
Earl H. Bennett
Virginia S. Gillerman

Staff Report 97-22
November, 1997

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

Earl H. Bennett
Virginia S. Gillerman

Staff Reports present timely information for public distribution. This publication may not conform to the agency's standards.

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

Staff Report 97-22
November, 1997
IDAHO GEOLOGICAL SURVEY

75TH

ANNIVERSARY
<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>The Nation's Economy</td>
<td>2</td>
</tr>
<tr>
<td>Idaho's Economy</td>
<td>3</td>
</tr>
<tr>
<td>Selected Metal Economics</td>
<td>3</td>
</tr>
<tr>
<td>Mining in Idaho</td>
<td>5</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Coeur d'Alene Mining District</td>
<td>8</td>
</tr>
<tr>
<td>Introduction</td>
<td>8</td>
</tr>
<tr>
<td>Asarco, Inc.</td>
<td>8</td>
</tr>
<tr>
<td>New Bunker Hill Mining Company</td>
<td>8</td>
</tr>
<tr>
<td>Coeur d'Alene Mines Corporation</td>
<td>10</td>
</tr>
<tr>
<td>Hecla Mining Company</td>
<td>11</td>
</tr>
<tr>
<td>Sunshine Mining and Refining Company</td>
<td>12</td>
</tr>
<tr>
<td>Other Coeur d'Alene News</td>
<td>15</td>
</tr>
<tr>
<td>Other Producing Metal Mines (Figure 2)</td>
<td>15</td>
</tr>
<tr>
<td>U.S. Antimony Corporation</td>
<td>15</td>
</tr>
<tr>
<td>Thompson Creek</td>
<td>15</td>
</tr>
<tr>
<td>Hecla Mining Company - Grouse Creek</td>
<td>16</td>
</tr>
<tr>
<td>Pegasus Gold Corporation</td>
<td>18</td>
</tr>
<tr>
<td>Dakota Mining Company</td>
<td>18</td>
</tr>
<tr>
<td>Kinross Gold</td>
<td>19</td>
</tr>
<tr>
<td>Aluminum Recycling Plant</td>
<td>19</td>
</tr>
<tr>
<td>Other Small Mining Operations</td>
<td>19</td>
</tr>
<tr>
<td>Placer Mines</td>
<td>21</td>
</tr>
<tr>
<td>Phosphate Mines and Plants (Figures 2 and 9)</td>
<td>21</td>
</tr>
<tr>
<td>Introduction</td>
<td>21</td>
</tr>
<tr>
<td>FMC Corporation</td>
<td>22</td>
</tr>
<tr>
<td>J.R. Simplot Company</td>
<td>23</td>
</tr>
<tr>
<td>NuWest Industries, Inc.</td>
<td>24</td>
</tr>
<tr>
<td>Monsanto Company</td>
<td>24</td>
</tr>
<tr>
<td>Rhone-Poulenc Basic Chemicals Company</td>
<td>25</td>
</tr>
<tr>
<td>Kerr-McGee Chemical Corporation</td>
<td>25</td>
</tr>
<tr>
<td>Industrial Minerals (Figure 12)</td>
<td>27</td>
</tr>
<tr>
<td>Limestone</td>
<td>27</td>
</tr>
<tr>
<td>Silica</td>
<td>28</td>
</tr>
<tr>
<td>Perlite</td>
<td>30</td>
</tr>
<tr>
<td>Pumice</td>
<td>30</td>
</tr>
</tbody>
</table>
Garnet ........................................... 30
Diatomite ....................................... 31
Clay ............................................. 31
Scoria ......................................... 31
Sand and Gravel ............................... 31
Stone .......................................... 32
Gemstones ..................................... 33
Zeolites ....................................... 33

Exploration (Figure 15) .......................... 34

Coeur d’Alene District ......................... 34
Other North Idaho ............................. 34
Salmon Area .................................... 35
West-Central Idaho ......................... 39
East-Central Idaho ............................ 39
South-Central Idaho .......................... 40
Boise Basin .................................... 41
Southeast Idaho ............................... 41
Southwest Idaho .............................. 43

Environmental News ............................ 44

Introduction ................................ 44
Clayton Silver Mine ........................... 45
Bunker Hill Superfund ....................... 45
Lead Poisoning ................................ 48
Coeur d’Alene Basin Cleanup ............... 48
The Salmon Issue ............................ 52
Other Salmon-Related Issues .............. 56
Bull Trout .................................... 57
PacFish ....................................... 57
Steelhead Licenses ............................ 58
Aqua-Tech Company ........................... 58
McKim Creek Cleanup ....................... 58
Land Board Mining Awards ................ 58
Blackbird Mine ............................... 59
Triumph Mine ................................ 59
Phosphate Slag Studies ..................... 61
Michaud Flats Superfund Site ............... 62
Cove-Mallard Area, NezPerce National Forest 62
State Grazing Permits ....................... 63
Saylor Creek Bombing Range Expansion .... 63
Wilderness Legislation ........................................ 63
U.S. Forest Service Reorganization .......................... 64
Idaho Wolves .................................................... 64
Columbia Plateau Sole Source Aquifer ..................... 65
Snake River Water Rights Adjudication ..................... 65
Snake River Protection .......................................... 66
Boise River Cleanup ............................................ 66
Clean Water Act .................................................. 66
Mercury Poisoning ............................................... 67
White Sturgeon Listing ......................................... 67
Bruneau "Hot Springs" Snail .................................... 67
Pocatello Aquifer Contamination ............................ 68
Boundary County Roads ........................................ 68
Salmon River Closure ........................................... 68
Abandoned and Inactive Mines ............................... 68
Columbia Basin (Eastside) Ecosystem Study ................ 69
Snake River Canyon Management Plan ...................... 69

Other Mining-Related News .................................... 69

WWP Generator .................................................. 69
Want to Buy a Used Uranium Processing Plant? .......... 70
A Mammoth Story at Tolo Lake ............................... 70
Mining Law Reform ............................................. 71
West Coast Blackout ............................................ 71
Earth Resources Building ...................................... 71
Idaho Geological Survey- 75th Anniversary ................ 71
Index ............................................................... 72
TABLES

Table 1. Nonfuel raw mineral production in Idaho 1993-1994 .................................. 6
Table 2. Value of nonfuel mineral production in Idaho 1989-1994 ............................... 7

FIGURES

Figure 1. Location of selected cities and towns in Idaho ............................................. 9
Figure 2. Active mines (o), processing plants (o), and mines under development (x) in Idaho, 1994 .......................................................... 9
Figure 3. Coeur d’Alene Mining District, Idaho, 1994 ............................................. 9
Figure 4. Art Brown, Chairman, Hecla Mining Company, helps celebrate the mining of 100 million ounces of silver from the Lucky Friday mine .............................................. 14
Figure 5. West Chance exploration at the Sunshine mine ........................................... 14
Figure 6. A model of the complex mill at the Grouse Creek mine, Hecla Mining Company, Custer County, Idaho ......................................................... 20
Figure 7. Map of the Delamar and Stone Cabin mines, Kinross Gold, Owyhee County, Idaho 20
Figure 8. CSC’s gold recovery mill at the Rescue mine, Warren, Idaho ................... 22
Figure 9. Phosphate mines and plants in Idaho, 1994 ................................................ 23
Figure 10. NuWest Industries’ fertilizer plant at Conda, Idaho ................................... 26
Figure 11. Enoch Valley phosphate mine, Monsanto Company, Caribou County, Idaho 26
Figure 12. Industrial mineral mines, plants, and exploration projects in Idaho, 1994 .... 29
Figure 13. Long conveyor to Chemical Lime Company’s plant, Bancroft, Idaho ....... 29
Figure 14. Washing plant owned by Emerald Creek Garnet, Fernwood, Idaho ......... 34
Figure 15. Exploration projects in Idaho, 1994 .......................................................... 37
Figure 16. Crusher site and conveyor path to the leach pad, Beartrack mine, FMC Gold, Lemhi County, Idaho ......................................................... 37
Figure 17. Drilling hole No. 66 in the Jacob zone, Blackpine mine, Formation Capital, Lemhi County, Idaho ......................................................... 42
Figure 18. Underground drilling by Ramrod Gold, Talache mine, 900 level, Atlanta, Idaho . .42
Figure 19. The Bunker Hill zinc plant, scheduled for demolition under Superfund . . . . .50
Figure 20. Removing mill tailings and restoring the stream channel on Ninemile Creek,
    Shoshone County, Idaho ................................................................................. .50
Figure 21. Results of the drawdown of Lower Granite Dam in 1992. Location is near Red Wolf
    Crossing Bridge, Clarkston, Washington. ....................................................... .60
Figure 22. The tailings impoundment at the Triumph mine, Blaine County, Idaho . . . . .61
MINING, MINERALS, AND THE ENVIRONMENT
IN IDAHO, 1994

Earl H. Bennett1
Virginia S. Gillerman

Introduction

This paper summarizes all mining and mineral-related activity in Idaho for 1994. Sources used to compile this document include U.S. Forest Service and federal Bureau of Land Management mineral specialists and geologists in the state, the U.S. Bureau of Mines, the Mine Safety and Health Administration (MSHA), numerous company geologists and spokespersons, the Idaho Mining Association, and clippings from area and trade newspapers and periodicals. For the second year, we have expanded the scope of this report to cover many of the important environmental stories that occurred in Idaho, as most of these had some effect on our mining industry. We begin our review with a summary of national and international events that directly or indirectly influenced Idaho's mining sector.

At the head of the list of the top 10 news stories in 1994 was the Republican landslide in the November election, sparked by a voter rebellion against the Washington establishment and the general state of the nation. The Grand Old Party (GOP) won control of both the House and Senate in Congress. House Republicans (with a new Speaker, Newt Gingrich from Georgia) promoted a Contract with America that they pledged to have in place in the first 100 days of the 104th Congress. The GOP victory extended to all levels of government. Phil Batt won the Gubernatorial race in Idaho against Larry Echohawk, and for the first time in 24 years the state will have a Republican governor. The sweep included most elected state officials, and Republicans strengthened their control in both the House and Senate. Idaho is now the most Republican state in the nation. Pledges of tax cuts, leaner and more responsive government, better education, and increased crime prevention were all planks in GOP platforms.

The "hot" fall election followed a blistering summer. Wild fires burned some three-quarters of a million acres of Idaho forests during one of the worst fire seasons on record. Hardest hit was the Payette National Forest, where three huge fires burned some 290,000 acres, or 453 square miles. Over 7,800 fire fighters fought these blazes, which burned until finally extinguished by fall rains. The cost for fighting the Payette conflagrations alone was an estimated $82 million.

Thanks to U.S. intervention, a war was averted in Haiti (former President Carter played a peacemaker role), and the Palestinians and Jordan signed peace treaties with Israel. While old enemies made peace, new adversaries emerged, and bloody civil wars erupted or continued in Bosnia, Rwanda, and Chechnya, Russia.

1Earl H. Bennett, State Geologist, Idaho Geological Survey, Room 332, Morrill Hall, University of Idaho, Moscow, ID 83844, phone (208) 885-7991; or Virginia Gillerman, Economic Geologist, Idaho Geological Survey, Math-Geology, Room 229, Boise State University, Boise, ID 83725, phone (208) 385-4002.

WARNING: This report contains preliminary data that has not been thoroughly checked with company sources.
Minerals, Mining, and the Environment, 1994

Other national headline stories of 1994 included the big earthquake in Northridge, California (the most expensive natural disaster in the nation's history), the Tonya Harding-Nancy Kerrigan figure skating scandal, the baseball and hockey strikes, President Clinton's failed health care plan, and, of course, the O.J. Simpson case.

The Nation's Economy

Unemployment dipped nationwide to 5.6 percent at year's end, down from 7.2 percent at the end of 1993. Factories hummed at full production and the economy expanded by about 4 percent. That was the good news but, as always, all was not perfect. Fears of inflation led the Federal Reserve to raise interest rates six times to cool down the hot economy. The higher rates caused the worst collapse in the bond market since the Great Depression, and there was little sign of a recovery. The stock market stalled in 1994, with the closing value of the bellwether Dow Jones Industrial Average at 3,834 or 80 points higher than when it opened the year but below the all-time high of 3,978 reached on January 31. The Dow did lose 260 points in March, but soon recovered.

On October 25, the dollar was worth 98 Japanese yen, an all time low, and one that caused international heartburn. The U.S. invested some $2 billion in November to prop up the greenback. Many economists note that a cheap dollar is good, as it lowers the cost of U.S. exports. This would be welcome, as the U.S. set a new balance of payments deficit in 1994, thanks largely to petroleum imports. However, the Japanese rely on imports for just about all of their raw resources, so a cheap dollar also helps them.

The trillions of dollars invested by mainstream America in mutual funds buoyed markets, but are also a concern. There could be problems if these unsophisticated investors panic and withdraw support from the funds. Their confidence was shaken when Orange County, California, one of the wealthiest counties in the country, declared bankruptcy in December. The debacle was caused by a $2-billion investment fund loss in the derivatives market. Many others were stung by these relatively new and complicated investment instruments.

In December, the Mexican peso nose-dived, dropping 36 percent against the dollar and plunging from 3.5 to 5.5 pesos to the dollar. Overall, the peso lost 43 percent of its value against the dollar in 1994. The devaluation shocked North Americans and other foreign investors (many in international mutual funds), as the Mexican stock market went into free fall and they lost some $10 billion. It was an especially rude awakening because the Mexican stock market has turned in a stunning performance over the past few years. The peso has been quite stable for the past six years, hovering around 3.5-4.0 pesos per dollar. By year's end the United States was a partner in a plan (we provide half of a $18 billion international loan package) to help the ailing Mexican economy.

The devaluation of the peso could have serious repercussions for the North American Free Trade Agreement (NAFTA), as Mexican labor costs and goods will become much cheaper in comparison to United States' products. The country has always had trouble with inflation. A rebellion in the state of Chiapas and political assassinations did not help the latest round of peso
free fall. There is concern that the ailing Mexican economy may spill over into other Latin and South American countries, which are trying to implement free-market economies.

The last act of the lame duck 103rd Congress was to pass the General Agreement on Tariffs and Trade (GATT) in December. Billed as the most ambitious trade agreement in history, the pact required seven years of negotiation by 124 nations. Under GATT, a World Trade Organization will be established to settle trade disputes. The agreement will lower tariffs by one-third, bring down subsidies for farm exports, strengthen international copyrights and patents, and attempt to regulate international trade in services and investments. The removal of trade barriers is expected to favor U.S. exports and to help create many new jobs.

Idaho's Economy

By midyear the state's population stood at 1.1 million, a 3 percent rise from the previous year. The state was among the fastest growing in the nation, exceeded only by Nevada and Arizona. According to the Idaho Department of Employment, Idaho's seasonally adjusted unemployment rate in August was 4.4 percent, the lowest since the figure was first computed in 1978. The highest unemployment was 11.4 percent in 1983. Revenue for the state's coffers exceeded projections, which had seemed phenomenal at the beginning of the year. In FY-95, the state budget topped $1 billion for the first time, and the new money was used to fund the largest increase in the general education budget in history. Idaho's economy is expected to slow somewhat next year, as noted in widely watched year-end reports by U.S. Bancorp and the Northwest Policy Center. Although slowed, growth should continue in 1995 with a 3.5 percent increase. Personal income should grow by about 7-8 percent.

Selected Metal Economics

Cautious optimism was the watchword, as silver prices stayed above $5 an ounce in early 1994. According to the Silver Institute, inventories on the COMEX reached their lowest point since 1990 and world silver supplies lagged demand for the third consecutive year. The survey was supported, as Comex stocks dropped to 258 million ounces by the end of 1994, down from the all-time high of 280 million ounces in September 1993. The increase in precious metal prices last year was buoyed by Saudi and other Middle Eastern investors who feared a devaluation of local currencies. Austerity measures buoyed up the Saudi economy and the rally in precious metals ended. Political assassinations in Mexico and civil uprisings in Chiapas province spurred precious metal prices, and silver rose briefly to the $5.75 range in March. As the Federal Reserve boosted interest rates to control inflation, the price began to falter, declining from $5.65 an ounce in early-to-mid October to the $4.60 an ounce range by early December. Commodity funds dumped the metal, which finished the year with spot prices in the $4.80-$4.90 range. The influence of mutual funds was well illustrated during the sell-off. A bright note is that, if silver consumption continues to grow at about 6 percent, excess inventories may be consumed within the next 14 months.
Minerals, Mining, and the Environment, 1994

The Safety-Kleen Corporation announced that it would expand into silver recycling by acquiring the Boston Recovery Company of Canton, MA, and the Drew Resource Corporation of Berkeley, CA. The new business will help some 400,000 photochemical users meet stringent environmental standards for safe silver disposal. The metal is a waste product of photographic film processing. The new business is expected to have revenues of some $100 million per year.

Gold ended 1993 in the $397 an ounce range, with expectations of $400 or more for 1994. But, instead, it turned out to be a lackluster year for the yellow metal, with the price bouncing up and down in the $370-$400 range. As noted for silver, the increase in precious metal prices late in 1993 was buoyed by Saudi and other Middle Eastern investors. An announcement by Japan in March that they would melt and sell a hoard of gold coins also dampened the market. The political problems in Mexico drove prices higher in March, from $377 an ounce to over $390 an ounce. Caught by the Federal Reserve’s increases in interest rates, the metal began a downward spiral in April reaching the $370 mark. The stability of South Africa after national elections continued to decrease prices. Brief rallies in June and late September brought prices back to the $390-almost $400 range, but by year’s end, the metal was back around $380.

Base metal markets enjoyed a reasonably good year as fund managers poured money into commodities, and the world’s economy, particularly in the U.S., Europe, and Japan, continued to improve. Emerging economies in China and other countries supported price increases. Copper was a star performer, starting the year at 71 cents a pound, rising to 85 cents a pound by the end of January (a 16 percent increase over lows in the fall of 1993) and skyrocketing upward (with some perturbations) to end the year at $1.35 per pound. Mining companies flocked to South America (especially Chile) and just about everywhere else in the world to look for new copper mines, as the metal is projected to be in demand for at least a decade. Lead also turned in a stellar performance, beginning the year in the 23-cents-a-pound range and ending at 45 cents a pound. Zinc only fluctuated a bit, starting 1994 at 45 cents a pound and ending at 50 cents a pound. There is a large worldwide oversupply of the metal.

Copper gave us an interesting story (Wall Street Journal, 3/16/94) concerning computers and a slip of the wrist. Juan Pablo Davila was a Chilean futures trader who worked for the national copper giant, Codelco. Davila accidently switched several sell and buy orders while entering overseas transactions on his computer. The typing error, and his ill-fated attempts to rectify the problem, ended up costing the Chilean government some $207 million of taxpayers’ money, or about 0.5 percent of Chile’s gross national product.

The U.S. Bureau of Mines estimated that the amount of cobalt mined worldwide declined by two-thirds from 1986 to 1993 to 17,400 tonnes. Continued political unrest in Zambia and Zaire (the world’s largest producer) and dwindling exports and lower production from the former Soviet Union (off 200 tonnes from 1993) drove cobalt prices much higher in 1994. Expatriates fled Zaire, which continues to suffer under the Mobutu regime. Zaire was projected to produce only 3,500 tonnes of cobalt this year, down from 12,273 tonnes in the early 1980s. Problems at the Norilsk refinery in Siberia (the largest nickel refinery in the world, which produces a cobalt byproduct) reduced Russian cobalt production from last year’s 3,100 tonnes and incidentally, drove nickel prices through the roof. Scrap recycling and sales from the U.S. strategic metals
stockpile made up part of the cobalt shortage and prevented even higher prices. Mining companies scrambled to find and develop new sources of the steel additive. Last year, cobalt prices were in the $15 a pound range. This increased to $25 a pound in mid-1994, with the price ending the year at almost $30 a pound on the free market. Such dramatic increases spurred interest in Idaho's copper-cobalt belt, including Formation Capital's Blackpine mine and Noranda's inactive Blackbird mine.

And cobalt was not alone. The price of antimony, an unsung metal used in fire retardants and batteries, soared as China, the world's largest source, halted production (the mines flooded in mid-year). Prices rose from 80 cents a pound at the new year to $2.90 a pound at year's end. Sunshine Mining, the largest producer of domestic antimony, enjoyed the largess.

Molybdenum, used as a steel additive and in lubricants, also enjoyed a price resurgence. Demand by the steel industry, mine closings, and producer allocations caused the increase. Producer prices rose from $2.60-$2.80 a pound for "moly" oxide in January to $13-$16 a pound at the end of 1994, with further increases projected. A major price hike happened towards the end of the year. The price was so high that the Japanese government announced that it was considering selling some molybdenum from its strategic stockpile. This would be the first sale since the stockpile was created in 1983. The huge Thompson Creek mine in Custer County reopened just in time to take advantage of the bounty.

The health of the steel industry was also good for vanadium prices. Vanadium pentoxide ended the year at $3.50-$4.00 a pound, more than double the price in mid-1993. The metal, used as a steel additive and catalyst, is produced by Kerr-McGee in Soda Springs.

Mining in Idaho

Introduction

According to the U.S. Bureau of Mines, nonfuel mineral production in Idaho in 1994 was estimated at $343 million dollars, compared to $274 million last year (Table 1 and 2). Idaho ranked 32nd in total mineral value among the 50 states, compared to 35th last year. The state is the nation's only producer of vanadium and antimony, leads in garnet, is ranked third in the production of phosphate rock, silver, and lead, fourth in pumice, sixth in feldspar, and eighth in zinc. Idaho is fourth nationwide in molybdenum production and ranks 10th out of 13 states where the USBM reports gold production. Increases in the value of molybdenum, antimony, and vanadium, full production from all phosphate mines, and a continued expanding economy and growing population fueled the increase. If commodity prices hold, next year will be even better, with a full year's production of molybdenum from the Thompson Creek mine and the startup of the Grouse Creek and Beartrack gold mines adding to the total. The trend, first noted in 1992, for the value of sand and gravel to exceed first the state's silver, and now gold, production continues. This is another indicator of the rapid growth in the state.

