

# Problem Rounds Path Forward Briefing Series



## Schedule of Topics

26 October 2011

Presented to:  
Design Options Working Group

Presented by:  
Scott Susman  
ACWA Systems Engineering and Operations

A PARTNERSHIP FOR SAFE  
CHEMICAL WEAPONS DESTRUCTION

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## Schedule of Topics

A Partnership for Safe Chemical Weapons Destruction

- Possible Problem Rounds Path Forward Topic Areas for Future Discussion
  - Problem Rounds Processing Alternatives ..... **COMPLETED** 8 Dec '10
  - Path Forward Schedule and Bechtel's Proposal Process ..... **DELAYED** 8 Dec '10
  - National Environmental Protection Act (NEPA) Process ..... **COMPLETED** 26 Jan '11
  - NEPA Process Q&A ..... **COMPLETED** 30 Mar '11
  - Determination of potential feeds (types and quantities) ..... **COMPLETED** 27 Apr '11
  - Considerations for processing boxed 105mm projectiles ..... **COMPLETED** 27 Apr '11
  - Other Topics ..... TBD
    - Environmental Assessment (EA)/Multi-Pathway Health Risk Assessment (MPHRA) Update ..... **COMPLETED** 29 Jun '11
    - EA/MPHRA Update ..... **COMPLETED** 23 Aug '11
    - EA/MPHRA Update ..... 26 Oct '11
    - Assessment of Bioremediation of EDS Effluent ..... 26 Oct '11
    - Final Disposition of the Explosive Destruction Technology (EDT) ..... TBD

# Problem Rounds Path Forward Briefing Series



## Environmental Assessment and Multiple Pathway Health Risk Assessment Update

26 October 2011

Presented to:  
Design Options Working Group

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Scott Susman  
ACWA Systems Engineering and  
Operations

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## Environmental Assessment (EA) Status

A Partnership for Safe Chemical Weapons Destruction

- ACWA has received Chapters 1 and 2 of the Environmental Assessment and is under review. Also under review by EPA Region 8 and CDPHE
- Draft portion of Chapter 3 of the EA to be submitted to the Government this week for review
- Draft MPHRA Report to be submitted to the Government this week for review
- Outcome of EA still anticipated for March 2012 release for comment.




## Environmental Assessment (EA) Status

A Partnership for Safe Chemical Weapons Destruction

### Overview of Chapters 1 and 2

- Chapter 1 (Introduction):
  - Summarizes the purpose of and the need for the proposed action
  - Provides relevant background information about the chemical agents and munitions to be destroyed at the Pueblo Chemical Depot (PCD)
- Chapter 2 (Proposed Action and Alternatives):
  - Describes in detail the proposed action and the no-action alternative, as well as other alternatives to the proposed action
  - Provides the technical basis upon which the assessment of impacts will be conducted in Chapter 3

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## Environmental Assessment (EA) Status

A Partnership for Safe Chemical Weapons Destruction

### Outline for Chapter 1

- 1.0 INTRODUCTION
  - 1.1 Background
    - 1.1.1 The PCD Inventory of Mustard-Filled Munitions
    - 1.1.2 The Present Situation at the PCD
  - 1.2 Overview of the Proposed Action
  - 1.3 Purpose and Need for the Proposed Action
  - 1.4 Scope of This Environmental Assessment
    - 1.4.1 Framework
    - 1.4.2 Approach
  - 1.5 Public Participation

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## Environmental Assessment (EA) Status

A Partnership for Safe Chemical Weapons Destruction

### Summary of Contents for Chapter 1

1.0 INTRODUCTION

- Provides basic, introductory background information and sets the stage for the subject Environmental Assessment

1.1 Background


1.1.1 The PCD Inventory of Mustard-Filled Munitions

- Describes the chemical munitions in storage at the PCD
- Provides data and illustrations for each munition type
- Provides the status of overpacked munitions and discloses their number
- Describes reconfiguration activities at the PCD

1.1.2 The Present Situation at the PCD

- Summarizes the 2002 Final Environmental Impact Statement (FEIS) and its outcome
- Introduces the PCAPP and describes its mission
- Describes anticipated problems with the processing of certain munitions at the PCAPP and discloses the anticipated number of such reject munitions
- Describes how some method of destroying the leaking/overpacked munitions, as well as the PCAPP reject munitions, must be identified and employed

