Chapter 58

Groundwater, rivers and fish

Like many other U.S. aluminum plants, the smelter in Columbia Falls was built right next to a major river, but the Montana aluminum plant relied on rail transport for shipping, not river transport. By the time the mainstem of the Flathead River flows past the smelter site north of Columbia Falls, it includes water from three main tributaries – the South Fork, which originates in the Bob Marshall Wilderness and is held back by the Hungry Horse Dam; the Middle Fork, which drains from both the Bob Marshall Wilderness and Glacier National Park and flows past small communities west of the Park's entrance; and the North Fork, which starts in Canada and drains water from Glacier Park and the Whitefish Range as it flows south through a mostly undeveloped valley. All of the headwaters forks are entirely or in part designated National Wild and Scenic Rivers. By the time the Flathead River passes the federal gage station at Columbia Falls downstream of the smelter, it has drained 4,464 square miles – most of it mountainous wilderness. Water quality in the river is considered good. In the 2003-2004 measuring year, river flow at Columbia Falls ranged from a low of 3,290 cubic feet per second in December to a high of 26,400 cubic feet per second in May. The flow reached a record high of 176,000 cubic feet per second during the historic flood on June 9, 1964. [1]

The river provides fishing, swimming and paddling recreation opportunities that support tourist businesses. Game fish present in the Flathead River include lake trout, lake whitefish, mountain whitefish, northern pike, rainbow trout, smallmouth bass, westslope cutthroat trout and westslope cutthroat-rainbow hybrids. Other fish species found in the river include black bullhead, brook trout, brown trout, bull trout, kokanee, largemouth bass, largescale sucker, longnose dace, longnose sucker, mottled sculpin, northern pike minnow, peamouth, pumpkinseed, pygmy whitefish, redside shiner, slimy sculpin and yellow perch. The river is also used by terrestrial wildlife, from big game animals, small mammals and amphibians to waterfowl and raptors, including osprey and bald eagles. The Flathead River flows into Flathead Lake about 20 miles south of Columbia Falls. With a surface area of about 195 square miles, 370 feet deep and more than 27 miles long, Flathead Lake is the largest natural freshwater lake by surface area in the U.S. west of the Mississippi River. The lake has good water quality but is the recipient of water from several impaired rivers impacted by development in the Flathead Valley. To protect the lake, the Montana Legislature created the Flathead Basin Commission in 1983 to coordinate water quality protection and monitoring, facilitate policies and actions, and provide leadership in protecting the lake. [2]

Man's impact on the Flathead River's ecology was not always the result of point-source pollution by sewage treatment plants and industry or nonpoint-source pollution by forestry operations, agricultural practices and scattered rural septics. It also included the unintended consequences of planned government actions. This was the case of the kokanee salmon – landlocked sockeye salmon that were introduced to Flathead Lake in 1920. Kokanee had replaced cutthroat trout as the most-caught fish by 1940, and they remained dominant until the 1980s. [3] In mid-November 1953, the Hungry Horse News reported that the size of the salmon run up the Flathead River past Columbia Falls was larger than usual and the fish appeared larger than usual. The salmon migrated up the river from Flathead Lake in the fall to spawn on gravel beds upstream from Columbia Falls, including at McDonald Creek in Glacier Park. Unfavorable spawning conditions in 1948 reportedly had affected the salmon run as late as 1952, when the run was very light. But the kokanee salmon in 1953 were up to 20 inches long when the average was usually 12 to 14 inches long. Swarms of salmon blackened patches of the normally clear river, the newspaper reported. [4]

Kokanee salmon were prized by fishermen and bald eagles alike. To encourage production of larger kokanee salmon, the Montana Department of Fish and Game introduced opossum shrimp, Mysis diluviana, in several of the river's headwaters lakes in 1968, but the shrimp eventually made their way downstream to Flathead Lake by 1981 where they interfered with the food chain and ecology of lake trout. The result was a dramatic increase in lake trout, which were planted in Flathead Lake in 1905, and a collapse of the kokanee. The dramatic change resulted from the interaction of four non-native species – lake trout, kokanee salmon, mysis shrimp and government scientists. [5]

River impacts

The focus for most local watchdog groups, however, was man-made pollution – nutrients from sewage and agriculture; sediments from forestry, agriculture and construction; and hazardous chemicals from stormwater runoff and industry. When the Anaconda Company promoted its new aluminum smelter to locals in the Flathead Valley in the early 1950s, the company claimed no wastewater would be discharged into the Flathead River, and no air pollution was expected. Air pollution became a major issue for the company by the late 1960s, but pollution in the river was never a significant public issue until after the plant closed for good 60 years after it first fired up. [6] On April 17, 1959, the Hungry Horse News described a recently released 111-page report published by the Montana Board of Health titled "An Extensive Chemical, Physical, Bacteriological and Biological Survey – Columbia River Drainage in Montana." The report provided details on pollution in the Flathead River caused by sewage from small towns in the Flathead Valley, particularly Whitefish. “The Anaconda Aluminum Co. has well-designed facilities that protect the river,” publisher Mel Ruder noted in his newspaper story. A grassroots environmentalist group that actively watched for pollution threats to the Flathead River and Flathead Lake was the Flathead Lakers of Polson, he said. [7]

In early December 1959, Flathead Lakers President A.J. Cramer reported on pollution problems in regional streams in the watchdog group’s newsletter. The city of Whitefish had been warned by the Montana Board of Health that court action would be taken unless the city modernized its sewage disposal system to meet requirements of the state’s water pollution laws. Both the city of Columbia Falls and the Anaconda Aluminum Co. plant did not present a pollution problem to the Flathead River, Cramer said. [8] Ruder raised that point following an October 1968 meeting of the Montana Water Pollution Control Council in Helena to discuss water pollution problems in the state. The focus had moved to agricultural pollution after the council decided not to make a decision on whether the AAC plant was affecting the Clark Fork River. “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,” Ruder commented in an editorial. [9]

The AAC plant had various infrastructure in place to prevent wastewater from directly entering the Flathead River, including a mechanical sewage treatment plant and numerous holding ponds. In January 1970, Wilbur O. Aikin, a regional public health officer for Montana, sent a report to A.W. Hook, AAC’s environmental officer, describing his investigation of the plant’s wastewater discharges. The facility’s “means of waste disposal is having no adverse effect upon property, surface water or groundwater outside the confines of the Anaconda plant,” Aikin said. A holding pond built near the Flathead River provided sufficient time for noncontact cooling water from the smelter’s casting facility and other places in the plant to lose heat before entering the river. An 8 to 10 acre lagoon located north of the plant received “highly toxic wastes such as oils, acid, (as well as calcium fluoride) or contaminated water which occurs in small volume in the plant operation,” Aikin said. (Note: The calcium fluoride was produced in the air pollution control equipment when hydrofluoric acid in wet scrubber discharge water was neutralized with lime.) Aikin said this second lagoon “was well sealed by now and it is agreed that very little contaminated recharge is finding its way into the groundwater table.” Aikin said a third and smaller lagoon received wastewater from the carbon paste plant and “no damage to surface or groundwater outside the plant” was found to be caused by this lagoon. (Note: Boiler blowdown, which contained chemicals used to prevent corrosion in boilers, was also put in this third lagoon.) As a result of Aikin’s report, Claiborne Brinck, the Montana Board of Health’s director of environmental sanitation, issued AAC a new wastewater discharge permit with the stipulation that secondary treatment equipment be installed in the sewage treatment facility before July 4, 1972. [10]

Landfill problems

In addition to wastewater ponds, AAC built several landfills over the years. According to a former Columbia Falls Aluminum Co. engineer who worked on a landfill reclamation estimate for the plant in the 1990s, spent potliner was dumped along with other types of waste or garbage in various landfills that were not engineered or built to government specifications from 1955 to 1980. An engineered landfill that met government specifications was built in 1980 and put into use through 1985. As before, spent potliner was dumped in the engineered landfill along with other types of waste and garbage. After 1985, as part of the financial arrangements whereby Brack Duker and Jerome Broussard took ownership of the aluminum plant from the Atlantic Richfield Co. and renamed the operating company as the Columbia Falls Aluminum Co., all spent potliner was shipped to out-of-state locations. The pre-1985 onsite landfills were filled with a mixture of spent potliner; surrounding soil; garbage from lunchrooms, offices and maintenance shops; basement sweepings – including bath, aluminum and other materials that ended up in the potlines basements after a reduction pot overflowed; dust-collection bags and other waste from the dry scrubbers or other air pollution control equipment; coal tar pitch or petroleum coke scraps; friable asbestos insulation and other materials containing asbestos; worn-out electrical equipment that might contain PCBs; and other possibly hazardous industrial waste from multiple sources. Long-time plant employees recalled seeing large pieces of equipment dumped in the landfills, including welding machines. [11]