Last year, the Survey reported the value of finished phosphate products (acid and elemental phosphorous) in addition to the value traditionally reported, which is based on the price for raw
<table>
<thead>
<tr>
<th>MINERAL</th>
<th>1993 Quantity</th>
<th>*Value</th>
<th>1994* Quantity</th>
<th>*Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gem stones</td>
<td>NA</td>
<td>$566</td>
<td>NA</td>
<td>$119</td>
</tr>
<tr>
<td>Gold</td>
<td>W</td>
<td>W</td>
<td>5,600*</td>
<td>$65,000*</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>--</td>
<td>--</td>
<td>5,550</td>
<td>~$30,600</td>
</tr>
<tr>
<td>Phosphate rock</td>
<td>4,355</td>
<td>$78,432</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Pumice</td>
<td>43,438</td>
<td>$327</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Sand and Gravel:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>13,600*</td>
<td>$44,900*</td>
<td>15,500</td>
<td>$52,700</td>
</tr>
<tr>
<td>Industrial</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Silver</td>
<td>190</td>
<td>$26,232</td>
<td>162</td>
<td>$22,400</td>
</tr>
<tr>
<td>Stone (crushed)</td>
<td>4,602</td>
<td>$20,770</td>
<td>4,000*</td>
<td>$18,400*</td>
</tr>
<tr>
<td>Combined value of antimony,</td>
<td></td>
<td>$102,983</td>
<td>XX</td>
<td>$154,000</td>
</tr>
<tr>
<td>cement, clays (common),</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>copper, feldspar, garnet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>abrasive), lead, lime, perlite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(dimension), vanadium ore,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>zinc, and values indicated by</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>symbol W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>XX</td>
<td>$274,210</td>
<td>XX</td>
<td>$343,000*</td>
</tr>
</tbody>
</table>

* (in thousands)
1/Estimated. 2/Preliminary. NA/Not Available. W/Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX/Not applicable.
3/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
4/Excludes certain clays; kind and value included with "Combined value" data.
5/Recoverable content of ores, etc.
7/Data do not add to total shown because of independent rounding. Data from U.S. Bureau of Mines.
TABLE 2. Value of nonfuel mineral production in Idaho 1989-1994 (add 000 to all dollar figures)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>37,602</td>
<td>45,649</td>
<td>39,107</td>
<td>35,241</td>
<td>40,919</td>
<td>39,343</td>
</tr>
<tr>
<td>Moly</td>
<td>53,890</td>
<td>44,634</td>
<td>13,419</td>
<td>28,841</td>
<td>-0-</td>
<td>28,990</td>
</tr>
<tr>
<td>Pb+Zn+Cu</td>
<td>41,830</td>
<td>67,947</td>
<td>18,400</td>
<td>18,000</td>
<td>15,670</td>
<td>12,446</td>
</tr>
<tr>
<td>Silver</td>
<td>77,651</td>
<td>68,418</td>
<td>43,807</td>
<td>32,131</td>
<td>26,231</td>
<td>22,762</td>
</tr>
<tr>
<td>Phosphate</td>
<td>488,236</td>
<td>464,280</td>
<td>585,695</td>
<td>546,842</td>
<td>568,152</td>
<td>630,000</td>
</tr>
<tr>
<td>Other</td>
<td>77,533</td>
<td>83,011</td>
<td>97,518</td>
<td>112,194</td>
<td>126,653</td>
<td>127,171</td>
</tr>
<tr>
<td>Total</td>
<td>776,742</td>
<td>773,939</td>
<td>797,946</td>
<td>773,249</td>
<td>777,625</td>
<td>860,712</td>
</tr>
</tbody>
</table>

Production data is based on figures provided by the U.S. Bureau of Mines (USBM) for 1989-1993, except phosphate. The value for phosphate for 1991-1993 was tabulated by the Idaho Mining Association (IMA) and is estimated for 1989, 1990 and 1994. The IMA number is the average value of phosphoric acid and elemental phosphorous produced from raw phosphate ore (about $105/ton), not the value of the raw ore ($25/ton) that is reported by the USBM. Annual totals include this new phosphate value and are therefore significantly higher than USBM totals. Other includes antimony, cement, clay, garnet, lime, stone (dimension and crushed), vanadium, pumice, gemstones, and sand and gravel. For 1994, Idaho Geological Survey has computed the value for all commodities using some USBM numbers.

ore. The estimated 7.5 million short tons of new ore mined in 1994 (more ore than actually processed) will make acid and elemental phosphorous worth about $788 million (versus the $102 million value of the raw ore). The differential between raw ore ($25 a ton) and finished products ($105 ton) is obvious. In actuality, 1994 plant production will probably be close to that in 1993 or about 6 million tons of ore.

The Idaho Department of Employment noted that in 1994 there were about 2,400 people employed in the mining industry, with about 1,100 in metal mining. There were another 1,400 working in the stone, clay, glass, and concrete products industries and 4,000 in chemicals and allied products, which includes many of the workers in the phosphate plants in Soda Springs and Pocatello. The average hourly wage for mining workers was over $15 an hour, and miners' pay remains among the highest of all industrial workers in the state.

A number of mines are in remote areas and are described in this report relative to the nearest urban center. Figure 1 is a simplified map showing the location of the major towns and cities in Idaho.
Minerals, Mining, and the Environment, 1994

Coeur d'Alene Mining District (Figures 2 and 3)

Introduction

Although mining pays well, seasonally adjusted unemployment in Shoshone County and the Coeur d'Alene mining district remained among the highest in Idaho, at over 11 percent. Many miners have moved away or are still unemployed. Only the Lucky Friday and Sunshine mines were in production, and both reported losses for the year. The start-up of a small operation at the Bunker Hill mine and the formation of the Silver Resources Corporation by Asarco and Coeur d'Alene Mines Corporation were encouraging. Most of the news from the Silver Valley was about the cleanup efforts at the Bunker Hill Superfund site (see page 45) and in the Coeur d'Alene Basin (page 48).

Asarco, Inc.

Asarco, Inc., and Coeur d'Alene Mines Corporation formed a new company, Silver Resources Corporation, which includes the Galena, Coeur, and Caladay properties in the Coeur d'Alene district. Each company holds a 50 percent interest in the new venture. Rumors were rampant that the the Coeur mine, followed by the Galena (both now on standby), might reopen if silver prices improve and stabilize. The Galena opened in 1955 and the Coeur in 1976. Together, the two mines have produced over 160 million ounces of silver. When the mines closed, the Coeur had reserves of 360,000 tons grading 17.32 ounces of silver a ton and the Galena, 951,000 tons grading 15.07 ounces a ton. The year-end decline in silver prices cast a pall on the hoped for reopenings.

Asarco has made a major commitment to cleaning up several mines it has operated or owned. The company was active at the Bunker Hill Superfund site this summer and is working with the state and the Environmental Protection Agency (EPA) at the Triumph mine in Blaine County. The company has also expended considerable funds cleaning up an old smelter site in Tacoma, Washington.

New Bunker Hill Mining Company

The New Bunker Hill Mining Company added a Humbol Wedag horizontal bar impact crusher with a capacity of 110 tons an hour to the mill at the Bunker Hill mine. The mill also includes a conveyor system, a 16-foot double-decked screen and an 8-bank Reichart spiral concentrator. By year's end, about 40 tons of concentrates were being produced each month, grading 60 percent lead. The company increased employment from 10 to 19 miners. Bob Hopper, president and owner of the company, bought the mine in 1991. In addition, Bunker Hill is still mining pyromorphite crystals for sale to collectors. The old Bunker Hill rock house was purchased from Shoshone County for $50,000 in December.
Figure 1. Location of selected cities and towns in Idaho.

Figure 2. Active mines (●), processing plants (○), and mines under development (×) in Idaho, 1994.

Figure 3. Coeur d'Alene Mining District, Idaho, 1994.
Coeur d'Alene Mines Corporation

A third quarter profit of $1.6 million was a marked improvement over last year's third quarter loss of $10.4 million. In spite of the good quarter, the company finished the year with a loss of $3.9 million (including one-time write-offs of $9.4 million, all taken in the third quarter) compared to $8.1 million in 1993. The company started the year with a $90 million debentures placement in January. The funds will be used for acquisitions and new mining ventures. Dennis Wheeler, Chairman, President, and CEO, received the American Institute for Mining, Metallurgical and Petroleum Engineers' Environmental Conservation Distinguished Award.

Coeur completed the new life-of-mine leach pad at the Rochester silver-gold mine in Nevada, ahead of schedule and under budget. The new pad will accelerate metals recovery. A new conveyor system for moving ore to the pad will reduce operating costs and increase efficiency. The company's flagship mine produced a near-record 5,937,770 ounces of silver and 56,886 ounces of gold from 7,760,000 million tons of ore in 1994, compared to 5,943,894 ounces of silver and 66,412 ounces of gold from 7.2 million tons in 1993. A total of 23,056,000 tons of ore and waste rock was moved in 1994.

The company announced in mid year that construction had started at the Fachsenal gold-silver mine in Chile. Estimates are that the property contains at least 318,000 ounces of gold and 14.6 million ounces of silver. Coeur has expended about $20 million in exploration and development at the minesite over the last three years. Estimated first year's production is 41,000 ounces of gold and 2.6 million ounces of silver. Construction will take 18 months and cost an estimated $41.8 million. Both underground and open-pit mining techniques will be used, and 225 people will be employed. The flotation mill will process about 1,650 tons of ore a day. Coeur purchased Fachsenal and six other Chilean properties in 1990 for $5 million.

Coeur remapped the Faride mine in Chile, which has an estimated reserve of 234,000 ounces of gold. The mine operated until 1988. Coeur can buy a 51 percent interest in the property for $4 million, plus an additional $3.5 million for exploration and development work. The mill at the site can be bought for another $8 million.

The company purchased a 51 percent managing interest in the El Bronce gold mine in Chile for $20.4 million in October. Coeur will invest an additional $5 million in the property. The mine presently produces 40,000 ounces per year, and Coeur hopes to increase output to 65,000 ounces annually.

Coeur worked with International Curator Resources at the Boleo copper-cobalt project in Baja California, Mexico. The property contains an estimated open-pit resource of 141 million tons of ore grading 2.67 percent copper and 0.082 percent cobalt. Much of this ore is deep, with a stripping ratio for potential open-pit mining of 8-10 to 1. In August, the company announced a restructuring of its agreement with Curator. Coeur will gain full ownership of the Jualin gold project in Alaska and Curator will take over the Boleo project. Coeur will sell its $4 million in Curator shares and use the money to further compensate Curator for Jualin.
Minerals, Mining, and the Environment, 1994

The company experienced some problems with ore dilution from the underground part of its 80 percent owned Golden Cross mine in New Zealand. On a positive note, cash operating costs at the mine continued to decrease over the year. The mine yielded 67,400 ounces of gold in 1994 at a cash cost of $277 per ounce.

The EPA issued a Technical Assistance Report to the Army Corps of Engineers late in the year, clearing the way for the Corps to issue a permit for the tailings dam at the Kensington mine. The historic gold mine, near Juneau, Alaska, has been under development for several years by Coeur and its equal partner, Echo Bay Mines.

Hecla Mining Company

The company ended 1994 with a loss of $32.7 million, compared to a loss of $21.9 million in 1993 and $49.3 million in 1992. Most of this year's red ink was due to write-downs in the fourth quarter. Hecla employs about 800 people in North America. In June, the company reclaimed all of its outstanding zero-coupon subordinated Liquid Yield Option Notes (LYONS) for $50.2 million. This followed the completion of a common stock offering of 7.4 million shares worth $64 million.

Industrial minerals continue to be an important and stable part of Hecla's portfolio. The Kentucky-Tennessee Clay Company began selling clay products through a subsidiary, K-T Clay de Mexico S.A. de C.V. Most of the ceramic will be used to make sinks, toilets, and bathtubs. The Mountain West Bark Company, Inc., (headquartered in Rexburg, ID) was acquired last year. The company mines scoria in south Idaho for decorative stone and gas barbecues, and it exceeded sales expectations for the year.

The company acquired Equinox Resources Ltd., a Vancouver, B.C., company and gained the Rosebud gold property in Nevada. Hecla sold its share in the Hog Heaven silver mine in Montana to Pan American Minerals for an undisclosed sum. The mine contains 11 million tons averaging 4.23 ounces of silver and 0.022 ounces of gold per ton.

Hecla opened the LaChoya gold mine in Sonora, Mexico. The deposit contains an estimated 225,000 ounces, with 200,000 ounces recoverable over the three-year life-span of the mine. After three months of operation, the mine had a cash cost of $185 per ounce and a full cost of $285 per ounce, well within expectations.

In August, the company received bad news: First District Court Judge Craig Kosonen upheld a $20 million award given to the Star-Phoenix Mining Company by a Wallace jury in June. Star had claimed that Hecla unjustly canceled its lease on the Star mine four years ago. At the time, the company owed nearly $6 million to a number of Silver Valley and other creditors. With the lease canceled, Star was forced into bankruptcy and had to lay off 120 workers. The case is now under appeal to the Idaho Supreme Court. Hecla posted a $27 million bond as a guarantee of payment, which will keep Star-Phoenix from collecting any cash until the appeals process is completed.
Minerals, Mining, and the Environment, 1994

The Lucky Friday mine recovered 1,306,884 ounces of silver, 2,431 tons of zinc, and 13,214 tons of lead from 124,986 tons of ore in 1994, compared to 2,122,738 ounces of silver, 4,385 tons of zinc, and 19,795 tons of lead from 179,579 tons of ore in 1993. Cash costs were $5.81 an ounce silver in 1994 compared to $5.54 an ounce last year. On August 30, a skip was hoisted into the sheave wheels at the Friday. The hoist cable snapped and the bucket loaded with 50 tons of ore plunged 6,100 feet to the bottom of the Silver shaft, causing considerable damage. The mine was closed for two months for repairs, idling some 100 workers. Fortunately, nobody was riding in the man cages below the ore skip. The accident was blamed on the failure of the automatic controls that are supposed to slow the skip down as it nears the surface. Insurance should pay for most of the damage. Workers at the Friday received an early Christmas present when the mine reopened on December 5. There were 147 people working at the property at year's end.

The closure did not dampen enthusiasm in September, when the company celebrated the mining (on March 15) of the 100 millionth ounce of silver from the Friday (Figure 4). The party was enjoyed by all. A 23-foot cube made of pipe symbolized how much (or more realistically, how little) space is needed to hold 100 million ounces of silver. Each Hecla employee received a special commemorative silver round to mark the occasion, and six trees (silver maples, of course) were planted in the park at Osburn. A line of one-ounce rounds made from the Friday silver would stretch from Osburn to Miami, Florida, along Interstate 90. The company has lost $18 million over the past five years, by keeping the mine operating while silver prices were low.

When the Friday reopened in December, there were 11 new miners on the job who began development work at the Gold Hunter project. This old mine lies west of the Friday, and Hecla has been exploring the property at depth from the 4050 level of the Friday. Last year they announced a significant discovery of the downward extension of the Hunter vein system. The decision was made in August to expend $4.7 million on developing the discovery, adding 20 new jobs. As many as 200 men may be hired, if the property is placed in production. The Hunter could yield as much as 3 million ounces of silver annually. Development will include driving a 5,500-foot-long tunnel from the 4900 level of the Friday.

For the past few years, the Republic gold mine in northeast Washington has been Hecla’s flagship. All mines eventually close, and the company announced that Republic will shut down on January 2, 1995. The closure will cost an estimated $15.4 million, including a write-down of $8 million and another $7.4 million for reclamation and other expenses. About 75 people will lose their jobs as a result of the closure. The mine produced about 2.9 million ounces of gold during its lifetime.

Sunshine Mining and Refining Company

In June, the company changed its name from the Sunshine Mining Company to the Sunshine Mining and Refining Company. Sunshine finished the year with a loss of $4.9 million, compared to a $10.9 million operating loss (a $42.2 million overall loss included one-time losses from restructuring bonds) in 1993.
In May, about 150 miners and other union employees at the "Shine" received their first pay raise in six years under a new contract with the United Steelworkers of America. It was a sign that Sunshine may have stopped the great flow of red ink experienced in recent years. The company posted a $3.2 million profit in the first quarter, the first since 1984. They also paid Shoshone County about $1 million in back taxes in July. This delay was related to the company's contention that its mining properties had been assessed at too high a value. The county lowered the property tax assessment and Sunshine paid the money.

Shareholders were offered 5.75 million "rights units," which can be used for buying additional shares and warrants of Sunshine stock. Each "right" will be good for two shares of Sunshine common stock and a 5-year warrant to purchase another share. Cost of the rights will fluctuate with the company's current stock price. The units will be traded on the NASDAQ and should raise capital for investment and development.

Company geologists continued to assess the West Chance discovery made last year in the Sunshine mine (Figure 5). A new drift from the 3100 level of the "Shine" reached the West Chance vein in September, and a number of drill stations were established. Production from the big mine in 1994 was 2,089,000 ounces of silver, 723,000 pounds of copper, and 565,000 pounds of antimony from 107,000 tons of ore, compared to 2,298,000 ounces of silver, 813,000 pounds of copper, and 656,000 pounds of antimony from 100,441 tons of ore last year. The decrease was due to rock bursts in the area of the Copper Vein and on the 4600 level, which slowed mining in some of the more productive parts of the mine.

As with other companies, Sunshine "headed south" and opened an exploration office in Lima, Peru. The company also signed an agreement with Empresa Argentina de Cemento Armado (EACA) to earn a half interest in the Huemules concessions in Argentina. The $2.1 million agreement covers three years of exploration expenses.

In April, Sunshine signed a joint venture agreement with International Gold Resources (IGR) for the Virginius gold mine near Ouray, Colorado, owned by the Revenue Virginius Mining Corp. The old mine, presently closed, produced some 14.5 million ounces of silver. Proven and probable reserves are 410,000 tons containing 4.9 million ounces of silver. A seven-hole drill project and geologic mapping program were completed at the property.

Sunshine sold an interest in a diamond lease in Sierra Leone in West Africa that once threatened to bring down the entire company. Diamond Fields Resources, Inc., of Vancouver, B.C., exchanged stock for Sunshine's interest. Sunshine is now a major investor in Diamond Fields, a company with experience in African diamond mining and exploration. Sunshine lost a lawsuit to the Boule Group of Dallas, Texas, over the property in 1992. Boule threatened to force the company to pledge the Sunshine mine as collateral while the suit was appealed. Sunshine eventually bought themselves out of the bad deal for $5 million. Although a principal partner in Boule is also a principal in Diamond Fields, the new agreement is believed beneficial to both parties.
Figure 4. Art Brown, Chairman, Hecla Mining Company, helps celebrate the mining of 100 million ounces of silver from the Lucky Friday mine.

Figure 5. West Chance exploration at the Sunshine mine.
Other Coeur d'Alene News

Henry Day Ellis, one of the last of the second generation of the Day family who formed Day Mines, Inc., died in December. He was the cousin of Henry L. Day (long time president and CEO of the company). He served for a time on the Board of Directors of Day Mines and was known as a friend of the working man. Ellis, like his cousin, was a philanthropist. Although very wealthy, he lived frugally in Spokane and gave generously to friends and institutions. In later years he was very interested in the environment and the peace movement.

Two books were completed during the year that describe life in the Coeur d'Alene district. Jerry Dolph published "Fire in the Hole: The Untold Story of Hardrock Miners," and Ray Chapman released "Uncle Bunker- Memories in Words and Pictures," the story of the Bunker Hill Company.

Other Producing Metal Mines (Figure 2)

U.S. Antimony Corporation

U.S. Antimony Corporation (USAC) operates a 180 ton-per-day standard flotation mill around the clock at the Yellowjacket mine in Lemhi County. The ore contains 0.07-0.085 ounce a ton gold and is mined from a small shear zone by open-pit methods. An underground operation may be added. Because of limited space, the company digs up their mill tails twice a year and backfills the pit. USAC is recovering about 250 ounces of gold a month and there are 18-24 men working at the site. The concentrates run about 20 ounces of gold to the ton and are shipped to Trail, B.C. The operation produced 2,471 ounces of gold from 40,179 tons of ore in 1994. The Steen family owns the property and receives a smelter return lease royalty.

USAC lost a lawsuit over the Custer mine (on the Yankee Fork of the Salmon River) to Daryl Moon for $1.3 million. As part of the settlement, John Lawrence had to give up the Estes Mountain properties and almost went bankrupt. The suit was brought because USAC was reporting ball mill discharge as mill heads, and Darrel Moon, the owner of the Custer, thought he was being cheated. USAC has been refinanced by an individual and is seeking to have its stock relisted.

