SOUTH DAKOTA – 1998 Mineral Summary

Production, Exploration and Environmental Issues

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Production

Gold: There was a major decline in South Dakota gold production in 1998. The gold mines in the northern Black Hills produced 389,875 ounces of gold in 1998. This represented a 26% drop in the amount of gold produced the previous year, but gold remained the leading mineral commodity in South Dakota in terms of value. The average price of gold in 1998 was $294.09, yielding a gross value of about $115 million. While the amount of gold produced in 1998 dropped by 26% from the previous year, the lower gold price equated to a 34% drop in gross value. The table below lists production figures at the active large scale gold operations in South Dakota that produced gold in 1998. The mines are surface heap leach operations with the exception of Homestake.

	1998 (ounces)	1997 (ounces)
Homestake	277,402 (117,446 U)	397,298 (259,350 U)
	(159,956 OC)	(137,948 OC)
Wharf Resources	110,176	103,145
Brohm Mining	2,297	26,957
TOTAL	**389,875**	**527,400**

Key: U - Homestake's Underground Operation

OC - Homestake's Open Cut Surface Operation

In early 1998, Homestake announced that it was temporarily shutting down the underground portion of the mine to institute a new mining plan. The new plan would help the company withstand low gold prices without permanently shutting down the mine. When operations resumed in April, the workforce was reduced from 850 to 380 employees and gold production decreased from 397,298 ounces in 1997 to 277,402 ounces in 1998. In September, Homestake completed mining in the Open Cut.

In June 1998, the South Dakota Board of Minerals and Environment conditionally approved a permit application from Wharf Resources for its expansion project north and east of the present Wharf Mine which has operated in South Dakota since 1982. During the next ten years, Wharf will mine two new pits in phases, reclaiming one pit while

mining another. The project involves 616 acres, of which 279 acres will be affected by the operation and 337 will be undisturbed. Total production is estimated at 21.3 million tons of ore with an average grade of 0.032 ounces of gold per ton, containing about 679,000 ounces of gold. About 54.9 million tons of overburden and waste rock is involved with the project. Ore from the expansion project will be processed at the existing facilities at the Wharf Mine. Waste rock will be used as backfill. Some waste rock will be placed in a new waste depository that will partially cover a relic tailings area.

The Golden Reward Mine remained under temporary cessation and produced no gold. LAC Minerals' Richmond Hill Mine is no longer producing gold and the mine is now undergoing final reclamation. Brohm Mining's gold production dropped by almost 25,000 ounces in 1998 from the previous year due to delays in commencing mining of the remaining Anchor Hill deposit.

Non-Metallic Industrial Minerals: During the 1998 reporting period, 503 companies had active mine licenses in South Dakota. An operator must obtain a license to mine for sand, gravel, pegmatite minerals, materials used in the process of making cement or lime, and rock to be crushed and used in construction. There were also a total of 52 mine permits that covered the mining of other non-metallic minerals such as slate, bentonite, and dimension stone.

Sand and gravel was the major non-metallic industrial mineral commodity produced with 15,130,994 tons reported removed. Sand and gravel is produced in nearly every county in South Dakota and is used mainly for road construction projects.

Sioux quartzite was the next largest non-metallic industrial mineral commodity produced with 2,805,906 tons reported removed. It is quarried from four locations in southeastern South Dakota. Most of the quartzite is crushed and used in construction. Some larger blocks are used for rip-rap, railroad ballast, and occasionally for decorative purposes.

Pegmatite mining, mainly in the southern Black Hills, produced 17,109 tons of pegmatite minerals such as feldspar, mica, and rose quartz.

The South Dakota Cement Plant reported mining 1,317,373 tons of limestone, 207,234 tons of shale, 45,166 tons of gypsum, and 33,626 tons of sand.

Dimension Stone: A total of 264,863 tons of granite was mined by Dakota Granite Company and Cold Spring Granite Company from quarries near Milbank, South Dakota. Due to its beauty and distinctive red color, the mahogany granite is used primarily for floor tiles, monuments, and building construction. Much of it goes to international markets. Waste granite was crushed and used in road construction in 1998. Total sales from 1998 production were $40.4 million.

Bentonite: There was 40,000 tons of bentonite mined in the western portion of South Dakota.

Exploration

Five exploration permits were issued in 1998 to Luff Exploration Co., Homestake Mining Co., Terry Springer and Kenneth Clark, and Douglas and Donald Ottema. A total of 640 test holes were permitted for drilling in Harding and Lawrence Counties, 600 of which were seismic shot holes drilled by Luff Exploration for oil and gas exploration in Harding County and 40 of which were permitted by Homestake Mining for all minerals excluding uranium in Lawrence County. Additionally, 65 prospect pits and a bulk sample were permitted by Douglas and Donald Ottema to conduct exploration for cassiterite, tantalite, scheelite, and placer gold in Lawrence County. An exploration permit for amphibolite, gold, and quartz schist in Custer County was issued to Terry Springer and Kenneth Clark for removal of waste rock previously stockpiled on site and removal of up to 5,000 tons of material from an underground drift as a bulk sample.

