# Technical Engineering Exploitation of Iraqi Suspect BW-Associated Trailers: A Preliminary Report

(b)(3):50 USC 403-1(i) ~~(S//~~ **Introduction.** This is a preliminary engineering assessment of two Iraqi BW-associated trailers—Trailer #1 from Irbil and Trailer #2 from Mosul that are currently located in Baghdad. The interagency and coalition exploitation team consisted of biological and chemical process engineers and a utilities engineer. (b)(1),1.4 (c) The physical inspection of the trailers was performed on 25 and 26 May 2003. This report lacks refinements and additional research before final conclusions can be reached.

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(b)(3):50 USC 403-1(i) ~~(S//~~ This team evaluated the trailers as they are configured now and addressed the capabilities of the equipment and not the intent. (b)(1),1.4 (c) The trailer inspections were performed systematically for the existing utilities and trailer components. Trailer #2 was found to be incomplete in construction and looted significantly. Although Trailer #1 was also looted, the essential differences between what remains on the Mosul and Irbil trailers have been previously documented. Thus, the below data refers to Trailer #1.

(U) **Electrical System, Large Water Chilling System, and Large Compressor.** The electrical system was traced wire-by-wire throughout the trailer. The system was designed for operation from the central control panel on the side of the trailer. All electrical cables are sized properly for existing equipment. (i.e., The electrical system would require modification for more equipment to be operational.) Each equipment item was found "hard-wired" to the central control panel, and the original switches on the equipment were found removed. The "pigtail" at the front of the trailer could potentially have been plugged to a generator mounted at the rear of the truck pulling the system or to a "house supply" when parked.

(U) The large water chilling system is a two-staged design permitting operation at half or full capacity. None of the pipes connecting the equipment on the trailer were insulated leading to overall reduced chilling by 1/5 to 1/3 that helps to explain why such a large chilling system was employed.

(U) The low pressure air compressor is a two-staged unit for operation at two different output levels. The compressor is unremarkable and is typical for an industrial process.

(b)(3):50 USC 403-1(i) ~~(S//~~ **Reactor Vessel.** The team inspected the domed-shaped reactor vessel thoroughly and concluded that although this vessel with modifications could support an

aerobic fermentation process, or plausibly an anerobic process within the existing vessel, many features lead to the conclusion that the vessel is not practical or suitable for an efficient fermentation process. The trailer contains sufficient utilities for air, water, and power to support an air-lift fermentation process. There is, however, no adequate filtration for intake air and water. The temperature gauges will not measure accurately the temperature of the vessel contents because they do not penetrate the interior chamber of the vessel. No ports for pH or dissolved oxygen monitoring were found making fermentation control difficult. The configuration of the entry and exit points of the vessel do not allow for efficient addition and collection of the contents of the vessel.

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~~(S/~~ The reactor vessel is better suited for a chemical process that cannot be specified at this time. With a few modifications, the vessel probably could be used for inefficient fermentation with a low product yield. Overall, the reaction vessel design is simple, but not versatile. The type of chemical process that it can support has the following characteristics:

- an exothermic reaction
- involves water or reactants in solution
- generates a gaseous product to be collected in compressed gas cylinders
- operates in a batch rather than continuous mode
- does not require precise controls of feedback
- does not require mixing

~~(S//REL)~~ **Downstream Gas Collection (from the Reactor Vessel).** The design of the gas collection system permits the filling of a bank of five compressed gas cylinders simultaneously. The temperature and pressure of this gas stream is monitored at two points in the processing, and the gas stream has water vapor and particulate matter removed prior to entering the compressor.

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~~(S/~~ The performance of a simple batch chemical process in the reactor generating a gaseous product of interest, is more consistent with the system design. The five cylinders contain 900 moles of gas. Chemical reactants sufficient to generate 900 moles of gas are readily accommodated within the working volume of the reactor. At the maximum flow rate of the compressor, the five cylinders would be filled in 30 minutes.

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~~(S/~~ **Conclusion.** Although it is possible to make modifications to the existing system to operate an inefficient fermentation process, the overall purpose of the trailer system appears to be production of a gas from a chemical reaction in the reactor vessel. (Although several features of the trailer system appear inconsistent with its production, hydrogen gas cannot be ruled out at this time.) The overall design of the reactor vessel coupled with major discrepancies related to the structural design of the vessel, the monitoring requirements for a fermentation process, and the operational difficulties related to inconsistencies in volumes of gas exiting the reactor vessel led to the conclusion of the inspection team that the trailer could not be used as a transportable biological production system as the trailer system is presently configured.