



**ASSEMBLED
CHEMICAL
WEAPONS
ASSESSMENT**

Three yellow pencils of increasing height are positioned to the right of the text, with the tallest pencil on the right.

Assembled Chemical Weapons Assessment Program

Annual Report to Congress

December 1998

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A Message from Michael A. Parker, Program Manager

Significant milestones have been completed over the past year moving this program towards the ultimate goal, alternative technologies demonstrations. All major activities have been accomplished including initiating actual demonstration testing. Technology proposal evaluations moved smoothly with the proactive support and input from the Dialogue via the Citizens' Advisory Technical Team (CATT). The Environmental Team has worked very closely with the Technical Team, Public Outreach Team, CATT members, and Dialogue members to ensure full public participation with regards to environmental considerations. As a result, all required environmental compliance documentation has been prepared and completed with the involvement of the affected communities and submitted for public scrutiny. The Business Team continually worked to ensure innovative procurement strategies were executed appropriately and properly coordinated throughout the Department of Defense (DOD).

Three technologies were selected for demonstration, using a best value decision, one more than the two Congress mandated. Three technology providers were not selected for demonstration. Shortly, after the selection, one technology provider, not selected for a demonstration, filed a protest, which postponed the demonstration contracts and led to a major schedule impact and major program restructuring. Publication of the Supplemental Report to Congress, which will outline results of actual demonstrations and make recommendations for follow-on implementation, is estimated for September 1999.

Moving forward over the final phase of this program will be challenging. Demonstration testing will continue and is scheduled for completion in May 1999. After demonstration completion, our final evaluation of the technologies will take place. This final phase evaluation includes public acceptability criteria developed in conjunction with the Dialogue early in the program. I look forward to the successful completion of the demonstration phase of the ACWA program and delivery of the Supplemental Report to Congress by September 30, 1999.

Michael A. Parker
Program Manager

A Message from the Dialogue on Assembled Chemical Weapons Assessment

“When the Keystone Center began to convene the Dialogue on Assembled Chemical Weapons Assessment (ACWA), skeptics said parties who had been fighting for years over methods for destroying chemical weapons would not sit down at the table together.

When regulators, community activists that favor and oppose incineration, Department of Defense (DOD) officials, environmentalists, and others agreed to participate, skeptics said they would never be productive.

When the 35 participants agreed on a common goal and ground rules at the first meeting, skeptics said the Dialogue would never produce anything of substance.

When the ACWA Dialogue reached full consensus on 100+ pages of the Request for Proposal outlining what all agreed should be criteria for any chemical weapon destruction method, skeptics stated industry would never submit responses.

When major defense contractors and a number of small businesses submitted responses, skeptics stated that activists and others would never support the DOD Technical Team’s application of the criteria and award of task orders.

When full consensus was reached between Dialogue-selected representatives and the DOD Technical Team regarding the selection of six firms showing technical promise, skeptics said both funding and schedule would impede the demonstration of these technologies.

The upcoming fiscal year will reveal these answers.” -- The Keystone Center

Over the last year, the Dialogue on ACWA has worked closely with DOD ACWA program staff to ensure that the goals of the ACWA Program are achieved. The first part of the Dialogue’s goal – that of identifying alternatives to incineration of chemical weapons – has been completed with a degree of success unanticipated when the program began. Based on the application of the rigorous three-tiered evaluation endorsed by the full Dialogue, 6 of the original 12 proposals met all of the technical criteria to proceed to the demonstration phase. DOD, with input from the CATT, awarded three task orders based on the funds available. All six of the technologies had high technical merit.

Considerable concern exists within the Dialogue that three potentially viable proposals were not awarded contracts based solely on funding limitations. Thus, while the full Dialogue has enthusiasm for the three technologies being demonstrated, the majority of Dialogue participants strongly support DOD or the Congress designating additional funding to demonstrate the remaining three technologies that passed the technical criteria. These Dialogue participants believe the additional cost, an estimated \$25 million, is a worthwhile investment. A minority of Dialogue participants believes that three technology demonstrations meet both the mandate of the law and the intent of Congress.

This minority is concerned that additional funding and demonstrations are likely to lead to delays in schedule within the ACWA Program as well as the baseline incineration program.

However, the full Dialogue agrees that funding all six technologies would provide the following benefits:

- 1) Any technology eliminated would be found lacking by scientific evaluation rather than for scarcity of funds.
- 2) It would eliminate questions of whether any of the technologies that were not demonstrated hold the best chance for safe disposal of the chemical weapons stockpile.

The Dialogue strongly believes that the inclusive and collaborative process employed in the ACWA program has been a success. **The Dialogue commends the innovative effort by DOD to involve the Citizens' Advisory Technical Team (CATT) in the sensitive procurement process. The CATT has both monitored the procurement process and serves as a resource and bridge to Dialogue citizen participants. The Dialogue believes that these achievements could be a foundation for future successes in the Chemical Demilitarization Program as a whole.** Furthermore, the Dialogue believes that technologies identified and tested in this program may have important applications to other aspects of chemical demilitarization as well as to other defense and non-defense hazardous waste disposal issues.

The ACWA program provides DOD with an historic opportunity to successfully bring individuals on all sides of the chemical demilitarization debate together in a cooperative effort. **Building on the ACWA model, the Dialogue believes DOD has within its grasp a process through which the ultimate goals of the Chemical Demilitarization Program can be achieved safely, expeditiously, and cooperatively.**

Dan Bauer Office of Planning and Budget State of Utah	Ralph Collins Kentucky Dept. for Environmental Protection	Alabama Department of Environmental Management
Pua'Ena Burgess Pacific & Asia Council of Indigenous People	Elizabeth Cotsworth Office of Solid Waste U.S. Environmental Protection Agency	Douglas Hindman Kentucky Citizens' Advisory Commission
Kathryn Cain Pueblo Chemical Depot	Dennis Downs Utah Department of Environmental Quality	Worley Johnson Kentucky Citizens' Advisory Commission
David Christian Serving Alabama's Future Environment	Pamela Ferguson Indiana Citizen	Karyn Jones GASP
Daniel Clanton Arkansas Department of Environmental Quality	Wm. Gerald Hardy	Cindy King Utah Chapter Sierra Club
		Irene Kornelly Colorado Defense Initiatives

Thomas Linson Indiana Department of Environmental Management Dane Maddox Blue Grass Army Depot	Sierra Club Air Committee Michael Parker Assembled Chemical Weapons Assessment	Commission Paul Walker Global Green USA Legacy Program
Brett McKnight Oregon Department of Environmental Quality	William J. Pehlivanian Assembled Chemical Weapons Assessment	J.R. Wilkinson Conf. Tribes of Umatilla
Jim Michael Office of Solid Waste U.S. Environmental Protection Agency	Joe Schieffelin Colorado Department of Public Health and the Environment	Craig Williams The Chemical Weapons Working Group Kentucky Environmental Foundation
Sara Morgan Citizens Against Incineration at Newport	George Smith Alabama Citizens' Advisory Commission	Evelyn Yates Pine Bluff for Safe Disposal
John Nunn Maryland Citizens' Advisory Commission	Wesley Stites Arkansas Citizens' Advisory Commission	
Bob Palzer	Ross Vincent Colorado Citizens' Advisory	

Executive Summary

This report to Congress as required by section 8065 of Public Law (PL) 104-208, the Omnibus Consolidated Appropriations Act, 1997, describes activities carried out for the Assembled Chemical Weapons Assessment (ACWA) program during fiscal year 1998 to:

- Select and award task orders for demonstration of alternative technologies;
- Develop and implement environmental regulatory strategies to ensure compliance with applicable environmental and safety standards;
- Promote public participation through the use of Dialogue meetings, the Internet, and community meetings to incorporate affected community and stakeholder input into the Program Manager for Assembled Chemical Weapons Assessment (PMACWA) technology selection, demonstration planning, and environmental compliance activities; and
- Undertake the necessary planning activities in order to conduct a successful demonstration to identify technologies that will safely destroy assembled chemical munitions and their associated materials.

The ACWA program involves a three-phased approach - evaluation criteria development, technology assessment, and demonstration of not less than two technologies. PMACWA's technology evaluation efforts are a process which systematically assess submitted proposals and other documents as requested in response to the request for proposal against a series of program evaluation criteria. The Department of Defense (DOD) working in concert with the Dialogue developed the program evaluation criteria in 1997. The assessment phase of the program was a carefully constructed process to evaluate the technologies against the full set of demonstration selection criteria. In the demonstration testing phase of the ACWA program, ACWA staff, in consultation with the Dialogue will oversee actual test operations and will validate the selected contractor's test data. A final evaluation of the demonstration test results will be provided to Congress in a Supplemental Report to Congress in September 1999. As required by Public Law 104-201, the National Defense Authorization Act for Fiscal Year 1997, section 142, the assessment of alternative technologies is being conducted in coordination with the National Research Council (NRC). The NRC is performing an independent review and evaluation of the technologies that passed the PMACWA go/no go criteria.