Environmental Issues

Enforcement: The Department of Environment and Natural Resources (DENR) issued one notice of violation (NOV) to a large-scale gold mine in 1998. Homestake Mining was issued one NOV and Order for a tailings release into Gold Run Creek. This NOV also covered a release in November 1997 when a slurry line to the underground mine plugged and allowed the slurry to back up and escape through a vent line onto adjacent soils and into Whitewood Creek. It is estimated that less than 100 gallons of slurry entered the creek in the November 1997 release. Cyanide and heavy metals in the slurry killed about 65 brown trout. In May 1998, tailings from Homestake's west sand plant, which contained heavy metals and cyanide, escaped containment and flowed into Gold Run Creek and Whitewood Creek. The discharge contributed to a fish kill downstream in the Deadwood area. An estimated 10,000 gallons of tailings containing 10 pounds of cyanide were discharged into the creek. Homestake took immediate steps to mitigate the effects of the discharge. They performed an immediate biological assessment on Whitewood Creek to assess the impact of the spill while simultaneously removing 12 to 15 tons of tailings from Gold Run Creek. In a settlement agreement signed in December 1998, Homestake agreed to pay $200,000 (a penalty of $150,000 paid to the DENR's emergency response fund and $50,000 paid to the city of Lead to separate stormwater flows from the Lead sewer system). As part of the settlement agreement, Homestake also agreed to conduct a thorough assessment to identify and correct any structural problems with their mill to ensure future releases do not occur. Homestake must also conduct biological studies of Whitewood Creek over the next three years to ensure these two releases did not have any long-term negative impact on Whitewood Creek.

Brohm Mining's Gilt Edge and Anchor Hill Projects: Dakota Mining Corporation which owns Brohm Mining's Gilt Edge and Anchor Hill mines continued to experience on-going financial and environmental difficulties throughout 1998. Acid mine drainage (AMD) at Brohm's Gilt Edge mine continues to be a significant problem. In early January 1998, several environmental and citizens groups appealed the U.S. Forest Service decision made in November 1997 that would allow Brohm to proceed with the Phase II expansion of the Anchor Hill project. In February 1998 the U.S. Forest Service withdrew

its approval citing deficiencies in the Environmental Impact Statement (EIS) that was required. Addressing the deficiencies and submitting a supplement to the EIS delayed the project. Unable to finance continuing operations at the site, Dakota announced in May that it would abandon the mine site. Governor William J. Janklow responded by going to the eight circuit court and obtaining a temporary restraining order and a Preliminary Injunction to prevent Dakota/Brohm from abandoning the mine. To date, the company has complied with the restraining order and injunction. In July, the Forest Service issued a new Record of Decision (ROD) approving the expansion of the Anchor Hill Mine. In September, Earthlaw filed an appeal of the ROD on behalf of several parties. In October, the Forest Service denied the Earthlaw appeal. At year end, Dakota was pursuing financing for the Anchor Hill Project and finalizing operating and reclamation plans.

As the mine was shut down, no reclamation work was completed. The water treatment plant continued to periodically treat acidic water collected at the mine and Brohm periodically continued to evaporate acidic water held in two pits at the Gilt Edge Mine. Unfortunately, the treatment and evaporation system could not keep up with inflows from precipitation. After reducing the amount of AMD water stored in the pits to about 65 million gallons at the end of 1997, the amount increased to about 90 million gallons at the end of 1998. The water treatment plant which uses sodium hydroxide as a reagent is quite effective at removing much of the metals and raising the pH in the AMD water prior to discharge, but the concentrations of parameters such as sulfate, total dissolved solids, sodium, and conductivity remain very high in the discharge.

Reclamation at Richmond Hill Mine: The pit impoundment at LAC Minerals' Richmond Hill mine, designed to reclaim impacts from AMD that occurred at the site in 1992, continued to perform well based on results of about three years of performance monitoring of the facility. In 1995, the reclaimed pit impoundment was fitted with numerous performance monitoring devices designed to track the long term success of remedial measures. Results from gravity and barrel lysimeters, heat dissipation units, neutron probes, piezometers, pore gas (oxygen and CO_2) monitoring, temperature probes, water quality and aquatic monitoring, and cap settlement surveys, indicate that the reclaimed site is performing quite well. Performance monitoring data continues to be collected at the site. Water quality data from some wells and surface sites continue to show impacts from AMD, adding to the need to keep an eye on the results and trends at these and other monitoring stations in future sampling events. It is hoped that results of continued monitoring, which will occur indefinitely, will indicate that the reclaimed site performs well as time goes on. Performance monitoring data is on file at the DENR and is available to the public.

Nitrate Treatment: Bacteria have been used for nitrate-reduction in mine waters prior to discharge at two denitrification plants at Wharf Resources and in a pond system at Golden Reward. The biotechnology is successful at reducing nitrate concentrations. Various levels of nitrate reduction are achieved, depending on site-specifics. Some additional concerns were raised in 1998 over potential impacts to human health and the environment from microorganisms involved in the process. Those concerns are being investigated.

Inactive and Abandoned Mines: Although the DENR does not have an abandoned mine reclamation program, the DENR worked with the U.S. Forest Service, the Bureau of Land Management, and the EPA to begin the process of reclaiming two abandoned mine sites in the northern Black Hills. Federal Superfund (CERCLA) funds are being used to reclaim both mine sites, the Minnesota Ridge Mine located on USFS and private property and the Belle Eldridge Mine located on BLM land. Both of these mines are typified by draining mine tunnels, acid mine drainage consisting of elevated heavy metals and other contaminants, sulfide waste rock piles, eroding streamside tailings, dilapidated structures and open shafts. An inventory of known inactive and abandoned mines in the Black Hills identified approximately 900 historic mine sites, of which about 200 are located on U.S. Forest Service land and about 700 on private land. For more information, a web page on Inactive and Abandoned Mines in the Black Hills is found at http://www.state.sd.us/denr/DES/mining/acidmine.htm