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## Environmental Assessment (EA) Status

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### Summary of Contents for Chapter 1 (cont)


1.2 Overview of the Proposed Action

- Includes basic text to orient the reader
- Describes and defines the proposed action in general terms
- Provides a narrative overview of the four EDT technologies

1.3 Purpose and Need for the Proposed Action

- Contains a statement of purpose: "to provide the operational flexibility needed to complete the destruction of the problematic chemical munitions and explosive components currently being stored at the PCD by augmenting the planned chemical agent destruction capabilities of the PCAPP."
- Contains a statement of need: "to meet current U.S. obligations under the international Chemical Weapons Convention and U.S. Congressional directives (see Public Law 99-145, et seq.) for destroying the entire U.S. stockpile of lethal, unitary chemical warfare agents. These destruction activities must be completed on a schedule in agreement with the 2017 deadline specified in Section 8119 of Public Law 110-116."

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## Environmental Assessment (EA) Status

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### Summary of Contents for Chapter 1 (cont)

1.4 Scope of This Environmental Assessment


1.4.1 Framework

- Describes the withdrawn 2010 EA
- Discusses the legal framework under which the subject EA is being prepared
- Describes the relation of the subject EA with the 2002 FEIS and other environmental reviews conducted for EDT units at other locations
- Introduces the four EDT units that are evaluated in this EA
- Describes additional regulatory requirements beyond NEPA

1.4.2 Approach

- To identify, document, and evaluate potential environmental impacts of construction, operations and closure
- To engage an interdisciplinary staff to conduct the analyses and to document their findings in Chapter 3
- To include direct impacts, indirect impacts, and cumulative impacts

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## Environmental Assessment (EA) Status


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### Summary of Contents for Chapter 1 (cont)

1.5 Public Participation

- Public comments and participation are welcome
- The Army will disseminate information and invite stakeholder input, including other reviews that are to be conducted outside of NEPA
- There will be a 30-day public comment period on the Final EA
- Possible outcomes of the subject EA:
  - Finding of No Significant Impact (FNSI)
  - Discovery of potentially significant impacts could trigger an Environmental Impact Statement

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## Environmental Assessment (EA) Status

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### Outline for Chapter 2

2.0 THE PROPOSED ACTION AND ITS ALTERNATIVES


2.1 The Proposed Action

- 2.1.1 The Proposed EDT Facility and Its Associated Equipment
  - 2.1.1.1 The Army's EDS Unit
  - 2.1.1.2 The TDC Unit
  - 2.1.1.3 The SDC Unit
  - 2.1.1.4 The DAVINCH Unit
- 2.1.2 The Proposed Site, Layout and Installation
- 2.1.3 Resource Requirements
- 2.1.4 Waste Management
- 2.1.5 Approvals, Permits and Conditions
- 2.1.6 Decommissioning and Closure

2.2 The No-Action Alternative

2.3 Alternatives to the Proposed Action

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## Environmental Assessment (EA) Status

A Partnership for Safe Chemical Weapons Destruction

### Summary of Contents for Chapter 2

2.0 THE PROPOSED ACTION AND ITS ALTERNATIVES

- Provides a roadmap for the contents of Chapter 2


2.1 The Proposed Action

- Provides a detailed description of the Proposed Action

2.1.1 The Proposed EDT Facility and Its Associated Equipment

- Provides a detailed overview of the EDT technologies and prepares the reader for the remainder of Chapter 2, including the detailed description of each EDT unit as contained in the following subsections
  - 2.1.1.1 The Army's EDS Unit
  - 2.1.1.2 The TDC Unit
  - 2.1.1.3 The SDC Unit
  - 2.1.1.4 The DAVINCH Unit

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## Environmental Assessment (EA) Status

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### Summary of Contents for Chapter 2 (cont)

- 2.1.2 The Proposed Site, Layout and Installation
  - Describes the proposed location for the EDT facility and the site preparation activities that would be required, as well as the features of the as-constructed site
- 2.1.3 Resource Requirements
  - Describes the resources, such as utilities and manpower, that would be required for the construction and operation of the EDT facility
- 2.1.4 Waste Management
  - Describes the types of wastes that would be generated during the construction and operation of each of the EDT units
  - Describes the overall strategy for managing such wastes

