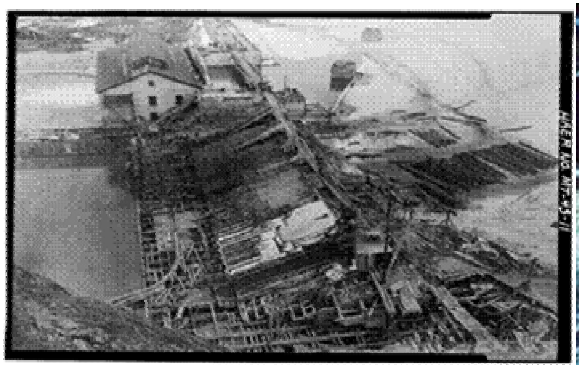
Milltown Superfund Site Update – October 21, 2008

The spillway of William Andrews Clark's dam was reconstructed in 1909, following the enormous 1908 flood. The dam's original construction included a rock-filled timber crib wing wall at the right abutment, concrete and masonry powerhouse, rock-filled timber crib wall separating the powerhouse from the spillway, and the timber crib spillway covered with wood decking. The spillway construction included 10 by 10 inch timbers, secured in a box like crib structure with metal spikes, and the cribs were filled with gravel and rock. The dam was owned by Clark Montana Realty Company, and was sold to the Montana Power Company in 1929.

The 1908 flood washed out the toe of the spillway, and about one third of the left hand side of the structure.

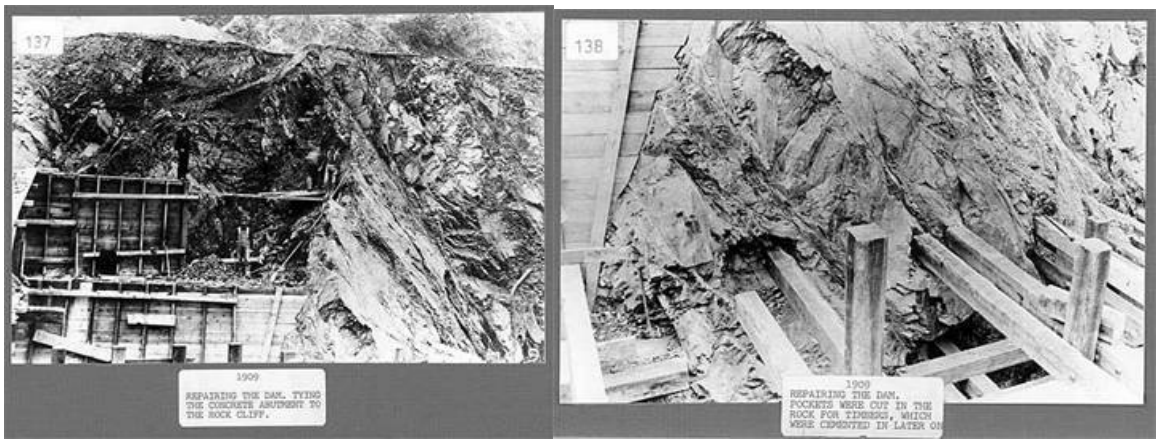
The 1909 repairs included reconstruction in the breach at left side of spillway. Rock-filled timber cribs were constructed up to finished elevation of spillway. Steel rails, similar to railroad rails, were driven down more than 60 feet into the underlying river bed. The rock cliff extending on the river's left bank was blasted and removed. Waste rock used to fill timber cribs.



The photo above at the left, courtesy of the National Archives, shows the dam's spillway under reconstruction in 1909. The photo at the right shows the dam's spillway in the wintertime ice breakup and flood in February 1986, when the dam's spillway was significantly damaged by the force of the river, floating ice and debris. MPC spokesman Cort Freeman reported a "living room sized hole" in the wooden deck of the spillway caused by the ice and debris. Fifty of the dam's 67 wooden flashboards atop the spillway were destroyed. Over the years the dam had begun to show the signs of age. Dam safety investigations revealed significant problems, including leakage, cracks, voids, settlement in the spillway crest and erosion of the riverbed beneath the old dam. The 1986 damage to the dam was serious. The spillway needed major repairs. But the Milltown Dam and Reservoir had just been listed on the federal Superfund priorities list three years earlier, and the dam's federal hydropower license was about to expire. Should the dam be repaired now, or should it wait until after the Superfund cleanup decision is made? This was a crucial decision point for the dam in 1986. A new river conservation organization called the Clark Fork Coalition got involved in 1986. I was the Coalition's first staffer. One of my first job duties after being hired in January, 1986 was to attend a meeting with the Federal Energy Regulatory Commission to discuss whether to extend the dam's hydropower license for another 50 years. Ultimately, the decision was made to extend the license for only a few years whole the U.S. Environmental Protection Agency made its decision about how to clean up the recently discovered arsenic pollution in the aquifer at Milltown. The Montana Power Company decided to take the risk, and initiated a major two year rebuild