In October 1997, PMACWA awarded \$60,000 task order contracts to seven companies with promising technologies that could serve as alternatives to incineration for the destruction of the U.S. stockpile of assembled chemical munitions. Based on a technology evaluation process that assessed the submitted proposals, the initial awards funded additional work by the technology providers to fill in identified data gaps, so that more robust evaluations could be conducted. A second task order to the technology providers, based on data evaluation,

required the offerers to submit demonstration work plans. A Best Value Decision was used to determine the technologies to demonstrate and was based on the technical merit of each proposed technology and such resource considerations as cost and facility availability. Demonstrations were awarded to three technology providers in July 1998. Table 1 lists the six technology providers that had high technical merit and summarizes the features of their respective technologies. The three technology providers selected to perform demonstration testing using the Best Value Decision are:

- Burns and Roe
800 Kinderkamack Road
Oradell, New Jersey 07649
Point of Contact: Joe Klimek
(201) 986-4058

- General Atomics
3483 Dunhill Street
San Diego, California 92121
Point of Contact: Mike Spritzer
(619) 455-2337

- Parsons/Allied Signal
100 West Walnut Street
Pasadena, California 91124
Point of Contact: Jack Scott
(626) 440-4966

The demonstration phase was delayed due to a protest filed with the General Accounting Office by a prospective technology provider not receiving a third task order to demonstrate their technology. Planning and coordinating activities with the three technology providers receiving an award were suspended until the protest was resolved. Despite efforts to maintain the demonstration schedule, the conduct of the demonstrations, the evaluation of the demonstrations, and the reporting of the results in the Supplemental Report to Congress have been delayed.

PMACWA developed and implemented environmental regulatory compliance and safety strategies to ensure the technology demonstrations were compliant with applicable environmental and safety standards. PMACWA prepared a National Environmental Policy Act environmental assessment, the result of which produced a finding of no significant impact. PMACWA also worked closely with those U.S. Army sites and their respective state regulatory officials where demonstrations were to be conducted. Site-specific environmental strategies were implemented to ensure that PMACWA demonstrations were in compliance with all federal and state environmental laws and regulations governing transportation of demonstration materials, handling and disposal of waste, and potential emissions into the air

or water. For example, the PMACWA, State of Utah Solid and Hazardous Waste Control Board, Dugway Proving Ground, and Deseret Chemical Depot have signed a Consent

Table 1: Technology Descriptions for all successful offerers to the ACWA program. Teams awarded demonstration task order awards are shown bolded.

Offerer*	Munitions Access	Agent Treatment	Energetics Treatment	Metal Parts Treatment	Dunnage Treatment
AEA Technology CH2M Hill	Modified reverse assembly (high-pressure wash, new rocket shearing)	Electrochemical oxidation using silver ions in nitric acid at 90 °C (SILVER II)	Treated with SILVER II process	High-pressure acid wash, thermal treatment to 3X, shipped to Rock Island Arsenal (RIA)	Shredded and treated with SILVER II process
Burns and Roe Foster-Miller Startech	Minor modifications to reverse assembly	Plasma arc	Plasma arc	Plasma arc	Shredded and processed in plasma arc
General Atomics	Modified reverse assembly, cryofracture	Hydrolysis with caustic, supercritical water oxidation (SCWO)	Hydrolysis with caustic, SCWO	Hydrolysis with caustic, thermal treatment to 5X	Shredded and destroyed in SCWO
Lockheed Martin SAIC Kvaerner John Brown Foster Wheeler Corporation Elf Eco Logic International El Dorado Engineering, Inc. Aerojet General Corporation Illinois Institute of Technology Research Institute	Modified reverse assembly (multiple lines, compact layout, new drain and wash)	Hydrolysis with caustic at 90°C, SCWO, Eco Logic gas phase chemical reduction (GPCR)	Hydrolysis with caustic, SCWO, GPCR	Washed in caustic, treated in thermal reactor to 5X, GPCR	Washed in caustic, treated in thermal reactor to 5X, GPCR
Parsons and Allied Signal	Modified reverse assembly (jet washout and cutting)	Hydrolysis with caustic at 90°C followed by biotreatment	Hydrolysis with caustic biotreatment	Thermal treatment to 5X	Thermal treatment to 5X
Teledyne Commodore Mason & Hanger Stone & Webster Southwest Research Institute University of Kentucky	Fluid Jet Cutting Remove, initiate fuzes and capture residues in Solvated Electron Technology (SET) Access and drain agent Wash energetics out in ammonia	Solvated electron process using sodium metal and ammonia Chemical oxidation destroys Schedule 2 products	Solvated electron process Chemical oxidation destroys residual toxicity of product	Wash in SET followed by oxidation treats residues and heels to 3X Shipped to RIA for government disposal	Crush or shred charcoal, personal protective equipment, wood, fiberglass Treat in SET, shipped to landfill Destroys contamination on dunnage

Note: *Offerors listed above in alphabetical order propose to apply these technologies to all munitions.

Agreement providing approval for the planned treatability test demonstrations and providing for sufficient public involvement in the planned testing and agent transport.

Based upon Dialogue input regarding local public participation, PMACWA continues to promote such input into its program planning and technology demonstration activities through a variety of means. This includes the Dialogue process itself and the use of public meetings and the ACWA web site to keep stakeholders informed of PMACWA demonstration and program developments.

PMACWA held four Dialogue meetings this year: one at a stockpile site (Anniston, AL), one near locations where PMACWA would conduct much of its demonstration testing (Salt Lake City, UT), one centrally located for Dialogue participants in the West (Phoenix, AZ), and one where congressional and DOD officials could more easily attend (Washington, DC). PMACWA used the information shared at these meetings to develop public participation strategies and keep state and federal regulators, affected community representatives, and the technology providers informed of ACWA program developments. These meetings also served as an opportunity to share information with those NRC members performing the independent review of alternative technologies.

PMACWA uses a web page and information exchange on the Internet to keep Dialogue participants and other stakeholders informed of PMACWA demonstration and program activities. Many of the Dialogue members and stakeholders who provide public participation input are geographically dispersed across the United States. PMACWA's web page serves as a tool to provide the public with information on the latest program developments. The information exchange provides a rapid means of sharing important program information expeditiously which facilitates the accomplishment and fast pace of the program.

I. INTRODUCTION/BACKGROUND

This annual report is submitted to the United States (U.S.) Congress in compliance with requirements contained in Title VIII, section 8065 of the Omnibus Consolidated Appropriations Act, 1997 [Public Law (PL) 104-208]. This report presents the status of activities associated with the Department of Defense (DOD) Assembled Chemical Weapons Assessment (ACWA) program accomplished during fiscal year (FY) 1998.

In accordance with PL 104-208, the Under Secretary of Defense for Acquisition and Technology appointed Mr. Michael A. Parker the Program Manager for Assembled Chemical Weapons Assessment (PMACWA) with the mission to demonstrate not less than two alternate technologies to the baseline incineration process for the demilitarization of assembled chemical weapons. Assembled chemical weapons for this purpose represent the chemical weapons stockpile configured with fuzes, explosives, propellant, chemical agents, shipping and firing tubes, and packaging materials.

The ACWA program involves a three-phased approach - evaluation criteria development, technology assessment, and demonstration of not less than two technologies. The technology assessment phase consists of four steps: (1) Go/No Go Evaluation, (2) Initial Assessment/Data Gap Resolution, (3) Final Assessment/Technology Ranking, and (4) Demonstration Work Plan Development/Review. The PMACWA has established four teams (Technical Team, Environmental Team, Business Team, and Public Outreach Team) to accomplish the mission of the program. The Technical Team's objective is to conduct a detailed assessment of proposed technologies using the integrated criteria developed in conjunction with stakeholders. The Environmental Team is charged with (1) identifying the environmental regulatory requirements with which the program must comply as it develops demonstration test plans and (2) analyzing the impact that compliance with these regulatory requirements will have on the test demonstration schedules. The Business Team handles all procurement activities and provides legal services to the program. The Public Outreach Team's goal is to provide the necessary tools and information to support the program in effectively communicating with the public and interested parties.

The foundation of the ACWA program is based on stakeholder involvement from each of the chemical stockpile storage sites and identification of their concerns about the program. In response to the desire to integrate stakeholder input, The Keystone Center, a non-profit, neutral facilitation organization specializing in environmental and health policy issues, was asked by a diversity of individuals from DOD and community organizations to convene a Dialogue on ACWA and to facilitate Dialogue meetings.

