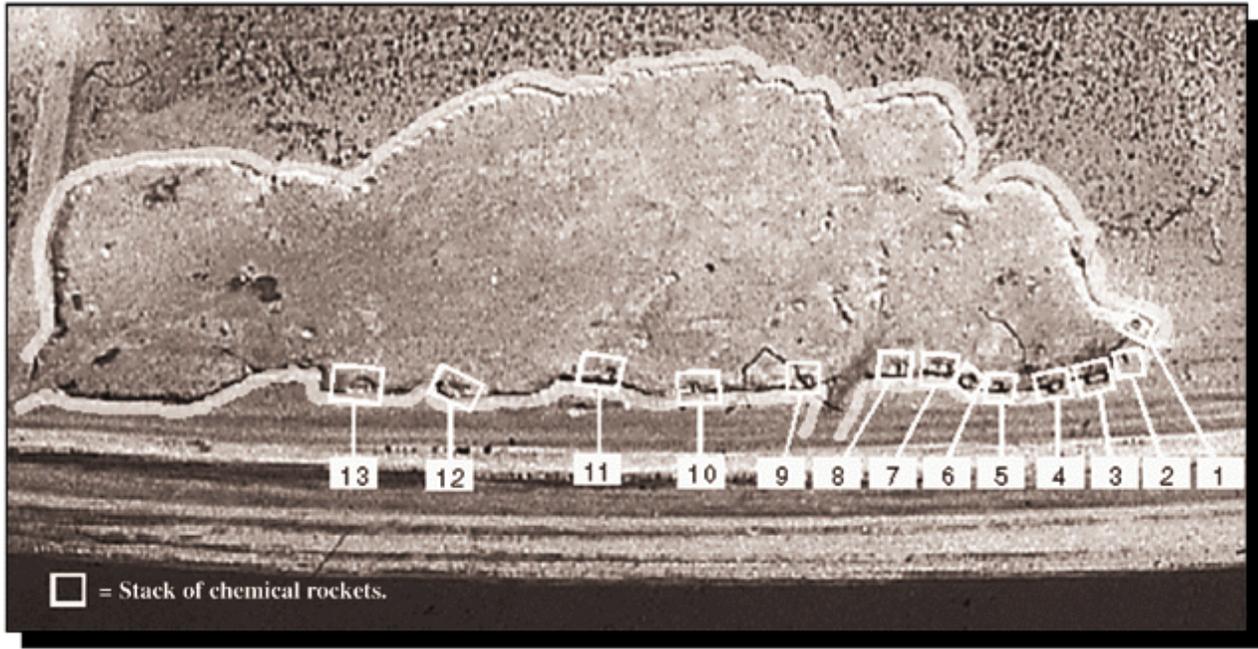
*Figure 5. Demolition of bunkers at Khamisiyah, 4 March 1991.*

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*Figure 7. Remnants of Bunker 73 at Khamisiyah, February/March 1992.*

357522PM6 4-97



*Figure 8. Predemolition photo of pit area near Khamisiyah.*

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*Figure 9. Chemical rockets destroyed in pit area, March 1991.*

357521PM6 4-97

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**Chronology**

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**Information & Events**

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**Actions**

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**Sep 76:** First intelligence revealing depot

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**Jun 77:** Depot named "Tall al Lahm" in imagery database

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**Sep 80:** Iran-Iraq war begins

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**Apr 82:** First mention of "Khamisiyah" depot in reporting

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**Aug 83:** Iraq begins using chemical weapons against Iran

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**Jul 84:** Decon vehicle present at Khamisiyah; not found until March 1997

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**May 86:** Sensitive human-source report indicates chemical weapons moved to Khamisiyah between Jun 84 and Mar 85; report received limited distribution

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**Nov 86:** CIA/DI intelligence assessment concludes that chemical weapons stored at "Tall al Lahm," but highlights S-shaped bunkers as future CW deployment sites

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**2 Aug 90:** Iraq invades Kuwait

