SUMMARY OF
THE MINING INDUSTRY IN SOUTH DAKOTA

1997

Protecting South Dakota's Tomorrow… Today

PREPARED BY
THE MINERALS AND MINING PROGRAM
SD DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
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INTRODUCTION

The Department of Environment and Natural Resources is required by state law to prepare a "Summary of the Large Scale Gold Surface Mining Industry in the Black Hills" and a "Publication of Surface Mined Disturbed Land and Reclamation Acreages under Chapter 45-6B." These two reports have been combined into a single report entitled "Status of the Mining Industry in South Dakota." This report covers mining activities from January 1 to December 31, 1997. The information in this report is based on mine operators' annual reports and other information submitted by permitted large and small scale mine operators.

1997 Summary

The large scale gold mines were successful in reclaiming 500 acres of surface mining disturbed land that was required by law to be completed by September 1, 1997. In fact, the large gold mines reclaimed about 620 acres of surface mining disturbed land by July 1, 1997, a full two months before the September 1 deadline. The Board of Minerals and Environment toured the reclaimed areas on July 16 and 17 and held a public hearing in Lead on July 18 on the 500 acres of reclamation. After hearing testimony, the board determined that the current reclamation standards are adequate and no additional reclamation requirements are needed. The board was satisfied with the reclamation and commended the large scale gold mines for their hard work and dedication to successful reclamation.

The department, in conjunction with the South Dakota School of Mines, completed an inventory of inactive and abandoned mine lands in the Black Hills. This inventory was required under SDCL 45-6B-100. It appears that of about 900 sites listed in the inventory, only a few pose a threat to the environment. At this time, there is no state abandoned mine land program or state funds to clean up these problem sites. However, the department is currently working with the Western Governors' Association, the federal government, and industry to secure the needed resources to cleanup problem sites. The mining industry has spent over $6 million to reclaim a number of sites on private land over the past decade.

The department issued three notices of violation to two large scale gold mines. Brohm Mining Corp. was issued two notices of violation for two separate releases of acidic water into Strawberry and Bear Butte Creeks. In settlement of these violations, Brohm has paid penalties and agreed to take steps to prevent future acid water discharges. Wharf Resources was issued one notice of violation for exceeding nitrate and cyanide water quality standards in surface and ground water. In settlement of the violation, Wharf agreed to pay a penalty of $40,000 and give the Department of Game, Fish, and Parks $160,000 over the next three years for stream improvement projects. Wharf is also taking steps to reduce nitrate levels at the mine.

\S/

Nettie H. Myers
Secretary

SUMMARY OF THE LARGE SCALE GOLD MINING INDUSTRY IN THE BLACK HILLS

1997

Photo 1.1 - Reclaimed Spruce Gulch area at Richmond Hill Mine

MAJOR EVENTS IN 1997

Gold Mines Achieve 500 Acres of Reclamation

In early July, the large scale gold mines completed reclamation on over 500 acres of surface mined disturbed land. In accordance with SDCL 45-6B-90, if 500 acres of surface mining disturbed land attributed to large scale gold surface mining were not reclaimed by September 1, 1997, no new permits or amendments to existing permits for any large scale gold mining operation could have been issued. As of July 7, 1997, the gold mines reclaimed a total of about 620 acres of surface mining disturbed land which is 120 acres over the 500-acre goal. Figure 1.1 shows the contribution by each company toward the 620 acres of reclamation.