This cross-contamination presented a serious difficulty in dealing with potential groundwater contamination caused by spent potliner. One possible reason other Pacific Northwest aluminum smelter sites were cleaned up relatively quickly and efficiently after they permanently shut down was because managers at those plants had segregated the facility’s wastes, especially spent potliner, the former CFAC engineer said. He noted that throughout the life of the smelter plant in Columbia Falls, dross was usually sold to a buyer for reprocessing. Dross was the material skimmed off the top of molten aluminum in the casting plant’s holding furnaces. He noted that cryolite bath was typically reclaimed at the plant and reused. The amount of spent potliner generated in a year by the AAC smelter depended on several factors – how many reduction pots were in operation, how long the pots could typically operate before needing replacement, and if the pots were replaced before they were worn out because of a process change. The total number of pots at the smelter increased from 240 after the first eight years of operation to 360 in the early 1960s, and then 600 by 1968. All 600 pots were replaced during the late 1970s as part of the Sumitomo conversion. Pots tended to last longer than five years after the Sumitomo conversion. In the 1990s, plant engineers estimated about 150,000 to 250,000 tons of spent potliner might be buried at the plant, but because of cross-contamination the actual amount of waste needing removal could be two to three times that amount, the former CFAC engineer said. [12]

In October 1972, Les Espeland, the Flathead County sanitarian, told AAC that the plant's onsite dump must be closed down. Espeland explained to local media that the aluminum plant's dump was not approved by state and local agencies, did not meet legal requirements for such a disposal site and was not properly covered. Espeland said the dump should have been covered daily with a layer of earth. He also said the dump could be violating the state's groundwater or air pollution standards. [13] According to a December 1995 Missoulian article, AAC had buried 16,700 tons of carbon per year until the material was declared a hazardous waste around 1980. (Note: Calling the waste "carbon" was often shorthand for spent potliner, which could also contain refractory brick and various hazardous chemicals.) An estimated 400,000 tons of spent potliner buried at the plant site prior to 1980 contained between 800 and 1,200 tons of sodium cyanide, the newspaper reported. [14] AAC took its main landfill out of operation in 1980 and capped and revegetated it. According to a November 1988 draft report by Ecology and Environment Inc., of Denver, it was known that solvents had been dumped in the plant's landfills prior to 1980. Plans were made to build a new sanitary landfill lined with clay. [15]

In April 1981, AAC announced plans to build two new onsite landfills – a landfill with a clay lining for disposal of industrial waste materials, the first such landfill in Montana, and a sanitary landfill similar in design to Flathead County's solid waste landfill north of Kalispell. Marquardt Surveying conducted surveys north of the potline buildings for the new landfills. The clay lining was intended to prevent seepage of water or other materials from the landfill into natural groundwater systems. The Anaconda Company had already built a one-acre test landfill with a five-foot thick lining made from 10,000 cubic yards of clay to see if the industrial waste landfill could meet federal regulations. The main landfill at the AAC plant had been in use for 26 years and covered 30 acres, the Hungry Horse News reported. "We're burying the whole thing and planting it," said Bob Emerson, a construction supervisor for AAC. "All of the areas which have been used as a dump in the past will be reforested." [16]

Work began on the new landfills in September 1981. URECO Construction Co., a local company, won the bid to build the hazardous waste landfill, and Reynolds Excavating Co. won the bid to build the sanitary landfill. The projects were expected to cost about $400,000 and be completed by fall 1981. [17] In November 1981, construction workers finished excavating a 3.5-acre site lined with 25,000 cubic yards of clay laid down five feet thick for the new hazardous waste landfill. The clay lining was covered with 1,500 cubic yards of gravel. Plans called for the landfill to be covered with 60,000 cubic yards of soil and planted over with vegetation once it was full. [18] In a February 2016 interview, former AAC Purchasing Manager and Columbia Falls City Councilor Mike Shepard commented on the disposal of hazardous wastes at the smelter plant over the years. “Sometimes it went to the dump,” he said. “Sometimes the service crews would bury it. Nobody really knows where a lot of that stuff went.” Shepard said he had concerns about groundwater contamination if the landfills were not cleaned up. “The question is, at what point will it be leaching into the river, if it’s not already leaching into the Flathead River.” he said. [19]

Dealing with spent potliner

Spent potliner handling in the AAC potlines building began in the crane transfer building, which ran along the north end the entire length of the 10 potrooms. The main purpose of the room was to provide a means to move overhead cranes and pin-pulling cranes from one potroom to another or to one of the maintenance sheds used to repair cranes or rebuild anodes and cathodes. A new crane-transfer car was installed in June 1963 capable of carrying two 50-ton overhead cranes along with a 90-ton cathode between the potrooms and the maintenance sheds. [20] The maintenance sheds were located between the potrooms, and cranes could roll off the transfer car into the various sheds for production work or maintenance. Sheds 2, 8 and 19 were used to assemble and repair cranes. Shed 11 was the cathode-rebuild facility, and Shed 24 was the anode-rebuild facility. When the plant expanded from four potrooms to six in 1963, the crane transfer building could not be easily extended east to connect the existing West Plant to the new Potrooms 5 and 6 because the garage maintenance building jutted out too far north and soaking pits for dismantling used cathodes were located in the same space where the crane transfer building would go. The garage building’s huge steel columns were jacked up and the building was rolled south about 20 to 30 feet to move it out of the way. [21]

Moving the soaking pits, however, involved pollution issues. According to plant workers, wastewater from the soaking pits was pumped to treatment facilities and ponds north of the potline buildings, but there were government claims that cyanide leaked from the ponds and entered groundwater which was moving toward the Flathead River. When the crane transfer building was extended east to the new potrooms in the 1960s, the soaking pits were removed and a new method was implemented to dismantle used cathodes – the 50-ton cranes simply flipped the 90-ton cathodes upside down onto the thick concrete floor in the crane transfer building, causing the spent potliner and bricks to break loose and fall out without soaking. The resulting cloud of dust containing hazardous chemicals would fill the crane transfer building from Potroom 6 to Potroom 10. The strong smell of ammonia could be detected from a hundred feet away. Ammonia, like cyanide, was produced over time in the potliner materials. Personnel who worked in the crane transfer building, repairing pot skirts or at other jobs, asked plant managers to move the cathode dismantling process to a separate building. They said they were told by management that the federal Environmental Protection Agency had drawn a rectangular red line around the 10 potrooms and limited all work dealing with aluminum reduction pots to that area. If the company chose to move cathode-dismantling operations to a new building north of the potlines, it would require an expensive and complicated variance from the EPA, the workers were told. [22]

According to a Feb. 26, 1992, issue of "CFAC Newsbriefs," a company newsletter, wastewater from the cathode-soaking pits was discharged to the boiler blowdown pond, located about half a mile north of the potlines building, until 1978. After the Columbia Falls Aluminum Co. was founded and took over ownership of the smelter plant, all spent potliner was shipped to hazardous waste sites in Utah, Idaho and Oregon. Over the years, federal, state and private environmental engineering firms conducted hydrogeological assessments and site inspections at the plant that found groundwater flowed from plant property toward the Flathead River. Monitoring of this groundwater began in 1979, including the installation of 13 test wells, and reports were sent three times a year to the Montana Department of Health and Environmental Sciences. A state groundwater permit was issued to ARCO in 1984 and 1986 which was transferred to CFAC. In August 1991, according to the newsletter, a field investigation by the state health department found groundwater seeps along banks of the Flathead River. The seepage contained trace amounts of cyanide that were within the proposed EPA limit of 0.2 ppm for human consumption. "In other words, there was no violation of federal drinking water standards," the newsletter said. In December 1991, the state Water Quality Bureau advised CFAC to submit a plan by Feb. 28, 1992, to determine the exact source of the cyanide in the seeps and to eliminate any discharge into the Flathead River. CFAC hired Hydrometrics of Helena to assist in addressing this request, including installing additional test wells. [23]

In July 1991, CFAC built a facility onsite to expedite the shipment of spent potliner to a disposal site in Utah. New federal regulations prohibited the storage of spent potliner at the CFAC plant. By 1998, cathodes were split in the crane transfer building north of Potroom 8. The material was then scooped up by large front-end loaders and dumped into large metal containers, weighed, sealed and hauled to a temporary storage area across the railroad tracks north of the potlines. Periodically trucks arrived to haul away the containers. [24] In 1995, it was reported that spent potliner material was trucked from

CFAC to a landfill in Oregon, but the company was considering shipping the material to Arkansas for processing, which posed additional costs to the plant. It was estimated that each ton of waste carbon might contain four to six pounds of sodium cyanide. The typical lifespan of an aluminum smelting pot had increased from 3.2 years in 1983 to seven or eight years by 1995. Longer lifespans for pots reduced the amount of carbon waste generated by the plant from 16,700 tons per year prior to 1979 to 5,400 tons per year in 1995. Trucking spent carbon to Oregon cost the aluminum company about $750,000 per year. [25] By 1999, the company estimated the cost of shipping spent potliner out of state at about $100,000 per year. A typical aluminum reduction pot in the industry lasted about 1,500 days, the company told media, but CFAC's pots averaged 3,100 days. [26]

In the Nov. 5, 1997, issue of "CFAC Newsbriefs," the company provided information on respirators and atmospheric hazards in the plant. Paper dust masks were no longer considered an approved respirator at CFAC "because the Industrial Hygiene Committee determined these dust masks do not provide adequate protection against respirable dust, as well as no protection against hydrogen fluoride and coal tar pitch volatiles." The newsletter also noted that workers had expressed concerns about respiratory protection and bad visibility in the crane transfer building when cathodes were dumped. The company's response was to recommend that "while splits are taking place in the north end of Room 8, all nonessential employees avoid the affected area… Currently, the facility permitted to handle spent potliner requires the material to be sized. This sizing operation is the task that creates the majority of the dust in the north end of Room 8." To "size" the spent potliner, it needed to be crushed by front-end loaders or manually using jackhammers, which created more dust. [27] CFAC issued another safety alert bulletin on the hazards of spent potliner dumping in the crane transfer building on June 15, 2007, along with new safety procedures. "Tape and/or chain and signs are placed around the work area to warn away all traffic," the bulletin said. "Do not drive or walk through this area while barricades are in place. If going outside north of Rooms 8 and 9, use eye contact with driver of the large Taylor (Big Red) forklift. Visibility behind this vehicle is very limited." [28]