Participants of the Dialogue on ACWA include representatives from affected communities, appropriate state and/or tribal representation, relevant U.S. Environmental Protection Agency (EPA) staff, appropriate DOD staff from affected sites and headquarters, representatives from national citizen groups that work regularly on this issue, and other concerned entities (see appendix A for a complete list of Dialogue participants and alternates). Many Dialogue participants noted the need for involvement throughout the source selection process. This

was clearly impractical for the entire Dialogue. Therefore, four Dialogue members agreed to sign confidentiality agreements and to dedicate their time to participate in technical evaluations along with the government's Technical Evaluation Team. Because of the need for independent technical assistance to advise these citizens, as well as the entire Dialogue throughout the program, the PMACWA agreed to fund a technical consulting firm. Together, the four Dialogue members and the consulting firm comprise the Citizens' Advisory Technical Team (CATT). The CATT works on behalf of Dialogue participants and is charged with overseeing, consulting, and reporting duties regarding complex and technical information during the program.

As required by PL 104-201, the National Defense Authorization Act for Fiscal Year 1997, section 142, the assessment of alternative technologies is being conducted in coordination with the National Research Council (NRC). The NRC is performing an independent review and evaluation of the technologies that passed the PMACWA go/no go criteria.

During FY97, the ACWA program completed the criteria development phase and Step 1 (Go/No Go Evaluation) of the technology assessment phase. Seven technology providers met the go/no go criteria. They were AEA Technology, ARCTECH, Burns and Roe, General Atomics, Lockheed Martin, Parsons/Allied Signal, and Teledyne Commodore. During Step 2 (Initial Assessment/Data Gap Resolution) of the technology assessment phase, each of these technology providers received \$60,000 task order contracts to prepare Data Gap Resolution Work Plans and to fill the identified data gaps. This report builds on the 1997 report and addresses PMACWA activities accomplished in FY98. For complete details of FY97 activities, see PMACWA December 1997 Report to Congress. The 1997 report is available on the Internet at <http://dialogue.pmacwa.org>.

II. TECHNOLOGY EVALUATION

A. Technology Assessment Phase

1. Initial Assessment/Data Gap Resolution

The seven technology providers mentioned above filled their identified data gaps according to their approved Data Gap Resolution Work Plans during the November 1997 to February 1998 timeframe. Step 2 of the technology assessment phase (Initial Assessment/Data Gap Resolution) culminated with the submission of the technology providers Data Gap Resolution Reports in February 1998.

2. Final Assessment/Technology Ranking

In Step 3 of the technology assessment phase (Final Assessment/Technology Ranking), the Program Evaluation Team (comprised of representatives of the Technical Team, Business Team, and CATT) performed a final assessment (using a subset of the demonstration selection criteria) of each technology using the Data Gap Resolution Report (submitted in

February 1998) and the original proposal. The Evaluation Team then ranked each technology against the demonstration criteria and recommended which technologies should go to demonstration testing. Six technology providers were recommended for demonstration testing. They were AEA Technology, Burns and Roe, General Atomics, Lockheed Martin, Parsons/Allied Signal, and Teledyne Commodore. Each of these technology providers received a \$150,000 task order to prepare Demonstration Work Plans. Descriptions of the six technologies are in appendix B.

3. Demonstration Work Plan Development/Review

In Step 4 (Demonstration Work Plan Development/Review), the six technology providers that were awarded task orders to prepare Demonstration Work Plans received demonstration statements of work (SOW) from the Government. The SOW identified the unit operations to be tested and the demonstration locations/facilities to be used for the testing, and indicated the government furnished equipment and materials (including chemical agents, energetic materials, and/or hydrolysates produced therefrom) to be used in the demonstration testing. Based on the SOW, each technology provider prepared a detailed Demonstration Work Plan that included a technical and management approach for the demonstration testing, past performance information, a socioeconomic plan, a demonstration schedule, quality assurance/quality control plan, and a cost proposal for the demonstration testing. Additionally, each technology provider submitted a preliminary hazard analysis and a preliminary health and safety plan. The Program Evaluation Team then evaluated each Demonstration Work Plan against the full set of demonstration selection criteria (process efficacy, human health, and environment, safety, and business factors). Besides the likelihood of conducting a successful demonstration based on the evaluation, the constraint of program funding also was used to determine which technologies continued into the demonstration phase. Based on the evaluation of each of the Demonstration Work Plans and a determination of best value to the Government, three technology providers were awarded task order contracts to conduct demonstration testing. They are Burns and Roe, General Atomics, and Parsons/Allied Signal. Summaries of the demonstration tests to be performed by each are provided in appendix C.

4. Compliance with Chemical Weapons Convention Requirements

All the agent-related testing under the ACWA program will be done in compliance with the requirements set forth in the Chemical Weapons Convention (CWC). PMACWA personnel have discussed the program and the approach for demonstration with Technical Secretariat (TS) officials from the Organization for the Prohibition of Chemical Weapons (OPCW). The TS is aware of the agent requirements for the demonstration test program. A discussion of the issues being addressed by PMACWA concerning the CWC can be found in section IV.A.1.d.

5. Compliance with Federal/State Regulatory Requirements

PMACWA, as part of its FY97 demonstration planning activities, conducted a comprehensive analysis of the applicable federal and state environmental laws and regulations with which it must comply in planning and conducting its technology demonstrations. PMACWA environmental and technical personnel have worked closely with site demonstration personnel, state and Federal regulators, and stakeholders to develop a template by which PMACWA test plans could be written and evaluated as Resource Conservation and Recovery Act (RCRA) treatability studies. In Maryland and Utah for example, close coordination was required to develop and implement a process to obtain a variance to the 1-kilogram (kg) acute hazardous waste limit. PMACWA also implemented, in close coordination with the Dialogue, public involvement actions to inform and solicit ideas and input relating to planned demonstration activities. This approach met statutory requirements of the RCRA and the tight program schedule. FY98 activities have focused on implementing these strategies.

PMACWA completed an environmental assessment (EA) meeting National Environmental Policy Act (NEPA) requirements in May 1998 to assess the potential environmental impacts resulting from ACWA's proposed demonstrations. The NEPA EA assessed the impact on the environment of two alternatives: the effect of conducting demonstrations at five potential sites versus the effect of taking no action and thereby conducting no demonstrations. The EA described the technologies to be tested and analyzed the effect of possible testing at each site. The five sites addressed were Aberdeen Proving Ground (APG), MD; Dugway Proving Ground (DPG), UT; Deseret Chemical Depot (DCD), UT; a commercial chemical surety laboratory located near Buffalo, NY; and Porton Down, a testing facility near Coventry, the United Kingdom, in southeast England. All were determined to be acceptable for ACWA demonstrations within the operational constraints of their facilities. The draft was reviewed by the Dialogue members and other parties involved in the technology demonstrations.

A finding of no significant impact (FONSI) was published the week of June 1, 1998 and made available for public comment until July 5, 1998. The EA was published on the ACWA web site; sent to any member of the public who requested a copy; distributed to the test installations, Dialogue, and Citizens' Advisory Commission representatives; and placed at U.S. Army public outreach offices and local libraries near the installations. Based upon the FONSI and public comments, PMACWA signed a decision document on July 8, 1998 completing the NEPA effort. The decision document concluded in the analysis of alternatives, (i.e., to demonstrate or not to demonstrate) that proceeding with the demonstrations uses the best programmatic alternative. An example of the FONSI (the one signed for the State of Utah) is provided in appendix D.

PMACWA concluded that the FONSI is supportable because:

- Proposed demonstrations would occur at existing or previously planned facilities. There would be no new construction or ground disturbance.
- Proposed test facilities have redundant containment mechanisms and safety systems in place. This should eliminate the potential for releases into the environment.

- Proposed demonstrations would use quantities of materials that conform to the environmental and safety limits of the facilities used. The demonstrations would also generate waste streams similar to those already demonstrated and managed at those existing facilities.
- Proposed individual demonstrations are of limited duration, (i.e., less than a year).
- Protocols exist and are already in place to ensure safe management of any materials used in the proposed demonstrations.
- Proposed demonstrations would be consistent with historic land use at each of the proposed sites.
- PMACWA's technology selection criteria were designed to screen out technologies likely to result in obvious significant environmental impacts.
- Transportation of agent between DCD and DPG is of public concern but can be conducted safely.

Other federal and state environmental laws and regulations likely to be triggered on a case-by-case basis depending on the type of technology tested and the scope of demonstration activities proposed include, but are not limited to the following: Clean Air Act, Clean Water Act, Toxic Substances Control Act, Emergency Planning and Community Right-to-Know Act, U.S. Department of Transportation regulations, and state solid and hazardous waste laws. PMACWA has worked with respective installation personnel and federal/state regulators to identify those PMACWA demonstration activities that may be affected by these regulatory requirements. Regulatory approvals have been sought as appropriate, and standard operating procedures and other environmental, health, and safety provisions have been identified and included in site-specific planning that ensure compliance with requisite regulations.

