Chapter 34

Teakettle Mountain

Teakettle Mountain, the southern tip of the Whitefish Range, became a symbol of the Anaconda Aluminum Co.'s fluoride problems by the late 1960s. Looming over Bad Rock Canyon, where a million tourists funneled through every summer on their way from the Flathead Valley to Glacier National Park's western entrance, the low mountain's lack of trees contrasted perfectly with green of Columbia Mountain, the northern tip of the Swan Range sitting on the other side of the canyon. Before new air pollution control technology reined in the smelter's emissions, the haze of white smoke and dust that hung over the plant didn't quite hide Teakettle Mountain from the passersby, but it did explain things for many locals – "The Company" had killed off the trees just like it had with its copper smelter in Anaconda. Teakettle's story, however, is a bit more complicated, but what couldn't be denied by the late 1960s was that the expansion of the aluminum smelter from two potlines and four rooms to five potlines and 10 rooms had tipped the balance – daily fluoride emissions had reached the point where they were killing trees and other vegetation and harming wildlife in National Forest lands and Glacier Park.

High mountains bordering western Montana's valleys tend to shield the lowlands from winds and often trap smoke and fog in weather inversions – when hotter air can't rise because it is covered with a blanket of colder air. The Flathead Valley, at 3,037 feet, is surrounded on three sides by the Swan, Mission, Flathead, Whitefish and Lewis mountain ranges, which reach 5,000 to 7,000 feet in elevation. At the south end of the valley lies Flathead Lake, the largest freshwater body west of the Great Lakes, measuring 27 miles long and 15 miles wide. Glacier Park, a 1,500-square-mile de facto wilderness called the "Crown of the Continent" by its many admirers, is about six air miles east of the Flathead Valley. South of the popular national park lies a large expanse of protected wilderness – the Great Bear, the Bob Marshall and the Scapegoat, a wilderness complex containing more than 2,300 square miles often referred to simply as "the Bob." [1] According to some accounts, Bad Rock Canyon, the narrow gap between the Whitefish and Swan ranges which accommodates the mainstem of the Flathead River, U.S. Highway 2 and the BNSF Railway mainline, was given its name because Blackfeet Indians lay in wait there to ambush Salish and Kootenai who passed through on their way east on the buffalo trail. For others, the strong winds at the mouth of the canyon are the source of the name. Visitors to the House of Mystery roadside attraction on U.S. 2 will find trees twisted, gnarled and stunted by these strong winds.

The changing mountain face

Early pioneers who came to the Flathead in the 1880s are credited with naming Teakettle and Columbia mountains. A rock formation that resembled a teakettle when snow covered it could be seen by valley farmers on the smaller mountain left of the canyon's mouth. The name of the broad mountain to the right of Bad Rock Canyon was given in recognition of the three forks of the Flathead River forming the headwaters of the Columbia River. [2] In winter 1895, James White climbed up the hill overlooking Kalispell that today makes up Lone Pine Park to photograph the north half of the Flathead Valley. The photo clearly shows a snow-covered teakettle formation on Teakettle Mountain. The photo was later given as a gift to Hungry Horse News publisher Mel Ruder by Mrs. Dean King. [3] When the Hungry Horse News published White's photo on Oct. 18, 1968, the caption read, "West slope of Teakettle Mountain had thin timber cover, which became even more sparse as a result of the 1929 fire." [4] On Sept. 28, 1978, the Hungry Horse News published a photo taken by Ruder in 1952 showing Teakettle Mountain on the left and Columbia Mountain on the right and the location where the AAC plant was later built in the foreground. "Teakettle Mountain has fluoride-killed trees, but succession of forest fires with the last in 1929 result in a mountain of considerable contrast to Columbia Mountain," the caption read. [5] His point was that habitat change had come to Teakettle Mountain long before the smelter fired up – according to some residents, nobody had seen the teakettle formation since the 1929 Half Moon Fire denuded the mountain.

The rocky cliffs and terraces on Teakettle Mountain provided habitat for a wide range of big game animals before and after the aluminum plant began operating. In February 1953, a hunter killed a mountain lion and its kitten on Teakettle Mountain within half a mile of the plant site, and early construction crews recalled seeing mountain goats on the mountain and deer on the flats. [6] Two decades later, on Nov. 9, 1975, Columbia Falls teenagers Rick Berry and Dave Sullivan surprised a black bear while hunting for mule deer on Teakettle Mountain above the AAC plant. [7] The mountain's steep southern flank drew hang gliders from the University of Montana in June 1975. The pilots rode in four-wheel-drive vehicles to a TV satellite station at the summit, about 2,900 feet above the valley floor, where they launched. "Teakettle Mountain is likely the best hang glider site in Montana," pilot Tim Schwarzenberg said. [8] That steep rocky front could serve another purpose, Ruder surmised in an Oct. 30, 1959, editorial. Ruder discussed the merits of allowing locals to mark the side of Teakettle Mountain with white-painted rocks to create the letters C and F for Columbia Falls. "We recognize the hesitancy in this area to disturb the mountain beauty with anything man-made," Ruder wrote. "Yet, we think a big 'CF' on the rock slopes of Teakettle merits consideration." [9]

The Half Moon Fire that changed the landscape around Columbia Falls was started by sparks from a donkey engine used for a logging operation northeast of the State Mill, about three miles west of downtown Columbia Falls, on Aug. 16, 1929. Driven by high winds and fed by tinder-dry trees, the fire raced up and over Teakettle Mountain the first day and ran all the way to Coram, halfway to Glacier Park, by noon the next day. Observers said the fire destroyed all the timber on Teakettle Mountain in an hour flat. The wildfire ran within a mile of Columbia Falls but spared the community. With strong winds and so much dry downfall, the fire was impossible to control. It burned from Aug. 16 to Sept. 24 and spread as far as 35 miles, destroying 100,000 acres, including 40,000 in Glacier Park – vast stands of cedar at the Park's entrance and around Lake McDonald. [10] In a February 1949 Forest Service economic study, Lower North Fork District Ranger John R. Castles said a number one priority for his district was replanting the trees on Teakettle Mountain that had burned over in the Half Moon Fire. "Visible to most of the Flathead Valley are the eroding west slopes of Teakettle Mountain, 5,318 acres of land whose forest cover has been burned away and is now in urgent need of a reforesting program," the Hungry Horse News commented at the time. About 28 acres on Teakettle Mountain had been replanted with ponderosa pine in 1948, but there was a shortage of funding for more replanting. [11] In fall 1959, the Forest Service used bulldozers to terrace portions of the upper slopes of Teakettle Mountain in preparation for tree planting where the Half Moon Fire had destroyed the forest. The terraces were visible from the town of Columbia Falls. [12] In April 1960, Forest Service crews planted 11,000 Douglas fir seedlings on the sides of Teakettle Mountain burned over by the Half Moon Fire. The Forest Service initially planned on planting 25,000 seedlings, but the crews ran out of ground cleared by bulldozers in 1959. [13]

Trees were not the only thing planted by the government on Teakettle Mountain. On Oct. 16, 1962, Faye M. Couey, a big game manager for the Montana Fish and Game Department, told the Rocky Mountain Sportsmen during a meeting in Columbia Falls about plans to plant 15 to 25 Rocky Mountain bighorn sheep on Teakettle Mountain. Couey said the habitat on the mountain was good for Rocky Mountain sheep and there was ample food. He predicted that eventually ram hunting would be available on the mountain. [14] In September 1967, the Montana Fish and Game Department announced that it still was considering planting 15 bighorns on Teakettle Mountain. Couey said he felt Teakettle Mountain's topography would provide better sheep habitat than the Swan Range. Fourteen sheep recently had been planted on Doris Mountain, on the Swan Range south of Columbia Mountain. Joseph P. Mazzoni, manager of the National Bison Refuge at Moiese, had sheep available at the refuge for the project. [15] On March 6, 1968, Montana Fish and Game personnel transported 15 bighorn sheep from the National Bison Range to the AAC plant, and six rams and nine ewes were released at the base of Teakettle Mountain. Couey, Mazzoni and James McLucas, the Fish and Game

agent in charge of game planting operations, all agreed that Teakettle Mountain would provide a suitable bighorn habitat with its rocky terrain and comparative lack of snow, brush and grass. Supporting the mountain sheep planting on Teakettle Mountain was the Northern Rocky Mountain Sportsmen's Club. [16]

Teakettle Mountain was struck by another natural disaster by the early 1960s – an insect infestation. On May 4, 1964, the Columbia Falls City Council met and discussed a report that an insect infestation was attacking pines and other evergreens in the Columbia Falls area. The infestation was first reported by Mr. and Mrs. Ray Allison, who contacted the Flathead County Agent's office. Noble E. Dean, the County Extension Agent, attributed the damage seen on yellow pine trees to a native insect called pine needle scale. Dean recommended using an insecticide spray made of DDT or Malathion to protect trees. He considered the infestation to be "a serious problem in the Columbia Falls district and should be considered on a large scale control program." City Councilman Sam Ellman proposed using the city's volunteer fire department's pumps and hoses to administer the spray. [17] By 1965, the Forest Service planned on harvesting 3 million board-feet of timber in the Coram District of the Flathead National Forest, on the east side of Teakettle Mountain, that included stands of timber damaged by insects, disease and porcupines. [18] The insect infestation added to the reasons later given for the lack of trees on Teakettle Mountain – 1) the rocky terrain didn't favor tree growth; 2) the 1929 Half Moon Fire destroyed any trees that had managed to grow on the rocky terrain; 3) by the late 1960s, fluoride emissions from the smelter had weakened any trees that survived the Half Moon Fire or had grown on Teakettle's south face since then; 4) harmful insects are typically drawn to stressed trees and finish them off, or conversely, the insects came first and the fluoride finished them off.

