

ZORTMAN AND LANDUSKY WITH 20/20 HINDSIGHT

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ABSTRACT

The Good, The Bad, and The Ugly. Is this the name of an old western or the historical account of the Zortman and Landusky gold mines in north-central Montana? These two mines played an industry-leading role in the development of cyanide heap leach operations of low-grade gold deposits. They have also been in the news for “state-of-the-art” reclamation efforts. **The Good** this mine did for a depressed part of Montana is not in question. Where else could 300 people make a good living for 20 years on 1200 acres? **The Bad** is a blotchy past, starting over a hundred years ago with the “white man’s” dealings with the Fort Belknap Indian Reservation. **The Ugly** is a present-day bankrupt gold mining company with a bond shortfall and numerous site problems.

This paper will provide you with insights into the political/economic climate leading to the development of Pegasus Gold as the golden employer having several Montana gold mines (including Zortman Mining Inc.’s Zortman and Landusky Mines) with the State singing their praises and their subsequent fall from grace. A brief history is necessary to understand how things happened followed by a discussion of some of the lessons learned along the way.

HISTORICAL BACKGROUND

Chris Keyes is supposed to have found signs of paying placers somewhere in the Little Rockies region in 1864, but he was killed before his partner could join him. Twenty years later on July 3rd, 1884, Frank Aldridge found gold in his sluice box on Alder Creek. It was averaging over \$0.12 per pan. “Dutch” Lewis Meyers and Pike Landusky were there and before a week had passed a new gold rush stampede had started and within a month a mining district had been formed. It is thought that as many as 2,000 men may have been involved. The area lay within the major Indian Territory for the northern tribes, and federal troops were sent to investigate the placer activity and keep order at the peak of the rush. A mere two months would pass before a bustling, rowdy, lawless mining camp with tent saloons, dugouts, hastily constructed log cabins, and a dance hall and grocery store sprang from nowhere. This first “strike” did not pan out and soon thereafter only a handful of prospectors remained. It took another 10 years before Pike Landusky, for whom the Landusky town and mine were named, would strike it rich on the August claim on the Landusky side of the mountain in 1893. Pete Zortman, for whom the Zortman town and mine were names, came into the picture shortly thereafter. He and his partner constructed a mill on Ruby Gulch in 1904. This mill had a 120-ton per day capacity and was further enlarged in 1907 to 300 tons per day capacity. Fire destroyed it in 1912 and it was replaced with a 600-ton mill in 1914. World War I idled the mine in 1918. It reopened in 1922 and was plagued with problems. In 1923, a fire destroyed the second mill, forcing the mine to closed until the early 1930’s. Still a third mill was constructed with the remnants still standing today on the north side of the Zortman 89 Leach Pad. All three mills used cyanide leach tanks to extract the gold. A third disastrous fire swept through in 1936, closing the Ruby Gulch and Little Ben mines. The mines restarted and continued sporadically until 1942, when the World

War II's war production boards order L-208 caused the mines to close again. Another attempt at starting in 1946 failed and in 1954 all the property was sold in a sheriff's sale for \$60,000.

The low-grade ore associated with Zortman and Landusky lie buried deep in the earth for another 40 years from the mid-1930's, waiting for the next generation of prospectors. In 1977 a group formed Pegasus Exploration. They drilled 400 test holes on both sides of the mountain with samples taken every 10 feet. Following an Environmental Impact Statement by the Montana Department of State Lands, mining was allowed to start, once again, in 1979 as the modern day Zortman and Landusky Mines were approved.

Was there a silver lining or golden parachute for those early pioneers? Not hardly, the two key figures in the early development of the area did not die wealthy or famous. Pete Zortman died penniless at the age of 65, having been a county charge for three and half months prior to his death and was buried in the paupers corner of the county cemetery. Pike Landusky met his death in 1894, when he was shot in a bar fight by Kid Curry during one of his frequent visits to the Landusky town saloon with his gang (the "Wild Bunch" and The Sundance Kid).