6. Public Involvement

The DOD is committed to effectively involving the public and communicating with interested parties throughout the assessment. Through the open exchange of ideas among program team members and the public, communication efforts ensure that interactive public involvement is not only incorporated but also encouraged at every stage of the program. Outreach initiatives focused on two primary objectives: providing information and providing opportunities for public involvement. The program attempts to provide the public with as much information as possible about the technologies and the decision-making process, given the constraints of a procurement sensitive evaluation process.

a. Information Products

The Public Outreach Team distributed a variety of information products through various venues including the public affairs offices located at each stockpile storage site and through established community outreach offices. In addition, program information was regularly distributed to Citizens' Advisory Commission (CAC) members in each stockpile state. Program staff worked with technology providers to distribute updated brochures describing

each technology. Information materials developed include summaries of NEPA and RCRA, a technology matrix, frequently asked questions, a glossary of technical terms, 200 word summaries of the technologies, and summaries of the Dialogue on Assembled Chemical Weapons Assessment and the overall program. Videos of technology providers' presentations are available at the outreach offices and upon request. In addition, a video was produced following the selection of the technologies going to demonstration; this video provides an overview of the program, the Dialogue process, and descriptions of the three alternative technologies selected for demonstration.

b. Electronic Resources

Electronic information resources are provided for public access through the development and maintenance of a web site that provides meeting information, including times and locations for future meetings as well as agendas and minutes from previous meetings. Fact sheets, press releases, and technology information is also posted. The web site provides links to Internet sites of the technology providers and other related sites.

c. Public Meetings

The Public Outreach Team strategized, coordinated, and participated in community meetings to facilitate a better understanding of the program. In addition to issues addressed at CAC meetings, each involved community has unique concerns regarding the assessment program. PMACWA continues to identify these issues and coordinates public meetings designed to address specific community concerns. Because members of the Dialogue and the individual CAC's represent segments of the public in general, Public Outreach Team members attend and help coordinate additional public and community meetings and related efforts to communicate with the broader public. Local print and other media outlets were identified to advertise community information meetings.

d. Public Involvement and Outreach Strategies

The Public Outreach Team continues to participate in the development and support of state-specific involvement and outreach strategies given the appropriate levels of public interest and current levels of involvement. PMACWA worked with stockpile site representatives from Alabama, Arkansas, Colorado, Kentucky, Oregon and Utah, and related personnel to develop and implement involvement and outreach strategies at each site.

B. Demonstration Phase

The demonstration testing phase of the ACWA program began with the award of task orders to teams led by Burns and Roe, General Atomics, and Parsons/Allied Signal on July 29, 1998. The demonstration planning was accomplished concurrent with the technology evaluation process in order for PMACWA to meet the aggressive schedule established for the program. The planning activities have included the necessary adjustments that resulted from the protest

related schedule delay. Treaty and regulatory requirements were identified and worked as planning progressed.

The testing of a fully integrated system, from start to finish is unnecessary since many of the technologies proposed incorporate proven unit operations. Additionally, due to the aggressive PMACWA schedule and budgetary constraints, testing fully integrated systems is precluded. ACWA technology demonstrations, then, have been defined to be a series of tests conducted on critical, less proven unit operations to show the effectiveness and repeatability of those technologies and that those major unit operations can be incorporated into an overall system or "total system solution." The unit operation selections were based on information (test scale size, use of off-of-the-shelf equipment, prior test data, technology maturity, etc.) in the technology providers' original proposals and their Data Gap Resolution Reports.

1. Demonstration Planning

Concurrent to the development of the demonstration SOWs, PMACWA staff worked in an iterative process with installation representatives, PMACWA contractors, members of the CATT, and the technology providers in performing detailed demonstration planning activities. Planning is essential for this type of test program. The technology demonstration phase is very complex and its success depends upon the timely completion of critical, preparatory activities, such as:

- Test facility modifications,
- Test facility/technology provider coordination,
- Feed materials (agent, metal parts, etc.) availability and transport,
- Agent/energetic hydrolysate production,
- Analytical methods identification/validation,
- Test facility standard operating procedures requirements,
- Test facility safety (pre-operational) requirements,
- QA/QC program development and implementation, and
- Sampling and analysis support coordination.

The Demonstration Testing Work Group worked to identify and resolve the many issues related to demonstrating the technologies. The Demonstration Testing Work Group consists of representatives of the Technical Team, Environmental Team, and support contractors. Towards this end, the group worked to identify and create a test matrix for each of the technologies. Representatives of the technology provider companies were involved to provide information on their proposed processes and to provide feedback on developing demonstration decisions. The work surrounding the development of the test matrices helped to identify and define many aspects of the actual demonstration details, and indicated the roles and responsibilities of the PMACWA, test facility site personnel, and technology provider staff in preparing for the performance of the demonstration activities. This work also led to the definition of specific demonstration test objectives.

PMACWA staff also worked on the identification and resolution of issues related to coordinating with the selected demonstration sites; ensuring treaty, transportation, and regulatory compliance; involving the affected public in the process; and obtaining the required agent, energetic, and other materials required for demonstration testing.

a. Development of Test Objectives

The objective of the program is to demonstrate to the extent possible (within program resources, schedule, and budget constraints) a broad range of technologies that represent a safe and cost effective alternative to incineration. The demonstrations will focus on unit operations necessary for demilitarizing assembled chemical munitions. Demilitarization processes include the following:

- Chemical munitions access,
- Agent destruction,
- Energetic/propellant destruction, and
- Metal parts and dunnage decontamination.

The overall objectives of the demonstration testing have included (1) independent validation of selected unit operations for a technology to achieve the stated performance objectives; (2) characterization of major feed materials, intermediates, and final products/effluents; and (3) independent validation of analytical methods for agents and energetics used during demonstration testing. To ensure a successful demonstration test program, specific test objectives that are in full alignment with the overall program test objectives have been developed. A detailed test program has been designed to meet specific (definitive, focused, and measurable) test objectives.

These specific test objectives are clear, concise, definitive, measurable and practicable within the ACWA program schedule, resources, and budget limitations. The specific test objectives were developed with consistency across all technology providers to ensure a successful demonstration test program. Success was defined as a program that met the following, to the extent practical:

- Provides credible, verifiable, and unbiased performance data;
- Ensures coverage of critical regulatory/permitting issues;
- Provides sufficient operational data to develop both a preliminary capital/operating cost estimate and a schedule for a full-scale facility; and
- Incorporates major concerns of all relevant stakeholders.

b. Development of Test Matrices

In a series of meetings held in February and March 1998, the Demonstration Testing Work Group carefully developed the requirements for performing a technology demonstration that would meet the requirements set forth in PL 104-208, and be responsive to the evaluation criteria. Because of the schedule constraints on the program, these meetings were concurrent

with the review and evaluation of the Data Gap Resolution Reports. Steps were taken to ensure the development of the demonstration requirements (or the test matrices, as they have been referred to) would not interfere with the Data Gap Evaluations.

Many data elements were identified during this work, and consensus was reached on each data element for each technology to be tested. At the time that this work was being performed, all seven technologies that were awarded Task Order # 1 were considered. For each technology, the Demonstration Testing Work Group reached consensus on the critical unit operations to be tested, and the definition of clear, concise, and measurable test objectives for each of those critical unit operations.

This information was then used to define all elements of the demonstration (test matrices). These elements include the following:

- Feed materials (type and quantity),
- Test location(s),
- Number/duration of test runs,
- Process monitoring parameters,
- Utility requirements,
- Operating personnel requirements,
- Sampling locations/methodologies/frequency,
- Analytical methodologies/validation,
- QA/QC program,
- Data requirements/reduction, and
- Final report requirements.

It is important to note, however, that once all the elements comprising the test matrices were identified and defined, they were reviewed in light of ACWA program/real world/practical constraints. Any of the elements defined in a manner which allowed them to fall outside of the program limitations or determined to be impractical, necessitated the unit operations and corresponding specific test objectives be reevaluated. This has been an iterative process, with the ultimate goal of ensuring the following:

- Specific test objectives align with and are in balance with overall program objectives;
- Specific test objectives are definitive, focused and measurable;
- Specific test objectives define the test program (test matrices elements); and
- Test matrices' elements are practical and within ACWA program resources, schedule, and budget.

The matrices were then provided to the technology providers for review. The matrices were updated based on comments received from the technology providers, a series of two-day meetings with each technology provider, and ensuing teleconferences.

2. Site Selection and Site Interactions

PMACWA's goal in planning for demonstration was to have test facilities available for all participating technology providers. To that end, the demonstration site selection planning began in September 1997 after the first task order awards were made. PMACWA identified six government and contractor sites that had facilities capable of accommodating the test equipment and the amount (agent and energetics) of feed material required for the demonstrations. The sites that were considered for demonstration include Edgewood Research, Development, and Engineering Center at APG, MD; Aberdeen Test Center, APG, MD; Chemical Agent Munitions Disposal System (CAMDS), DCD, UT; DPG, UT; Calspan Corporation in Buffalo, NY; and Porton Down in the United Kingdom.

