

Secret Government Research on the Upper Main Line

Processing Lithium and Zirconium at the Foote Mineral Company

By Richard Kurtz

In the 1940s and '50s, Berwyn, Paoli, and Malvern were very small communities where folks knew every aspect of community life, or so everyone thought. In reality, secret government research was conducted on the Upper Main Line, much of it by the Foote Mineral Company.¹

In 1876, Foote Mineral Company was founded in Philadelphia by Dr. Albert E. Foote, a nationally renowned expert in mineralogy. The company had research facilities on the old Dobson Estate, which still stands near the "Falls of the Schuylkill" near Ridge Avenue. In 1942, the Foote company purchased an old limestone quarry site in East Whiteland Township in cooperation with the Defense Plant Corporation, which financed much of America's industrial expansion during WWII. This site was ostensibly used to produce strontium nitrate, used in military flares. It now appears in hindsight that the work of producing flare components was always subservient to the production of two chemical elements, lithium and zirconium, which had more strategically important uses.



Looking north, an aerial view of the Foote quarry site in East Whiteland Township in the 1940s. *Photo courtesy of the author.*

Few, if any, local residents knew that “secret government work” was being performed by the Company at several sites on the Upper Main Line, let alone the nature of that work. Even fewer ex-employees are still available to talk about the operations which took place. The author is indebted to his friend, Joseph Pezzotti, who graduated with the author from Tredyffrin Easttown High School in 1950 and thereafter spent 50 years working in the research department of Foote Mineral Company. His co-employee, Walt Kramer, was an engineer with even more experience with Foote. We are indebted to Joe and Walt for much of the information in this article; about the processing of lithium at the old limestone quarry in East Whiteland Township, and the processing of zirconium at other Foote facilities in our area.

The quarry is now a hazardous waste site because of the toxic nature of lithium. The toxicity of lithium was not completely understood in the 1940s and ‘50s when hundreds of local residents were employed in the processing facilities of the Foote company. Access to the property is now restricted, but a map of the site can be viewed on the internet and is reproduced below.²

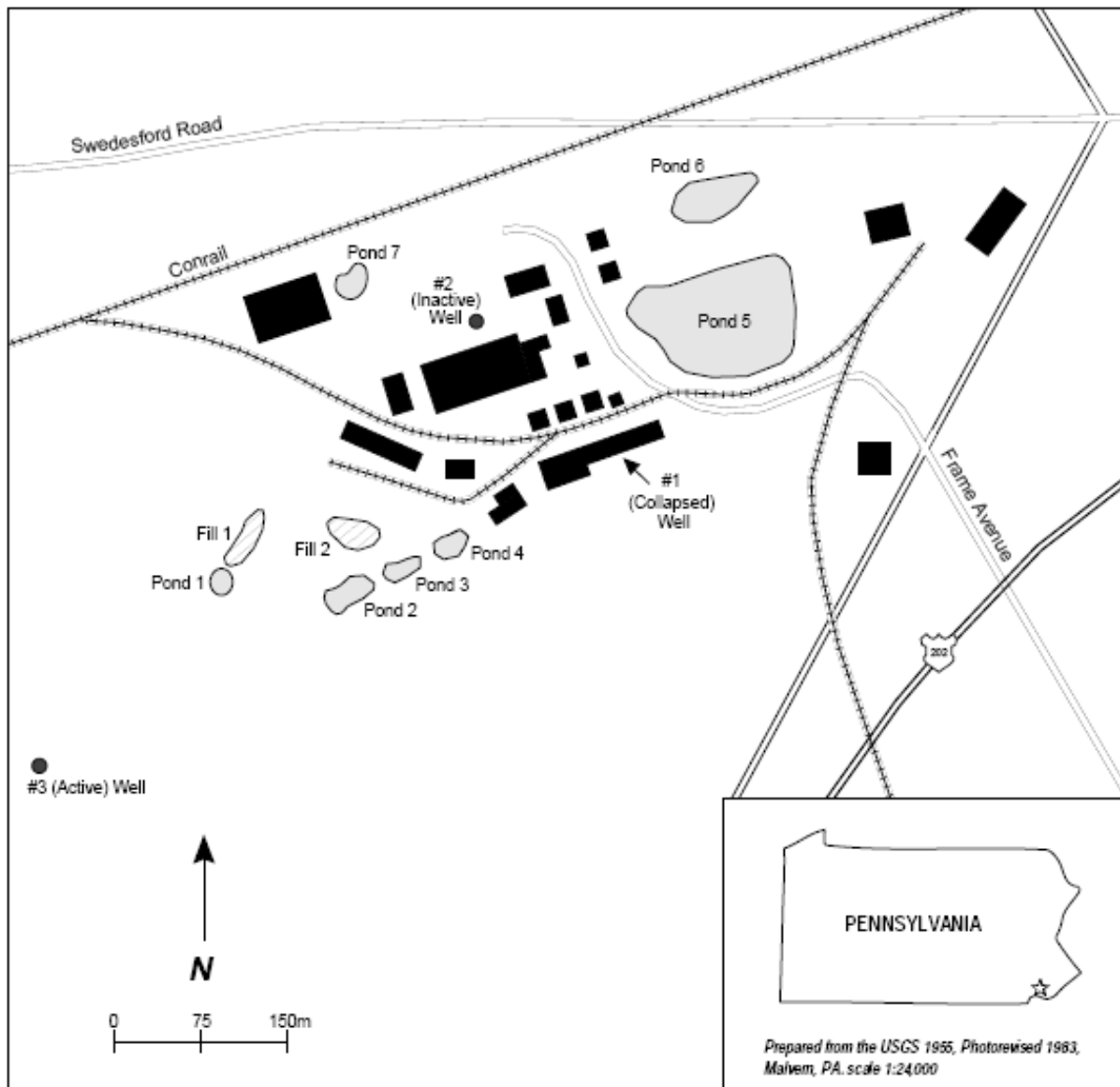
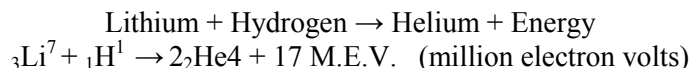