Thompson Creek

A socio-economic report by the University of Idaho noted that in 1991 mining accounted for 63 percent of the earnings and 47 percent of the jobs in Custer and Lemhi counties. With the closure of the Thompson Creek mine in 1992, mine employment fell to 16 percent with that percentage maintained by the startup of the Grouse Creek mine. Mining is obviously very important to these counties. The good news last year was that the Thompson Creek molybdenum mine would reopen under new ownership, as Steve Mooney had bought the mine from Cyprus Minerals Company. An open house in April was attended by Governor Cecil Andrus, Congressman Michael Crapo, and state Representative Lenore Barrett.
Minerals, Mining, and the Environment, 1994

The new management is running a lean operation compared to the Cyprus days. Today, 150 people are working at the mine, compared to 400 for Cyprus. They are processing 34-35,000 tons a day through the mill, using one line working a 10-day-on and 4-day-off shift. The mill produces MoS₂ and lubricant grade moly. The company milled 5,100,000 tons of ore (yielding 13 million pounds of Mo) while in operation in 1994. Cost savings are evident everywhere. The crusher is operated at night to save power, the mine's major expense. Thompson Creek has a 10-year mine plan, but at $2.75 moly, it can mine the highwall under a 20-year plan. Mining costs are 45 cents a pound (compared to $1.00 for Cyprus), with on-site total costs of $1.15 a pound. As noted, moly prices continued to improve dramatically, with recent highs posted as the steel industry increases production worldwide. The company is helped by the bonus it receives for producing high-grade lubricant moly in a special circuit in the mill.

As a point of clarification, Thompson Creek reports all production in pounds of Mo. This is worth about the same price a pound as molybdenic oxide. The company subtracts about $1.25 a pound for roasting and transportation costs to get their realized price. An exception is the high-grade product from the lubricant-grade circuit. This specialty item accounts for only a small part of production and is reported as MoS₂.

The mine will have an annual payroll of about $7.8 million and will pay taxes of $650-750,000 a year. There are 200 million tons of reserves at a grade of 0.18 percent MoS₂. Moly from the mine is marketed worldwide. For example, the company has an agreement with Nissho Iwai Corporation for the exclusive distribution of its products in Japan.

In 1992, a landslide sloughed off the highwall of the pit. The slide contains about 10 million tons of rock debris. Thompson Creek is using a "yarder" (used for logging in very steep country) to remove the slide material. Rather than pulling logs up a hill, the yarder is dragging the slide debris off the highwall with a blade. The company will stockpile and bury rock from parts of the orebody that contain a lot of pyrite to solve a potential acid water problem at the tailings pond. Overall, Thompson Creek will spend about $500,000 addressing environmental issues.

In December, a 65-ton truck being transported to the mine slid off its flatbed and landed upside down on the banks of the Salmon River on Highway 75. Crews from Thompson Creek, Grouse Creek, and the Sawtooth Rural Fire Department arrived quickly and prevented any possible contamination of the river from fluids in the truck. Recovering the mammoth vehicle took a little longer and required the services of a 120-ton crane dispatched from Soda Springs and a 90-ton crane from the mine. There was no damage from the incident, and the response teams from both Thompson Creek and Grouse Creek showed that their plan for quick containment of fluid spills along the highway works well.

Hecla Mining Company - Grouse Creek

Hecla's Grouse Creek project was given the go-ahead and the year was spent in construction and development work. In February, Hecla sold 20 percent of Grouse Creek to Great Lakes Minerals, Inc., of Toronto, Canada, for about $35 million. Great Lakes has an option to acquire
another 10 percent interest. The mine contains reserves of 15.1 million tons grading 0.055 ounce gold and 1.1 ounce silver a ton. The stripping ratio is 4.2 to 1.

Two pits, the Sunbeam and Grouse Creek, will be developed to mine epithermal volcanic-hosted and sediment-hosted orebodies. Ore minerals include native gold, electrum, pyrrargirite, native silver, and a number of silver sulfosalts. The ore is in stockwork veins and breccias. Exploration and development drilling in 1994 totalled approximately 65,000 feet, including 63 reverse-circulation and core holes.

A high-grade gold zone was discovered at Grouse Creek early in the year. Five holes returned values up to 3.32 ounces a ton over 25 feet. The high grade sections are in the B3 underground zone located below the main orebody. Previous estimates for the A3 and B3 underground zones were about 200,000 tons of ore averaging 0.5 ounce of gold a ton. New underground drilling cored several spectacular intercepts, including hole 38, which returned 15 feet grading 48.244 ounces gold and 39.48 ounces silver a ton. These zones will be mined from two declines (one 2,500 feet long and the other 1,500 feet) at a rate of 400 tons a day plus waste. The underground operation will last for a year.

Mining, at a rate of 6,000 tons a day, started in the Sunbeam pit using a shovel, a front end loader, and a fleet of eight 90-ton Caterpillar trucks. Hecla had invested $140 million in the project by the time the mill started up on October 25. The first dore' bullion was poured on December 20.

The 6,000-ton-a-day mill uses gravity separation, vat leach, and carbon-in-pulp circuits (Figure 6). The tailings pond is built on an old landslide, and the pond is keyed into the hillside for stability. An administration building and shop facilities were also completed. The Hecla mine will have a work force of 180 and an annual payroll of about $6 million. The mine will add $1-2 million annually to the local tax base.

In September, a rockslide at the mine (containing an estimated 30,000 cubic yards of debris), partially blocked Jordan Creek. A mine road built across the slide-prone area may have induced the failure. Quick action by Hecla crews averted any major problems. Jordan Creek, a tributary of the Yankee Fork of the Salmon River, is sensitive habitat due to concern over endangered salmon species. Hecla quickly constructed a 600-foot bypass channel to divert Jordan Creek around the toe of the slide. A team of state and federal regulators investigated the slide. The National Marine Fisheries Service (NMFS) was concerned about the site and may take another look at the mining operation.

Hecla reconstructed a riparian wetland near the mouth of Jordan Creek as a replacement for the Pinyon Basin "wetland" that was needed for the mine. The Forest Service was quite pleased with the Jordan Creek wetlands project.
Minerals, Mining, and the Environment, 1994

Pegasus Gold Corporation

In February, Pegasus Gold Corporation received permission for a 221-acre expansion at the Black Pine mine in Cassia County. The addition includes three new open pits totaling some 177 acres, a new waste dump on 34 acres, some new roads, and a 50-foot increase in the height of the existing leach pad. The mine is scheduled to close in 1999 when the expansion is mined out.

The company faced up to $20,000 in fines levied by the state Department of Environmental Quality for alleged environmental problems found during a routine inspection last August. Part of the problem relates to the emergency neutralization and dumping of cyanide solution from the leach pad during the record snowmelt and floods in the spring of 1993.

In June, the company announced it would voluntarily spend up to $700,000 to clean up 11.3 acres at an old mining area called the Tallman Historic Tailings site, mined in the 1950's, long before the new operation at Black Pine began. A pond in the area contains high arsenic values and is believed to have poisoned three cattle in 1991. Plans called for removing contaminated soil at the site.

In midyear the company wrote off $17.4 million against the carrying costs of the mine. Inconsistent ore grades and variable metallurgy forced a reduction in estimated reserves by some 30,000 ounces, or about 6-months' operation. The mine produced 64,000 ounces of gold in 1994, won from some 6.4 million tons of ore. Overall, Pegasus moved some 139 million tons of material at Black Pine, including waste and ore. Production was off somewhat from original estimates. The mine was affected by a drought, which limited the amount of water available for the heap-leach operation.

Dakota Mining Company

Dakota Mining canceled the 1994 mining season at the Stibnite mine in Valley County. The mine has produced about 25-30,000 ounces of gold per 6-9 month season in past years. The decision was made after the company waited for over a year for approval of road use and mining permits by the National Marine Fisheries Service (NMFS). Only six of the usual 120 Dakota employees remained at Stibnite in September. The NMFS-caused delay relates to the concern over the salmon habitat in the South Fork of the Salmon River system. One irony is that Dakota cannot fund or complete reclamation plans at the mine without first completing the mining operation. The Idaho Conservation League issued an intent to sue against the company in May, citing violations of the Endangered Species Act and the Clean Water Act. The company will also lose its grandfather status as an operation that was under way before Idaho promulgated state cyanide rules and regulations. Since the company now wants to change its mining plan and had some environmental problems related to a diesel spill in 1990, it will have to apply for a cyanide permit. Dakota proposed a new mining plan covering the next 15 years of operation, which was released for public comment at year's end.
Kinross Gold

Kinross Gold completed their first full year of operation at the DeLamar mine in Owyhee County (Figure 7). The company purchased DeLamar and the Candelaria mine in Nevada, from Kennecott Corporation for $20.2 million in August 1993. Kinross’ annual report for 1993 noted that the DeLamar mine yielded almost 28 million ounces of silver and 464,000 ounces of gold over 17 years of operation. The mine produced 36,025 ounces of gold and 1,699,000 ounces of silver from 1,225,400 short tons of ore in 1994, compared to 43,074 ounces of gold and 1.7 million ounces of silver in 1993. The company moved some 5,619,900 million short tons of ore and waste this year. Kinross immediately started an aggressive exploration program and increased reserves at the Glen Silver pit soon after acquiring the property. Waste cyanide from the mill is reclaimed in an Acidification and Volatilization-Renaturalization (AVR) plant, the only such facility in the United States.

Aluminum Recycling Plant

IMSAMET operated normally all year. The state's only aluminum recycling plant recovers about 100 million pounds of used beverage cans (UBCs), 56 million pounds of other scrap and 45 million pounds of dross (a waste product) per year. A waste product, salt cake, is shipped to Utah for further recycling and disposal. The molten aluminum is trucked from the Hauser Lake facility to Kaiser Aluminum's Trentwood plant in east Spokane. The company added some extra storage capacity this year and employed 79 people.

Other Small Mining Operations

CSC Mining operated all season at the Rescue gold mine near Warren (Figure 8), in spite of huge forest fires that came within a mile and a half of the old mining town. They mined underground and fine-tuned the 120-ton-a-day gravity mill built last year. A sand-fill system was designed and built, and stops and raises were cut in the mine. About 2,000 tons of development ore were milled to produce two truck loads of concentrates that were shipped to Asarco's East Helena smelter. Milling operations were shut down for the winter, but the company is intending to mine and drive new drift all year.

Richard Johnson of NJB Mining continued to operate the Kodan mine with a small open pit and a gravity mill. The mine is near the Red River Ranger Station, southeast of Elk City. The seasonal operation uses mercury to amalgamate gold won by a Wilfley table.

The Velvet Quartz and Fourth of July mines were both worked. The small underground mines are located near Big Creek in Valley County.
Figure 6. A model of the complex mill at the Grouse Creek mine, Hecla Mining Company, Custer County, Idaho.

Figure 7. Map of the DeLamar and Stone Cabin mines, Kinross Gold, Owyhee County, Idaho.
Placer Mines

Two gold placers operated on private ground along the main Salmon River north of Riggins. Noel Tanner of Lucille opened a new mine (4-7 year operation) two miles south of Slate Creek at Stanton Eddy. His company, *Amerigold, Ltd.*, may also work the Triad Resources' property, which has operated intermittently.

On the east side of the state near North Fork, two placer gold operations have been quite successful. Jim Riggan completed work and reclaimed his property on the North Fork of the Main Salmon. Buster LaMoure has been operating a placer on Kirtley Creek for four years.

George Castle continued to work his placer at Twin Springs on the Middle Fork of the Boise River. He is taking the claims to patent.

Many of Idaho's streams and rivers were inundated by hundreds of recreational dredge operators. An example was in the Boise National Forest. Officials were flooded with requests for several hundred suction dredge permits. In Idaho, a one-stop permit allows applicants to operate a dredge with up to an 8-inch intake as long as it does not process more than two cubic yards of material per hour. According to the state Department of Water Resources, 699 one-stop permits were issued for recreational dredging in 1994.

**Phosphate Mines and Plants (Figures 2 and 9)**

**Introduction**

The U.S. Bureau of Mines noted that phosphate production fell 9 percent nationwide, from 41.2 million tons in crop year 1993 to 37.6 million tons in 1994. The average value of marketable phosphate rock also fell, from $21.87 a ton last year to $19.96 a ton this year. Producers were located in Florida, North Carolina, Idaho, Montana, and Utah.

In Idaho, the Monsanto Company, Rhone-Poulenc Basic Chemicals Company and FMC Corporation mine phosphate rock to produce elemental phosphorous and J.R. Simplot Company and NuWest Industries, Inc. produce phosphoric acid for making fertilizer. According to the Idaho Mining Association, the firms used 5,913,252 short tons of phosphate ore to produce products worth $568,152,286 in 1993, compared to 5,971,731 tons yielding $546,842,047 in 1992. Overall, the four companies mined about 7.5 million tons of phosphate ore in 1994, an excess over the approximately six million tons of processing plant capacity.

Caribou County tax collectors were challenged by Simplot, Rhone-Poulenc, and Monsanto over net-profit taxes paid in lieu of property tax. The companies refused to pay the second half of the 1993 tax until the matter was resolved. The dispute was over a recent Attorney General's decision stating that a multiplier of one, not five, should be used in calculating the tax. The larger multiplier has been used since 1984. The lower number would reduce 1993 taxes from $511,423 to $203,830, and the companies want a credit for 1994. The companies agreed in May
to pay the full tab for 1993, but will benefit from the new multiplier in 1994. Officials are working on plans to compensate for reduced income to the county and local schools.

**FMC Corporation**

The company spent $2.5 million on air pollution control in 1993 with another $10 million budgeted over the next five years. The voluntary program is designed to reduce small particulate (PM10) emissions in the Pocatello area that are partially due to the FMC and Simplot plants. Pocatello has suffered some of the worst air quality in the state in past years. It is anticipated that FMC will have reduced emissions by 70 percent and Simplot by 80 percent at year's end. The companies also spent money evaluating contamination problems in the Michaud Flats area, near where the plants are located. The general market for elemental phosphorus has been negatively impacted by the reduction of phosphate used in laundry detergent. Some groups are concerned about algal growth in rivers and lakes which is nourished by phosphate in the water. FMC believes that other uses will be found to increase the demand for elemental phosphorous in the future.

FMC’s new Dry Valley mine had an excellent first year of full production. The mine is staffed with 66 persons. The company estimates 1994 production at 1.4 million tons of ore. The A pit was finished, and equipment was moved to a new panel to start the B pit while the A pit was backfilled. A new D-10 dozer was purchased to complement the 23-yard shovels and 150-

![Figure 8. CSC's gold recovery plant at the Rescue mine, Warren, Idaho.](image-url)
ton trucks used in the mining operation. Ore is hauled from the pit to FMC's elemental phosphorous plant in Pocatello by train. The mine had an excellent safety record, and FMC received the 1993 Sentinel of Safety Award from the Mine Safety and Health Administration (MSHA).

J.R. Simplot Company

The company's patriarch and namesake, J.R. (Jack) Simplot, retired from the empire he started 70 years ago. The 85-year-old entrepreneur controlled one of the largest family-held corporations in the country, with revenues of some $1.8 billion in 1993. The company employs 9,000 people, including 5,500 in Idaho. Simplot is a vast agribusiness with major interests in electronics and other investments.

Mining at the Smoky Canyon mine near the Wyoming border will produce 2.5 million tons of ore during Simplot's fiscal year. About 165 employees run the mine and pumping station at Conda. A new Caterpillar mechanical shovel is being tested at Smoky Canyon. Simplot is mining the D panel between Pole Canyon and Sage Creek and is advancing to the south at the mine.

The company applied for an exploration license with the BLM and USFS for an area on Freeman Ridge between Sage Creek and Diamond Creek in Bear Lake County. Simplot planned
on drilling 16 locations on Freeman Ridge along 7.1 miles of existing road and on 1.1 miles of new road, disturbing about 5.5 acres. The company is looking for phosphate reserves, but will not automatically receive a lease if a discovery is made. The Forest Service started the EIS process for two leases in the Manning Canyon and Dairy Syncline areas. Manning Canyon is south of Simplot's Smoky Canyon mine and the Dairy Syncline is west of the Mountain Fuels mine. The EIS is being prepared by a third party, Montane Resources, and public meetings will be held soon. A lease sale is targeted for 1996.

Simplot's acid plant in Pocatello had an excellent year, as the fertilizer market was quite strong. Some 500 employees work at the plant. Like FMC, Simplot contributed to the Michaud Flats Superfund project. Contractors installed many monitoring wells. The Gay mine, now closed, was undergoing final reclamation.

**NuWest Industries, Inc.**

NuWest continued to operate their acid plant at Conda (Figure 10), but has stopped mining in Dry Valley. Ore feed is coming from Rhone-Poulenc's Rasmussen Ridge mine under a 7-year agreement signed late last year between the two companies. About 1.8 million tons of ore will be delivered to the NuWest plant in 1994. Starting December 1, NuWest will take over the ore unloading process from the mining contractor and increase its plant employment to about 270 persons. Fertilizer prices were good this year, and the plant met six different production goals.

The company signed a contract with Kennecott Corporation of Salt Lake City to purchase sulfuric acid from their Utah smelter. This will allow NuWest to close one of their sulfuric acid plants at Conda next summer. Last year NuWest completed a new high-purity silica circuit at Conda. They are fine tuning their process to meet market specifications after receiving input from potential vendors.

NuWest and Conda Mining have been planting aspen and bitterbrush and doing other reclamation work at the Mountain Fuels mine, which closed last year. Governor Andrus announced he will serve on NuWest's Board of Directors after stepping down as the state's chief executive officer in January.

**Monsanto Company**

Monsanto received an award from the state Land Commissioners for excellence in annual operations at the Enoch Valley mine (Figure 11). The company's environmental coordinator, Mike Vice, also won an individual award for outstanding reclamation work.

The company developed new ways to plant aspen seedlings and transplant native soil and vegetation from a newly mined area to a waste dump undergoing reclamation. In the spring, workers collect seeds from aspens near the mine site. The seeds are sent to a nursery where they are potted in soil inoculated with cultured mycorrhizae (soil organisms) native to their Idaho habitat. The mycorrhizae help plant growth by forming a symbiotic relationship with the aspen.
habitat. The mycorrhizae help plant growth by forming a symbiotic relationship with the aspen. In the fall, when the aspen seedlings are about 8 inches tall, they are returned to the mine site and replanted by the thousands. Lodgepole pines are also planted.

Monsanto has been active in the community, contributing land for walking paths and encouraging numerous school groups to tour the mine. The kids especially like the Cattail Soup recipe. A bucket of pond water is spiked with detergent that helps cattail seeds germinate. The company routinely builds bird boxes and puts in rock waterways to prevent erosion on dumps and other bare areas. Final reclamation at the Henry mine is complete, and the site has been released from its bond. The Henry is the first phosphate mine to have been completely reclaimed. Monsanto also received an award from the Wildlife Habitat Council of Maryland for its innovative environmental programs, which far exceed legal requirements.

Monsanto's elemental phosphorus plant in Soda Springs was running at near-record rates. The plant's annual capacity is 220 million pounds of elemental phosphorus. The company spent close to $8 million on upgrades and modifications to the kiln and furnaces. About 400 people work at the plant. Dravo Soda Springs, the contractor at Enoch Valley, mined about 1.4 million tons of phosphate ore and employed about 60 people. Monsanto has another dozen employees at the minesite. Conda Mining, Inc., has the mining contract at Monsanto's quartzite quarry and employs about 17 people on site. The quartzite is used for slag in the electric furnaces where elemental phosphorus is won from the ore.

Rhone-Poulenc Basic Chemicals Company

Rhone-Poulenc has greatly expanded operations at the Rasmussen Ridge mine to fulfill last year's agreement to supply 1.8 million tons of ore for NuWest's Conda plant. Rhone-Poulenc is building a new shop and office complex at the mine, which also produced 400,000 tons of ore that was shipped to Rhone's elemental plant in Silver Bow, Montana. Last November, the company purchased $13 million worth of new mining equipment, including 4 bulldozers, 4 loaders, 10 trucks, and a new drill and blasting truck, to handle the increased production. The company employs about 80 people at the mine.

Kerr-McGee Chemical Corporation

Kerr-McGee announced that they are now certified as an International Organization for Standardization (ISO) 9002 quality standard company. The plant in Soda Springs produces some 4 million pounds of vanadium products from about 14,000 tons of ferrophosphorous waste from the elemental phosphorus plants owned by Monsanto and FMC. The product line includes seven grades of vanadium pentoxide, which is used as a hardening agent for high-strength steel and in catalysts. The company is enjoying the recent high prices for their products.
Figure 10. NuWest Industries’ fertilizer plant at Conda, Idaho.

Figure 11. Enoch Valley phosphate mine, Monsanto Company, Caribou County, Idaho.
Industrial Minerals (Figure 12)

Limestone

Ash Grove Cement in Inkom, Idaho, did very well, producing a little more than 220,000 tons of cement. The quarry and plant are the state's only cement manufacturer and employ 70 people. The tire burner, installed last year, burns old tires collected from around the state and contributes 14 percent of the fuel needed for the rotary kiln. The company is forging ahead with plans to further automate the plant and to research a potential new product, a 1P (pozzolan) cement for impermeable concrete, which is more resistant to alkali-silica reactions than other cements. One requirement is a nearby source of kaolin or other clay low in alkalies, calcium, and iron.

Idaho Travertine had a good year, although only about 20 tons of limestone was taken out of the Fall Creek travertine quarry. Most of the business was cutting imported building stone, particularly a dolomite from Minnesota, and some Table Rock sandstone, popular in Boise and Sun Valley. The Minnesota rock is for a rapid transit and office building in Los Angeles. One hundred twenty semi truckloads, each with 23 tons of stone in inch-thick slabs, were shipped to California. Italian marble and granite from Brazil and India are also being cut for homes in Sun Valley and Jackson Hole, as well as for an interior remodeling of the Federal Office Building in Boise. The company purchased a new coping saw and increased employment slightly to 35 persons. The Idaho Falls firm is one of the few stonemasons left in this country that can cut blocks weighing up to 25 tons. An out-of-court settlement was reached with the U.S. Forest Service over the status of several of the company's mining claims in Idaho that are up for patenting. The agreement permits the building stone claims to be located rather than leased.