In January 1998, PMACWA asked each technology provider to supply various equipment and resource requirements. The requested information included (1) the unit operation throughput, size, and weight; (2) maximum utility requirements; (3) auxiliary equipment; (4) whether existing equipment was available for testing; (5) whether the equipment was transportable; and (6) if the equipment did not exist, how much time was required to manufacture it. The information provided by the technology providers was used to select the best test location for each unit operation. Personnel from the test sites played a key role in finalizing the site/facility selections. Site limitations required technology providers to be located in more than one location. The number of test sites where each technology provider will be supporting demonstration testing ranged from one to three. Test site personnel were also involved in the development of the demonstration matrices as well as meeting with the technology providers to discuss the matrices. Necessary facility modifications were identified and have been initiated in order to accommodate the planned test(s) and schedule requirements.

3. Impact of Chemical Weapons Convention on Demonstration Planning

The Chemical Weapons Convention (CWC) specifically states chemical weapons destruction technology development should be encouraged but then does not provide the required guidance for destruction technology development. This has provided PMACWA a unique set of challenges in trying to execute the demonstration of three technologies. However, PMACWA has been able to resolve the challenges by working closely with the Department of Defense and Technical Secretariat. The challenge of synchronizing cost, schedule and performance for demonstration testing with the treaty requirements will continue through the completion of demonstration testing. PMACWA is aware of the treaty obligations and is committed to achieving the Congressional mandate in concert with the CWC.

4. Federal and State Environmental Regulatory Compliance

Through the development of its environmental compliance strategy, discussions of this strategy with the Dialogue, and input received from public meetings, two primary issues relating to planned demonstration activities have been raised. The first is the use of

treatability studies provided for by RCRA. RCRA does not require any form of public participation with regard to the evaluation and approval of treatability studies as would be required under a permitting scenario. However, PMACWA conducted briefings and public meetings to solicit input, concerns, and ideas.

The second issue of public concern relates to the proposed transport of chemical agent to support demonstration testing. This issue is discussed in the following section.

5. Transportation of Agent

PMACWA has undertaken planning actions to transport a limited quantity of chemical warfare agent from DCD to DPG, both U.S. Army facilities in Utah, for use in proposed PMACWA demonstrations. PMACWA developed a Transportation Plan in close coordination with local, county, and state officials, including the Governor's staff, which has been approved by Headquarters, Department of the Army in accordance with Army Regulation 50-6 (Chemical Surety). This issue of agent transport was included in public meetings to discuss the demonstrations. In keeping with section 1512 of Title 50 of the United States Code outlining DOD notification procedures required before the transportation of chemical warfare agent to or from any military installation in the United States, PMACWA has initiated measures for the required statutory notification to the President of the Senate, Speaker of the House of Representatives, and the Governor of Utah. The notifications are required at least 10 days prior to the transport. These procedures require the Secretary of Defense to (1) make a determination that the transportation is necessary in the interests of national security, (2) bring the particulars of the planned transportation to the attention of the Secretary of Health and Human Services, and (3) implement any precautionary measures recommended by the Secretary of Health and Human Services. The details of the planned transportation have been discussed with staff from the Department of Health and Human Services (DHHS) and PMACWA has addressed the few minor issues raised. As of the writing of this report, the transportation of chemical warfare agent from DCD to DPG has been postponed.

6. Hydrolysate Production

In the request for proposal (RFP) published in July 1997, several previously proven processes and technologies were offered by the Government for use by the prospective proposers. These were agent neutralization with sodium hydroxide or water, baseline reverse assembly, and metal parts smelting. The baseline reverse assembly and the metal parts smelter are already in use and the agent neutralization has undergone extensive testing and is soon to be implemented at the APG, MD and Newport, IN chemical agent stockpile sites. PMACWA felt it was not necessary to require the technology providers to test these portions of their technology proposals because they have undergone extensive testing. However, General Atomics and Parsons/Allied Signal technology proposals were based on the current agent neutralization processes and ongoing conventional munition programs energetic neutralization processes. In order to test their post-treatment processes – supercritical water

oxidation and biodegradation – agent hydrolysate (neutralized agent) will be required. Supplying the agent and energetics hydrolysates (as Government Furnished Material) for these tests would avoid duplication of equipment and save money, conserve limited test facilities, and enhance demonstration results because the feedstocks are consistent.

The HD hydrolysate production was completed by the Chemical Operations Group at the Edgewood Research, Development, and Engineering Center, MD (June 8 to September 10, 1998). A 100-gallon agent neutralization reactor system has been designed, purchased, and installed at the CAMDS, UT to produce GB and VX hydrolysates. The GB and VX hydrolysate production will begin at the CAMDS in December 1998 and January 1999 respectively.

The energetics hydrolysates will be produced at the Pantex Plant in Texas and the Radford Army Ammunition Plant in Virginia. The energetics hydrolysate production will begin in November 1998.

7. Public Involvement

a. Interactive Community Meetings

Prior to community meetings, the goal of the Public Outreach Team was to provide the public with current information that was easy to understand and reference. Community meetings during the demonstration phase were designed to provide an interactive meeting format for the public regarding the planned demonstrations. Publicity for the meetings included placing large display ads in the classified section of local newspapers and distributing flyers to individuals and groups on the local mailing list. The meetings to date have focused on the following topics: description of demonstrations, facilities to be used, safety, schedule, transportation of agent, and environmental considerations.

b. Heightened Program Awareness

To inform and involve local entities regarding the demonstrations to begin in Utah, PMACWA representatives met with editorial boards, local and state officials, academia, advisors to government, representatives from Office of Emergency Planning and Department of Environmental Quality, and citizen advocacy groups.

c. Related Activities

The Public Outreach Team advised PMACWA in the areas of government and media relations. The team facilitated responses to general information inquiries, supported interviews with the media, and arranged photographic coverage. In addition, public outreach advice and support was provided to other ACWA teams as required. The team also worked with state legislative groups and national interest groups to ensure their membership was fully apprised of program progress and had access to the most accurate information.

C. Broad Agency Announcement

The ACWA Broad Agency Announcement (BAA) was issued on August 27, 1997. The BAA was designed to allow the inclusion of partial technologies and to address potential retrofit scenarios. The BAA has been sent to 254 firms and 22 proposals have been received to date. BAA proposals may be submitted until December 1, 1998. The BAA proposals that were submitted are currently being evaluated. The Dialogue developed a BAA working group to focus on assessing partial technology proposals that were received under this procurement action. Actual demonstration testing under the BAA is contingent upon the receipt of additional funding.

D. National Research Council

As required by PL 104-201, the National Defense Authorization Act for Fiscal Year 1997, section 142, the assessment of alternative technologies is being conducted in coordination with the NRC. A special NRC committee is performing an independent review and evaluation of the seven technologies that passed the PMACWA threshold (go/no-go) criteria. The NRC committee consists of 14 distinguished scientists and engineers whose expertise ranges from chemical process engineering to public involvement. The principal result of the NRC study will be a report evaluating the current status of each technology (including advantages, disadvantages, knowns, unknowns, and potential for implementation).

The NRC committee met four times in 1998 to gather information and to work on early drafts of its report. Two of these meetings were held at the chemical stockpile storage sites in Richmond, KY, and Pueblo, CO. At each of these sites, the committee met with members of the public to hear their opinions about alternatives to incineration. Representatives from the NRC also attended all of the Dialogue meetings held this year. In addition, site visits to each of the seven technology providers were made by members of the committee to meet with cognizant technology provider personnel and to observe any equipment or systems that they had developed. At the time of this writing, the committee is revising its first complete draft of its evaluation report.

III. DIALOGUE ON ASSEMBLED CHEMICAL WEAPONS ASSESSMENT

The Dialogue on ACWA was convened in response to the desire to integrate stakeholder input into the ACWA program. The Dialogue is composed of participants with a wide range of perspectives regarding the stability of current chemical weapon stockpiles; the wisdom regarding searching for alternatives to baseline incineration given the aging stockpile; and the ability of any technology to meet the Chemical Weapons Convention deadline. Significant disagreement still remains among Dialogue participants on these and other issues. Given the spectrum of perspectives represented by Dialogue participants, they defined their goal as the following: to draw a wide range of experience, perspectives, and expertise in support of efforts to identify, demonstrate, and deploy safe, effective, and broadly acceptable methods for disposing of chemical munitions and any resulting materials and/or waste streams.

In the past year, the Dialogue has contributed to the ACWA program's objectives by:

- Involving the CATT, which is composed of four Dialogue participants with a diversity of perspectives as well as a technical consulting firm. The CATT conducted an independent evaluation of the original 12 technology proposals. Both DOD and the CATT assessed the proposals using DOD's three-tiered criteria developed in consultation with the Dialogue. The CATT fully endorses and supports DOD's technical assessments of the technology proposals.
- Distributing information and soliciting additional input through public meetings, radio shows, mailings, and electronic correspondence from those communities, agencies, groups, and individuals not directly represented in the Dialogue.
- Suggesting the development of a Stipulation and Consent Agreement between DOD, the State of Utah, and Utah DOD installations, CAMDS and DPG. Dialogue participants reviewed and commented on the draft agreement.
- Working in consultation with DOD to design and execute public meetings regarding the study plans for the State of Utah, which will guide all aspects of the demonstrations.
- Involving the BAA Working Group in on-going discussions regarding the assessments of partial technology proposals that may be appropriate for some specific sites.
- Working collaboratively with the NRC to ensure an awareness of each other's efforts while maintaining the appropriate independence required by the NRC.

