FOOTE MINERAL
@ SUNBRIGHT (HORTON'S SUMMIT)

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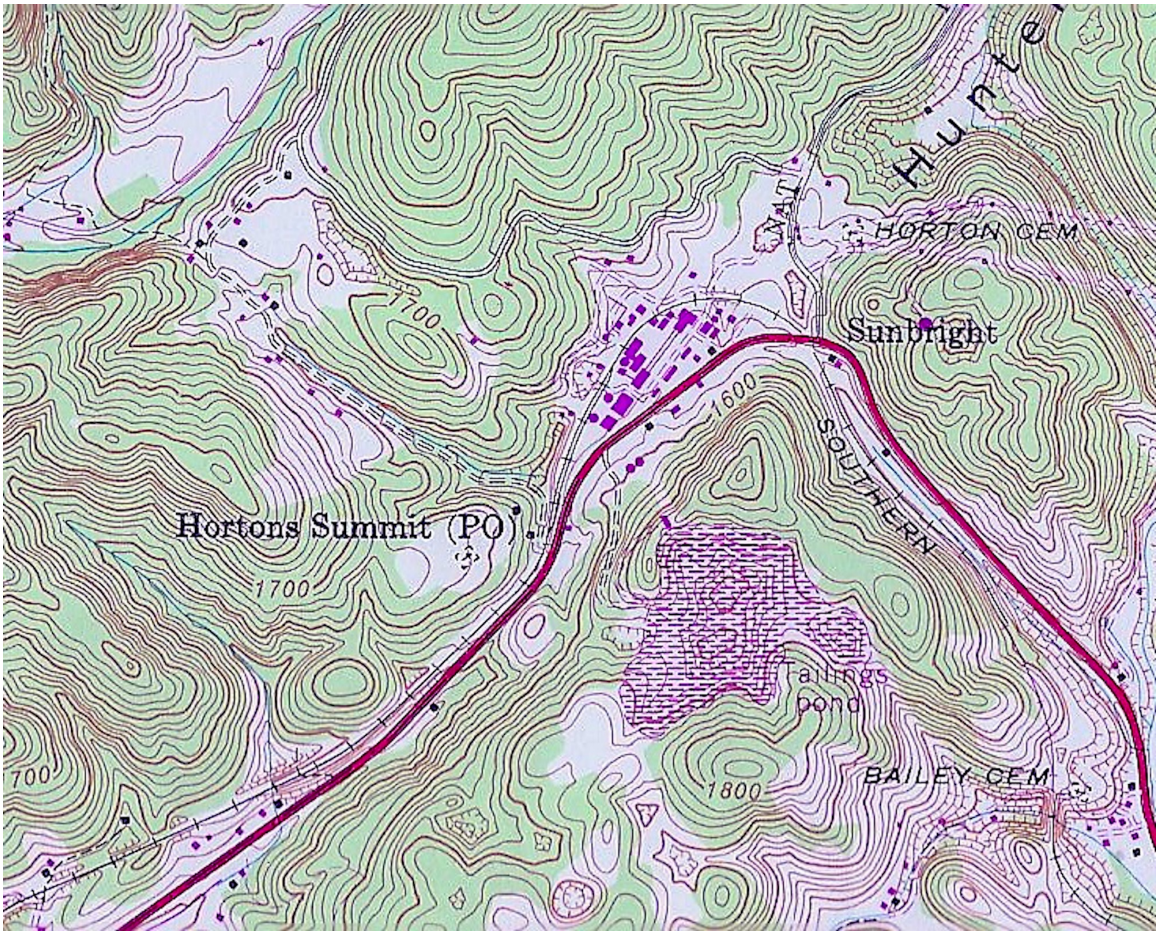
Big Stone Gap, Virginia
Nov. 18, 2017
Version 11-26-17