The EPA first listed spent potliner as hazardous under the code name K088 in 1980 because it contained high concentrations of cyanide. [29] The state of Montana registered the CFAC smelter site as a "large quantity hazardous waste generator and transporter" in 1980. [30] The EPA conducted an onsite inspection of the ARCO aluminum smelter in Columbia Falls on Aug. 25, 1981. According to results reported in a March 5, 1984, preliminary assessment and site history report, "Hazardous wastes produced at the facility are spent halogenated solvents and contaminated gasoline. Solid wastes include spent potliners, basement sweepings and air pollution control dusts." Spent potliner, basement sweepings and air pollution control dust were "deposited in an engineered landfill." The spent halogenated and nonhalogenated solvents were collected at six locations around the plant "and periodically transported to a storage area prior to shipment offsite. Depending on the nature of these wastes, they are stored in color-coded drums to prevent the possibility of chemical interaction and to facilitate recycling efforts." The collection and storage of the solvent wastes "is routinely inspected and monitored by personnel from Anaconda's Environmental Department." The aluminum plant was listed under the federal Resource Conservation and Recovery Act program with a "generator and treatment/storage/disposal status." [31]

EPA site investigation

ARCO applied for a Montana Ground Water Pollution Control Permit for the smelter site from the Montana Department of Health and Sciences in 1984. The permit was granted but did not authorize wastewater discharge to state surface waters. [32] MDHES also conducted a preliminary site assessment in 1984 and found further evidence the plant was generating hazardous waste. [33] On April 19, 1984, Sara Weinstock, with MDHES's Solid Waste Management Bureau, wrote to Jim Dunn, at EPA's office in Helena, about the aluminum smelter site in Columbia Falls. Attached was the EPA's March 5, 1984 preliminary assessment and site history report. "Based on our review of the available data, we have concluded that EPA should take no further action at this time," Weinstock wrote to Dunn. [34]

The EPA sent a field investigation team to the smelter site on Dec. 17, 1987, to conduct a visual inspection. That was followed up with a more thorough investigation of the 120-acre smelter site by Ecology and Environment Inc. under contract with the EPA Region 8 office in Denver, Colo. The contractor submitted a draft analytical-results report on Nov. 11, 1988. CFAC Environmental Coordinator Ken Reich told the contractor that the plant had 600 operating reduction cells with one or two taken out of service each week. Forty tons of waste carbon was removed from each spent cell's cathode, meaning about 80 tons of spent potliner was created each week. Reich said cyanide was present in each cell at the level of about 1%. He also said fluoride was present in about 17% of the waste in the form of sodium aluminum fluoride. [35]

The first 31 pages of Ecology and Environment Inc.'s 1988 draft report was a narrative summary with sections on site location and history, previous work, site geology and hydrogeology, well drilling and installation, sampling activities, analytical screening, quality assurance review, analytical results and conclusions. The four appendices totaled more than 300 pages. The contractor reported that drilling and installation of monitoring wells and sampling took place from June 1 to 18, 1988. Objectives included characterizing the hydrogeological conditions beneath the plant, assessing local groundwater flow patterns and direction, and collecting samples of sediment and water from the land surface and surface waters. The field investigation team conducted in-field screening for fluoride, cyanide and hexavalent chromium (which is commonly found in boiler blowdown). All told, the contractor collected nine groundwater samples, five soil samples, seven surface water samples and nine sediment samples. Three maps included in the draft report showed the location of the city of Columbia Falls' Cedar Creek Reservoir north of the smelter and the flood control ditch that ran from the reservoir to the Flathead River along the smelter's east boundary at the base of Teakettle Mountain. The naturally flowing Cedar Creek ran along the plant's west boundary. "Cedar Creek was of paramount concern under this investigation because it is used as the domestic water supply for Columbia Falls and that the site is situated topographically level with the Cedar Creek drainage," the report stated. "Obvious overland flow of contaminants was not observed during the investigation." [36]

Ecology and Environment Inc.'s report also included maps and text describing the layout of the smelter site. Three percolation ponds were located south of the smelter adjacent to the Flathead River. North of the boiler house were a sludge pond, a closed landfill and a sanitary landfill. Closer to the boiler house was the boiler blowdown pond. Northeast of the boiler house was a spent potliner landfill. To the north and south of the spent potliner landfill were two leachate ponds. Northwest of the boiler house were an infiltration pond and more percolation ponds. Monitoring wells installed prior to the EPA's 1987 inspection included one just west of the closed landfill, two near the spent potliner landfill, one just northwest of the warehouses, and one about a quarter mile north and west of the warehouses. The plant's production well was located near the Flathead River and east of the riverside percolation ponds. [37]

According to Ecology and Environment Inc.'s report, monitoring wells drilled and installed for the EPA included one about a quarter mile northwest of the closed landfill, one adjacent and north of the sanitary landfill, and one between the boiler house and the potlines building. Prior to 1978, waste effluent from cathode-soaking ponds was piped to the boiler blowdown pond, and an adjacent infiltration pond captured overflow from the boiler blowdown pond. Ken Reich told the EPA that by 1987, the boiler blowdown pond was used for noncontact cooling water. Quarterly monitoring of wells by CFAC personnel indicated a decrease in fluoride and cyanide concentrations since 1978 in the area of the boiler blowdown pond, Reich said. The percolation ponds near the river received noncontact cooling water from the casting plant and effluent from the plant's sewage treatment plant. The closed landfill was taken out of operation in 1980, capped and revegetated. It was known that solvents were dumped in the plant's landfills prior to that time, Reich said. The sanitary landfill was lined with clay and was used to take plant garbage, Reich said. [38]

Ecology and Environment Inc.’s report also described geological and hydrogeological features near and beneath the aluminum smelter site. The Flathead River flowed about a quarter of a mile south of the plant site with an average flow of 9,778 cubic feet per second. Heavy sediment loading in the Middle Fork of the Flathead River occurred during spring runoff. Industrial logging in the North Fork drainage resulted in phosphorus content about twice that of the Middle Fork. Cedar Creek originated north of the smelter in the Whitefish Range but flowed near the plant’s west boundary. The Cedar Creek Reservoir project initially was constructed for flood control but also for a time provided drinking water for the city. Flood control was accomplished by redirecting Cedar Creek to a ditch that ran around the east side of the plant at the foot of Teakettle Mountain to a culvert that discharged into the Flathead River upstream of the plant. The flood control ditch ran within 200 yards of the plant’s spent potliner leachate pond complex and less than a quarter of a mile east of the smelter. [39]

According to Ecology and Environment Inc., the complex geology beneath the plant site made it difficult to ascertain the exact hydrogeological relationships of the different groundwater aquifers. A previous contractor, Hydrometrics, had used piezometers in 1985 to determine subsurface depositional relationships by past glacial activity. The piezometers and drillers’ logs indicated a heterogeneous substratum existed below the plant that was both vertically and laterally discontinuous. This included a buried glacial outwash channel consisting of cobbles and gravels emanating from a bedrock canyon along the plant’s southern boundary that allowed “highly transmissive” groundwater at depths greater than 100 feet. Depth to groundwater across the plant property was variable, ranging from about 15 feet near the Flathead River to about 100 feet near the spent potliner landfill and sludge pond. Extrapolation of Hydrometrics’ work in 1985 indicated that groundwater flowed southwest under the plant. Groundwater yields in wells varied from only a few gallons per minute to more than 1,500 gallons per minute. This large variability was attributed to the heterogeneous nature of the glacial deposits underlying the site. Groundwater generally moved into the Flathead River, Hydrometrics’ work suggested. [40]

Soil, groundwater and surface water samples collected by Ecology and Environment Inc. were tested in a laboratory for fluoride, cyanide and hexavalent chromium – the latter a man-made anticorrosion compound that is a recognized carcinogen. Measurable concentrations of cyanide and fluoride were found in groundwater drawn from two monitoring wells located downgradient from the north percolation ponds, where cathode-soaking wastewater was discharged prior to 1977. But overall, the investigation found cyanide concentrations in groundwater had decreased. Cyanide was found in the surface water of the south percolation ponds and in small concentrations in the nearby Flathead River. No cyanide was found in Cedar Creek. Contact cooling water from the plant's casting plant, which did not go to the percolation ponds adjacent to the river, had increased concentrations of aluminum, barium, iron, lead, vanadium, zinc and cyanide. Hydrometrics had found increased concentrations of fluoride in the south percolation ponds in 1985. Ecology and Environment Inc. reported finding higher concentrations of fluoride in groundwater samples from all its wells and in samples taken from the plant's production well. [41]

