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Cleanup Enforcement in Action:
Addressing Community Needs in North Haven, Connecticut

The Value of Environmental Enforcement

At the Pharmacia & Upjohn Company LLC facility in North Haven, Connecticut, the U.S. Environmental Protection Agency's (EPA's) enforcement mechanisms and resources have played a vital role in achieving protection of public health, environmental restoration, and property reuse. This case illustrates how EPA, Pfizer, and the community achieved positive results through the use of a collaborative enforcement process and the use of appropriate enforcement tools. At this facility, the parties decided together that an enforcement order on consent would be the most effective way to manage the final cleanup. Today, this agreement is creating long-term benefits for the North Haven community.

The successful use of enforcement tools at this facility led to one of the largest cleanups in the history of EPA's Resource Conservation and Recovery Act (RCRA) program. Total cleanup costs for this large and complex facility are estimated at more than $152 million. Through a series of RCRA enforcement orders, EPA, Pfizer, and the Connecticut Department of Energy & Environmental Protection (CT DEEP) facilitated the cleanup of the 78-acre former manufacturing facility. The most recent enforcement order (2011) contains a master plan with deadlines that are enforceable yet adaptable.

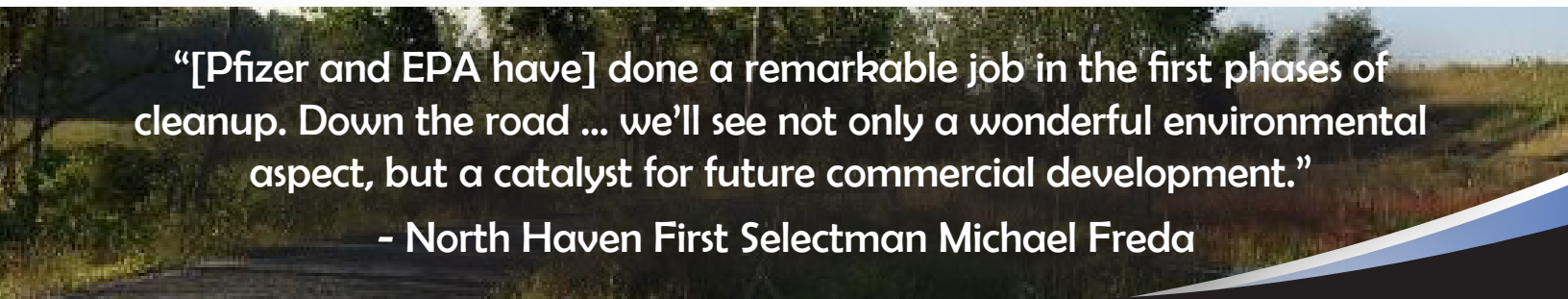
Incorporating ASTM's *Standard Guide for Greener Cleanups* into the remedy helped Pfizer reduce the cleanup's

Environmental Enforcement Benefits the Community

Environmental and public health impacts affect people most significantly where they live. EPA works to provide strong, effective enforcement support to all communities. As the Agency implements environmental and public health improvements across the country, EPA is looking for new ways to assist communities in environmentally overburdened, underserved, and economically distressed areas where the needs are greatest.

