



**INCHING AWAY FROM ARMAGEDDON:
DESTROYING THE U.S. CHEMICAL WEAPONS STOCKPILE**

April 2004

By
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With the assistance of
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INTRODUCTION

On 3 September 2003, the Department of Defense issued a press release noting that the United States (US) would be unable to meet the Chemical Weapons Convention (CWC) deadline for the destruction of 45 percent of its chemical weapons stockpile by 27 April 2004.¹ This announcement also indirectly confirmed that the United States will be unable to meet the CWC's deadline for destroying its entire stockpile by 27 April 2007. The treaty allows for a five-year extension of this final deadline, which the United States will likely need to request as that date draws closer.

Chemical weapons destruction is the exception to the old adage that it is easier to destroy than to create. While some of the toxic agents are stored in bulk containers that must be emptied, their contents neutralized, and the contaminated containers destroyed, more remain in weaponized form (inside rockets, bombs, landmines, and other armaments) in storage igloos at six sites in the US. Maintaining safety, therefore, must be the priority for the destruction process.

Assuring citizens of the communities near to the facilities that every effort is being made to minimize risks to their safety and working with these communities to develop sound emergency response plans are connected but separate tasks. Indeed, many citizens, alarmed by the possible damage an accidental release during destruction could cause to their communities, have mounted extensive efforts to address their concerns. Lawsuits over safety measures delayed the operational testing of the Anniston, Alabama facility, while investigation of an accidental leak that exposed a worker to an agent at Tooele, Utah caused its facility to cease operation for several months.

Regulatory changes, contractor problems, security concerns, and addressing the deteriorating condition of some parts of the stockpile are other reasons that have been cited for the ongoing delays and increased costs that have plagued US chemical destruction efforts.

The purpose of this guide is to serve as a basic reference to the US chemical demilitarization program. The guide does not seek to pass judgment on the program, nor on those who oppose the program's decisions.

¹ The United States requested, and received in October 2003, a three-year extension of this intermediate deadline via mechanisms provided within the CWC.

All of the information contained within this document was gathered from open sources and collated in this volume with tabbed divisions for easy access to the topic areas. The data was current as of April 2004. Chemical and Biological Weapons Nonproliferation Project research assistants Katherine Powers and Yun Jung Choi and interns Alexis Pierce and Gina Ganey pulled together the data found herein, an often confusing and difficult task.

In the long term, ridding the United States of this deadly arsenal will improve the security of all Americans. Understanding the complexity of the task and continuing to develop and support policies that move this process forward safely in the short term is of the utmost importance in reaching that goal.

Claudine McCarthy
Editor
April 30, 2004

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April 2004

Acronyms

Destruction Sites

Chemical Agents

Munitions and Storage

Destruction Techniques

Program Time and Cost Overruns

Key Organizations/Agencies

Timeline of Legislation and Oversight

Timeline of Chemical Leaks at Destruction Sites

Glossary

Links

Sources

ACRONYMS

ABCDF	Aberdeen Chemical Agent Disposal Facility
ACADF	Anniston Chemical Agent Disposal Facility
ACWA	Assembled Chemical Weapons Alternatives
ACWAP	Assembled Chemical Weapons Assessment Program
APG	Aberdeen Proving Ground
ATAP	Alternative Technologies and Approaches Project
CAC	Citizens Advisory Commission
CBDCOM	Army Chemical and Biological Defense Command
CDC	Centers for Disease Control and Prevention
CMA	Chemical Materials Agency
CSDP	Chemical Stockpile Disposal Project
CSEPP	Chemical Stockpile Emergency Preparedness Program
CWC	Chemical Weapons Convention
DTRA	Defense Threat Reduction Agency
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GB	sarin
H, HD, HT	sulfur mustard
JACADS	Johnston Atoll Chemical Agent Disposal System
NaOH	sodium hydroxide
NECDF	Newport Chemical Agent Disposal Facility
NSCMP	Non-Stockpile Chemical Material Project
PBCSF	Pine Bluff Chemical Storage Facility
PMECW	Program Manager for Elimination of Chemical Weapons
PUCD	Pueblo Chemical Depot
SCWO	super critical water oxidation
TOCDF	Tooele Chemical Agent Disposal Facility
UMCDF	Umatilla Chemical Agent Disposal Facility

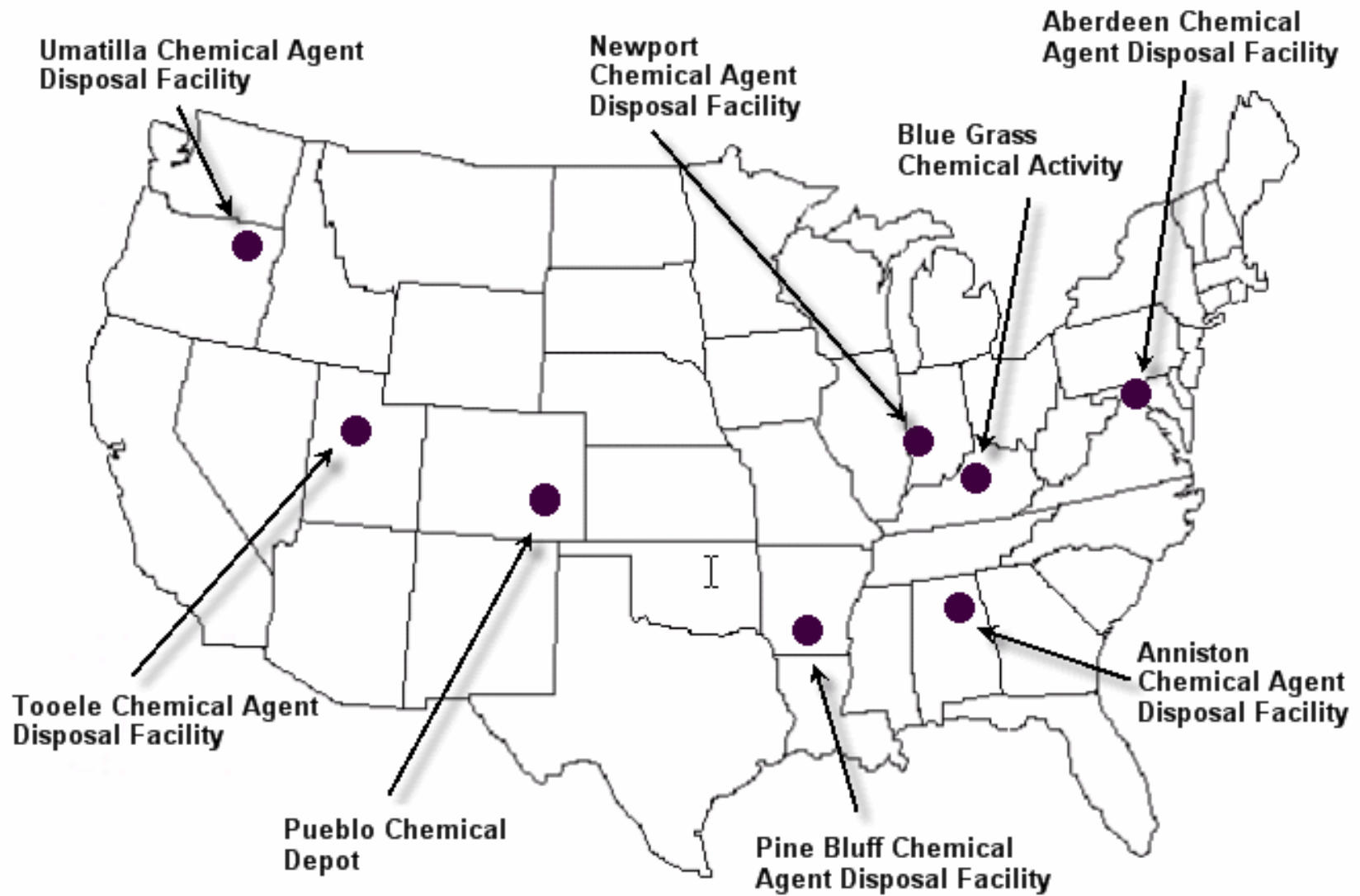


Figure: US Chemical Weapons Storage/Destruction Sites

ABERDEEN CHEMICAL AGENT DISPOSAL FACILITY (ABCDF)

Aberdeen/Edgewood, Maryland

When the US chemical demilitarization effort began, Aberdeen housed 5 percent of the nation's original stockpile – 1,625 tons of chemical agent. As of April 2004, 7% of the agent stockpile and 7% of the munitions stockpile at the Aberdeen facility had been neutralized.

Agent

Blister agent sulfur mustard stored in ton containers

Site Location and Specifics

- Southeast of Edgewood, MD; near the City of Aberdeen (pop. 13,000)
- In Harford County (pop. 227,713)
- 2,700 families live on-site

Employment Statistics

- Aberdeen Proving Ground employs 6,699 civilians and 4,785 military personnel*
- Subcontractor Battelle Memorial Institute employs 210 local civilians

Agent Destruction

Accelerated Neutralization

Contractors/Subcontractors

- A \$306 million contract was awarded to Bechtel National, Inc. in 1998
- Subcontractors include:

Battelle Memorial Institute	Innovative Emergency Management
Earth Tech	Horne Engineering
EA Engineering	Upper Chesapeake Medical Services
General Physics Corporation	UXB Waste Management

* Numbers are not available for demilitarization facilities alone.