Harvey's aluminum plans

The bench land below Teakettle Mountain and above the Flathead River was the first choice for an aluminum smelter site, but not the only choice. On May 10 and 11, 1950, the Harvey Machine Co. of Torrance, Calif., acquired options to purchase land at the base of Teakettle Mountain with the announced intent of building an aluminum plant. The site had been investigated previously by agents from the Anaconda Company. [19] On June 6, with the Hungry Horse Dam three years away from completion, the Hungry Horse News published a special issue on the aluminum plant story. Harvey was showing further interest in purchasing options on 760 acres just north of Columbia Falls, the newspaper reported. [20] On June 21, the Great Falls Tribune, Hungry Horse News and Daily Inter Lake reported in special editions that Harvey had acquired options to purchase 740 acres of land at the base of Teakettle Mountain for a new aluminum smelter. A spokesman for the Flathead Citizens Committee called the media reports

"premature" and warned about the dangers of fumes from the plant on agriculture and water resources. [21]

The story changed on Aug. 18, 1950, after Rep. Mike Mansfield learned from a caller that Harvey planned to set up two potlines just north of Kalispell at Rose Crossing – in the middle of the Flathead Valley. The company reportedly had chosen the new location because of concerns about adverse weather near Teakettle Mountain. [22] On Sept. 8, the Hungry Horse News reported that Harvey's options on land north of Columbia Falls would soon expire, and it was believed the company intended to build its plant closer to Kalispell, across from the county airport. The newspaper included two large front-page photographs with aerial and internal views of Kaiser's Mead smelter near Spokane – a hint at potential air pollution problems. [23] The Hungry Horse News updated plans by Harvey on Sept. 22. "An aluminum reduction plant does not require quantities of water, nor is there a factor of stream pollution," the newspaper reported. "The modern plant has controls to curb its fluoride smoke. It is not considered an insurmountable problem, nor will it damage trees and vegetation." [24]

Like boosters in Columbia Falls' early history, Ruder promoted the bench land below Teakettle Mountain as the best site for a new aluminum smelter. "No spot in the Flathead has been spat on more than the peaceful section at the foot of Teakettle Mountain on the banks of the Flathead River, next to the Great Northern mainline," he said in a Sept. 15, 1950 editorial. Ruder was frustrated that lobbyists from Kalispell had persuaded Harvey to locate its smelter near the county airport at Rose Crossing. In describing the many advantages of the Teakettle site, Ruder noted that "the spot, while still in the valley, would not create a Pittsburgh-like section in the midst of valuable farming acres." Ruder also mentioned that a third potential site was being considered in Coram, up the Middle Fork canyon and closer to Glacier Park. [25] Elsewhere in the same issue was a report that land in Martin City also was being promoted as a site for the new aluminum smelter. [26] That made four sites under consideration – one in the very middle of the valley, surrounded by farm fields; another at the base of Teakettle Mountain next to the windy mouth of Bad Rock Canyon; and two in the narrow confines of the Middle Fork canyon and a short distance from Glacier Park.

Ruder traveled to Spokane in September to see Kaiser's 234-acre Mead aluminum smelter. Ruder reported that "Mead is a clean plant, and the heat factor isn't too bad." [27] He expressed his optimism about the proposed aluminum smelter in an Oct. 20, 1950 editorial. "Let's take it in stride that industry coming to the valley is not all good," he wrote. "Fortunately, an aluminum plant does not pollute streams. In the nature of a smelter, there are some fumes, which we have been assured can be controlled. There are great sections of the nation more highly industrialized than can be anticipated for

the Flathead. We will not be a dominant industrial area, nor did many of us come here to develop the Flathead into a baby Pittsburgh. On the other hand, let's be practical and recognize that we must create conditions in this valley where men can expect to work the year around." [28] Mansfield also was optimistic. According to a Nov. 9, 1950, AP story, Mansfield said he had contacted various federal agencies to ensure that contracts with the Harvey Machine Co. included requirements that the company protect the Flathead Valley from fluoride and air pollution from its proposed aluminum smelter. [29] By January 1951, however, residents in the Flathead were expressing widespread concern about potential damage caused by fumes from the Harvey smelter if it was built in the middle of the valley at Rose Crossing. [30]

"As it is now," Ruder wrote in a Jan. 5, 1951, editorial in the Hungry Horse News, "there is considerable feeling especially among local farmers that fumes from the proposed plant in the center of agricultural lands will damage vegetation and harm livestock." Ruder quoted Barton Pettit, a farmer, who asked, "Will Harvey build their plant right in the first place or wait 'til this looks like Butte and then control the fumes?" The Whitefish-Half Moon Farmers Union had expressed concerns over fumes from proposed industrial plants in mid-December 1950, but it was articles in the Dec. 30 and 31, Spokane Spokesman-Review about fluoride pollution by the Kaiser smelter that intensified the concerns of Flathead Valley farmers and residents. According to the Spokesman-Review, Kaiser planned to spend $3 million on air pollution control equipment. In the Dec. 30 article, the newspaper reported that scientists had found concentrations of fluoride in the needles of pine trees 12 miles from the Kaiser plant. Heading the study of the trees was George W. Fischer of Washington State College in Pullman, Wash. Ruder tried to balance air pollution concerns with the need for more jobs in the Flathead Valley, noting that 2,778 workers were unemployed in February 1950. He called for more public disclosure by Harvey over its plans to control air pollution at its proposed aluminum smelter, and he pointed out that a clause might exist in Harvey's power contract with the Bonneville Power Administration requiring an air pollution control program at the new plant. [31]

The Harvey Machine Co. responded on Jan. 9, 1951, when M.E. Darkenwald, assistant to the president of Harvey, visited the Hungry Horse News. Both the BPA and the General Services Administration required that the aluminum smelter be built with adequate air pollution control equipment, Darkenwald said. He added that he would have one of the company's scientists prepare more detailed information for the public about air pollution control equipment. An important point was that Harvey intended to use the Soderberg process, Darkenwald said, which was less apt to create dangerous smoke and fumes than the "Hall" system used by other aluminum plants. The "Hall" system was an antiquated reduction pot that used prebaked carbon rods that were inserted into an

open cathode pot. The "Hall" system was not the same as the prebake pots used by Alcoa in some of the World War II plants it built for the U.S. government, which used prebaked carbon blocks inside a hooded reduction pot. [32]

According to Darkenwald, Lawrence and Herbert Harvey had traveled to Norway, Italy and France to investigate aluminum smelters there, and they had returned convinced that the Soderberg process was the best design for controlling air pollution. While visiting the Hungry Horse News office, Darkenwald met briefly with the acting chairman of a local farmers organization about the air pollution issue. The farmers planned to postpone a Jan. 18 meeting at the Flathead County High School in Kalispell, where they would discuss their air pollution concerns, until more information could be obtained from Harvey and other sources. [33] Word about air pollution by aluminum smelters soon reached Montana State College in Bozeman, where the Montana Conservation Council met on Jan. 11 and 12, 1951, and listened to a report by Charles W. Waters of Montana State University in Missoula about the impacts of fluoride pollution around the Spokane area. [34]

On Jan. 11, 1951, three state legislators from the Flathead, Ory J. Armstrong, Clifford E. Haines and Robert C. Sykes, wrote to the Hungry Horse News to report their concerns about air pollution by the proposed Harvey smelter. Haines said he sent a letter to Harvey on Jan. 5 asking specific questions about the company's plans. Responding to concerns by Flathead Valley farmers, the legislators contacted a chemical engineer who had traveled extensively across the U.S. studying the impacts of air pollution from various types of mineral-processing industries on surrounding vegetation and animal life. The engineer, who was familiar with the Kaiser plant in Spokane, said air pollution from aluminum smelting affected two sensitive plant species in particular – the western pine and the gladioli – and only slightly affected grasses and cultivated crops. Livestock, including cattle and sheep, were only affected when exposed to substantial quantities of fluoride over a long period of time, while horses were practically unaffected. Substantial sums of money had been paid by the Reynolds Metals Co. for damage to crops and livestock allegedly caused by polluted air and water by its aluminum smelter in Troutdale, Ore., but after the case was studied by team from the University of Wisconsin, the damage was thought to be caused by a mineral deficiency in the soil rather than by pollution, the engineer told them. [35]