The Good

Fast-forward to today and we find Montana is a very depressed state, ranking 46th in personal income. Mining jobs and the associated trickle-down effect of mining related purchases of goods and services had been pursued very aggressively by the state and the governor's office. Labor salaries often are 4 times the states average per capita income of \$15,360 (for 1998). With agriculture requiring 300 acres to feed one cow, the attractiveness of providing a good standard of living for 300 people on 1200 acres is a given. Phillips County had the lowest unemployment rate in the state during mining at around 3.5% compared to the state average of 6.5%. Since mine closure, Phillips County has soared to around 8% unemployment and now has the 10th highest unemployment figures in the state. Pegasus Gold had several gold mines running in Montana and the Company was viewed very favorably by everyone but the environmentalists.

The Bad

The bad is a blotchy past, starting over a hundred years ago with the "white man's" dealings with the Fort Belknap Indian Reservation. The early placer strikes in 1884 brought a huge influx of white men to Indian country. It took three years to work out an initial agreement with the Indians. By the time the Agreement of January 21, 1887 defined a new boundary for the southern end of the tribal land (Gros Ventre and Assiniboine Tribes), placer activity was pretty well over. Life could have gone on with the land fairly untouched if it had not been for mans persistence and Pike Landusky's new strike in 1893 on his August claim. It was located within the boundary of the Tribal lands and the miners worked the claim at night, getting down 65 feet of shaft, and removing ore that brought in \$32,000 from an Illinois smelter. As word leaked out, Montana politicians secured the appointment of commissioners to negotiate a further land cession by the Indians. Headed by George Bird Grinnell, the commission secured the services of Walter Weed, a geologist, to assist in identifying the mineral lands that were to be bought. With his recommendations, the commission on October 9th, 1895 concluded an agreement changing the Reservation boundary so as to exclude the mineral lands. The "Grinnell" land, as it has become known, was purchased from the Reservation in 1895 and again repurchased in recent

years as part of a BLM settlement with the Tribe. The BLM is currently engaged in another lawsuit with the Tribe, where they are requesting the land be returned to the Tribe.

Protests regarding water degradation date way back in the history of the mining. The Montana State Board of Health, at the request of the Sanitary Engineer with the U.S. Public Health Service inspected King Creek and the Little Ben Mining Company properties on 9/26/1933. Accompanying him were the Forest Examiner for the Fort Belknap Indian Reservation, Mr. Kirkaldie, field clerk for the Indian service, and John Buckman, Thomas Mann and Russell Young representing the Tribal Business Committee. The Report of Investigation indicated that “no tailings had as yet been discharged into King Creek”, but “further observation and analysis following the discharge of tailings” would be necessary. Those tailings eventually found their way down King Creek and in 2000 the Corps of Engineers, through their contractor IT, removed approximately 78,000 cubic yards of tailings for a cost of over \$3.4 million (over \$43/cy). These tailings found their way back up the mountain and were used as a six-inch subsoil layer on the lower Landusky leach pads. In tribal meetings over the past three years, many people have spoken out on how the mines ruined the water and caused their health problems including diabetes and cancer. EPA has conducted public meetings regarding the disconnect between the mine and the Tribal waters to no avail. Land and water have always been hotly debated issues worth fighting over in the west. It is certainly true for this small piece of the Little Rockies.

The Tribe has ongoing lawsuits pending right now to force the BLM and DEQ to implement the preferred alternatives selected in the Final Supplemental EIS published in December 2001. The federal and state agencies chose alternatives that exceeded the available bond funds with the caveat that should additional funding not become available; two lesser alternatives would be implemented. The Tribe has repeatedly requested that the “Grinnell” lands be returned and that Spectrum Engineering and all white men be removed from the reclamation effort and water treatment on the site.