Figure 1. The Foote Mineral Company in East Whiteland Township, Pennsylvania, showing pond and fill areas of the site (PADER undated.)

In the 1940s, serious efforts toward nuclear technology were just developing. As we subsequently learned, lithium was an ingredient in a nuclear reaction. Lithium was bombarded with protons to produce helium ions with energies many times greater than that of the bombarding protons. The partial conversion of some of the mass of lithium into helium is in accordance with the following nuclear reaction:³



The Great Valley has large deposits of limestone which have been quarried and processed into agricultural limestone since colonial times. Foote was not primarily interested in quarrying limestone, but rather using the old quarry site to process lithium ore which was shipped to the Valley by rail or truck from Kings Mountain, North Carolina.

Local Foote Operations

After purchase of the East Whiteland property, Foote moved all of its mineral grinding operations to East Whiteland. Shortly thereafter, Foote built a large pilot plant in Exton. This plant was located on Route 100 near the present Main Street at Exton retail center. From this plant, samples of various chemical elements, such as zirconium, were made. These samples were used by the government to evaluate their usefulness for nuclear weaponry.

Until 1959, the main offices of Foote Mineral Company were in Germantown in North Philadelphia. At that time, the offices were moved to Route 100 in Exton. The Foote pilot plant was well known by local residents, but few knew that Foote also had facilities in Berwyn. In about 1952, Foote Mineral Company opened offices and a research center in what had been the old Berwyn Primary School on Lancaster Pike in Berwyn.



Foote's Exton facility, looking north in this aerial view, with Route 100 running to the top right-hand corner. *Photo courtesy of the author.*

Lithium and Zirconium Processing

Zirconium is a crystalline material which is “grown” on a starter filament in an electro-chemical process. The government was interested in using zirconium as a cladding material for the fledgling nuclear submarine program. Foote Mineral Company agreed to produce sample zirconium rods for use by the Atomic Energy Commission. High security clearance was needed to work on this project. Ductile zirconium is produced by the iodide process which had been proposed by two Dutch scientists. A rod of ductile zirconium was successfully produced at the Foote facilities. Walt Kramer was chosen to deliver a sample rod to the Atomic Energy Commission in New York City. In his own words, here is Walt’s story of that delivery:

In the early 1950s I was given the honor of taking the crystal rods up to a hotel room in New York City. I traveled by train from Paoli to Penn Station, New York. I went up to either the 10th or 12th floor. I was told the room number. I knocked on the door, the door opened up about 2 feet, I handed them the box; boom! They shut the door and that was it. I took the train back to Paoli and never had a chance to tell them of the months of hard work we spent making that little rod of ductile zirconium.

Foote Mineral Company was acquired in 1988 by Cyprus Minerals Company, which still operates large plants in Tennessee and other places that make lithium and zirconium products. Aside from government work, lithium has many uses, including compounds which extend the life of rubber tires, and compounds used in the medical treatment of depression.

Unfortunately, lithium is a corrosive, toxic material thought to be a carcinogen. The Energy Employees Occupational Illness Compensation Act of 2000, Public Law 106-398, established a program to provide compensation to individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities. The Foote Mineral Company site in East Whiteland is on that list.



Once home to Foote offices and research laboratories, today’s Berwyn Primary Office building was built in 1912 and called the Berwyn Primary School. In 1932 the Tredyffrin School Board rented the then-vacant building from the Easttown authorities, refurbished and renamed it the Lincoln Highway School, and used the school for segregated education until 1934. After re-integration, the Lincoln Highway School finally closed as an educational facility in 1939. *Photo courtesy of Roger D. Thorne.*

The secret processing of lithium and zirconium in the Upper Main Line area is an important part of our history. The Foote Mineral Company is gone from our area, but its contribution should not be forgotten.

NOTES

1. Foote Prints, Vol. 42 , No.1, 1976. This is a learned journal published by the company and “devoted to subjects of general scientific interest.”
2. PA Department of Environmental Protection, East Whiteland Township, Pennsylvania. Cerclis #PAD077087989.
3. Fromm, James Richard. *Harnessing of Nuclear Fission: The Story of the Atomic Bomb, 1934-1945.*