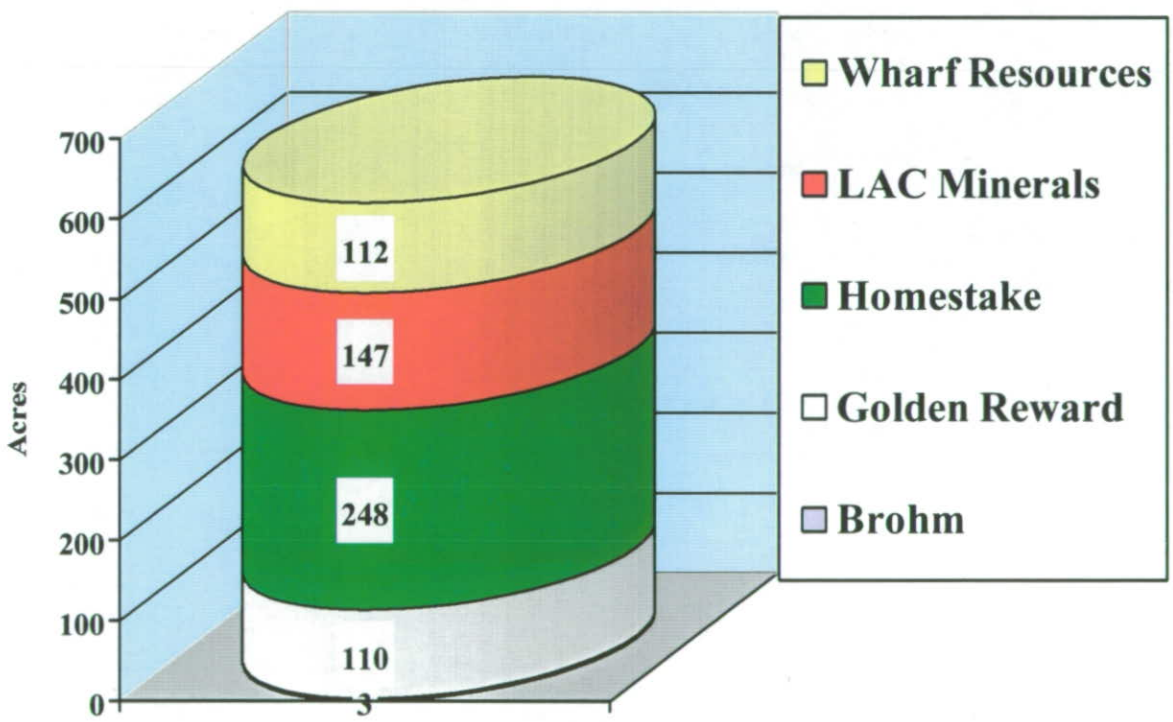

Figure 1.1 Status of 500-acre reclamation goal as of July 7, 1997

In June and July 1997, the department conducted an inspection of each reclaimed area to confirm that each area met the reclamation requirements listed in SDCL 45-6B-90. Based on the inspections, the department determined that about 620 acres met the reclamation requirements. On July 16 and 17,

members of the Board of Minerals and Environment and the public toured the reclaimed areas at each mine. On July 18, the board held a public hearing to determine whether the current reclamation standards were adequate and if additional reclamation regulations were necessary. Based on the mine tours and public comments during the hearing, the board determined that the 500-acre reclamation goal was adequately met, the present reclamation standards are adequate, and no additional reclamation regulations are necessary. In essence, it was determined that reclamation works. Since the 500-acre goal was met, the board can now continue to issue new permits and amendments to existing permits for any large scale gold and silver mine in the Black Hills. The board commended the gold mines for the work that was done in meeting the 500-acre goal.

Photo 1.2 – Kim Schultz of Wharf Resources explains to board members and public the methods used to reclaim the Squaw Waste Rock Facility.

Photo 1.3 – Golden Reward placed stumps and logs in the reclaimed Hannibal Pit area for wildlife habitat.

Photo 1.4 – Homestake created a pond and placed rock structures on the reclaimed Sawpit Waste Rock Depository for widlife habitat.

Acid Mine Drainage Mitigation Update

LAC Minerals (USA), Inc./Richmond Hill Mine

LAC Minerals completed capping and reclamation of the leach pad area at the Richmond Hill Mine in 1997. The purpose of the caps is to reduce infiltration through the spent ore on the leach pads which will reduce the amount of runoff needing treatment. The cap design is similar to the cap placed over the pit impoundment. The only difference is that a 12-inch low permeable layer was used instead of an 18-inch layer.

Non-acid generating material for the capping system was obtained from a v-notch cut to the southwest of Pad 3. The v-notch cut was constructed so that surface water could be diverted away from the French drain under Pad 3. Since the French drain was constructed from acid generating waste rock it also had to be sealed.

The pit impoundment continued to perform better than expected in 1997. No major problems were noted at the impoundment. Only minimal amounts of oxygen and water were detected in the impoundment which indicates that the cap is effective in limiting oxygen and water infiltration. No signs of settling or slumping were found during several department inspections of the impoundment. Settlement surveys conducted by LAC Minerals showed that the cap is extremely stable. Only minor erosion was noted, and LAC has repaired and reseeded the eroded areas.

Brohm Mining Corp./Gilt Edge Mine

Brohm continued to collect and treat acidic water generated at the mine in 1997. The water treatment plant continued to treat water through the year. Brohm also evaporated acidic water in the Dakota Maid and Sunday Pits in an effort to reduce the amount of acidic water in the pits. The combination of water treatment and evaporation proved to be effective as Brohm reduced the amount of water in the pits from over 100 million gallons down to about 65 million gallons by the end of 1997.

Brohm also began preparing the bottom portion of the Ruby Waste Rock Depository for capping. The first six lifts and a portion of the seventh lift of the depository have been regraded and compacted. By the end of 1997, about 14.6 acres of the depository have been regraded and compacted. Brohm plans to begin placing a cap on the compacted area in 1998.

New Permits

The department continued its review of a permit application submitted by Wharf Resources on November 6, 1996, for its proposed Clinton Project north and east of the present Annie Creek mine. Wharf submitted additional information to complete the application, and the department determined that the application was complete and filed on January 9, 1998. A hearing on the application is tentatively scheduled for May 1998 before the Board of Minerals and Environment.

Wharf will mine two pits in phases during the ten-year life of the project. By mining in phases, Wharf will be able to reclaim one pit while it is mining the other pit. The Portland Pit will be mined first and will be backfilled after mining is completed. The Trojan Pit will be mined in three phases and portions of the pit will be backfilled. Waste rock from the Trojan Pit will be used to encapsulate the upper portion of the relic Bald Mountain Tailings area. Ore from the Clinton Project will be processed at the existing facilities at the Wharf Mine covered under Permit Numbers 356, 434, and 435.