Chemstar Lime changed its name to the Chemical Lime Company. The company received a reclamation award from the state Land Board and Governor Andrus for excellence in operations at their Bancroft plant. Specifically cited was the company's construction of deer passes under the conveyor system (Figure 13) and installation of water guzzlers for upland game birds. The quarry and plant at Ten Mile Pass in Caribou County can process 600 tons of lime per day, which is used for steel fluxing, pH control at gold mines, soil stabilization, and other uses. In 1994, the plant produced 135,000 tons of lime from 490,000 tons of newly mined ore.

Idaho Lime used a portable Winkie drill to further evaluate the Slate Point deposit near Lucille and the Sewell pit near Orofino. The Grangeville grinding and packaging plant did not operate. The company is working on a permit to open the Sewell pit next summer. The lime would be used for ag lime (a soil conditioner), and cattle feed supplement.

Clayton's Calcium Company employed two people in a small mill in Meridian, Idaho.

Treasure Canyon Calcium Company employed five men at the Treasure Canyon Quarry No. 2 and nine at their packaging plant at Preston. About 20,000 tons of limestone was shipped to Simplot's fertilizer plant at Pocatello where the rock is used in making phosphoric acid.
Minerals, Mining, and the Environment, 1994

There were some inquiries about the Darlington limestone deposit, which is owned by Stan Vaneck of Nampa. It was looked at a few years ago by West One Minerals, who planned to sell lime to the sugar plants in Nampa.

Castle Creek Mines, Inc. mined and shipped about 10,000 tons of oolitic limestone for use in fertilizer and acid-control in gold mines. Most of the markets are outside of Idaho but in the Pacific Northwest. A new market is being developed that would use bagged limestone for neutralizing battery acid leaks in the communication industry. The company gets its limestone from the Castle Creek mine located south of Grandview in Owyhee County.

Owyhee Calcium Products ships about 9,000 tons of oolitic limestone a year for use in cattle feed supplements. The rock is obtained from a quarry south of Grandview. Castle Creek Mines, Inc. was negotiating to buy Owyhee Calcium, but it was unclear in November if the deal would be consummated. Combining the two firms, which are said to be the only marketable sources of oolitic lime in the country, would allow for year-round operations.

About 2,000 tons of stockpiled rock were trucked from the Mission Creek limestone quarry to Potlatch Forest Industries' paper plant at Lewiston. There was no new mining at the quarry that is operated by the Nez Perce Tribe.

E.J. Wilson & Sons was very active this year, shipping about 6,000 tons of limestone and 1,000 tons of dolomite for animal feed supplements. The stone is mined from pits near Birch Creek and Lidy Hot Springs. They modified their plant to produce coarser material, which is favored by the dry feed supplement companies. This market seems to be increasing to more of a year-round trade, due to dairies or general expansion. Wilson also produced some pure pharmaceutical-grade lime from a high-grade deposit.

Faxe Kalk had Chuck Wilson quarry 3,000 tons of high-grade limestone. About 1,000 tons of the rock will be crushed to minus 1.5 inches and sent off for testing. The company has owned the deposit for several years and is interested in using the limestone for paper filler.

The Vaughn Smith Construction Company did not mine any new limestone at the Trail Canyon mine located north of Soda Springs. The company shipped about 10,000 tons of stockpiled lime to the Kerr McGee vanadium plant, its sole customer, where the rock is used in the vanadium extraction process.

Silica

Unimin Corporation mined silica sand for bottle glass from the Zierold pit just off the Emmett highway on the road to Pearl. The pit is named for Arthur Zierold, a Boise mining engineer and attorney, who died in an avalanche while working in central Idaho a few years ago. Unimin had an average year. The plant at Emmett also produces a feldspar concentrate and sand for golf course bunkers. An old pit was closed and reclaimed on Freezout Hill west of the road. City Transfer is Unimin's mining contractor.
Figure 12. Industrial mineral mines, plants, and exploration projects in Idaho, 1994

Figure 13. Long conveyor to Chemical Lime Company's plant, Bancroft, Idaho.
Perlite

National Perlite, a subsidiary of Oglebay-Norton, remained closed and is for sale. The property shut down due to environmental problems (mostly dust) at the crusher at the Wrights Creek mine north of Malad. The company thought they had the property sold at year's end, but the deal fell through. Most of the market for perlite is east of the Continental Divide. The railroads charge a special trunk-line tariff for hauling over the Divide, which gives eastern sources (including perlite operations in New Mexico), an advantage.

Pumice

Hess Pumice operated its plant at Malad and the Wrights Creek mine (located north of town) at full capacity. The company mined about 70,000 tons of pumice, which is processed into abrasives for polishing and other purposes. New accounts in Germany pushed the plant to capacity and the company is turning away business, especially in the Pacific rim. Hess increased employment from 40 workers last year to 60 people in 1994. The present plant is being expanded by 20 percent and this addition should come on line in the first quarter of 1995. There is a big demand for pumice that contains low heavy minerals. Hess will build a new plant in Malad, with about the same capacity as the present plant, for this market.

A pumice pit just east of Fairfield in Camas County expanded operations. An original claimholder was Dale Eskridge of Twin Falls, but the contractor doing the mining this year was Gayle Lim of Blackfoot.

Producers Pumice mined 20,499 tons of pumice from the Rock Hollow mine near Idaho Falls. The company employed 2-3 men in the mining operation. All of the pumice is used as lightweight aggregate.

Amcor, Inc., employed five people at their crushing plant near Idaho Falls. The company mined 7,466 tons of pumice in 1994 for lightweight aggregate.

Garnet

Emerald Creek Garnet had a good year at its garnet placer mine (Figure 14) and processing plant near Fernwood in Benewah County. The company submitted applications for seven new projects over the next 20 years as part of a plan to mine all the known garnet reserves in the area. Required permits include a 404 (wetlands) permit for the entire area, and reclamation and stream channel alteration plans. The previously mined federal lease has been reclaimed, and the company will reestablish the stream drainage and plant trees this fall and next year. Production this year is estimated to be up somewhat, at 30,000 tons of finished garnet product. Employment is stable at 50 people. The placer deposits yield industrial grade garnets for use as abrasives, for filtration, and in water-jet cutting equipment.
Diatomite

Grefco retained its claims on the Deep Creek diatomite deposit in southern Owyhee County.

Joe Lynde and Sons (Steelhead Specialty) reopened a diatomite prospect at Succor Creek near the Oregon-Idaho border.

Clay

Unimin Corporation bought the Ben-Jel mine, a bentonite deposit on Castle Creek in Owyhee County, in late spring. The mine was part of the Idaho properties of AIMCOR, which was purchased by Unimin in April. AIMCOR’s Caldwell plant was included in the sale.

Joe Lynde has claims on a clay deposit about 5 miles west of the town of Bruneau. He was canvassing eastern markets, where the clay could be used for making an acid-resistant concrete.

E. J. Wilson and Sons sold 2-3,000 tons of bentonite last summer. According to rumor, the Department of Energy may want 100,000 tons of the clay for use at INEL in the near future.

Scoria

Mountain West Bark, owned by Hecla, mined scoria from three pits. The Moonstone pit near Fairfield and Sun Valley recovers beige- and gold-colored pumice, which is trucked to the railhead in Shoshone and shipped nationwide. A pit near Soda Springs produces black rock. Red lava, the most popular color, is quarried from a pit near St. Anthony. The pits are operated during the summer season, and the rock is either shipped direct to market or returned to the plant at Rexburg for packaging into 1.0 and 1.8 cu. ft. bags. The stone is used for landscaping, ground cover, and other ornamental purposes. About 60 people work year round for the company, with additional hires during the summer.

Sand and Gravel

Demand for sand and gravel sources is very high in Idaho, particularly in the growing cities of Boise and Coeur d’Alene. However, the vocal concern of citizens who do not want a gravel pit in their backyard is making it much harder to obtain permits for these operations. Another problem is that the best gravel sources are located along rivers, and county planning and zoning commissions are reluctant to approve pits located near waterways. Even within active flood plains, river areas are prime real estate for new subdivisions. Along with environmental issues, noise and traffic complaints are common. One solution would be to designate sections of land outside of an urban area for gravel sources in land use plans. It is somewhat ironic that several of the most popular "natural" wetlands and fishing ponds in Boise are old gravel pits.

The largest sale of aggregate in eastern Idaho took place this year when Phoenix of Idaho, an Idaho Falls company, bought 100,000 cubic yards of gravel from a BLM pit on the west side of INEL. As elsewhere in the state, the magnitude of the contract reflects Idaho’s ongoing growth.
and active construction industry. The Mine Safety and Health Administration (MSHA) reports that another 14 portable and permanent rock crushing plants were active in Idaho.

Stone

Market demand for Oakley Stone, a micaceous quartzite prized as a facing and building stone, continued to grow. Major producers were Northern Stone Supply and Oakley Valley Stone, Inc., with lesser production by Rodriguez. Northern Stone quarried rock from the Rocky Mountain Quartzite Quarry near Oakley and employed 12 people. Oakley Valley Stone employed 10 workers at their plant and quarry. Smaller operations by American Stone near Fish Creek in Albion and Utah Stone just across the Utah line at Lyn Springs quarried another 1,000 tons of rock. A recent court ruling determined that the stone is locatable, and the government will have to convert some leases to lode claims.

The Rocktile Company in Boise added several new employees to its stone cutting operation to handle increased business. The company cuts tiles from Oakley and other stone and has expanded its export markets in Japan and Germany. Rocktile gets its stone from the Oakley quarries and from stone producers in northern Utah. They have been in business for 13 years and employed 15 to 18 people in 1994.

Mining expanded and accelerated at the Three Rivers Stone quarry near Clayton after a new owner, Scott Laine, took over in March. The Shoshone-based company shipped slabbed quartzite for paving, surfacing, and flagstone directly to job sites. Eight persons worked at the quarry. Partners in California handle marketing. About 20,000 square feet of stone were installed on Phil Collin's house in Beverly Hills.

The market for dimension stone waned somewhat around Ketchum and Sun Valley, but decorative river rock (river cobbles and gravel) regained its popularity. The Forest Service sold about 500 tons of "compressed granite" from one quarry in Currier Gulch behind Triumph.

A new "hot rock" in the Boise area is lichen-covered sandstone. The BLM had to close down several pits due to overuse. The desirable rock has been cemented by waters from old hot springs along the southwestern margin of the Snake River Plain. The BLM sells the rock for $5 a ton to casual collectors, but the rock may retail for as much as $160 a ton as commercial landscaping material.

The federal Bureau of Land Management won an important decision when Judge Ramon M. C Child stopped United Mining Company's plan to mine stone from unique rock formations along a segment of the Big Wood River. The basalt rock has been sculpted by the river action, forming erosion remnants (for example, giant pot holes) unknown anywhere else in the world. United can appeal the decision to the Department of Interior's Board of Land Appeals. The Idaho Geological Survey published a photo essay about this unique area with text by Terry Maley and superb photographs by Peter Oberlandacher, both with the BLM office in Boise.
Minerals, Mining, and the Environment, 1994

Hans Borbonus Landscaping and Cloverdale Nursery quarried some 1,000 tons of sandstone from the Table Rock Quarry in Boise. The raw stone sells for over $100 a ton. The famous sandstone is prized for landscaping, but the better blocks were stockpiled for future building projects and some were sent to Idaho Travertine for cutting into benches and veneer stone. A dispute over reclamation practices was resolved with the county, and the company's conditional use permit was renewed. The historic quarry sits on a ridge above the Warm Springs Mesa subdivision.

Gemstones

Spencer Opal Mines is open during the summer months for at least one day per week. The popular gem collecting locality is located near Spencer in east Idaho.

Golconda Resources, Ltd., continued with a second season of exploring for diamond-bearing rocks in the McCall area. Two holes drilled in 1993 contained indicator minerals, including G10 garnets and chromite and ilmenite with compositions consistent with the diamond stability field, according to the consultant Lakefield Research. Three to ten additional holes were being drilled in November using a low impact buggy-mounted drill. In an agreement with BHP Minerals International Exploration, Inc., geologists will collect samples on site and test them for diamonds and indicator minerals. One of the holes will twin an earlier hole which encountered lamproitic tuff from 45 ft. to 495 ft. BHP may enter into a joint venture with Golconda and earn a 51 percent interest in the project by financing future exploration.

In the Floodwood area southeast of St. Mary's, several individuals were prospecting for gem quality sapphires and rubies.

The Willow Creek Jasper and Bruneau Jasper mines continued to operate.

The U.S. Forest Service sold 2,089 permits and registered an additional 1,351 visitors to the star garnet collecting locality near St. Mary's. Rockhounds recovered 685 pounds of garnet in the summer of 1994. About half of the material is star garnet. The largest find was a 10-ounce, golf-ball size stone. Mining is taking place on the east and west forks of 281 gulch. The Forest Service also gave free tours to 36 school groups. They give a lecture on the garnet operation and allow the students to dig for an hour. The popular site is open from Memorial Day to Labor Day.

Zeolites

There was little activity at the Castle Pit in Owyhee County by Teague Mineral Products, though they did mine some zeolite on their Oregon property. The company operates a sizing and packaging plant for the mineral at Adrian, Oregon.
Figure 14. Washing plant owned by Emerald Creek Garnet, Fernwood, Idaho.

Exploration (Figure 15)

Coeur d’Alene District

Mine Systems Design is going forward with its proposal to install a mill on patented claims in Gold Run Gulch. A concrete pad was installed and a ball mill delivered to the property in the fall.

Other North Idaho

A joint venture between Arbor Resources and Wealth Resources completed a 3,010-foot-deep hole at the Galena Giant property, just east of the Montana-Idaho stateline. The target was a deep geophysical anomaly, which they hoped might be a stratiform copper-silver deposit. Although no mineralization was intersected, they plan to reenter the hole next year to reach the anomaly. Also, some surface sampling was completed at the old Jack Waite mine, with several dumps assaying very high in gold, copper, and silver. An agreement to acquire a 50 percent working interest in the Jack Waite was being finalized in November, subject to Canadian regulators’ approval. The companies hope to be more active around the Waite next year.
Salmon Area

*FMC (Meridian) Gold Corporation* gave the green light to the Beartrack heap-leach gold mine west of Salmon. Almost as soon as FMC Gold received a non-jeopardy ruling from the National Marine Fisheries Service in April, they began construction at the mine near the old ghost town of Leesburg in Lemhi County. And none too soon, as hard-won permits were about to expire. The property was placed on hold in 1992 awaiting favorable gold prices. Till that time, some $20 million had been invested in the property. Another $57 million will be spent bringing the open-pit, cyanide heap leach mine into production. Mining costs are expected to be about $215 an ounce. FMC now owns the entire mine, having bought out the remaining 14.5 percent interest held by *Minex Resources*.

There are two ore bodies at Beartrack, the North and South, together containing some 30 million tons grading 0.034 ounces a ton for a total proven and probable reserve of 715,000 ounces of recoverable gold. The deposit is hosted in rocks of the Yellowjacket Formation, which are faulted against augen gneiss along the Panther Creek fault. The best mineralization is in a breccia zone between the Panther Creek fault and another structure to the west. Dilation zones along the Panther Creek fault host the South ore body, where mining has begun. Some mineralization is also found in the augen gneiss. Sericite in the mineralized rock has been dated at 68 million years, but the age is still questionable. The open-pit mine will be 400 feet deep when finished.

During the mine's seven-year life, some 40 million tons of waste rock will be moved. There will be 150 permanent employees, with about 250 on site during construction. The leach pad will be built in four large panels. Ore will be brought to the pad by some 7,000 feet of conveyors measuring 42-48 inches wide. A belt stacker will heap the ore on the pad. Each lift on the pad will be 27 feet high and there will be four or five lifts per panel. Commercial electricity will be available next February and the primary gyratory crusher will then start crushing ore to three-inch size. The carbon-tower recovery plant will start operation in April or early May and will use six tanks. FMC plans to leach during the winter by burying the sprinkler-drip lines on the pad.

By late fall, workers had gotten most of the 60-mil liner down on Phase 1 of the leach pad. Clay was used as a sealant under the plastic liner. Run-of-mine ore will be trucked to the pad this winter until the crusher starts up. The stripping ratio is only 1.2/1. There was some concern that fines in the newly mined ore might plug up the leach system, so mining has concentrated on siliceous, competent rock in the Atlanta Pit in the South orebody. Foundations were installed for the crusher (Figure 16). Office and shop buildings, processing plants, and the mine access road from Salmon were built or improved by year's end. Full-scale operations should be under way by next May at a rate of 375,000 tons a month or 4.5 million tons a year.

Two new wetland areas along Napias Creek were created by *Copeland Construction* to replace wetlands that will be lost due to mining. Copeland received a state Land Board reclamation award as an outstanding contractor for their work at Beartrack. The company completed all
reclamation on the project. In addition, they reclaimed old dredge tailings along Napias Creek downstream from Luesburg.

The Salmon area, particularly the Napias Creek/Panther Creek trend and the Idaho Cobalt Belt, was the place to be this year for exploration. Formation Capital Corporation continued to expand the size of the Blackpine copper/cobalt/gold project in Lemhi County. Blackpine is in the Idaho Cobalt Belt, which hosts mineralization at the Blackbird mine. The company is interested in a potential open-pit mine at Blackpine using solvent extraction-electrowinning to recover copper and cobalt. There is also a significant gold credit to the ore, which could be treated with cyanide after the copper extraction. Geologic mapping and drill hole analysis by consultant Gordon Hughes and the Formation staff have identified structural and stratigraphic controls on higher grade zones in favorable rocks of the Precambrian Yellowjacket Formation.

Old underground workings in the Swift zone at Blackpine contain minimum reserves of 80,000 tons grading 3.5 percent copper with cobalt and gold. This original zone is only part of the strike length of the property, which extends some 20,000 feet. The Swift West zone contains an estimated 505,000 tons of ore grading 1.06 percent copper, 0.004 percent cobalt and 0.004 ounces a ton gold. The Jacobs zone (Figure 17) contains an additional 169,000 tons of 0.95 percent copper and 0.005 percent cobalt. Diamond drilling in the Regina zone (about 8,400 feet southwest from the Jacobs zone) returned good copper, cobalt, and gold intercepts and confirmed that a substantial oxide layer has developed above a stratiform sulfide horizon.

The company spent $1.5 million at Blackpine in 1994, building five miles of new road and drilling 22 diamond drill holes, 100 reverse circulation holes and six large-diameter core holes for metallurgical testing. Core hole 17 in the Regina zone cut a 9.2 foot intercept that averaged 1.25 percent cobalt and 0.03 percent copper, with 0.41 ounces a ton gold. Rotary drilling tested the Jacob zone, 8,400 feet away from the Regina zone.

Formation plans on drilling 200 holes next year, using one reverse circulation rig and two core rigs, and to do extensive road building to reach the Gossan Zone and other anomalies not previously accessible. The company is almost as excited about the world cobalt market as about the Blackpine results. As noted, the world price of cobalt has been hovering around $25 a pound.

When Noranda dropped claims outside of their patented ground near the Blackbird mine, Formation was on the spot and snapped up the abandoned land, including the Sunshine mine. Ore from this property is high in cobalt and carries gold. Cominco acquired most of the rest of the claims, which extend west to Quartzite Mountain.

Newmont Exploration was active all year at the Musgrove project in Lemhi County. A sizable crew conducted extensive geologic mapping, soil and rock chip sampling, geophysics, roadbuilding, and drilling. The terrain is very steep and the geology complex on this Precambrian to Tertiary gold target. Host rock is the Precambrian Yellowjacket Formation. Ten core holes were completed by mid-November. Most of the holes were drilled in the Musgrove
Figure 15. Exploration projects in Idaho, 1994.

Figure 16. Crusher site and conveyor path to the leach pad, Beartrack mine, FMC Gold, Lemhi County, Idaho.
shear zone that parallels Musgrove Creek. As usual, Newmont had no official word on results, other than "encouraging," but did say that it was a big property and they would be back next year.

*Cominco American* drilled five core holes near Freeman Peak in the Beaverheads and two holes near Bohannon Creek. The targets were stratabound copper-silver mineralization. Cominco also has property adjacent to Newmont's Musgrove claims, and the two companies were discussing an agreement. Cominco is principally interested in the base-metal potential of the area.

*BHP Minerals* drilled three core holes at their Bobcat Gulch joint venture with *Formation Capital* in Lemhi County. Two of the holes went down about 700 feet and one reached 400 feet in depth. Drilling was located between Napoleon Ridge and Dump Creek to the west. The best hole encountered weak copper mineralization, including some chalcocite enrichment, similar to results found by Cominco several years ago. Host rocks are Yellowjacket Formation with a few intrusive dikes. BHP plans to continue the project next year with a soil grid and additional drilling.

Late in 1994, *Battle Mountain Gold* signed a joint venture agreement with *Formation Capital Corporation* on the *Morning Glory/King Solomon* property west of Salmon and east of the Beartrack claims. Formation and joint venture partner, Teck Resources, drilled several holes on the property in 1990-91, and Pathfinder Exploration explored and drilled the King Solomon in 1992 with mixed results. In 1994 Battle Mountain did only minor surface work; they plan to do extensive surface mapping and sampling next summer as well as permitting for a drilling program. New sampling of the King Solomon workings has reportedly identified a low-sulfide, quartz-gold vein stockwork target along a regional northeast-trending structure which may be a splay to the Panther Creek Fault.

*Owl Mining Company* did a little development work on its claims surrounding the St. Clair mine near Oreana Lookout, northwest of Salmon. Owner Walt Walton set up a 10 ton-a-day pilot mill and shipped some concentrate to East Helena, MT for testing.

