

Introduction

Contamination at the General Electric Co./Shepherd Farm Superfund site threatened public health and the environment. Following cleanup by the U.S. Environmental Protection Agency and potentially responsible party (PRP) General Electric, the site remains in continued use – businesses, homes and a park are located on site. The carefully designed cleanup made it possible for people to continue to live and work on site during the Superfund process.

Today, General Electric continues to operate its lighting manufacturing facility on site and remains an important regional employer. General Electric also maintains outdoor sports facilities – including tennis courts and a baseball field – on site. Small businesses active on site include an electronics manufacturer, an equipment services provider, and a vehicle rental and moving company. The retirement community on site provides more than 100 single-family homes as well as community space.

The continued use of Superfund sites helps sustain and revitalize local economies through jobs, business activity, tax revenues and spending. This case study explores the General Electric Co./Shepherd Farm area’s history, cleanup and continued use, highlighting the beneficial outcomes of Superfund cleanup and continued use.

Beneficial Effects

- On-site businesses employ over 400 people, providing over \$28 million in annual employment income to the community. In 2016, on-site business sales exceeded \$222 million.
- General Electric’s employee recreation facilities include basketball courts, tennis courts, a softball field, a children’s playground, a mini-golf course and a picnic area.
- The Spring Haven Estates retirement community includes about 125 homes and a community center.
- In 2016, on-site properties generated over \$100,000 in property tax revenues. Site properties are currently valued at more than \$14.9 million.

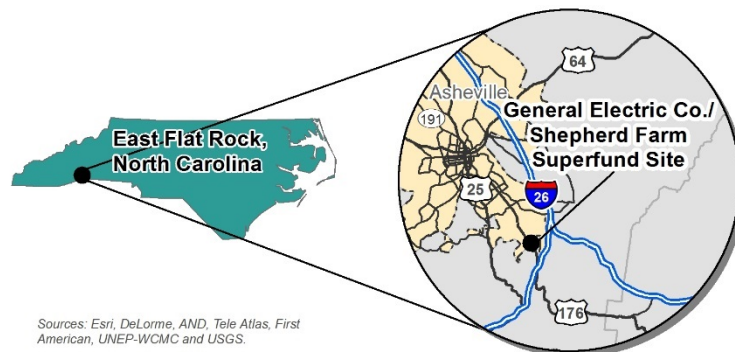


Figure 1. The site’s location in East Flat Rock, Henderson County, North Carolina.