Ecology and Environment Inc. reported that soil samples collected about 2 1/2 feet below the surface near the closed landfill contained a full range of polycyclic aromatic hydrocarbons and other contaminants, including acenaphthylene at 51 times above background levels, benzo(a)anthracene at 5,900 times, chrysene at 45 times, benzo(a)fluoranthene at 22 times, benzo(a)pyrene at 44 times, benzo(g,h,i)perylene at 43 times, dibenzofuran at 190 times and fluorine at 610 times. A sample of waste dust from the air pollution control system contained significant concentrations of polycyclic aromatic hydrocarbons compounds, including phenathrene at 2,235 times above background levels, fluoranthene at 2,735 times, pyrene at 1,433 times, benzo(a)anthracene at 110,000 times, chrysene at 578 times, benzo(k)fluoranthene at 512 times, benzo(a)pyrene at 781 times, indeno(1,2,3-cd)pyrene at 480 times, dibenzo(a,h)anthracene at 24,000 times, and benzo(g,h,i)perylene at 464 times. Also detected were toluene at 1,000 ppb, dibenzofuran at 7,500 ppb and bis(2-ethylhexy1)phthalate at 5,000 ppb. A soil sample from the covered sludge pond also contained polycyclic aromatic hydrocarbons, including fluoranthene at 10,000 ppb, pyrene at 9,000 ppb, benzo(a)anthracene at 2,300 ppb and benzo(b)fluoranthene at 3,700 ppb. The investigators also took a sample of the carbon used to make cathodes as a representative example. Groundwater sampled from the monitoring wells did not indicate that these organic contaminants had gotten into the groundwater. [42]

Ecology and Environment Inc. also sampled surface waters, notably the Flathead River and the Cedar Creek flood control ditch. No organic contamination was found in the noncontact casting-plant cooling water that flowed out of the south percolation ponds into the river, but sediments in the south percolation ponds had polycyclic aromatic hydrocarbon concentrations as high as 130,000 ppb. Surface water in the Flathead River downstream from the percolation ponds did not contain organic contaminants, but a sediment sample collected downstream of the percolation ponds had a minor amount of polycyclic aromatic hydrocarbons, with 41 ppb of benzo(b)fluoranthene. While the Cedar Creek flood control ditch east of the smelter had no signs of organic compound contamination, there were signs in the sediment of Cedar Creek on the west side of the plant but not in its surface waters. The highest concentrations of organic compound contamination in surface water were found in the boiler blowdown pond, including phenanthrene, fluoranthene, pyrene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene all at greater than 1,000,000 ppb. Ecology and Environment Inc. concluded that high levels of polycyclic aromatic hydrocarbons had been found in soil and sediments associated with plant processes, and a release of cyanide was evident in groundwater and some surface water. The contractor noted that the city of Columbia Falls' municipal water supply did not contain contamination from the smelter plant. [43]

Riverbank seeps

In 1989, the Montana Department of Environmental Quality evaluated the Columbia Falls aluminum plant site under the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) and referred it from the CECRA list to the DEQ's Hazardous Waste Program as a generator of hazardous waste. [44] By late February 1992, the state Water Quality Bureau was awaiting a report from CFAC on how the company planned to deal with cyanide and fluoride getting into groundwater and then seeping into the Flathead River. The seeps quickly diluted to undetectable levels in the river's large volume, but the seeps exceeded some federal and state standards at the source. The cyanide concentration of the seeps ranged as high as 0.151 ppm, which was below Montana's proposed drinking water standard of 0.200 ppm also used as a groundwater standard. Below the seeps, cyanide concentrations in the Flathead River ranged around 0.006 ppm, which was above the long-term limit for fish and aquatic animals of 0.005 ppm. The company's wastewater discharge permit required CFAC to monitor river water at the U.S. 2 highway bridge just east of Columbia Falls, where cyanide concentrations dropped below detection levels. The fluoride concentration ranged as high as 2.7 ppm at the seeps and around 0.410 ppm in the river below the seeps. The allowable concentration of fluoride in drinking water was 4 ppm. One onsite pond trapped seepage from ponds containing sodium fluoride-contaminated wastewater from past and obsolete air pollution control equipment. [45] The plant had switched from wet scrubbers to dry scrubbers by 1980.

John Arrigo, a state Water Quality Bureau supervisor, told local media in February 1992 that the riverside seeps fell under an unresolved area of the law – technically the plant was in compliance with its permits. Arrigo explained that Montana state law did not allow degradation of surface water, and discharges could not make a stream worse downstream than it was above. The aluminum plant seeps, however, began prior to passage of a 1982 Montana state law on stream degradation, he said. Furthermore, the plant had a valid groundwater discharge permit and was meeting monitoring requirements, Arrigo said. Both federal and state water quality agencies had argued that infiltration ponds near streams were in fact surface discharge points, and companies with ponds near streams should be required to get surface discharge permits, Arrigo noted. [46] In March, Tim Byron, a Water Quality Bureau environmental specialist, publicly stated his dissatisfaction with CFAC's plan to monitor cyanide seepage into the Flathead River. As developed by Hydrometrics, the company's plan called for drilling three monitoring wells, but Byron was concerned about where the wells would be located, how they would be constructed and what data would be collected. "We have a large front where we're finding trace amounts of cyanide," Byron said. "How are two wells going to be used to suggest how to intercept this whole front of groundwater?" [47]

The Water Quality Bureau sent CFAC a list of 13 issues the state had with the company's groundwater pollution problem in April 1992. The bureau questioned CFAC's explanation that cyanide seeping into the Flathead River came from a pit once used to soak cathodes containing spent potliner material. A state study showed that the level of cyanide in the groundwater at the CFAC plant was almost 30 times the legal maximum, and groundwater data indicated an annual surge in cyanide levels during the months of July and August. "They haven't soaked down potliners for 15 years, so why this annual surge?" Byron asked. The bureau also wanted to find the source of fluoride in CFAC's groundwater test wells. Other issues involved how CFAC disposed of spent potliner and whether CFAC monitored chemicals leaching from an old landfill at the plant. The company was given until June 1, 1992, to respond to the bureau's questions. [48] CFAC Spokesman Jack Canavan responded to the bureau's interpretations in May. "This is not an environmental disaster by any stretch of the imagination," he told local media, noting that cyanide in any surface water was broken down by sunlight and oxygen before entering the Flathead River. Arrigo responded to Canavan's statements by noting that even if the cyanide seepage was a minor threat to human health, the problem existed and needed to be dealt with. [49] In June, the bureau gave CFAC its approval to begin drilling three test wells to monitor seepage of cyanide into groundwater. The company was given 60 days to drill the initial test wells. [50]

The state Water Quality Bureau asked CFAC in December 1992 to come up with a new plan for dealing with cyanide found to be seeping into the Flathead River. The bureau found the company's plan to use wells to intercept cyanide-contaminated groundwater that was migrating toward the river to be ineffective. A test well used by the bureau indicated that cyanide was coming from an unused cathode-soaking pit and from an older closed landfill, but CFAC officials claimed the cyanide came only from the soaking pit. [51] Byron spoke to local media about the cyanide seep in June 1993. More than a year after cyanide was discovered seeping into groundwater from an old landfill or an old soaking pond at the plant, a plan submitted by CFAC was still being reviewed by the state, he said. CFAC's plan called for capping the landfill and pond with clay or synthetic material. The state called for drilling more monitoring wells in summer 1993 to pinpoint the source of the cyanide. CFAC still contended the source of the cyanide was a former cathode-soaking pond, while the state suspected a landfill north of the pond. [52]

With a determination that the plant was discharging into the Flathead River without a permit, CFAC submitted an application in 1993 for a Montana Pollutant Discharge Elimination System permit. The Montana Department of Environmental Quality required a groundwater investigation to determine sources of cyanide to the Flathead River. The DEQ issued the permit to CFAC in 1994, authorizing the discharge of process wastewater through groundwater to the Flathead River. [53] By the end of 1995, with CFAC back to nearly 100% capacity after restarting an idled potline in the spring, discharge levels by the plant were well within pollution standards, the state Water Quality Bureau reported. The plant used 4 million gallons of water per day, drawn from production wells near the Flathead River. Most of the water ended up in the Flathead River after passing through cooling ponds near the river. Low levels of cyanide continued to be monitored around landfills where spent potliner had been dumped in the past. [54]

In spring 1996, the EPA reported finding several visible seeps containing cyanide on the banks of the Flathead River near the CFAC plant when the river was at low level. The EPA returned to the plant at a later date with DEQ officials and took discharge samples that exceeded two federal standards for aquatic life in rivers but were below standards for human health. In February 1997, the DEQ said it planned to order CFAC to obtain a permit for cyanide discharge, which would mean CFAC would have to calculate how much cyanide it discharged, Tim Byron told local media. The cyanide originated in a landfill north of the potline building, he said. CFAC was shipping all its spent potliner out of state, but spent potliner was buried on plant property in the past, he said. [55]

A groundwater sample taken from a monitoring well near the landfill in June 1996 contained 47 milligrams per liter of cyanide, Byron told the Hungry Horse News. The human health standard for cyanide was 0.2 milligrams per liter. Groundwater moved in a mile-wide swath beneath the plant from beneath the landfills to the river. A sample from a well close to the river contained 0.055 milligrams per liter of cyanide, which was above two standards for aquatic life in rivers. Byron said that sample was characteristic of groundwater flowing into the river, but recent tests of the river showed no detectable levels of cyanide. At the EPA's request, CFAC capped the landfill north of the plant with a synthetic liner to reduce the amount of precipitation entering the landfill and the amount of cyanide flushed into the surrounding groundwater. CFAC Environmental Manager Steve Wright said CFAC was taking steps to mitigate the cyanide discharge and planned to continue working with the DEQ and EPA. "Dealing with this, and with both regulatory agencies, will take some time," he said. [56]