The engineer told the legislators there were two common ways to reduce alumina to aluminum. In the first, an older process he called the "pot-line plant," reduction cells had about 24 carbon electrodes inserted into an open pot that needed to be constantly changed or adjusted – what could be called the "Hall" system. This type of processing cell could not be easily hooded and caused more air pollution than the other type of

process. “Some plants operated without any effort being made to control the gas and fume emanations from the pot-line,” he said. “There are plants which endeavor to collect the gases from a pot-line plant, but this is done with difficulty and rather inefficiently in general practice.” Usually pot gases from this type of plant vented to the atmosphere through the openings in the buildings. When possible, pot gases could be diverted through duct-working to scrubbers that used water to absorb the pollutants. The wastewater was then discharged into a nearby stream, as was the case at the two aluminum plants on the Columbia River, the engineer told the legislators. The second type of aluminum production used the Soderberg process, which utilized a single large electrode that was constantly fed with additional carbon material. This type of reduction pot was more readily hooded, and the pot gases were more easily controlled. “The operation of the Soderberg plant is as near perfection in the control of gases as has yet been devised,” the legislators said in their letter to the Hungry Horse News. [36]

The three legislators also pointed out in their letter to the Hungry Horse News that high freight costs to the Flathead Valley practically eliminated the possibility of an alumina refinery being built there. Published alongside the legislators’ letter was a response to Haines’ Jan. 5 letter from Leo Harvey, president of Harvey Machine Co. “The aluminum reduction plant which we are designing differs from the ones now in existence,” Harvey wrote. “Said new and novel design affords means for the proper elimination of fumes or air pollution. We intend to use a modern method of fume control.” Harvey pointed out that the problem facing most aluminum smelting plants was that air pollution control equipment was not part of the initial overall design of the plant, and that aluminum smelting plants were difficult to modify later to accommodate air pollution control. “Fume control in our plant is an integral part of our operation,” he wrote. [37]

Information on environmental impacts by aluminum smelters was not well reported by 1951, and the information provided by the unnamed chemical engineer to the legislators was misleading. He misspoke about Soderberg pots, which were also difficult to hood to reduce secondary emissions in the potrooms. The engineer also never mentioned prebake pots, which were installed by Alcoa at several new plants built during World War II and could be hooded. As for Leo Harvey’s comments about plans to employ “a modern method of fume control,” when his company built a smelter at The Dalles, Oregon in the late 1950s, it used nearly identical Soderberg-type cells as the Anaconda Aluminum Co. smelter in Columbia Falls.

Anaconda’s pollution promises

By Jan. 19, 1951, Harold Passmore, Robert Gatiss, DeWitt Clark and Art Small, leaders of farmers organizations in the Flathead, were still awaiting information on Harvey’s plans to control air pollution at their proposed aluminum smelter. [38] But by late 1951, the

Anaconda Copper Mining Co. had announced it was taking over Harvey's project and would build its own aluminum smelting plant in Columbia Falls. Anaconda engineers traveled across the U.S., Canada and Europe studying alternative smelter designs. The plant that most impressed the Anaconda engineers was located in St. Jean de Maurienne in France and was owned by century-old Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. The Pechiney process was thought to run more efficiently than other designs and to cut down on atmospheric contamination by fumes, the media reported at the time. [39] The "Pechiney process" turned out to be Soderberg pots ducted to wet scrubbers for primary emissions control, and nothing in place to control secondary potroom emissions. The Anaconda Company's announcement sparked new interests in air pollution control – by staff at Glacier Park. On Jan. 25, 1952, the Hungry Horse News reported that letters had been exchanged between Anaconda and the National Park Service regarding possible air pollution from the company's proposed aluminum plant. "This was first learned at (Glacier Park) headquarters," the newspaper reported. "ACM has assured the park service that the new plant will be thoroughly modern with all possible controls. Furthermore that the company is desirous that its industry will in no way create a problem that will cause the park or others apprehension." [40]

The Anaconda Company worked on its plans over the next eight months, in particular lining up an alumina supply for the new smelter, and then made a big official announcement in an Aug. 30, 1952 press release. Anaconda Chairman Cornelius F. Kelley explained the company's choice of the site below Teakettle Mountain. "The site originally acquired by the Harvey Machine Company was located in the center of the agricultural area of the Flathead valley, and considerable apprehension was expressed by some residents of the area as to possible crop or livestock damage as a result of emanations from the plant," Kelley said. "These feelings of concern were without foundation, as it is the intention that the plant shall be completely modern in design, so that no damage of any kind will result from its operation. However, in order to completely satisfy these apprehensions, even though unfounded, it was concluded to move the plant location to the Columbia Falls area." The aluminum plant would sit on a bench above the Flathead River and adjacent to the Great Northern Railroad mainline at the base of Teakettle Mountain. Owners of the 750-acre site where the new plant would be built had been notified, Kelley said. [41]

In a Sept. 19, 1952, editorial in the Hungry Horse News, Ruder cautioned readers about the future of the Columbia Falls economy once Anaconda's new aluminum plant was in operation. The number of plant workers would be about the same as worked at the Hungry Horse Dam and the total payroll would be about the same, but the earnings would be dispersed across the entire year – including winter, he said. Ruder also spoke

about the effects of too much industrialization coming to the Flathead Valley while encouraging more development in order to promote jobs. “We do not want the Flathead to resemble the industrial Pittsburgh area,” he said. “People leave there for good reason. Yet the people of this valley for example should look ahead to the feasibility of diverting the Middle Fork of the Flathead River into Hungry Horse Reservoir. We do not know of any opposition to this project that would provide more water storage and power right here at home. Soon we will be able to measure steady jobs in the valley by water storage in the mountains.” [42] More water behind the big dam would mean more power and more industry, was Ruder’s reasoning. The water flow from the South Fork of the Flathead River alone to the dam was not enough to power even two potlines when streamflow was averaged over a long period.

By mid-November 1952, an agreement had been signed between Anaconda and Pechiney for use of French technology at the company’s Flathead smelter. “Advantages of the French method include complete control of contamination factors and mechanical improvements in operation,” the Hungry Horse News reported. The design to be used at the Columbia Falls plant would be a combination of American techniques with those found at the French smelter at St. Jean de Maurienne near the Swiss border. [43] On Dec. 12, Anaconda announced that erection of buildings for the new plant would begin in spring 1953. According to the Hungry Horse News, the word was that the deciding factor in Anaconda’s decision to adopt French aluminum producing technology was “the maximum control it gives in preventing air contamination. The Flathead plant will be the most modern in the United States in this respect.” [44] This optimism was spread across the state. The January 1954 issue of “Montana Affairs,” a publication of the Montana Chamber of Commerce, reported on the AAC plant under construction near Columbia Falls. The article, which was prepared by the Anaconda Company, stated that the design for the new plant came from studies of a plant in France “which has been said to incorporate the most advanced techniques in aluminum metallurgy. Principally this system modifies pot design, eliminates contamination from fumes and minimizes power consumption. Thus the new Columbia Falls plant should set new U.S. standards of efficient aluminum plant operation while providing excellent working conditions for employees.” [45]

On May 22, 1953, more than two hundred diners met at the Canyon Hotel for a trout meal sponsored by the Columbia Falls Chamber of Commerce in honor of the AAC smelter still under construction. Government officials were represented at the dinner, where AAC General Manager H.G. Satterthwaite explained why the start of construction had been delayed for so long. Changes in the plant’s design took advantage of new ideas that would improve appearance, efficiency and pollution control, he said. The only water that would return to the Flathead River would be water used to cool

transformers, Satterthwaite explained, and air fumes would be controlled. [46] More than two years later and two months after first metal was poured at the new smelter, Jean Grolee of the Pechiney aluminum company arrived in Columbia Falls to see the AAC plant. Grolee was in charge of Pechiney's 100-year old aluminum operations. He noted that AAC had adopted many of the processes used at Pechiney's operations at St. Jeanne de Maurienne in the French Alps, a plant admired around the world for its air pollution control systems and its high efficiency in terms of electrical consumption per ton of aluminum produced. Seven other Pechiney men had worked at the AAC plant site since the beginning of the year. [47]

More specific information about the AAC smelter's air pollution control plans became available a year before the first Soderberg pots were baked out in July 1955 in preparation for operation. On June 30, 1954, members of the Montana Conservation Council visited the smelter and listened to Satterthwaite and AAC Production Manager James F. Smith talk about pollution control equipment to be used at the plant. Satterthwaite and Smith said pollution control was designed into the plant from the very beginning, unlike other aluminum plants in the U.S. that had to address pollution problems after production had already begun. All the gases emitted by the reduction pots would be carried by ductwork to scrubbing towers where the fluorine gas would be converted to hydrofluoric acid by combining with water in a spray chamber. The hydrofluoric acid would be treated with slaked lime to make calcium fluoride, which would precipitate into a material resembling mortar. The calcium fluoride precipitate would be deposited at the north end of the plant grounds in wastewater pits. Water for the plant's equipment would come from wells and also be used for cooling transformers and for domestic use. The only wastewater to be discharged from the plant into the Flathead River would be the cooling water and wastewater from the sewage treatment plant. The sewage treatment plant met all Montana Board of Health specifications, they said. [48]

The Anaconda Company promoted the care it had taken in designing its new aluminum smelter during the plant's dedication in August 1955. The vertical-stud Soderberg reduction cell was considered by the company to represent the best technology at the time for production of aluminum and treatment of pot gases. All reduction pots were equipped with skirts to prevent pot gases from escaping into the potrooms. Fans and multiclones were installed for removing particulates and fluorides from collected pot gases before they went to the wet scrubbers installed for removing fluorides. The hydrofluoric acid produced by the wet scrubbers was treated by lime and no industrial wastewater effluent was discharged into the streams draining into the Flathead River system. As Potlines 3 through 5 were built in the 1960s, the same type of pollution control technology was installed. [49]