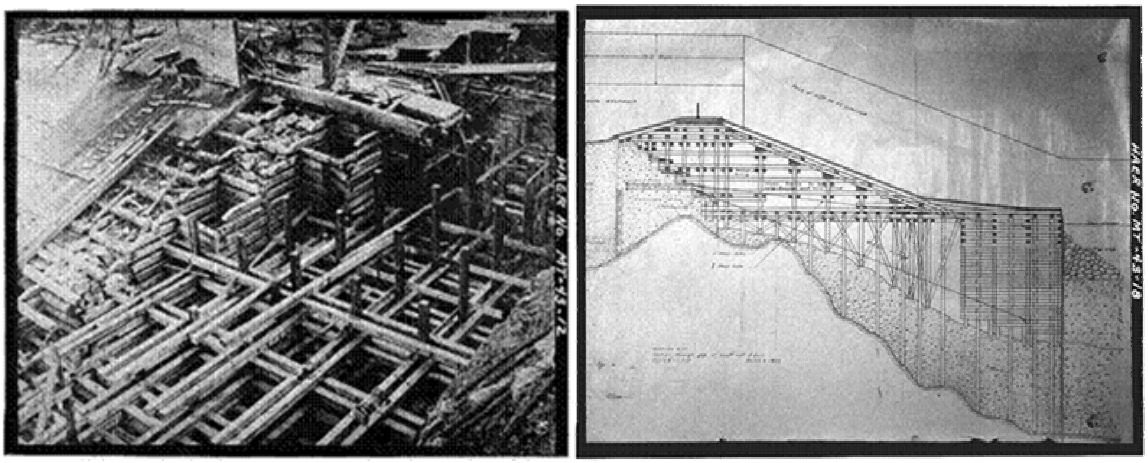
of the spillway in 1987. The spillway was fortified for the first time with two and a half feet of concrete, and tied it down to bedrock with post-tensioned steel cables. The rebuild was completed in 1988. But, there still was no decision on the Superfund cleanup. The dam's hydropower license was extended again, temporarily, pending the EPA's final decision.

The photo at the left above shows the dam in 2002, during the first ten foot drawdown conducted to design a potential sediment and dam removal alternative. The EPA, under the leadership of Montana Office Director John Wardell, and the State of Montana, under the leadership of Attorney General Mike McGrath, initiated negotiations with the Atlantic Richfield Company and NorthWestern Energy. Montana Governor Judy Martz called for the dam's removal in January, 2003. The EPA issued its Record of Decision to remove the dam in 2004. A Consent Decree was signed by the U.S., State and Tribal Governments, Arco and NorthWestern in 2005, calling for the cleanup of contaminated sediments in the Milltown Reservoir, removal of both the Bonner Dam and the Milltown Dam, and restoration a naturally, free-flowing confluence of the Blackfoot and Clark Fork Rivers. The Consent Decree took effect in April, 2006, and the project was initiated in June. Two years later, the Milltown Dam's powerhouse and right abutment have been removed, and the removal of the dam's spillway is expected to be complete in November or December this year. The photo at the right shows excavation in progress at the dam's spillway on October 10. When the spillway is removed to the specified depth, the gravel berm upstream will be breached, and the combined flows of the two rivers will flow into their original channel for the first time in more than one hundred years. It will not be as dramatic as the cofferdam breach that occurred in March, when the rivers dropped about 15 feet in a day. This time, the rivers will only drop another couple of feet. Nonetheless, it will be a historically significant event.



The photos above are courtesy of the UM K. Ross Toole Archives, Demmons Collection. They show the construction of the timber cribbing at the left abutment of the dam when it was rebuilt in 1909.

