United States Environmental Protection Agency | Solid Waste and Emergency Response (5502G) | EPA 520-F-92-005 Fall 1992

EPA Superfund At Work

Hazardous Waste Cleanup Efforts Nationwide

Celanese Corporation Site Profile

Site Description: An active polyester production facility located in Cleveland County, North Carolina

Site Size: 469 acres

Primary Contaminants: Volatile organic compounds (ethylene glycol, phthalates, benzene, trichloroethene), heavy metals (chromium, arsenic, lead)

Potential Range of Health Risks Without EPA Cleanup: Potential for cancer or leukemia through long-term contact with contaminated soil or ground water

Nearby Population Affected: Approximately 3,000 people live within three miles of the site

Ecological Concerns: Potential damage to agricultural land within one half-mile of the site

Year Listed on NPL: 1986

EPA Region: IV

State: North Carolina

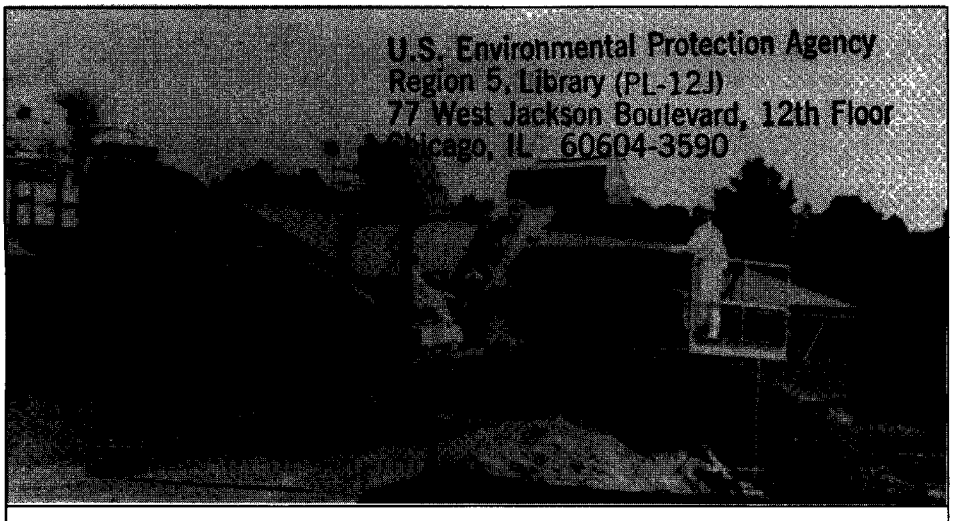
Congressional District: 10

Success In Brief

EPA and Polluter Work Together to Clean Superfund Site in North Carolina

The U.S. Environmental Protection Agency's (EPA) Superfund program has reached some major milestones at a hazardous waste site in Shelby, North Carolina. The site's success is underscored by the fact that the polluter, Höechst-Celanese Corporation, took the initiative to perform the cleanup of the hazardous waste found on their property. Some highlights of the cleanup include:

- EPA negotiated a settlement in which Celanese would perform the cleanup of contaminated ground water, soil, creek sediments, and sludge at the site. This settlement is valued at approximately $6 million;
- EPA employed a multi-method approach for a comprehensive cleanup, including the use of an innovative technology, biological treatment;
- EPA and Celanese worked closely to clean the site and took action to control contaminants from migrating into nearby streambeds and residential wells; and
- EPA significantly reduced potential health risks by providing local residents with an alternate water supply.



Cleanup crew loads contaminated soil into incinerator. Safer than land disposal, incineration can destroy or permanently neutralize up to 99.99% of the toxic materials.