Working Together to Achieve Site Cleanup and Reuse

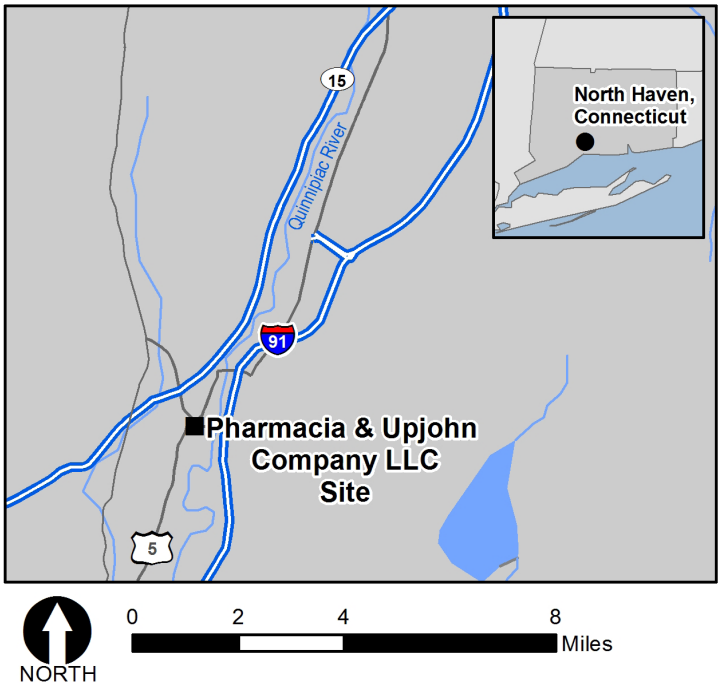
EPA, Pfizer, and CT DEEP worked together to determine that an enforceable order was the best mechanism to use at this facility. The resulting order allows Pfizer to develop and modify, with EPA approval, ambitious deadlines that keep the cleanup ahead of schedule. Additionally, Pfizer focused on community relationships and incorporated community priorities into the final cleanup plan which includes 17 acres of new light industrial and commercial business space and roughly 60 acres of restored wetlands and meadows that will include nature trails available for public use.



"[Pfizer and EPA have] done a remarkable job in the first phases of cleanup. Down the road ... we'll see not only a wonderful environmental aspect, but a catalyst for future commercial development."

- North Haven First Selectman Michael Freda

The site's location in North Haven, Connecticut.



Sources: Esri, DeLorme, AND, Tele Atlas, First American, UNEP-WCMC and USGS.

environmental footprint and ASTM's *Standard Guide for Integrating Sustainable Objectives into Cleanup* enabled the incorporation of economic and social best management practices (BMPs). These practices helped ensure the project's compatibility with community needs and priorities.

Following cleanup, the once-contaminated facility will be returned to productive and beneficial use. Seventeen acres of the property's west side are planned for commercial and light industrial use. An additional sixty acres of wetlands and meadow habitat along the Quinnipiac River are being restored and include walking trails and signage providing for recreation and environmental education opportunities.

Facility and Community Overview

North Haven is a small town in south-central Connecticut, a few miles from New Haven. About 25,000 people live in the community. For much of the 20th century, the Pharmacia & Upjohn Company chemical manufacturing facility was a major local employer. The facility made products used in dyes and pigments; photographic chemicals; sunscreen agents; additives for soaps, perfumes, and cosmetics; agricultural herbicides; pharmaceuticals; and photo-initiators. The facility became contaminated through historical releases of hazardous manufacturing process wastes and wastewater treatment residuals. All manufacturing ceased at the facility in 1993.

In 2003, pharmaceutical company Pfizer purchased Pharmacia Corporation, the parent company of the Pharmacia & Upjohn Company. Although Pharmacia & Upjohn Company is the named party on the most recent enforcement order, Pfizer is managing the cleanup and working with EPA, CT DEEP, and the community on facility-wide cleanup and reuse planning.

Administrative Cleanup Orders

Legal agreements signed by EPA and an individual, business, or other entity through which the property owner or operator agrees to take the required corrective or cleanup actions. They describe the actions to be taken, apply to civil actions, and can be enforced in court.

Project History

1989 – 2002
Initiating RCRA Corrective Action Cleanup

In 1989, EPA issued a RCRA administrative order requiring facility investigations and cleanup. One facility investigation identified 28 areas of environmental concern. Pharmacia & Upjohn Company, the owner of the facility at the time, began to implement a series of corrective action interim measures.

Corrective action interim measures identify and correct any actual or potential releases of hazardous waste or hazardous constituents from regulated areas, sources, or areas at facilities that may present an endangerment to human health or the environment. Interim measures are often used to achieve the initial goals of controlling the migration of contaminated groundwater and controlling current human and ecological exposure to contaminated media.

