



CUSTOMER CASE STUDY | TRIAL BURNS

Noah Chemicals[®] Formulates Trial Burns for Chemical Weapons Destruction

OVERVIEW

INDUSTRY:

Military / Department of Defense

CHALLENGE:

With entry into the Chemical Weapons Convention (CWC)—A world-wide multilateral disarmament agreement. The US Government embarked on the elimination of the chemical weapons stockpile at the Anniston Depot.

SOLUTION:

Our Chemical Services team advised onsite chemists on the most efficient and appropriate surrogate and testing materials to prove the destruction and removal efficiency (DRE) of their facility leading to a chemical weapons incineration certification.

OUTCOME:

Successful Elimination of Hazardous Chemical Weapons

EXECUTIVE SUMMARY

From World War I to 1968, the United States produced chemical weapons as a deterrent against use of similar weapons by other countries. Though never used in battle, these U.S. weapons are now obsolete and deteriorating with age. Noah Chemicals partnered with the US Army sites in developing the most efficient methods of testing the Destruction and Removal Efficiency (DRE) of their incinerator systems.

BACKGROUND

In 1970 Congress Mandated Destruction of Chemical Weapons. The amount of stockpiled chemical warfare agents in the United States is thought to have reached almost 40,000 tons by 1968. These chemical warfare agents were stored in bulk containers or as assembled weapons and ammunition at nine sites in the United States.

Chemical warfare agents at seven of the nine disposal facility sites have been destroyed and those facilities are closed.

The seven closed sites are:

- Aberdeen Chemical Agent Disposal Facility, Aberdeen Proving Ground, Maryland
- Anniston Chemical Agent Disposal Facility, Anniston, Alabama
- Johnston Atoll Chemical Agent Destruction System, Johnston Atoll
- Newport Chemical Agent Disposal Facility, Newport, Indiana
- Pine Bluff Chemical Agent Disposal Facility, Pine Bluff, Arkansas
- Tooele Chemical Agent Disposal Facility, Tooele, Utah.
- Umatilla Chemical Agent Disposal Facility, Umatilla, Oregon

Noah had a role in facilitating the demonstration of efficiency for the destruction facilities at Anniston, Pine Bluff, Tooele, and Umatilla. We continue to support the Blue Grass facility with their ongoing mission.

CASE EVALUATION

The U.S. stockpile of chemical warfare agents (i.e., nerve agents and vesicants or blister agents) was stored at nine sites either in bulk containers or as assembled munitions. Chemical agent disposal facilities were built at each site to destroy the stockpile using either incineration or neutralization.

Incineration was selected in 1982 as the method of choice for disposal of chemical agents and munitions after long and careful consideration of several technologies. The National Research Council endorsed this selection in 1984 and continued to regard incineration as a demonstrated safe “baseline technology” in 1994. It is appropriate for several major reasons:

- Incineration effectively converts the agent to relatively harmless or controllable end products such as carbon dioxide, water vapor, ash, and other combustion products.
- Incineration has been around long enough to have matured into a well-controlled and understood body of knowledge.
- Incineration has been demonstrated to be capable of being operated in a manner that is safe for workers and the public.
- Emissions are constantly monitored for chemical agent release and the DRE is significantly higher than commercial hazardous waste facilities. The DRE requirement for the Anniston Chemical Destruction Facility was 99.9999% (< 1 ppm) while actually achieving 99.99988% (< 0.12 ppm) during the trial burn.

LIQUID INCINERATOR (LIC) - Function: To Destroy Liquid Lethal Agent

Noah Chemicals was tasked with developing a method to incorporate 21 different metals in various compounds in a liquid glycol base and enable them to suspend these compounds over the duration of the feed into the liquid incinerator. Through careful consideration of the starting materials, manipulation of particle size, and carefully selected suspending agents, we were able to achieve a stable mixture that delivered everything that was required. We successfully produced 80,000 lbs to be delivered over 190 hours of testing.

In addition to the metal compounds suspension, we coordinated the delivery of almost 550,000 lbs of trichlorobenzene and tetrachloroethylene in tanker trucks and drums.