The Ugly

The ugly is a present-day bankrupt gold mining company with a bond shortfall and numerous site problems. Large-scale mining started in 1979. Pegasus was a modern day pioneer, not in looking for gold, but in cyanide heap leaching practices. They were able to take a very low-grade deposit and make it profitable. The production from the two mines is summarized in the following table:

**ZORTMAN MINING INC.
HISTORICAL PRODUCTION REPORT**

ZORTMAN MINE

YEAR	ORE (TONS)	GOLD (OZ/TON)	SILVER (OZ/TON)	WASTE (TONS)	TOTAL MOVED (TONS)	STRIP RATIO
1979	218,000	0.057	0.39		218,000	
1980	675,000	0.031	0.29	620,000	1,295,000	0.92
1981	1,023,000	0.025	0.25	418,000	1,441,000	0.41
1982	1,889,000	0.035	0.25	968,000	2,857,000	0.51
1983	2,008,000	0.034	0.15	2,217,000	4,225,000	1.10
1984	2,373,000	0.022	0.07	1,491,000	3,864,000	0.63
1985	5,334,000	0.026	0.20	2,356,000	7,690,000	0.44
1986	1,654,000	0.027	0.14	993,000	2,647,000	0.60
1988	1,043,000	0.024	0.04	1,493,000	2,536,000	1.43
1989	3,683,000	0.019	0.05	2,939,000	6,622,000	0.80
TOTAL	19,900,000	0.026	0.15	13,495,000	33,395,000	0.68

517,400 ounces

LANDUSKY MINE

YEAR	ORE (TONS)	GOLD (OZ/TON)	SILVER (OZ/TON)	WASTE (TONS)	TOTAL MOVED (TONS)	STRIP RATIO
1979	458,000	0.038	0.12	11,000	469,000	0.02
1980	616,000	0.030	0.15	603,000	1,219,000	0.98
1981	1,084,000	0.025	0.18	1,024,000	2,108,000	0.94
1982	1,994,000	0.031	0.30	1,740,000	3,734,000	0.87
1983	2,021,000	0.033	0.25	1,452,000	3,473,000	0.72
1984	3,301,000	0.022	0.11	1,658,000	4,959,000	0.50
1986	4,865,000	0.021	0.19	4,910,000	9,775,000	1.01
1987	9,663,000	0.019	0.07	5,805,000	15,468,000	0.60
1988	10,379,000	0.019	0.09	4,567,000	14,946,000	0.44
1989	6,369,000	0.019	0.08	2,559,000	8,928,000	0.40
1990	12,895,000	0.016	0.31	4,558,000	17,453,000	0.35
1991	14,236,000	0.018	0.35	6,045,000	20,281,000	0.42
1992	12,974,058	0.015	0.08	5,852,745	18,826,803	0.45
1993	12,510,178	0.018	0.12	8,324,062	20,834,240	0.67
1994	14,842,721	0.017	0.13	10,964,957	25,807,678	0.74
1995	10,020,394			7,700,861	17,721,255	0.77
1996	138,945	0.015		207,942	346,887	1.50
TOTAL	118,367,296	0.017	0.15	67,982,567	186,349,863	0.57

2,012,244 ounces

TOTAL MODERN DAY PRODUCTION FROM ZORTMAN AND LANDUSKY MINES

TOTAL:	138,267,296	0.018	0.15	81,477,567	219,744,863	0.59
TOTAL	OUNCES	2,529,644	20,740,094			

Production is good and gold in the process solution is even better. It helps keep profits up. But when a permit expansion is delayed, gold prices drop dramatically, and your parent company gets involved in an overseas project gone bad, it spells disaster for all the subsidiary companies. Zortman Mining Inc., one of Pegasus's more profitable subsidiaries, had to follow its parent into bankruptcy. Like the early prospectors, the State of Montana now has to pioneer new ground in its quest for securing the bonds and starting the reclamation implementation phase. After negotiating through the bankruptcy court system and come out the end with far less than needed to complete the work, the State of Montana was forced with taking a very hard look at what could realistically be done with the money available.