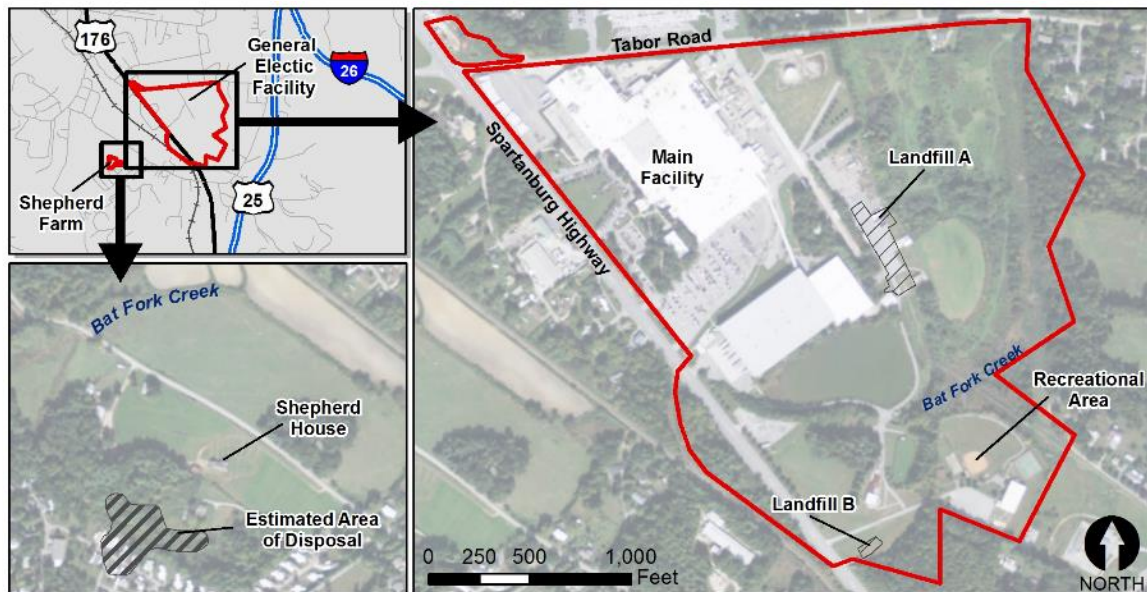
Site History

The 141-acre site is located in a mixed-use area in East Flat Rock in Henderson County, North Carolina. The site includes two main areas – the 110-acre General Electric Lighting Systems facility and the 31-acre Shepherd Farm sub-site. The Spartanburg Highway separates the two areas. Current site features at the General Electric Lighting Systems area include manufacturing facilities, warehouses, former landfills, a recreation area and the Spring Haven Estates residential community. The Shepherd Farm part of the site includes residential homes and agricultural land. Spring Haven Estates, the residential community on the Shepherd Farm property, includes 125 individual lots and a community center. The site previously included a 1-acre field on the northeast corner of Tabor Road and Spartanburg Highway, called the Seldon Clark subsite. EPA deleted this portion from the Superfund program’s National Priorities List in 1996. According to 2016 census data, about 114,000 people live in Henderson County.¹



Figure 2. Shepherd Farm property, where the PRP formerly disposed of manufacturing wastes.

General Electric’s design, development and manufacturing facility for high-intensity lighting systems has operated



Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, the GIS User Community and the 2004 FYR.

Figure 3. Site features and layout.

on site since 1955. Until 1975, the company also made electrical transformers, which contained polychlorinated biphenyl-laden oil, at the facility. During this early period of operations, workers disposed of polychlorinated biphenyl-contaminated wastes in landfills, sludge impoundments and waste treatment ponds on site. General Electric also stored fuels, paints, varnishes and liquid wastes in underground storage tanks on the property. Between 1957 and 1970, General Electric coordinated with a nearby farm, Shephard Farm, to dispose of waste from General Electric’s operations in a 3-acre ravine. For a few years prior to 1980, wet and dry sludge containing

¹ <https://www.census.gov/quickfacts/fact/table/hendersoncountynorthcarolina/SEX255216>.

metals and solvents from General Electric's wastewater treatment facility were disposed of in two unlined treatment ponds and near facility buildings. Together, these waste storage and disposal practices contaminated site soil and groundwater.

General Electric applied for waste permits for its facility in 1980. After the company began disposing of hazardous waste off site in 1984, EPA began conducting site inspections and investigating remaining hazardous waste and contamination at the General Electric Lighting Systems facility, the Shepherd Farm property and the Seldon Clark property, a 1-acre field adjacent to the site's northeast corner. The studies confirmed the presence of polychlorinated biphenyls in soil and volatile organic compounds in area groundwater. EPA added the areas to the National Priorities List in December 1994. EPA later took the Seldon Clark property off the National Priorities List, after sampling found that contaminants at the 1-acre property did not pose a risk to human health or the environment.



Figure 4. General Electric produced historical lighting systems, like the one pictured above, during its early years of operation.

Site Cleanup and Ensuring Safe Continued Use

Before EPA placed the site on the National Priorities List, General Electric took several measures to improve waste management and disposal practices, including following National Pollutant Discharge Elimination System guidelines for discharge of treated wastewater and installing clean air devices to improve air quality. In 1990, General Electric also began groundwater studies and design of a groundwater recovery and treatment system at the General Electric Lighting Systems facility. The final design includes four recovery wells, a 10,000-gallon treatment tank and an air stripping tower. Under the National Pollutant Discharge Elimination System permit, cleaned and treated water discharges to a water treatment pond on site.

After the site's listing on the National Priorities List, EPA began investigations to determine the full extent of contamination and to identify possible risks to on-site workers and residents. After the work finished, EPA selected a final cleanup plan to address soil and groundwater contamination in the site's September 1995 record of decision. EPA selected cleanup goals based on present and future land uses at the site, assuming that the General Electric Lighting Systems property would remain in commercial/industrial use and that the Shepherd Farm property would remain in residential use. General Electric signed a Consent Decree in September 1996 assuming responsibility for the cleanup. The company has led all cleanup activities, with technical assistance from its remedial contractors and EPA.