Permit Amendments

The department issued no permit amendments to large scale gold and silver mining operations in 1997.

Abandoned Mined Land Inventory Completed

The department, along with the South Dakota School of Mines and Technology, completed an inventory in 1997 of inactive and abandoned mined lands in the Black Hills. The inventory lists about 900 inactive and abandoned mines with 200 sites on federal land and 700 sites on private land. Based on the information in the inventory, the department believes that most of the 900 sites do not pose a significant environmental threat. However, a number of the sites do have physical hazards such as open shafts and dilapidated buildings, and several sites have environmental problems. The department currently does not have an abandoned mine land program or funding to cleanup the small percentage that do pose a threat. However, the department is currently working with the Western Governors' Association, the federal government, and industry to secure the needed resources to cleanup problem sites. The department is working with the US Forest Service and EPA to cleanup the Minnesota Ridge Mine and with the Bureau of Land Management to reclaim the old Belle Eldridge Mine. These two mines are medium sized and have open adits and shafts, acid mine drainage, and sulfide waste rock piles.

The mining industry has reclaimed about 65 inactive and abandoned mine sites on a voluntary basis at a cost of about $6.2 million. These sites are mostly on private land. The following table summarizes some of the abandoned mine reclamation conducted by large scale gold mining companies:

Table 1.1 – Abandoned and Inactive Mines Reclaimed by Large Scale Gold Mines

Company	Reclaimed Site	Acres Reclaimed
Brohm Mining	Strawberry Creek Tailings	5
	Coppo Mill	0.25
	Gilt Edge Tailings	Not Available
Golden Reward	Lundberg-Dorr-Wilson Tailings	10
	Horseshoe Tailings	10
Homestake	Double Rainbow Mine	4
	Wasp Tailings (in progress)	20
	Standby Mine	Not Available
	Numerous mine and exploration areas	Not Available

Company	Reclaimed Site	Acres Reclaimed
Wharf Resources	Nevada Gulch Tailings	4
	Bald Mountain Tailings	70
	Reliance Tailings	2

Photo 1.5 – Homestake removing tailings from Wasp #2 Mill Site

Notices of Violation

The department issued three Notices of Violation to large scale gold mines in 1997. Brohm Mining was issued two notices of violation and orders under the mining and water pollution control laws and Wharf Resources was issued one notice of violation and order under the mining and water pollution control laws.

On February 20, 1997, Brohm was issued a notice of violation and order for discharging 5,400 gallons of acidic water into Strawberry and Bear Butte Creeks on November 11, 1996. The discharge was caused by a pipe gasket that failed in the acid drainage pumpback system. This allowed a collection pond to overflow into Strawberry Creek. The discharge was in violation of permit conditions and an order issued by the department to Brohm on April 19, 1993, which required no discharge of acid drainage from the mine. In a settlement agreement signed April 21, 1997, Brohm agreed to:

1. Develop emergency procedures to prevent acidic discharges into the environment;
2. Reduce the amount of acidic water stored in the Dakota Maid and Sunday Pits;
3. Continuously operate the water treatment plant;
4. Increase the environmental bond to cover the cost of treating the pit water; and

5. Pay a penalty of $5,400.

Brohm has paid the $5,400 penalty, reduced the amount of acidic water in the pits, installed acid proof gaskets in the pipeline, developed emergency procedures to prevent future discharges, and increased the environmental surety by $455,000.

The second notice of violation and order was issued to Brohm on September 15, 1997, for another discharge of acidic water into Strawberry and Bear Butte Creeks on July 10, 1997. The discharge occurred when a power fluctuation at the mine, created by a tree falling on a power line, caused a valve at the water treatment plant to only partially close. This allowed acid water to enter Strawberry Creek. The discharge was in violation of permit conditions and orders issued by the department on April 19, 1993, and April 21, 1997, which required no discharge of acid drainage from the mine. In a settlement agreement signed January 12, 1998, Brohm agreed to:

1. Develop procedures to prevent future discharge of acid drainage from the mine;
2. Report all discharges to the department and the Lawrence County Commission within 8 hours of discovery;
3. Pay a penalty of $8,000; and
4. Submit an additional $10,000 cash bond to be used as environmental surety.

Brohm is scheduled to pay the penalty and submit the additional bond in early 1998. They also have taken steps within the treatment plant to prevent future acid discharges.

The department issued Wharf a notice of violation and order on December 12, 1997 for violations of its mine permit, surface and ground water discharge permits, and water quality standards. Since March 1, 1994, the daily maximum total cyanide limit of 0.02 ppm was exceeded numerous times, although the exceedences of the total cyanide limit were not considered toxic. Nitrate concentrations in ground water were exceeded in two monitoring wells on several occasions from June 1995 to December 1997. In a settlement agreement signed December 18, 1997, Wharf agreed to:

1. Continue operating the pumpback system at monitoring well HDH-12 until nitrates levels are below the ground water quality standard of 10 ppm;
2. Submit a nitrate reduction plan within 60 days of the effective date of the order;
3. Submit a request to change the total cyanide compliance value in the discharge permit to an EPA approved weak acid dissociable limit which is more representative of the amount of toxic cyanide in the water;
4. Pay a $40,000 penalty; and
5. Fund supplemental environmental projects totaling $160,000.