The state solicited statements of interest from qualified engineering firms to assist them in the reclamation process. The present-day engineering and reclamation design phase started in June of 1999 with the hiring of Spectrum Engineering out of Billings, Montana. This led to many changes and modifications of the BLM and Montana DEQ pre-selected reclamation plans. This was necessitated, in part, by a large reclamation bond shortfall for Zortman and Landusky. The resulting reclamation designs have been implemented with the majority of the two mines already backfilled, regraded, topsoiled, and revegetated.

One of the first steps involved a detailed engineering evaluation of existing proposed alternatives and any and all other potential alternatives, both within the bond funding and those costing more than the available bonds. The engineering evaluation was completed within the framework of a multiple accounts analysis with the EPA, BLM, Fort Belknap Tribe, and the Montana DEQ all being stakeholders as well as reviewers of everything produced. What came out of this process were a set of alternatives with many common elements, which everyone agreed could be implemented immediately and a set of distinct tasks requiring more study. These additional tasks eventually were analyzed in a full-blown Supplemental EIS. While the EIS was being developed, much of the reclamation was ongoing and taken to final completion. The engineering evaluation identified a few areas with major bond deficiencies. These included process water management and acid mine drainage treatment via the two water treatment plants. The water treatment shortfall had already been identified, but the reason for the shortfall was unknown. In the next two sections is a brief discussion of the two major bond shortfall problems:

PROCESS WATER MANAGEMENT

The heap leach operation consumed 295 acres at the Landusky Mine on seven different leach pads. One pad completely blocked an entire large drainage. At the Zortman Mine, the ore was leached on six different leach pads covering 121 acres. The dikes of each of these leach pads are at the angle of repose (typically 1.7H:1V) and the revegetation success has been problematic at best with erosional rills being an ongoing problem. Handling the process water was the largest single bust in the bonding calculations done by the State of Montana. The then unprecedented high bonds already posted for Zortman (\$10 million) and Landusky (\$19.6 million) for reclamation and handling of leach pad process water seemed to be plenty to handle anything to come up. However, the state had been led to believe that a two pore water flush of the leach pads and then puncturing the liners would be the solution for the leach pad solution water. The estimated bond cost for this was \$120,000 with another \$40,000 for leach pad sump sampling for 3 years. Nothing could be further from the truth.

A table on the following page shows the yearly LAD costs:

**ZORTMAN AND LANDUSKY MINE SITES
YEARLY PROCESS WATER MANAGEMENT AND SAFETY**

Cost Category	Quantity	Monthly Units	Rate/ Unit	Number of Months	Total Estimate	Total By Category
LAD and General Operations & Maintenance Labor						
Zortman Operators	1	176	22.88	7.0	\$28,188	
Landusky Operators	1	176	22.88	7.0	\$28,188	
Mechanic/Electrician	1	176	28.84	7.0	\$35,531	
Technician	0.5	176	28.32	12.0	\$29,906	
Bookkeeping	0.5	176	30.00	12.0	\$31,680	
Clerk	1	176	21.04	12.0	\$44,436	
Project Eng. Manager	0.6	176	78.00	12.0	\$98,842	
Lab Manager	0.9	176	37.42	12.0	\$71,128	
General Superintendent	0.9	176	63.58	12.0	\$120,853	
Operator Overtime	1	12	31.72	12.0	\$4,568	\$493,320
LAD/General Mine/Safety Expenses						
Lab/Analysis Costs	1	1	1400.00	12.0	\$16,800	
Mine Office Lease/Water	1	1	1555.00	12.0	\$18,660	
Repairs/Maintenance	1	1	8350.00	12.0	\$100,200	
Fuel/Propane	1	1	1950.00	12.0	\$23,400	
Chemical Tank Lease	1	1	400.00	12.0	\$4,800	
Biological Treatment Plant Oper.	12	8	500.00	1.0	\$48,000	
MSHA Training Course	1	1	2000.00	1.0	\$2,000	
General Office/Phone/Ins./Misc.	1	1	1700.00	12.0	\$20,400	
Assett Purchases	1	1	62000.00	1.0	\$62,000	\$296,260
Power Cost						
Zortman 82 Pond	1	1	620.00	12.0	\$7,440	
Zortman 83 Leach Pad	1	1	680.00	12.0	\$8,160	
Zortman 85 Leach Pad	1	1	380.00	12.0	\$4,560	
Zortman 89 Leach Pad	1	1	1220.00	12.0	\$14,640	
Landusky 83 Leach Pad	1	1	330.00	12.0	\$3,960	
Landusky 87 Leach Pad	1	1	3900.00	12.0	\$46,800	
Landusky 87 Pad Dike	1	1	1000.00	12.0	\$12,000	
Landusky 91 Leach Pad	1	1	9600.00	12.0	\$115,200	
Landusky Barren Pond	1	1	1620.00	12.0	\$19,440	
Landusky Mine Maint. Shop	1	1	390.00	12.0	\$4,680	
Zortman Gate-Pit Security	1	1	60.00	12.0	\$720	
Landusky Gate-Pit Security	1	1	100.00	12.0	\$1,200	
Mine Office	1	1	500.00	12.0	\$6,000	
Zortman Generator	1	1	200.00	12.0	\$2,400	
Landusky Generator	1	1	320.00	12.0	\$3,840	
Capital Credit Repayment	1	1	300.00	12.0	\$3,600	\$254,640
TOTAL LAD/GENERAL COSTS FOR 2002						\$1,044,220