Norwegian inventor Carl Wilhelm Soderberg patented the Soderberg anode for aluminum reduction cells in 1918. His invention began to see widespread use in the aluminum industry in 1923 and was considered the first important breakthrough invention for the industry since the Hall-Heroult reduction process was discovered in 1886. By 1923, prebaked carbon rods had been in use for about 40 years, but the problem of carbon consumption in the reduction process was addressed by the Soderberg anode, which was a continuous self-baking and monolithic anode. The heat from the electrolyte in the pot baked the anode to just the right consistency to conduct electricity for aluminum reduction. The main advantages of the vertical-stud Soderberg anode was savings in capital, labor and energy required to manufacture prebaked anodes. The disadvantages included higher pot voltage and energy consumption, lower current efficiency, lower quality anodes, smaller pot size, and higher emissions of fluoride and polycyclic aromatic hydrocarbons. [50]

In the 1940s, horizontal-stud Soderberg aluminum reduction cells were considered to be superior to Hall prebake cells, which were small, 30,000 amp pots with low current efficiency and higher energy consumption. The electrical current of Soderberg pots was gradually increased to 60,000 and then 120,000 amps over time by increasing the length of the anode and the number of anode studs. With growing demand for aluminum, the number of less expensive Soderberg smelters increased from the 1940s to the mid-1970s in North America and South America. By the 1970s, twenty-four Soderberg smelters operated in North America and South America with a total capacity of 3 million tons per year. The largest Soderberg smelter was the Companhia Brasileira de Aluminio, which started its last Soderberg line in 2007 and had a 470,000 ton per year capacity. Poor magnetic flux inherent to the end-to-end Soderberg cell buss bar design limited any further increases in current, while more modern side-to-side prebake cells were able to operate more efficiently at 200,000 amps and higher. Eventually, Soderberg cells were recognized as less efficient with higher production costs, more difficult to automate and with greater health and environmental challenges. As health studies from the mid-1970s indicated a clear link between Soderberg tar fume exposure and the incidence of various types of cancer, aluminum producers began to look for replacement cell technology. By 2014, only five Soderberg smelters continued to operate in North America and South America with a total capacity of 1 million tons per year. [51]

During the 1940s, Alcoa built seven aluminum smelters for the U.S. government using a new prebake cell design called the Alcoa N-40. This design was developed at Alcoa's Niagara Falls smelter and was a 50,000-amp, end-riser, center-work design. The smelters built in the 1940s that employed this design included the Brooklyn, N.Y. smelter which was shut down after the war; the Massena, N.Y. smelter which was also

shut down; the Riverbank, Calif. smelter which was shut down; the Mead smelter in Spokane, Wash., which was bought by Kaiser; the Jones Mills smelter in Arkansas, which was bought by Reynolds; the Troutdale smelter in Oregon, which was bought by Reynolds; and the Alcoa smelter in Vancouver, Wash. By 2000, the Mead, Troutdale and Vancouver smelters continued to use the N-40 cells with modifications. [52]

By 1986, the 10 aluminum smelters in the Pacific Northwest used a variety of reduction cell types. Those using older prebake pots constructed by Alcoa during World War II and using an identical set of engineering specifications included Alcoa's smelter in Vancouver, Kaiser's smelter at Spokane and Reynolds' smelter at Troutdale. Smelters with modern prebake technology that were either upgraded or more recently built included Alcoa's smelter in Wenatchee, Wash., and the Intalco smelter at Ferndale, Wash. Smelters using horizontal-stud Soderberg pots included the Kaiser smelter at Tacoma, Wash., and the Reynolds smelter at Longview, Wash. Smelters using vertical-stud Soderberg pots included the Columbia Falls Aluminum Co. smelter in Montana, the Commonwealth smelter in Goldendale, Wash., and the Martin Marietta smelter in The Dalles, Ore. Compared to Soderberg pots, modern prebake pots cost more to build but had lower energy and labor costs. Converting Soderberg plants to prebake, however, was considered prohibitively expensive. [53]

The new AAC smelter was considered a cutting edge facility when it began production in August 1955. "The aluminum plant of The Anaconda Company embodies the most modern and the best in technical design and equipment," the Hungry Horse News reported at the time, using Anaconda Company promotional material. One of the new features of the AAC plant was its air pollution control systems. The waste products from the burning of anode carbon in the reduction pots included mostly carbon dioxide and carbon monoxide, the newspaper reported, along with volatiles distilled out of the anode paste compounds and small amounts of inorganic volatiles released by the bath or by the air current carrying off bath particulates. A burner at the end of the pot converted most of the carbon monoxide to carbon dioxide, and five-inch ducts carried away the pot gas to common 18-inch ducts connected to multiclones, to remove dust, and then on to the wet scrubber towers. There were 12 scrubber towers located in the courtyards, six between Pot Rooms 1 and 2, and six between Pot Rooms 3 and 4. Pot gas passed through water spraying inside stainless steel chambers mounted on each tower that converted some of the pot gas into an acid solution. The acid solution flowed down into reactor tanks where slaked lime was added to precipitate insoluble fluorides. The solids were settled in a Dorr tank where the clear overflow solution was recycled back into the towers, and the rest of the fluid was pumped to settling ponds located north of the plant. [54]

The bakeout period for the first pots at the new AAC plant began at 9:15 a.m. on July 20, 1955, when electrical current was applied to the 120 aluminum reduction pots in potline one. As the current climbed to 90,000 amps, briquettes in the steel anode casing melted into a mass of carbon, solid at the bottom and liquid at the top, and created the carbon anode. Usually a lot of smoke was created during bakeout periods, but not much smoke was reported at the AAC plant and none was visible from the town of Columbia Falls, according to the Hungry Horse News. [55] But evidence of impacts from the smelter's emissions was seen as early as 1957, when Forest Service personnel suspected fluoride from the AAC plant was killing ponderosa pines near the smelter. [56] Despite this awareness of possible impacts, no scientific studies were conducted until after 1968, by which time the plant had reached its maximum size and was emitting the most fluoride in its history – and extensive tree death was evident on the west side of Teakettle Mountain. [57]

The Anaconda Company also took proactive steps to protect itself from pollution lawsuits. On Nov. 8, 1957, AAC filed deeds at the Flathead County Courthouse for the purchase of 2,215 acres north, west and south of the plant site, including a tract of land on the other side of the Flathead River. The purchase increased the plant's overall size from the original 750 acres to nearly 3,000. Homes on the purchased property were leased. In reporting this purchase, the Hungry Horse News discussed the plant's efforts to control both water and air pollution and concluded, "The 2,215 acres purchased may be a legal precautionary measure by Anaconda." [58] Some future adjacent land acquisitions followed lawsuits filed against the Anaconda Company. On Aug. 30, 1961, AAC acquired 160 acres from Thomas and Catherine McNulty. On Oct. 5, 1966, AAC acquired 40 acres from Richard and Emily Bingham. On Jan. 15, 1968, AAC acquired two parcels measuring 80 acres each from Conrad Laughlin. And on Aug. 14, 1975, AAC acquired 160 acres from Mabel Dehlbom. [59]

By the late 1970s, with the Anaconda Company installing millions of dollars worth of potline improvements and a new air pollution control system, experts and the public agreed that it was the plant's expansion from two potlines to five that put the company on the wrong side of so many air pollution lawsuits. But it was perhaps not understood on Aug. 16, 1963, when Ruder published an editorial in the Hungry Horse News praising AAC's plans to expand production at the plant by building a third potline. Ruder addressed concerns by some residents about the possibility of increased water and air pollution by the expansion. "For those who are not able to see for themselves, we'd like to state that pollution and contamination controls have worked effectively at this plant," Ruder said. "Investment by AAC for these factors was over 10 million dollars. The Flathead River downstream from the AAC plant is as sparkling clear and clean as above the plant. We haven't heard of any fume or smoke problems." [60]

Environmentalists take a look

In May 1966, with the third potline completed and plans underway to build two more potlines simultaneously, AAC announced it would begin using a mobile truck-mounted laboratory to monitor air quality on its plant property and at nearby locations west of the plant. The Hungry Horse News took note of the announcement with another editorial. “Anaconda has had expensive experience with both air pollution and stream contamination problems,” the newspaper said. “It is to the credit of Montana industry when it undertakes pollution control on a voluntary basis. Present Montana law is of little worth in this respect. Belching chimneys and contaminated streams will lead to stronger law.” [61] Meanwhile, at least one local conservation group wanted to know the details on its own terms. In fall 1967, with Potlines 4 and 5 still under construction, the Polson-based Flathead Lakers sent one of their members, an engineer, to visit the AAC plant to see if it was polluting the Flathead River, which ultimately drained into Flathead Lake. The engineer returned to Polson and relayed his findings to the local newspaper, the Flathead Courier, which reported the news with a banner headline – there was no evidence that the AAC plant polluted the river. [62]