IV. KEY ISSUES

A. Resolution of Fiscal Year 1997 Issues

1. Impact of the Assembled Chemical Weapons Assessment Program on the Chemical Demilitarization Program

House Report 105-132 (June 16, 1997) directed the Secretary of Defense to report to Congress on the impact of the ACWA program on the costs and schedule for completion of destruction operations at Pueblo, CO and Blue Grass, KY storage sites. Sufficient information and data do not currently exist to project an impact on construction and systemization costs or schedules for those sites. The DOD expects to have sufficient information on both potential cost and schedule impacts for Pueblo and Blue Grass as well as the Chemical Demilitarization Program in time for the Supplemental Report to Congress in September 1999. Note, the Program Manager for Chemical Demilitarization (PMCD)

reported in the PMCD December 1998 Annual Report to Congress that a decision on Pueblo and Blue Grass with respect to implementing a baseline incineration facility is required by June 1999 to meet the CWC deadline.

2. Implementation of Successfully Demonstrated Alternative Technologies

The ACWA 1997 Annual Report to Congress identified actions necessary to implement alternative technologies successfully demonstrated within ACWA expeditiously. To that end, Congress authorized actions in accordance with the 1997 Report to Congress as outlined within Public Law 105-261, the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999. This legislation will allow ACWA to continue to move forward with implementation. Public Law 105-261 directs PMACWA to undertake activities necessary to ensure that an alternative technology can be implemented immediately after the technology has been demonstrated successfully and a report has been submitted to Congress on the demonstration. The activities necessary include (1) establishment of program requirements, (2) preparation of procurement documentation, (3) development of environmental documentation, and (4) identification and preparation of public involvement and outreach requirements.

3. Demonstration of Three Alternative Technologies

Section 8065 of PL 104-208, the Omnibus Consolidated Appropriations Act, 1997, requires the DOD "to identify and demonstrate not less than two alternatives to the baseline incineration process for the demilitarization of assembled chemical munitions". DOD has actually decided to demonstrate three technologies. The Department believes that demonstrating three technologies, selected through a best value decision, will (1) provide a diversity of technologies to cover different types of stockpile weapons, (2) enhance the probability of finding an alternative technology, (3) demonstrate viable alternative technologies, and (4) create excellent competition for future Requests for Proposals.

4. Impact of Chemical Weapons Convention Restrictions

The chemical agent issue raised in the December 1997 Report to Congress has been resolved. Portions of the demonstration will be conducted with Schedule 1 material (DOD receives an allocation of 440 kg/year pursuant to U.S. government implementation of the CWC) and chemical weapons as defined by the CWC. The majority of the testing will be conducted using the chemical weapon designated agent. This means the OPCW inspectors will be on-site witnessing the agent destruction testing.

The second issue concerning the lead time required to get a destruction facility designation (360 days) has been resolved by amending existing facility agreements to include the ACWA test facilities.

The final issue relates to protecting proprietary information during inspections. This issue is currently being worked within the Office of the Secretary of Defense.

B. Dialogue on Assembled Chemical Weapons Assessment Issues

1. Demonstrate ALL six potentially viable technologies in FY99.

While the ACWA program is able to meet its legal requirements to demonstrate “not less than two alternatives” to incineration within currently appropriated funds, the elimination of three potentially viable alternative technologies from consideration due to a lack of adequate funding can only weaken program results, competitiveness, and the public acceptance of any deployment decisions derived from these results. The credibility of future chemical demilitarization decisions can best be ensured by complete ACWA demonstrations of all six potentially viable technologies. This requires additional funding of some \$25 million in FY99 (in addition to the proposed \$18 million for FY99) and/or reprogramming of FY98 funds.

2. Pursue actions which will expedite any potential future deployment.

The Dialogue supports and encourages efforts to expedite any potential future deployment by beginning preliminary environmental and program planning as soon as possible. While the Dialogue recognizes the scope of the initial 2-year ACWA program is limited to technology demonstrations, the Dialogue continues to have an interest in follow-on programming to include deployment. The Dialogue, with its diversity of perspectives, is committed to the destruction of the nation’s stockpiled chemical weapons in a safe, cost-effective, environmentally sound, and publicly acceptable manner that meets CWC deadlines.

3. Communicate and coordinate with the Program Manager for Chemical Demilitarization.

The Dialogue supports strategic coordination with the Program Manager for Chemical Demilitarization while maintaining ACWA as an independent program as stated in its authorizing legislation. Although the independence is essential, the Dialogue believes that coordination between PMCD and ACWA will help facilitate any potential deployment of successful technologies at existing and planned chemical demilitarization facilities to meet the CWC schedule in a cost-effective manner.

V. NEXT STEPS

A. Demonstration and Evaluation

The demonstration of selected critical process units for the chosen technologies and the evaluation of these technologies against the program implementation criteria are the next critical steps of the ACWA program. The demonstrations and subsequent evaluations will be an integrated effort involving the technology providers, Dialogue participants, contractor personnel, and DOD personnel. The purpose of the demonstrations is to validate the chosen technologies ability to safely destroy chemical munitions and their associated materials. The demonstrations will provide test samples resulting from tests using the chemical agents, energetics, metal parts, and dunnage found in assembled chemical weapons. These samples will be processed and analyzed by independent analytical facilities following strict quality assurance procedures for the generation of the validation data. These validation data will be provided to the technology providers for their evaluation and preparation of their demonstration reports. The demonstration data and the final reports from the technology providers will be provided to the Program Evaluation Team (PET) and representatives from the Dialogue for assessment against the program implementation criteria. The PET, in conjunction with the Dialogue representatives, will prepare a technical report documenting the results of these assessments.

To initiate demonstrations, the technology providers will work with DOD personnel to complete (1) demonstration work plans, (2) test facility modifications, and (3) installation of all test equipment. This will be followed by a period of systemization. During this period the test equipment's proper operation and performance are verified, final training of DOD personnel in the proper operation of all equipment is completed, standard operating procedures are finalized and validated, and compliance with all required regulations are ensured. Of critical importance are the safety checks of the test equipment and the containment facilities. The DOD personnel will then perform the demonstration testing in accordance with the approved Work Plans and with the monitoring and support of the technology providers. The demonstrations will be divided into multiple campaigns that address the various validation requirements. The DOD will prepare independent milestone reports following equipment installation, systemization (including operator training) and at the completion of each campaign to document all testing. Test samples taken by DOD personnel will be provided to independent contractors for final analysis. Sample handling and analysis will follow previously established quality control and quality assurance requirements. The final data generated from these samples will be provided to the technology providers and the DOD. The technology providers will prepare a report based on their assessment of the demonstration and its resulting data and provide this report to the DOD and representatives from the Dialogue.

The assessment of the technology demonstrations will be performed by the DOD's PET and representatives from the Dialogue. Using the previously approved program implementation criteria, the PET and representatives from the Dialogue will assess each of the technologies demonstrated. The information for these assessments will come from the technology provider's demonstration reports, PMACWA's milestone reports, the validated demonstration data, and all previous documentation submitted by the technology providers. The assessment

process will strive for consensus by all members of the PET and the representatives from the Dialogue. The demonstration evaluation will assess each technology independently against the 19 implementation criteria. At the completion of the assessment process a detailed report will be prepared subsequent to the assessment and submitted to the PMACWA.

B. Supplemental Report

The Supplemental Report to Congress will include the results of the demonstration program. Each technology provider's data from the demonstration program will be evaluated against the program implementation criteria as described above. PMACWA will recommend to Congress those technologies that are successfully demonstrated and have a high likelihood of being implemented at the full-scale level. In summary, these would be those technologies that, at a minimum, meet or exceed the following goals defined in the implementation criteria:

- Performance – demonstrated ability to destroy chemical munitions in a safe and environmentally acceptable manner,
- Schedule – meet treaty schedule requirements,
- Cost – comparable cost to that of baseline, and
- Public Acceptance – community willingness to accept technology.

Technologies, depending on the degree to which they meet, exceed, or fall below these goals, would be recommended to advance to the next phase – pilot-scale testing.

C. Dialogue on Assembled Chemical Weapons Assessment

The Dialogue is committed to collaborating with ACWA and DOD to meet current objectives and any follow-on mandates in hopes of ensuring the safe and responsible disposal of chemical weapons stockpiles. The Dialogue will continue to:

- (1) build consensus around ACWA program issues;
- (2) work to inform and solicit input, where appropriate, from the diversity of perspectives in the respective communities, agencies, organizations, and appropriate congressional representatives;
- (3) involve the BAA Working Group in on-going discussions regarding the assessment of partial technology proposals that may be appropriate for some specific sites; and
- (4) monitor and aid PMACWA with respect to the demonstrations and demonstration evaluations of alternative technologies to the baseline incineration process with an eye towards possible follow-on deployment.