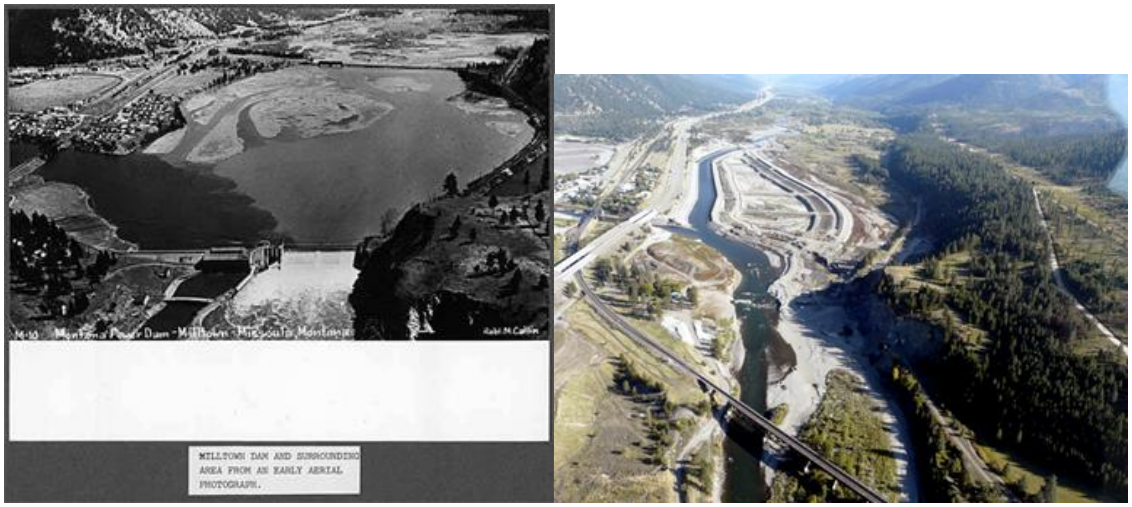
On October 7, 2008, the left abutment removal was nearing completion. Remnants of the original timber crib remained, stained by years of immersion in the reservoir by iron and manganese. Globs of concrete grout poured out of the old timber cribs, where it had been injected to stabilize the rock fill and spillway.



When the dam was rebuilt in 1909, it was done with great craftsmanship and skill with hand tools and horse drawn wagons. The photo at the left shows the workmanship of the original timber cribbing, courtesy of the National Archives. The diagram at the right, courtesy of the K. Ross Toole Archives at the University of Montana, shows a cross section of the rebuilt spillway where it had been breached by the 1908 flood. The spillway's crest rested on bedrock, but its toe was built on loose gravel deposits, which in later years would be eroded and compromise the spillway's stability.

After one hundred years, most of the timbers in the top 20 feet of the spillway were gone, most of them removed during the reconstruction in 1987 and 1988. Loose rock fill replaced the old timber cribs, held in place by sheet metal walls upstream and downstream of the spillway, which was capped with concrete and held in place with post tensioned cables. But when the excavators working for Envirocon, Arco's contractor on the dam removal, dug down below 20 feet the original timbers were exposed. Some were badly deteriorated. But many of them are in remarkably good condition, submerged continuously under water for all of these years. The photo at the left shows some of the original rounded timbers, hand notched and placed near the base of the dam. The photo at the right shows some of the 10 inch timbers removed from the spillway's cribbing.

The photo above, taken on October 7, shows the view from the base of the old spillway toward the left abutment. The original timber cribbing remains, along with a piece of metal sheet pile wall which was installed upstream and downstream of the structure to provide stability. The wire netting was placed to protect workers from rocks that might fall from the bluff above. Excavators will dig down about another 12 to 15 feet into the spillway and remove reservoir sediments located upstream of the old dam in the next several weeks. Once a new river channel is constructed as specified by the State Natural Resource Damage Program, the river will be turned loose into its final location.



The photo at the left shows an early, undated aerial view of the reservoir, courtesy of the UM K. Ross Toole Archives, Demmons Collection. The photo at the right shows the same scene, from a slightly different perspective, taken in October by Mike Kustudia of the Clark Fork River Technical

Assistance Committee and pilot Gary Matson, of the Friends of Two Rivers. About 1.6 million tons of contaminated reservoir sediments have been removed so far, more than half of the total to be removed in the remediation phase of the project.

EPA and Montana DEQ now expect the sediment cleanup to be completed about one year from now, possibly as late as early 2010 if additional channel sediments are removed as planned with funds from the State Natural Resource Damage Program. These channel sediments are located at the right hand side of the photo above. When the sediment cleanup is complete, the lead role for the site will be turned over to the State of Montana, which will oversee the restoration of natural resources including fish and wildlife habitat. The State will also remove additional sediments from the area upstream of the current removal area, in order to create a smooth transition in river grade from the river upstream to the area near the dam where sediments were about 25 feet thick. The restoration work will continue through approximately 2011.

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Missoula, Montana, Tuesday, December 15, 1981 25¢

Arsenic found in Milltown water supplies

By KEVIN MULLER
of the Missoulian

State and county health officials have discovered arsenic in drinking-water wells in Milltown, about five miles east of Missoula.

In one well the arsenic level was .37 milligrams per liter, more than seven times the .05 milligrams allowed by

tamination.

The investigation has been long delayed because an overloaded state laboratory took months to analyze water samples, even after the state was alerted to the arsenic contamination.

Higher-than-permitted arsenic levels first showed up in routine testing on a private water system that supplies 13 homes in Milltown. Such tests are done every three years.

Those samples were sent to the state in early September. Although state officials knew the samples were from an area of suspected arsenic contamination, local officials didn't receive the results until Thursday. Four of seven samples showed levels higher than permissible.