University of Montana botany professor Clancy Gordon began to look into potential impacts of fluoride emissions by the AAC plant as early as 1967. [63] On Nov. 19, 1967, he traveled to New York City to present a paper dealing with air and water pollution to the American Association for the Advancement of Science. The name of the paper was “Interaction of a Science Information Committee and the Community in the Montana Air Pollution Problem.” [64] By that time, Gordon was very involved in the fluoride pollution problem created by the Rocky Mountain Phosphate Co. in Garrison, Mont. On Dec. 2, Gordon addressed the 24th annual Farmer-Labor Institute in Missoula about air and water pollution problems in Montana. Gordon took issue with recent statements by industrial representatives who had requested that state officials consider economic factors when dealing with air pollution issues in Montana. He cited the example of the Rocky Mountain Phosphate Co., which had refused for several years to install adequate air pollution control equipment on the basis of cost. Gordon said a similar situation existed at the Anaconda Aluminum Co. plant in Columbia Falls, adding, “But the people are not upset because it is not economically feasible to be upset.” [65]

Newspapers across the state carried stories about Gordon’s fiery talk to the Farmer-Labor Institute. “Man will destroy himself, if he does not learn to live in a symbiotic relationship with his environment,” Gordon told the Missoula gathering. The Hungry Horse News later explained to its readers that symbiosis was “a condition in which a parasite and its host live in intimate association for mutual benefit… with man as the parasite and the environment as his host.” Gordon presented slides showing damage to

plant life and livestock by air pollution from the Rocky Mountain Phosphate processing plant and then showed slides of the AAC smelter, noting that air pollution in the Flathead was just as serious. “The difference between Garrison and Columbia Falls is that the people in Garrison got upset about it and objected publicly,” Gordon said. The land being impacted by air pollution from the AAC plant was Forest Service land, “but the Forest Service won’t say anything about it because it might upset the public’s image of Lassie and the square-jawed Forester,” Gordon said. [66] Benjamin Wake, director of Montana’s air pollution control program, later joined Gordon on Dec. 5, 1967, for a talk on air pollution issues at a meeting in Missoula sponsored by Air Information and Research (AIR), a citizens group concerned about air pollution issues. [67]

One of the most important books in U.S. environmental history is John McPhee’s “Encounters with the Archdruid,” published in 1971. The book culminates with an encounter between David Brower, the executive director of the Sierra Club and a leading environmentalist, and Bureau of Reclamation Commissioner Floyd Dominy during a whitewater raft trip through the Grand Canyon. Encounters between Gordon and Ruder could be described as epic only on a local scale. Ruder interviewed Gordon by telephone on Dec. 9, 1967. By that time, Gordon had attracted considerable public attention for his outspoken stance against industrial pollution in Montana. Ruder told his readers that he had presented to Gordon what he considered the local viewpoint. He explained that the Montana Board of Health had erected a test apparatus on top of the Columbia Falls High School which used vacuum pumps and filters. The testing apparatus only indicated air pollution from local sawmills. Ruder also explained that, prior to construction of the AAC plant in 1953, he had traveled to Spokane to check out the Mead smelter built during World War II without air pollution controls. As a layman, Ruder had read and learned about the fluoride problem at that time. Ruder also noted that the Anaconda Company had spent $11 million on air pollution control equipment when the plant in Columbia Falls was initially built, and he told Gordon that Teakettle Mountain was rocky and had always lacked vegetation. “To us and most residents of the Flathead, Teakettle Mountain looks the same as it did before AAC located here,” he told Gordon. [68]

Gordon disagreed with Ruder on many of his points. He said he had checked vegetation near the plant and found unusual fluoride concentrations. “Could a layman recognize it?” Ruder asked. “Yes,” Gordon replied. Ruder pointed out that prevailing winds came from the southwest and that nobody lived on downwind side of the smelter. He said his biggest concern was for the 3,000 residents of Columbia Falls. Gordon explained that hydrogen fluoride air pollution from aluminum smelters like the AAC plant was usually not dangerous to humans unless “a family lived entirely on the vegetables, fruit and meat produced adjacent to an aluminum plant without adequate pollution control.”

Gordon added that the pollution control equipment installed at the plant in 1953 to 1955 was not as effective as equipment available in 1967. Gordon pointed out that he didn't have permission from AAC to trespass on their land to study the impacts of fluoride emissions on plant and animal life. He also lacked a research grant and wasn't able to conduct an adequate study of the situation. Gordon concluded by comparing Columbia Falls to the land surrounding the smelter towns of Kellogg and Wallace in northern Idaho "where industry was essential to jobs, and that industry would not move until forced to take care of their image." Ruder disagreed. "The Hungry Horse News sees little resemblance in the appearance of Columbia Falls and Idaho locations," he told his readers. "However, it is this editor's conclusion that the public has the right to know and this includes matters of air and water pollution. Dr. Gordon should be invited to participate in a panel discussion to be held in the Flathead." [69]

In May 1967, after lengthy hearings, the Montana Board of Health adopted new ambient air quality regulations which included standards for fluoride emissions. [70] Ruder advised his readers about the board's upcoming Nov. 17 public hearing on proposed air pollution regulations in a Nov. 10 editorial. Ruder acknowledged the growing feeling across the nation and the state for control of air pollution, but emphasized efforts by AAC to control emissions from the aluminum plant. "The wide open prairie has purging wind, while Missoula and the Flathead know what it is to be in a natural bowl of smog," he said. "It is to the credit of Anaconda Aluminum Co. that the original plant had an investment of $11 million in scrubbing systems and other pollution control. Such improvements are even more essential to the enlarged plant. Fortunately when the wind blows here it generally is from the southwest." [71]

Gordon soon gained a reputation in the Flathead. On Jan. 15, 1968, Harold R. Dehlbom wrote to Gordon about air pollution by the AAC smelter possibly affecting his property near the plant. Dehlbom said he had read Gordon's speech to the 24th annual meeting of the Farmer Labor Institute in Missoula and found it "very interesting to us." The Dehlboms owned 160 acres of land about a quarter of a mile from the AAC smelter buildings and were completely encircled by the company's holdings. He told Gordon that a neighbor about two miles north raised cattle and sold milk. "The trend of smoke from Anaconda follows the mountainside more or less over his place," Dehlbom said. Dehlbom asked Gordon to "keep up the good work." [72] Gordon responded to Dehlbom two days later. Gordon said he had conducted sampling in the Columbia Falls area in April 1967 and had plans to return. "I need a location like yours to set out trees and trap rodents (field mice, ground squirrels)," he said. The research could continue for three years, Gordon said. He also expected the state would install an air-monitoring station nearby to measure hydrogen fluoride in the air. Gordon said he needed about a 20-foot

square space for his research. [73] The Dehlbom site eventually became an important source of data for lawsuits filed against the Anaconda Company.

The Hungry Horse News named the completion of Potlines 4 and 5 at the AAC plant as the top news story of 1968. [74] In 1968, the smelter emitted an estimated 7,500 pounds of fluoride per day. [75] By 1970, the company reported a reduction in fluoride emissions to 5,000 pounds per day and some reduction in particulates. In 1972, after further improvements and modifications to the plant's air pollution control system, the company reported a reduction in fluoride emissions to 2,500 pounds per day. [76] Critics and plaintiffs had a different estimate – as high as 10,000 pounds per day after the expanded facilities began operating in 1968. [77] According to Kalispell attorney Dale McGarvey's recollection in a 2014 interview, tests conducted by AAC and released during the discovery phase of the Krecks' class action lawsuit indicated the smelter emitted 10,000 pounds of fluoride a day. [78] McGarvey represented many of the property owners who sued the Anaconda Company and received supporting evidence from Gordon's sampling and tests.

Beginning in late June 1968, federal scientists aboard a small prop plane began a study of air pollution impacts in Flathead County. Sponsored by the U.S. Public Health Services and the Forest Service, the focus of the study was the composition and distribution of smoke from a controlled forest fire in Miller Creek northwest of Whitefish. Instruments in the plane were capable of measuring pollutants such as hydrocarbons and carbon oxides. [79] From 1968 through 1970, scientists working for the Forest Service and the National Air Pollution Control Administration, a predecessor to the Environmental Protection Agency, found evidence of foliar damage in ponderosa pine, lodgepole pine, western white pine and Douglas fir trees downwind of the AAC plant. The observations led the two government agencies to develop a plan to analyze the extent of fluoride impacts to these ecosystems. With the aluminum smelter at the center, 10 easterly transects up to 6.2 miles long were drawn on a map extending from the northwest to south-southeast. From seven to nine sampling stations were located on each transect. Fluoride tests in parts per billion were conducted in conifers, shrubs and herbaceous species and the information was plotted as isoclines on a map. The isoclines trended northeast with 600 ppb near Teakettle Mountain, 100 ppb on the opposite side of Teakettle Mountain from the smelter, 60 ppb up to Glacier National Park, past the Park headquarters and near west end of Lake McDonald, and 10 ppb at the east end of Lake McDonald. In a southeast direction, 10 ppb was measured up to the Hungry Horse Dam. By August 1998, permanent sampling stations had been established at places surrounding Lake McDonald, both inside and outside the Glacier Park boundary. [80]

The fluoride debate ensues

In response to early public concerns about increased fluoride pollution in the Flathead, AAC announced in August 1968 that A.W. Hook would present a series of public talks on the plant's pollution control methods and plans. Hook, a chemist, was formerly the superintendent of the plant's laboratory and recently had been appointed manager of environmental control. [81] The company was nearing completion of Potlines 4 and 5 but was still operating only three potlines at the time Hook wrote an eight-page report that became the basis of the public talks. "First, it must be recognized that industry in many cases is among some of the causes for the problem," he wrote. "Secondly, however, it must be acknowledged that industry can be a major contributor to the solution of many of the problems confronting us today. This is not only true for industry, but in many cases the technology which industry has gained through research and practical experience may be used to help its neighbors in the community." [82]