A second RCRA administrative order required Pharmacia & Upjohn Company to continue interim measures already in place, conduct human health and ecological risk assessments, and prepare a corrective measures study

RCRA Overview

Congress enacted RCRA in 1976. RCRA, an amendment to the Solid Waste Disposal Act, was designed to address the huge volumes of municipal and industrial waste generated by operating facilities. This includes hazardous waste generated and disposed of by owners and operators who contaminate land, water, and air. Under RCRA, owners and operators are liable for the cleanup of the contamination. RCRA protects human health and the environment in two ways:

1. Prevention: preventing future environmental problems from being caused by waste.
2. Corrective Action: Cleaning up current environmental problems caused by the mismanagement of waste.

RCRA Corrective Action usually takes place at facilities that treat, store, or dispose of hazardous waste. Corrective action can also take place while a facility continues operation and it may be required through a RCRA permit, voluntary agreement, order, or administrative or judicial action.

One of the walking trails on the Pfizer property.

(CMS). A CMS is used to develop and evaluate corrective action alternatives and recommend the corrective measures that the owner or operator should take at a facility to protect human health and the environment. As a result, all manufacturing buildings at the facility were demolished, decontaminated, or disposed of. Other interim measures included the installation of a state-of-the-art groundwater recovery and treatment system, soil and sludge capping, and facility security.

2003 – 2008
Rebuilding Relationships

In 2003, Pfizer took over financial responsibility for ongoing facility-wide investigations and cleanup when it acquired the Pharmacia Corporation. Pfizer also recognized the need to rebuild community relationships and began an inclusive stakeholder engagement process. For its part, EPA was also committed to involving the public in the development and implementation of cleanup decisions. One of the Agency's central goals is to empower community involvement in local activities by providing equal access to information and an equal opportunity to participate.

With EPA's guidance, Pfizer developed a community relations plan as a guide for sharing information and obtaining public input during the corrective measures implementation phase of the project. The outreach tools outlined in the plan ensured a transparent and accessible process and meaningful community stakeholder participation.

To build the community's trust, Pfizer also worked closely with the North Haven Citizens' Advisory Panel (CAP). CAP representation includes the Quinnipiac River Watershed Association (QRWA), the North Haven Land Trust, the Regional Growth Partnership, the North Haven Trail Association, and local town boards and commissions. CAP was established as a conduit to the community for information regarding the environmental investigation and cleanup of the Upjohn property. Input and feedback from CAP helped shape EPA's approved remedy and inform the future vision for the property.

Through regular CAP meetings and facility visits with community members, Pfizer established key objectives for the future use of the property. The company's stakeholder-driven reuse planning process included presentations and discussions with hundreds of stakeholders, market analyses, feasibility planning, and stakeholder interviews. Through this effort, Pfizer learned that economic development and the creation of an ecological preserve with green space were local priorities and integrated them into the cleanup plan.

For example, Pfizer worked closely with local environmental resources – QRWA, the North Haven Land

Use of ASTM's Standard Guide for Greener Cleanups

EPA worked with ASTM to develop the *Standard Guide for Greener Cleanups*, the consensus-based standard intended to encourage property owners, regulatory agencies, responsible parties, developers, and communities to voluntarily use greener practices for contaminated site cleanup. As a starting point for the standard development process, EPA and state agencies developed a framework outlining the desired outcomes of a potential standard for greener cleanups.

ASTM issued the *Standard Guide for Greener Cleanups* in 2013 and updated it in 2016. The standard guide is intended to complement regulatory and voluntary cleanup programs and accommodate each phase of a cleanup. It includes:

- A systematic protocol to identify, prioritize, select, implement and report on the use of BMPs to reduce the environmental footprint of cleanup activities.
- A list outlining 115 greener cleanup BMPs that are linked to the core elements of greener cleanups and to relevant cleanup technologies.
- Guidelines to quantify the environmental footprint of cleanup activities.
- A reporting structure to promote public availability of information relating to the decision-making process and communication of outcomes.