*KRL Minerals* completed reclamation and cleanup work in Burns Basin where they drilled last year. The property is near North Fork.

*American Gold Resources* (a subsidiary of *International Gold Resources*) was drilling an additional 20 reverse circulation holes at their Humbug (Ditch Creek) property near North Fork at year's end. They also put down three core holes for metallurgical sampling. The company has been trying to sell both the Humbug and Arnett Creek properties, but put any sale on hold pending further evaluation. Approximately 240 drill holes at the Humbug have delineated some 12.9 million tons of ore averaging 0.038 ounces a ton gold in a heap-leachable deposit on private ground. Altering the crushing and agglomeration methods has improved the economics of the project. Extensive drilling at Arnett Creek over the past few years has delineated a sizable low-grade gold resource.
West-Central Idaho

South of Yellow Pine, Harlow Oberbillig drilled seven holes in the Golden Gate area on Antimony Ridge in late summer. He would like to do additional road building, but permitting has been a lengthy process because of the rough terrain and anadromous fish habitat.

USMX, Inc., was drilling feverishly at the Dewey mine in the Thunder Mountain Mining District of Valley County. In addition to 28,000 feet of drilling in 99 core and reverse circulation holes, the company conducted groundwater monitoring, soil tests, and engineering and metallurgical studies. The Dewey deposit is located on approximately 600 acres of patented mining claims and is adjacent to the reclaimed Sunnyside mine, which was mined by Coeur d'Alene Mines Corporation in the 1980's.

Based on their 1993 program, which included 15,000 feet of drilling, the company announced a minable reserve of 4.7 million tons grading 0.05 ounces-a-ton gold, with a 0.021 ounce-a-ton cutoff and $400 an ounce gold. Updated reserve calculations are due to be completed in late December 1994.

Drilling in the Dewey deposit returned several intercepts of 100 feet grading about 0.1 ounce a ton gold, and hole 94-75R had an intercept of 80 feet averaging 0.983 ounces-a-ton. Drilling tested the deposit in three directions and identified high-grade feeder structures.

Mineralization is hosted in volcanioclastic sediments within the down-dropped Dewey graben. The ore lies below a silicified cap. The strip ratio is 1 to 1. Exploration drilling on three nearby targets, Lightning Peak, Goldbug, and Powder Cabin, was favorable enough to warrant further work.

The company is talking with state and federal agencies about permitting at the Dewey/Thunder Mountain property. A preliminary geologic resource of 5.5 million tons grading 0.055 ounces-a-ton gold was noted. The proposed operation would be a seasonal open pit with an 8-10 year mine life. The mine would produce approximately 35,000 ounces of gold a year. Initial milling would be by gravity and flotation, with an option for vat leaching. Additional work is anticipated next year.

Exploration efforts in the vicinity of the Wallawalla mine in the Marshall Mountains were minimal, in part because of fire restrictions. It is rumored that two competing groups, Earth Science Research and Quasar Equities, Inc., are putting together land packages in the area.

Alta Gold performed reclamation work at their Copper Cliff mine near Cuprum in Adams County. The open-pit copper mine closed in 1990.

East-Central Idaho

Mining was featured in several political promotions when Idaho Congressional candidate and final victor Helen Chenoweth said mining should be allowed in the Sawtooth National
Minerals, Mining, and the Environment, 1994

Recreation Area. The statement was issued after Grandma's Inc. called Chenoweth to enlist her aid. Grandma's filed a Plan of Operations to mine rare earth placers in the Stanley Basin from the Old Faith and Susan claims located on Stanley Creek. The Forest Service plans to do a validity exam on the claims next summer. Chenoweth commented that the "SNRA contains world-class molybdenum, black sands and gold deposits. And we are playing on them."

AB Mining Enterprises applied for mining permits for sites on the Pole Creek Road and on the backside of Abe's Chair, a mountain located behind Smiley Creek. The plans call for installing mills at both sites, which are in the environmentally sensitive Sawtooth National Recreation Area. The Abe's Chair project would be visible to, and is opposed by, the 81 residents of Sawtooth City and will require an Environmental Impact Statement. The entire affair received substantial press coverage, as the claims are leased by Allen Ball, an Idaho Falls millionaire and developer. Last spring, Ball purchased some land near Orofino, ID, owned by congressional candidate Helen Chenoweth for $60,000. Her opponents charged that the land was only worth $10,000, and so the sale was, in essence, an undeclared political contribution. The money is, in part, credited with assisting Chenoweth's dramatic "underdog" victory in both the Republican primary in May and the general election in November. Ball did not do any on-the-ground activity, but did submit a proposal for work on the URA and Pole claims located west of Galena Summit in the uppermost portion of the Vienna District.

Logging was the only activity at the Webfoot Mine located on Smiley Creek in the Vienna District. The mine is owned by Rothschild's Corporation. At year's end, Aurrtex, Inc., the publicly traded company which owns Biomyne, leased the Vienna District properties.

One person was employed in care and maintenance at the Lost Packer mine in Custer County. The mine has produced gold contained in chalcopyrite in the past.

South-Central Idaho

Biomyne, Inc., continued searching for gold up the West Fork of Warm Springs Creek where it has been exploring since 1988. They built a mile of temporary road and drilled 16 reverse circulation holes. Following past practice, the road was recontoured and reclaimed at the end of the season. The venture has drawn the ire of residents of Sun Valley and Ketchum, 500 of whom signed a petition protesting the company's activities. An expansion of Biomyne's program to Moran Creek, a branch of Cove Creek southeast of Ketchum, included six additional holes. Drilling problems cut the program short and the Cove Creek area will be restated in the spring. Biomyne changed its name in mid-year to Aurrtex, Inc., and is now traded on the NASDAQ.

Westmont/Curator American proposed building 3/4 mile of new road on the North Fork of the Big Lost River (Bear Creek) and drilling seven holes near a site on the West Fork of Trail Creek (DSA property). Exploration on the stratabound base metal target has been in progress for several years. The target is on both sides of the divide behind Sun Valley and extends into the Sawtooth and Challis National Forests. A small diamond drill will be airlifted to the remote hand-built drill pads. The drill site is at an elevation of 9,200 feet, close to an area drilled in 1989. Access to the environmentally sensitive area is by trail. However, only permitting
activity was done in 1994. The company contracted for a required biological assessment of the proposed drill site. At year’s end, the company and the Forest Service were in the final stages of evaluating the biological survey and other permitting issues. Curator hopes to complete its drilling program next year. The rugged and scenic mountain site was used by Chrysler Corporation as the backdrop for an advertisement for Jeep vehicles in *Sports Illustrated* magazine.

*Atlanta Gold Corporation* entered into a joint venture in November 1993 with *Ramrod Gold USA, Inc.*, for a major exploration effort on their property at Atlanta in Elmore County. Ramrod is a subsidiary of Vancouver-based Consolidated Ramrod Gold Corporation. The Tahoma mine, located on 53 acres of patented land, was purchased early in the year for $50,000. The 900 level in the old Talache mine was reopened and 2,500 feet of drift completed, including 685 feet of rehabilitated workings and 1,880 feet of new tunnel (Figure 18). Crosscuts for underground drill stations were also put in by the miners with Widman Contractors of Baker, Oregon. A 12,000-foot underground drilling program was started in the fall to test mineralization at depth. Previous surface drilling intersected four feet of 0.78, 6.5 feet of 0.50, 11 feet of 0.32, and 20 feet of 0.22 ounce a ton gold.

Two zones at the Tahoma were tested this summer by surface drilling during a 14,000-foot program. The West Tahoma was drilled by nine widely-spaced holes over a strike length of 1,000 feet, and the East Tahoma was defined by four holes along a 700-foot length. Gold was intersected in the two zones and both are open along strike. Other holes detected mineralization in the East Extension area of the main Atlanta shear and on the Bascom Shear Zone.

The *U.S. Forest Service* took 10 samples two miles below the Kirby Dam at Atlanta. The Forest Service is monitoring sediment contamination, which occurred when the old Kirby Dam washed out in 1991 and old tailings from the mines at Atlanta were flushed down the Middle Fork of the Boise River.

*RST Mining* drilled two holes in James Creek Saddle between Rocky Bar and Atlanta. The company has been active in this area for several years.

**Boise Basin**

*Cactus West* was back to do some core drilling in the Boise Basin. Four holes totaling 3,000 feet were planned in the Alder Creek Summit area. Other activity in the basin was confined to small operators doing minimal mining and assessment work.

**Southeast Idaho**

*Echo Bay Mines* leased the Kilgore project from *Placer Dome USA*. It was the fourth year of drilling on the epithermal gold-silver target in Clark County. Echo Bay drilled 17 reverse circulation holes and two diamond drill holes into the main target area in late fall. Results were
Figure 17. Drilling hole No. 66 in the Jacob zone, Blackpine mine, Formation Capital, Lemhi County, Idaho.

Figure 18. Underground drilling by Ramrod Gold, Talache mine, 900 level, Atlanta, Idaho.
encouraging, and the company plans to return next year for additional work, if permitting can can be completed.

Southwest Idaho

Ican Minerals did additional work on the Idaho-Almaden mine after AMAX was forced to drop the property last year as part of the merger agreement with Cyprus Minerals. AMAX had drilled several holes in 1992 and did extensive metallurgical and feasibility studies. The mine on Nutmeg Mountain in Washington County is Idaho's largest historic mercury producer. It is an epithermal deposit in a highly silicified zone which has been explored over a number of years. By 1993 the property was peppered with 676 drill holes, and a resource of 40 million tons of 0.024 ounces a ton gold had been delineated. AMAX was looking at a potential orebody of 650,000 ounces using 38 percent recovery from run-of-mine ore, a scenario similar to their Wind Mountain low-grade deposit in northwestern Nevada.

This year, Ican drilled 44 core and reverse circulation holes on the main ore body and on two new exploration targets-- Stinking Water Basin to the north and Cove to the south. The new discovery at Stinking Water Basin is described as a gold stockwork with replacement bodies in sandstone. The new zone is 2,000 feet northwest of the old pit and some 500 feet lower in elevation.

In compiling and reviewing the AMAX and Ican data, geologist Cal Herron generated new structural and genetic interpretations for the ore. He better defined the ore-controlling structures and discovered several pits thought to be hydrothermal explosion craters created by paleo hot springs. Ican is excited about the property and is seeking a joint venture partner with money and mining and metallurgy expertise.

Kinross DeLamar Mining Company has completed the Environmental Impact Statement for the Stone Cabin mine on Florida Mountain, about 5 miles east of the DeLamar mine in Owyhee County. The final step in the EIS is a Cultural Resources Mitigation Plan, which was presented at public hearings in October. There are 31 historical sites that will be destroyed or visually impacted by the new mine and Kinross will mitigate or make up the loss of the cultural resources.

The property is named for a stone cabin, which is located near the old Empire State mine. Supposedly, William Dewey (Colonel Dewey) and Michael Jordan (not believed to be related to the famous Chicago Bull), both famous mining entrepreneurs in the Silver City area, lived together in the cabin in 1865 during early exploration in the area.

The Stone Cabin plan calls for removing between 60 and 113 feet from the top of Florida Mountain. The open pit will cover about 112 acres on the west side of the peak. An 80 foot-wide haul road will be built from the mine to the Delamar mill, 5 miles to the west. A fleet of 85-ton haul trucks will make about 366 round trips a day, year round, from the mine to the mill. Waste rock will be disposed of in Jacobs and Rich Gulches. Reserves at Stone Cabin are estimated at 6.5 million tonnes grading 2.09 grams of gold and 28.62 grams of silver a tonne.
Minerals, Mining, and the Environment, 1994

Fairview Resources Corporation (a subsidiary of Pacific Power and Industry, Ppaidco) began to recondition the Sinker Tunnel that extends some 6,177 feet into War Eagle Mountain near Silver City. The company reopened and restored the portal of the tunnel and secured it with a locked gate. Drainage control measures were put in to minimize erosion. Employees attended the necessary MSHA classes to start underground work, planned for next year. Crews also surveyed the surface workings on top of the mountain.

According to an article by Chad Hyslop in the Owyhee Avalanche (November, 1994), the Sinker tunnel was driven in 1899 to tap the riches of the old Ida Elmore and Golden Chariot mines, which produced ore worth some $7 million between 1863 and 1875. At a depth of 1,250 feet, the mines encountered water problems that, coupled with the failure of the Bank of California in 1875, shut the properties. The tunnel would have provided drainage and ventilation for these rich upper workings but the project went broke in 1905. Then the Sinker Tunnel Mining Company opened some 2,600 feet of new tunnels before also failing in 1925. The property remained dormant until 1993. Ppaidco hopes to accomplish the original plan for the tunnel— to drain the old upper workings and continue mining the rich veins at depth.

A sidebar by Hyslop reminds us of the famous underground war between miners in the Ida Elmore and Golden Chariot in 1868. Both mines were exploiting veins that joined into a single structure at depth. The Owyhee war broke out over who would mine the rich ore in the single vein and each company suffered a fatality. Governor D.W. Ballard sent federal troops to Silver City to end the battle and ever-present attorneys soon reached a settlement.

Hartman Associates, owners of the Adelman mine on the ridge above the Lucky Peak dam east of Boise, did handwork in several of the old adits for assessment purposes.

Environmental News

Introduction

One of the frequently stated reasons for the flight of the U.S. mining industry offshore is the added cost of doing business incurred in complying with the numerous environmental laws passed by Congress since the 1970s. An article in the Wall Street Journal (9/14/94) estimates that pollution abatement and control cost the private sector some $102 billion in 1992, or 18 percent of gross private domestic nonresidential investment. The cost has been about 15 percent of fixed investment or $1.5 trillion, over the past 20 years. With the Clean Air, Clean Water, and Superfund (CERCLA) acts up for reauthorization and a number of new environmental initiatives on the table (including revamping the 1872 Mining Law), it looked like the new Congress would have to move quickly to get everything done. The backlash to this burden began in February when Jim Baca, Director of the Bureau of Land Management, was fired by the Secretary of the Interior, Bruce Babbitt. Baca had strong environmental leanings and favored drastic changes in grazing policy and mining law. His management style proved to be very abrasive to western politicians and ranchers. The Republican minority in Congress adopted the concept of “takings” (appropriation of private lands without compensation) as a major foil to environmental legislation. Mired down by a national debate on health care, little of the
anticipated action on environmental issues happened. With the dramatic Republican victory in
the November election, the reauthorization of environmental laws will probably take on a
decidedly different flavor in the coming Congress.

As two-thirds of Idaho is federally administered land, federal environmental regulation has a
significant impact on our state's economy. The following discussion describes the major
environmental issues that impacted Idaho and our mining industry in 1994.

Clayton Silver Mine

Approximately 80 truckloads of mill concentrates were moved from near a loading pad to the
old millsite near the Clayton Silver mine at Clayton, Idaho. The action was taken after a former
resident wrote a letter to the Environmental Protection Agency (EPA) about the contamination.
The work was done in coordination between Clayton Silver, EPA, and the state Division of
Environmental Quality. After the concentrates were removed, more sampling followed. If the
test results are unfavorable, EPA may add the site to the National Priorities List for Superfund
designation. Old tailings near the mine could also be a problem if the sediment gets into
Kinnikinnic Creek.

Bunker Hill Superfund

Garnering the dubious distinction of being the number one mining story for 1994 (based on the
poundage of clippings in the file) is the ongoing Bunker Hill Superfund saga. The year began
with Asarco, Inc., Hecla Mining Company, Coeur d'Alene Mines Corporation, and Sunshine
Mining announcing a consent decree under which they will spend $30 million for cleanup of
populated areas in the 21-square mile site over the next several years. Included are plans for
replacing topsoil in 1,300 residential yards and instituting other pollution controls in populated
areas. A $1 million fund was established to cover health monitoring and public information.
Coeur d'Alene Mines Corporation, with minimal involvement with the smelter, will pay $1.23
million to the other companies but will then have no further liability. This part of the consent
decree was signed by Governor Andrus, the Department of Justice, and EPA in March.

A second part of the consent decree called for Gulf USA Corporation to spend $60 million to
clean up the non-populated areas, including the smelter and zinc plant sites (Figure 19). When
Gulf declared bankruptcy last year, their ability to fulfill the decree became doubtful. The
bankruptcy not only placed Gulf's Superfund liabilities in question, but also pension and health
benefits (est. $30-80 million) due some 2,100 former Bunker employees. Gulf's bondholders
were also owed some $75 million. The company announced it would sell some marginal coal
holdings to raise $3 million for the pensioners.

Gulf tried to reorganize in Bermuda in 1989, which would have blocked all US legal
procedures but this was thwarted by the Environmental Protection Agency. Later in 1989 and
1990, Gulf purchased real estate in New Zealand, moving some $250 million in corporate funds
offshore. These holdings are now worth about $35-$45 million, based on bankruptcy records.
Governor Andrus asked the Justice Department to stop Gulf from shipping its assets offshore in
Minerals, Mining, and the Environment, 1994

1989 but nothing was done. Senator Craig asked Attorney General Janet Reno to investigate the Justice Department's bungling of the Gulf problem.

The plot thickened in mid-January when it was revealed that Gulf may have siphoned off millions from the New Zealand investments into Swiss bank accounts held by company executives. Mentioned in these stories are Graham F. Lacey and David Rowland (a former Gulf CEO, who is rumored to have led a lavish lifestyle in Monte Carlo, Monaco, at Gulf's expense). The bankruptcy proceedings continued to drain off dwindling assets. In February, attorneys for both sides of the debacle met in a Coeur d'Alene courtroom to squabble over their fees. By August, over $2 million had been accrued for professional fees and $675,000 of these charges had been paid.

Pintlar Corporation (Gulf's subsidiary in the valley) proposed an $8 million cleanup plan for 1994. Much of the funding was to come from selling recycled materials from demolition of the old smelter and zinc plant buildings. The work plan included continuing revegetation of the hillsides inside the site and the decontamination of several buildings. Construction of an impoundment pond (within the site of a previous pond) was halted in February by EPA because Pintlar had not obtained approval for the project. Pintlar had about 45 employees at the site.

In April, the Department of Water Resources announced tough new rules for drilling and abandoning wells in the Bunker Hill Superfund area. Drillers must prove that they have the equipment and know-how to drill wells correctly and must post a minimum $10,000 bond. The new rules were requested by EPA and DEQ because of health concerns.

In March it was revealed that Justice Department officials had met with Gulf officers last spring to discuss a financial reorganization plan but the pensioners were not invited. A plan that would have favored bondholders was scuttled after attorneys for the pensioners and the United Steel Workers union found out about the scheme in June.

In a turnabout, Gulf sued former officers for fraudulently diverting funds to New Zealand. Two of these men, former CEO, David Angelicciio, paid back $75,000 from a $300,000 severance package, and a former attorney, Albert Hawk, reimbursed $60,000 from a $105,000 package. Both men were dropped from the Gulf suit.

In August, a reorganization plan was announced. Under the plan, pensioners will lose 25 percent of their medical benefits. Environmental claimants will get $18 million, including $11 million in cash. Bondholders will get 8 percent of Gulf's stock, plus a $1 million cash payment. EPA would take over control of some of the Superfund work and responsibilities from Pintlar.

Acting quickly, EPA announced in September that buildings near the smelter would be decontaminated and torn down at a cost of some $1.2 million; the money came from a settlement with the Bunker Ltd. Partnership made several years ago. While demolishing the old powerhouse, asbestos was discovered, which delayed the operation for several days. The work is being done by Rust Environmental, Inc. Another 18-20 buildings, from about 150 buildings on site, are scheduled for demolition next spring.
Minerals, Mining, and the Environment, 1994

More shenanigans surfaced in November when the Spokesman Review reported that William Purcell, Gulf’s CEO, had disclosed to the Justice Department that the company was being run by insiders and lawyers looking to line their own pockets. He noted that the firm was overstating debts and undervaluing assets in a scheme to defraud the public. Many of the allegations pointed to British investors and the Nycal Corporation, which owns a controlling interest in Gulf. Under the scheme, associates of current Gulf board members would buy up shares in a reorganized Gulf for pennies on the dollar. If Gulf has understated the value of its New Zealand real estate, investors in the new company would reap instant millions. He also claimed that Gulf’s attorneys had made over $800,000 on the bankruptcy and should be fired. Shortly after this exposé was published, U.S. Bankruptcy Judge Alfred Hagan ordered an investigation into the fraud allegations.

In mid-December, Purcell himself was criticized by other Gulf executives. Just before blowing the whistle on Gulf, Purcell had been fired by Gulf’s Board of Directors for alleged improprieties, including a planned trip to Scotland (thwarted by bankruptcy attorneys), expensive meals in New York (claimed as business expenses), and other problems. Purcell is now suing to get back his $180,000 a year job as CEO.

As one of his last official acts, outgoing Governor Andrus signed another consent decree for $6.5 million in December with Stauffer Management Company and the Union Pacific Railroad. The money will be used to clean up a fertilizer plant near the Bunker Hill smelter site that was a joint venture between Bunker Hill and Stauffer. Sulfuric acid from the smelter emission control system was mixed with phosphate ore mined in southeast Idaho to make fertilizer. The railroad hauled concentrates from the mines to smelters nationwide, and their share of the money will be used to remove contaminated railroad beds.

As Pintlar has run out of money, EPA has assumed responsibility for security and fire protection at the site. The agency signed an agreement with the Bunker Hill Ltd. Partnership in November to take over the operation of the central water treatment plant that processes acid water from the mine and other drainage.