In the announcement for the public talks, Hook described current pollution control efforts at the aluminum plant. The company had cooperated with the Montana Board of Health in the matter of pollution control, and the board "had been most cooperative and helpful," Hook said. From the very beginning, AAC was "involved in maintaining the air quality in the Flathead Valley," he said. "It was aware that fluorides which are generated by the electrolytic reduction of alumina must be adequately collected, treated and disposed of in a manner which would not be injurious to human health, property or vegetation." Hook explained how the Anaconda Company had sent representatives to study aluminum plants in the U.S. and Europe before deciding how to build the plant in Columbia Falls. In locating the plant, the existence of prevailing southwesterly winds was taken into account, winds that would carry plant emissions away from the Flathead Valley. Pollution control equipment was installed when the plant was built in 1955, and the same equipment was being installed in the new potlines. "The system has never been inoperative and it has been maintained at a high level of efficiency ever since," Hook said in the announcement. [83]

In a report written for the talks, Hook quoted from Anaconda Company Chairman Cornelius Kelly, who had described the site location during the AAC plant's dedication on Aug. 10, 1955. "Having had as much, if not more, experience in what damage may result from metal reduction plants, we sent our experts to study the situation, and as a result we changed the site that had been selected in the valley and decided to acquire and build upon the site on which we now stand," Kelly had said, referring to the chosen site below Teakettle Mountain as opposed to the Rose Crossing site in the center of the valley. "Here at the head of the valley, with no merchantable timber, little if any agriculture and with prevailing favorable wind direction, its natural advantages were to

be augmented by the decision to study and adapt the best planned method that had been developed for the control of emanations and liquids from the plant, and as a result here, they have been installed in a manner that can be guaranteed to do no possible damage to any growing or living things," Kelly said. Hook commented on Kelly's choice of words. "This, then, was the confidence that was shared by all of us when the plant was put into operation, and rightfully so," Hook said. [84]

The electrolytic reduction cells in the AAC plant operated at about 1,778 degrees Fahrenheit, Hook explained. About half a pound of carbon in the anode was consumed for every pound of aluminum metal produced in the cathode. About 1.89 pounds of alumina was consumed for every pound of aluminum produced. Carbon monoxide made up about 30% to 40% of the pot gases, and carbon dioxide made up about 60% to 70%. Pot gases collected inside the cast-iron anode skirts included hydrogen fluoride gas, carbon monoxide, carbon dioxide, sulfur compounds, and particulates of carbon, tars and alumina. Potmen worked to maintain the seal between the cathode shell and the anode skirt, where a crust typically formed, in order to prevent pot gases from escaping into the pot room. The cast iron anode skirts were periodically replaced as they wore out under high heat. High capacity 75-horsepower fans in the wet scrubber towers located between the pot rooms created a negative pressure in the reduction cell, drawing out the pot gases. Tars and carbon monoxide were combusted in burner units at each end of the reduction cell. Pot gases and particulates were drawn from the cell and transported through flue ducting in the pot room basements to the multiclones, where carbon and alumina particulates were removed. The pot gases then continued to the stainless steel wet scrubbers at 12,000 cubic feet per minute, where a water spray turned hydrogen fluoride gas into hydrofluoric acid, which was collected in tanks in the scrubber towers. [85]

Each 90-foot tall scrubber tower handled pot gases from 20 reduction cells, Hook said – 10 cells from a pot room to the east and 10 cells from a pot room to the west. The pot gases passed through three vanes that reduced the gas flow and retained solids that had not been captured by the multiclones. Treated pot gas that passed through the wet scrubbers continued up the stacks, where a mist could be seen leaving during cold weather. The hydrofluoric acid solution created in the wet scrubbers flowed by gravity to a vessel where lime water (calcium hydroxide) reacted with the acidic solution to form calcium fluoride, which was insoluble and nontoxic, Hook said. Hydrated lime was stored in a silo and combined with water in large slaking tanks before being pumped to the scrubber towers. [86]

Wastewater containing calcium fluoride was pumped to the clarifiers, where a thickener was added. Solids that settled in the clarifier were periodically pumped to a settling

pond north of the potlines building. Hook said the pond was kept moist at all times so solids would not dry out and blow away. Clean water from the clarifier tanks was recycled back to the scrubber towers, with make-up water added as needed. The wet scrubber system was fully automated and a closed system, Hook said – no wastewater left the plant site, and make-up water came from on-site wells. When the expansion project was completed, Hook said, the plant would have 600 reduction cells and 30 scrubber towers. The air pollution control system required extensive maintenance by a permanently assigned crew, including anode skirt replacement, scheduled cleaning of burners, multiclones and wet scrubbers, and replacement of piping as needed. The plant laboratory conducted scheduled tests to determine the system's performance. The system for three potlines had cost $6 million to build and $1 million per year to maintain. Hook noted that the waste products from the system had no commercial value. [87]

Hook also noted that studies for occupational health at the AAC plant were conducted in cooperation with the Montana Board of Health, and where problems existed, studies were conducted to find solutions. Hook noted that the company had consulted with a meteorologist and a plant physiologist, and used research from the Boyce Thompson Institute and the University of Wisconsin about the impacts of fluoride on vegetation and livestock. He also noted that the aluminum industry participated in national committees to establish criteria, standards, and sampling and analytical methods. These committees were associated with the U.S. Department of Health, Education and Welfare, the Aluminum Association, and the American Society for Testing Materials. [88]

Hook concluded by noting that the AAC plant could not meet the fluoride emission standard being considered by the state of Montana using available technology. "The problem basically involves the handling of large volumes of air with extremely low concentrations of pollutants," he said. "Every company in the aluminum industry is researching this problem without exception. As soon as the technology is available, the Anaconda Aluminum Company will employ whatever is reasonably necessary to keep the collection and treatment system up to date." [89] The Montana Legislature had extended the compliance deadline for the plant, Hook said, "because industry in many cases must research many of the complex problems facing it." [90] Hook gave the first of several public talks on air pollution control at the Rotary Club in Kalispell on Sept. 5, 1968. Hook, a club member, spoke of continuing improvements in air pollution control at the aluminum plant. [91] That same day, he gave a talk at the Lions Club in Columbia Falls. "There is increasing comment in Columbia Falls that AAC is not as diligent in control of fluorides as was formerly the case," the Hungry Horse News reported. A reporter for the Great Falls Tribune also was present at the talk. [92]

The Hungry Horse News continued to report and comment on the state's proposed air quality standards for industry as they were debated in Helena. In an Oct. 4, 1968, editorial alerting readers to an upcoming meeting of the Montana Board of Health scheduled for Oct. 25, the newspaper described the growth of industry in Columbia Falls since the end of World War II, especially the aluminum smelting plant. The plant's recent expansion had met with "the cheers of chambers of commerce and labor unions," but air pollution problems existed at the aluminum plant. "It is to the credit of Anaconda Aluminum Co. that a sizeable percentage of the original plant investment was for scrubbing towers and other pollutant control," the editorial said. "As the plant was enlarged, further safeguards were made. There is a question on the part of some citizens as to whether or not controls are adequate." The Board of Health had given AAC a nine-month extension to come up with standards which it thought were safe and adequate. Those standards would be reviewed by the board, which currently was planning a new survey of the situation in the Flathead Valley, the newspaper reported. [93]

The distinction between potential water pollution and potential air pollution by the AAC smelter was raised time and time again. During a mid-October 1968 meeting of the Montana Water Pollution Control Council in Helena, the focus moved to agricultural pollution after the council decided not to make a decision on whether the AAC plant was affecting the "Clark Fork River" drainage. The Hungry Horse News commented in an editorial, "There is an air pollution problem with the AAC plant, but no indication that the Flathead River, part of the Clark Fork drainage, is harmed." [94] Meanwhile, Gordon traveled north to present a talk at the Flathead Valley Community College in Kalispell on Nov. 1. Calling him "Montana's best known speaker on the topic of air pollution," the Hungry Horse News reported that Gordon had recently written an article for the summer issue of Montana Business Quarterly called "Air Pollution – Montana Style." Gordon was known to be critical of the lack of air pollution regulations in the state, the Hungry Horse News told its readers. [95] Gordon was not alone among academics interested in the AAC plant's emissions. On Nov. 12, five men from the University of Montana headed by Richard Solberg, the associate dean of the College of Arts and Sciences, visited the AAC plant at Hook's invitation. Four days later, a group of students from an environmental biology class at the University of Montana spent four hours touring the smelter. [96]

On Nov. 22, 1968, the Hungry Horse News published portions of another interview with Gordon. The newspaper noted that Gordon was an active member of the Environmental Defenders of Western Montana, which was linked with the Environmental Defense Fund Inc. based in Brookhaven, N.Y. The groups' goal was protection of man's environment, and it had filed a lawsuit against the Hoerner-Waldorf paper mill west of Missoula. The

lawsuit hinged on the constitutional right of citizens to clean air and water based on an interpretation of the Ninth Amendment to the U.S. Constitution. Gordon explained that his group had never won a court case, but he pointed out that his group's efforts in Wisconsin led to the end of the use of DDT despite a victory in the courts. "We plan to take Anaconda Aluminum Co. on next," he told the Hungry Horse News. Fluoride emissions from the AAC plant had impacted vegetation in the area, particularly on Teakettle Mountain. AAC had purchased large acreage around the plant to evade the issue of pollution control, Gordon said, but he agreed that the company was making efforts toward improving pollution control. The Hungry Horse News noted that some locals didn't approve of how the Environmental Defenders of Western Montana attempted to bypass ongoing efforts by both the state and federal governments to create new air pollution control regulations. [97]

It was about this time that Ted and Lulu Rogers began to notice serious problems with their cattle. The Rogers owned land on the south side of U.S. Highway 2 east of the bridge over the Flathead River and east of Columbia Falls, about four miles due south of the aluminum plant. Laurie Mercer, of the Montana Historical Society, recorded the Rogers on Nov. 18, 1983, as part of an oral history project. The following is an excerpt from that interview as transcribed by Jane Renfrow of Columbia Falls:

Ted: We had quite a problem with the aluminum plant, which was an offshoot, you know of the dam. Our cattle with their fluoride teeth, oh ya. We had quite a struggle with them for awhile.