EPA anticipates that use of this private-sector standard guide will advance EPA's objectives by:

- Providing clear definitions, methods, expectations, and goals that can be used by all stakeholders involved in a cleanup, making it easier for regulators and the regulated community to implement greener cleanups.
- Establishing a framework to support new tools for evaluating impacts from cleanups.
- Building on state and local government incentives for greener cleanups.

To learn more, visit https://www.epa.gov/greenercleanups.

Final Corrective Action Components

- Upgraded groundwater pump-and-treatment system.
- Perimeter groundwater hydraulic barrier wall.
- Excavation and on-site consolidation of impacted soils.
- Sediment dredging.
- Low-permeability and protective soil barrier cover systems.
- In-situ thermal remediation (ISTR) for dense non-aqueous phase liquid (DNAPL) removal.
- Ecological restoration.
- Land preparation for future commercial/light industrial redevelopment.

Reuse plans designated a 60-acre ecological preserve on the eastern side of the property (green areas above) and 17 acres along its western side for commercial and industrial use (blue and grey areas).

Trust, Yale University, and the University of New Haven – as well as expert consultants in ecological restoration and interpretive planning to develop detailed designs for a well-functioning ecological preserve. The efforts resulted in reuse plans for the property that designated a 60-acre ecological preserve on the eastern side and 17 acres along the western side for commercial and industrial use.

2009 – 2011
Final Cleanup Planning, Enforcement Excellence

By 2009, the facility had reached a critical milestone – it was time to select and implement the final cleanup plan. EPA, CT DEEP, and Pfizer discussed whether a state RCRA permit or an enforceable federal order would be the best mechanism. After years of experience working with both permits and orders, the agencies and Pfizer decided that an enforceable order with EPA oversight was the best option for the active cleanup phase.

An enforceable order offered several advantages. For example, EPA could structure it to include a master plan that increases flexibility and efficiency during cleanup and supports Pfizer's use of ASTM's *Standard Guide for Greener Cleanups*. It lists all key deadlines and any proposed deadline changes, and shows a timeline for the entire project. EPA retains authority to reject any changes to the timeline; Pfizer submits a master plan every quarter. Once the cleanup goals are achieved and the site transitions to operation and maintenance, EPA will transfer site care to Pfizer management under a state stewardship permit.

In addition, the master plan allows Pfizer to develop ambitious deadlines. In typical consent orders, EPA and the responsible party must agree upon a compliance schedule. Parties are often more likely to agree to conservative deadlines to make sure remedial timelines stay on track. The master plan allows Pfizer to modify deadlines as needed, with EPA approval, and propose deadlines to keep the cleanup on track to reach RCRA Corrective Action program goals. Master plans also allow facilities to respond in real time to redevelopment interest by quickly shifting deadlines to prioritize cleanup of the portion of the facility in which a redeveloper may be interested – all while maintaining enforceable deadlines for cleanup of the entire facility.

2012 – 2018
Innovating for the Future

Throughout its work, Pfizer prioritized environmental sustainability. To inform its efforts, Pfizer followed ASTM's *Standard Guide for Greener Cleanups*. This voluntary, consensus-based guide provides a step-wise process to assess, prioritize, select, and implement BMPs that can help reduce the environmental footprint associated with cleaning up contaminated sites. The selected corrective action objectives maximize a range of benefits – greater chemical mass removal, less impact on

Recognizing Community Leadership

In 2011, founding members of the North Haven CAP were honored with EPA's Environmental Merit Award in recognition of their long-term commitment and outstanding efforts.

The Town of North Haven also honored CAP with a proclamation recognizing members' service and dedication.

North Haven CAP members at the EPA award ceremony in Boston.

Principles for Greener Cleanups

A greener cleanup is a sustainable approach to cleaning up contaminated sites. EPA's "Principles for Greener Cleanups" provides a foundation for planning and implementing cleanups that protect human health and the environment while minimizing the environmental footprint of cleanup activities.