In March 1997, the DEQ gave CFAC until March 12 to quantify the amount of contaminated effluent from the smelter plant that was entering the Flathead River. DEQ officials told local media they were concerned about cyanide and fluoride in the groundwater beneath the plant. "I really don't think they have a groundwater problem, but we need to know the pounds per day of cyanide and fluoride that reaches the river," Tim Byron said. Once the extent of the discharge was known, the DEQ could include the effluent in CFAC's wastewater discharge permit, so long as the discharge did not exceed state standards, he said. Neither the state nor CFAC believed maximum standards were being exceeded at the time. "There's no way this could be construed as a public health hazard at this point, especially with regard to contaminant levels in the river," Byron said. "The Flathead River is a pretty clean river. The only way you could have a problem is if you were drinking groundwater from directly beneath the plant. Personally, I wouldn't want to be drinking that water." Steve Wright said CFAC was already determining how to collect the measurements requested by the DEQ. As soon as the procedural details were hammered out, CFAC would begin field work in cooperation with the DEQ and EPA, he said. [57]

The DEQ announced its intent to renew CFAC's wastewater discharge permit on Nov. 25, 1998. The permit was set to expire on Feb. 28, 1999. The DEQ stated in a public notice that the permit was for industrial wastewater that was discharged "to groundwater that is hydrologically connected to the Flathead River." The wastewater was discharged from plant processes and by seepage from landfills and included wastewater from the carbon paste plant, obsolete wet scrubbers, ingot-cooling water and domestic water. The permit defined several underground "mixing zones" where dilution would take place and certain water quality standards could be exceeded. The permit also required sampling at 10 monitoring wells, two production wells and three surface-water monitoring points. Surface water in the area was classified as B1 – suitable for drinking, culinary and food processing with conventional treatment, as well as for bathing, swimming and recreation, agricultural uses, and growth and propagation of fish, associated aquatic life, waterfowl and furbearers. Groundwater in the area was classified as Class 1 – suitable for the same. [58] Montana DEQ's Permitting and Compliance Division also required removal of spent potliner material in surface soil. [59]

In March 1999, it was reported that the DEQ had collected a $27,000 civil penalty from CFAC for violations of the Montana Hazardous Waste Act. The company was fined for failing to remove, treat or dispose of spent potliner, the DEQ reported. Steve Wright told local media that CFAC contacted the DEQ in November 1997 when it discovered sludge material containing cyanide in a waste pile. The material was placed there in 1994, Wright said, and the cyanide levels were "less than detectable." He said he was surprised by the fine. "We don't necessarily agree it was hazardous waste," he said. [60] The DEQ renewed CFAC's Montana Pollutant Discharge Elimination System permit in 1999, authorizing the discharge of process wastewater through groundwater to the

Flathead River through 2004. The DEQ administratively continued the 1999 permit when CFAC applied to renew the permit in 2003. [61]

Treating spent potliner

The cost and technical requirements of abiding by state or federal regulations on spent potliner drew the attention of the Aluminum Association, which included the matter in a two-day workshop on pollution prevention in 1998. [62] Two years later, the EPA published stricter standards for cyanide and fluoride levels for disposal of spent potliner. The previous standard for treated potliner waste was 590 mg/kg of cyanide and the new standard would be 1.4 mg/kg. The proposed standard for treated-potliner wastewater would be 2.7 mg/L of fluoride – this reinstated a standard that existed prior to an April 1998 federal appeals court ruling in CFAC v. EPA that vacated a 1996 rule on spent potliner disposal. The EPA said there would be a 60-day comment period on the July 12, 2000, proposal, which also sought to regulate vitrification of potliner waste – a process which converted spent potliner waste to a glass-like material by heat. Most of the vitrification was done at the Reynolds Metals Co. plant in Gum Springs, Ark., which treated about 120,000 tons of spent potliner per year. Another vitrification plant existed at the Ormet aluminum plant in Hannibal, Ohio. A treatment plant in Arlington, Ore., used chemical means to treat spent potliner. The EPA estimated the annual cost for treating spent potliner for cyanide and fluoride ran from $12.4 million to $36.8 million per year. [63]

Finding a way to treat spent potliner or to reuse the material was a long-held goal of the U.S. aluminum industry. In 1939, Alcoa began to process spent potliner from its smelters at Niagara Falls and Massena using facilities at its East St. Louis Works in an attempt to recover cryolite. The process was similar to the process Alcoa used to produce synthetic cryolite at the East St. Louis Works acid plants. The spent potliner was finely ground and then leached with a hot caustic solution. The liquor was then thickened, filtered and neutralized such that the cryolite precipitated out of the solution. The precipitated cryolite was then filtered and dried, with the liquor returning to the refining plant's digesters. Residue from the spent potliner recovery process was typically called "black mud," a highly alkaline material containing carbon, fluoride and cyanide. [64]

In 1988, the International Aluminium Institute stated that its objectives for spent potliner included finding ways to use the material as feedstock for other industries, including cement, steel, mineral wool and construction aggregate, and "to endeavor to store all spent pot-lining in secure, waterproof, ventilated buildings or containers." The compounds found in spent potliner could be corrosive, toxic, reactive and even explosive, the organization stated. In an unusual case, spent potliner in the hold of a cargo ship reacted with water, creating flammable gases that exploded, killing two workers and causing $30 million in damages. In the past, spent potliner was disposed of by dumping it in rivers or seas, storing it in open dumps or by land-filling. By the late 1980s, spent potliner was stored in secure landfills with an impermeable base and covered with an impermeable cap. [65]

In April 1993, local media reported that CFAC was strongly backing plans in the Montana Legislature to build two waste-incinerating kilns in Montana for the production of cement – one in Three Forks and another near Montana City. CFAC at the time was shipping 6,000 tons of spent potliner each year to landfills in Idaho, Oregon and Utah, and the company could save money by disposing of the material locally. "The Environmental Protection Agency, in its infinite wisdom, has banned land-filling of potliners," CFAC Vice President Lee Smith told local media at the time. This left the company with no alternative but to ship the waste to an incinerator in Arkansas, which would quadruple costs adding up to millions of dollars, Smith said. Opposing the Montana incinerators were environmental lobbyists, including Brady Wiseman of the Bozeman-based Montanans Against Toxic Burning. Wiseman accused CFAC of hardball lobbying, including misleading the legislature into believing the CFAC plant would be forced to close if the waste-burning facilities were not built. But all aluminum smelters faced the same kind of waste disposal problems, Wiseman said. The 6,000 tons of hazardous waste CFAC generated each year accounted for about half the hazardous waste shipped out of Montana each year. [66] The spent potliner treatment proposal for the two Montana cement plants was never implemented.

By the mid-1990s, CFAC and other aluminum producers in the U.S. faced a difficult situation – because of EPA regulations and interpretations, spent potliner could no longer be buried at specially-constructed landfills or treated at the only facility in the U.S. that handled spent potliner. There was nowhere for the waste to go. CFAC sued the EPA and won in April 1998 when the U.S. Court of Appeals for the District of Columbia ruled in favor of the aluminum company. [67] The petition was brought by CFAC and two small aluminum manufacturers to challenge three EPA rules promulgated pursuant to the Resource Conservation and Recovery Act of 1976 which established standards for the treatment of spent potliner or its disposal if not treated. U.S. Circuit Judge Raymond Randolph ruled that the EPA's test for determining compliance was arbitrary and capricious. The issue originated in 1984 when Congress passed the Hazardous and Solid Waste Amendments with the goal of shifting hazardous waste management from land disposal to treatment. The amendments specified that hazardous materials must be treated as specified in the act, or they must be disposed of in such a way that they will not migrate. The amendments also provided that the EPA would specify the levels or methods of treatment that diminished the toxicity of the wastes or reduced the chances of migration. Ultimately the EPA chose to use standards based on “the best demonstrated available technology.” [68]

The EPA first listed spent potliner as hazardous in 1980, but before the listing went into effect, Congress enacted the 1980 Solid Waste Disposal Act, which contained the so-called Bevill Amendment that excluded mining wastes from the act. The EPA interpreted the amendment to include “solid wastes generated during the smelting and refining of ores and minerals” and excluded spent potliner. The Environmental Defense Fund brought legal action against the EPA regarding this interpretation. As litigation ensued, the EPA chose to reinterpret the amendment and flip-flopped on the agency’s position. Finally the U.S. Court of Appeals for the District of Columbia ordered the EPA to re-list spent potliner by Aug. 31, 1988. The EPA complied but missed the six-month statutory deadline for promulgating land-disposal restrictions and treatment standards. The Environmental Defense Fund brought suit again resulting in the EPA signing a consent decree requiring it to promulgate a final rule for spent potliner by June 30, 1996. In addition, Congress enacted an absolute deadline of May 8, 1990 – the so-called “hard hammer” for all hazardous wastes listed or identified at the time of the 1984 amendments. The “hard hammer” was intended to be a powerful incentive for regulatory action, because a ban on land disposal without means of treatment would have threatened to close down the entire aluminum industry. [69]