Groups/Organizations Involved with Site

Local

APG Superful Citizens' Coalition

Aberdeen, Abingdon, Baltimore, Earleville, Elkton, and North East Counties

State

Harford County

Harford County Division of Environmental Affairs

Harford County Health Department Bureau of Environmental Health

Maryland Citizens' Advisory Commissions

Milestones/Important Developments

- April 2003: Destruction began almost two years ahead of original schedule
- January 2004: Over 78 tons of agent has been destroyed

Projected Schedule

- Spring 2004: Complete agent neutralization, 18 months ahead of original schedule
- Winter 2004: Finish cleaning containers
- Summer 2005: Close site, one to two years ahead of original schedule

Political Representatives

- US Representative C.A. Dutch Ruppersberger III (D - 2nd District)
- US Senators Barbara Mikulski (D) and Paul Sarbanes (D)
- Maryland Governor Robert L. Ehrlich
- Maryland State Senator Nancy Jacobs (34th District)
- Maryland State House Delegates Charles Boutin (34th District) and Mary-Dulany James (34th District)

Contact Information

Edgewood Chemical Stockpile Outreach Office

tel. 410-676-6800 fax. 410-676-2483

Aberdeen Chemical Agent Disposal Facility

tel. 410-436-5253 fax. 410-436-9646

ANNISTON CHEMICAL AGENT DISPOSAL FACILITY (ACADF)

Anniston, Alabama

When the US chemical demilitarization effort began, Anniston housed 7 percent of the nation's original stockpile – 2,254 tons of chemical agent. As of April 2004, 5% of the agent stockpile and 3% of the munitions stockpile at the Anniston facility had been destroyed.

Agent

- Nerve agents sarin and VX stored in cartridges, projectiles, rockets and mines
- Blister agent sulfur mustard stored in cartridges, projectiles and ton containers

Site Location and Specifics

- 8 miles west of Anniston (pop. 23, 332)
- In Calhoun County (pop. 112,171)

Employment Statistics

- Anniston Army Depot as a whole employs 3,804 people *
- Affiliated groups
 - Westinghouse Electric Corporation employs 503 people
 - Werner Co. (aluminum extrusions) employs 650 people
 - General Dynamics employs 223 people

Agent Destruction Technique

Incineration

Contractors/Subcontractors

- \$213.8 million contract awarded to Westinghouse Electric Corporation in 1996, now part of the Washington Demilitarization Company
- Current contract value is approximately \$1.3 billion
- Subcontractors include:

Battelle Memorial Institute	Morrison Knudsen
General Physics Corporation	Bechtel National, Inc.,
Innovative Emergency Management	Becon Construction Company

* Numbers not available for demilitarization facility.

Groups/Organizations Involved with the Site

Local

Coosa River Basin Initiative CRBI)

Environmental Justice Task Force

Families Concerned About Nerve Gas Incineration

Calhoun, Cleburne, Clay, Etowah, Saint Clair and Talladega Counties

State

Alabama Citizens' Advisory Commission

Alabama Department of Environmental Management

Alabama Department of Public Health

Burn Buster and Serving Alabama's Future Environment (SAFE)

Milestones/Important Developments

- August 2003: Facility began destruction of sarin
- November 2003: Facility had destroyed 12,645 rockets and 13,526 gallons of liquid sarin

Projected Schedule

- 2006: Close site
- 2010: Estimated end work date given by the Washington Demilitarization Company

Political Representation

- US Representative Mike D. Rogers (R - 3rd District)
- US Senators Jeff Sessions (R) and Richard Shelby (R)
- Alabama Governor Bob Riley
- Alabama State Senator Del Marsh (12th District)
- Alabama State House Delegate Barbara Boyd (32nd District)

Contact Information

Anniston Chemical Demilitarization Facility Outreach Office

tel. 256-238-0120 fax. 256-238-0195

Anniston Chemical Demilitarization Facility Public Affairs Office

tel. 256-238-1652 fax. 256-238-4318

BLUE GRASS CHEMICAL ACTIVITY

Richmond, Kentucky

When the US chemical demilitarization effort began, Blue Grass housed 2 percent of nation's original stockpile – 523 tons of chemical agent. The Blue Grass facility is still in its planning stages and construction is scheduled to begin in 2004.

Agent

- Nerve agents sarin and VX stored in projectiles and rockets.
- Blister agent sulfur mustard stored in projectiles.

Site Location and Specifics

- 6 miles south of Richmond (pop. 28,000)
- 8 miles north of Berea (pop. 8,200)
- In Madison County (pop. 73,334)

Employment Statistics

Blue Grass is still in the planning and design stages.

Agent Destruction Technique

Neutralization and supercritical water oxidation

Contractor/Subcontractors

- Contract awarded in June 2003 to a team headed by Bechtel National, Inc. and Parsons Infrastructure and Technology Group, Inc.
- Subcontractors include:

Washington Demilitarization Company	General Physics Corporation
Battelle Memorial Institute	General Atomics

Groups/Organizations Involved with Site

Local

Common Ground
Concerned Citizens of Madison County

State

Chemical Stockpile Emergency Preparedness Program
Kentucky Citizens' Advisory Committee
Kentucky Department for Environmental Protection

Milestones/Important Developments

- June 2003: Contract awarded
- November 2003: Destruction technique chosen

Projected Schedule

- 10 year estimated timeframe for total construction, operations and closure
- Approximately 3 year construction
- Approximately 2.5 year systemization
- Approximately 2.5 year operations
- Approximately 2.5 year closure

Political Representation

- US Representative A.B. “Ben” Chandler (D - 6th District)
- US Senators Jim Bunning (R) and Mitch McConnell (R)
- Kentucky Governor Ernie Fletcher
- Kentucky State Senator Ed Worley (34th District)
- Kentucky House Representative Harry Moberly, Jr. (81st District)

Contact Information

Blue Grass Chemical Stockpile Outreach Office

tel. 859-626-8944 fax. 859-626-8949

Blue Grass Army Depot Public Affairs Office

tel. 859-625-6221 fax. 859-625-6617

NEWPORT CHEMICAL AGENT DISPOSAL FACILITY (NECDF)

Newport, Indiana

When the US chemical demilitarization effort began, Newport housed 3.5 percent of nation's original stockpile – 1,269 tons of chemical agent. As of April 2004, 98% of the construction of chemical weapons disposal facilities at the Newport site had been completed.

Agent

Nerve agent VX stored in ton containers

Site Location and Specifics

- 2 miles south of Newport, Indiana
- 70 miles west of Indianapolis
- In Vermillion County (pop. 16,581 in 2001)

Employment Statistics

- Approximately 222 full-time employees work at the Newport Chemical Depot
- Mason & Hanger Corporation employs 205 workers at the stockpile

Agent Destruction Technique

- Neutralization and supercritical water oxidation

Contractors/Subcontractors

- \$295 million contract awarded in 1999 to Parsons Corporation, with then partnership team AlliedSignal (which merged in December 1999 with Honeywell Inc.), for construction, testing, operation and closure
- Mason & Hanger Corporation is the operating contractor as of January 2003.

Groups/Organizations Involved with Site

Local

Citizens Against Incinerating at Newport

Fountain County Emergency Management and Commissioner

Newport Outreach

Newport Study Group

Parke County Emergency Management

Restoration Advisory Board

Vermillion County Emergency

State

Indiana Citizens' Advisory Commissions
Indiana Department of Environmental Management
Indiana Department of Health

Milestones/Important Developments

- 2000: Construction began
- December 2003: The Army postpones VX operations scheduled to begin in January 2004 to August 2004
- The current Army offsite treatment plan to ship waste from Indiana to a treatment facility in New Jersey has not been finalized and faces intense opposition; an April 2004 GAO report states that further DOD funds will not be appropriated to the Newport site until a disposal location has been chosen.

Projected Schedule

- 2003: Complete construction
- 2004: Operations, one year behind original schedule
- 2005: Close site
- 2007: Finish demolition of final structures

Political Representation

- US John N. Hostettler (R - 8th District)
- US Senators Evan Bayh (D) and Richard Lugar (R)
- Indiana Governor Joseph E. Kernan
- Indiana State Senator Timothy Skinner (38th District)
- Indiana House Representative F. Dale Grubb (42nd District)

Contact Information

Newport Chemical Stockpile Outreach Office
tel. 765-492-4445 fax. 765-492-4475
Newport Army Depot Public Affairs Office
tel. 765-245-4475 fax. 765-245-4500

PINE BLUFF CHEMICAL AGENT DISPOSAL FACILITY (PBCDF)

Pine Bluff, Arkansas

When the US chemical demilitarization effort began, Pine Bluff housed 12 percent of nation's original stockpile – 3,850 tons of chemical agent. As of April 2004, 100% of the construction of chemical weapons disposal facilities at the Pine Bluff site had been completed.

Agent

- Nerve agent sarin stored in rockets, and VX stored in rockets and landmines
- Blister agent sulfur mustard stored in ton containers

Site Location and Specifics

- 6 miles northwest of the City of Pine Bluff (pop. 55,085)
- 42 miles southeast of Little Rock
- In Jefferson County (pop. 84,278)

Employment Statistics

- Pine Bluff Arsenal as a whole employed 1,350 people in 2001
- Washington Demilitarization Company employed 1000 people in Jefferson County (2001 figures)

Agent Destruction Technique

Incineration

Contractors/Subcontractors

- \$512 million contract awarded to the Washington Demilitarization Company, formerly Raytheon Demilitarization Company, in July 1998 for construction, operations, maintenance and closure
- Current contract value approximately \$866 million

Groups/Organizations Involved with Site

Local

Jefferson County Office of Emergency Management

Pine Bluff for Safe Disposal

Arkansas, Dallas, Grant, Jefferson, Lincoln, Prairie, Pulaski, and Saline Counties

Women's Action for New Directions

State

Arkansas Citizens' Advisory Commission

Arkansas CWWG

Arkansas Public Policy Panel

Arkansas Sierra Club

Milestones/Important Developments

- January 1999: Construction began on schedule
- 2002: Construction completed one year behind original schedule
- May 2003: Systemization 81 percent complete

Projected Schedule

- Late 2004: Operations to begin, one year behind the original schedule
- 2006: Operations complete and site closed

Political Representation

- US Representative Mike Ross (D - 4th District)
- US Senators Blanche L. Lincoln (D) and Mark Pryor (D)
- Governor Mike Huckabee
- Arkansas State Senator Hank Wilkins IV (5th District)
- Arkansas House Representative Booker T. Clemons (16th District)

Contact Information

While Hall Chemical Stockpile Outreach Office

tel. 870-247-2025 fax. 870-247-2335

Pine Bluff Chemical Activity Public Affairs Office

tel. 870-540-2047 fax. 870-540-3886

PUEBLO CHEMICAL DEPOT (PUCD)

Pueblo, Colorado

When the US chemical demilitarization effort began, Pueblo housed 8.5 percent of nation's original stockpile – 2,611 tons of chemical agent. Construction is slated to begin in 2004 and end in 2006.