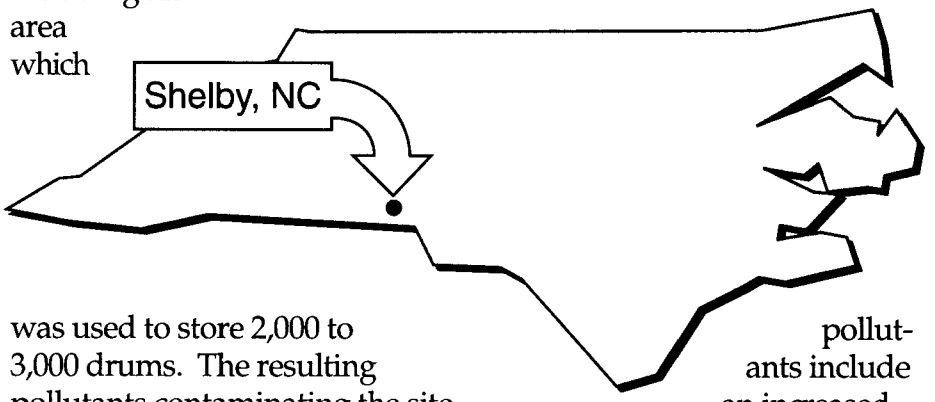
The Site Today

The source of contamination has been cleaned up at the Celanese site, effectively reducing the risk to public health and the environment. Soil decontamination has been quick and effective — taking only seven months to safely incinerate a huge volume of contaminated sludge and soil. The treated area has been regraded and seeded for grass, and the incinerator is being dismantled. Ground water treatment is ongoing, and monitoring activities continue to ensure that no contamination migrates away from the site.

A Site Snapshot

The Celanese hazardous waste site is an active 469-acre polyester production facility in a rural area of Cleveland County, North Carolina. The plant combined synthetic chemicals to manufacture polyester chips, typewriter key caps, automotive components, and filament threads used in fabric for apparel, home furnishings, and industrial products. The site's facilities and land-use areas include the plant, wastewater treatment area, and adjacent recreational and wooded areas.

For several years after the plant began operation in 1960, chemical wastes were disposed directly into a drainage ditch, until the company installed a wastewater treatment plant. During the 1960s, other production waste was burned in open outdoor pits, and sludge was buried in trenches. The ground water, soil, and sediment at the site were contaminated from various other waste disposal areas, including an area which was used to store 2,000 to 3,000 drums. The resulting pollutants contaminating the site are volatile organic compounds (VOCs) including ethylene glycol and phthalates, benzene, trichloro-ethane, and heavy metals including chromium, arsenic and lead. 3,000 people live within a three mile radius of the site, which is mostly forest and farm land. Potential health effects from direct exposure to these pollutants include an increased risk of cancer or leukemia through long-term contact with contaminated soil.



Celanese Shelby Fiber Operation Site Timeline

Improper disposal, burning, and burial of wastes and sludge

• Celanese removes all waste drums from site and sends them to disposal facilities

Contamination of ground water, soil, and sediment

1960 1969 1970 1978 1979

Under Agreement with EPA, Celanese Corporation

Lack of Knowledge Leads to Improper Waste Disposal

Celanese Corporation began producing polyester resin and filament yarn in 1960, without an awareness of proper hazardous waste management. These routine waste disposal practices resulted in the company spending almost $6 million to clean up extensive ground water and soil contamination.

Several areas around the plant were used to dispose of production waste. In the 1960s, polyester and miscellaneous trash were burned in trenches. From 1970-1978, 2,000 to 3,000 drums of waste chemicals and solvents were temporarily stored near the former burn pits.