While the Dialogue recognizes that financial constraints have limited the number of technologies awarded task orders to demonstrate at this time, the Dialogue will continue to

support demonstration of all six alternative technologies identified as being technically promising.

D. National Research Council

The NRC continues to be very interested in maintaining open communication with all parties in the ACWA process, including the Dialogue but is also firmly committed to maintaining the independence of its assessment. Committee representatives will attend future Dialogue meetings and will give update briefings at such meetings, but the contents of the evolving report will be kept confidential until its completion.

During FY99, the NRC will continue its data gathering activities, potentially visiting the demonstration sites. The NRC report will then be revised to take into account the latest information from the demonstrations and will be sent out for external review approximately 4 months from the desired publication date. Upon resolution of all review comments, the final report will be published just prior to the next PMACWA Report to Congress.

E. Actions in Accordance with FY99 Authorization and Appropriations Acts

PMACWA will continue to manage the development, testing, and demonstration of alternative technologies. In doing so, PMACWA will continue to report to the Under Secretary of Defense for Acquisition and Technology (until completion of the demonstration phase of the program). In addition, an independent, nongovernmental evaluation of the cost and schedule of any potential alternative technologies resulting from the ACWA demonstration activities will be performed.

Appendix A
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**Dialogue on Assembled Chemical Weapons Assessment
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Appendix B

Alternative Technologies Descriptions

AEA Technology

The approach proposed by AEA Technology and CH2MHILL (AEA/CH2) for a total solution for the destruction of all assembled chemical weapons uses modified reverse assembly for chemical access, followed by AEA Technology's patented SILVER II™ process for destroying chemical agent and energetics. Modifications to reverse assembly include a high-pressure wash to remove agents and energetics. Three separate SILVER II™ units are proposed: one for chemical agents; one for energetics; and one for shredded dunnage, washings from metal parts, decontamination solutions and other mixed wastes. The SILVER II™ process uses an electrochemical cell containing nitric acid to generate SILVER (II) ions. Energetics and agents are oxidized either directly by the SILVER (II) ions or by other oxidizing compounds produced from reactions involving SILVER (II) ions. The process operates at 190 degrees Fahrenheit (°F) and near atmospheric pressure [14.7 pounds per square inch absolute (psia)]. All effluents from the SILVER II™ process will be contained and tested to be agent free before release, recycling, or disposal.

Burns and Roe

The approach proposed by the Burns and Roe Team for a total solution for the destruction of all assembled chemical weapons uses a modified reverse assembly process for chemical access, followed by the Startech Plasma Waste Converter (PWC) process for destroying chemical agent, energetics, and other materials. Four separate PWC systems are proposed: one for agents and decontamination solution; one for metal parts from rockets and energetics; one for metal parts from projectiles, mines and energetics; and one for dunnage. The PWC is an electrically driven system that produces an intense field of radiant energy that causes the dissociation (breaking apart) of the molecular bonds of solid, liquid, and gaseous compounds. Plasma is a gas that has been ionized so that the gas becomes an electrical conductor. The plasma is discharged within the PWC chamber in a continuous arc of lightning-like energy with plasma temperatures as high as 30,000 °F. The PWC chamber operates at slightly below atmospheric pressure (14.7 psia). The system produces a synthesis gas, called plasma converted gas, which will be held and tested before used on-site. The PWC melts the metals into ingots that can be sold for industrial use.

General Atomics

The approach proposed by General Atomics for a total solution for the destruction of all assembled chemical weapons uses modified reverse assembly for rockets and modified reverse assembly plus cryofracture for projectiles. Cryofracture is a process developed by General Atomics for the Army in which munitions are embrittled by cooling in liquid nitrogen and then fractured to access agents and energetics. General Atomics proposes to neutralize (hydrolyze with caustic) the agents and energetics separately and then destroy hydrolysate and shredded dunnage using separate supercritical water oxidation (SCWO) units. SCWO mineralizes the hydrolysates at temperatures and pressures above the critical point of water which is 705.2 °F and 3,204.6 psia and produces effluents which can be held and tested

before release. General Atomics proposes to recover process water for reuse and to dispose of dry salts and solid residues in a permitted waste landfill.

Lockheed Martin

The approach proposed by Lockheed Martin and its partners for a total solution for the destruction of all assembled chemical weapons uses modified reverse assembly to separate agent, energetics, and metal parts. Lockheed Martin proposes to neutralize (hydrolyze with caustic) the agents and energetics in separate vessels and then destroy the hydrolysates using SCWO. SCWO mineralizes the hydrolysates at temperatures and pressures above the critical point of water which is 705.2 °F and 3,204.6 psia and produces effluents which will be held and tested before release. The metals, solids, and dunnage are decontaminated in a caustic solution and then are treated again in a commercial gas phase chemical reduction unit in a hydrogen atmosphere at 1,000 °F⁺ for at least 15 minutes. Lockheed Martin proposes to recover process water for reuse and to dispose of dry salts and solid residues in a permitted waste landfill.

Parsons/Allied Signal

The approach proposed by Parsons/Allied Signal for a total solution for the destruction of all assembled chemical weapons uses modified reverse assembly for chemical access. Modifications to reverse assembly include a high-pressure water jet to cut the munitions and a high-pressure wash to remove the agents and energetics. Parsons/Allied Signal proposes to neutralize (hydrolyze with caustic) the agent and energetics and then destroy the hydrolysates using a biological treatment process operated at ambient temperature and pressure. Organic vapors and odors will be passed through a catalytic purifier (similar to an automotive catalytic converter) developed by Allied Signal. Parsons/Allied Signal proposes to recover process water for reuse and to dispose of dry salts and solid residues in a permitted waste landfill. Recovered metal parts will be steam treated and released as scrap.

Teledyne-Commodore

The approach proposed by Teledyne-Commodore for a total solution for the destruction of all assembled chemical weapons uses high-pressure fluid jet cutters for munition access, followed by Solvated Electron Technology (SET) for chemical and energetic destruction. After access, a high-pressure wash removes the agents and energetics and dissolves them in liquid ammonia. A fully integrated system comprised of five subsystems is proposed: one for agents, one for energetics, one for shredded dunnage, one for metal parts, and one for fuzes. SET involves reactions between agents and/or energetics with electrons released when sodium metal is dissolved (solvated) in liquid ammonia. The proposed system operates at room temperature (72 °F) and a pressure of approximately 155 psia. Teledyne-Commodore proposes to treat effluents from the SET reaction with chemical oxidation. The process for agents yields compounds such as alcohols, low-molecular weight combustible gases, and inorganic salts; and for energetics, compounds such as high-molecular weight hydrocarbons and inorganic salts. Teledyne-Commodore proposes that (1) the combustible gases produced

be used as fuel for energy for the process, (2) ammonia be recovered for reuse in the system, and (3) solid residues be disposed of in a permitted waste landfill.

Appendix C

Summaries of Technology Demonstrations

BURNS AND ROE

LOCATION	UNIT OPERATION	TEST REQUIREMENT	TOTAL QUANTITY (Including Work-up & Validation Tests)
APG, MD (ERDEC)	Energetic Deactivation Chamber	Energetics Comp B Tetrytol M28 Propellant	0.2 lbs 0.2 lbs 0.2 lbs
APG, MD (ERDEC)	Plasma Waste Converter	Energetics Comp B Tetrytol M28 Propellant Simulated Mortar with GB heel Agent HD Agent GB Agent VX Agent Dunnage Wood Pallets (spiked with PCP) DPE Fiberglass Firing Tubes Decontamination Solution with Carbon	2.1 lbs 2.1 lbs 30 lbs 60 400 lbs 400 lbs 136 lbs 800 lbs 800 lbs 800 lbs 800 lbs

Note: APG = Aberdeen Proving Ground; ERDEC = Edgewood Research, Development, and Engineering Center; GB = sarin, a nerve agent; HD = distilled mustard; VX = nerve agent; DPE = demilitarization protective ensemble; lbs = pounds.

GENERAL ATOMICS

LOCATION	UNIT OPERATION	TEST REQUIREMENT	TOTAL QUANTITY (Including Work-up & Validation Tests)
CAMDS, UT	Energetics Rotary Hydrolyzer	Fuzes Comp B, Tetrytol & Tetryl Bursters M28 Propellant	7 fuzes 7 bursters each 7 sections
DPG, UT	Shredder/Hydropulper	Dunnage DPE, Wood, Carbon	5,000 lbs shredded 4,600 lbs hydropulped
DPG, UT	Supercritical Water Oxidation	Agent Hydrolysates* HD Agent Hydrolysate VX Agent Hydrolysate GB Agent Hydrolysate VX Agent Simulant Energetic/Dunnage Hydrolysates* Comp B/M28 Propellant Hydrolysate Dunnage Slurry Tetrytol Hydrolysate & Dunnage Slurry	1,760 lbs 1,760 lbs 1,760 lbs 4,400 lbs 1,760 lbs 1,760 lbs

Note: CAMDS = U.S. Army Chemical Agent Munitions Disposal System; DPG = Dugway Proving Ground; DPE = demilitarization protective ensemble; HD = distilled mustard; VX = nerve agent; GB = sarin, a nerve agent; lbs = pounds.