Seldon Clark Property

Sampling of the Seldon Clark Property revealed that contaminants at the 1-acre property did not pose a risk to human health or the environment. EPA issued a partial deletion of the Seldon Clark Property from the National Priorities List in 1996. Two businesses are located on the Seldon Clark Property, including 1st Line Supplies LLC and the Case Quality Sales Neighborhood U-Haul Dealer.

The site's long-term cleanup plan included extraction and treatment of groundwater using air stripping and carbon adsorption as well as continued surface water and groundwater monitoring. At the General Electric Lighting Systems property, cleanup included placement of a multi-layer cap over the Dry Sludge Impoundment to isolate and control contaminated soil. At the Shepherd Farm property, cleanup included excavation and removal of

contaminated soil. The soil was placed beneath the Dry Sludge Impoundment cap on the General Electric Lighting Systems property. General Electric and EPA also monitored wells on nearby properties, including a former residential property that now operates as an electronics repair business located adjacent to the General Electric Lighting Systems facility across Spartanburg Highway.

In 1997, General Electric installed an accelerated groundwater remediation system. It operated from 1997 to 2000. General Electric then built a permanent groundwater treatment system. It includes five wells at the General Electric Lighting Systems property and four wells at the Shepherd Farm property and the Spring Haven Estates residential community. The wells extract contaminated groundwater; an air stripper removes volatile organic compounds from the groundwater. Activated carbon treats the volatile organic compounds and the system also treats groundwater for metals. As of September 2013, the system had extracted and treated over 183 million gallons of groundwater and removed an estimated 325 pounds of total volatile organic compounds. Operation of the groundwater treatment system is ongoing to ensure long-term protectiveness.

General Electric transported landfill materials to the Dry Sludge Impoundment, filled in excavated areas with clean fill, paved some areas and replanted other areas with grass. Workers also removed contaminated materials from small areas around the landfills and next to the Dry Sludge Impoundment. Soil cleanup and cap construction finished in April 1999.

Because the cleanup left waste in place at levels that do not allow for unrestricted land use, land use restrictions ensure the long-term protection of human health and the environment. The Dry Sludge Impoundment area is also fenced to restrict access and trespassing.

Spring Haven Estates

The Spring Haven Estates residential retirement community has been located on the southern part of the Shepherd Farm property since 1975. Cleanup of the property included excavation and consolidation of impacted surface soil from the Shepherd Farm property and placement of these soils beneath the Dry Sludge Impoundment cap on the General Electric Lighting Systems property. Cleanup also included supplying bottled water, connecting residents to the municipal water supply and groundwater monitoring.

During soil excavation, General Electric exercised due diligence to ensure the safety of Spring Haven Estates residents and temporarily relocated 14 families while the company excavated



Figure 5. Groundwater treatment facility at the General Electric facility, which has extracted more than 183 million gallons of groundwater and removed an estimated 325 pounds of total volatile organic compounds.



Figure 6-7. Entry sign for Spring Haven Community (above) and the community center building (below).
Figure 7 Source: Spring Haven Estates

contaminated soil from a 4-acre area. Excavation began in October 1997; workers removed 7,034 cubic yards of contaminated soils. General Electric and its contractors worked quickly to minimize disruptions; the work took three weeks and residents returned to their homes in November 1997. Cleanup included installation of crawlspace liners in homes in the excavation area to make sure residents would not come in contact with any remaining soil contamination. In 2014, EPA inspected these liners and all were intact.

General Electric continues to monitor groundwater wells in the Spring Haven Estates community and provides potable water to residents. A 2010 residential well survey confirmed that there were no new groundwater wells in the area, residents have access to the municipal water system, and residents living near the General Electric Lighting Systems property had begun to properly close and abandon groundwater wells on their properties.

Beneficial Effects

Residential Community

The site's cleanup plan minimized disruption of people's lives and ensured that people could remain in their homes during most activities. The Spring Haven Estates community caters to retirees and senior citizens and provides affordable housing options. Amenities include a community center that hosts regular events. There are about 125 homes in the Spring Haven Estates community. Additionally, General Electric conducted well surveys and groundwater monitoring to ensure other surrounding residential homes were not impacted by contamination.

Businesses and Jobs

General Electric Lighting Systems

The company's 13,200-square-foot facility continues to provide skilled jobs and employment income for the community. General Electric, one of the region's major employers, makes lighting components and systems at its facility. Products produced include energy-saving light emitting diode outdoor lighting fixtures for commercial, institutional and government applications. On an average day, the facility produces and ships about 3,000 lighting systems.² Since 1955, the facility has produced more than 50 million lighting units.³ The business contributes an estimated \$28 million in annual employment income. Estimated annual business sales in 2016 reached nearly \$222 million.