Agent

Blister agent sulfur mustard stored in cartridges and projectiles

Site Location and Specifics

- 14 miles east of the City of Pueblo (pop. 104,124)
- In Pueblo County (pop. 147,284)

Employment Statistics

- The Pueblo Depot employs 175 civilian and military personnel
- Bechtel Pueblo Team has a staff of around 300 people in San Francisco for plant design
- During peak construction, Bechtel Pueblo Team estimates 1,000 craft workers employed
- During operations, estimated 700 local workers employed
- As of November 2003, 15 contracts awarded to businesses in Pueblo totaling \$976,584 and 36 to companies within Colorado (outside Pueblo) totaling \$865,627

Agent Destruction Technique

Neutralization followed by biotreatment

Contractor/Subcontractors

- \$1.5 billion contract awarded to Bechtel National, Inc. in September 2002 for directing construction
- Subcontractors include:
 - Washington Demilitarization Company (operations and closure)
 - Parsons Infrastructure and Technology
 - Battelle Memorial Institute

Groups/Organizations Involved with the Site

Local

Citizens for Clean Air and Water

Diocese of Pueblo

Pueblo County Department of Health and Environment

State

Union Leaders

Citizens' Advisory Commission

Colorado Department of Public Emergency Management

Milestones/Important Developments

- September 2002: Contract awarded
- 2003-2005: Facility design

Projected Schedule

- 2004-2006: Construction
- 2006-2007: Pre-Systemization
- 2008-2009: Pilot Testing
- 2009-2010: Operations
- 2010-2013: Closure

Political Representation

- US Representative Scott McInnis (R - 3rd District)
- US Senators Wayne Allard (R) and Ben Nishthorse Campbell (R)
- Colorado Governor Bill Owens
- Colorado Senator Abel Tapia for District 3
- Colorado House Representatives Dorothy Butcher (46th District), Liane McFayden (47th District), and John T. Salazar (62nd District)

Contact Information

Pueblo Chemical Depot Community Outreach

tel. 719-546-0400 fax. 719-546-0409

Public Affairs Office

tel. 719-549-4135 fax. 719-549-4866

TOOELE CHEMICAL AGENT DISPOSAL FACILITY (TOCDF)

Tooele, Utah

When the US chemical demilitarization effort began, Tooele housed 44 percent of nation's original stockpile – 13,616 tons of chemical agent. As of April 2004, 47% of the agent stockpile and 83% of the munitions stockpile at the Tooele facility had been destroyed.

Agent

- Nerve agents tabun, sarin and VX stored in cartridges, projectiles, rockets, bombs, landmines, ton containers and spray tanks
- Blister agent sulfur mustard and lewisite stored in cartridges, projectiles and ton containers

Site Location and Specifics

- 12 miles south of Tooele (pop. 30,000)
- 40 miles southwest of Salt Lake City
- In Tooele County (pop. 48,000)

Employment Statistics

- Deseret Chemical Depot employed 335 local people
- Chemical Agent Munitions Disposal System employed 170 people (2002)
- EG&G Defense Materials, Inc. employs 518 local people, and Battelle Memorial Institute employs 88 people

Agent Destruction Technique

- Incineration
- Lewisite is destroyed by neutralization and stabilization

Contractor/Subcontractors

- EG&G Defense Materials, Inc. is the main contractor and operator
- Subcontractors include:
 - Battelle Memorial Institute
 - Washington Demilitarization Company

Groups/Organizations Involved with the Site

Local

Families Against Incinerator Risk
Redevelopment Agency of Tooele City
Tooele County
West Deseret Healthy Environment Alliance of Utah

State

Salt Lake City Sierra Club
Utah Department of Environmental Quality
Utah Solid and Hazardous Waste Control Board

Milestones/Important Developments

- August 1996: Operations began on schedule
- March 2002: All sarin munitions destroyed
- March 2003: Destruction of VX began
- November 2003: Destroyed last chemical agent-filled M55 rocket (last VX rocket)

Projected Schedule

- 2004: VX agent destruction operations complete
- 2007: Operations complete, three years behind original schedule

Political Representation

- US Representative Rob Bishop (R - 1st District)
- US Senators Robert Bennett (R) and Orrin Hatch (R)
- Governor Olene S. Walker
- Utah Senator Ron Allen for (12th District)
- Utah House Representative James R. Gowans (21st District)

Contact Information

Tooele Chemical Stockpile Outreach Office
1-800-471-1617

Tooele Chemical Stockpile Public Affairs Office
tel. 435-833-2211 ext. 2693

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY (UMCDF)

Umatilla, Oregon

When the US chemical demilitarization effort began, Umatilla housed 12 percent of the nation's original stockpile—3,717 tons of chemical agent. As of April 2004, 100% of the construction of chemical weapons disposal facilities at the Umatilla site had been completed.

Agent

- Sulfur mustard in ton containers
- Sarin and VX in projectiles, rockets, bombs, landmines and spray tanks

Site Location and Specifics

- 10 miles west of Hermiston (pop. 15,100 in city limits, 30,000 surrounding area)
- In Umatilla County (pop. 70,548)

Employment Statistics

- Umatilla Chemical Depot employs 135 local people
- Washington Demilitarization Company employs 500 local people
- Employment peaked at 750 local workers during construction
- Approximately 600 people will be employed during operations and maintenance

Agent Destruction Technique

Incineration

Contractor/Subcontractors

- \$567 million contract awarded to Raytheon Company in 1997, now part of the Washington Demilitarization Company, for construction, operations, maintenance and closure
- Current contract value is approximately \$1 billion

Groups/Organizations Involved with the Site

Local

Benton County
Confederated Tribes of the Umatilla Reservation
GASP
Morrow County CSEPP

State

Oregon Chemical Demilitarization Citizens' Advisory Commission
Oregon Clearinghouse for Pollution Reduction
Oregon Department of Environmental Quality
Oregon Sierra Club
Oregon Wildlife Federation
Washington State Emergency Management

Milestones/Important Developments

- 1997: Construction began
- 2001: Construction completed

Projected Schedule

- Early 2004: Operations to begin two years behind original schedule
- Late 2004: Operations complete
- 2005: Original close date
- 2012: estimated end work date given by the Washington Demilitarization Company

Political Representation

- US Representative Greg Walden (R - 2nd District)
- US Senators Ron Wyden (D) and Gordon Smith (R)
- Governor Ted Kulongoski
- Oregon State Senator David Nelson
- Oregon House Representative Bob Jenson

Contact Information

Umatilla Chemical Disposal Outreach Office
tel. 541-564-9339 fax. 541-564-9532
Umatilla Chemical Depot
tel. 541-564-5312 fax. 541-564-5395

CLOSED

JOHNSTON ATOLL (JACADS)

CLOSED

Johnston Atoll, Hawaii

Johnston Atoll once stored 6 percent of the nation's original stockpile – 2,031 tons of chemical agent. As of March 2004, 100% of the agent and 100% of the munitions stockpile at the Johnston Island facility had been destroyed.

Agent

- Nerve agents sarin and VX stored in cartridges, mortars, projectiles, and ton containers
- Blister agent sulfur mustard stored in bombs, mines, projectiles, rockets, and ton containers

Site Location and Specifics

825 miles southwest of Hawaii in the Pacific Ocean

Employment Statistics

- Johnston Atoll currently employs 800 Department of Defense civilians, US Air Force, and civilian contractor personnel involved in remediation
- In 2000, around 1,300 US military and civilian contractor personnel lived on the island, most of them assigned to the chemical disposal plant
- EG&G Defense Materials, Inc. employed around 80 workers

Agent Destruction Technique

Incineration

Contractor/Subcontractors

- \$250 million contract awarded to Raytheon in 1996, now part of Washington Demilitarization Company.
- Current contract value is approximately \$1.4 billion
Subcontractor EG&G Defense Materials, Inc received a five-year, \$40 million sub-contract as part of the Raytheon Technical Service Company's team

Milestones/Important Developments

- 1985: Construction began
- 1994: Destruction of agent began
- 2000: Destruction of agent 100 percent complete on schedule

Projected Schedule

- Late 2003-early 2004: Close site

Political Representation

- US Representative Ed Case (D - 2nd District)
- US Senators Daniel Akaka (D) and Daniel Inouye (D)

Contact Information

Program Manager for the Elimination of Chemical Weapons

tel. 800-488-0648 fax. 410-436-5122

CHEMICAL AGENTS

The United States (US) began storing chemical weapons in WWI. The US government committed to destroying its chemical weapon stockpile in 1970, and the US Army began to study methods of destruction. Destruction was deemed necessary due to the health and environmental risks posed by long-term storage of chemical agents.

