

**Review of the U.S. Army  
Proposal for Off-Site Treatment  
and Disposal of Caustic VX  
Hydrolysate from the Newport  
Chemical Agent Disposal Facility**

**A Report to Congress**

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# SUMMARY

The U.S. Army proposal for caustic VX hydrolysate (CVXH) transportation, treatment, and discharge into the Delaware River has raised concerns and questions about potential impacts on public health and the environment. This report describes the findings from the Centers for Disease Control and Prevention (CDC) evaluation of this proposal. CVXH is the waste product of the hydrolysis reaction of nerve agent VX, water, and sodium hydroxide that will be generated at the Newport Chemical Agent Disposal Facility (NECDF) in Newport, Indiana. The proposal is to transport CVXH from NECDF to the DuPont Secure Environmental Treatment (SET) Chambers Works facility in Deepwater, New Jersey, for secondary treatment and subsequent discharge in the Delaware River. Please note that the term *CVXH* is referred to in some reports as *Newport caustic hydrolysate* or *NCH*.

CDC's review of the CVXH disposal plan examined several critical issues, including (1) potential health hazards associated with the waste produced at NECDF, (2) potential risks associated with transportation of the material from Indiana to New Jersey, (3) ability of the DuPont facility to adequately treat the CVXH in addition to the ability of NECDF to produce caustic VX hydrolysate meeting clearance criteria, and (4) potential ecologic impact associated with discharge of the DuPont-treated material into the Delaware River. Because CDC did not have the expertise to review DuPont's ecologic report, CDC requested assistance from the U.S. Environmental Protection Agency (EPA), Region II. A summary of the results of CDC's evaluation are described below:

- CDC found that the potential human health hazards of the untreated CVXH are associated predominantly with its corrosive and caustic properties and not nerve agent effects, although trace levels of VX and EA 2192 (a degradation product with nerve agent properties) may be present. The toxicity of CVXH does not preclude handling and transportation provided that proper precautions are in place.
- The transportation plan meets Department of Transportation regulations, and precautions in the plan are adequate to protect the public, personnel, and environment.

## Major Findings:

- The potential human health hazards of caustic hydrolysate are associated predominately with its corrosive and caustic properties.
- The precautions in the transportation plan are adequate to protect the public.
- The DuPont process should be capable of treating the major components of the waste with noted exceptions.
- More information is needed to evaluate the ecological risk of discharge of this waste into the Delaware River.

CDC does not recommend proceeding with the treatment and disposal at DuPont until EPA's noted deficiencies in the ecologic risk assessment are addressed.

- CDC's technical review of the DuPont SET indicated it is a viable process and should be capable of treating the major components of CVXH (see subsequent discussion on phosphonic acids). However, the NECDF VX stockpile utilizes two chemicals (referred to as stabilizers), diisopropylcarbodiimide (DIC) and dicyclohexylcarbodiimide (DCC), added to prevent VX degradation during storage. The data indicate that CVXH produced from DIC-stabilized VX at the 8% agent loading level should meet the Army's clearance criteria for VX and EA 2192 during storage and can be treated at DuPont. The term "loading" refers to the total percentage of VX added to the NECDF process for reaction. Loadings greater than 8% of DIC-stabilized VX or any treatment of VX stabilized with DCC is not recommended until the treatment effectiveness is demonstrated and confirmed. Consequently, only a portion of the Newport VX stockpile currently can be processed to meet clearance criteria.
- The Environmental Protection Agency's (EPA's) analysis indicates that the DuPont risk assessment does not contain adequate information to determine that the aquatic ecologic risk from the discharge of treated CVXH to the Delaware River is acceptable. Further, the EPA expressed concerns that the 20 ppb clearance criterion for VX in CVXH is based "solely on the protection of humans from a drinking water source and may not be protective of aquatic organisms through ingestion or dermal exposure."

In conclusion, while the CDC found that the Army/Dupont proposal was sufficient to address critical issues in the areas of potential human toxicity, transportation, and treatment of CVXH (generated from recommended VX loading and stabilizer), EPA concluded that the information regarding the ecologic risk of treated CVXH discharge into the Delaware River was inadequate.

Consequently, CDC cannot recommend proceeding with the treatment and disposal at the DuPont SET facility until EPA's noted deficiencies are addressed.