Laurie: What happened?

Ted: Fluoride emissions from the plant rotted our cows' teeth out for a while. Oh ya, they had the experts out here. We got a payment out of them for …

Lulu: They put in a lot, you know. They cleaned it up and put in a lot better emissions control since then, but…

Ted: Oh ya, they let it go wild, this fluoride. It's a different kind of fluoride than the dentist puts on your teeth. Makes the cows teeth soft and they wear off quick. Oh ya, we had quite a struggle for a while.

Laurie: How did it get over here though? What …

Roger: Oh, prevailing winds from the Canyon as we call it, or from this Teakettle Mountain which is right behind the plant. Sure blew those emissions down over our forage.

Laurie: Was the… how did the company… what did you do when you first discovered that your cows' teeth were rotting away?

Ted: Well, we weren't paying too much attention. Are we on tape now? (Laughter) We weren't paying too much attention to it, and they come out and kind of poking around and wondering how things were going.

Lulu: Well, we have Dr. Clancy Gordon from the University of Montana to thank for it because he was up here and took a lot of samples and things and was suspicious. He passed away a few years ago, but…

Ted: Have you heard of him?

Lulu: He um, he was the one that came up and began investigating.

Ted: He was a "dirty communist" just kicking up trouble, you know.

Laurie: Well, that's what, who said that?

Ted: Oh, corporate interests around Columbia Falls. Well, all over the state. They didn't like him to be questioning pollution. Now you see you have two people to the one. You can get a lot more. I've forgotten about Clancy Gordon. Ya, he kind of stirred it up first and then we started looking and, "Hey!" So then the Anaconda Company came out and started looking, too, then.

Lulu: They brought in a veterinary from the West Coast that had had experience out there with emissions. He went through our herd and…

Ted: Told them they'd better do something.

Lulu: Then they just kept track of it and realized their teeth were deteriorating, so we finally got a settlement.

Ted: Ya, that Clancy Gordon saved my… The corporate interests was screaming, "Well, we're paying taxes to that university and here's that dirty so and so just working against us!" Well, good gosh, why not if they're hurting animals and…

Laurie: What about other herds around here?

Ted: Oh, it petered out on south.

Lulu: It seemed like the wind… the… emissions didn't fall… well, of course, Anaconda bought up all the land. We are the first. There were a few other cattle, too, farther up, but it seemed like the emissions didn't fall right away, you know. The wind kind of

carried them. So they apparently were worse in this area, right in this area than they were anywhere else.

Ted: They bought a buffer area around the plant, but they didn't get quite far enough.

Laurie: Did the company try to fight that decision?

Ted: Oh… no… as soon as they got it all put together, why they didn't… they didn't argue.

Laurie: Lulu is nodding her head. (Laughter)

Lulu: Well, it seemed like they took quite a while (laughter) to convince them that there was damage.

Ted: Well, if they could convince us that there wasn't any damage, it had been all right, but… ya. So now they've cleaned up, so we can't see anything at all now.

Lulu: We can always smell. When there was a canyon wind, there was such an odor. Of course, they say that that doesn't harm, the odor doesn't harm you, but we could notice it.

Ted: Well we'd know that the emissions was coming this way. What we'd smell was something like a burning-out wood chimney. Kind of a pitchy burnt smell.

Lulu: Creosote smell.

Ted: Well, that's what they make those pots, line those pots with. They call it pitch among other things, and that's what we would smell and we'd know the fluoride emissions were coming this way. Although that pitchy smell wasn't it. The fluoride, was not able to smell that.

Lulu: But we don't notice.

Ted: So we don't notice any now, so…

Lulu: But we don't notice that odor at all now since they've put in the new controls.

Ted: So they're cleaning it up, apparently all of it, even the smell that isn't harmful. [98]

As 1968 wound down, public talks on air pollution continued, the state adopted air quality standards for the timber industry, and the Anaconda Aluminum Co. began to seek technical support for its building pollution case. The Columbia Falls Chamber of Commerce began to host a series of public meetings in early November 1968 about air pollution control regulations that would go into effect in 1969. Ruder, who was the

acting secretary for the local chamber, contacted Benjamin Wake about appearing at the chamber meeting. Wake said he would be prepared in a few months with figures on costs, availability of equipment and names of vendors for pollution control equipment. [99] The Montana Board of Health adopted air quality standards for timber and other industries but not smelters during a meeting on Nov. 23, 1968. [100] In early December, it was reported that AAC had provided a $3,000 grant to the University of Wisconsin to conduct a clinical study of the toxicity of fluorine at the school's biochemistry department. [101]

The enormity of the state's air pollution control effort had its own impacts. Serious progress had been made with developing standards and regulations for the timber industry, but dealing with the Anaconda Company posed a greater difficulty – with large copper and aluminum facilities in Butte, Anaconda, Great Falls and Columbia Falls, the company not only wielded political influence but also significant economic impacts. Benjamin Wake, the man in charge of directing Montana's air pollution control program since passage of the Montana Clean Air Act in 1967, expressed concern in 1968 that the program was "losing ground." He based his pessimism on the lack of manpower needed to enforce the law and to develop clean air standards. "Things that should be under control now aren't," he said, specifically tepee burners, asphalt plants and illegal open burning. He noted that local air pollution control programs, such as in Missoula and Billings, took a load off the state, but he called for at least one air pollution control officer in each county just to control illegal open burning. Enforcement of more technical problems would require even more manpower. Wake pointed out that he was sending Ed Gatzemeier to Kalispell to set up a permanent northwestern Montana air pollution control office, explaining that the "area is not responding at all" to the state's clean air program. [102]

---

[1] Michael P. Malone, "Montana: A Contemporary Profile," 1996 [AL0584] and "Environmental Impact Statement for the air pollution variance requested by the Anaconda Aluminum Company for its aluminum reduction plant at Columbia Falls, Montana," Montana Department of Health and Environmental Sciences, May 20, 1974 [AL0439]
[2] Beatrice Macomber, "Columbia Falls Yesteryears," 1976 [AL0434]
[3] "Before the turn of the century, Kalispell and Teakettle Mountain – 1895," Hungry Horse News, July 29, 1982 [AL2481]
[4] "Teakettle on mountain," Hungry Horse News, Oct. 18, 1968 [AL0969]
[5] "What did the Anaconda plant site look like before," Hungry Horse News, Sept. 28, 1978 [AL0462]
[6] Caption for photo of three successful hunters with mountain lions shot near the new Anaconda Aluminum Co. plant, Hungry Horse News, Aug. 12, 1955 [AL0511]
[7] "Get black bear on Teakettle," Hungry Horse News, Nov. 13, 1975 [AL1337]
[8] "Teakettle Mtn. prized by gliders," Hungry Horse News, June 24, 1976 [AL1388]
[9] Mel Ruder, "Big CF on Teakettle," Hungry Horse News, Oct. 30, 1959 [AL2022]