About 1888 the South Atlantic and Ohio Railroad, which was building a line to the Big Stone Gap coalfields from Bristol, Virginia, arrived at the saddle divide between Cove Creek and Little Flat Lick Creek, which is also the divide between the valleys of the North Fork of the Clinch and the main Clinch River. The site was of some importance, because the trail leading across Powell Mountain to Big Stone Gap via Maple Gap began here. The railroad moved material to be used in building the railroad to Big Stone Gap via oxen by this route. The site also provided access to Hunter's Valley. A depot was located here called Horton's Summit, named after a family that lived there. Later, a post office was established in a country store at the intersection of the Wilderness Road and the road across Powell Mountain. It also was named Horton's Summit. Between 1901 and 1903 the railroad began to search for a new name, perhaps because of potential confusion with the depot at Summit, South Carolina. The SA&O time schedule in 1903 used the name 'McRae', but by 1905 the name had been changed to 'Nora'. The schedule of 1909 had changed the name to 'Sunbright', a name that had no previous connection to the site.(1, 2, 3) Despite this official change in the depot's name, the crewmen that ran the local from Appalachia, and which serviced Foote Mineral, continued to use the term 'Horton's Summit'.(4)

As the SA&O was building through the area, geologists in 1909 discovered and described a very pure grade of limestone at Horton's Summit. It earlier had been found at Newman's Ridge on the Tennessee line, and was therefore named the 'Newman Limestone' (the modern name is Greenbrier Limestone). The published assay of this stone as found at Horton's Summit showed a very high calcium content, with little impurities such as shale or magnesium (dolomite). It was noted to lay "not far from the tracks of the Virginia and Southwestern Railroad" (which had bought the SA&O in 1910). Its analysis showed 1% aluminum oxide, 1% iron oxide, 49% calcium oxide, 90% calcium carbonate, and 2% magnesium. (The oxide and carbonates of calcium are alternate forms, and the percentages are not additive)(5)

Interestingly enough, there is another outcropping of Newman Limestone on the southern entrance to the gap in Stone Mountain at the Town of Big Stone Gap. There, the slope of the limestone is towards the sky pointing towards the southeast. The layer of stone is 300-400 feet thick. The analog of this anticline in the Newman Limestone is that which is found at Horton's Summit, where it is diving underground sloping toward the southeast. These circumstances indicate the

previous existence of a high mountain that once connected the Stone Mountain and Horton's Summit formations, and which has long since been eroded away.(5, 6)



