



# **Iraqi Mobile Biological Warfare Agent Production Plants**

28 May 2003





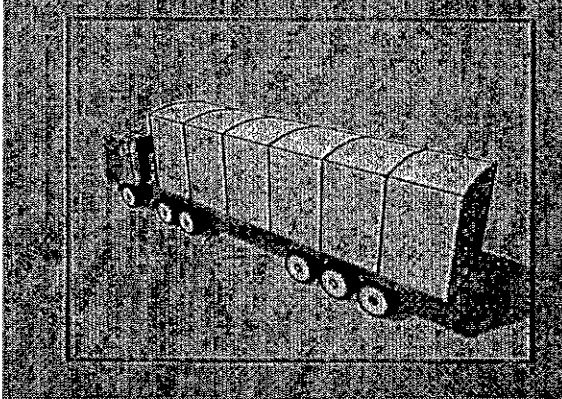
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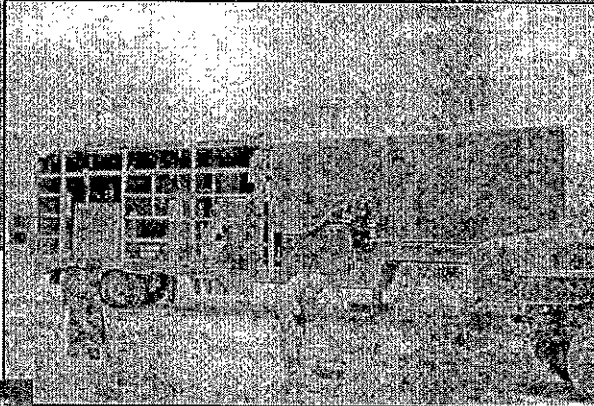
## Reported Mobile Plants Compared to Those Found in Iraq

### Mobile Production Facilities For Biological Agents



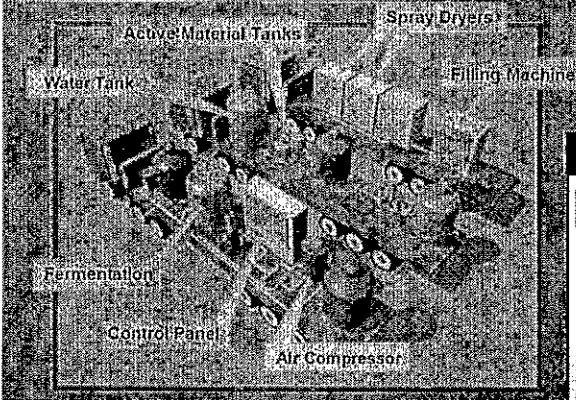
*Exterior graphic from Secretary Powell's speech to the United Nations.*

### Probable Biological Agent Production Plant



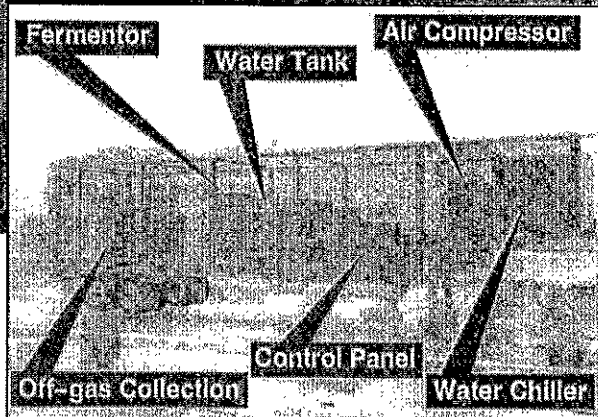
*Exterior photograph of a probable mobile BW production plant found near Mosul, Iraq, in late April.*

### Mobile Production Facilities For Biological Agents



*Interior graphic from Secretary Powell's speech showing original three-trailer design.*

### Probable Biological Agent Production Plant



*Interior graphic of a probable mobile BW production plant showing components similar to those in the far left trailer in the graphic on the left.*

## Iraqi Mobile Biological Warfare Agent Production Plants

### Overview

Coalition forces have uncovered the strongest evidence to date that Iraq was hiding a biological warfare program.

- Kurdish forces in late April 2003 took into custody a specialized tractor-trailer near Mosul and subsequently turned it over to US military control.
- The US military discovered a second mobile facility equipped to produce BW agent in early May at the al-Kindi Research, Testing, Development, and Engineering facility in Mosul. Although this second trailer appears to have been looted, the remaining equipment, including the fermentor, is in a configuration similar to the first plant.
- US forces in late April also discovered a mobile laboratory truck in Baghdad. The truck is a toxicology laboratory from the 1980s that could be used to support BW or legitimate research.