For the $160,000 supplemental projects, Wharf will make payments to the Department of Game, Fish, and Parks over the next three years for stream improvement projects in the northern Black Hills. The public will have a chance to have input on the projects that will be funded with the money.
Wharf also developed an innovative biotechnology process to treat nitrates at the mine site to acceptable levels. As part of the nitrate management plan, Wharf constructed a bio-denitrification plant that breaks the nitrates down into harmless by-products. This is one of the first nitrate treatment plants

to use biotechnology to treat mine water. The excess levels of nitrate on the mine site are the result of residual nitrate from blasting and the breakdown of cyanide.

Major Technical Revisions Conditionally Approved by The Department

January 13	Golden Reward – Modify the leakage response action plan for the Leak Detection, Collection, and Recovery system for the mine process area during the period of temporary cessation.
January 24	Brohm Mining – Construct and modify the sludge disposal and dewatering trenches.
January 27	Wharf Resources – Add alfalfa to final reclamation seed mix and describe tree and shrub planting materials and densities.
February 10	Brohm Mining – Mine and subsequently reclaim the Southeast Langley ore body.
March 17	Brohm Mining – Construct another expansion to the Gilt Edge leach pad and increase the capacity of the Stormwater Pond.
March 17	Homestake Mining – Consolidate the planting and improve the woody species planting under Mine Permit No. 332.
March 18	Wharf Resources – Expand the Whiteside Pit backfill area.
May 5	Golden Reward – Divert runoff from the neutralized leach pad to the spent ore depository.
May 23	Brohm Mining – Allow mining on the non-US Forest Service portion of Phase II, allow expansion of the Phase II Pit on non-US Forest Service land, abandon and replace ground water wells BED-8 and BES-8, and modify total sulfur cutoff values.
June 2	LAC Minerals – Install reverse osmosis water treatment system.
July 22	LAC Minerals - Construct two discharge ponds for the reverse osmosis water treatment system.
July 25	Homestake Mining – Modify reclamation of the Sawpit Waste Rock Facility, Sawpit haul roads, and Open Cut.

August 15	Wharf Resources – Construct and use a denitrification "bug plant" to reduce nitrate levels in neutralized solutions.
September 25	Wharf Resources – Reline Contingency Pond for neutralized solution storage.
September 30	Wharf Resources – Increase spent ore backfill capacity in Juno Pit from 8.1 to 9.4 million tons.
December 23	Homestake Mining – Recontour the southern slope of the East Waste Rock Facility.

Note: This list does not include all technical revisions issued in 1997, only the major ones.

Special or Unique Land Determinations

The department did not receive any requests for determination of Special, Exceptional, Critical, or Unique Lands for potential large scale gold mines in 1997.

Homestake Completes Dakota Placer Mine Site Reclamation

Homestake Mining Company and Brightwater Inc., an affiliate of the Dunbar Resort, completed voluntary reclamation of the Red Placer claim previously mined by Dakota Placers under Large Scale Mining Permit No. 208. Homestake and Brightwater jointly own and manage the Red Placer claim and completed an extensive reclamation and stream rehabilitation plan for the former mining site.

Photo 1.6 – Homestake crew putting finishing touches on reclaimed Dakota Placer mine site.

Neither Homestake nor Brightwater conducted mining at the site. They obtained the property in an unreclaimed state through foreclosure proceedings.

The reclamation and stream rehabilitation plan initiated by Homestake and Brightwater significantly exceeded the reclamation standards and requirements in Dakota Placer's reclamation plan. Homestake reconstructed the Whitewood Creek channel running through the site and developed fish habitat. They also conducted grading, stabilization, and revegetation of the site. Several buildings were removed from the site. The cost of implementation exceeded two million dollars.

After a self-sustaining vegetative cover is established at the site, Large Scale Mine Permit No. 208, issued to Dakota Placers, will be closed and no additional mining will take place under the permit.

ACREAGE AND PRODUCTION TABLES

The following tables were developed by compiling information from annual reports and supplemental information submitted to the department by the large scale gold mines. The department also used inspection reports and other records in completing these tables.

The graph below shows the percentage of total affected reclaimed acres versus total affected unreclaimed acres for the large scale gold mine industry. The graph on page A-2 in the appendix shows a comparison of reclaimed acreage versus affected acreage for each company. The chart on page A-3 compares the total affected acres versus the total reclaimed acres for the large scale gold industry from 1990 to 1997.