The bankruptcy has forced the state and EPA to rethink the cleanup program. Cost effectiveness and long range solutions are important. If the cleanup costs have to be taken from the Superfund pool, the state could be liable for 10 percent, or about $10 million. One plan calls for burying the Shoshone County airport under 4 to 6 feet of tailings to avoid trucking them to the central impoundment area. A new airport could be built on the tails, or the land could be used for industrial development. Metal problems in the South Fork of the Coeur d’Alene River would be solved by removing contaminated soil at the source rather than by cleaning the water in treatment facilities such as man-made wetlands. The entire Superfund process at Bunker Hill has been a long drawn-out affair. In November, Elliot Laws, EPA’s assistant administrator for solid waste and emergency response, said that EPA was embarrassed by the slow progress at the site.
Minerals, Mining, and the Environment, 1994

Lead Poisoning

Based on a study by the National Institute for Occupational Safety and Health (NIOSH), warning letters were sent to some 800 former Bunker Hill smelter workers informing them that they were at risk from kidney disease, cancer, and stroke, due to possible lead poisoning. NIOSH examined the health records of some 2,000 smelter workers. Of the 1,028 men who had expired by the time (1985-1988) the study was done, nine had died from kidney cancer, four from kidney disease, and 26 from stroke; the rest died from other cancers, heart disease, lung disease, and accidents.

The Agency for Toxic Substance Disease Registry tested 281 young adults who had grown up in the Silver Valley to study the long term affects of lead exposure and possible related bone loss. An additional 287 people from Spokane were tested as a control group. Also tested were 107 women who had worked at Bunker Hill and 101 Spokane women as a control. The former employees were brought in from all over the country for the study. Findings should be available in about a year.

The Panhandle Health District announced encouraging results from ongoing blood lead-level screening in October. Lead levels were the lowest in 20 years of testing, but 17 percent of the 416 children examined still exceeded the accepted threshold of 10 micrograms per deciliter of whole blood. When testing started in 1974, the average blood lead level was 65 micrograms and this has fallen to six micrograms. Jerry Cobb, the Panhandle Health District's environmental health officer, attributed the decrease to the removal and replacement of top soil from residential yards. About 400 yards were replaced from 1988 to 1993. An additional 154 yards (77 in Smelterville) were treated in 1994, with another 200 scheduled for next year. Some of the elevated levels may be due to contamination from within houses. Home interiors are scheduled for cleanup later in the program. In the interim, Cobb suggested that parents pay close attention to hygiene, nutrition, and good housekeeping.

Panhandle Health District specialists informed north Idaho doctors about the hazards and detection of heavy metal poisoning. A series of workshops were held at the doctors' request in April. The doctors were shown how to recognize and treat health problems related to heavy metals and asked to test blood lead levels of their patients to see if lead poisoning is a problem outside of Shoshone County.

Coeur d'Alene Basin Cleanup

In April the federal government filed a $1.1 billion lawsuit against Gulf Resources claiming damage to the Coeur d'Alene River Basin. Included were $106 million for future cleanup at Bunker Hill and a smelter site at Harbor Island near Seattle, Washington; $658 million to clean up and restore the rest of the Coeur d'Alene basin damaged by mining pollution; and $400 million to compensate for lost resource use, including camping, fishing, and timber production. The Coeur d'Alene Tribe filed a $1.39 billion suit against the company, citing the same reasons. Neither action has any chance of full payment by the bankrupt company.
Minerals, Mining, and the Environment, 1994

In November, Gulf reached an agreement with insurance companies, including Lloyd's of London, for $14.2 million covering damage to the Coeur d'Alene River Basin. Gulf and other mining companies have been at loggerheads with insurers for years over the huge liability for pollution (especially under Superfund). These disagreements are believed to be a major obstacle to the smooth working of the Superfund (CERCLA) process and will probably be addressed when Superfund is reauthorized in the next Congress. Some of the insurance policies go back to 1950, and some of these insurers are now out of business. Lloyd's itself is not in very good financial condition, and it is unsure how much of the agreement will actually be paid.

The Coeur d'Alene Basin Group and the Bunker Hill Superfund Task Force hosted Congressmen Larry LaRocco and Al Swift on a tour of cleanup projects on Ninemile Creek and Elizabeth Park in the Silver Valley. The efforts are being partially paid for out of a $5.4 million fund established from an out-of-court settlement between the state and mining companies in the mid-1980s. The fund is administered by the Silver Valley Natural Resources Trustees. The Ninemile Creek program is designed to remove old mill tailings from about 3 miles of the creek bed (Figure 20). While removing contaminated tailings from the creek, the contractor discovered the old stream channel, which had been moved by early-day miners to make room for the tailings. The decision was made to return the creek to its original bed. The effort at Elizabeth Park consists of removing tailings from the South Fork of the Coeur d'Alene River, piling them into a dike, and armorng the dike with riprap to control erosion. The banks will be planted with trees for fish habitat and erosion control. The Ninemile project cost $700,000 and the Elizabeth Park reclamation $350,000. Both programs should be completed next year. The congressmen were impressed by the effort and praised both projects. A program similar to the Ninemile cleanup will start next year on Canyon Creek.

In February, the Coeur d'Alene Tribe appealed a U.S. District Court decision from last July that determined that the tribe did not own Lake Coeur d'Alene. If the tribe can prove ownership, it will press its huge lawsuit against the mining companies for cleanup of the water body. The ownership case is on hold pending the outcome of the appeal before the Ninth U.S. Circuit Court of Appeals. The district court judge ruled that the tribe did not own the lake and could not sue the state under the Eleventh Amendment to the U.S. Constitution. The tribe claims the lake was granted to it in 1873 under executive order by President Ulysses S. Grant; however, when Idaho became a state in 1890, the lake was given to the state by the federal government. While awaiting a ruling, the Justice Department announced it might sue the state Land Board on behalf of the tribe, claiming the Indians did own the southern third of the lake. Next, the circuit court reversed the district court, stating that the tribe could sue the state and that the Eleventh Amendment only protected the state from claims for past damages. The tribe's suit seeks to prevent future damage. The case will be tried in district court next year.

In April, the tribe and the state said they would ask Congress for $1 billion to clean up the lake. Congressman Larry LaRocco said he would honor their request and he submitted two bills in August. The first was the state/tribe bill asking for the $1 billion (the Coeur d'Alene Basin and Spokane River Restoration Act). The second bill (the Coeur d'Alene Basin Restoration Act of 1994) was written as an amendment to the Clean Water Act, which was up for reauthorization. Both bills were designed to restore and protect the 3,700-square-mile basin.
Figure 19. The Bunker Hill zinc plant, scheduled for demolition under Superfund.

Figure 20. Removing mill tailings and restoring the stream channel on Ninemile Creek, Shoshone County, Idaho.
The state/tribe bill would charter a federal corporation to provide for conservation in the watershed. A five-member board would oversee funding of $200 million the first year and $40 million annually for the next 20 years. Senator Larry Craig was against the $1 billion price tag, claiming it was too expensive and not justified. The second bill called for convening a management conference to develop a plan for pollution prevention and restoration. Neither bill was successful.

The Coeur d'Alene tribe won an award during the 1994 American Indian Film and Video Competition for its documentary entitled "Paradise in Peril." The half-hour film focused on metal pollution in the South Fork of the Coeur d'Alene River.

The Coeur d'Alene Basin Restoration Project is administered by a basin steering committee composed of the EPA, DEQ, and the tribe. Under a management reorganization, Al Murrey, (who had overseen the lake project for the past three years) was replaced. His job will pass to a committee composed of Earl Liverman, EPA, Geoff Harvey, DEQ, and Ed Javorka from the Coeur d'Alene tribe. A group of about 30 citizens advises the steering committee. The citizens were unhappy that they had not been involved enough in the decision-making process. In January, the citizens' group asked the state to continue funding the project, which is due to end in 1995. So far, DEQ has spent some $637,000 on studying the extent of metal contamination in the lake and in forming a lake management plan. The studies have been done primarily by the U.S. Geological Survey (USGS) with state, federal, and tribal support.

A three-year study by the USGS concluded that the metals in the sediment in the bottom of Lake Coeur d'Alene pose little threat, as long as present water quality is maintained. However, if nutrient loads increase in the lake water, there is a possibility that the metals could be released into the lake. The nutrients encourage algal growth, which removes oxygen from the water. Metals might be released from the sediments under these anoxic conditions. The shallow swampy southern end of the lake is currently most at risk from algal blooms. Of most concern is development around the lake itself, which has accelerated over the past 20 years. A draft management plan was unveiled by DEQ in April. The plan calls for managing the nutrient load by controlling growth and pollution along the lake shores and drainages into the lake. High levels of zinc in the water are probably a plus, as the metal inhibits algal growth. The water quality of the lake has improved significantly since mining companies stopped dumping mill tailings into the basin.

Another part of the USGS study found that much of the metal contamination that is still going into the lake is coming from old tailings in the chain lakes along the Coeur d'Alene River from Cataldo to the mouth of the river at Harrison. At the present time, there is no funding for cleaning up this area. The Survey is drafting a plan that calls for slowing motorboats along this stretch of the river (propeller wakes erode the old mill tails from the banks), restricting shoreline development, improving farming practices and reducing pesticide use, changing logging methods and using fewer clear-cuts, and reducing phosphorous loads from sewage treatment plants.

There was some thought that the bottom of the lake was dead, as the USGS had not noted many life forms in the bottom muck while sampling for metal content. After Geoff Harvey, a
DEQ scientist, questioned this belief, the Survey decided to take another look. This time, they found bottom invertebrates (and in some places lots of them), indicating that the metals in the sediments had not killed everything and that the lake was not dead after all.

One of the few proven threats to life that is known to exist as a result of the pollution of the South Fork and Lake Coeur d’Alene is the poisoning of tundra swans (also called whistling swans) that nest along the Chain Lakes between Cataldo and the main lake. The swans eat lead-laden toxic roots of aquatic plants and are very susceptible to lead poisoning. A $34,000 study (funded by Hecla and Asarco) is trying to minimize the danger to the majestic birds. Researcher Caren Cooper from the University of Idaho is studying the swans to see what can be done to decrease mortality. Ideas include manipulating feeding sites by either killing off poisoned vegetation or providing areas with clean food, altering water levels in the lakes so that the swans cannot reach contaminated plants, and using sound guns or other distractions to scare the birds away from dangerous areas.

The Salmon Issue

Garnering far more press (based on the size of the stack of news clippings) than any other environmental story in 1994 except Bunker Hill was the continuing problem of dwindling salmon runs in the Columbia Basin. Politicians quickly got into hot water over the issue. Congressional candidate Helen Chenoweth said jokingly at the "second annual endangered salmon bake" held near Stanley, Idaho, that she could not take the Endangered Species Act seriously when she could "buy a can of salmon off the shelf in Albertson’s." Her attempt at humor backfired and the press had a field day with the comment. Likewise, Interior Secretary Bruce Babbitt said at a meeting of Trout Unlimited in Mammoth Hot Springs, Wyoming, that he would love to be the first Secretary of Interior in history to tear down a really large dam. Again, the press got fired up. This is a very serious issue to a lot of people, who see little humor about this subject. Senator Dirk Kempthorne signed up none other than Jacques Cousteau as an advisor on how to restore dwindling salmon runs. The Senator is working with the Idaho National Engineering Laboratory where fish-friendly power turbines are being developed.

Species of spring, summer, and fall Chinook salmon were listed as threatened and the sockeye salmon as endangered in 1992-1993. It is estimated that before the dams on the Columbia-Snake River system were built, it took one week for young salmon (smolts) to traverse the rivers to the sea. Now it takes 40 days, if they make it through dam turbines and escape the predators that lurk in the reservoirs. Beyond concern for the fish themselves and individual state water rights is the issue of state vs. federal control and ownership of water.

There are three entities that have responsibility for the salmon: the National Marine Fisheries Service (a division of the National Oceanographic and Atmospheric Administration, or NOAA), the Army Corps of Engineers, who manages the dams on the Columbia and Snake, and the Pacific Northwest Power Council. Attempts to save the salmon include three major strategies: barging, flushing, and drawdowns. These are defined as:

1. Barging - removing the fish from the reservoirs, putting them in specially made barges and releasing them below the dams. This program is currently controlled by the Corps of Engineers.
2. Flushing- moving the smolts down the Columbia-Snake rivers by massive releases of water from upstream Snake River impoundments, including Dworshak, Hells Canyon, Oxbow, Brownlee, Cascade, Deadwood, Black Canyon, and other reservoirs in the upper Snake River in Idaho. This idea is also divided into two schools of though:
* the flush- draining upstream reservoirs to speed up water flowing through the system and, hopefully, decreasing the travel time of the smolts to the sea. The fish would pass around or through the dams using currently installed juvenile fish bypass systems. This plan is favored by NMFS and the Corps of Engineers.
* the spill- a modification of the "flush" where the water from the upstream reservoirs is allowed to spill over the lower Snake dams instead of drawing the water through the dams. Salmon are shallow swimmers, so, in theory, the spill should move many of the smolts over the dams rapidly.

3. Drawdowns- draining the lower Snake reservoirs, including Lower Granite, Little Goose, Lower Monumental, and Ice Harbor. The idea is to drop the level of these reservoirs to as near free-flowing river conditions as possible, thereby speeding the salmon to the Columbia. This strategy primarily affects the Port of Lewiston in Idaho and water users further downriver in Washington and Oregon. This is also referred to as the "Idaho Plan" and was promoted by Governor Cecil Andrus.

There were three plans announced during the year to save the dwindling salmon runs. Most important was the National Marine Fisheries Service (NMFS), who has jurisdiction over the fish. A precursor to the NMFS plan is a report by the Salmon Recovery Team called the Bevan Plan. The second plan was released by the Pacific Power Council. Both of these plans call for massive releases of water from upper Snake River reservoirs in Idaho. A third plan was promoted by Governor Cecil Andrus and is referred to as the Idaho plan. As noted, it calls for lowering the four reservoirs on the lower Snake. Each plan came in for criticism, and each made some progress in 1994.

Even before the National Marine Fisheries Service announced their plan, they were under fire. The year started with Senator Larry Craig threatening to sue the NFMS if their plan included drawing down Idaho reservoirs. Governor Andrus had filed suit against a "Biological Opinion" by NMFS last year, claiming it improperly ruled that the dam operations on the lower Snake did not jeopardize the salmon runs. He was also unhappy with the Bevan plan because it does not call for substantial modifications of the Columbia-Snake dams to mitigate the problem.

The NMFS plan, released in February, called for releasing more water in the Columbia system in the spring and early summer to flush young salmon to the sea. The increase would amount to 11.55 million acre-feet by 1999, compared to 10.4 million acre-feet in 1993. Much of the increased flow would come from Idaho reservoirs. NFMS's could use substantial water from Dworshak Reservoir and 500,000 acre-feet from upper Snake River impoundments.

Snake River flows prior to 1991 averaged about 4.8 million acre feet. Adopting the new NMFS's plan means that over half of the water in the Columbia system would be dedicated to salmon recovery. The additional flow would increase the survival odds for spring and summer Chinook salmon by only 10 percent. The faster flows would also mean less water in reservoirs
for power generation and irrigation. Federally operated dams on the Columbia account for half of the electric power for Oregon, Washington, Idaho, and western Montana. Costs to the Bonneville Power Administration were estimated at $30-40 million this year alone. A drought would make the NMFS’s plan inoperable, although it called for BPA to establish a fund to purchase water from farmers during dry spells.

West Coast conservationists filed suit against NMFS, the Corps, and the Bureau of Reclamation stating that the five-year plan for salmon recovery proposed by NMFS was flawed and relied too much on barging and not enough on spills and drawdowns. Senator Craig asked NMFS for an explanation, stating he was disappointed with their plan, which placed little blame for the salmon perils on the lower Snake dams. Judge Malcolm F. Marsh, in the federal court in Boise, ruled that NMFS and the Army Corps of Engineers had erred badly when they concluded that the dams on the Columbia posed “no jeopardy” to migrating salmon. The NMFS decision allows the dams to operate as they have in the past. The judge ordered the NMFS and the Corps to come up with a new plan in 60 days. The Clinton Administration said they would have a revision by year’s end.

As noted, the case was heard at the insistence of Governor Andrus, who also was displeased with the NMFS plan. The governor favored the “Idaho Plan” and modifying the dams to increase successful passage of the smolts. The Army Corps of Engineers proposed a major drawdown of Lower Granite and Little Goose reservoirs in 1995 or 1996, as a biological test to see if it would help the salmon. A previous drawdown of Lower Granite in 1992 (Figure 21) examined the impact on the structure of the reservoir and the dam itself. The new experiment would be conducted during April to June and draw Lower Granite down 48 feet, or seven feet lower than the 1992 test. Governor Andrus spoke in Lewiston in April in support of the Corps’ plan as it mirrored the Idaho plan.

According to the Corps, modification of the Columbia-Snake dams to handle drawdowns could cost as much as $5 billion. In addition, the generator turbines would shut down for essentially six months of the year while the reservoirs were dry! However, a study commissioned by the Idaho Department of Water Resources found that retrofiting the dams would cost about $610 million. In early March, 1,200 people assembled in Swallows Nest Park in Clarkston to protest future reservoir drawdowns.

Just before leaving office in January, the Governor added support for the Idaho plan. A new study showed that salmon populations remained relatively high after completion of all of the upper Snake River dams but began to plummet with the completion of the four dams on the Lower Snake.

Reversing itself, NMFS suggested in May that spilling the salmon over the dams was preferable to barging them. The agency asked the Corps to begin spilling water over six dams and to stop barging smolts. The spill level was reduced by 1/3 in early June, as high levels of nitrogen picked up by the falling water were killing the little fish. The Bonneville Power Authority estimated that the spill would cost over $12 million. President Clinton assured local congressmen and senators that the government would pay for the lost power revenue, so Northwest ratepayers would not be impacted. Residents near Cascade Reservoir complained...
when the Bureau of Reclamation began to drain 70,000 acre-feet from Cascade Reservoir to replenish water withdrawn from Brownlee for the flush. The shallow reservoir is subject to algal blooms, and soon after the drawdown began, dead fish began appearing.

In July, NMFS announced that the return of wild spring Chinook salmon to the Columbia was the lowest ever recorded. Only 3,100 fish (including 1,000 wild fish) passed Lower Granite Dam, compared to an early estimate of 6,200 wild fish. Over the past decade, there have been about 20,000 salmon counted yearly, including 6,200 wild fish. The salmon could go extinct this year. The Idaho Fish and Game Department quickly canceled the 1994 fishing season. This emergency raised the prospect of using water from Dworshak Reservoir to flush salmon smolts through the dam system. In August, NMFS announced they would upgrade the Chinook salmon from threatened to endangered status.

As suspected, the drawdown of Dworshak Reservoir began in July. The flow from the dam was increased from 1,300 cfs to 5,000 cfs, eventually reaching 20,000 cfs. The water level in the reservoir began to drop four feet a day, while the Clearwater River at Spalding deepened by four feet. By July, mud banks extended 200 feet into Dworshak. By August, the level was 110 feet below full pool, the lowest in history. To slow the release, the state Division of Environmental Quality informed the Corps that they were in violation of Idaho's water quality standards for dissolved nitrogen. The Idaho Fish and Game Department opposed the drawdown because of the impact to other fish in the reservoir, including other salmon and kokanee. Orofino officials and the Clearwater Power Company sued NMFS to stop the release in late July. NMFS needed 4.5 million acre feet from all upstream sources to make the August flush work; they got 2.7 million including drawing Dworshak down so far that it may not refill this winter.

After the spill to aid the spring and summer chinook, NMFS decided in August not to ask for a fall release to flush fall chinook. They noted the rivers were low this summer and that barging the smolts was probably preferable to another spill.

NMFS was not the only agency to get its salmon recovery plan criticized. In September, the Ninth Circuit Court of Appeals rejected the Northwest Power Council's 1992 strategy for salmon, stating it violated the Northwest Power Act. The council is composed of eight members from Idaho, Washington, Oregon, and Montana. The court ruled that the council had only suggested minor mitigation measures, instead of major changes, because of pressure from water users. The council had become a consensus builder instead of a regional leader, according to the court, which claimed that 80 percent of the salmon loss was due to the dams on the Columbia and suggested that the council listen more to state and tribal biologists.

The council addressed the court's concerns and, in December, voted to implement the Salmon Recovery Strategy. The price tag will be $177 million through 1998, including $57 million in lost power purchases, $25 million in BPA project costs, and $95 million in dam modification and repayment. The council made the decision in spite of requests from governor-elect Phil Batt of Idaho, other Northwest governors, and the Northwest states' congressional members to delay until new members were seated. At year's end, the plan included:

- spilling water over dams so that 80 percent of the smolts do not go through the turbines.
Minerals, Mining, and the Environment, 1994

- improving spillways to cut down on nitrogen accumulation in the water.
- drawing down Granite Reservoir 28 feet for two months next spring and another 17 feet in 1996.
- drawing down John Day Reservoir to minimum operating pool in 1996 and holding it there.
- deciding in 1997 on whether to draw down Little Goose Reservoir to near the spillway crest.
- deciding weather to draw down Ice Harbor and Lower Monumental dams by the year 2002.
- intensifying monitoring of smolt barging and spill programs.
- studying new bypass systems for the dams.
- buying more water from southern Idaho farmers, including 500,000 acre-feet in 1996 and another 500,000 by 1998.
- negotiating with Canada for more water for fish.
- limiting drawdowns of Montana reservoirs to protect trout and kokanee, and limiting drawdown of Lake Roosevelt.
- storing more water in Lake Pend Oreille to flush salmon.
- intensifying efforts to negotiate a new Canada-U.S. salmon treaty.
- limiting the catch of endangered Snake River Chinook and sockeye salmon.
- installing screens on all irrigation water systems by 1996 (A study in May discovered that 60 percent of the screens placed over pumps along the Columbia were missing. The pumps draw irrigation or stock water from the river).
- pursuing protection of salmon habitat.
- reforming and improving hatcheries.