In 1985, the Chemical Stockpile Disposal Program was charged with destroying the stockpile, and an organization to manage chemical weapon disposal was created under the Department of the Army. Since then, the US has ratified the Chemical Weapons Convention in 1997, completed destruction operations at the Johnston Atoll site in 2001, and destroyed 27 percent of its agent and 40 percent of its munitions as of March 2004.

The US chemical weapons stockpile is composed of five chemical agents:

sarin (GB)

tabun (GA)

VX

lewisite

sulfur mustard (H, “mustard gas,” mustard agent)

NERVE AGENTS

Nerve agents impair the body by disrupting the normal transmission of nerve impulses. When this happens, the “off switch” for muscles and other tissues may be disabled. The resulting continuous stimulation can eventually cause critical body functions to fail.

Sarin, tabun, and VX are the nerve agents in the US chemical weapons stockpile.

People can be exposed to nerve agents through inhalation, skin or eye contact, drinking poisoned water, or eating contaminated food.

When exposed to nerve agent vapor, individuals can experience symptoms within seconds. When exposed to liquid nerve agent, individuals can become symptomatic within minutes or after as long as 18 hours.

Symptoms of nerve agent exposure include:

confusion	watery eyes	drooling	nausea
drowsiness	small pupils	excessive sweating	vomiting
weakness	pain in the eyes	coughing	abdominal pain
headache	blurry vision	chest tightness	diarrhea
runny nose	rapid breathing	increased urination	abnormal heart rate
abnormal	blood pressure		

When exposed to a large amount of nerve agent, persons may experience convulsions, paralysis, loss of consciousness, and respiratory failure, possibly leading to death, although these symptoms do not always result from exposure to nerve agents.

SARIN

Known by the short form GB, sarin was developed as a pesticide in Germany in 1938.

Has sarin been used offensively?

- The Japanese cult Aum Shinrikyo used sarin twice in terrorist attacks against Japanese citizens. The first attack in Nagano Prefecture in June 1994 killed seven and injured over one hundred. Aum followers then attacked the Tokyo subway in March 1995, killing twelve and injuring over one thousand.
- Saddam Hussein ordered sarin used in 1988 against the Kurdish town of Halabja in Iraq. Iran also alleged that Iraq used sarin in the Iran-Iraq War (1980-88).

Are the precursors for sarin used commercially?

Sarin precursors are used commercially in fire retardants, insecticides, disinfectants, paint solvents, ceramics, and optical brighteners.

Can sarin be detected?

- Sarin is clear, colorless, and tasteless with no odor.
- The liquid form of sarin can evaporate into a vapor.

Can people recover from sarin exposure?

- Yes, if the exposure is mild. Those people who experience extensive exposure are unlikely to survive.
- Sarin breaks down slowly in the body, so people with repeated exposures may suffer more harmful effects.
- Antidotes atropine and pralidoxime chloride (2-PAMCl) are available and most effective when used immediately after exposure.

TABUN

Known by the short form GA, tabun was originally developed as a pesticide in Germany in 1936.

Has tabun been used offensively?

Tabun was used by Iraqi forces in the war with Iran in March 1984, March 1985 and April 1987.

Are the precursors for tabun used commercially?

Tabun precursors are used commercially in insecticides, gasoline additives, detergents, missile fuel, plastics, dyes, and pigments.

Can tabun be detected?

- Tabun is clear, colorless, and tasteless, but has a faint fruity odor.
- Liquid tabun can become a vapor.

Can people recover from tabun exposure?

- Yes, if the exposure is mild. Those people who experience extensive exposure are unlikely to survive.
- Antidotes atropine and pralidoxime chloride (2-PAMCl) are available and most effective when used immediately after exposure.

VX

VX is a man-made nerve agent, developed in the United Kingdom in the 1950s as a potential pesticide and produced in large-scale chemical weapons programs by the US and the former Soviet Union in the 1960s.

Has VX been used offensively?

VX may have been used by Saddam Hussein's forces during the Iran-Iraq War (1980-88) and against the Kurdish town of Halabja in Iraq in 1988.

Are the precursors for VX used commercially?

VX precursors are used commercially in insecticides, pyrotechnics, textile softeners, and pharmaceuticals.

Can VX be detected?

- VX is tasteless and odorless.
- As a liquid, VX has the consistency of motor oil with an amber color.

Can people recover from VX exposure?

- Yes, if exposure is mild. People who experience extensive exposure are unlikely to survive.
- Repeated exposure to VX may have a cumulative effect because the VX breaks down slowly in the body.
- Antidotes atropine and pralidoxime chloride (2-PAMCl) are available and most effective when used immediately after exposure.

BLISTER AGENTS

Lewisite and sulfur mustard are blister agents.

Blister agents are vesicants, or severe irritants to the skin, eyes, mucous membranes of the nose and mouth, and lining of the digestive and respiratory tracts.

People can be exposed to blister agents through inhalation, skin or eye contact, drinking contaminated water, or eating contaminated food.

In addition to blistering of the skin and mucous membranes, other symptoms of blister agent exposure include:

runny nose	shortness of breath	eye burning/redness	nausea
cough	nasal/sinus irritation	excessive tears	vomiting
sore throat	skin rash or itching	blurred or lost vision	diarrhea
hoarseness	pain, swelling	low blood pressure	tremors
respiratory bleeding	loss of consciousness	loss of balance	convulsions

LEWISITE

Known as the short form L, lewisite is a man-made blister agent, originally produced in 1918.

Has lewisite been used offensively?

Lewisite may have been used by the Japanese Imperial Army in China between 1937 and 1945.

Are the precursors for lewisite used commercially?

Lewisite precursors are used commercially in ceramics, insecticides, and pharmaceuticals.

Can lewisite be detected?

- Lewisite has the odor of geraniums.
- It is colorless in its pure form, but can appear light amber to black in its impure form.

What does lewisite do?

- Lewisite is a blistering agent that causes the skin and mucous membranes to blister on contact, potentially damaging the eyes, skin and respiratory tract.
- Lewisite contains arsenic and may have similar effects to arsenic poisoning, such as low blood pressure and stomach upset.

Can people recover from lewisite exposure?

- Yes. An antidote, British-anti-lewisite (BAL or dimercaprol), is available and can be injected to mitigate systemic effects.
- BAL has no effect on lesions of the eyes, skin or airways caused by lewisite exposure. Supportive care is the only treatment for these symptoms.

SULFUR MUSTARD

First used in World War I, sulfur mustard is known by the short form designations H, HD, and HT (signifying variations in composition) and also as “mustard gas.”

Has sulfur mustard been used offensively?

- Sulfur mustard was used during WWI by German forces against Allied troops.
- Sulfur mustard was used in 1935-1940 by the Italians in Ethiopia.
- The Japanese Imperial Army used sulfur mustard in China between 1937-1945.
- Sulfur mustard may have been used by Egyptian forces in Yemen in the 1960s.
- Iraqi forces used sulfur mustard in the war with Iran between 1983 and 1988, and possibly against Kurdish villages in Iraq in 1997-98.

Are the precursors of sulfur mustard used commercially?

- Sulfur mustard was once used to treat the skin condition psoriasis, but it is no longer used for that purpose.
- The precursors of sulfur mustard are commercially used and produced during the manufacture of some paper and rubber, pharmaceuticals, insecticides, plastics, detergents, cosmetics, and lubricants.

What are the characteristics of sulfur mustard?

- In both its liquid and solid form, sulfur mustard can be clear, or a shade from yellow to brown.
- Sulfur mustard may smell like mustard, garlic or onions, or be odorless.
- Sulfur mustard can be a vapor, a solid, or an oily-textured liquid.

What does sulfur mustard do?

- Sulfur mustard blisters the skin and mucous membranes, potentially damaging the eyes, skin, respiratory tract, and can also damage DNA.

What are symptoms of sulfur mustard exposure?

- Symptoms do not occur immediately and may not occur for 2 to 24 hours.
- Repeated exposure may have a cumulative effect since sulfur mustard breaks down slowly in the body.
- Sulfur mustard exposure may cause redness and itching of the skin leading to yellow blistering, as well as damage to the eyes or respiratory tract.

Can people recover from sulfur mustard exposure?

- Exposure is usually not fatal, although extensive skin burning can be fatal.
- Treatment consists of providing supportive medical care to minimize the effects of exposure.
- No antidote is known, though sodium thiosulfate may help prevent lethality.

MORE INFORMATION

More information on chemical agents can be accessed through the following organizations:

Center for Disease Control and Prevention

www.cdc.gov

Public Inquiry c/o BPRP
Bioterrorism Preparedness and Response Planning
Centers for Disease Control and Prevention
Mailstop C-18
1600 Clifton Road
Atlanta, Georgia 30333

Public Inquiries:

English (888) 246-2675

Español (888) 246-2857

T*TY (888) 874-2646

Agency for Toxic Substances and Disease Registry (ATSDR)

www.atsdr.cdc.gov

tel. 1-888-422-8737

fax. 404-498-0093

ATSDR

Division of Toxicology
1600 Clifton Road NE,
Mailstop E29
Atlanta, Georgia 30333

tel. 404-498-0160

fax. 404-498-0094

AGENT STORAGE

Chemical agents in the United States are stored either in bulk or as weapons. The difference is important because the way chemical agents are stored determines how they must be destroyed.