To learn more, visit: https://www.epa.gov/greenercleanups

Green Remediation

Green remediation – another term for greener cleanups – is the practice of considering all environmental effects of remedy implementation and incorporating options – such as the use of renewable energy resources – to maximize the environmental benefits of cleanups. EPA has a host of additional resources available at:

- EPA Green Remediation Report: https://www.epa.gov/remedytech/green-remediation-incorporating-sustainable-environmental-practices-remediation
- Contaminated Site Cleanup Information (CLU-IN) – Green Remediation Focus: https://clu-in.org/greenremediation

Above: Reuse of facility soil for grading significantly reduced the volume of imported fill material.

Below: View of the facility's vegetated cover.

the community, greater beneficial reuse, a lower carbon footprint, reduced long-term groundwater pumping – and are backed by strong public support.

The facility's remedy also conserves energy and resources. For example, Pfizer's contractors used repurposed slag from a furnace blast to build a barrier wall to protect the Quinnipiac River from groundwater contamination. Instead of excavating a 1-acre area and disposing of contaminated soil off site, Pfizer used a thermal heating process to remove the primary source of groundwater contamination. This option reduced greenhouse emissions and kept trucks filled with hazardous waste headed to disposal sites off the community's streets. Additionally, a 6-acre wetland constructed on site provides long-term stormwater management without the need for active pumping or treatment, while also providing critical habitat for freshwater plant and animal species. The project also used solar-powered air monitors, lowering energy costs.

A recent review of the corrective action activities found that Pfizer successfully incorporated 87 greener cleanup BMPs from ASTM's *Standard Guide for Greener Cleanups* as well as nine social BMPs and eight economic BMPs (see ASTM's *Standard Guide for Integrating Sustainable Objectives into Cleanup*). These practices helped ensure the project's compatibility with community needs and priorities. Today, cleanup remains on track for completion in 2018. In the meantime, property reuse is already underway. Community

organizations and school and church groups can schedule visits to the property's growing ecological preserve to enjoy the green space and interpretive trail network. Full public access is anticipated when the ecological preserve is well-established. Commercial and light industrial development will start after the final facility remedy is in place.

Enforcement Makes a Difference

EPA's enforcement program has helped make a difference in thousands of communities impacted by hazardous waste contamination. At facilities such as the Pharmacia & Upjohn Company LLC facility, the enforcement program, working in conjunction with EPA Corrective Action program technical staff, has played a central role in facilitating cleanup and reuse by negotiating innovative settlement agreements and emphasizing the importance of community engagement.

EPA's enforcement tools and greener cleanup resources protected public health and provided for environmental restoration, reuse, and greener cleanup at the facility. Additionally, early and continued community involvement and transparency ensured efficiency in developing a cleanup plan. From there, EPA enforcement staff's decision to integrate a master plan into the order provided the flexibility necessary to set and meet ambitious deadlines, keep the cleanup on track, and provide long-term community benefits. Looking forward, EPA will continue to work with community members, CAP, local governments, CT DEEP, and Pfizer to keep the public informed and ensure the cleanup's long-term protectiveness.

Additional Resources

ASTM's *Standard Guide for Greener Cleanups* (ASTM E2893):
https://www.astm.org/COMMIT/ASTM%20E2893-13e1_userdoc%20reporting.pdf

ASTM's *Standard Guide for Integrating Sustainable Objectives into Cleanup* (ASTM 2876-13):
https://www.astm.org/Standards/E2876.htm

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Local Economic Benefits of Cleanup

The cleanup has prioritized the use of local sources of labor and materials. Over 30 percent of the project's labor, services, and materials come from within 25 miles of the facility – and over 40 percent of labor, services, and materials come from within Connecticut.

Community members touring the site's ecological restoration area in 2016.

The beneficial reuse of materials during remedy construction has kept 2,465 tons of material out of local landfills.