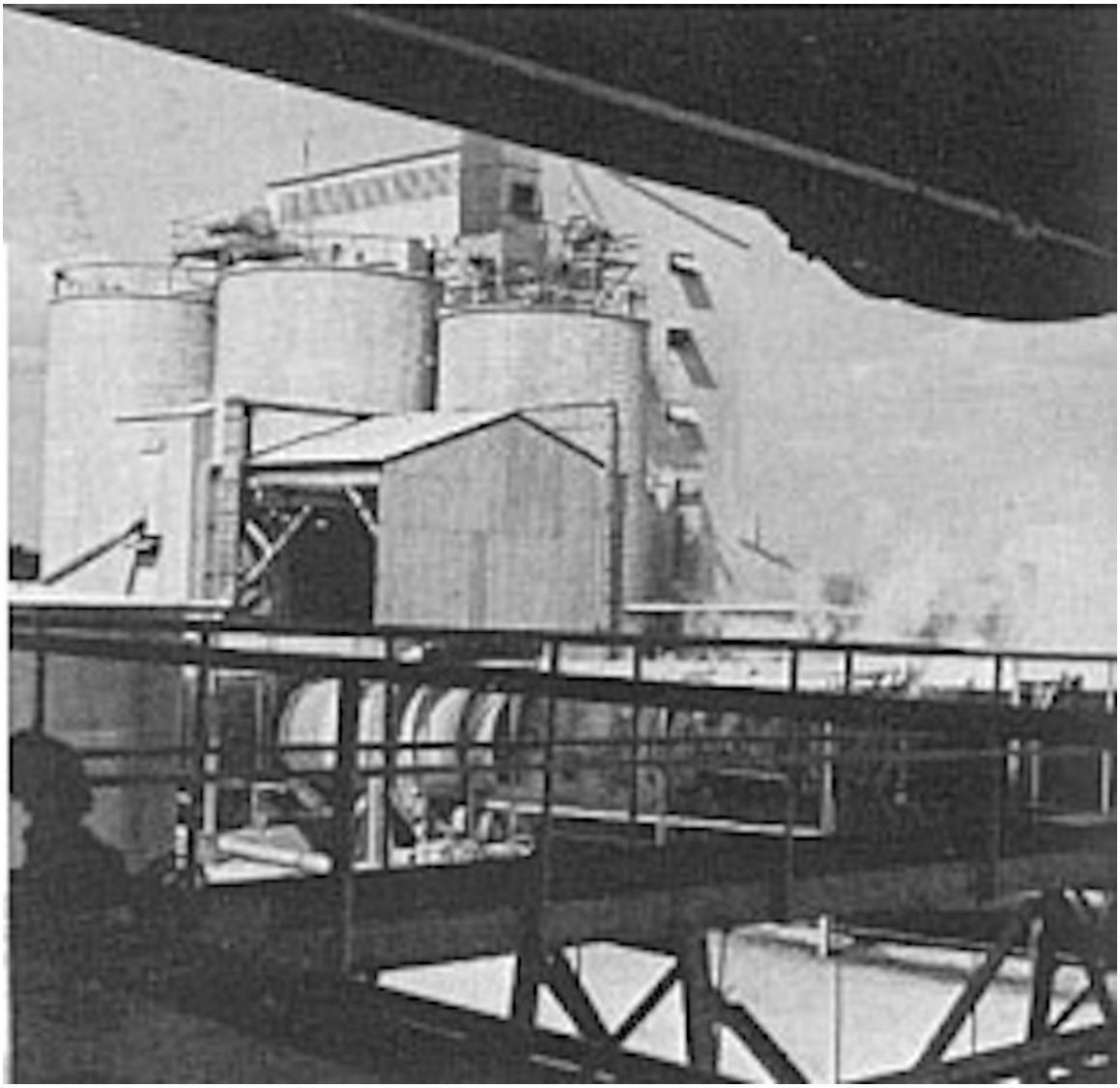
FOOTNOTE #19

DESCRIPTION OF TOPOGRAPHIC MAP
OF FOOTE MINERAL, SUNBRIGHT, VA.

1 – Foote Mineral plant – center of illustration
2 – mine – end of road in northwestern plant grounds
3 – rotary kiln – center of plant, running southwest to northeast
4 – scrubbers and smoke stack – northeastern end of rotary kiln
5 – Southern Railroad sidetrack – west of plant grounds
6 – two electric lines – coming in from northeast
7 – open alkali vats – the two rectangular structures next to highway at the southwestern corner of the plant
8 – classroom – the building closest to the highway in the southeastern plant site; to the left of the entrance gate
9 – tailings pond – top of the hill south of the plant
10 – road to Maple Gap – northwest of plant, heading north

In 1953 Foote (pronounced locally as 'foot', but more properly as in 'toot') Mineral Company opened a plant here.(7) It already had a lithium plant in Pennsylvania, which had been built in 1941. The public was told that it produced