Shortly after beginning its operation in 1955, General Electric constructed a recreational area for the benefit of its employees and former employees. This area includes both indoor and outdoor basketball courts, tennis courts, a softball field, a



Figure 8-9. General Electric Lighting facility on site (above). Workers at the facility assembling lighting components (below). Source: General Electric

² <https://www.hendersonvillelightning.com/news/6524-ge-puts-lighting-division-on-the-block.html>.

³ <https://www.genewsroom.com/press-releases/40-million-investment-realized-ge-lighting%E2%80%99s-hendersonville-nc-plant-home-roadway>.

children's playground, a mini-golf course and a picnic area. General Electric estimates that 150-300 employees and former employees use this area weekly.

1st Line Supplies LLC

This company is located on the Sheldon Clark property, which EPA took off the National Priorities List in 1996. 1st Line Supplies LLC provides uniforms, boots and accessories. It also supplies metal carports and outdoor storage units. The business provides more than \$100,000 in annual income.

Case Quality Sales U-Haul Neighborhood Dealer

This business is also located on the former Sheldon Clark property. The company provides vehicle rental and moving services. The business contributes an estimated \$88,000 in annual income and generated nearly \$101,000 in sales in 2016.

CB Electronics

This company is located across Spartanburg Highway the General Electric Lighting Systems property. Groundwater monitoring included wells on the property. CB Electronics restores antique televisions and builds custom electronics. The business contributes more than \$26,000 in annual employment income and generated about \$55,000 in sales in 2016.



Figure 10. Case Quality Sales and 1st Line Supplies LLC operate at the Sheldon Clark property.



Figure 11. CB Electronics has been restoring antiques and building custom electronics since 1996.

Property Values and Property Tax Revenues

Properties cleaned up under the Superfund program that remain in continued use provide tax revenues for local municipalities, providing funding for schools, local government operations and transit. The 2017 value of land and improvements at the General Electric Co./Shepherd Farm site was over \$14.9 million. The properties contributed over \$100,000 in annual property taxes. On-site businesses that produce retail sales and services also generate tax revenues through the collection of sales taxes, which support state and local governments.³

3. The combined sales tax rate in Henderson County is 6.75 percent. This includes sales tax rates for the state, county and city. For more information, see the Henderson County Economic Development website: <http://gohendersoncountync.org/dyn.php?page=taxes.php>.



www.epa.gov

Conclusion

Collaborative efforts by EPA and General Electric and the parties' ongoing coordination with site businesses and residents have made the site's cleanup possible. In turn, cleanup has ensured the safe continued use of the area for commercial and industrial facilities, the Spring Haven Estates retirement community, and recreation facilities for General Electric's employees. Looking forward, collaboration among EPA and site stakeholders will ensure that this Superfund cleanup continues to yield valuable benefits for the East Flat Rock community.



Figure 12. Recreational facilities include a softball field and outdoor basketball court. Figure 12 Source: General Electric

For more information about EPA's Superfund Redevelopment Initiative (SRI), visit:
<http://www.epa.gov/superfund-redevelopment-initiative>.



In May 2017, EPA established a task force to restore the Superfund program to its rightful place at the center of the Agency's core mission to protect health and the environment.

epa.gov/superfund/superfund-task-force



www.epa.gov

Reuse and the Benefit to Community General Electric Co./Shepherd Farm Superfund Site

Technical Appendix

Employment Information for On-Site Jobs

EPA obtained the data included in this appendix directly from reputable sources and reported the data as presented by those sources. Information on the number of employees and sales volume for on-site businesses came from the Hoovers/Dun & Bradstreet (D&B) database.¹ In some instances, business and employment information came from local business representatives. EPA also gathered information on businesses and corporations from D&B. D&B maintains a database of over 225 million active and inactive businesses worldwide.

Wage and Income Information for On-Site Jobs

EPA obtained wage and income information from the U.S. Bureau of Labor Statistics (BLS). Part of the U.S. Department of Labor, the BLS is the principal federal agency responsible for measuring labor market activity, working conditions and price changes in the economy. All BLS data meet high standards of accuracy, statistical quality and impartiality.