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## Environmental Assessment (EA) Status

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### Summary of Contents for Chapter 2 (cont)

- 2.1.5 Approvals, Permits and Conditions
  - Provides information about the Army's coordination with other local, state, and federal agencies
  - Provides a list of other permits that will be required for the proposed EDT facility
- 2.1.6 Decommissioning and Closure
  - Describes the activities associated with decommissioning and closure of the EDT facility
- 2.2 The No-Action Alternative
  - Provides a description of the no-action alternative to be evaluated in this EA
- 2.3 Alternatives to the Proposed Action
  - Describes the alternatives to the proposed action, including those that were considered but not evaluated in detail in this EA

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## Multiple Pathway Health Risk Assessment (MPHRA) Status

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### Overview of MPHRA Process

- Define emission units and emission rates
  - Four technology options
  - Combination of vendor and calculated data
- Identify receptors
  - Fence line
  - Farmlands
  - On-site workers
- Calculate dispersion/transport
  - Unit response emission rate (1 gram/second) applied to multiple Chemicals of Potential Concern (COPCs)
  - Vapor concentrations
  - Wet deposition
  - Dry deposition

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## Multiple Pathway Health Risk Assessment (MPHRA) Status

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### Overview of MPHRA Process (cont)

- Import results into risk model
  - Adjust COPC concentrations based on actual emission rates
  - Incorporate transport and uptake parameters
- Summarize risk and hazard
  - Incorporate toxicity information
  - Evaluate special scenarios

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## Multiple Pathway Health Risk Assessment (MPHRA) Status

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### Introduction Outline for MPHRA Report

- 1 INTRODUCTION
  - 1.1 What does this report present?
  - 1.2 How does the EDT relate to PCAPP?
  - 1.3 What are the general characteristics of the area around the PCD?
  - 1.4 Why must a MPHRA be performed for the EDT?
  - 1.5 Who oversaw the planning and conduct of the MPHRA?
  - 1.6 What is the process for performing an MPHRA?
  - 1.7 Should the results of the EDT MPHRA be compared with the PCAPP MPHRA?
  - 1.8 What are the differences between the methods used to conduct this EDT MPHRA and the methods used to conduct the original PCAPP MPHRA?
  - 1.9 How is this report organized?
    - Data Collection and Evaluation
    - Exposure Assessment
    - Toxicity Assessment
    - Risk Characterization
  - 1.10 What other information should be reviewed when evaluating this report?

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## NEPA Process – Schedule

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Activity	Calendar Year				
	2011	2012	2013	2014	2015
<b>NEPA PROCESS</b>	■				
<b>FONSI OR NEED FOR EIS</b>	◆	◆			
<b>EDT IMPLEMENTATION</b>		■			
<b>PCAPP START OF OPS</b>				◆	
<b>CURRENT PERMIT CONDITION FOR EDT</b>				◆	
<b>EDT START OF OPS (TBD)</b>				← ? →	

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## Problem Rounds Path Forward Briefing Series



### Feasibility of Treating EDS HD/MEA Neutralent and Rinsate Composite Stream in PCAPP ICBS

26 October 2011

Presented to:  
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### Feasibility of Treating EDS MEA Stream in PCAPP ICBS

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- **Question**
  - If the Explosive Destruction System (EDS) were to be selected for use as the explosive destruction technology (EDT) at PCAPP and monoethanolamine (MEA) used for neutralization, what is the feasibility of treating the resulting composite MEA neutralent and water rinsate stream?
- **Considerations**
  - Biodegradability of the MEA in the EDS MEA stream
  - Treatment of the MEA stream in the PCAPP immobilized cell bioreactors (ICBs)
  - Logistics of transporting and feeding the MEA stream to the ICBs
  - Other issues/concerns




## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

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- **Biodegradability**
  - Non-Stockpile Chemical Materiel Project (NSCMP) [Shaw, May 2006] performed biotreatability testing on mustard/MEA neutralent and rinsate from actual explosive destruction system (EDS) testing.
    - Test objectives
      - Determine the biodegradability of the MEA composite (neutralent and rinsate) stream.
      - Evaluate the potential to treat the MEA streams in commercial biological wastewater treatment processes.
    - Respirometry testing was conducted using activated sludge from a local publicly owned treatment works (POTW).
    - MEA concentration in the undiluted composite stream was 400,000 mg/L.
    - Results
      - The testing demonstrated biodegradability of MEA in streams diluted to initial MEA concentrations of 2000 mg/L.
      - Microbial acclimation was occurring at the end of testing in streams diluted to initial MEA concentrations of 4000 mg/L.
      - The results support the feasibility of disposal of this waste in a commercial wastewater treatment facility.

