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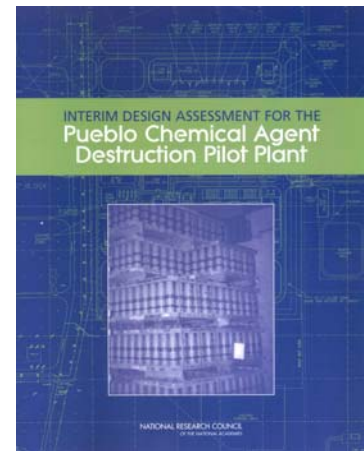
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Interim Design Assessment for the Pueblo Chemical Agent Destruction Pilot Plant—*Summary*

BOARD ON ARMY SCIENCE AND TECHNOLOGY

Background

In 1996, Congress enacted legislation (P.L. 104-201 and P.L. 104-208) directing the Department of Defense to assess and demonstrate technology alternatives to incineration for destruction of the chemical weapons stored at Pueblo Chemical and Blue Grass Army Depots. Since then, the National Research Council (NRC) has been carrying out evaluations of candidate technologies including reviews of engineering design studies and demonstration testing. Most recently, the NRC was asked by the Army to evaluate designs for pilot plants at Pueblo and Blue Grass. These pilot plants would use chemical neutralization for destroying the chemical agent and the energetics in the munitions stockpiles of these two depots. Because of delays arising from security concerns in providing information about the design of the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP) to the NRC study committee, the evaluation was delayed. The PCAPP design proceeded during this delay, however, so the Army requested an interim report on the facility to permit adjustment of any significant problems as soon as possible. This report provides the interim assessment of PCAPP. A second report will be prepared as the Army finalizes its design. .



Design Issues

The destruction process used at PCAPP consists of three general steps. First, the chemical weapons are transferred from the storage area to the destruction facility and are disassembled using robotics. Second, the agent and energetics within the disassembled units are transferred to the processing stage and destroyed through treatment by hydrolysis and biological processes. Finally, contaminated munitions bodies and other associated materials are decontaminated using superheated steam treatment. Uncontaminated materials are expected to be taken off site for disposal.

In general, the study committee found the design being developed to implement these steps would be effective. Some concerns, however, were identified.

- Up-to-date, off-the-shelf robotics are important for allowing the machines responsible for disassembly to be effective and reliable.

- Resolution is needed of the means to transfer the energetics from the disassembled munitions to the hydrolysis treatment processing equipment.
- A review may be warranted on the size of the components in the energetics hydrolysis system after the main hydrolysis processing step. This review might lead to a reduction in plant costs.
- There is the potential for the system designed for steam treatment of contaminated materials—continuous steam treater (CST)—to jam from the formation of tars, and planned testing of this system might be inadequate to discern maintenance problems.

General Findings and Recommendations

Within the limitations of available information and time constraints for the evaluation, the PCAPP can effectively destroy the agent and energetic materials at Pueblo.

- Hydrolysis of mustard agent is a mature technology and major problems should not occur. While hydrolysis of energetic materials is not a mature, testing has shown that it, too, can be effective and safe.
- Successful biotreatment of the agent and energetic products of hydrolysis has been demonstrated.
- The systems for disassembling the munitions and for securing the agent in these munitions are up-to-date approaches that appear to be effective.
- Although the metal parts treater for decontaminating metal parts is still undergoing development, it should be capable of successful decontamination.

The CST for processing associated materials (dunnage and wastes) and the complexity of the system to treat the gases coming off the CST are of significant concern. In addition, fabrication and testing of the CST will not be completed until the design of the PCAPP is in its final stages. **Alternative approaches of this step should be considered by the Army with involvement of the public in the decision process.**

Materials that are not contaminated with agent could be sent to off-site disposal facilities equipped to treat energetic materials from conventional weapons. **The Army should involve both permitting agencies and the public in formulating such procedures.**

The PCAPP has never been operated as a total, integrated facility. An extended period of coordinating unit processes (systemization) will be necessary to resolve issues arising from integration of the separate units. **Adequate time should be scheduled during the facility's design to address for the systems contractor to address these integration issues including defining a safe and effective method for transferring agent and energetics from disassembly to the destruction processes.**

Public participation and involvement have been strong and public interest remains high. There are still disagreements about some aspects of the design, however, and additional opportunities for public involvement in the design exist. **The Army and the contractor should continue to offer substantive opportunities for public and state and local official involvement in relevant PCAPP design decisions and risk assessment.**

For Further Information

Copies of the complete report, *Interim Design Assessment for the Pueblo Chemical Agent Destruction Pilot Plant* can be obtained on the National Academy Press Web <<http://books.nap.edu/catalog/11213.html>>.

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