All of the leach pads have elevated nitrates (averaging around 250 ppm) and residual amounts of cyanide. At the end of June 1999, there were 253 million gallons of process water in solution. By the end of June 2002, this total had been dropped to 123 million gallons. To pump down the existing water and all new rainfall, it requires yearly LAD disposal of 80 to 100 million gallons of water. This was happening on less than 100 acres prior to expansion to almost 400 acres. The yearly costs for direct land application disposal, safety, and general site operations have been averaging around \$1 million per year to send 80-100 million gallon per year to the LAD.

Contrary to popular opinion, these costs are NOT based on a per gallon formula from an estimating guidebook. Many of these costs are fixed costs and do not go down when you place covers over the leach pads. For example, the monthly power costs are based on \$1/Kva of transformer size plus power consumption. While most of the leach pads sit much of the year without being pumped, they may be running \$750 to \$3000 per month in power due to the transformers. The previous table shows power to be 25% of the total yearly costs. The mines were over 75% of the total base load for the small electric cooperative servicing the mines and general area while operating. When the mines closed, Big Flat Electric was forced to increase rates significantly. Therefore, even with engineering revisions and redesign to drop the power demand, it has not had a dramatic effect on the bottom line as rates go up.

The largest leach pad complex (87/91 at Landusky) contains the largest volume of water and has the added bonus of containing selenium in the process water. This water chemistry was assessed and a decision was made to pre-treat this water before land application. A biological treatment system, developed by Applied Biosciences from Salt Lake City, was selected as the system of choice. A total of \$3.03 million has been expended to date with the plant test results looking promising. Full-scale implementation is scheduled for late August 2002.

Adding the biological pretreatment plant construction (\$3M), ongoing pumping, treatment with hydrogen peroxide to kill the cyanide, and subsequent land application (\$1M/yr x 3 years) together gives a staggering \$6 million expenditure for which there was \$160,000 worth of bonding available. Ouch.

WATER TREATMENT

If the creek isn't running red from a claim jumper shot in the back (or the State's red ink) yet, then let's continue with a discussion of water treatment. Having never bonded anything but drill holes, exploration roads and some simple mine reclamation earthwork now the State was tasked with figuring out the real costs for running two water treatment plants mandated by a Consent Decree resulting from a massive lawsuit by the environmentalists, EPA, BLM, DEQ, and Fort Belknap Reservation against the mining company. They enlisted the EPA's help and ended up with a series of line items with costs for each (labor, maintenance labor, direct costs, indirect costs, general and administrative, administrative, monitoring and analysis, sludge removal, and engineering). The sureties bonded these 9 line items individually. If the state exceeds a line item, they eat the cost. If the state underruns a line item, the sureties keep the money. Direct costs were funded at just over \$62,000 per year to include all hydrated lime, ferric sulfate, power, fuel, and other direct costs. This line item requires closer to \$250,000 to \$300,000 per year. Another shortfall and more red ink in the creek sours the states outlook on mining. The state no longer can see the gold glitter in the pan.