Fetler said he can't explain why the state took so long.

"Their budget, their staff has been cut way back," he said of the state lab. Fetler added that worried state officials apparently gave up on their own lab and had the tests

immediate problems. The lowest level at which arsenic has been determined to have ill effects on humans is 1.4 milligrams per liter, they said, about four times the highest level found in Milltown.

That means arsenic has ill effects above that level, said Fetler, but it doesn't mean there are no ill effects below that level, since little is known about the long-term effect of low levels of arsenic.

"We don't have enough information to advise people

Arsenic contamination was first discovered in Milltown's groundwater in 1981, during a routine inspection of Milltown's public water supply. Today, in 2008, the arsenic concentrations in

monitoring wells surrounding the old reservoir are dropping about as fast as the value of my 401(k). This was once the largest plume of polluted groundwater, by far, in Missoula County. And it was polluted with arsenic, a substance know to cause cancer and disease in human populations. Arco is required to monitor ten polluted wells within the arsenic plume until they meet the federal drinking water standard. Of those ten wells, two are already below the standard, four more are getting very close to the standard, and all but one have shown significant reductions in arsenic since the project began in 2006. It is encouraging and satisfying to see this improving trend of groundwater quality, after all of these years.

MARCH 1, 1996

Milltown drawdown fouls river

Water released during February flood danger was full of heavy metals

By SHERRY DEVLIN
of the Missoulian

Levels of heavy metals in the Clark Fork River below Milltown Dam significantly exceeded state water quality standards when the reservoir was drawn down because of flooding and ice jams in February, a Missoula

During the ice floes of 1996 we learned how ice events and floods can release enormous amounts of sediments from the reservoir. These sediments contain very high levels of copper which can kill fish and harm other aquatic life. During the dam's removal, the most contaminated sediments in the reservoir were protected from erosion by the $14 million bypass channel and flood berms Arco was required to build to protect the river. But it is not possible in any dam removal to prevent all sediment from being eroded downstream. About 371,000 tons of sediment was eroded downstream from the project area this year, more than the 300,000 tons predicted by computer models before the project began. Much of that sediment came from the Blackfoot, which is not polluted by mine waste. But some came from the upper Clark Fork arm of the reservoir, and contained elevated levels of arsenic and copper. The good news is that water quality standards for suspended sediment and arsenic were only exceeded in the river just downstream of the dam on one day this year. The dissolved copper standard was never exceeded. Water quality has been worse – much worse - in the past when the dam was still in place, including during the 1996 ice event shown in the photo above.

Still, the sediment has had an impact, particularly on aquatic life. Sediment scouring contributed to an approximate 70% reduction in aquatic macro invertebrates in the 13 mile reach from the site to the confluence with the Bitterroot River downstream. This impact is significant, but expected to be short lived. Fish were impacted too. Trout populations below the dam through Missoula decreased this year by about 60%, but populations upstream increased by 50%. Fish were able to swim upstream this year for the first time in a hundred years and they apparently did just that. Still, fish mortality was caused by the project over the past three years. But the long term

benefits of opening up thousands of miles of spawning habitat are expected to far outweigh the short-term impact.

Erosion of sediments is expected to decrease in coming years, and the State Restoration Program and the EPA are planning work in the upper reservoir to stabilize vulnerable stream banks and remove additional sediments. The sediments in the upper reservoir are a not nearly as polluted as those in the lower reservoir where they are currently being removed, but it is still good practice to protect them from eroding downstream. We support the State and EPA as they continue to plan this important work.

For a complete summary of the data on water quality, wells, macroinvertebrates and fish after this year's dam breach, check out the following website:

http://www.clarkfork.org/water-watch/beyond-the-breach.html

This site was compiled by Chris Brick of the Clark Fork Coalition, and it includes several charts and data provided by the Missoula City-County Health Department, EPA, DEQ, Envirocon and Fish, Wildlife and Parks. It provides information, in an easy to understand format, on water quality in the Clark Fork River and the Missoula Aquifer, changes in water levels in the aquifer, sediments and fisheries. Water Quality data is compared to historical events, such as the 1996 ice jam or the dam rehabilitation project conducted in the 1980's.

Also, check out the EPA's website, which includes the PowerPoint presentations given by project manager Russ Forba at recent public meetings:

http://www.epa.gov/region8/superfund/mt/milltown/

More information on the project, including photos and press accounts, can be found at the Clark Fork River Technical Assistance web site:

http://www.cfrtac.org/

Stay tuned for news about the completion of the Milltown dam removal. Now is a great time to go to the bluff overlook to view the project's progress. Directions to the bluff are available at:

http://www.clarkfork.org/water-watch/beyond-the-breach.html

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