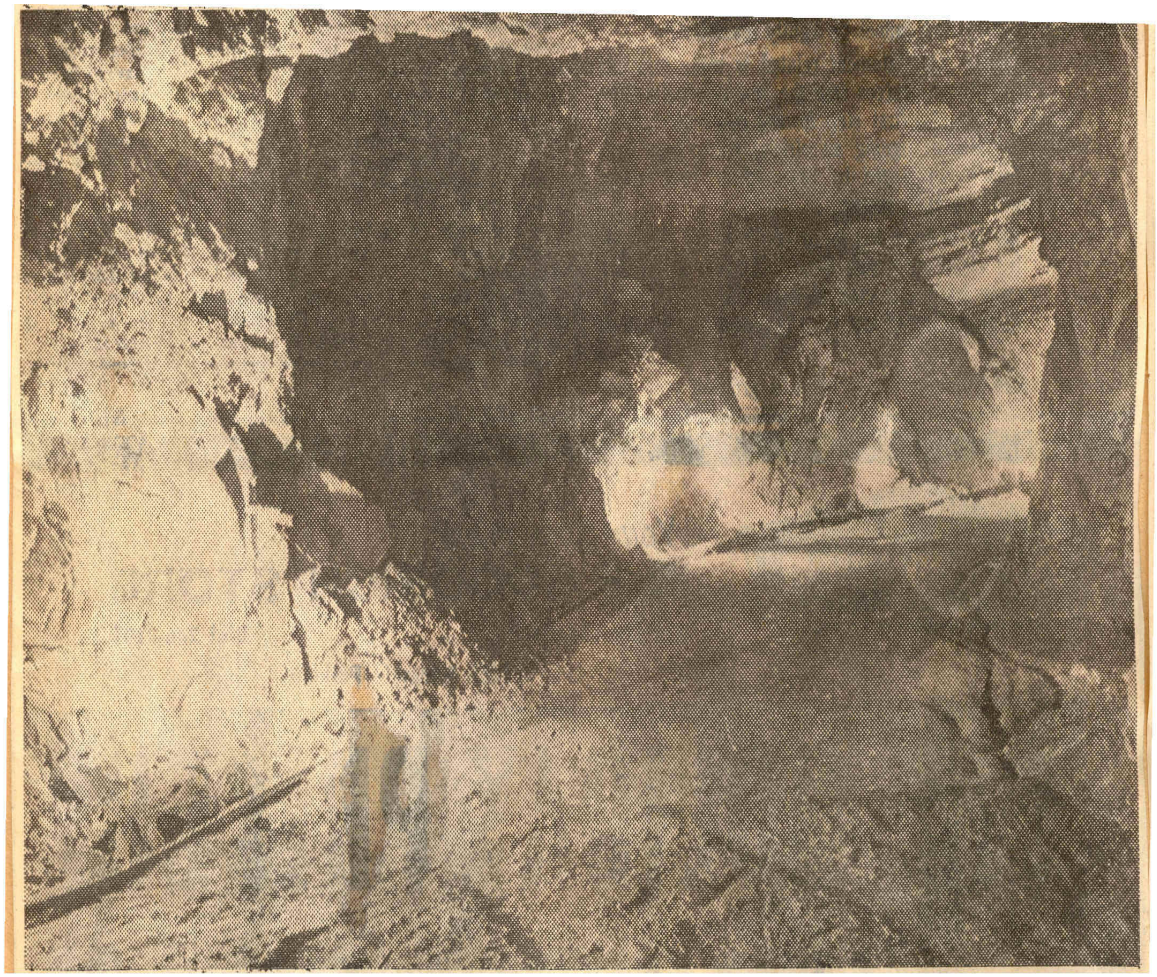
'lithium, which was used to make the white baked enamel finish on kitchen appliances and on bathtubs'.(8) At other times student groups were told that the lithium made at Sunbright was used in grease.(9)



GOOGLE IMAGES

THE FOOTE MINERAL PLANT AT SUNBRIGHT, VIRGINIA

The camera is located in the southern end of the facility looking north. The photographer is standing on the catwalk over the alkali vats near the emergency showers which were to be used if someone were to have fallen into the caustic fluid contained in them. In the center left background are the storage silos for the raw minerals to be processed. The tall structure in the center right was at the entry to the rotary kiln, from which the crushed raw minerals were dumped. The discharge gasses generated in the kiln vented into the smoke stack here. After the lawsuit it contained the scrubbers. The structure in the left foreground and that looks like a horizontal belted tin can is the ball mill that pulverized the oar, limestone, and coal.



GOOGLE IMAGES

The limestone mine at Foote Mineral at Sunbright, Virginia. The camera is looking toward the entrance, or to the northwest. The slope is the natural dip in the Newman Limestone formation.