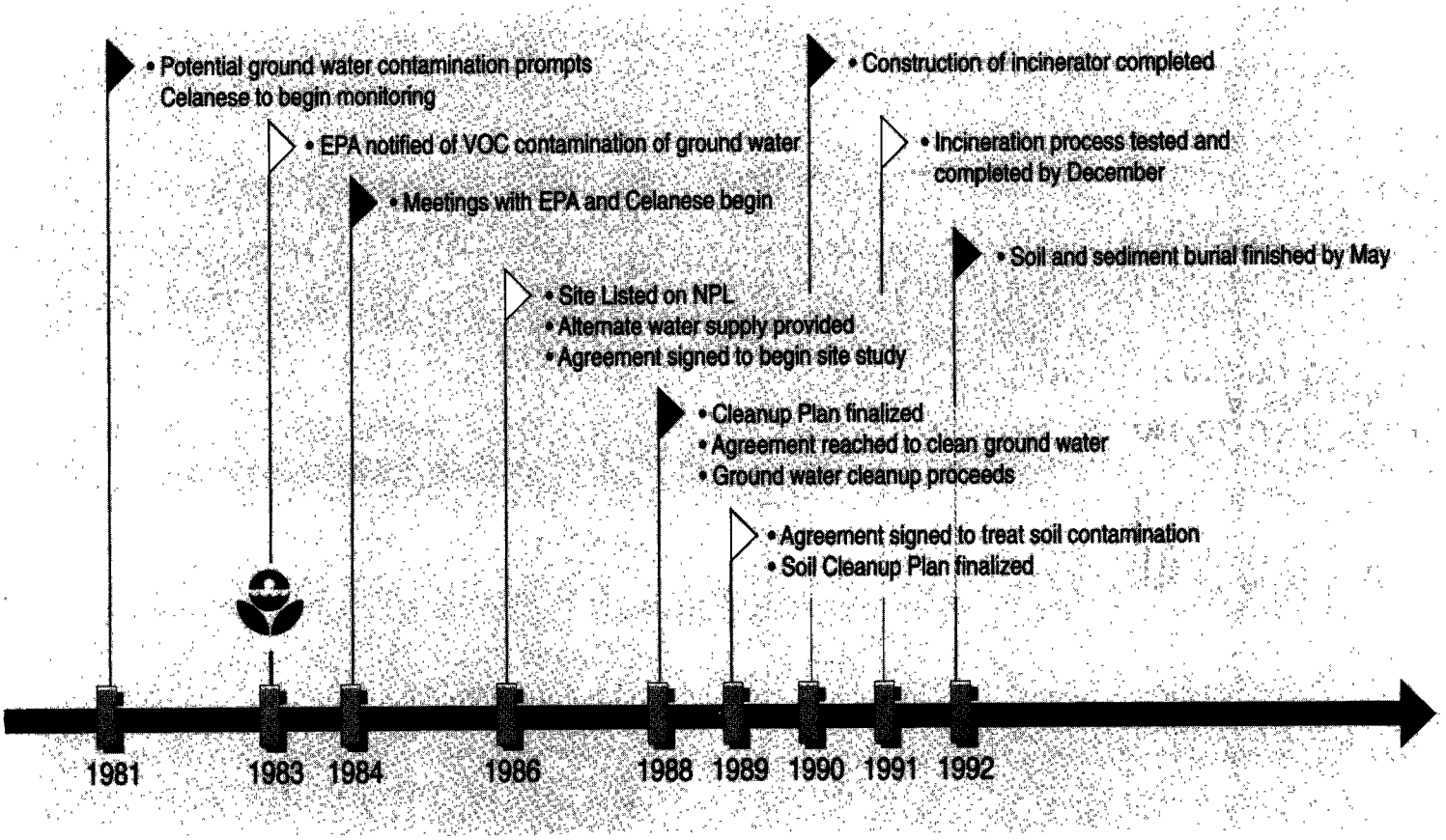
In the late 1970s, as knowledge of the problem of hazardous waste management grew, Celanese Fibers Operation began efforts to rectify problems caused by improper waste disposal. In 1978, Celanese removed all drums from the area and sent them to outside disposal facilities. By October 1981, concern about potential ground water contamination prompted Celanese to install 23 monitoring wells and to further investigate the site. The shallow ground water was discovered to be contaminated with organic compounds, but there was no indication that contaminants were migrating off-site. When these toxins were found at the site in 1983, Celanese promptly notified EPA.

In October 1984, Celanese agreed to conduct a preliminary investigation at the site to evaluate the extent of contamination, and possible cleanup alternatives. By August 1985 the preliminary study was complete, and the need for remedial work clearly established.

In October 1985, in a continuing effort to address public concerns, Celanese conducted tours for the public of the site's wastewater treatment facilities, the sludge burial sites, and the ground water monitoring well network. Following the tours, the company sponsored an informal public meeting to answer any questions a local citizen's group had about the site's history and the cleanup process.

To respond to public concerns, EPA also took several actions, including:

- Working with the state to provide sampling and analysis of private well drinking water;
- Holding public hearings and regularly disseminating information throughout the duration of cleanup; and
- Placing information on cleanup activities in two local repositories.



Cleans Site and Addresses Community Concerns

In February 1986, Celanese signed an agreement with EPA to begin investigating the nature and extent of site contamination. The company sampled existing wells and some off-site residential wells, conducted soil sampling, and installed additional monitoring wells. Seven residential wells were found to be contaminated; these residents were provided with an alternate water supply.

The cleanup process continued and, under two additional agreements signed with EPA, Celanese agreed to perform cleanup of contaminated ground water, sludge, stream sediment, and soil, as well as reimburse EPA for past costs associated with cleanup. Under the first agreement, signed in September 1988, Celanese agreed to clean up contaminated ground water with a multi-method approach:

- Ground water was treated with an innovative technology in which microorganisms (bacteria) consume some of the contaminants as food, breaking them down into harmless compounds;
- Ground water was then treated by a technology called "air stripping" whereby air was forced through the water, evaporating some major contaminants;
- For the remaining hazardous chemicals, the ground water was pumped through a "carbon adsorption" filtration system that removed the contaminants.

The ground water cleanup system became operational in August 1989, and the system continues to be monitored to ensure that EPA's target goals for contaminants are met. The estimated value of the ground water cleanup, including operation and maintenance costs, is $2.03 million.