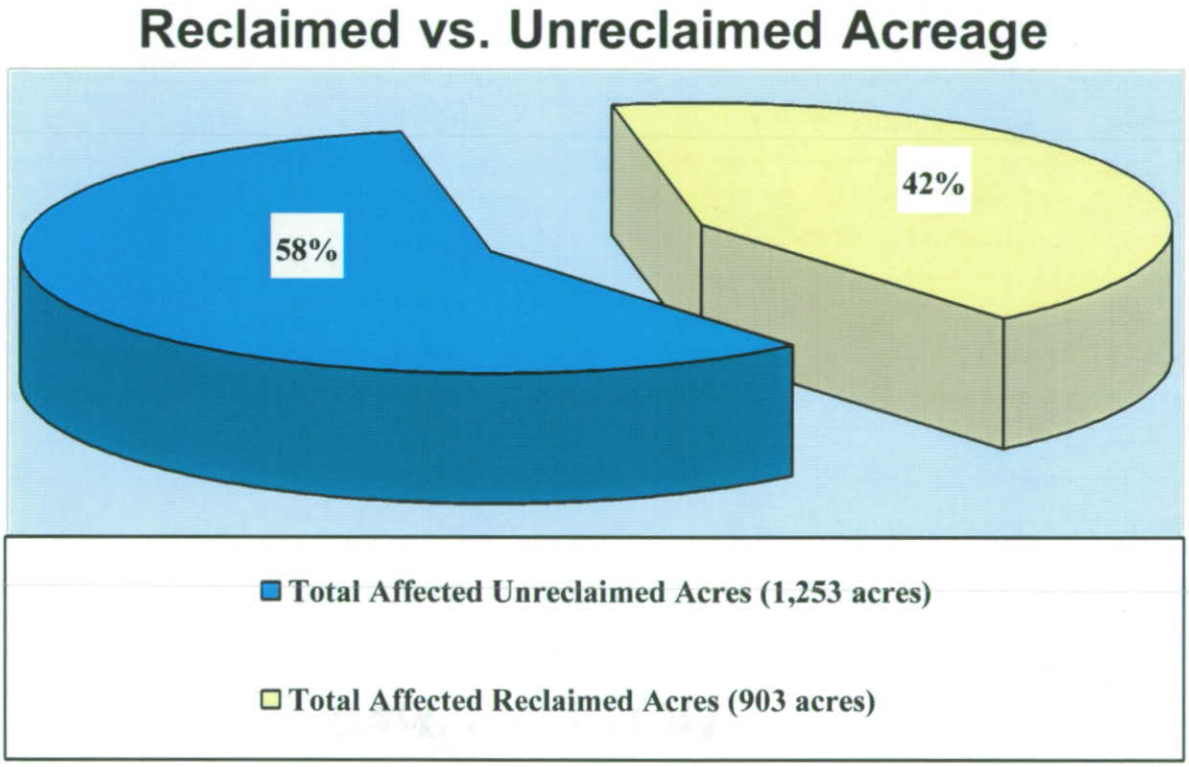

Figure 1.2 – Comparison of reclaimed versus unreclaimed acreage at large scale gold mines.

TABLE 1.1 - AFFECTED MINED LAND ACREAGE				
Permit Number	**Operator**	**Permitted Affected Acres**	**Additional Acres Affected Past Year**	**Total Acres Affected as of Dec. 31, 1997**
439 & 462	Brohm Mining Corp.	564.00	56.50	263.00
208	Dakota Placers, Inc.	81.00	0.00	16.10
450	Golden Reward Mining Co., L.P.	493.62	0.00	397.00
332 & 456	Homestake Mining Company	658.23	1.00	533.80
445	LAC Minerals (USA), Inc.	439.10	0.00	320.70
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	122.00	0.00	0.00
356, 434, & 435	Wharf Resources	688.92	3.31	625.55
TOTALS		3046.87	60.81	2156.15

Definitions:

Permitted Affected Acres - As defined in SDCL 45-6B-3(1), permitted affected land involves all lands permitted to be affected by a mining operation. This includes land from which overburden is to be or has been removed; land upon which overburden, waste rock, mine spoil, or mill tailings are to be or have been deposited; land disturbed by the building of access roads, railroad loops, warehouses, storage areas or other support facilities for the purpose of mining; and land affected by surface subsidence, unstable slopes, and other surface effects caused by underground mine workings.

Additional Acres Affected Past Year - Previously unaffected acres disturbed from January 1 to December 31, 1997. This acreage is also included in "Total Acres Affected as of Dec. 31, 1997."

Total Acres Affected as of Dec. 31, 1997 - All land currently affected by the large scale gold and silver operations under permit as of December 31, 1997. This includes all lands described above in "Permitted Affected Acres."

TABLE 1.2 - SURFACE MINING DISTURBED LAND ACREAGE			
Permit Number	**Operator**	**Additional Surface Mining Acres Disturbed Past Year**	**Total Surface Mining Disturbed Acres as of Dec. 31, 1997**
439 & 462	Brohm Mining Corp.	56.50	202.10
208	Dakota Placers, Inc.	0.00	15.90
450	Golden Reward Mining Co., L.P.	0.00	258.50
332 & 456	Homestake Mining Company	1.00	504.70
445	LAC Minerals (USA), Inc.	0.00	192.90
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00
356, 434, & 435	Wharf Resources	3.31	500.13
TOTALS		60.81	1674.23

Definitions:

Additional Surface Mining Acres Disturbed Past Year - Previously unaffected surface mining land disturbed from January 1 to December 31, 1997. This acreage is also included in "Total Surface Mining Disturbed Acres as of Dec. 31, 1997."