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

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- **Terminology/Assumptions based on NSCMP operations**
  - Shot: An EDS reaction cycle, processing a number of munitions. In the case of PCAPP:
    - Three munitions per shot (3-pack) for 155-mm projectiles
    - Six munitions per shot (6-pack) for 105-mm projectiles and 4.2-in mortars
  - Reagent: Neat (100%) MEA used to neutralize agent in the EDS vessel post reaction.
    - 60 gallons/shot for 3-pack shots
    - 120 gallons/shot for 6-pack shots
  - Neutralent: Spent reagent following treatment of agent pumped from the EDS vessel into a drum.
    - Volume equal to about 110% of reagent volume.
  - Rinsate: Water rinses of the EDS vessel after the neutralent is pumped out.
    - Volume about equal to neutralent volume.

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

Public Chemical Agents  
Destruction Pilot Plant

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- **Treatment in the PCAPP ICBs**
  - Number of rounds to be treated:
    - 155-mm projectiles: 4,600 rejects
    - 105-mm projectiles and 4.2-in mortars: 8,600 rejects (total)
  - Composite stream characteristics for PCAPP:
    - Total quantity of (100%) MEA: 2,244,000 lbs
    - Total volume of composite stream: 586,667 gallons
  - Calculated MEA concentration in ICB feed:
    - Average MEA concentration in ICB would be about 3,400 mg/L based on a total ICB feed quantity of 79 million gallons.
  - Conclusion
    - This is above the concentration of 2,000 mg/L demonstrated in the Shaw treatability testing, but it may still be possible to treat the stream in the ICBs by maintaining the concentration of MEA in the ICBs below inhibitory levels or by diluting the feed with additional process water and recycled ICB effluent.

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

Public Chemical Agents  
Destruction Pilot Plant

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**Simplistic illustration of dilution of MEA in ICB feed:**

Hydrolysate

8.1 Mgal

Process water  
Reverse osmosis reject  
25% sodium hydroxide  
Nutrient streams

70.9 Mgal

79 Mgal

Explosive  
Destruction System

MEA composite stream  
MEA quantity = 2,244,000 lbs  
Composite stream volume = 0.59 Mgal


ICB feed

Volume = 79.59 Mgal  
Calculated average  
MEA concentration = 3,400 mg/L

Immobilized Cell  
Bioreactors

*Legend*  
 ——— Solid line – Current design  
 - - - Broken line – EDS concept

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

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- **Logistics**
  - Additional dilution with process water will increase the volume of the ICB feed and thus increase the number of ICBs needed for treatment.
  - The MEA will contribute significant quantities of nitrogen to the ICBs, probably in the form of ammonia. The fate of the nitrogen through the ICBs, Brine Reduction System (BRS), and offgas treatment is another unknown.
  - Impacts of combining caustic based feed with MEA based feed is not fully known.
  - Transportation of the MEA composite stream from the EDS to the BTA.

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

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- **Other issues/concerns (relative to shipping the MEA offsite for disposal)**
  - If the option of treatment of the MEA composite stream is to be pursued, more research will be needed to fill the data gaps identified here and others that will likely arise as we study this further.
  - Design/Construction Costs/Schedule
    - Transfer station(s) and mobile equipment would be needed.
    - Impact to PCAPP schedule not fully known.
  - Systemization/Operations
    - Safety - Increased handling of a hazardous waste.
    - Additional labor and other direct costs (ODCs) for laboratory analysis and material handling.

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## Feasibility of Treating EDS MEA Stream in PCAPP ICBs

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### ▪ Path Forward

- We will continue to investigate this approach if EDS is the selected technology. (This has not yet been coordinated with PCD, CMA, and Bechtel to fully understand program impacts)
- Any decision would need to consider the value in pursuing a course of action other than off-site treatment of EDS effluent
  - Safety implications
  - Environmental implications
  - Impact to current PCAPP performance
  - Impact to schedule
  - Impact to cost