After the fall election, Governor Batt quickly appointed two new members to the Northwest Power Council, replacing former Governor Andrus' appointees. What the new makeup of the council will mean for the approved plan was unclear at year's end, but the new governor called the plan "unacceptable to the state of Idaho as written." He is against using Idaho water to flush salmon and favors modifying the dams to make them more fish-friendly.

In August, a single sockeye salmon returned to Redfish Lake. There have been only 13 fish arrive at Redfish in the past four years, compared to 4,000 in 1956.

Other Salmon-related Stories

The National Marine Fisheries Service was sued in October over the non-jeopardy finding for the Beartrack gold mine in Lemhi County. The suit was filed by the Sierra Club Legal Defense Fund on behalf of Idaho Rivers United, Golden Eagle Audubon Society, Idaho Environmental Council, the Boulder-White Clouds Council, and the Sierra Club. The environmental groups claim that the mine is a hazard to salmon habitat.

In March, the Pacific Fishery Management Council placed a ban on salmon fishing off the coasts of Washington and northern Oregon. Charter fishing boat operators were expected to suffer, with estimates that up to 60 percent would go out of business. Washington and Oregon governors and congressional delegations appealed directly to President Clinton for $15 million for the relief of coastal communities staggering under the lost revenue brought by the closure.
Canada and the United States accused each other of overfishing respective waters. The Canadians blame lost salmon runs in the Fraser River on overfishing by the U.S., and we blame the Canadians for the loss of Columbia River salmon for the same reason. While waiting for renewal of the Pacific Salmon Treaty (signed in 1985 and expired last year), Canada imposed a $1,100 one-way fee for traveling British Columbia's Inside Passage to and from the Alaska fishing grounds. Vice President Gore and the National Security Council met in June to discuss the Canadian/U.S. salmon issue. Frustrated over the lack of an agreement, Canada expanded the coho fishery in the Straits of Juan de Fuca to catch migrating fish before they ventured into American waters on their way to spawn in the Fraser River. Estimates are the Canadians took 50,000 salmon in gill and seine nets.

Bull Trout

In June, the U.S. Fish and Wildlife Service announced that the bull trout would not be added to the Endangered Species list because other species had a higher priority for protection. The trout had been proposed for listing by many environmental groups. This decision was challenged by a coalition of four conservation groups in November. Both Governor Andrus and Governor-elect Batt opposed the listing, as studies about the health of the trout population are currently under way in Idaho. The listing of the fish under the Endangered Species Act would have far-reaching negative economic implications for the Pacific Northwest.

PacFish

In keeping with the endangered and threatened species listing last year for salmon, the U.S. Forest Service announced that they would curtail any development within 100 yards of active spawning streams. If implemented, this would close down, curtail or alter most activities in the Boise, Payette, Salmon, Sawtooth, Nez Perce, and Challis National Forests. The concept was formalized by the Clinton administration and is called the PACFISH proposal, which is administered by the U.S. Forest Service and the Bureau of Land Management. It will affect the Salmon and Clearwater drainages and the lower Snake below Brownlee Dam.

The Sierra Club Legal Defense Fund, on behalf of the Pacific Rivers Council and the Wilderness Society, filed suit in March claiming six national forests in Idaho had violated the Endangered Species Act by failing to protect endangered salmon. The suit follows a similar one won by environmentalists last year in Oregon that concluded that the USFS must consult with NMFS for approval of all forest plans. In Oregon, all projects under way were allowed to continue, but an injunction was placed on future projects until approved by NMFS. Leaders of Idaho Steelhead and Salmon Unlimited (ISSU) denounced the lawsuit as frivolous, claiming that much of the spawning habitat in question in central Idaho is in excellent condition. This issue would become a major news story in 1995.

The Clinton administration asked that the injunction on logging in Oregon and northern California be lifted. This has prohibited harvesting trees in the remaining 25 percent of the old growth forests closed since 1990 due to the spotted owl controversy. Under the plan, logging will fall to about 1.1 billion board feet a year in the forests or about one-fourth the yield of the 1980s.
Confusing the issue further was a decision in March by the U.S. Circuit Court of Appeals for the District of Columbia, stating that the Fish and Wildlife Service had wrongly interpreted significant habitat modification (logging, road building, etc.) to be harmful to species under the Endangered Species Act. The decision, known as the Sweet Home ruling, appeared to be opposite to a decision by the Ninth Circuit Court of Appeals in San Francisco in 1981 regarding the spotted owl. The Clinton Administration announced it would appeal the new decision because it struck at the very heart of the Endangered Species Act.

Steelhead Licenses

The Nez Perce tribe announced in October that they would charge a $10 licensing fee for sportsmen fishing for steelhead on the stretch of the Clearwater River that traverses the reservation. The tribe justified the action by citing an 1855 treaty which recognizes their exclusive right to fish within the reservation boundary. The announcement caused great confusion among fishermen. Would they now have to have a valid Idaho fishing license with a steelhead tag in addition to the $10 tribal license, or would either one do on the reservation? An interim agreement was signed between the tribe and Idaho Fish and Game in December. For the current season, at least, the tribe and Fish and Game will recognize either license on the reservation. Negotiations will continue for a permanent agreement.

Aqua-Tech Company

An out-of-court settlement in October between the Aqua-Tech Company of Spokane and the Idaho Division of Environmental Quality (DEQ) set the stage for cleanup at the Dayrock mine on Ninemile Creek, north of Wallace. After a fire last year at another Aqua-Tech facility in Spokane, hazardous materials were moved to the Dayrock site for storage. DEQ claimed the storage was haphazard and a danger to the environment. Under a consent decree, the company will remove all of the hazardous materials.

McKim Creek Cleanup

A proactive group of mining companies banded together and cleaned up a mess generated by a so-called miner in Lemhi County. Six acres near McKim Creek were illegally bulldozed by a prospector, making a real problem. Frustrated by the inability of federal agencies to clean up the mess, Phil Nisbet, Formation Capital Corporation, approached his own company and Cominco American Resources, Newmont Mining, FMC Gold, BHP Minerals, and Battle Mountain Exploration for funds for the cleanup. All of these companies have major exploration projects under way in the Salmon area and are very aware of the necessity for positive public relations and a good neighbor policy. Using the expertise gained over a decade of environmental restoration, the companies made quick work of solving the potentially serious problem. The main concern was sediment loading of the North Fork of McKim Creek from the disturbed land.

Land Board Mining Awards

Dan Copeland, owner of Copeland Construction, received the Outstanding Reclamation Contractor award from Governor Andrus and the state Land Board. His work at Beartrack has
been exemplary and included the invention of the Copeland bridge, a simple yet effective structure that causes little sedimentation in streams. He has also developed new techniques for building wetlands and has gained additional recognition for this work at the Grouse Creek gold mine.

*Idaho Energy Resources* (a subsidiary of Idaho Power) received an Excellence in Exploration Reclamation award from Governor Andrus and the Land Board. The company was cited for being acutely aware of water quality in areas disturbed by exploration and for repeated seedings of areas to insure revegetation. It has also done volunteer cleanup of old mining sites along the Continental Divide.

*Formation Capital Corporation* was also presented an Excellence in Exploration Reclamation Award by Governor Andrus and the state Land Board in September. The company was honored for its excellent work at the Comet Ridge and Red Rock projects in 1991 and at Blackpine in 1992-1994.

**Blackbird Mine**

*Noranda* may farm out any future mining at Blackbird. The mill has been salvaged and the equipment sent to Cananea, Mexico. The tailings pond/dam reclamation was completed this year at a cost of $3 million. Noranda dropped all of its unpatented claims surrounding the Blackbird patented ground, including the Sunnyside property, which was restaked by Formation Capital. Cominco grabbed the claims due west of the mine.

In October, a federal judge ruled that Noranda, Blackbird Mining, and Alumet will have to pay the multi-million-dollar tab for the cleanup at the mine site. The state filed suit for the cleanup in 1983, and all court appeals open to the company have been exhausted. The Union Carbide Company, who worked the mine briefly, has agreed to pay $250,000 towards the cleanup. The 80-acre site contains 4.8 million tons of waste rock and 2 million tons of tailings. The old tailings pond holds some 2 million cubic yards of material. The mine has an acid drainage problem that is neutralized in Noranda's water treatment plant.

Reopening the mine may become the avenue for cleaning up the site. As noted, cobalt prices were going through the roof in 1994, more than doubling from $12 a pound in 1993 to $26 a pound in November 1994. Some brokers project a price of $35 a pound next year, equaling the record prices of the early 1980s.

**Triumph Mine**

In February, the Environmental Protection Agency (EPA) noted that they might let the state oversee the cleanup of the Triumph mine in Blaine County, rather than place the site on the National Priorities List as Idaho's tenth Superfund site. The old mine site is contaminated by approximately 1 million tons of old mill tailings (Figure 22) containing arsenic, lead and other metals. Cleanup costs at the 60-acre site are estimated at $6-7 million, if the state runs the program, but as high as $25 million if handled by EPA under Superfund. In March the state Department of Environmental Quality announced it would establish an office in Hailey or
Ketchum to oversee the cleanup. The 26 page Memorandum of Understanding was finally signed in August, and the state was in control. Idaho is a Principal Responsible Party (PRP), as one corner of the Triumph site is on state land. The Idaho legislature gave the Department of Lands authority to spend as much as $750,000 to start the effort. The cleanup would be a partnership between Lands, DEQ, and Asarco (another PRP). In March, Lands announced that Kennedy/Jenks Consultants had been selected to conduct the engineering work at the site.

In May, a study by the Idaho National Engineering Laboratory noted that ground water contamination at Triumph was limited to the immediate area of the mine and waste piles. The study urged that the old tailings dumps not be disturbed to avoid spreading contaminants, which pose little risk to the small community (about 50 citizens) in their present state. After signing the MOU in August, Lands announced it would seek a supplemental appropriation of $1 million for this fiscal year and an additional $2 million from the legislature for next year. Asarco is expected to pay half of the cleanup cost, or about $3.6 million. In September, EPA released a 26 page report noting that high blood lead levels recorded in 1993 could not have come from the mill tails. Triumph citizens were angered that it had taken over a year for the report to be released.
In an astounding turn of events, the DEQ announced in October that in 30 days they would return control of the site to EPA. The reason was a disagreement with Lands, Triumph citizens, and Asarco over opening the one-person office near the site. With only six weeks of testing planned for 1995, no work scheduled for 1996, and remediation only beginning in 1997, there was concern about the need for the office and a full-time person. Governor Andrus stated that he would not stand in the way of returning control to EPA. A compromise was finally reached in November, and DEQ agreed to keep control of the project. Under the new deal, a full-time employee will be assigned to the project, but will be stationed in Twin Falls and will work on other projects besides Triumph. Three residents of the site will attend cleanup strategy meetings. In a win-win plan, the mine once again escaped Superfund designation.

Phosphate Slag Studies

A study of the potential harmful effect on humans from radiation from phosphate slag continued. Slag is a byproduct of the elemental phosphorous process at Monsanto’s and FMC’s plants in Soda Springs and Pocatello. The slag has been used as an aggregate in home foundations, sidewalks, driveways and highway construction for years. Twenty-five employees at FMC, a like number at Monsanto, and their spouses, volunteered to wear badges that record
exposure to radiation at work and at home. The same group wore the badges last fall. The study is being conducted under the authority of the Slag Technical Work Group and is funded by Monsanto, FMC, and Simplot. Previous studies showed dramatic differences in exposure and could not differentiate between slag and other sources of radiation. The new study should eliminate other sources. Another recently completed study showed that radiation in the cabs of trucks transporting the slag material was low and posed little health risk. The Slag Technical Group's report was approved by EPA in mid-December and will soon be publicly available. A second phase of the project will see if radiation in slag used in house foundations is a hazard. A similar study group will wear monitoring badges to test the homesites.

Surprisingly, sales of slag by Bannock Paving, which gets the material from FMC, picked up this year in spite of the warnings about possible health hazards that have been issued by EPA since 1990. A meeting in August in Pocatello, convened by Senator Larry Craig, discussed the slag issue.

Michaud Flats Superfund Site

There was good news from Bechtel Environmental, Inc., the prime contractor at the Michaud Flats Superfund site. Metal and radiation hazards around the FMC and Simplot plants near Pocatello pose little immediate threat to Pocatello residents. However, the possible long-term threat of the pollution that resulted from years of phosphate processing is still being evaluated. The study has been under way for two years, and the site characterization summary released in April was two feet thick. The document contains the results of thousands of analyses for up to 91 different chemicals from 4,000 air, water, and soil samples collected from around the plants. The state Division of Environmental Quality had 39 pages of questions about the report, which is in review. Editorials in local papers, although cautious, praised FMC, Simplot, the Shoshone-Bannock tribe, Bechtel, EPA, DEQ, and civic leaders for cooperating on the study and having an open-door policy with the community.

Cove-Mallard Area, NezPerce National Forest

Protests over new logging in the Cove-Mallard area of the NezPerce National Forest by the radical environmental groups Earth First and the Ancient Forest Brigade grabbed headlines last year. Over 150 arrests were made, mostly for trespassing. The Forest Service wants to log some 81 million board feet of timber and build 135 miles of new roads. Joined by the Ecology Center, the Sportsmen's Coalition, Alliance for the Wild Rockies, the Federation for North American Wild Sheep, and other groups, the environmentalists sued to stop the sales, claiming they violated the Endangered Species and the National Environmental Policy acts. A temporary injunction halting further logging was granted by the U.S. District Court in Boise in February. In December, Federal Judge Alan McDonald overturned the injunction, but an appeal was quickly filed in the Ninth Circuit Court of Appeals by the environmentalists. Although delayed by the injunction, the timber harvest has gone forward. The Grouse Creek sale has already been logged and roads have been constructed for the Noble Creek sale which is under way. Another stumbling block appeared in September when the National Marine Fisheries Service informed forest officials that they would like to see PacFish rules applied to the Cove-Mallard area. These would affect both the Noble and Jack sales and will be implemented before the sales proceed.
State Grazing Permits

Jon Marvel from Hailey, founder of the Idaho Watersheds Project, won bids for 10-year leases on several parcels of land that have traditionally been used for grazing. A similar move last year on a 640-acre section near Challis was overturned by the State Land Board in favor of rancher Will Ingram, whose family had leased the grazing lands for many years. Marvel’s plan is to remove the leased areas from grazing for environmental reasons. He feels that grazing is destroying the land, especially riparian zones. This year he won bids on 160 acres in Twin Falls County and a 640-acre parcel in Owyhee County. He plans to bid on thousands of acres next year. According to the state constitution, the 2.4 million acres of state land are supposed to be managed for the maximum return to the state endowment fund, which goes to education. Marvel claims he is doing just that by outbidding the ranchers who traditionally use the land for grazing. The Land Board will have to review the new leases next year.

Saylor Creek Bombing Range Expansion

Plans for the controversial expansion of the bombing range used by Mountain Home Air Force Base were placed on hold by the Air Force in October. Mike Medberry with the Idaho Conservation League staked several nuisance mining claims on a basalt field in the Deep Creek area of Owyhee County, which is included in the proposed expansion. The claims were based in part on a study by the U.S. Geological Survey, which reported anomalous gold in places. The BLM sent out a geologist to do a mineral exam to test the validity of the claim. However, it may be a moot issue, if the Pentagon keeps the plans on hold. The state has been asked to prepare a report addressing concerns brought by environmentalists about the proposed expansion.

Wilderness Legislation

Congressman Larry LaRocco introduced a revised Idaho wilderness bill in January covering Congressional District 1 in north Idaho. The bill called for protection of some 1.36 million acres and released another 3 million acres for multiple use. Included in the bill were several “special management” zones comprising about 319,000 acres. As with all recent attempts to formulate a wilderness bill in Idaho, this one met with criticism from both industry (too much wilderness) and environmental groups (not enough wilderness). The rest of Idaho’s delegation called for an all Idaho bill that would cover both congressional districts. LaRocco decided to go it alone after a bipartisan effort from the entire delegation failed to agree on an all-state wilderness bill. The delegation had problems with the timing of the act and questions about jobs, private property rights, release language, and water rights.

In April, Congressman Michael Crapo from Idaho’s Second District conducted hearings on wilderness areas for his district. As always, there was a lot of dissension by both sides about each proposed area.

At about this same time, Congresswoman Carolyn Maloney (NY) was championing a 16-million-acre multistate Northern Rockies Wilderness Bill that would have placed almost all federal land in Idaho in wilderness. Maloney’s bill was supported by some big names, including
Carole King and former president, Jimmy Carter. Although her bill had some 60 co-sponsors, it brought down the wrath of most of the congressional delegations from the Pacific Northwest. Congressman LaRocco received a lot of press when he said, tongue in cheek, that he would propose a Wilderness Equity Act putting Manhattan's East Side and Central Park in wilderness. A spirited debate was conducted in the New York Press between LaRocco and Maloney.

LaRocco's wilderness bill came under fire from both sides in a hearing before the House Subcommittee on National Parks, Forests, and Public Lands in March. However, the bill made it through two Agriculture subcommittees in May and also the Natural Resources subcommittee, clearing it for consideration by the full Natural Resources and Agriculture committees. A vote by the Resources committee was delayed when LaRocco visited the Vanderbilt area (east of the Mallard-Larkins area). Originally designated for special management, the Congressman changed the area's classification to wilderness, immediately catching heat from the timber industry. After the visit, he decided that special management status was probably best for the area. However, to everybody's surprise, the Congressman announced in July that he was shelving his 18-month effort to get the bill through the House. Reasons given were the intense opposition on both sides of the issue and the belief that, even if he was successful, Idaho's two senators would bottle up the legislation. The Congressman was also receiving considerable heat from Helen Chenoweth, his opponent in the upcoming November election.

Also in May, the Greater Yellowstone Coalition unveiled a 238-page report recommending protection for a huge area surrounding Yellowstone National Park. The proposal took four years to prepare. The coalition first proposed the Greater Yellowstone Ecosystem in 1989 and has been working on the project ever since.

Dwarfing Idaho's wilderness issue was the passage in April of the California Desert Protection Act. Under debate for eight years, the act called for the protection of 6.4 million acres in California, including three national parks and 74 wilderness areas. The act set aside the largest area of new parks since the Alaska lands bill in 1980 and is a record acreage for the lower 48. The new parks will cover an area three times the size of Yellowstone National Park.

U.S. Forest Service Reorganization

The Forest Service announced in September that the Frank Church River of No Return Wilderness in central Idaho, the largest contiguous wilderness area in the lower 48 states, will be managed as a single unit. Previously, the 2.3 million acres has been controlled by 11 different ranger districts in six national forests. In another possible management realignment, the USFS may close the Region I office in Missoula, Montana, by 1996 and assign the three north Idaho forests currently administered by this office to Region 4 in Ogden, Utah. Also, several Idaho forests may be consolidated, including the Salmon and Challis forests. All of these ideas are part of a streamlining and cost cutting plan to reinvent the USFS.

Idaho Wolves

The central Idaho Wilderness was again the center of controversy, this time over a $7 million federal Fish and Wildlife plan to reintroduce gray wolves into Idaho and Yellowstone Park. The
first four Idaho wolves were released on Corn Creek (west of North Fork on the main Salmon River) early in January 1995, with more to follow. Ranchers fear the animals will stray out of the central core of Idaho and attack livestock. Supporters of the program want the wolves reintroduced into the habitat where they were eradicated by ranchers and bounty hunters in the early part of the century. The state has an opportunity to take over the wolf program from the federal Fish and Wildlife Service, but may be stymied over the state's demand to recompense livestock owners for wolf predations at federal expense. If the state cannot come up with a plan that is acceptable to the feds, Fish and Wildlife may authorize somebody else to oversee the program. The NezPerce tribe is reportedly interested in the project.

Columbia Plateau Sole Source Aquifer

The Environmental Protection Agency called for protecting drinking water in a 14,000-square-mile area on the Columbia Plateau by designating the area as a sole-source aquifer. The aquifer underlies parts of Benewah, Latah and Nez Perce Counties in Idaho and seven counties in Washington. Some 260,000 people obtain their drinking water from this aquifer. The sole-source designation gives EPA the authority to review any project or program that receives federal funding for the potential to pollute groundwater in the area. Area farmers were concerned that this would include pesticides and fertilizers, but they were assured by EPA that there was no intent to do more than prevent degradation of the aquifer's water quality. There is also debate as to whether the aquifer is a single body or several interconnected systems. Multiple aquifers would not be considered for the sole-source listing. Public hearings about the proposal were under way at year's end.