EPA used the BLS Quarterly Census of Employment and Wages database to obtain average weekly wage data for businesses at the General Electric Co./Shepherd Farm Superfund site. Average weekly wage data were identified by matching the North American Industry Classification System (NAICS) codes for each type of business with weekly wage data for corresponding businesses in Henderson County. If weekly wage data were not available at the county level, EPA sought wage data by state or national level, respectively. In cases where wage data were not available for the six-digit NAICS code, EPA used higher-level (less-detailed) NAICS codes to obtain the wage data.

To determine the annual wages (mean annual) earned from jobs generated by each of the selected businesses at the General Electric Co./Shepherd Farm Superfund site, EPA multiplied the average weekly wage figure by the number of weeks in a year (52) and by the number of jobs (employees) for each business.

¹ <http://www.dnb.com/>

Table 1. General Electric Co./Shepherd Farm Superfund Site: Information for On-site Businesses

On-site Business	NAICS Code	NAICS Title	Number of Employees ^a	Average Weekly Wage (2016) ^b	Annual Wage (Mean Annual) per Employee	Total Annual Income ^c	Annual Sales (2016) ^a
1st Line Supplies LLC	423990	Other Miscellaneous Durable Goods Merchant Wholesalers	2	\$976	\$50,752	\$101,504	\$87,550 ^d
Case Quality Sales U-Haul Neighborhood Dealer	532120	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing	2	\$845	\$43,940	\$87,880	\$100,990
CB Electronics Inc.	811211	Consumer Electronics Repair and Maintenance	1	\$509	\$26,468	\$26,468	\$55,000
General Electric Lighting Systems	423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	400 ^e	\$1,353	\$70,356	\$28,142,400	\$221,890,000
Total			405			\$28,358,252	\$222,133,540

^a Data are from the D&B database.

^b Average weekly wage per employee based on BLS 2016 Average Weekly Wage data.

^c Total annual income figures derived by multiplying “Number of Employees” by “Annual Wage (Mean Annual) per Employee.”

^d While sales values typically exceed estimated totals of annual employee income, annual reported sales can sometimes be lower than estimated annual income. This atypical condition of estimated income exceeding sales can be a result of business conditions, estimated business wages not accurately reflecting actual wages for the site-specific business, annual sales being under-reported, a business loss for the year or a combination of those factors.

^e Employee number provided by General Electric representative.

Property Values and Local Tax Revenue Generated from Property Taxes

EPA obtained data on the most recently assessed values for property parcels at the General Electric Co./Shepherd Farm Superfund site in February 2017 through property records accessible through Henderson County's online property appraisal database². EPA also obtained 2016 property tax information for the site parcels.

Table 2. Property Value and Tax Summary for Taxes Payable in 2016

Parcel ID No.	Parcel Address	Total Market Value of Land and Improvements (2017)	Total Property Tax (2016)
9928729	3010 SPARTANBURG HWY	\$11,826,100	\$81,009
113512	423 TABOR RD	\$58,400	\$400
102512	2712 SPARTANBURG HWY	\$220,200	\$1,508
1010945	1 DEAD END DR	\$205,400	\$964
9939442	107 SPRING HAVEN DR	\$37,600	\$258
9939401	109 SPRING HAVEN DR	\$38,000	\$260
9939441	111 SPRING HAVEN DR	\$22,500	\$154
9939400	113 SPRING HAVEN DR	\$31,700	\$217
9939399	115 SPRING HAVEN DR	\$35,800	\$245
9939398	117 SPRING HAVEN DR	\$26,700	\$183
9939397	119 SPRING HAVEN DR	\$27,300	\$187
9939396	121 SPRING HAVEN DR	\$27,300	\$187
9939395	123 SPRING HAVEN DR	\$22,300.00	NA
1018943	100 SPRING HAVEN DR	\$2,183,100	\$14,954
9939413	106 SPRING HAVEN DR	\$43,100	\$100
9939447	108 SPRING HAVEN DR	\$33,100	\$227
9946944	110 SPRING HAVEN DR	\$17,600	\$121
9939448	202 APRIL SPRING CT	\$39,500	\$271
9939405	112 SPRING HAVEN DR	\$36,200	\$248
		\$14,931,900	\$101,492

NA = Not Available

² <http://taxinfo.hendersoncountync.org/>