The plant was abolished in 1971(10), after which the public was informed that Foote Mineral had been a front organization of the Atomic Energy Commission. The process of turning an atomic bomb into a hydrogen one involved encasing an atom bomb in a jacket of lithium deuteride.(11, 12, 13, 23, 24)

Lectures to local high school science students were a regular feature of the Sunbright operation. Their lectures stated that the ore containing lithium was called 'spodumene' (pronounced as 'spod – u – main'), which was mined at Kings' Mountain, North Carolina. Chemically spodumene is lithium aluminum inosilicate. This ore required large amounts of pure limestone and coal to process. It was said that an unusually pure vein of limestone existed at the site, and that very pure coal was being mined near Appalachia. It was cheaper to bring the spodumene to the coal and limestone than to haul them to North Carolina.(8)

The lecturer said that one of the characteristics of such a pure vein of limestone was that it gave off vapors that could be seen ascending the mountain at night, leading to a frequent association of ghost stories with these locations.

The students were toured through the plant. To its north side was an underground limestone quarry referred to as a 'mine'. It had ceilings 40 feet high. The limestone, and spodumene were crushed in a ball mill, and then sent to a rotating kiln where coal was blasted into the lower end of the massive pipe shaped kiln, and burned at high temperatures. The lower end (to the southwest) had a swivel mounted 10 gauge shotgun that the employees used to break up clinkers in the kiln.(8)

Massive amounts of electricity were then used to separate the resulting product. Foote had required two different power lines originating from two different suppliers to supply this plant. These power lines traversed the Fugate Farm in Rye Cove by different routes.(14)

Large concrete tanks were used to further separate the chemicals. The thick milky material in these vats was caustic, and were said to be 'like lye'. Out of this process came the final product, which was said to have been 'lithium hydroxide monohydrate'.(8)

The discards of this process were two. There were massive amounts of white powder blown out the high smoke stacks at the upper ends of the rotary kilns. The caustic liquid left from the separation vats was taken to the top of the hill south of the plant, where it was dumped into 'settling ponds'. The dust settled the area for half a dozen miles around, and covered it like someone had shaken a flour sack over it. The public was told that it was 'nontoxic', but the public also noted that it killed the fish and snakes in the creeks.(15)

About five years after the Sunbright plant was opened, local citizens came together and brought suit against Foote over the dust cloud. The settling pond, located on top of the pointed end of Purchase Ridge, and across the highway to the south, was not an issue. Raymond C. Shannon, an attorney from Appalachia, Virginia was chosen to represent this group. Perhaps part of the reason for his selection was that he was not from Scott County. The group solicited further local people to become participants in the suit. Some refused, saying that "it was not right to ask an industry to set up a business in the community, and to then sue them".(16)

At the time of the suit, neither the suing citizens of Scott Co., nor Shannon (everyone, including his wife, called him by his surname), nor anyone else knew that the actual force behind Foote Mineral was the Atomic Energy Commission. Not only that, but the concepts of 'pollution' and 'environment' were not in the common vocabulary. Municipal sewer systems customarily dumped untreated sewage, including whatever chemicals industries might have emptied into them, straight into the streams. Home, as well as industrial smoke stacks, spewed all kinds of chemical

waste gasses into the air. Sinkholes were commonly used as disposal sites for dead animals, garbage, old stoves, and old automobiles. The Town of Big Stone Gap dumped part of its untreated sewage into a cave well into the 1960's. Suing one's neighbor over his doing one of these activities was viewed with horror. One minded one's own business, and did not interfere with someone else's life.

Everyone was surprised when Shannon won his lawsuit. There was a cash settlement with the suing parties. A typical payout was about $600 to the average local farmer.(16) More importantly, as part of the settlement scrubbers were installed in the smoke stacks. They immediately removed all the visible dust. It should be noted that scrubbers were known technology at the time the plant was built. Foote, and more likely the Atomic Energy commission, obviously had made the decision that the citizens of Scott County were not worth the cost of installing the scrubbers.

No one at the time took notice of the seismic quake that this suit was to bring internationally. It was the first time citizens sued a corporation over its pollution. Soon, the terms 'pollution' and 'environment' were in everyone's minds. A continuing avalanche of such suits started. Even the government, arguably the worst polluter of all (either directly or indirectly by means of its contractors), got on the bandwagon, and formed the Environmental Protection Agency. But such was the case. These farmers from Scott County, and Attorney Shannon changed the world, without even thinking about the enormity of what they were doing.