Total Surface Mining Disturbed Acres as of Dec. 31, 1997 - As defined in SDCL 45-6B-3(15), surface mining disturbed land is land from which overburden has been removed; land upon which overburden, waste rock, mine spoil, or mill tailings have been deposited; land mined which has no overburden; heap leach pads; and process ponds. Surface Mining Disturbed Lands include overburden and waste rock dumps, spent ore dumps, tailings impoundments, heap leach pads, open pits, process ponds, and haul roads in pit areas or constructed largely of waste rock, spent ore, or overburden. Surface Mining Disturbed Lands **do not** include access roads, haul roads constructed from normal cut and fill methods, railroad loops, utility corridors, buildings including process plants, land application areas, topsoil stockpiles, ore stockpiles, crusher areas, storage areas, sediment and erosion control structures, and land affected by surface subsidence, unstable slopes, and other surface effects caused by underground mine workings.

TABLE 1.3 – INTERIM RECLAIMED ACREAGE			
Permit Number	**Operator**	**Additional Interim Reclaimed Acres Past Year**	**Total Interim Reclaimed Acres as of Dec. 31, 1997**
439 & 462	Brohm Mining Corp.	0.40	0.95
208	Dakota Placers, Inc.	0.00	0.00
450	Golden Reward Mining Co., L.P.	0.00	7.21
332 & 456	Homestake Mining Company	8.12	75.72
445	LAC Minerals (USA), Inc.	0.00	32.30
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00
356, 434, & 435	Wharf Resources	0.00	28.13
TOTALS		8.52	144.31

Definitions:

Interim Reclamation - As defined in ARSD 74:29:01:01(17), interim reclamation is reclamation performed during a mining operation or between mining phases to stabilize affected land by regrading and revegetating to control erosion, improve aesthetics and minimize hazards. It can be construed to be temporary reclamation or soil stabilization for affected land that will be disturbed again.

Additional Interim Reclaimed Acres Past Year - Acres under interim reclamation from January 1 to December 31, 1997. These acres are also included in "Total Interim Reclaimed Acres."

Total Interim Reclaimed Acres as of Dec. 31, 1997 - The total number of acres under interim reclamation as of December 31, 1997. Acres redisturbed or now considered as final reclamation are not included in these totals.

TABLE 1.4 - FINAL RECLAIMED ACREAGE FOR PAST YEAR

Permit Number	Operator	Final Reclaimed Acres Past Year that Meet Post-Mine Land Use[1]	Final Reclaimed Acres Past Year that Do Not Meet Post-Mine Land Use
439 & 462	Brohm Mining Corp.	0.00	7.10
208	Dakota Placers, Inc.	0.00	16.10
450	Golden Reward Mining Co., L.P.	0.00	37.33
332 & 456	Homestake Mining Company	135.24	95.45
445	LAC Minerals (USA), Inc.	0.00	84.80
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00
356, 434, & 435	Wharf Resources	0.00	37.52
TOTALS		135.24	278.30

[1]The final reclaimed acres during the past year that meet the post mining land use in this table are industry estimates. The department does not necessarily agree with the reported acreage and will need to confirm in the field that these acres do meet the post mine land use criteria.

Definitions:

Final Reclaimed Acres Past Year That Meet Post-Mine Land Use - Affected land under final reclamation from January 1 to December 31, 1997, that has a permanent, self-sustaining vegetative cover which meets the requirements of the approved reclamation plan and meets the reclamation requirements of SDCL 45-6B and ARSD 74:29. These acres can be considered for bond release.

Final Reclaimed Acres Past Year That Do Not Meet Post-Mine Land Use - Affected land under final reclamation from January 1 to December 31, 1997, that does not meet the requirements of the approved reclamation plan and the reclamation requirements of SDCL 45-6B and ARSD 74:29. Final grading, topsoil placement, erosion and drainage control, and seeding and planting have been conducted on these acres. However, a permanent, self-sustaining cover has not been established.

TABLE 1.5 – TOTAL FINAL RECLAIMED ACREAGE
As of December 31, 1997

Permit Number	Operator	Final Reclaimed Acres that Meet Post-Mine Land Use[1]	Final Reclaimed Acres that Do Not Meet Post-Mine Land Use
439 & 462	Brohm Mining Corp.	0.00	17.50
208	Dakota Placers, Inc.	0.00	16.10
450	Golden Reward Mining Co., L.P.	30.85	139.70
332 & 456	Homestake Mining Company	203.81	145.12
445	LAC Minerals (USA), Inc.	37.00	175.40
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00
356, 434, & 435	Wharf Resources	38.21	98.84
TOTALS		309.87	592.66

[1]The final reclaimed acres that meet the post mining land use in this table are industry estimates. The department does not necessarily agree with the reported acreage and will need to confirm in the field that these acres do meet the post mine land use criteria.