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**18 Aug 90:** Possible chemical weapons transfer activity underway at Khamisiyah, but not identified as such until early 1996

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Reported as munitions transloading activity

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**17 Jan 91:** Desert Storm air campaign begins

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**23 Feb 91:** CIA reporting cable sent to Headquarters and Desert Storm support element states chemical weapons stored at 3047N04622E (now known to be Khamisiyah)

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Report passed to CENTCOM in Riyadh; CENTCOM issues several collection taskings that week, but relationship unclear

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**24 Feb 91:** Ground war begins

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**28 Feb 91:** Cease-fire declared

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DIA notifies CENTCOM that possible BW- or CW-related bunker identified at Tall al Lahm

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**4, 10, 12 March 91:** US troops destroy chemical weapons at Khamisiyah

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**Chronology (continued)**

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**Information & Events**

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**Actions**

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**8 Mar 91:** CENTCOM reports that no chemical munitions found in KTO and restates its view that Iraqi chemical munitions bear characteristic markings

**6 Mar 91:** CIA analysts warn CENTCOM of risks from unmarked Iraqi chemical munitions; Khamisiyah not on CIA list of facilities of interest

**Apr 91:** Intercepted Iraqi reports claim US forces destroyed Khamisiyah on 1-2 April

**16 May 91:** Iraqi declaration provides first indication that damaged chemical weapons located at "Khamisiyah storage facility"

Declared facility assessed to be An Nasiriyah

**15-22 Aug 91:** Iraq tells UNSCOM 9 (CW 2) team that Khamisiyah and chemical weapons there were under Coalition control until after 18 Apr 91

**Oct 91:** UNSCOM 20 inspects Khamisiyah; originally expected site to be Nasiriyah

**Nov 91:** Khamisiyah correctly identified as facility commonly known to the US as Tall al Lahm

**12 Nov 91:** CIA administrative cable notes evidence of US demolition charges found at Khamisiyah

CIA notifies ARCENT; later contacts 24th Mech

**Feb-Mar 92:** UNSCOM 29 destroys chemical weapons at Khamisiyah; UNSCOM informally requests information on Coalition activities at site

Memo seeking DoD answers to UNSCOM request drafted by NPC officer but apparently not sent; no formal UNSCOM request

**25 May 94:** CIA testimony to Senate Banking Committee shows CIA aware that "Nasiriyah" depot in KTO, but uncertain if US troops occupied site

**Mar 95:** ADCI Studeman authorizes CIA review of relevant intelligence

**Summer 95:** CIA conducts study of potential exposure from bombed Iraqi CW facilities; concludes Khamisiyah key to exposure issue; requests information on US troop activities there

**26 Jan 96:** CIA briefs Khamisiyah evidence to NSC

**8 Feb-7 Mar 96:** Intensive CIA search of historical files uncovers more evidence linking US troops to destruction of chemical weapons at Khamisiyah

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**Chronology (continued)**

<b>Information &amp; Events</b>	<b>Actions</b>
<b>10 Mar 96:</b> CIA analyst hears taped radio broadcast that provides missing link connecting US troops to Khamisiyah demolition	DIA, PCIT, PAC quickly notified of this discovery
<b>19 Mar 96:</b> UNSCOM plans to revisit Khamisiyah based on concerns of Iraqi munitions accounting	
	<b>1 May 96:</b> At PAC hearing, CIA publicly announces evidence US troops unknowingly destroyed chemical weapons at Khamisiyah
<b>14 May 96:</b> UNSCOM inspects Khamisiyah, verifies that Bunker 73 contained chemical rockets; Iraq claims for first time that US forces destroyed chemical weapons in pit area as well	
	<b>Aug 96:</b> CIA publishes unclassified study of potential exposure caused by US bombing of various Iraqi chemical facilities and by demolition at Khamisiyah Bunker 73
	<b>Oct 96:</b> DIA forms Persian Gulf Focus Group; acquires additional evidence about pit area demolition
	<b>27 Feb 97:</b> ADCI Tenet creates IC task force on Gulf war illnesses