In April 1996, the EPA set forth the first of three rules, which were challenged in the CFAC v. EPA case. The April 1996 rule established a treatment standard expressed as numerical concentration limits for constituents including cyanide, toxic metals and polycyclic aromatic hydrocarbons. For fluoride and metals, the standard was expressed in terms of the Toxicity Characteristic Leaching Procedure (TCLP), a pivotal element in the case. The EPA routinely used the TCLP standard for land disposal restrictions. The April 1996 rule also provided aluminum smelters a nine-month variance to allow adequate time to work out the logistics of complying with the rule. At that time, the Reynolds Metals Co. was the only company engaged in full-scale treatment of spent potliner. The Reynolds method at its Gum Springs, Ark. facility involved crushing spent potliner to particle size and adding equal parts limestone and brown sand. The limestone would react with the fluoride in the spent potliner to make relatively insoluble calcium fluoride. The brown sand was a waste product from the refining of bauxite into alumina. The mixture was fed into a 250-foot long rotary kiln, heated to 1,200 degrees Fahrenheit and then buried in an onsite mono-fill. [70]

The EPA ruled that the kiln residue at the Reynolds plant was hazardous because it was derived from a hazardous substance. In August 1989, Reynolds petitioned the EPA to have the kiln residue de-listed, which the EPA granted because it recognized that, for all practical purposes, Reynolds was the only company in the U.S. treating spent potliner and likely would end up treating all of the spent potliner from the U.S. industry. In January 1997, without any formal notice and comment, the EPA promulgated a second spent potliner rule, just as the nine-month variance was due to expire, providing aluminum producers a six-month extension on the variance because of problems found in the Reynolds treatment process. In July 1997, the EPA announced that the “Reynolds' treatment (albeit imperfect) does reduce the overall toxicity associated with the waste” and was therefore an improvement over disposal of untreated spent potliner. The extension ended on Oct. 8, 1997, and the prohibition on land disposal of untreated spent potliner took effect. In his decision in the CFAC v. EPA case, Judge Randolph ruled that the EPA lacked confidence in its own interpretation of the effectiveness of the Reynolds process. “Once an agency reopens an issue, whether by soliciting comments or indicating a willingness to reconsider, ‘a new review period is triggered,'” he said. “By the same token, once an agency reopens, the record before the agency at the time of the reopening may be reviewed by the court.” [71]

Judge Randolph felt CFAC's objections were not well-taken when they charged that the EPA improperly adopted the Reynolds process as the “best demonstrated available technology.” On the other hand, Randolph noted that CFAC was correct in charging that the EPA should not have used the TCLP standard to measure compliance once the EPA became aware the TCLP standard was not an accurate predictor of the mobility of toxic constituents. This was particularly true because the constituents of spent potliner were not destroyed by the Reynolds process, and the goal was to minimize mobility. The Reynolds process destroyed most of the cyanide and all of the polycyclic aromatic hydrocarbons, but it did not destroy fluoride or metals. “We cannot make sense of EPA's conclusion,” Judge Randolph wrote. “An agency's use of a model is arbitrary if that model ‘bears no rational relationship to the reality it purports to represent.'” Judge Randolph also provided a means for aluminum producers to remain operating. “If we were to vacate the treatment standard for spent potliner without vacating the prohibition on land disposal, aluminum manufacturers might be forced to cease production,” he said. “EPA is of course aware of such consequences. It listed spent potliner in 1988 but failed to meet the six-month statutory deadline for promulgating a land disposal prohibition. The inference is that the Agency delayed banning land disposal until it could develop a treatment standard.” [72]

The treatment of spent potliner to reduce its hazardous properties continued to be a goal in industry after the CFAC v. EPA case. On July 26, 2000, the EPA granted a variance to Safety Kleen, a solid waste disposal company located in Texas that handled spent potliner from primary aluminum plants. Changes were made in how the EPA regulated the company after CFAC won its case against the EPA regarding standards for handling spent potliner. [73] The Aluminum Association met with the EPA in October 2001 to discuss treatment, recycling and other technologies related to spent potliner, with the probability that some type of voluntary program would continue. [74] In mid-January 2005, Alcoa announced a new use for spent potliner. Together with Nova Pb and St. Lawrence Cement, Alcoa scientists had discovered a way to recycle the hazardous waste into a new product called CALSiFrit, which could be used to strengthen cement. [75]

Wastewater permits

The CFAC smelter fired back up in 2002 after being closed for a year during the West Coast Energy Crisis. For the next eight years, the plant struggled to keep the three potlines in the East Plant operating, dropping to only one potroom in the final months before permanently closing. Between 2002 and 2005, according to the EPA, one inspection was made for the site's "permit compliance system for Clean Water Act programs monitoring National Pollutant Discharge Elimination System" permits and one "informal enforcement action" took place. During the same time period, five inspections were made of the site's Resource Conservation and Recovery Act waste handler database system, and there were no "alleged current significant violations." [76] CFAC's state-issued pollution discharge elimination system permit was set to expire on Jan. 31, 2004. Under the state permit, CFAC's discharges to the Flathead River were monitored for temperature, pH, cyanide, fluoride, aluminum, specific conductance, nickel, antimony, benzo(a)pyrene, biological oxygen demand, total suspended solids and flow. [77] In spring 2013, the DEQ determined that an updated permit application was required for renewal since the previous application was submitted in 2003 and hence outdated. Although CFAC had ceased operating its aluminum smelting operation in 2009, CFAC submitted its updated application in 2013 with the assumption that production could restart at any time. [78]

On Feb. 18, 2014, the DEQ published a legal notice seeking comment for an update to CFAC's wastewater discharge permit. The permit was issued in 1999 and hadn't been updated since then. Wastewater discharge permits were typically updated every five years, but the DEQ said there was a shortage of staff. The permit covered discharges while the plant was in production and from any landfills and ponds on the site. Some landfills contained spent potliner that could contain hazardous chemicals, including cyanide. The 11 outfalls described in the permit included cooling water for the paste plant and the casting plant, effluent from the sewage treatment plant, collected stormwater, noncontact cooling water, boiler blowdown and incidental process discharge. The DEQ proposed including cooling water for the sow casting line installed in 2006. According to the legal notice, groundwater that flowed beneath the plant received wastewater from several settling ponds, drywells, steam-cleaning sumps, landfills, a septic system and other small sources. The DEQ also proposed including new requirements for ammonia, chlorine, cyanide, aluminum, antimony, benzo(a)pyrene, copper, fluoride and nickel. [79]

The Daily Inter Lake in a March 30, 2014, editorial sharply criticized the DEQ for delaying an update of CFAC's wastewater discharge permit for 15 years. "If CFAC's permitting has been delayed that long, then it's hard to imagine what other permits could possibly have been considered more pressing and worthy of DEQ staff time," the editorial board said, adding that, "CFAC, after all, is a well-known source of contaminants." Noting that the plant's landfills contained spent potliner, the editorial pointed out that the reason for the wastewater discharge permit was to make sure contaminants didn't leave the plant site. It went on to note that the EPA was in the midst of an investigation to see if the site should fall under the Superfund program for cleanup. The editorial also noted that the CFAC plant was still operating in 2009, ten years after the last permit was issued, and permits were supposed to be updated every five years. "If Montana is going to have an environmental agency with permitting power, then CFAC should warrant the utmost priority for that oversight," the editorial stated. [80]

With all that editorial comment and environmental investigation, what locals wanted to know was if their drinking water was safe – particularly the municipal water supply of Columbia Falls. In April 2016, the Hungry Horse News reported on the quality of the city's drinking water, which was supplied from two 200-foot deep aquifer wells that could pump up to 1,000 gallons per minute. The water was pumped from the wells located south of U.S. Highway 2 to a 2 million gallon concrete water storage tank north of the aluminum plant next to the Cedar Creek Reservoir. The city no longer used water from the Cedar Creek Reservoir for its drinking supply. When the public learned about contamination in residential wells near the plant, the city ran the same types of tests used at the residential wells on the city water and found no contamination, public works director Grady Jenkins told the Hungry Horse News. [81] Another concern was whether the aluminum plant had polluted the Flathead River and harmed fish. In October 2000, Mark Deleray, a fisheries biologist at the Montana Department of Fish, Wildlife and Parks in Kalispell, said he was unaware of any pollution from the aluminum plant impacting the Flathead River fisheries, and that he had never heard of any such complaints in the 10 years he had worked in the area. [82]

Fish conservation

Pacific Northwest aluminum companies not only needed to be concerned about plant pollution harming fish – they also needed to pay for fish conservation programs at federal hydroelectric dams across the region. Fish conservation efforts began to peak just as the West Coast Energy Crisis spread north out of California along the Pacific

Northwest-Pacific Southwest Intertie. The result was a clash between those who supported regional preference and didn't want to send precious power to California and those who supported restoring fish in the Columbia River. The Bonneville Power Administration had taken measures since the agency's beginning to mitigate for migrating salmon blocked by dams in the Columbia River. A count of fish using fish ladders at the newly constructed Bonneville Dam on the Columbia River from May 1, 1938 through Sept. 10, 1938, indicated "the successful operations of these facilities," the BPA reported in its first annual report. [83] But prior to construction of the dams on the Columbia River, a thriving commercial salmon fishery existed with as many as four canneries in operation along the river and more than 20 million pounds of salmon harvested annually. After 1960, the harvest was closer to 8 million pounds, and the last cannery on the river closed its doors in the mid-1970s. [84]