Definitions:

Final Reclaimed Acres That Meet Post-Mine Land Use - Affected land under final reclamation as of December 31, 1997, that has a permanent, self-sustaining vegetative cover which meets the requirements of the approved reclamation plan and meets the reclamation requirements of SDCL 45-6B and ARSD 74:29. These acres can be considered for bond release.

Final Reclaimed Acres That Do Not Meet Post-Mine Land Use - Affected land under final reclamation as of December 31, 1997, that does not meet the requirements of the approved reclamation plan and the reclamation requirements of SDCL 45-6B and ARSD 74:29. Final grading, topsoil placement, erosion and drainage control, and seeding and planting have been conducted on these acres. However, a permanent, self-sustaining cover has not been established.

TABLE 1.6 – SURFACE MINED RECLAMATION ACREAGE AND RECLAMATION CREDITS
As of December 31, 1997

Permit Number	Operator	Surface Mined Acres Reclaimed (SDCL 45-6B-86)	Total Affected Acres Reclaimed that Apply as Reclamation Credit in 1992 Mining Initiative (SDCL 45-6B-97)
439 & 462	Brohm Mining Corp.	3.00	11.20
208	Dakota Placers, Inc.	0.00	0.00
450	Golden Reward Mining Co., L.P.	119.95	170.55
332 & 456	Homestake Mining Company	250.55	348.93
445	LAC Minerals (USA), Inc.	157.70	212.40
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00
356, 434, & 435	Wharf Resources	114.43	137.05
TOTALS		645.63	880.13

Definitions:

Surface Mined Acres Reclaimed - Total amount of surface mining disturbed acres under final reclamation as of December 31, 1997. The department is required to report these acres under SDCL 45-6B-86. Final grading, topsoil replacement, erosion and drainage control, and seeding and planting have been conducted on these acres.

Total Affected Acres Reclaimed That Apply as Reclamation Credit in 1992 Mining Initiative - Affected land under final reclamation as of December 31, 1997, that can be considered for reclaimed acreage credit as provided under SDCL 45-6B-97. Pursuant to SDCL 45-6B-97, reclamation is performed when the operator completes required grading, topsoil placement, erosion and drainage control, and seeding and planting.

TABLE 1.7 - ORE AND WASTE ROCK PRODUCTION FIGURES January 1 to December 31, 1997				
Permit Number	**Operator**	**Tons of Ore Mined Past Year**	**Tons of Ore Processed Past Year**	**Tons of Waste Rock and Overburden Mined Past Year**
439 & 462	Brohm Mining Corp.	962,214.00	730,591.00	2,912,876.00
208	Dakota Placers, Inc.	0.00	0.00	0.00
450	Golden Reward Mining Co., L.P.	0.00	0.00	0.00
332 & 456	Homestake Mining Company	1,219,203.00	1,219,203.00	4,398,193.00
445	LAC Minerals (USA), Inc.	0.00	0.00	0.00
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00	0.00
356, 434, & 435	Wharf Resources	4,555,928.00	4,471,200.00	6,170,245.00
TOTALS		6,737,345.00	6,420,994.00	13,481,314.00

TABLE 1.8 – GOLD AND SILVER PRODUCTION January 1 to December 31, 1997			
Permit Number	**Operator**	**Ounces of Gold Produced Past Year**	**Ounces of Silver Produced Past Year**
439 & 462	Brohm Mining Corp.	26,957	43,273
208	Dakota Placers, Inc.	0	0
450	Golden Reward Mining Co., L.P.	0	0
332 & 456	Homestake Mining Company[1]	137,948	33,385
445	LAC Minerals (USA), Inc.	0	0
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0	0
356, 434, & 435	Wharf Resources	103,145	22,517
SUBTOTAL		268,050	99,175
N.A.	Homestake Underground	259,350	62,770
TOTALS		527,400	161,945
ESTIMATED VALUE[2]		$174,722,346	$812,964

[1] Reflects production from the Open Cut only and does not include production from underground operation which is listed below

[2] Based on 1997 estimated average gold price of $331.29 and 1997 estimated average silver price of $5.02

TABLE 1.9 - WATER AND CYANIDE USE
January 1 to December 31, 1997

Permit Number	Operator	Gallons Ground Water Withdrawn Past Year	Gallons Surface Water Withdrawn Past Year	Pounds of Cyanide Used Past Year
439 & 462	Brohm Mining Corp.	2,200,000.00	0.00	403,794.00
208	Dakota Placers, Inc.	0.00	0.00	0.00
450	Golden Reward Mining Co., L.P.	33,160,100.00[3]	0.00	0.00
332 & 456	Homestake Mining Company[1]	0.00	26,689,000.00[2]	1,719,115.00
445	LAC Minerals (USA), Inc.	2,628,000.00	30,033,227.00	0.00
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	0.00	0.00	0.00
356, 434, & 435	Wharf Resources	22,789,896.00	0.00	498,474.00
TOTALS		60,777,996.00	56,722,227.00	2,621,383.00

[1] Water and cyanide use by Homestake's underground mine is not included in this table.
[2] Homestake used 26,000 gallons of fresh water and 26,663,000 gallons of recycled treated water from its waste water treatment plant for its Open Cut operations in 1997.
[3] Golden Reward dewatered its Bonanza well and discharged the water. None of the water was used at the mine.