*Hydrolysate – By-product of the agent or energetics neutralization reaction.

PARSONS/ALLIED SIGNAL

LOCATION	UNIT OPERATION	TEST REQUIREMENT	TOTAL QUANTITY (Including Work-up & Validation Tests)
DPG, UT	Rocket Cutting & Fluid Mining	M60 115mm Rockets (INERT) M61 115mm Rockets with agent simulant	10 rockets 10 rockets
APG, MD (ERDEC)	Immobilized Cell Bioreactor	Agent/Energetic Hydrolysates* HD Hydrolysate & Tetrytol Hydrolysate	20,100 lbs
CAMDS, UT	Immobilized Cell Bioreactor	VX Hydrolysate, Comp B Hydrolysate, & M28 Hydrolysate	22,400 lbs
		GB Hydrolysate & Comp B Hydrolysate	13,000 lbs
CAMDS, UT	Metal Parts Treater	Metal Parts	
		M2A1 4.2-inch Mortar spiked with HD	64 lbs
		M2A1 4.2-inch Mortar spiked with VX	64 lbs
		M2A1 4.2-inch Mortar spiked with GB	64 lbs
		Dunnage	
DPE with Butyl (spiked with HD)	8 lbs		
Wood Pallets (spiked with HD & PCP)	8 lbs		
Carbon (spiked with HD)	8 lbs		
Fiberglass Firing Tubes	8 lbs		

Note: DPG = Dugway Proving Ground; APG = Aberdeen Proving Ground; ERDEC = Edgewood Research, Development, and Engineering Center; CAMDS = U.S. Army Chemical Agent Munitions Disposal System; HD = distilled mustard; VX = nerve agent; GB = sarin, a nerve agent; DPE = demilitarization protective ensemble; lbs = pounds.

*Hydrolysate – By-product of the agent or energetics neutralization reaction.

Appendix D

Environmental Assessment

Finding of No Significant Impact

Finding of No Significant Impact
Environmental Assessment for Demonstration Testing
for Assembled Chemical Weapons Assessment

In accordance with the Council on Environmental Quality Regulations, 40 Code of Federal Regulations 1500-1508, and U.S Army Implementing Procedures for Implementation of the National Environmental Policy, Act 32 CFR 651, the Program Manager, Assembled Chemical Weapons Assessment has prepared an Environmental Assessment (EA) for the proposed Demonstration Testing of Alternative Technologies for demilitarization of assembled chemical weapons. The following summarizes the findings of the EA:

In December 1996 Congress directed the Department of Defense, through passage of Public Law 104-208, to identify and demonstrate not less than two technologies, other than the existing baseline incineration technology, for the demilitarization of chemical weapons in the U.S. stockpile by the end of calendar year 1998. Due in part to severe time constraints imposed on the program, DOD will conduct all demonstrations within existing test facilities designed for operations with the hazardous materials associated with chemical weapons. The procurement process had previously narrowed the potential technologies to seven, upon which the EA was conducted. Additional limiting may occur prior to actual demonstration.

The EA considers two alternatives; conducting demonstration testing (proposed action) and no action. As part of the proposed action up to seven technologies may be tested. Numerous facilities at five different sites, all of which have existing capability or have capability under construction, are considered. A final array of which technologies, and where they will be tested, is not available. The analysis assumed that any technology could be tested at any of these sites.

In conducting the EA, principle concerns centered on the potential for environmental impact from the release of chemical agent either during transportation, during testing, or during disposal of testing residuals. Emphasis was placed on potential air quality impacts, water quality impacts, and health and human safety impacts. Studies also addressed potential impacts from a spill during transportation. In addition to these concerns the potential for impacts was addressed with regard to geology and soils, land use, cultural resources, socioeconomic conditions and environmental justice.

As part of the EA, site visits were made to every facility where testing is being proposed. No new construction will be required to satisfy demonstration testing. All tests will be conducted in existing facilities, with the exception of the Fire Safety Test Enclosure (FSTE) located at the Aberdeen Proving Ground. The FSTE is still under construction but ACWA demonstration testing is incidental to its originally intended purposes and potential environmental effects were adequately addressed in a previous environmental assessment and finding of no significant impact. At each facility there are adequate safeguards to assure no release of agent to the environment as a result of testing, to include upset conditions. Testing methods are well understood, and highly trained professionals will perform the tests under a set of procedures designed to minimize or eliminate hazards. Protective clothing will be worn

during all testing. Trained professionals from the U.S. Army Technical Escort Unit will transport any agent needed for testing. Each transport will have its own transportation plan, supported by a hazards analysis specific to the route under consideration. In addition, the impacts of the proposed action were reviewed to determine the extent of any impact on populations of special concern. Because no significant impacts are expected, there is no unusual impact on the populations of special concern either.

The No Action Alternative will not have any impact on the environment, however this alternative will limit the information available for determining the effectiveness of alternatives for demilitarization of assembled chemical weapons. Therefore, the no action alternative is not acceptable as it severely impacts the Army's ability to perform a congressionally mandated task.

Based on the above facts, the Army concludes that the proposed action is not expected to have a significant environmental impact on air or water quality, ecology, or health and safety of personnel associated with or living near the operations, based on the operating procedures and containment mechanisms in the facilities to be used and the fact that no new construction will be required. In evaluating the potential environmental impacts, probabilities of accidental releases or spills were studied. The probability of an accident that would release chemical agent or other hazardous materials and cause adverse environmental impacts is very low. Special precautions, including transportation of agent and energetics by professionals with extensive experience using well-established procedures, will be taken at all phases of the operation to assure that such accidents do not happen. As proposed, the action will not cause significant environmental impacts because no contaminants are released and no changes to existing conditions occur.

The Environmental Assessment is on file and may be reviewed by interested parties at the CBDCOM Public Affairs Office at the Edgewood Area of the Aberdeen Proving Ground, (410) 671-4345. Copies may also be viewed at the Tooele Chemical Stockpile Outreach Office, 54 South Main Street, Suite 100, Tooele, Utah 84074; American Fork Library; the following branches of the Salt Lake County Library System: Brigham City Library, Calvin Smith Public Library, City Library Spanish Fork, City Library Richfield, Davis County Library Clearfield, Davis County Library Layton, Draper Library, East Millcreek Public Library, Lehi Public Library, and Magna Public Library; and Brigham Young University Library. Comments on this proposed action will be received for a 30-day period from the date this Finding of No Significant Impact is published. Address comments to: U.S. Army, CBDCOM Public Affairs Office, ATTN: AMSCB-PA, Aberdeen Proving Ground, MD 21010-5423.

Appendix E

Acronyms/Abbreviations

ACRONYMS/ABBREVIATIONS

3X	the state of absence of agent in a closed headspace, signifying that the material has been appropriately surface decontaminated
5X	the state of agent decontamination after heating to 538 °C (1,000 °F) for 15 minutes, signifying that the material is clean of chemical agent and may be released from government control
ACWA	Assembled Chemical Weapons Assessment
APG	Aberdeen Proving Ground
BAA	Broad Agency Announcement
°C	degree Celsius
CAC	Citizens' Advisory Commission
CAMDS	U.S. Army Chemical Agent Munitions Disposal System
CATT	Citizens' Advisory Technical Team
CBDCOM	Chemical and Biological Defense Command
CFR	Code of Federal Regulations
CWC	Chemical Weapons Convention
DCD	Deseret Chemical Depot
DPE	demilitarization protective ensemble
DPG	Dugway Proving Ground
DOD	Department of Defense
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ERDEC	Edgewood Research, Development, and Engineering Center
°F	degree Fahrenheit
FONSI	finding of no significant impact
FSTE	Fire Safety Test Enclosure
FY	fiscal year
GB	sarin, a nerve agent
GPCR	gas phase chemical reduction
HD	distilled mustard
kg	kilogram
lb	pound
NEPA	National Environmental Policy Act
NRC	National Research Council
OPCW	Organization for the Prohibition of Chemical Weapons
PET	Program Evaluation Team
PL	Public Law
PMACWA	Program Manager, Assembled Chemical Weapons Assessment
PMCD	Program Manager for Chemical Demilitarization
psia	pounds per square inch absolute
PWC	Plasma Waste Converter
RCRA	Resource Conservation and Recovery Act

RFP request for proposal
RIA Rock Island Arsenal
SCWO supercritical water oxidation
SETTM Solvated Electron Technology
SOW statements of work
TS Technical Secretariat
U.S. United States
VX nerve agent