One of the goals of the Pacific Northwest Electric Power Planning and Conservation Act passed by Congress in 1980 was to help restore the Columbia River fisheries. Between 1981 and 2005, more than $8 billion went into implementing fish and wildlife programs. More than half of that total cost came from lost hydropower generation as dams spilled water for fish. The act also called for the BPA to spend money supporting energy conservation and renewable power sources. These programs added costs that eventually made the BPA less competitive with other power suppliers, especially after deregulation took place in the 1990s. [85] The 1980 act also established the Northwest Electric Power and Conservation Planning Council, which was directed to begin right away to develop a program to protect, mitigate and enhance fish and wildlife. In the case of anadromous fish, the council was directed to provide for improved survival of such fish at hydroelectric facilities located on the Columbia River and to provide flows of sufficient quality and quantity to improve production, migration and survival of such fish. Consumers of power generated by BPA facilities would bear the cost of these fish and wildlife conservation efforts, the act stated. [86] In February 1992, the U.S. Army Corps of Engineers and the Bureau of Reclamation completed an environmental impact statement on a proposal to increase flows of water at federal hydroelectric dams to help restore salmon in the Columbia River. The BPA also paid for fish and wildlife mitigation efforts through a $12 million trust fund. Each year, $2 million was added to the trust fund, and the interest paid for habitat improvement projects. [87]

Fish conservation efforts extended far upstream from the Columbia River. Beginning Oct. 15, 1983, the Bureau of Reclamation and the BPA began to operate the Hungry Horse Dam differently in order to help the recovery of kokanee salmon in the mainstem of the Flathead River. Flow through the dam was reduced, thus lowering power output, in order to slow water flow in the Flathead River and help salmon locate places to spawn that would remain wet later in the year. The goal was to keep water levels in the river at a relatively regular level. State fisheries experts estimated the ailing salmon populations would not recover for five or 10 years. But officials did not take into account the impact of mysis shrimp on the life cycle of kokanee salmon. [88]

In June 1986, the BPA ordered operators at the Hungry Horse Dam to begin spilling water instead of producing power in order to help fish downstream in the Columbia River. Spilling would also help lower the nearly full reservoir, and by not running the generators workers had an opportunity to paint transmission towers between the dam and the Conkelley substation at the CFAC plant. About 8,000 cubic feet per second was spilled through the dam, enough to generate 240 megawatts of power, and it was expected to continue for a week. The last time water was spilled through the dam was in 1983. [89] Hungry Horse News publisher Brian Kennedy criticized the BPA order in a June 11, 1986, editorial. Kennedy said he recognized the need to spill water to protect fish, to reduce the level in the reservoir and to allow workers time to paint transmission towers, but he wanted to know why the dam's generators could not be producing power at the same time. He accused the BPA of mismanaging its surplus power at a time when the region's aluminum industry was having problems with high power rates. [90]

In 1990, the BPA, Army Corps of Engineers and Bureau of Reclamation began working on a systems operation review intended to find a way to balance demands on the Columbia River Basin's hydroelectric power facilities, including fish recovery efforts. During the review process, the state of Montana came up with its own plan called the "integrated rule curve." Brian Marotz, a fisheries program officer for the Montana Department of Fish, Wildlife and Parks, had helped create the integrated rule curves program for the state. His proposal would set schedules for releases of water from dams by taking into account the impact of the releases on the river and its resident fish, with the aim of moderating these impacts. [91] In October 1992, the BPA asked for more releases from the Hungry Horse Dam to provide water for downstream hydroelectric dams in order to generate more power. It was reported that the BPA request could be overridden by the Montana Department of Fish, Wildlife and Parks if the releases threatened kokanee salmon in the Flathead River. State fish biologists were conducting a study to determine how many kokanee salmon were in the river. [92]

Public reaction in Montana to the BPA's fish conservation programs typically questioned the fairness of impacts on Montanans. In a July 11, 1991 letter to the Hungry Horse News, Sandra Prichard noted that two Idaho-based conservation groups had warned the National Marine Fisheries Service that they might go to court to force the agency to declare sockeye salmon in the Snake River an endangered species. If the salmon were put on the endangered species list, electrical power costs would increase beyond the BPA's proposed hikes of 15% to 20%, Prichard said. [93] In February 1992, CFAC co-owner

Jerome Broussard told local media that fish remediation projects ordered by the National Marine Fisheries Service could force the BPA to raise electrical power prices. The remediation projects included expensive modifications to the hydroelectric dams as well as cutting the flow of water to turbines, thereby creating power shortages. [94] In July 1992, John Brenden, one of Montana's two representatives on the Northwest Power Planning Council, publicly criticized the BPA's plans to use water from the Hungry Horse Reservoir to help salmon in the Columbia River. "Downstream interests need our water for their fish," he told local media. "We need it, too. Who says your species is better than mine?" Recent drought conditions in Canada had forced a release of water by the Hungry Horse Dam to help migrating Chinook salmon in the lower Columbia River. Brenden noted that cold water released by the dam during the summer could hurt fish in the Flathead River. [95]

In January 1993, the BPA proposed an 11% rate increase, larger than all rate hikes combined over the past decade. The BPA blamed the rate hikes on the need to improve fish runs around hydroelectric dams and to meet the growing demand for electrical power. [96] The BPA also informed CFAC that it intended to cut back 25% of CFAC's power because of several years of drought that had left hydroelectric reservoirs low. [97] In April, BPA Administrator Randy Hardy announced a three-pronged cost-reduction plan. The BPA was facing serious financial problems resulting from power shortages caused by drought and costly mandatory conservation measures for salmon recovery in the Columbia River, he said. [98]

Lee Smith spoke to the Columbia Falls Chamber of Commerce about the BPA's problems on April 13. The BPA was in "deep, deep trouble," he said, and as a result the aluminum industry in the Pacific Northwest might be, too. A mandate to finance conservation efforts to benefit salmon in the Columbia River could cost the BPA as much as $40 million in 1993 and maybe $200 million per year, Smith said. [99] Hardy faced 1,500 people in the Columbia Falls High School gymnasium to discuss the BPA's proposed rate increases on June 1. R. Glenn Kennedy, a former CFAC employee who helped build the aluminum plant in the 1950s, argued that the fishing industry should pay the costs of restoring salmon, a comment that drew resounding applause. Others argued that severe reservoir draw-downs would not benefit salmon, and that it was like draining a bank account. Hardy conceded that scientific evidence about the benefits of the draw-downs was controversial, but he pointed out that federal wildlife agencies had directed the BPA to use draw-downs to help the salmon. [100]

Additional fish protection measures were being considered for hydroelectric dams in the BPA system by July 1993. The new proposals would be added to the existing Columbia River Basin Fish and Wildlife Program, a river system guideline set up by the Northwest

Power Planning Council that was last amended in 1987. The Bureau of Reclamation planned to use the integrated rule curves proposal at Hungry Horse Dam, but the new proposals were expected to cause electrical power rates to increase. George Eskridge, the BPA district manager in Missoula, noted that the proposals came at a bad time for the BPA – in the second year of a drought following a winter of high energy demand and low reservoirs. CFAC Vice President Lee Smith told local media that the aluminum plant's trade association in Portland was studying the proposals and would have a position ready by next year. Smith said the BPA had spent $1.2 billion for fish and wildlife mitigation since 1982, with most of the money going to protect ocean-going salmon. Smith estimated that the BPA's direct-service industry customers paid one third of that total. Since CFAC made up about 11.5% of that market, the company had paid about $46 million toward salmon mitigation over the past decade, Smith said. [101]

Montana officials believed their plan would best balance the needs of sea-going salmon in the Columbia River, native bull trout and cutthroat trout in Montana, and hydroelectric power production. In summer 1994, Gov. Marc Racicot formally threatened to sue the BPA over a proposal to draw down the Hungry Horse Reservoir. State officials were concerned about federal plans that might draw down Montana reservoirs, including Lake Koocanusa, to help troubled salmon downstream while neglecting Montana's fish. Federal authorities backed down and Racicot never followed through with his threat to sue. The National Marine Fisheries Service issued a ruling in 1995 stating what they believed was needed to protect salmon runs in the Columbia River, but its ruling did not include Montana's integrated rule curve proposal. By March 1995, the service's plan was considered the preferred alternative in the overall systems review, which Racicot reportedly considered a rude surprise. Racicot wrote to federal energy and hydropower officials criticizing their plans. "We will not stand idly by… as unproven recovery strategies threaten our natural resources," he wrote. [102]

Who's going to pay?

In June 1994, President Bill Clinton announced that the federal government would absorb $20 million to $40 million in salmon recovery costs by the BPA, which would save CFAC about $500,000, according to CFAC Spokesman Allen Barkley. CFAC had laid off about 120 workers in 1993 when the plant cut back production by 25% because of high power prices. Barkley said it was very unlikely a 10% rate hike would now be needed as was projected. Instead, the costs would be borne by taxpayers across the nation. Credit for the deal was given to Sen. Max Baucus, Sen. Mark Hatfield of Oregon and House Speaker Tom Foley of Washington, who had convinced Clinton that salmon recovery efforts were too expensive to be swallowed by Pacific Northwest ratepayers alone.