Bulk storage is found at:

Aberdeen Chemical Agent Disposal Facility in Aberdeen/Edgewood, Maryland
Newport Chemical Agent Disposal Facility in Newport, Indiana

Weaponized storage is found at:

Anniston Chemical Agent Disposal Facility in Anniston, Alabama
Blue Grass Chemical Activity in Richmond, Kentucky
Pine Bluff Chemical Agent Disposal Facility in Pine Bluff, Arkansas
Pueblo Chemical Depot in Pueblo, Colorado
Tooele Chemical Agent Disposal Facility in Tooele, Utah
Umatilla Chemical Agent Disposal Facility in Hermiston, Oregon
and previously at the Johnston Atoll Chemical Agent Disposal System, Johnston Atoll

M55 ROCKETS

The weapon in the US chemical stockpile causing notable safety concerns is the M55 rocket. The M55 is currently stored at four locations: Anniston, Blue Grass, Pine Bluff, and Umatilla. The last M55 rocket at Johnston Atoll was destroyed in March 1997 and the last M55 rocket at Tooele was destroyed in November 2003. Depletion of the stabilizer of the rockets' propellant could cause the rocket to self-ignite.

The manufacturer of the propellant has estimated that there is less than a one-in-a-million chance that a non-leaking M55 rocket will self-ignite before 2013. However, rockets with internal leaks may have shorter storage lives if the propellant comes in direct contact with a chemical agent. The Army's 1995 report, *M55 Rocket Storage Life Evaluation*, asserted that these rockets are safe to store until their scheduled destruction in 2004. Delays in the US destruction program will almost surely prevent the destruction of all the remaining M55 rockets by the conclusion of 2004. Further research concerning the M55 is currently being conducted by the US Army's Enhanced Stockpile Surveillance Program.

BULK STORAGE

STEEL CONTAINERS

- Ton containers
- Developed in WWI
- Most reconditioned in the mid to late-1980s. Reconditioning entailed grinding each container to bare metal, primer painting, applying a heat-reflective silver coating, and obtaining a gross weight.
- Contain sulfur mustard, sarin, VX, or tabun

WEAPONIZED STORAGE

ROCKETS

- **M55 115 mm**
 - Produced in the late 1950s for battlefield use
 - Contains 10.7 lbs of sarin or 10 lbs of VX nerve gas
 - Recognized by three green bands on body
 - Storage life without auto-ignition is estimated to be from 27 to 100 years of the date of manufacture
 - 478,000 rockets in the US stockpile
 - Stored at Anniston, Blue Grass, Johnston Atoll, Pine Bluff Umatilla, and Tooele
 - All M55 rockets at Johnston Atoll destroyed as of March 1997
 - All M55 rockets at Tooele destroyed as of November 2003
- **M56 Rocket Warhead**
 - Contains sarin or VX nerve agent

BOMBS

- **MC-1 bomb:**
 - 750 lbs
 - Contains 220 lbs of sarin nerve agent
- **MK-94-O bomb:**
 - 500 lbs
 - Contains 108 lbs of sarin nerve agent

- **MK116 bomb:**
 - Weteye bomb contains 347 lbs of sarin nerve agent

PROJECTILES

- **105mm Howitzer projectiles:**
 - M60 gas contains 3 lbs of sulfur mustard blister agent.
 - M360 gas contains 1.6 lbs of sarin nerve agent.
- **155mm Howitzer Bursting projectiles:**
 - M104 contains 11.7 lbs of sulfur mustard blister gas.
 - M110 contains 11.7 lbs of sulfur mustard blister gas.
 - M121 contains 6.5 lbs of sarin nerve gas.
 - M121A1 contains 6.5 lbs of sarin or 6 lbs of VX nerve gas. The weapon also has a supplementary charge of 0.3 lbs TNT.
 - M122 contains 6.5 lbs of sarin nerve gas.
- **203 mm or 8-inch projectiles:**
 - M426 contains 14.5 lbs of sarin or VX nerve gas.
- **Mortar projectiles**
 - M2 107 mm 4.2-inch contains 6 lbs of sulfur mustard blister gas.
 - M2A1 107 mm 4.2-inch differs from the M2 because it has an aluminum pressure plate instead of a steel one.

CARTRIDGES

- 105 mm cartridges contain sulfur mustard blister and sarin nerve agent.
- 4.2 inch cartridges contain sulfur mustard blister agent.

LANDMINES

There is one main type of land mine stored at US chemical demilitarization sites – the M23 13-inch contains 10.5 lbs of VX nerve agent.

SPRAY TANKS

Aircraft spray tanks produce a cloud of agent, though the vapor can also be invisible. Both the TMU-28 and TMU-28/B tanks contain 1,356 lbs of VX nerve agent.

INCINERATION

The Army chose incineration as the main destruction technology in 1988. First used at Johnston Atoll, incineration is now used at Anniston and Tooele. Incineration is also the technology planned for use at Umatilla and Pine Bluff.

Some opposition to incineration among citizens in some of the localities where storage sites were located led Congress to mandate Army research into possible alternative technologies other than incineration. As a result, neutralization has been adopted at sites where bulk agent is stored. However, the Army has repeatedly determined that incineration is the most effective available option for destroying chemical agent already weaponized in munitions.

THE CHEMICAL AGENT INCINERATION PROCESS

- Chemical Weapons are removed from igloos – steel-reinforced cement structures – and transported to disposal plants in sealed, fire- and impact-resistant containers.
- Before opening the containers at the disposal facility, workers check for leaking munitions. Employees then load the weapons onto conveyors, which carry the weapons through the disposal process.
- Workers then oversee the disposal process from an enclosed control room using robotics, video monitoring equipment, and computers.
- Automatic, robotic equipment drains the chemical agent from the weapons and dismantles the weapons in explosive-proof rooms.
- Once dismantled and drained, the different weapon parts travel to various furnaces in the plant, each designed for a specific purpose.
 - The liquid incinerator destroys the chemical agent.
 - The deactivation furnace destroys explosive material.
 - The metal parts furnace heats casings and other heavy metal parts to destroy any remaining agent contamination.
- During the entire process, all gaseous effluents go through an advanced filtration system and levels are monitored for safety.

NEUTRALIZATION

Chemical neutralization is the only alternative technology employed in the Chemical Demilitarization Program. Used at both Aberdeen and Newport, chemical neutralization is efficient at destroying chemical agents stored in bulk containers.

Neutralization employs different chemicals depending on the agent to be destroyed. By contrast, incineration constantly uses the same process for all agents. Currently, the ACWA plans to use neutralization at Blue Grass and Pueblo.

THE CHEMICAL AGENT NEUTRALIZATION PROCESS

- Ton containers are transported to the neutralization facility.
- Using protective equipment, workers open plugs in the containers and drain the liquid agent (sulfur mustard or VX).
- The steel containers are put aside for later destruction.
- Neutralization begins, which varies depending on the agent.
 - VX Agent Neutralization:
 - VX is added to a large mixing tank that contains hot lye.
 - These react and create a liquid effluent called hydrolysate.
 - The hydrolysate is tested to confirm no agent remains.
 - Sulfur Mustard Neutralization:
 - Sulfur mustard is added to a tank with hot water.
 - This mixture creates a liquid effluent called hydrolysate.
 - The hydrolysate is tested to confirm no agent remains.
- The hydrolysate is then transported off-site to a commercial treatment and disposal facility, where the chemical byproducts are made safe using biological degradation.**
- The empty steel containers are then cut into small pieces. Agent residue is removed with hot, high-pressure water. The pieces are then tested to ensure that no agent remains, and shipped to an Army steel recycling location.

**Transport of the hydrolysate is regulated by the Resource Conservation and Recovery Act [Hazardous Waste Rules]. Though hazardous, hydrolysate is actually less hazardous than many commercial chemicals transported by road.

TIME AND COST OVERRUNS

The US Chemical Demilitarization program has been plagued by cost overruns and missed deadlines. Delays have been caused by litigation against facilities implementing incineration, as well as technical problems. The table below lists program time and cost estimates for completion publicly cited between 1989 and 2004. A graph also depicts these figures (following page).

YEAR	ESTIMATED COST <i>IN BILLIONS</i>	ESTIMATED DEADLINE	SOURCE
1985	1.7	1994	U.S. Army (subsequent to Public Law 99-145)
1989	3.0	1997	Ambassador Friedersdorf US Representative at UN Conference for Disarmament
1990	3.4	1997	U.S. Army
1992	7.9	2000	General Accounting Office (GAO) Report to the Chairman, House Subcommittee on Environment, Energy, and Natural Resources
1993	8.6	2003	Steven R. Bowman National Defense Analyst Testimony, Senate Foreign Relations Committee
1994	10.0	-	David R. Warren , GAO Testimony, House Committee on National Security
1995	11.9	2004	U.S. Army
1996	12.0	2004	DoD Briefing
1997	12.4	2004	Henry Hinton, Jr., GAO Testimony, House Committee on National Security
1998	12.7	2007	Spokesperson for PMCD
2000	15.3	2007	Representative Duncan Hunter Testimony, Senate Armed Services Committee
2001	24.0	2011	Under Secretary of Defense (Acquisitions, Technology, and Logistics)
2002	24.0	2016	Government Estimates, <i>Kansas City Star</i>
2003	25.1	2007 CWC deadline for 45% agent destruction will not be met	GAO Report to House and Senate Armed Services Committees
2004	> 25.1	Further delays expected	Raymond J Decker, GAO Testimony, House Subcommittee on Terrorism, Committee on Armed Services