In June 1989, Celanese signed a second agreement with EPA to clean up soil and sediments. The Celanese plan for this phase called for excavating and incinerating an estimated 1,800 cubic yards of sludge. The incineration process was temporary, taking only seven months, from May to December 1991, and was conducted on-site with a mobile kiln. At the beginning of the incineration process, a "trial burn" was conducted by EPA and Celanese to carefully monitor air emissions and ensure the steam from the incinerator met North Carolina's air emissions standards. Following incineration of the sludge, the ash was solidified in cement along with an estimated 1,200 cubic yards of burn pit waste and 600 cubic yards of plastic chips and sediment. The process of on-site incineration offered the added benefit of reducing transportation costs and eliminating possible chemical releases from transportation mishaps.

> **"Communication between EPA, Celanese, and the community demonstrates the effectiveness of the Superfund program in action."**
> – states one Shelby resident.

Concerned Community Gets Involved

Local town residents concerned with the potential hazards of ground water contamination, formed a coalition called United Neighbors for Cleanup (UNC), to represent the 3,000 people whose drinking water could be affected by contamination. In 1984, along with the Clean Water Fund and EPA, the UNC sponsored a public hearing to discuss the issues of ground water contamination.

UNC members were pleased and encouraged by Celanese's cleanup initiatives. One UNC representative and former employee at the Celanese plant said, "We feel lucky that Celanese took the initiative" to clean up the site with EPA. The community's involvement and Celanese's responsiveness demonstrate the effectiveness of the Superfund program in action.

Public Concern over the Use of Incinerators

Residents of the surrounding community voiced concerns over use of an on-site incinerator. At a public meeting, citizens of the Earl/Shelby area expressed the need for reassurance that air emissions from the incinerator would be safe. They knew that the stringency standards for air emissions in the State of North Carolina were lower than federal standards.

EPA assured the community that the incinerator would be

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What is Incineration?

Incineration is the burning of substances by controlled flame in an enclosed compartment. This process (1) detoxifies hazardous wastes by destroying organic compounds contained in the wastes, (2) reduces the volume of the wastes, and (3) converts wastes to solids by vaporizing water and other liquids the wastes may contain. Organic compounds (composed of carbon, hydrogen, and sometimes other elements) burn over a broad range of temperatures. Wood, oil, and coal, for example, are all composed of organic compounds that burn at relatively low temperatures. Some organic compounds, including those found in certain hazardous wastes, burn less readily and must be subjected to higher temperatures before they burn. A hotter fire also burns more completely than a cooler one. As a consequence, hazardous waste incinerators must maintain extremely high temperatures (typically ranging from 1800°F to 2500°F) to ensure that virtually all organic compounds in the wastes are destroyed.