Baucus said regional ratepayers were already "tapped out" because they were spending more than $350 million each year on fish and wildlife. [103]

In a June 30, 1994, letter to the Hungry Horse News, Aluminum Workers Trades Council union official Larry Craft applauded Clinton's decision. "The spilling of water over the Northwest dams puts a heavy burden on CFAC and on the entire people of the Northwest," Craft said. "Water spilling this spring has already cost $12 million and could go as high as $40 million." He also noted that a promise had been made by the federal government that a salmon recovery plan would be completed by the National Marine Fisheries Service. "It will be good for all parties to have a completed plan in place for salmon recovery instead of a reactionary water spill," Craft said. "Hundreds of families at CFAC and in the Flathead Valley depend on competitively priced electricity to maintain decent paying jobs." [104]

On Feb. 16, 1995, with its smelter operating at reduced capacity, CFAC officials reacted to news that the BPA might hike power rates by 5.4% in October, potentially causing power costs at the aluminum smelter to increase by up to $4.5 million. Randy Hardy said the rate hike was necessary to account for drought, salmon recovery and increasing debt service for existing generation. Allen Barkley said CFAC was considering going to the open market in 1996 for 25% of its power needs. By March, CFAC continued to operate at only 75% capacity. Barkley noted that the proposed rate increase did not take into account the growing costs of salmon recovery efforts in the Columbia River system. Fish mediation cost $350 million in 1994, and Barkley believed the costs might increase by $150 million to $250 million per year. A big question was whether the BPA would pass on fish recovery costs to customers in the Pacific Northwest, or whether Congress would distribute the costs to the nation as a whole, as argued by Pacific Northwest's congressional delegations. [105] On June 23, during a tour of the CFAC plant, Lee Smith told Gov. Racicot that CFAC was fighting federal agencies over plans to use water from Montana to restore salmon in the Snake River. The proposed plans could add $20 million to CFAC's power bills in 1995 alone, Smith said. Racicot had issued a 60-day notice of intent to sue eight different federal agencies if the proposed salmon recovery plan was carried through. The BPA expected to spend more than $500 million on fish and wildlife programs in 1995 and pass a portion of those costs on to ratepayers. [106]

Racicot joined the governors of Idaho, Washington and Oregon to kick off a comprehensive review of the electrical power system of the Pacific Northwest in January 1996. Power in the region was once cheap and abundant, but the expensive legacies of unfinished nuclear power plants and the high costs of fish and wildlife mitigation projects threatened to drive up the price of regional power at a time when power markets were deregulated and more competitive, the governors said. The governors planned to work with the Northwest Power Planning Council to recommend possible changes in ownership of and responsibility for the dams and transmission systems, as well as how fish and wildlife programs should be run. [107] On Nov. 8, spokesmen from four Montana electric cooperatives appeared before the Northwest Power Planning Council to discuss the impact of salmon recovery efforts on power costs in the Pacific Northwest. The Montana co-ops told the council that the BPA and its customers should not be paying the entire cost of fish and wildlife mitigation. Fish restoration had become a greater priority for the council than its primary purpose of developing an efficient, affordable and reliable power supply in the Pacific Northwest, the co-op representatives said. Council Chairman John Etchart of Helena told the council that salmon recovery efforts would drive BPA's electric power costs too high in an increasingly competitive marketplace. A study was planned to determine whether existing policies could be maintained now that the BPA was no longer the major source of electrical power in the region. [108]

By 1998, the BPA had spent $2 billion supporting fish and wildlife programs in recent years, in addition to losing more than $1 billion in energy sales due to dam spills for fish. [109] The BPA paid $800 million per year to the U.S. Treasury for principal and interest on the cost of building the power-generating system, $400 million per year for costs at non-federal power plants and $300 million per year for salmon recovery efforts. [110] By June 2000, extreme market volatility caused by the West Coast Energy Crisis had spread from California to the Pacific Northwest, and wholesale electric power prices in the region climbed to an average of $180 per megawatt-hour and as high as $1,100 during peak hours. The market problems were blamed on extreme summer temperatures, major plant outages, reduced output from the hydroelectric system and all-time high natural gas prices. Because of the need to spill water over the dams for fish programs, the Federal Columbia River Power System produced 10% less power in 2000 than it did in 1995. [111] A Stage 3 power emergency was declared in California on Aug. 1, 2000, posing the threat of blackouts in some areas. As high temperatures continued to impact the state, the BPA explained how it intended to briefly curtail fish recovery efforts at its Columbia River dams by diverting water being spilled for fish through the generators. [112]

On Sept. 29, 2000, as the impacts of the West Coast Energy Crisis began to play havoc in the Pacific Northwest, two BPA representatives came to Kalispell to discuss instability in the power market. Spokesman Ed Mosey and Montana Liaison Gail Kuntz said a major threat to the market was demands for cheap hydroelectric power from outside the region. According to current plans, they said, beginning Oct. 1, 2001 the BPA would allocate 6,000 megawatts of continuous power to public utilities, 1,900 megawatts to for-profit utilities for residential and farm customers, 1,000 to 1,400 megawatts of potential power to spill over dams for fisheries, and 1,440 megawatts to direct-service industries, which included aluminum smelters. That meant fisheries would take about 13% of the potential hydro power, about the same as the regional aluminum industry. [113]

But the energy crisis only worsened in 2001. BPA officials told the Northwest Power Planning Council on Feb. 7, 2001, that expensive salmon-saving conservation measures might be sacrificed so the BPA could meet its regional power needs without going bankrupt. The council also learned that Oregon Gov. John Kitzhaber had petitioned President George Bush to relieve the BPA of its debt to the U.S. Treasury in order to set aside money for salmon. Conditions for the current crisis included drought, 37% less than normal water in the Columbia River system, and record-high power prices, making open market purchases difficult or impossible for both the BPA and aluminum companies. The BPA had spent $200 million purchasing 1,300 megawatts back from the aluminum companies, and salmon conservation measures had limited water flows to the dams, reducing federal output by about 980 megawatts of power. [114]

In late February 2001, the BPA decided to apply about $400 million in credits earned for fish and wildlife protection toward its $730 million annual Treasury payment. The agency had been using fish and wildlife protection credits to reduce its Treasury payments since 1995, in amounts ranging from $15 million to $60 million per year. The high prices the BPA paid for power in the open market during the energy crisis had also driven up the value of the fish credits. The 1980 Northwest Power Act allowed the agency to apply the costs of fish and wildlife protection against the Treasury payment. The credits applied to the Treasury payment included about $242 million in credits based on the value of water spilled through the dams and about $157 million from the Fish Contingency Fund. This would be the first time credits from the contingency fund would be used against the Treasury payment. The fund had been set up in 1996 in recognition of the fact that BPA ratepayers had been overcharged for some fish protection costs. [115]

In April 2001, the BPA announced that, because of emergency drought conditions, it would not spill water over the Columbia River dams to protect salmon runs. The BPA had the backing of the Northwest Power Planning Council and the National Marine Fisheries Service. By declaring an emergency, the BPA was able to avoid the requirements of the Endangered Species Act. The National Marine Fisheries Service estimated that as a result of the decision, survival of young salmon would decline by about 15%. “Bonneville has made substantial concessions for salmon but they’ve got to remain solvent, that’s their bottom line,” National Marine Fisheries Service Spokesman Brian Gorman said. Efforts to protect salmon would turn instead to using trucks to ferry young fish around the dams, but critics wanted the river to run free again. [116] The BPA reached an agreement with two California agencies in June to send excess power south to California if summer blackouts became imminent. While California officials at the Department of Water Resources and the California Independent System Operator applauded the promise, fish advocates criticized the plan after BPA officials said they would not spill water over the dams in the summer because of low water levels. "We're slipping," BPA Spokesman Ed Mosey said. "We're literally teetering on the edge of going into deficit this winter." A study by the Northwest Power Planning Council predicted a 17% likelihood of power shortages in the Pacific Northwest in the coming winter. [117]

The smelter at Columbia Falls sat idle for about three years after shutting down for the last time in September 2009 before talk turned serious about cleaning it up. Sites used by large manufacturing plants typically went through a detailed environmental review process when the plants closed. In the case of heavy chemical or metals processing plants – particularly aluminum smelters – the sites often were earmarked for Superfund status. While Montana was well known to tourists for its wide-open spaces, grand vistas and numerous outdoor recreation opportunities, it also had a long history of polluting industry, and 18 active federal Superfund sites existed in Montana by the time CFAC shut down. Geographically and historically, the Butte-Anaconda Superfund site was one of the largest and oldest Superfund sites in the U.S. The state of Montana listed 180 sites under the state's Comprehensive Environmental Cleanup and Responsibility Act, including 18 sites in Flathead County. Among the Flathead sites were the BNSF Railway locomotive fueling facility in downtown Whitefish, the Hungry Horse Dam Townsite dating back to construction of the dam in the early 1950s, three petroleum refining sites in Kalispell and four post-and-pole treatment sites in Kalispell and Columbia Falls. [118]

Talk of cleaning up the aluminum plant soon turned into intensive debate as the plant's last owner, Glencore, hired an East Coast public relations firm in an effort to influence public support, and politicians took sides to support or oppose Superfund listing. With the Flathead Valley's economy benefiting from its natural amenities, Superfund designation was considered a stigma by opponents who pointed to a calamity they claimed had struck the town of Libby, where an asbestos mine wreaked havoc on its people and its economy. The argument was that Superfund designation in Libby was the problem, not the company that ignored health warnings while it profited from asbestos mining. Similar sides seemed to form in the debate over the aluminum plant cleanup.

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