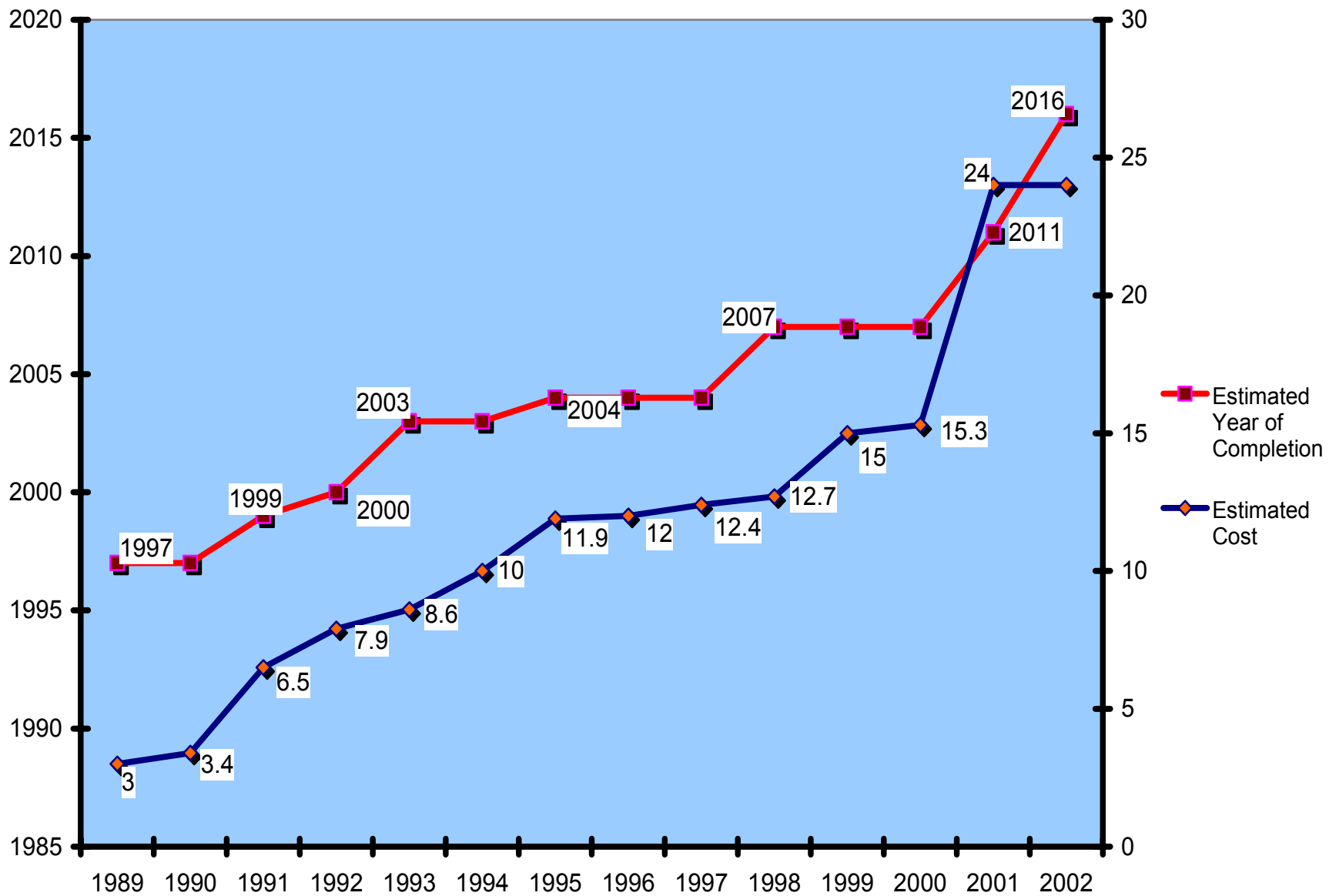


Figure: Trends in Time and Cost Estimates for US Chemical Weapons Destruction Efforts (1989-2002)

KEY ORGANIZATIONS IN US CHEMICAL DEMILITARIZATION

The Chemical Demilitarization Program has experienced numerous shifts in oversight and responsibility, including changes in both general oversight by the Department of Defense and Army, and the oversight of specific facilities. The roles played by different groups within the system are complex and changing. This list contains key groups that continue to play an active role in chemical demilitarization, and reflects their positions after the restructuring over oversight in 2003. For more information on each site, please see the section on chemical destruction sites.

ACWA Assembled Chemical Weapons Assessment Program

In 1996, in response to rising public concerns over the safety of incineration, Congress created the ACWA to explore and test two or more alternatives to incineration. The ACWA has immediate oversight at Pueblo and Blue Grass.

ASA (ALT) Assistant Secretary of the Army (Acquisitions, Logistics, and Technology)

The ASA-ALT has immediate oversight (together with the Commanding General of US Army Material Command) of the Chemical Materials Agency. Prior to the 2003 restructuring, the ASA-ALT immediately supervised the Program Manager for Chemical Destruction (PMCD), now the Program Manager for the Elimination of Chemical Weapons (PM ECW). The ASA-ALT's non-chemical demilitarization duties focus on scientific research and logistics management for the Army.

ASA-I&E Assistant Secretary of the Army (Installation and Environment)

The ASA-I&E regulates buildings, facilities and environmental repercussions of Army properties and activities.

ATAP Alternative Technologies and Approaches Project

ATAP was created solely to investigate alternative destruction technologies for Newport and Aberdeen, where the agent is stored in bulk containers. Neutralization became the central technique pursued by ATAP, which conducted the early pilot runs of neutralization.

CMA Chemical Materials Agency

The CMA was created in 2003 to combine the responsibility for storage and destruction of chemical weapons into one agency. Previously the Program Manager for Chemical Demilitarization and the Soldier Biological and Chemical Command separately oversaw these respective aspects of chemical demilitarization. The

creation of the CMA was part of a major restructuring in 2003, attempting to streamline oversight of chemical demilitarization.

AMC

Commanding General of US Army Military Command

The US AMC is in charge of Army material readiness. Previous to the reorganization in 2003, the AMC was in charge of the Army Soldier Biological and Chemical Command (SBCCOM). SBCCOM focused on technological protection from, and detection of, chemical agents.

CSEPP

Chemical Stockpile Emergency Preparedness Program

CSEPP is a joint Army–FEMA (Federal Emergency Management Agency) operation to strengthen the preparedness in communities surrounding destruction facilities. The efforts to improve preparedness in the surrounding areas focus solely on the possibility of chemical releases. Responsibility is divided between FEMA and the Army by location. The Army is in charge of on-site preparedness while FEMA (now part of the Department of Homeland Security) provides for the surrounding civilian population.

DO-CMA

Director of Operations, Chemical Materials Agency

The DO-CMA oversees sites that are past systemization and in operation or closure.

OPCW

Organization for the Prohibition of Chemical Weapons

The OPCW implements the provisions of the Chemical Weapons Convention (CWC). The CWC requires all countries to destroy their chemical weapons by 2007, with possible allowances for extensions. The OPCW verifies chemical weapons destruction conducted by the US chemical demilitarization program, as well as the destruction efforts being made by the five other chemical weapons possessor states that are current members of the Convention (Russia, India, Albania, Libya and allegedly South Korea).

PM ECW

Program Manager for the Elimination of Chemical Weapons

The PM ECW (formally the PMCD) had the most substantial role in chemical demilitarization until the creation of the CMA. The PM ECW has held some responsibility at all sites except those run by the ACWA. Two of the PM ECW's main programs include ATAP and the Chemical Stockpile Disposal Program. The PM ECW also oversees the disposal of the non-stockpile materials project.

TIMELINE OF US CHEMICAL WEAPON LEGISLATION AND OVERSIGHT

The Army began investigating methods of chemical weapon destruction in the 1970s. In 1997, the US ratified the Chemical Weapons Convention (CWC), and by 2001, the US had completed destruction operations at Johnston Atoll. As of February 2004, 26 percent of the chemical agent and 39 percent of the chemical munitions stored in the United States had been destroyed. The United States has acknowledged, however, that it will not make the CWC's 2004 deadline for destruction of 45 percent of its stockpile and received a three-year extension of this deadline from the member states of the treaty in October 2003. The treaty deadline for destruction of 100 percent of the stockpile is 2007. An extension of up to five years of this deadline can be requested under the CWC.

The Army is the executive agent for the program's implementation, and created the Chemical Material Agency to manage the storage and destruction of the stockpile. Oversight for construction and systemization is directed by the Program Manager for the Elimination of Chemical Weapons. Oversight of the individual destruction sites is divided between CMA's Director of Operations and ACWA.

1985 The National Defense Authorization Act for Fiscal Year 1986 (Public Law 99-145) mandates that an organization to manage the disposal of the US chemical stockpile should be created within the Department of the Army. The Army is the executive agent for the program's implementation.

1986 Congress requires the Department of Defense to destroy the US chemical weapons stockpile.

The Army charged with running the demilitarization program.

The Secretary of the Army puts the Assistant Secretary of the Army for Installations and Environment in charge of this effort.

Parsons Infrastructure and Technology Group, Inc. is awarded a \$52 million, four-year system design and integration services contract for the chemical weapons destruction program. (This contract is currently worth \$323 million and has been extended through 2005.)

1988 CSEPP created by Congress.

The Army selects incineration as its baseline chemical agent destruction technology.

1992 The National Defense Authorization Act for Fiscal Year 1993 (Public Law 102-484) mandates that the US stockpile of lethal chemical agents and munitions should be destroyed by 31 December 2004; and the Secretary of the Army should report to Congress on possible alternatives to baseline incineration for the demilitarization of the stockpile.

1994 The Army submits to Congress its Alternative Demilitarization Technology Report, which provides no alternative technology for the destruction of energetics. Neutralization is presented as a possible alternative to incineration for the destruction of some of the US stockpile of agent.

DoD designates the Chemical Demilitarization Program as a Major Defense Acquisition Program.

1996 Congress mandates that the Secretary of Defense conduct a pilot program to develop alternatives to incineration for chemical munitions demilitarization.

1997 Congress creates the ACWA program.

The United States ratifies the Chemical Weapons Convention.