[10] Henry Elwood, "The 1929 Fire," from "Kalispell, Montana and the Upper Flathead Valley," 1980 [AL0569]
[11] "Naked Teakettle needs tree dress," Hungry Horse News, Feb. 4, 1949 [AL3220]
[12] Mel Ruder, "Reforesting the Flathead," Hungry Horse News, April 29, 1960 [AL2046]
[13] Captions for two photos of Forest Service crews planting seedlings on Teakettle Mountain, Hungry Horse News, May 6, 1960 [AL2049]
[14] "To plant sheep on Teakettle, sportsmen have pre-hunt roundup," Hungry Horse News, Oct. 19, 1962 [AL2134]
[15] "To plant sheep on Teakettle," Hungry Horse News, Sept. 29, 1967 [AL0734]
[16] "New home for sheep, released on Teakettle," Hungry Horse News, March 8, 1968 [AL0452]
[17] "Yard trees threatened," Hungry Horse News, May 8, 1964 [AL1531]
[18] John Coleman and Jerome Moore, "Propose harvesting bug-killed timber," Hungry Horse News, May 16, 1965 [AL2219]
[19] Mel Ruder, "Tracing history of aluminum plant in Col. Falls," Hungry Horse News, Sept. 18, 1985 [AL0248]
[20] "First word of plant came June 21, 1950," Hungry Horse News, Aug. 12, 1955 [AL0213]
[21] "Citizen's committee spokesman call Columbia Falls plant announcement very premature," Whitefish Pilot, June 23, 1950 [AL4292]
[22] Transcription of phone call between John Davis and Rep. Mike Mansfield, Aug. 18, 1950 [AL4430]
[23] "Favor south of Falls plant site," Hungry Horse News, Sept. 8, 1950 [AL1413]
[24] "Expect aluminum announcements Friday," Hungry Horse News, Sept. 22, 1950 [AL2611]
[25] Mel Ruder, "Needed: Valley leadership," Hungry Horse News, Sept. 15, 1950 [AL1415]
[26] "M.C. offers plant site," Hungry Horse News, Sept. 15, 1950 [AL1416]
[27] Mel Ruder, "H.H. News visits aluminum potline plant," Hungry Horse News, Sept. 8, 1950 [AL1414]
[28] Mel Ruder, "Let's be practical," Hungry Horse News, Oct. 20, 1950 [AL2615]
[29] "No fume damage says Harvey Co.," Hungry Horse News, Jan. 12, 1951 [AL2579]
[30] "ACM to build aluminum plant; Teakettle site chosen," Daily Inter Lake, Aug. 31, 1952 [AL1521]
[31] Mel Ruder, "Harvey has answer," Hungry Horse News, Jan. 5, 1951 [AL2578]
[32] Hungry Horse News, Jan. 12, 1951 [AL2579]
[33] Hungry Horse News, Jan. 12, 1951 [AL2579]
[34] "Harvey preparing for plant," Hungry Horse News, Jan. 19, 1951 [AL2580]
[35] Ory J. Armstrong, Clifford E. Haines and Robert C. Sykes, "Present fluoride information," Hungry Horse News, Jan. 26, 1951 [AL2581]
[36] Armstrong, Haines and Sykes, Jan. 26, 1951 [AL2581]
[37] Leo Harvey, "Harvey replies to Rep. Cliff Haines," Hungry Horse News, Jan. 26, 1951 [AL2581]
[38] Hungry Horse News, Jan. 19, 1951 [AL2580]
[39] Jack D. Ryan, "New Anaconda aluminum plant to open next month in Montana, copper producer subsidiary is first company to enter that field since 1946," New York Times, June 19, 1955 [AL1205]
[40] "To produce aluminum in 1953," Hungry Horse News, Jan.25, 1952 [AL1434]
[41] Macomber, 1976 [AL0464]
[42] Mel Ruder, "No time to rest," Hungry Horse News, Sept. 19, 1952 [AL1462]
[43] "AAC adopts new plant design," Hungry Horse News, Nov. 14, 1952 [AL1471]
[44] "Aluminum plant to build in '53," Hungry Horse News, Dec. 19, 1952 [AL1474]
[45] "State Chamber has AAC plant article," Hungry Horse News, Jan. 22, 1954 [AL2334]
[46] "Welcomes AAC at dinner," Hungry Horse News, May 29, 1953 [AL2301]
[47] "Top aluminum official here," Hungry Horse News, Oct. 7, 1955 [AL0227]

[48] "Conservationists hear pollution control discussed," Hungry Horse News, July 2, 1954 [AL2376]
[49] Montana Department of Health and Environmental Sciences, May 20, 1974 [AL0439]
[50] Gary Tarcy, Halver Kvande and Alton Tabereaux, "Advancing the Industrial aluminum process: 20th century breakthrough inventions and developments," Journal of Metals online, Minerals, Metals and Materials Society, August 2011 [AL4939]
[51] Mike Barber and Alton Tabereaux, "The evolution of Soderberg aluminum cell technology in North and South America," Journal of Metals, Vol. 66 Issue 2 pp. 223-234, The Minerals, Metals & Materials Society, February 2014 [AL5620]
[52] Alton Tabereaux, "Prebake cell technology: A global review," Journal of Metals online, Minerals, Metals and Materials Society, 2000 [AL2989]
[53] Final Environmental Impact Statement, Bonneville Power Administration, Direct Service Industry Options, U.S. Department of Energy, April 1986 [AL4952]
[54] "New plant features most modern design," Hungry Horse News, Aug. 12, 1955 [AL0212]
[55] "First Montana aluminum production," Hungry Horse News, July 22, 1955 [AL0206]
[56] "Forest Service blasts pollution," Hungry Horse News, Oct. 5, 1978 [AL0461]
[57] Clinton Carlson, "Fluoride induced impact on a coniferous forest near the Anaconda Aluminum plant in Northwestern Montana," Ph.D. dissertation, University of Montana, 1978 [AL4638]
[58] Mel Ruder, "AAC files on Flathead land purchases," Hungry Horse News, Nov. 8, 1957 [AL1650]
[59] Flathead County Plat Room ownership records for Columbia Falls Aluminum Co. lands, May 19, 2015 [AL4844]
[60] Mel Ruder, "Good neighbors," Hungry Horse News, Aug. 16, 1963 [AL2176]
[61] "Controlling pollution," Hungry Horse News, May 20, 1966 [AL1505]
[62] Mel Ruder, "Criticizes air pollution," Hungry Horse News, Dec. 15, 1967 [AL0745]
[63] Letter from Clarence Gordon to Sharon Morrison," Dec. 2, 1969 [AL4612]
[64] Ruder, Dec. 15, 1967 [AL0745]
[65] "River polluter never fined, says Gordon," Missoulian, Dec. 3, 1967 [AL0778]
[66] Ruder, Dec. 15, 1967 [AL0745]
[67] "Ben Wake will speak on pollution tonight," Missoulian, Dec. 5, 1967 [AL0779]
[68] Ruder, Dec. 15, 1967 [AL0745]
[69] Ruder, Dec. 15, 1967 [AL0745]
[70] Montana Department of Health and Environmental Sciences, May 20, 1974 [AL0439]
[71] "Pollution controls," Hungry Horse News, Nov. 10, 1967 [AL0741]
[72] Letter from Harold R. Dehlbom to Clarence Gordon, Jan. 15, 1968 [AL4617]
[73] Letter from Clarence Gordon to Harold R. Dehlbom, Jan. 17, 1968 [AL4618]
[74] "1968," Hungry Horse News, Dec. 22, 1972 [AL0955]
[75] "Note adverse effect of fluorides on lodgepole," Hungry Horse News, Jan. 10, 1975 [AL1312]
[76] Montana Department of Health and Environmental Sciences, May 20, 1974 [AL0439]
[77] Roy Reed, "Prosperity, then pollution, in Montana," New York Times, May 22, 1971 [AL1270]
[78] Tristan Scott, "The firm, at Kalispell law office, standing up for the underdog still a 'labor of love,'" Flathead Beacon, April 23, 2014[AL4481]
[79] "Air pollution research underway in Flathead," Hungry Horse News, June 21, 1968 [AL0444]
[80] "Regional review, Colorado Plateau executive summary," "Chapter 6, Terrestrial," National Park Service online, August 1998 [AL3295]
[81] "AAC tells of pollution control methods, plans," Hungry Horse News, Aug. 16, 1968 [AL0962]
[82] A. Warren Hook, "Air quality control program at Anaconda Aluminum Company's plant in Columbia Falls, Montana," National Archives and Records Administration, Denver, Colo., July 1968 [AL5559]
[83] Hungry Horse News, Aug. 16, 1968 [AL0962]
[84] Hook, July 1968 [AL5559]

[85] Hook, July 1968 [AL5559]
[86] Hook, July 1968 [AL5559]
[87] Hook, July 1968 [AL5559]
[88] Hook, July 1968 [AL5559]
[89] Hook, July 1968 [AL5559]
[90] Hungry Horse News, Aug. 16, 1968 [AL0962]
[91] "AAC pollution control topic," Hungry Horse News, Sept. 6, 1968 [AL0963]
[92] "Tell Lions about pollution control," Hungry Horse News, Sept. 13, 1968 [AL0965]
[93] "Meeting on pollution," Hungry Horse News, Oct. 4, 1968 [AL0967]
[94] Robert E. Miller, "Water pollution topic at Helena meeting," Hungry Horse News, Oct. 18, 1968 [AL0970]
[95] "Gordon to speak on air pollution," Hungry Horse News, Nov. 1, 1968 [AL0976]
[96] "Missoula lawsuit, area concern," Hungry Horse News, Nov. 22, 1968 [AL0977]
[97] Hungry Horse News, Nov. 22, 1968 [AL0977]
[98] OH 725, oral history excerpt from Ted and Lulu Rogers interview conducted by Laurie Mercer for the Montana Historical Society on Nov. 18, 1983, transcribed from cassette tape to word processor by Jane Renfrow, emailed to Richard Hanners on Dec. 13, 2016. [AL5453]
[99] "Chamber sponsoring meeting on air pollution control," Hungry Horse News, Nov. 6, 1968 [AL0979]
[100] "Mills find Helena rule difficult to follow," Hungry Horse News, Nov. 29, 1968 [AL0978]
[101] "AAC supports fluorine study," Hungry Horse News, Dec. 20, 1968 [AL0982]
[102] Jerry Holloran, "Pollution control losing ground," Missoulian, circa 1968 [AL0766]