Snake River Water Rights Adjudication

The state has been trying to straighten out some 163,000 water rights claimed over the Snake River Aquifer in southern Idaho. These proceedings have cost Idaho some $15 million and are projected to cost another $30 million over the next 10 years. Most of the money has gone for legal fees, as the state has paid all fees for both regulators and claimants. This complicated legal process began in 1977, when ratepayers accused Idaho Power Company of not defending its rights to Snake River water, thereby forcing the construction of costly coal-fired generators to replace lost hydropower. In 1983, the Idaho Supreme Court ruled that Idaho Power's water rights above Swan Falls dam were not subordinate to upriver users. Under the "Swan Falls Agreement" of 1985, Idaho Power, the ratepayers, and the state agreed to settle all water rights on the plain to make sure that there is enough water for hydropower. On some stretches of the Snake, there are more water rights than there is water in the river. The legislature amended the adjudication laws in 1992. The state Supreme Court decided in March that, based on the 1992 changes, if there is a shortage of water for the 1.2 million acres under irrigation on the plain, the holders of the oldest rights get the water. In one scenario, upstream users could be cut off from water by downstream users with older rights. Early in 1994, the Snake River Basin Adjudication (SRBA) District Court found that these state laws governing adjudication were vague and unconstitutional. A month later, the Idaho Supreme Court decided in the Musser case that the legal fees for the adjudication could be assessed against the Director of the Department of Water Resources and the state. A dozen new laws were quickly passed by the 1994 legislature to address these new problems. One bill authorized the state to pump water in the spring time from
Minerals, Mining, and the Environment, 1994

the North Side Canal Company system to artificially recharge the aquifer near Hagerman. Hopefully, this would reverse a long decline in water supplies and provide ample irrigation water by augmenting the flow from Thousand Springs. Another new law is a moratorium on any new water development from the Snake River Plain Aquifer until the end of 1997. A third new law said that the Department of Water Resources (principal state agency handling the adjudication) and its Director will no longer be a party to lawsuits. This has placed the actual role of the agency in question. Several of these new laws, including those dealing with the liability of the department and director, were voided or found by the SRBA to be in violation of the authority of the Supreme Court, in December.

Snake River Protection

The legislature passed, and Governor Andrus signed, a bill protecting 70 miles of the Snake River between Milner Dam and King Hill. This part of the Snake is now protected under a natural or recreational designation, which limits new construction or expansion of dams, hydroelectric or diversion projects, dredge or placer mining, and streambed alteration. The bill covers six segments of the river that were given top priority for protection by the Water Resource Board.

Boise River Cleanup

Although we often hear the horror stories about abuse of environmental legislation and the waste of taxpayer dollars, there are also many success stories from our national effort to clean up the environment. For example, a story in the Wall Street Journal highlighted the cleanup of the Boise River as it flows through our capitol city. Slaughterhouses once discharged offal into the river, and there was little concern about the waterway by citizens or government. The river was a veritable sewer by the early 1960s. Cleanup began in 1966 when city property along the river was designated as contiguous parkland. The parks and heightened citizen awareness led to the Greenbelt that thousands of Boiseans enjoy today. Protection provided by the Clean Water Act in 1972 further enhanced the waterway. The annual River Festival now draws half-a-million people and "tubing the river" is a common way to beat the heat during a blazing summer. The riverfront is now the place to be for corporate headquarters and exclusive subdivisions. An average house along the river sells for about $60,000 more than an off-river location. As our capitol remains one of the fastest growing urban areas in the country, the reborn river will remain an asset for many future generations to enjoy.

Clean Water Act

Federal Judge William Dwyer took EPA to task for violating provisions of the Clean Water Act for recommending only 36 water bodies in Idaho (from a list of 962) that are degraded enough as to require protection under the act. The court order was the result of a lawsuit brought by the Idaho Conservation League and Idaho Sporting Congress against EPA for violating the Clean Water Act. The environmental groups hope to use the list to block development (especially logging) along the waterways. The original list of 36 waterways was submitted by the state, which has authority under an agreement with EPA for the cleanup of the rivers and streams. Governor Andrus admitted the list was inadequate and noted that a lack of
Minerals, Mining, and the Environment, 1994

manpower and resources limited the state's efforts to identify, protect, and clean up problem waterways. The judge gave EPA 30 days to come up with a new list. The revised list, released in October, contained some 962 stream segments covering over two-thirds of the some 16,000 miles of waterways in the state. The ICL and ISC, although pleased, were still not satisfied, claiming that there are almost 1,200 stream and river segments that need to be cleaned up and protected. In December, they asked Judge Dwyer to force EPA to take over the cleanup of the waterways from the state. Both EPA and the state opposed this idea.

Mercury Poisoning

Experts from the Department of Health and Welfare warned people that fish in Brownlee Reservoir may contain high levels of methylmercury. The Department, along with Fish and Game and the Idaho Power Company, planned to collaborate on a testing program to evaluate the potential problem. Women who are pregnant or who may become pregnant and children under 7 years old are most susceptible to mercury poisoning, and they should avoid eating the fish. The initial study was done after the Oregon Health Division issued a similar warning against consuming fish caught in Owyhee Reservoir. These fish contain as much as twice the methylmercury recommended by the Food and Drug Administration and three times the latest guidelines from the Environmental Protection Agency. The Owyhee River flows from the reservoir to a confluence with the Snake above Brownlee. Methylmercury is formed when organisms convert mercury into the compound. The mercury may have originally come from natural occurrences in the rocks of southwestern Idaho and southeastern Oregon or may be from early placer mining operations in the Silver City area of Owyhee County.

White Sturgeon Listing

The salmon and bull trout were not the only fish in Idaho to be in the endangered species spotlight in 1994. The U.S. Fish and Wildlife Service listed the Kootenai River white sturgeon as endangered in September. This issue revolves around river flow rates. Federal and state fish and game experts claim the fish need a minimum flow of 35,000 cubic-feet-a-second (cfs) in the spring and early summer to spawn. The Bonneville Power Administration and Army Corps of Engineers claim that they can only provide 20,000 cfs due to needs for power generation, salmon protection, and irrigation. In addition, a drought has lessened available water supplies. The sturgeon's decline began with construction of Libby Dam. One theory says that fluctuating water flows in the river have confused the fish, negatively impacting reproduction. Water pollution, habitat destruction, and predators may be other problems. BPA has spent some $6.6 million since 1983 to help make up for fish losses due to the dam.

Bruneau "Hot Springs" Snail

We thought that the saga of the Bruneau Hot Springs snail was over after the Idaho Farm Bureau won a court fight last year to delist the small crustacean from the Endangered Species list. After First District Court Judge Harold Ryan ruled that proper procedures had not been followed in the listing, federal agencies decided not to contest the decision. However, the Idaho Conservation League and the Land and Water Fund did file an appeal that will be heard in
Minerals, Mining, and the Environment, 1994

Seattle. Area ranchers and farmers held the second annual "Great Bruneau Snail Race" in September and raised $25,000 to continue the legal battle.

Pocatello Aquifer Contamination

An industrial chemical, trichloroethylene, is believed to have contaminated about 35 percent of Pocatello's groundwater supply. The chemical is leaking from an old landfill in Fort Hall Canyon south of the city. The city plans on installing two air stripping towers to clean the water at a cost of $1.1 million. The treatment facility will be near two polluted wells located south of the Juniper Hills Golf Course in the path of the spreading contamination.

Boundary County Roads

County Commissioners used an obscure 1866 law (RS-2477) to lay claim to all roads on U.S. Forest Service administered land in Boundary County. The old law gave citizens the right to build roads and trails over public lands. Although repealed by the Federal Land Management Policy Act (FLPMA) in 1976, the right-of-way for highways, roads, and trails established between 1866 and 1976 was left intact. The county enacted the ordinance to stop the USFS from closing roads to protect grizzly bear habitat and for other reasons. The county believes that they can remove gates blocking the roads under the new law, as the byways are really county roads. Forest Service officials have said that these removals or other obstructions are illegal and a criminal offense and that they will not tolerate this interference.

Salmon River Closure

The Idaho Land Board will hear testimony early next year about closing a stretch of the Salmon River to all mining from Long Tom Bar near Riggins to Hammer Creek near White Bird. This is the last stretch of the river where placer mining is still permitted. The hearings were requested by Idaho Rivers United. The group claims the action needs to be taken to protect endangered salmon habitat. The federal lands along this stretch have already been withdrawn by the U.S. Forest Service and BLM. A number of placers have operated along this stretch of the river, including the recently reclaimed AT&T placer. Another problem is that much of the aggregate used in Riggins for construction is river gravel, and gravel operations might be closed if mining is banned. The state controls the river to the mean high water mark. Protection for the rest of the river was proposed by Congressman Larry LaRocco in March. The congressman drafted a bill similar to one that was crafted by Senator Craig in 1993 but never introduced. This bill calls for adding this stretch of the Salmon to the National Wild and Scenic River System.

Abandoned and Inactive Mines

The Idaho Geological Survey began an inventory of some 300 inactive or abandoned mines (IAM) on U.S. Forest Service land in Region 4 forests (south of the Salmon River to the Idaho-Utah stateline). The sites, each with over 1,000 tons of production, were examined in the field for the presence of hazardous materials (including mine wastes such as old dumps or mill tailings, acid mine water, or old mill chemicals) or potential safety problems (open mine shafts,
Minerals, Mining, and the Environment, 1994

adits, or other dangerous structures). The study will be completed next year. An early estimate is that about 50 of the sites will need more detailed evaluation and possible remediation. The "problem" of abandoned and inactive mines was brought to the public's eye by the Mineral Policy Center, a Washington, DC-based lobbying group that is against mining in the U.S. As far as is known, at least during the last 20 years, no one has been seriously injured or killed at an old mine site in Idaho, and the extent of the environmental problem has been greatly exaggerated. The IGS has a digital database built up over the past 20 years, which contains information on some 8,300 mines and prospects in the state. This information has proved invaluable in addressing the IAM issue. IGS has been working closely with both the USFS and BLM on this problem in Idaho.

Columbia Basin (Eastside) Ecosystem Study

The U.S. Forest Service, in cooperation with other federal agencies, began an $8 million study to evaluate the ecosystem of part of six states, including eastern Washington and Oregon and almost all of Idaho (excluding the very southeastern corner of the state). The area encompasses some 144 million acres, including 75 million acres of federal land. The study team is headquartered in Walla Walla, Washington, and will use Geographical Information Systems (GIS) to aid in the evaluation. The study will include a host of biologic and abiotic systems. The study began in January 1994 and will be completed in June 1996. Two reports will result, entitled "Scientific Framework for Ecosystem Management in the Interior Columbia River Basin" and "Scientific Assessment for Ecosystem Management in the Interior Columbia River Basin." The studies will be used to prepare an Environmental Impact Statement that will be incorporated in land use plans for all of the federal land in the area. A similar study was done on the forest lands along the West Coast. That study resulted in the reduction of timber harvest from 5 billion to 1 billion board feet and involved the spotted owl controversy.

Snake River Canyon Management Plan

A U.S. Forest Service plan, released in November, calls for restricting power boat operation on the Snake River to 24 days in the summer. Access to the river will be by permit. The restriction covers a 21 mile stretch upstream from Pittsburgh Landing. Needless to say, power boaters, including 19 commercial operators, are upset about the restrictions. The rules resulted from the increased use of the river by both float boats and power boats and from complaints about noise generated by the powerful jet boats. The boaters formed the Hells Canyon Alliance and will appeal the plan to the state Land Board.

Other Mining Related News

WWP Generator

A new $66 million natural-gas-fired generating plant was put on line in Rathdrum, Idaho, at year's end. The plant, owned by the Washington Water Power Company, will provide enough electricity to power some 65,000 homes. Construction took 15 months to complete. The plant uses two turbines, each about the size of a subcompact car, which burn 2 million cubic feet of
Minerals, Mining, and the Environment, 1994

gas an hour. The facility is remotely monitored and controlled from WWP's offices in Post Falls and Spokane and only requires one person working part-time for its operation.

Want to Buy a Used Uranium Processing Plant?

When Tom Johansen, owner of Frontier Car Corral and Salvage in Pocatello, took a look at the 600 tons of equipment he had just purchased at a surplus sale from the Idaho Engineering Laboratory, he was not quite sure what he really had. He bought the bulky machinery for $154,000 and planned to sell the high-grade stainless steel parts for scrap. What he now owned was a nuclear fuel reprocessing plant (the kind used to enrich uranium from spent fuel rods and other sources), which originally cost the government about $10 million. The enriched uranium from this plant could be used to make nuclear weapons. Perhaps it was worth more than scrap—but how do you go about assembling such a plant? Johansen asked the National Lab for blueprints and instruction manuals, and they obliged for the cost of duplicating the materials. When he realized what he had, he began to look around for a buyer, and not one necessarily interested in scrap metal. The British Government first informed Washington that somebody in Pocatello was advertising a nuclear fuel reprocessing plant (with instructions), and other informants followed. Suddenly, the Department of Energy (and eventually President Clinton's office) became interested. After exposés on the front page of the Wall Street Journal and several TV shows, including "Eye to Eye" with Connie Chung, DOE placed a guard on the warehouse where the "scrap" was stored and informed the owner he would need an export license to sell the equipment offshore. Reportedly, Johansen had received offers of $8.3 million from an Australian company and $5 million from a Japanese concern. A deal has supposedly been made between the owner and DOE where the plant will be cut up and salvaged, and the instruction manuals returned.

A Mammoth Story at Tolo Lake

Tolo Lake, located on the basalt flats just west of Grangeville, used to be deep enough to support bass and other fish but has become a mud puddle due to a declining water table. A restoration project was started in 1994, which included deepening the lake, so it would once again support a fishery. When excavation began, an amazing discovery was made. Huge bones were sticking out of the sediment in the bottom of the 30-acre lake site. It turned out that this is the largest cache of mammoth fossils ever found in Idaho. By September, parts of four to seven of the woolly creatures had been excavated, and scientists believe that there could be more. Mammoths became extinct at least 10,000 years ago, and the fossils could be as old as two million years. Experts are uncertain as to why there are so many of the animals concentrated at this site. One theory is that this may have been an ancient watering hole and the animals, slowed by deep mud, may have been easy prey for predators. Another exciting idea is that early man may have been the hunter, as the Clovis culture is known to have existed near here about 11,000 years ago. The site was covered over, as there was not enough time to properly excavate the huge Pleistocene mammals before winter set in. More fossils will be removed next year. The town of Grangeville has adopted the site and is considering building a tourist theme around the animals. Hundreds of spectators watched the excavation work and all of north Idaho caught "mammoth fever."
Mining Law Reform

Bills to reform the 1872 mining law were introduced in both the House and Senate last year. The Craig Bill (S.775) and the Rahall bill (H.R.322, more radical and restrictive than S.775) were both passed by their respective houses in 1993. The year ended with the bills headed for resolution in a conference committee. Senator Bennett Johnston, Chairman of the Energy and Natural Resources Committee, offered a chairman's mark in May. The mark suggested a sliding scale on lease fees for minerals mined on federal land versus the 2 percent net royalty in Craig's bill. Forty Senators asked for a more restrictive bill similar to HR 322 (8 percent gross royalty) in June, while another group offered compromise language to the chairman's mark, calling for a 5 percent net proceeds royalty. The House finally named conferees in June and the conference committee met at the end of the month for the first time. Western Senators, led by Craig (ID), Wallop (WY), and Reid (NV), found themselves hopelessly deadlocked with eastern Senators and House conferees. The conference went nowhere, and the 103rd Congress adjourned without a new mining law. The November elections changed the complexion of Congress completely and with strong Republican control in the House and Senate, mining law reform will look very different in 1995.

West Coast Blackout

In less than a minute in mid-December, the entire West Coast experienced one of the largest electrical power failures in history. Fortunately, the power interruption only lasted for a few minutes but overall it affected eight western states. The power loss was due to the failure of a 345 kv power line in Idaho, which triggered power surges in other western systems. This caused numerous local interruptions throughout the West. Did the system fail? No, actually it is designed to handle local problems by compensating with small, brief interruptions rather than a massive, long-term failure.

Earth Resources Building

The James McClure Earth Resources Building on the campus of the University of Idaho neared completion at year's end. Scheduled to be occupied in 1995, the $12 million high-tech building will give future generations of earth scientists and students a first-class facility for teaching and research.

Idaho Geological Survey- 75th Anniversary

In 1994, the Idaho Geological Survey celebrated 75 years as the state's leading agency for the collection, interpretation, and dissemination of geologic and minerals data. Among the hundreds of publications the Survey has produced over its long history are 20 years of annual reports detailing the major events that have occurred in the state's mining sector. The current paper is a continuation of this long tradition.
Minerals, Mining and the Environment, 1994

Index

AB Mining Enterprises (40)
Adelman mine (44)
Alta Gold (39)
Aluminum Recycling Plant (19)
AMAX, Inc. (43)
Ancor, Inc. (30)
American Gold Resources (38)
American Stone (32)
Amerigold Ltd. (21)
Antimony (5)
Aqua-Tech Company (58)
Arbor Resources (34)
Asaro, Inc. (8, 60)
Ash Grove Cement (27)
Atlanta Gold Corporation (41)
Aurora, Inc. (40)
Bannock Paving (62)
Battle Mountain Gold (38)
Beartrack mine (35)
Bechtel Environmental, Inc (62)
Ben-Jel mine (32)
BHP Minerals Int. Exp. Inc. (33, 38)
Biomyne, Inc. (40)
Blackbird mine (37, 59)
Black Pine mine (18)
Blackpine mine (36)
Bruneau Jasper mines (33)
Bunker Hill Superfund (45)
Cactus West (41)
Castle Creek Mines, Inc. (28)
Castle Pit (33)
Chemical Lime Company. (27)
Chemstar Lime (27)
City Transfer (28)
Clay (31)
Clayton's Calcium Company (27)
Clayton Silver mine (45)
Cobalt (4)
Coeur d'Alene Basin Cleanup (48)
Coeur d'Alene District (34)
Coeur d'Alene Mines Corp. (10)
Cominco American (36, 38)
Copeland Construction (35, 58)
Copper (4)
Copper Cliff mine (39)
CSC Mining (19)
Curator American (40)
Custer mine (15)
Dakota Mining Company (18)
Deep Creek diatomite deposit (32)
Delamar mine (19)
Dewey mine (39)
Diatomite (31)
Dry Valley mine (22)

DSA property (40)
E.J. Wilson & Sons (28, 31)
Earth Science Research (39)
Echo Bay Mines (41)
Emerald Creek Garnet (30)
Enoch Valley mine (24)
Fairview Resources Corp. (44)
Fall Creek travertine quarry (28)
Face Kalk (28)
FMC (Meridian) Gold Corp. (35)
FMC Corporation (22, 61)
Formation Capital Corp. (36, 38, 58, 59)
Fourth of July mine (19)
Galena Giant mine (34)
Garnet (30)
Gay mine (24)
Gemstones (33)
Golconda Resources, Ltd. (33)
Gold (4)
Golden Gate mine (39)
Gold Hunter mine (12)
Grandma's Inc (40)
Greefo (31)
Grouse Creek mine (16)
Gulf Resources Corp. (46)
Hartman Associates (44)
Hecla Mining Company (11, 16)
Hess Pumice (30)
Ican Minerals (43)
Idaho-Almaden mine (43)
Idaho Conservation League (63)
Idaho Energy Resources (59)
Idaho Lime Company (27)
Idaho Travertine (27)
Industrial Minerals (27)
Insamet (19)
Joe Lynde and Sons. (31)
Kerr-McGee Chemical Corp. (25)
Kilgore project (41)
Kinross DeLamar Mining Co. (18, 43)
Kodan mine (19)
KRL. Minerals (38)
Lead (4, 48)
Limestone (27)
Lost Facker mine (40)
Lucky Friday mine (12)
Mine Systems Design (34)
Minex Resources (35)
Mission Creek limestone quarry (28)
Molybdenum (5)
Monsanto Company (24, 61)
Mountain West Bark Company (31)
Musgrove project (36)
National Perlite (30)
New Bunker Hill Mining Co. (9)
Newmont Exploration (36)
NevPerce Tribal Enterprises (28)
NJB Mining (19)
Noranda Mining Corp. (36, 59)
Northern Stone Supply (32)
NuWest Industries, Inc. (24)
Oakley Valley Stone (32)
Oglebay-Norton (30)
Owl Mining Company (38)
Owyhee Calcium Products (28)
Pegasus Gold Corporation (18)
Perlite (30)
Phoenix of Idaho (31)
Placer Dome USA. (41)
Ppadico (44)
Producers Pumice (30)
Pumice (30)
Quasar Equities Inc (39)
Ramrod Gold USA Inc. (41)
Rasmussen Ridge mine (25)
Republic mine (12)
Rescue mine (19)
Rhone-Poulenc Basic Chem. Co. (25)
Rock Hollow mine (30)
Rocky Mountain Quartzite Quarry (32)
Rocktite Company (32)
Rodriguez (32)
Rothschild's Corp. (40)
RST Mining (41)
Sand and Gravel (31)
Scoria (31)
Silica (28)
Silver (3)
Simplex Company (23)
Sinkor Tunnel (44)
Smoky Canyon mine (23)
Spencer Opal (33)
Star-Phoenix Mining Company (11)
Steelhead Specialty (31)
Sibinite mine (18)
Stone (32)
Stone Cabin mine (43)
Sunnyside mine (39)
Sunshine mine (13)
Sunshine Min and Refining Co. (12)
Table Rock Sandstone, Inc (33)
Tahoe mine (41)
Teague Mineral Products (33)
Thompson Creek Metals Co. (15)
Thompson Creek mine (15)
Three Rivers Stone (32)
Treasure Canyon Calcium Co. (27)
Triad Resources (21)
Triumph mine (59)
U.S. Antimony Corporation (15)

Unimin Corporation (28, 31)
United Mining Company (32)
USMX, Inc. (39)
Utah Stone (32)
Vanadium (5)
Vaughn Smith Const. Co. (28)
Velvet Quartz mine (19)
Wallawalla mine (39)
Washington Water Power Co. (69)
Wealth Resources (34)
Webfoot mine (40)
West One Minerals (28)
Westmont/Curator American (40)
Willow Creek Jasper (33)
Wrights Creek mine (30)
Yellowjacket mine (15)
Zeolites (33)
Zierold pit (28)
Zinc (4)