1998 The Defense Department delegates oversight of the chemical weapons destruction program to the Army as part of efforts to reduce staffing and DoD responsibilities.

2001 The Under Secretary of Defense (Acquisition, Technology and Logistics) is given ‘milestone decision authority’ to streamline decision-making and oversight.

The Army transfers primary program oversight from the Office of the Assistant Secretary of the Army (Acquisitions, Logistics, and Technology) to the Office of the Assistant Secretary of the Army (Installations and Environment).

2003 The Army reassigns oversight to the Assistant Secretary of the Army (Acquisitions, Logistics, and Technology) on all matters of policy and the direction of the CSEPP.

The Secretary of the Army directs the Assistant Secretary of the Army (Acquisitions, Logistics, and Technology) and the Commanding General of the US Army Material

Command to create jointly the Chemical Materials Agency to handle both storage and destruction of the US chemical stockpile.

The Program Manager for the Chemical Demilitarization is re-designated as the Program Manager for the Elimination of Chemical Weapons (PM ECW). The PM EWC reports to the Director of the CMA and is responsible at sites during construction and through systemization.

The CMA Director of Operations will manage Newport Chemical Agent Disposal Facility Demilitarization Facility, Pine Bluff Chemical Agent Disposal Facility, and Umatilla Chemical Agent Disposal Facility from operations to closure.

ACWA maintains its original oversight of Aberdeen Chemical Disposal Facility, Anniston Chemical Activity Destruction Facility, Johnston Atoll, and Tooele Chemical Agent Disposal Facility.

TIMELINE OF US CHEMICAL WEAPON LEAKS AT DESTRUCTION SITES

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
Aberdeen (ABCDF)				
5/12/03	Alarm detects mustard agent vapor inside the east end of the process neutralization building.	Yes (9 workers)	Yes (several hours)	No
5/30/03	Alarm detects presence of mustard agent vapor during electrical power outage; second power loss occurs several hours later but no alarms sound. Operations cease for several hours until stability of electrical power is restored.	Yes (entire facility)	Yes (several hours)	None reported
6/25/03	Mustard agent vapor leak found from 55-gallon hazardous waste drum in the drain site of the neutralization building; all workers are evacuated, 3 workers are sent to medical facility and cleared.	Yes (workers in neutralization building)	No	No
8/16/03	Fire safety system automatically shuts down facility's ventilation system after smoke is detected from a carbon filter drum venting a rinse water tank; low levels of agent vapor detected in neutralization bay and adjacent rooms.	Yes (workers in neutralization building)	Yes (Restarted on 11/05/03 with modified drain station)	No
11/14/03	Alarm detects mustard agent vapor in the glove box sump piping of ton container drain station; further examination of all glove boxes identifies corrosion in the piping and sump.	Yes (3 workers)	Yes (Restarted on 1/16/04 after examination and repair of all glove boxes)	No
1/25/04	Rinse water spill occurs during a regularly scheduled flushing of the rinse water vent condenser in the neutralization bay.	No	No	No
Anniston (ANCDF)				
10/23/03	Fire alarm sounds; a small fire involving a compressor motor is quickly extinguished (no chemical agents involved).	Yes	Yes (several hours)	No
11/7/03	Chemical agent monitor detects possible presence of GB nerve agent in an unoccupied room inside the chemical laboratory where GB should not have been present; agent alarm subsequently clears.	Yes (workers in chemical laboratory)	No	No
11/13/03	Fire alarm sounds after a piece of rocket debris ignites in the Explosive Containment Room (ECR) where GB M55 rockets are processed.	Yes (workers in ECR)	Yes, several hours	No
2/4/04	Chemical agent monitor sounds in an unoccupied observation corridor of the Munitions Demilitarization Building (MDB).	Yes (MDB personnel on observation corridor)	Yes (1 day)	No
3/2/04	GB leak detected inside igloo where 105 mm projectiles are stored during routine monitoring operations.	Yes (workers in igloo)	No	None reported
3/3/04	Confirmed reading of VX nerve agent on the perimeter of Pelham Range (about four miles northeast of chemical storage area); source of readings being investigated since ANDCF disposal facilities involve rockets only containing GB.	No	No	No

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
Newport (NECDF)				
7/25/02	VX agent detected inside a barrel of laboratory waste materials during routine air monitoring operations.	No	No	No
12/10/03	Emergency radios and sirens warn of chemical spill in two eastern Indiana counties; determined to be false alarm.	No	No	No
1/8/04	During dismantling operations, alarm indicates VX agent present in the former VX production facility; unclear whether VX presence resulted from new leak or residual contamination.	No	No	No
3/3/04	A chemical agent monitor sounds in a munitions dismantling area; air samples test negative for VX.	No	No	No
Pine Bluff (PBCDF)				
10/11/01	Near collision of truck into main power line to site causes power outage on north end of the arsenal.	No	No	No
1/1/02	VX leak detected in storage igloo.	No	No	No
1/23/02	Bomb threat received via telephone voice mail; construction halted and facility is closed for a day for investigation.	Yes (600 construction workers)	No	No
2/12/02	Hand-written message found on piece of protective personnel equipment indicates possible presence of biological agent; construction halted and facility is closed for a day.	Yes (800 construction workers)	No	No
Tooele (TOCDF)				
1/26/97	Alarm sounds indicating agent migration into the observation corridors of Munitions Disposal Building (MDB).	Yes	Yes	Possible
4/23/97	TOCDF shutdown for "Notice of Insufficient Quality" occurs due to failure to follow operating procedures. Shutdown initially presented as "routine maintenance."	No	Yes (Restarted on 06/15/97)	No
5/28/97	Citizens escorted through TOCDF into an area with a GB contaminated bomb present; citizen protection regulations violated but no confirmed physical effects.	No	No	No
3/30/98	Incomplete drain of an MC-1 bomb allows excess of GB agent to metal parts furnace. The resulting temperature variations cause a system shutdown.	Yes (entire facility)	Yes	Possible
10/01/98 - 12/04/98	24 GB vapor leaks involving 105mm projectiles detected; 16 leaks occurred after projectiles were transferred from storage igloos to the incinerator building, 8 occurred during the workers' removing of heavy bolts from the projectiles.	No	No	No
12/13/98	Liquid incinerator shut down after 140 gallons of GB are spilled while being fed into incinerator.	Yes	Yes	No
4/13/99	TOCDF back-up power system fails after depot-wide outage. Failures compromises the purification and air filter systems.	Yes	Yes	Possible

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
	Tooele (TOCDF)			
4/16/99	Confirmed agent reading in the DFS Cyclone Enclosure adjacent to outside environment.	No	No	Possible
5/5/99	Agent vapor leak forces workers out of certain areas.	Yes	No	No
5/21/99	Agent vapor migrates to an unpack area where vapor is not supposed to be present; chemical agent monitor reading exceeds 75 times the alarm point.	Yes (7 workers)	No	No
5/24/99	Workers removing nose closures from 105mm projectiles encounter liquid agent; alarms show agent presence to exceed 50 times the maximum allowable level for protective clothing specifications.	Unknown	No	No
5/26/99	Workers in Toxic Maintenance Area removing plastic bags of waste when alarm indicates agent presence of 50 times the maximum allowable level; workers test positive for agent even after multiple cleansing procedures.	Yes	No	No
6/4/99	County-wide power outage causes shut down of air flow system; emergency power does not come on for 25 minutes, allowing agent migration to areas where agent is not supposed to be present.	Yes	Yes (Chemical Demilitarization Program orders TODCF into "Stand Down" mode until 06/14/99)	Possible
6/14/99	Within six hours of restarting after being in "Stand Down" mode, allowable feed rate for rocket processing is violated and TOCDF re-shuts down.	Yes	Yes	No
2/20/00	Two workers are exposed to GB agent when it leaks into room where they are working.	Yes (2 workers)	No	No
5/8/00	Confirmed release of GB agent into the environment after workers complete maintenance on deactivation furnace system (DFS); inconsistent alarm readings cause confusion.	Yes	Yes	Yes
5/9/00	Second confirmed release of GB into the environment 1.5 hours after first confirmed release when workers attempt to relight DFS; local emergency officials not notified until four hours after first confirmed GB release.	Yes (entire facility)	Yes (Two liquid incinerators restarted on 7/28/00)	Yes
9/2/01	GB leak detected in mechanical equipment room; depot officials state agent reading is well below the safe level for workers	No	No	No
8/27/01 - 9/30/01	GB leaks detected in 68 on-site containers (ONC). All leaks involved 155mm projectiles and were discovered during routine air monitoring procedures	No	No	No
10/5/01	Two alarms sound in the Chemical Assessment Laboratory (CAL) during routine lab operations. Two chemists tested for exposure test negative.	Yes (all CAL personnel)	Yes	No
10/1/2001 - 10/8/2001	GB leaks detected in 18 ONCs. All leaks involved 155mm projectiles and were discovered during routine air monitoring procedures.	No	No	No