DEACTIVATION FURNACE SYSTEM (DFS) - Function: To Destroy Energetic or Explosive Materials

Introduction of testing materials into the DFS posed significant challenges. The shoot to the furnace would approach temperatures up to 1000 °F. The feed containers had to withstand the elevated temperatures all the way to the furnace. Metal containers would be ideal but would amount to a significant amount of scrap to be disposed of. Therefore, plastic was chosen. The plastic would need to be robust enough for the weight contained but also resistant to the aromatic solvents and 21 metal compounds in the testing feed. Noah Chemicals was able to source the over 25,000 jugs in various sizes with a special composite of plastic that contained Nylon that was compatible with the solvents. In coordination with the trial burn manager, we supplied burlap bags that could be packed with the jugs, wetted, and dropped down the shoot to deliver the package all the way to the furnace to be destroyed.

METAL PARTS FURNACE (MPF) - Function: To Decontaminate Empty Casings or Other Metal Containers that Once Held Agent

The challenge posed by the MPF was not only the chemical compatibility of the almost 85,000 jugs needed for this furnace testing, but also the sheer number of units.

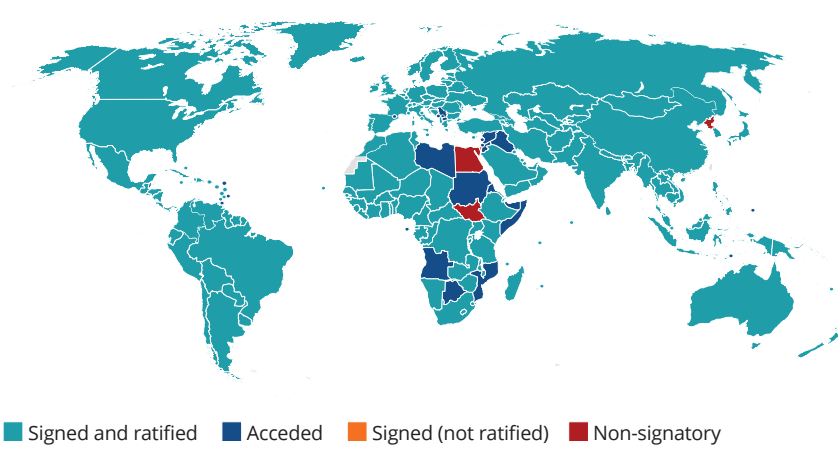
CONCLUSION

Noah Chemicals Manufacturing Process and Design for producing the most appropriate and optimal surrogate and testing materials were essential in the successful certification of the operational preparedness of the Anniston Chemical Agent Disposal Facility.

To ensure confidence in the amounts delivered to the furnaces during testing, each of the almost 110,000 drums and jugs and their raw materials were each weighed individually on calibrated measurement equipment. Solid raw materials were milled to ensure homogenization during pre-blending before addition to the final package. Labels were serialized to facilitate a documented chain of custody with weight certification to enable verification on site. Certificates of addition for each of the formulations provided lot traceability of the raw materials. Certificates of analysis by a third-party laboratory provided assurance of conformity to the specifications. With all these efforts, the regulators were satisfied that the required testing using our materials was conducted according to requirements on a local, state and federal level.

Noah Chemicals is proud to have played a significant role in the success of the Anniston Chemical Agent Disposal Facility and the other facilities around the nation in this monumental task to eliminate the risk of our chemical weapon stockpiles for local residents and future generations.

Participation in the Chemical Weapons Convention



Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction

Drafted: 3 September 1992
Signed: 13 January 1993
Location: Paris and New York
Effective: 29 April 1997
Condition: Ratification by 65 states
Signatories: 165
Parties: 193
Four UN states: are not party: Egypt, Israel, North Korea and South Sudan
Depositary: UN Secretary-General
Languages: Arabic, Chinese, English, French, Russian and Spanish

About Noah:

The Supplier of Choice to Fortune 500 Companies, Government Agencies and Independent Laboratories Noah Chemicals is the trusted chemical solutions partner for a broad range of clients, like General Electric, Dupont and 3M to U.S. Government agencies including NASA and the Department of Energy.

We also work closely with small laboratories and business startups. Noah manufactures an extensive list of research chemicals to scale, and we're a proven leader in creating custom products used in new and emerging technologies. Every client relationship we maintain is governed by the Noah Standard – our commitment to quality, innovation and transparency.

Our Mission:

We Enable the World's Greatest Innovations by sustainably delivering the highest purity chemicals along with custom & proven Chemical Services® while leading with an industry best customer experience and quality.



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