**ZORTMAN AND LANDUSKY
WATER TREATMENT PLANT COSTS
YEAR 2001 TO YEAR 2000 COMPARISON**

Cost Category	----- YEAR 2001 -----				----- YEAR 2000 -----			
	Cost By Category	Total Gallons	Cost Per 1000 Gallons	Total Cost	Cost By Category	Total Gallons	Cost Per 1000 Gallons	Total Cost
Zortman WTP Water Treated		51,325,290				52,591,030		
Landusky WTP Water Treated		266,250,000				273,710,324		
Entire Year		317,575,290	\$2.770	\$879,727.73		326,301,354	\$2.585	\$843,387.18
COST BREAKDOWN								
POWER AND FUEL								
Zortman Power								
Water Treatment Plant	\$40,950.48	51,325,290	\$0.798		\$36,465.95	52,591,030	\$0.693	
Alder Spur Capture System	\$11,019.85	5,260,811	\$2.095		\$9,958.49	4,798,611	\$2.075	
Carter Gulch Capture System	\$14,266.05	7,212,980	\$1.978		\$12,888.38	6,340,760	\$2.033	
Ruby Gulch Capture System	\$35,793.44	28,902,900	\$1.238		\$35,344.46	24,527,000	\$1.441	
Zortman Fuel (Propane)	\$6,225.30	51,325,290	\$0.121		\$4,779.44	52,591,030	\$0.091	
Landusky Power								
Water Treatment Plant	\$53,247.28	266,250,000	\$0.200		\$52,175.85	273,710,324	\$0.191	
Lower MT Capture System	\$22,845.47	923,060	\$24.750		\$17,496.94	51,631,570	\$0.339	
Upper MT Capture System	\$13,952.99	143,041,040	\$0.098		\$14,332.02	115,062,990	\$0.125	
Mill Gulch Capture System	\$5,181.08	15,119,070	\$0.343		\$6,539.70	13,441,700	\$0.487	
Sullivan Park Capture System	\$4,173.67	2,936,150	\$1.421		\$3,580.56	2,553,470	\$1.402	
Landusky Fuel (Propane)	\$6,374.10	266,250,000	\$0.024		\$5,860.80	273,710,324	\$0.021	
ZMI Capital Credit	\$390.00				\$88.45			
Lab	\$2,962.36				\$3,123.64			
Zortman Backup Generator	\$1,290.57				\$1,268.50			
Landusky Backup Generator	\$1,958.99				\$1,714.36			
SUBTOTAL POWER COSTS	25.08%	317,575,290	\$0.695	\$220,631.62	24.38%	326,301,354	\$0.630	\$205,617.55
LABOR								
Operations	\$232,436.70				\$232,436.70			
Maintenance	\$115,357.60				\$115,357.60			
Sludge Removal	\$26,344.30				\$26,344.30			
SUBTOTAL LABOR COSTS	42.53%	317,575,290	\$1.178	\$374,138.60	44.36%	326,301,354	\$1.147	\$374,138.60
MONITORING AND ANALYSES								
SUBTOTAL LAB ANALYSES	7.56%	317,575,290	\$0.209	\$66,522.60	7.82%	326,301,354	\$0.202	\$65,949.39
GENERAL, INDIRECT, PARTS, ENG.								
SUBTOTAL PUMPS, SUPPLIES	15.43%	317,575,290	\$0.427	\$135,744.07	16.59%	326,301,354	\$0.429	\$139,911.66
REAGENTS								
Hydrated Lime								
Landusky Water Treatment Plant	\$8,412.62	266,250,000	\$0.032		\$6,881.71	273,710,324	\$0.025	
Zortman Water Treatment Plant	\$36,240.94	51,325,290	\$0.706		\$19,203.35	52,591,030	\$0.365	
Ferric Sulfate - Zortman WTP	\$38,037.28	51,325,290	\$0.741		\$31,684.92	52,591,030	\$0.602	
SUBTOTAL REAGENTS	9.40%	317,575,290	\$0.260	\$82,690.84	6.85%	326,301,354	\$0.177	\$57,769.98
SUMMARY BY CATEGORY								
POWER AND FUEL COSTS	25.08%	317,575,290	\$0.695	\$220,631.62	24.38%	326,301,354	\$0.630	\$205,617.55
LABOR COSTS	42.53%	317,575,290	\$1.178	\$374,138.60	44.36%	326,301,354	\$1.147	\$374,138.60
LAB ANALYSES	7.56%	317,575,290	\$0.209	\$66,522.60	7.82%	326,301,354	\$0.202	\$65,949.39
PUMPS, SUPPLIES	15.43%	317,575,290	\$0.427	\$135,744.07	16.59%	326,301,354	\$0.429	\$139,911.66