The design, equipment, and layout of the trailer found in late April is strikingly similar to descriptions provided by a source who was a chemical engineer that managed one of the mobile plants. Secretary of State Powell's description of the mobile plants in his speech in February 2003 to the United Nations (see inset) was based primarily on reporting from this source.

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### Secretary Powell's Speech to the UN

Secretary Powell's speech to the UN in February 2003 detailed Iraq's mobile BW program, and was primarily based on information from a source who was a chemical engineer that managed one of the mobile plants.

- Iraq's mobile BW program began in the mid-1990s—this is reportedly when the units were being designed.
- Iraq manufactured mobile trailers and railcars to produce biological agents, which were designed to evade UN weapons inspectors. Agent production reportedly occurred Thursday night through Friday when the UN did not conduct inspections in observance of the Muslim holy day.
- An accident occurred in 1998 during a production run, which killed 12 technicians—an indication that Iraq was producing a BW agent at that time.

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Analysis of the trailers reveals that they probably are second- or possibly third-generation designs of the plants described by the source. The newer version includes system improvements, such as cooling units, apparently engineered to solve production problems described by the source that were encountered with the older design.

- The manufacturer's plates on the fermentors list production dates of 2002 and 2003—suggesting Iraq continued to produce these units as late as this year.

## Prewar Assessment

The source reported to us that Iraq in 1995 planned to construct seven sets of mobile production plants—six on semitrailers and one on railroad cars—to conceal BW agent production while appearing to cooperate with UN inspectors. Some of this information was corroborated by another source.

- One of the semitrailer plants reportedly produced BW agents as early as July 1997.
- The design for a more concealable and efficient two-trailer system was reportedly completed in May 1998 to compensate for difficulties in operating the original, three-trailer plant.
- Iraq employed extensive denial and deception in this program, including disguising from its own workers the production process, equipment, and BW agents produced in the trailers.

## Plants Consistent With Intelligence Reporting

Examination of the trailers reveals that all of the equipment is permanently installed and interconnected, creating an ingeniously simple, self-contained bioprocessing system. Although the equipment on the trailer found in April 2003 was partially damaged by looters, it includes a fermentor capable of producing biological agents and support equipment such as water supply tanks, an air compressor, a water chiller, and a system for collecting exhaust gases.

The trailers probably are part of a two- or possibly three-trailer unit. Both trailers we have found probably are designed to produce BW agent in unconcentrated liquid slurry. The missing trailer or trailers from one complete unit would be equipped for growth media preparation and postharvest processing and, we would expect, have equipment such as mixing tanks, centrifuges, and spray dryers.

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## Prewar Iraqi Mobile Program Sources

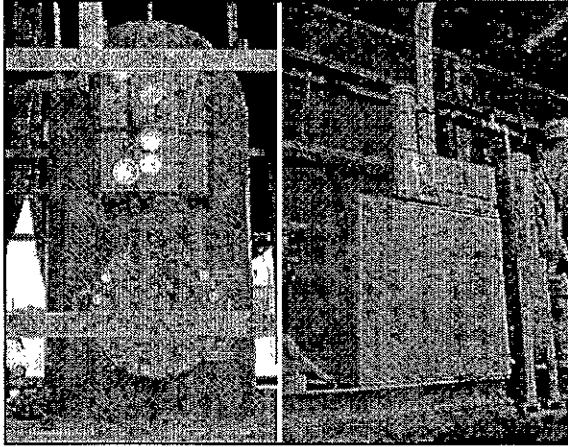
The majority of our information on Iraq's mobile program was obtained from a chemical engineer that managed one of the plants. Three other sources, however, corroborated information related to the mobile BW project.

- The second source was a civil engineer who reported on the existence of at least one truck-transportable facility in December 2000 at the Karbala ammunition depot.
- The third source reported in 2002 that Iraq had manufactured mobile systems for the production of single-cell protein on trailers and railcars but admitted that they could be used for BW agent production.
- The fourth source, a defector from the Iraq Intelligence Service, reported that Baghdad manufactured mobile facilities that we assess could be used for the research of BW agents, vice production.

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- These other units that we have not yet found would be needed to prepare and sterilize the media and to concentrate and possibly dry the agent, before the agent is ready for introduction into a delivery system, such as bulk-filled munitions. Before the Gulf war, Iraq bulk filled missile and rocket warheads, aerial bombs, artillery shells, and spray tanks.

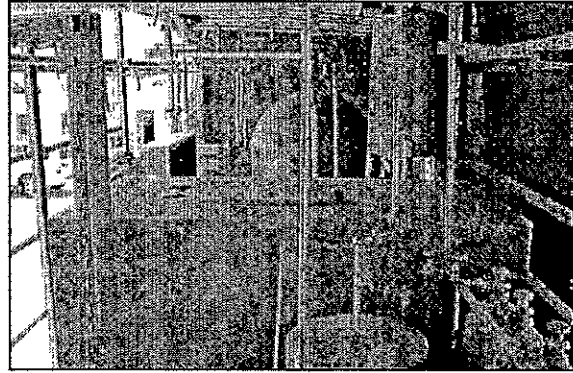
Our analysis of the mobile production plant found in April indicates the layout and equipment are consistent with information provided by the chemical engineer, who has direct knowledge of Iraq's mobile BW program.