But the kicker on top of all this was the fact that the people of Scott County and Shannon had actually taken on a surrogate of the Federal government at the height of the Cold War, and won! Shannon (5-29-1904 to 7-10-1987)(17) lived to see the unfolding results of his work.

The character of Shannon is very much a part of this story. After the Foote Mineral Company suit he took on the case of a jeep wreck, and sued the manufacturer over their responsibility for design flaws in their product. The result was that he not only won his suit, but he sat in motion another cascade of similar suits that resulted in the first total redesign of the Jeep since World War II.(18) Either historic case precedent would have been a career crowning achievement for any attorney. But Shannon was the embodiment of Hollywood's characterization of a country lawyer. He wore a coat and tie, to be sure. But he was not too particular about how well his shirt was tucked in. He cussed, chewed and spat tobacco juice wherever he wished. He was the only one allowed to spit tobacco juice on the floor of the courtroom in Wise. With his share in the cash settlement, he bought a Jaguar, and then a Rolls Royce, the first one anyone in town had ever seen. He had a fat pet ground hog that he let ride in the front seat. Thirty years after his death, people in Southwest Virginia still swap Shannon stories.

To follow up on the other half of the issue of what Foote chose to do with its industrial waste products, there is the issue of its liquid wastes. Everyone knew that

their destination had been that 'settling pond' on top of Purchase Ridge. No one seemed to have been concerned.

Examination of the period USGS topographic map(19) shows what it calls the 'tailings pond' in its relationship to the plant and neighboring countryside. The pond is a little over a quarter of a mile wide.(20) It is located in a sinkhole. This could have been no accident. Foote (and the Atomic Energy Commission) could be reasonably expected to have known that all liquids that enter into a sinkhole drain into the underground water table. So, just as they planned to get rid of their solid waste material (whatever it was) by discharging it into the air, it is apparent that they planned to get rid of their liquid waste material (whatever it was) by draining it into the water table.

At this point, the obvious direction this article should take is to see if the exact nature of these two types of Foote's waste products can be ascertained. This will require a review of the industrial chemistry performed in the Sunbright plant.

The chemical processes used in lithium purification are varied, and are available on-line. The process used at Sunbright is identifiable from the information that was presented at that company's lectures to local high school students. Large amounts of lye (sodium hydroxide) are commonly used. This removed the common impurities from the spodumene, such as iron, aluminum, magnesium, and calcium by turning them into hydroxides. This class of chemicals are cousins of lye, and are called 'caustics'. (21, 22)

The high temperatures in the rotary kill produced dicalcium silicate (a waste product), converting the lithium to water soluble form. Foote's kiln product was cooled, ground, water leached, and then dewatered in vacuum filters. The liquor was then evaporated and centrifuged to get the desired product lithium hydroxide monohydrate. This source reaffirms that this production was done under contract with the Atomic Energy Commission.(23, 24)

There is no available specific documentation of what happened to the dicalcium silicate. It likely was among the substances blown out by the prescrubber smoke stack and which coated the countryside, or it could have been in the liquor waste that was put into the settling pond. At any event, after the scrubbers were installed, this material would have been disposed of in another fashion, and the only known site was the settling pond.

It should be noted that silicates are relatives of sand, and can cause silicosis. Even though calcium silicate does not burn the Federal Center for Disease Control is so concerned about the dust that can be stirred up in a fire that it has stated in its policy in fighting such fires, "Fires involving calcium silicate should be fought upwind from the maximum distance possible. Isolate the hazard and deny access to unnecessary personnel. Firefighters should wear a full set of protective clothing and self contained breathing apparatus when fighting fires involving calcium silicate."