The table on the previous page provides two years of actual operating cost data for the Zortman and Landusky water treatment plants. Power, once again, is a significant part of the total at 25%.

Another misconception comes to light in the quest for cost savings measures on the two water treatment plants. Those darn fixed costs! About half of the operating costs are fixed, regardless of the quantity of water processed. It takes one operator per shift to process 10 million gallons per month through Landusky or 25 million. Price per gallon cost estimating on water treatment does NOT work. The prime example is the Landusky WTP. This plant processes around 480 gpm on a 24-hours per day, 7-days per week basis (around 20-25 million gallons per month). The input feed is made up of 145 gpm of 5.5 pH water from the old underground workings of Pike Landusky, 39 gpm from the Mill Gulch Capture System at 4.75 pH, 11 gpm from the Sullivan Capture System at 4 pH and a new source. The reclamation alternative selected for the August-Little Ben Pit required opening up an artesian well to prevent water from ponding in the pit complex (as opposed to cutting a \$6 million dollar notch through fresh sulfides to make the pit free-draining). The artesian well and upper Montana Gulch provides 283 gpm at 6.5-7 pH water to the mix. The addition of this 283 gpm did NOT double the cost of water treatment, as you would predict by using a cost per gallon estimating guide. Instead, the cost went down. The higher pH water lowered the lime requirements. The Landusky plant currently processes almost twice the quantity of water for less money than originally spent. It is seldom in life that you get more for less.

The Zortman water treatment plant processes from 2-15 million gallons per month, running around 6 days per month and averaging 160 gpm. This plant consumes \$70,000 more per year in chemicals than the Landusky WTP. Again, cost per gallon costing is dangerous.

RECLAMATION

Reclamation earthwork started in 1999 and is still ongoing. Virtually all of the earthwork affordable within the bond should be completed by mid-2003. Spectrum Engineering is operating an equipment spread consisting of eight Cat D400 haul trucks, one Cat 345 excavator, one Linkbelt excavator, one Cat D9 dozer, one Cat D10 dozer, a Cat 16 G grader and support equipment. Mungas Company, an earthwork contractor is operating a Cat 375 excavator and two Cat 777 haul trucks with support equipment. Approximately \$9 in reclamation has been completed to date.

SUMMARY

The reclamation process has been a learning experience for everyone involved. The State of Montana went from a bonding and review agency to an operator, owning their own heavy equipment with a new appreciation of how to bond other sites. The Fort Belknap Reservation has seen pits backfilled and the prospect of future mining diminish. The BLM has been requested to fund water treatment shortfalls from their operating budgets and has been requested by the Tribe to submit to a public caning for allowing this mine to ever exist. The EPA saw a tremendous amount of work accomplished for minimal expense, including moving tailings on the Zortman side for less than \$2/cubic yard versus the Corps cost of moving tailings a similar distance for over \$40/cubic yard. Spectrum Engineering has learned that satisfying four masters simultaneously is a daunting, thankless, task.