- The source recognized pictures of this trailer, among photographs of unrelated equipment, as a mobile BW production plant similar to the one that he managed, even pointing out specific pieces of equipment that were installed on his unit.



*Fermentor.*

*Exhaust gas compressor.*



*Interior view of fermentor, media tank, water supply tanks, and gas cylinders connected by pipes.*

Common elements between the source's description and the trailers include a control panel, fermentor, water tank, holding tank, and two sets of gas cylinders. One set of gas cylinders was reported to provide clean gases—oxygen and nitrogen—for production, and the other set captured exhaust gases, concealing signatures of BW agent production.

- The discovered trailers also incorporate air-stirred fermentors, which the source reported were part of the second-generation plant design.
- Externally, the trailers have a ribbed superstructure to support a canvas covering that matches the source's description.
- Data plates on the fermentors indicate that they were manufactured at the same plant the source said manufactured equipment for the first generation of mobile plants. The plant also was involved in the production of equipment used in Iraq's pre-Gulf war BW program.

Employees of the facility that produced the mobile production plants' fermentor revealed that seven fermentors were produced in 1997, one in 2002 and one in 2003.

- The seven fermentors appear to corroborate the source's reporting that Iraq in the mid-1990s planned to produce seven mobile production plants.

- The two fermentors produced in 2002 and 2003 reportedly were sent to the al-Kindi Research, Testing, Development, and Engineering facility in Mosul—the site where the second trailer was found—and probably are the fermentors found on the trailers in US custody.

There are a few inconsistencies between the source's reporting and the trailers, which probably reflect design improvements.

- The original plants were reported to be mounted on flatbed trailers reinforced by nickel-plate flooring and equipped with hydraulic support legs. The discovered plants are mounted on heavy equipment transporters intended to carry army tanks, obviating the need for reinforced floors and hydraulic legs.
- The trailers have a cooling unit not included in the original plant design, probably to solve overheating problems during the summer months as described by the source.

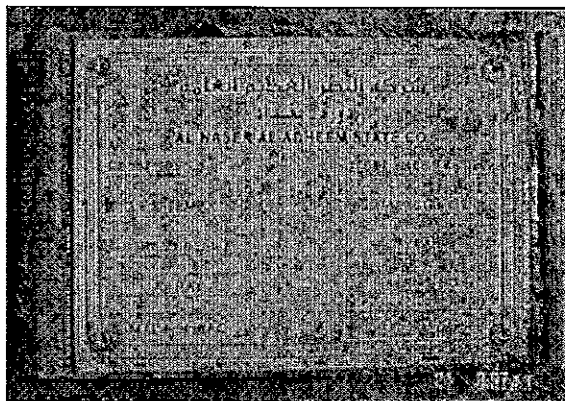
- The original design had 18 pumps, but the source mentioned an effort to reduce the number to four in the new design. The trailer discovered in late April has three pumps.

### Legitimate Uses Unlikely

Coalition experts on fermentation and systems engineering examined the trailer found in late April and have been unable to identify any legitimate industrial use—such as water purification, mobile medical laboratory, vaccine or pharmaceutical production—that would justify the effort and expense of a mobile production capability. We have investigated what other industrial processes may require such equipment—a fermentor, refrigeration, and a gas capture system—and agree with the experts that BW agent production is the only consistent, logical purpose for these vehicles.

- The capability of the system to capture and compress exhaust gases produced during fermentation is not required for legitimate biological processes and strongly indicates attempts to conceal production activity.
- The presence of caustic in the fermentor combined with the recent painting of the plant may indicate an attempt to decontaminate and conceal the plant's purpose.
- Finally, the data plate on the fermentor indicates that this system was manufactured in 2002 and yet it was not declared to the United Nations, as required by Security Council Resolutions.

Some coalition analysts assess that the trailer found in late April could be used for bioproduction but believe it may be a newer prototype because the layout is not entirely identical to what the source described.



*Manufacturer's data plate on the fermentor.*

A *New York Times* article on 13 May 2003 reported that an agricultural expert suggests the trailers might have been intended to produce biopesticides near agricultural areas in order to avoid degradation problems. The same article also reported that a former weapons inspector suggests that the trailers may be chemical-processing units intended to refurbish Iraq's antiaircraft missiles.