Lab animals exposed to calcium silicate develop pulmonary nodules and pleural sarcomas (cancers). In humans it produces hemolysis (destruction of the blood). Chronic exposure produces altered pulmonary function.(25)

About midway through their tenure at Sunbright, they changed the processes that occurred there. Instead of manufacturing lithium carbonate on site, they purchased it from an affiliate in Nevada. They then treated lithium carbonate with calcium hydroxide at Sunbright to make lithium hydroxide. Before this change in process, limestone from the mine at Sunbright was used, and calcium carbonate was formed as a waste product. This waste product remained (in 1990) on the site. The approximate analysis of the material in the waste at that time was 43-50% calcium carbonate, 3-6 % calcium hydroxide, and 40-48 % water. If the water were to evaporate, it would leave a dust at twice the above concentrations.(26)

In 2017 the Foote Mineral site at Sunbright was designated as having "hazardous waste", but was declared to be "conditionally exempt" from cleanup requirements because "the site was not currently producing waste".(27)

It should be noted that calcium carbonate was among the substances in the sludge that the Environmental Protection Agency mandated Olin Mathieson Corp. to bury in Saltville in 1982. The area of sludge burial is 125 acres, and is to a depth of 80 ft.(28)

Concerning the calcium hydroxide (a relative of lye) left on site at Sunbright, the Center for Disease Control states that it "is a corrosive that affects all tissues it contacts". Rats that drink water containing it die with multiple organ failure. Humans get corrosive chemical burns of the skin, eyes, esophageal strictures and pneumonia.(29)

In 1996 the total amount of pollutants released in to the environment by the waste material left on site by Foote Mineral at Sunbright was 246,745 pounds. In 1987 it had been 150,000 pounds. This report stated that lithium carbonate was also among the pollutants that had been released into the environment. Since the plant was inactive and the smoke stack was not in use, the only possible source of this pollution was the sludge pond. It was not stated whether the discharge was by means of the underground water table, or by dust blown into the air from dried sludge.(30)

Lithium is used in medicine to treat bipolar illnesses. It is a hard medicine to use because of its many side effects, and its general unpredictability in humans. The Federal Drug Administration's mandated list of potential side effects listed in that product's package insert gives the following as its side effects: "hallucinations, seizure (blackout or convulsions): fever with muscle stiffness, sweating, fast or uneven heartbeats; early signs of lithium toxicity, such as nausea, vomiting, diarrhea, drowsiness, muscle weakness, tremor, lack of coordination, blurred vision, or ringing in your ears."(31)

Approximately about 2010 the author went to the Southern States Farm Store at Gate City to buy agricultural lime to put on his fields. The manager there told him that a 'agricultural lime like material', which was a waste product of the Foote operation, had previously been taken to the spodumene mines in North Carolina and dumped there as a means of disposal. This had been found to have been unsatisfactory by some organization on the basis of concerns about the environment, and the material had been moved back to Sunbright and placed in the underground limestone quarry. He went on to say that his business was looking into the possibility of remining this substance and of selling it to farmers to spread onto their fields. He said it contained 'lime like in agricultural lime'. Since I knew that there were a couple of issues related to this, I asked him if this substance was more like 'quick or kilned lime', or like pelletized limestone dust. I also asked him specifically for the chemical name for this substance. I did not get an answer to either question. That Southern States store soon went out of business.

The Environmental Protection Agency's Super Fund has been cleaning up the original Foote Lithium plant in Pennsylvania. (32)

The "Kingsport Times" of November 7, 2012 reported that the Scott Co. Board of Supervisors had approved a special use permit to Secure Mountain LLC of Roanoke to build a data storage facility inside the old Foote Mineral mine. An officer of that corporation made a statement to the press that they had already spent more than $1 million cleaning up and securing the site, and were currently working to map out the total usable area and clean up "byproduct from past mining operations". There was nothing more said about the specific nature of those old waste products, nor of the history of deception and lack of concern for public health exhibited by the various entities historically involved in that industrial site. The 'products of mining' are not the issue. The products of the chemical industry at Sunbright are the issue, which are the silicates, the lithium, the lye, and its caustic cousins. The public should be concerned about the ultimate destination of this material. It should be informed about the Saltville Caustic landfills, and the Foote cleanup in Pennsylvania. It should be concerned about what procedures are planned to keep this material out of the air and streams around Sunbright. (33)

The author also notes that as of Dec. 2017 there is industrial activity at the old Foote Mineral site at Sunbright. The trees that hid the site from the highway have been cut down, and material for an electric substation are piled there. Sunbright is being reborn.

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