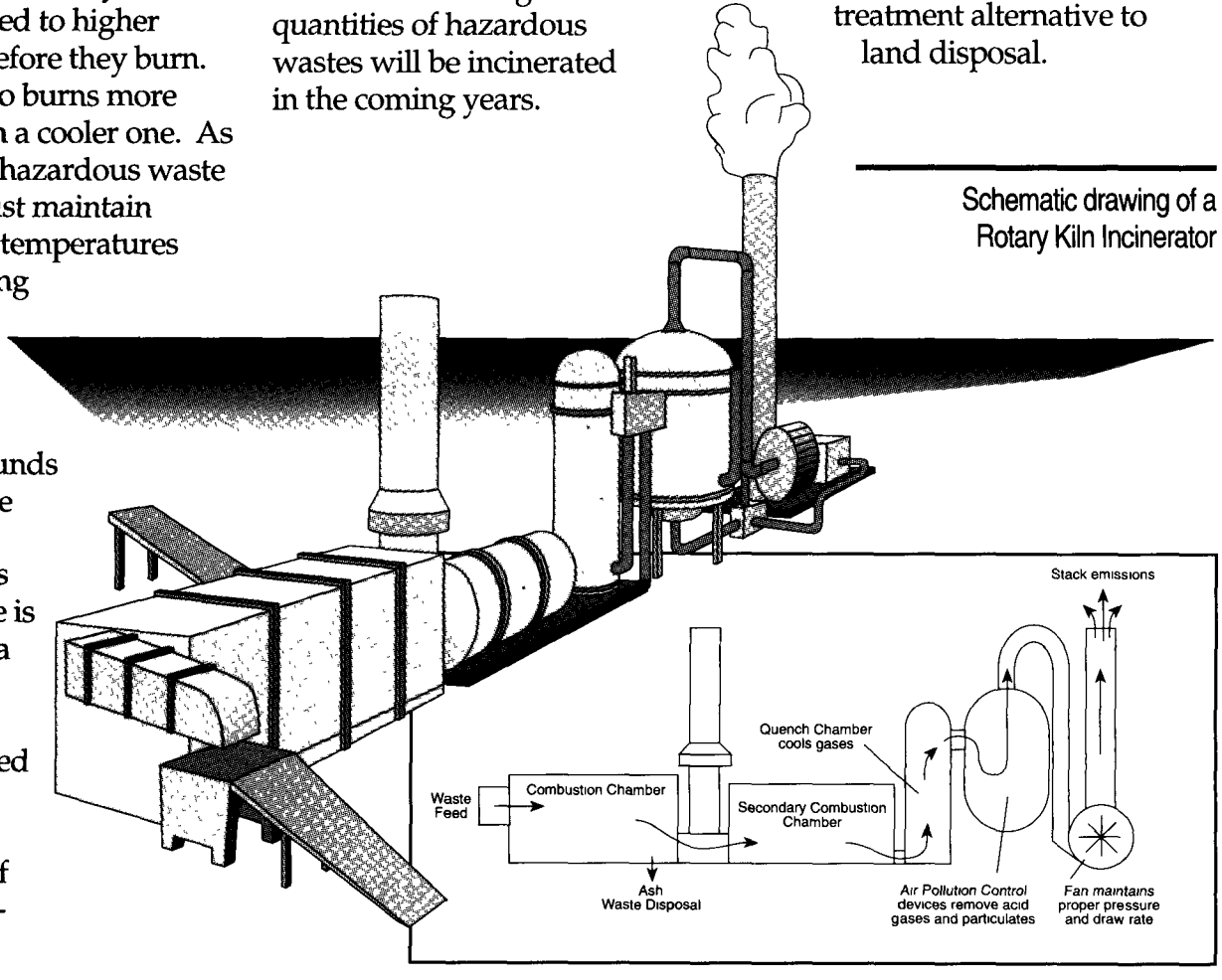
Incineration's main advantage is that it destroys a significant portion (under closely monitored conditions, commonly to 99.99 percent) of the toxic quantities of hazardous waste. It permanently reduces risks by destroying or reducing the hazardous character of the material, and is thus safer than long-term disposal on land.

Incineration has been used in the U.S. and Europe for many years. As of 1987, there were over 200 hazardous waste incinerators operating in the U.S. Most of these incinerators are used by companies for their own wastes; the remainder incinerate wastes on a contractual basis. Today, incineration is also playing an important role in the cleanup of many Superfund sites, where it is used for contaminated soils and other wastes removed from the site. EPA believes that greater quantities of hazardous wastes will be incinerated in the coming years.

Hazardous Waste Incineration: Why is it Important?

EPA expects that increased use of hazardous waste incineration will help eliminate the environmental problems caused by the mismanagement of hazardous waste. EPA research and independently prepared reports have concluded that hazardous waste incineration is safe and effective, in many cases, preferable to land disposal. In the Hazardous and Solid Waste Amendments (HSWA) of 1984, Congress enacted a ban on the land disposal of untreated hazardous wastes. EPA believes that incineration will play a major role in providing a treatment alternative to land disposal.

Schematic drawing of a Rotary Kiln Incinerator



Celanese Cleans Site

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subject to a range of oversight controls, particularly trial testing. The "trial burn" phase lasted from spring to early summer in 1991, with positive results: all of the state and federal air quality standards were met.

Celanese completed the incineration in December 1991. EPA maintained daily oversight to ensure that state and federal air emission standards were being met until completion of the process.

Throughout the second phase of cleanup, Celanese solidified the incinerator ash, plastic chips, burn-pit materials and sediment remains. These wastes were mixed with agents such as cement, to immobilize the waste and limit any movement of contaminants to soil and ground water. The solidification process was followed by on-site disposal of contained, solidified material into the on-site pits/trenches. The pits/trenches were covered over and Celanese finished regrading and filling the excavated area in early May, 1992. This phase of the cleanup cost an estimated $3.5 million.

Success at Celanese

EPA's Superfund program succeeded in gaining the Celanese Corporation's full participation during the innovative cleanup at the Shelby, North Carolina plant. Both Celanese and EPA have worked closely with the surrounding community to address local concerns about drinking water and incineration, while working cooperatively to permanently address the source of contamination. Thanks to Superfund enforcement and corporate initiative, Shelby residents once again have access to safe drinking water and a clean environment.

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