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
Tooele (TOCDF)				
10/25/2001, 11/3/2001, 11/6/2001	GB leak detected in a wet-eye bomb shipping container located in TOCDF unpack area during routine air monitoring procedures on three occasions.	No	No	No
11/16/2001 and 11/19/2001	GB leak detected in a wet-eye bomb shipping container in Deseret Chemical Depot (DCD) Storage area prior shipment to TOCDF.	No	No	No
11/26/01	Power loss results in low-level mustard agent migration; emergency generators operable within seconds.	No	No	No
12/10/01	Liquid leak of one-half teaspoon of mustard from 155mm projectile mustard leak detected in storage area during routine monitoring operations.	No	No	No
12/12/2001, 12/17/2001, 12/21/2001	GB leak detected in one or more ONCs at TOCDF during routine air monitoring operations on three occasions.	No	No	No
1/6/02	Alarms alerted workers to GB leak during repair operations. Workers test negative for exposure	Yes (6 workers)	No	No
1/11/2002 and 1/22/2002	GB leak detected in one or more ONCs at TOCDF Container Handling Building during routine air monitoring operations on two occasions.	No	No	No
1/25/02	GB leak detected in a chemical transport vehicle at DCD storage yard.	No	No	No
1/30/02	GB leak detected in TOCDF unpack area during movement of 155mm projectiles. Workers test negative for exposure.	Yes (8 workers)	Yes (several hours)	No
2/25/02	Mustard leak from 155mm projectiles detected in storage igloo during routine monitoring operations.	No	No	No
3/2/02	GB leak detected in ONC in TOCDF unpack area during routine air monitoring operations.	No	No	No
3/7/02	Liquid leak of one-half teaspoon from valve on a VX bulk container detected in storage igloo during routine operations.	No	No	No
4/3/02	Low-level GB detected in liquid incinerator primary furnace room while workers are preparing to install burner face plate.	Yes (3 workers)	No	No
5/4/02	Low level GB vapors detected while workers performed maintenance on a burner.	No	No	No
7/5/02	Trace amounts of Lewisite blister agent are released from filter stack.	No	No	No
7/15/02	Two workers exposed to GB vapors during routine maintenance on agent purge lines in liquid incinerator room. Four workers examined for exposure; one tests positive.	Yes (4 workers)	Yes (VX agent destruction -- resumed on 03/28/03)	No
9/09/2002 and 10/16/2002	Mustard leak from 155mm projectile detected in DCD storage area during routine leaker isolation operations on two occasions.	No	No	No

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
	Tooele (TOCDF)			
12/12/02	Mustard leak from unknown source detected in DCD.	Yes (4 workers)	No	No
3/27/03	VX leak in spray tank container detected during routine air monitoring operations.	No	No	No
4/9/03	Workers observe chemical reaction of VX agent and water in Agent Collection System (ACS) tank; operations suspended.	No	Yes (2 days)	None reported
5/3/03	Alarms recognizing presence of mustard agent sound in observation corridor south of Munitions Processing Bay.	Yes	Yes (3 days)	No
8/04/2003 and 8/25/2003	Mustard leak from 155mm projectile detected in storage igloo at DCD during routine air monitoring operations on two occasions.	No	No	No
8/27/03	Follow-up inspection of filtered storage igloo at DCD reveals seven mustard leaks amounting to approximately 1.5 cups.	No	No	No
9/4/03	“Maintenance Outage” to repair a leaking liner in Spent Decon System tank.	No	Yes (1 month)	No
9/29/2003, 9/30/2003, 10/14/2003	Mustard leak from 155mm projectile detected in storage igloo at DCD during routine air monitoring operations on three occasions.	No	No	No
11/3/03	Workers preparing a diluted GB agent sample evacuate a laboratory room when ACAMS alarms recognize a failure of the ventilation system; GB agent migration to adjacent room.	Yes (all workers)	Yes	No
12/10/03	Mustard leak from 155mm projectile detected in storage igloo at DCD during routine air monitoring operations.	No	No	No
12/12/03	TOCDF limits furnace processing to resolve analytical data inconsistencies from equipment that backs up real-time agent monitors in the pollution abatement system monitors.	No	Yes (several days)	No
1/28/2004 and 1/29/2004	Mustard leaks from four 155mm projectile detected in storage igloo at DCD during routine air monitoring operations over two consecutive days.	No	No	No
2/29/04	Small fire occurs at Continuous Emissions Monitoring System outlet outside of the Munitions Demilitarization Building. At the time of the fire, no waste was being processed and backup systems were in place during repairs.	Yes (all workers)	Yes (1 hour)	No
3/15/04	Leaking VX bulk container found by workers inside stockpile storage area; army states that no alarms went off nor was there any danger of an environmental release	No	No	No

Chronology of Shutdowns, Malfunctions, and other Incidents by Site since 1997

Date	Site and Event Description	Evacuation occurred? Extent (if known)?	Shutdown occurred? Duration (if known)?	Agent release to the environment?
	Umatilla (UMCDF)			
8/26/2001 and 10/3/2001	VX leak from overpacked weapons and ton containers detected in storage igloo on two occasions.	No	No	No
10/5/01	A suspicious item is found in the incineration sector and tested for hazardous material; never identified but determined to pose no risk.	Yes (all workers)	Yes (4 hours)	No
12/3/02	Employee dropped glass vials of diluted GB. Workers tested negative for exposure.	Yes (3 workers)	No	No
8/1/03	Worker left grounds early with a diluted vial of GB in his pocket; vial was returned without exposure.	No	No	No
12/8/03	Low-level GB vapor detected outside storage area; no specific leak identified.	500 workers ordered to wear gas masks	No	No

GLOSSARY

“Non- Stockpile” Chemical Materials

Recovered chemical weapons, chemical samples, former chemical weapons production facilities, binary chemical weapons and miscellaneous equipment such as empty aerial spray tanks.

“Stockpile” Chemical Materials

Chemical materials in munition form, or developed to be used in weapons.

Accelerated Chemical Neutralization

The process of chemical neutralization in which the containers are cleaned after the agent itself is neutralized, prioritizing agent destruction and thereby speeding the process. Accelerated demilitarization is used at Newport and Aberdeen.

Effluent

The wastewater that flows out of a treatment plant, sewer, or industrial complex as a byproduct of operations, generally into surface waters.

Energetics

The fuse, booster, burster and propellant of a munition are collectively referred to as the energetics.

Extrusions Common extrusions include tracks, rails, belt guides and bearings.

Hydrolysate The end product of the process of hydrolysis.

Hydrolysis A chemical process that uses water to break down a compound.

Lewisite A blister agent.

Neutralization

The act of altering the chemical, physical, and toxicological properties of a chemical agent to render it ineffective.

Pilot Testing

A period between the end of systemization and the beginning of operations, to verify the performance of destruction facilities and their ability to destroy chemical agent. Pilot testing

is separated into three stages: shakedown and ramp-up, testing, and post-pilot testing. These stages use a specified amount of agent to replicate the actual processes of destruction.

Pre-Systemization

A period to verify and document that the facility and equipment was constructed and installed according to the design. Pre-systemization may overlap or occur simultaneously with construction, and ends when systemization begins.

Sarin A nerve agent.

Super Critical Water Oxidation (SCWO)

A high temperature and pressure technology developed in 1975 that uses the properties of supercritical water to destroy organic compounds and toxic wastes.

Self-Ignition

A phenomenon in which a material or fuel catches fire naturally when its temperature is increased, even if no external fire is nearby.

Sulfur Mustard- H

A form of blister agent that contains 20-30 percent impurities (mostly sulfur).

Sulfur Mustard- HD

A form of blister agent that is nearly pure and also called distilled mustard.

Sulfur Mustard- HT

A form of blister agent created by mixing 60 percent HD with 40 percent of a substance called T. This results in a closely related agent to HD, but with a lower freezing point.

Systemization

A period beginning the day construction ends, to demonstrate that all facilities, equipment, procedures and personnel are ready to operate.

Tabun A nerve agent.

Vesicant

A chemical which causes extensive tissue damage, with vesicle formation or blistering.

VX A nerve agent.

LINKS

Government Sites

Aberdeen Proving Ground	www.apg.army.mil
Anniston Army Depot	www.anad.army.mil/
Agency for Toxic Substances and Disease Registry (ATSDR)	www.atsdr.cdc.gov/
Colorado Department of Public Health and Environment	www.cdphe.state.co.us/cdphehom.asp
DefenseLINK News	www.defenselink.mil
Department of Defense	www.dod.mil
Department of Labor: Whistle Blower Directory	www.oalj.dol.gov/libwhist.htm
Environmental Protection Agency	www.epa.gov
Federal Emergency Management Agency (FEMA)	www.fema.gov
Federation of American Scientists	www.fas.org
International Information Programs	http://usinfo.state.gov
National Library of Medicine: Specialized Information Services	www.sis.nlm.nih.gov/aids/nci.htm
National Institutes of Health	www.nih.gov
Program Manager for the Elimination of Chemical Weapons	www.pmcda.apgea.army.mil/
US Army	www.army.mil/
US Army Chemical Materials Agency	www.cma.army.mil

Public Interest Groups

Center for Health, Environment and Justice	www.chej.org
Families Against Incineration Risk	www.fair-utah.org/
Global Security Organization	www.globalsecurity.org
Greenpeace	www.greenpeace.org
Chemical Weapons Working Group	www.cwwg.org
Center for Public Environmental	www.cpeo.org/index.html
The National Academies Press	www.nap.edu
Sierra Club	www.sierraclub.org
Vietnam Veterans of America	www.vva.org

Corporations and Contractors

Battelle Memorial Institute	www.battelle.org
Bechtel Corporation	www.horne.com
EA Engineering, Science and Technology, Inc.	www.eaest.com
Earth Tech Corporation	www.earthtech.com
EG&G Technical Services, Inc.	www.egginc.com
General Physics Corporation	www.gpworldwide.com
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SOURCES

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CDC and ADSTR

www.cdc.gov

EG&G Corporation

www.egginc.com

Federation of American Scientists

www.fas.org

Global Security Organization

www.globalsecurity.org

The Henry L. Stimson Center

www.stimson.org

Edgewood Chemical Activity: SBCCOM Online

<http://eca.sbcom.army.mil>

Parsons Corporation

www.parsons.com

Program Manager for the Elimination of Chemical Weapons/ Chemical Demilitarization

www.pmcd.apgea.army.mil/default.asp

Washington Group International
www.wgint.com

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www.usace.army.mil

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