- Biopesticide production requires the same equipment and technology used for BW agent production; however, the off-gas collection system and the size of the equipment are unnecessary for biopesticide production. There is no need to produce biopesticides near the point of use because biopesticides do not degrade as quickly as most BW agents and would be more economically produced at a large fixed facility. In addition, the color of the trailer found in mid-April is indicative of military rather than civilian use.
- Our missile experts have no explanation for how such a trailer could function to refurbish antiaircraft missiles and judge that such a use is unlikely based on the scale, configuration, and assessed function of the equipment.
- The experts cited in the editorial are not on the scene and probably do not have complete access to information about the trailers.



## Hydrogen Production Cover Story

Senior Iraqi officials of the al-Kindi Research, Testing, Development, and Engineering facility in Mosul were shown pictures of the mobile production trailers, and they claimed that the trailers were used to chemically produce hydrogen for artillery weather balloons. Hydrogen production would be a plausible cover story for the mobile production units.

- The Iraqis have used sophisticated denial and deception methods that include the use of cover stories that are designed to work. Some of the features of the trailer—a gas collection system and the presence of caustic—are consistent with both bioproduction and hydrogen production.

The plant's design possibly could be used to produce hydrogen using a chemical reaction, but it would be inefficient. The capacity of this trailer is larger than typical units for hydrogen production for weather balloons. Compact, transportable hydrogen generation systems are commercially available, safe, and reliable.

## Sample Collection and Analysis

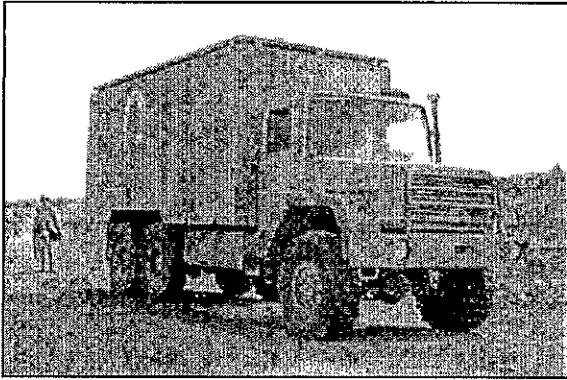
We continue to examine the trailer found in mid-April and are using advanced sample analysis techniques to determine whether BW agent is present, although we do not expect samples to show the presence of BW agent. We suspect that the Iraqis thoroughly decontaminated the vehicle to remove evidence of BW agent production. Despite the lack of confirmatory samples, we nevertheless are confident that this trailer is a mobile BW production plant because of the source's description, equipment, and design.

- The initial set of samples, now in the United States, was taken from sludge from inside the fermentor, liquid that was in the system and wipes from the equipment. A sample set also was provided to a coalition partner for detailed laboratory analysis.
- As we expected, preliminary sample analysis results are negative for five standard BW agents, including *Bacillus anthracis*, and for growth media for those agents. In addition, the preliminary results indicate the presence of sodium azide and urea, which do not support Iraqi claims that the trailer was for hydrogen production.
- Additional sample analysis is being conducted to identify growth media, agent degradation products, and decontamination chemicals that could be specific for BW agents, as well as to identify a chemical associated with hydrogen production.

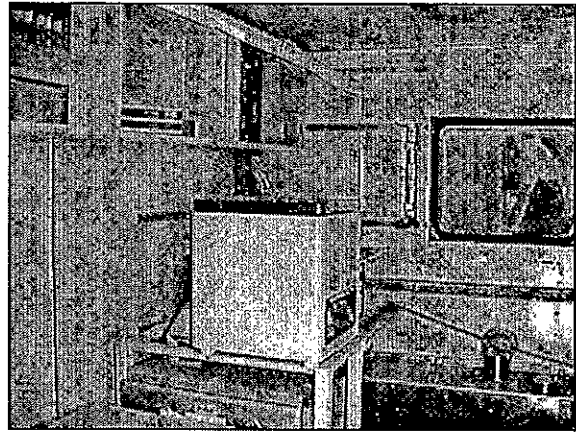
## Mobile Production Plant Versus Mobile Laboratory?

Although individuals often interchangeably use the terms production plant and laboratory, they have distinct meanings. The mobile production plants are designed for batch production of biological material and not for laboratory analysis of samples. A truck-mounted mobile laboratory would be equipped for analysis and small-scale laboratory activities. US forces discovered one such laboratory in late April.

- The mobile laboratory—installed in a box-bodied truck—is equipped with standard, dual-use laboratory equipment, including autoclaves, an incubator, centrifuges, and laboratory test tubes and glassware.
- These laboratories could be used to support a mobile BW production plant but serve legitimate functions that are applicable to public health and environmental monitoring, such as water-quality sampling.



*Iraqi mobile laboratory.*



*Interior view of mobile laboratory.*