TABLE 1.10 – RECLAMATION BOND AMOUNTS FOR LARGE SCALE GOLD MINES				
Permit Number	**Operator**	**Original Bond Amount**	**Current Bond Amount**	**Type of Bond**
439 & 462	Brohm Mining Corp.	$672,376	$10,300,124[1]	See Note 1
208	Dakota Placers, Inc.	$32,715	$27,000	Certificate of Deposit
450	Golden Reward Mining Co., L.P.	$954,384	$1,405,035	Certificates of Deposit
332 & 456	Homestake Mining Company	$928,790	$1,737,000	Surety Bond
445	LAC Minerals (USA), Inc.	$656,000	$10,700,000	Irrevocable Letter of Credit
416	Naneco Minerals, Inc. (formerly Minerva Explorations)	$661,800	$0[2]	See Note 2
356, 434, & 435	Wharf Resources	$732,800	$1,696,023	Certificate of Deposit

[1] As of December 31, 1997, the $10,300,124 bond for Mine Permit No. 439 and 462 consists of the following:

Permit 439 and 462 Reclamation Surety:	$4,136,676 certificates of deposit
Environmental Surety:	$1,672,869 certificates of deposit (cash portion)
	$4,490,579 demand note based on net worth

The reclamation surety covers basic site reclamation costs. The environmental surety covers costs of the acid rock drainage mitigation plan. Interest from the certificates of deposit is applied toward the cash portion of the environmental bond. The demand note amount will decrease over time as the cash portion of the environmental bond increases.

[2] Naneco Minerals is required to submit a reclamation bond in the amount of $661,800 before the commencement of mining

OPERATIONAL PLANS FOR 1998

Brohm Mining Corp.

Brohm plans to continue mining operations at the Anchor Hill Pit in 1998, pending the successful resolution of the appeals of the Environmental Impact Statement. In November 1997, the US Forest Service issued the final Environmental Impact Statement (EIS) and Record of Decision (ROD) for the Phase II expansion of the Anchor Hill project. The EIS was required before Brohm could expand Phase II of the Anchor Hill Pit onto US Forest Service land. After evaluating alternatives, the Forest Service determined that the project could go forward pending no appeals during the 45-day public comment period.

In early January 1998, several environmental and citizens groups appealed the Forest Service decision. The US Forest Service reviewed the appeals, and on February 18, 1998, the Forest Service withdrew its approval of the Anchor Hill Expansion Project. The approval was withdrawn to correct problems with the EIS. Once these issues are resolved, the Forest Service will draft a new ROD. This will delay Brohm's commencement of Phase II operations for several months.

Reclamation activities in 1998 will include the backfilling of the Dakota Maid Pit and the capping of the Ruby Waste Rock Depository. The timing of the reclamation will depend on the issuance of a new ROD and whether the new ROD is appealed.

Dakota Placers, Inc.

As mentioned earlier in the report, Homestake Mining Company, in cooperation with Brightwater Inc., an affiliate of the Dunbar Resort, reclaimed the Red Placer Claim previously mined by Dakota Placers under Mine Permit No. 208. Once the reclamation is deemed complete and a self-sustaining vegetative cover is established, the permit will be closed.

Golden Reward Mining Company, L.P.

Golden Reward plans to remain under temporary cessation in 1998. No mining or ore processing is expected to be conducted in 1998. However, Golden Reward plans to continue environmental monitoring, water balance control, reclamation, and some exploration drilling on its properties to identify new reserves or better define known reserves. In addition, Golden Reward plans to plant 3,000 trees and shrubs on previously reclaimed lands.

Homestake Mining Company

Homestake plans to complete mining at the Open Cut in May 1998. However, crushing and processing of stockpiled ore is planned to continue through the year.

On January 26, 1998, Homestake temporarily ceased production in the underground mine to implement a major restructuring of the operation. Homestake will implement a new operating plan to reduce costs significantly and to position the mine for future operations. The plan will require a substantial reduction in production from approximately 150,000 to 180,000 ounces per year. Total employment will be about 400 when underground mining resumes. Homestake expects to invest up to $30 million in the mine over the next several years to increase efficiency and decrease costs.

Reclamation activities in 1998 will focus on the waste rock disposal facilities and the Test Pit area of the Open Cut. Homestake plans to plant about 19,000 trees and shrubs on the East Waste Rock and Sawpit Waste Rock Disposal Facilities and the Test Pit area. Homestake also plans to voluntarily regrade, recontour, and reseed about 16 acres of the East Waste Rock Facility so that the area will blend in better with the surrounding undisturbed topography.

Major projects planned for 1998 include the continued construction of the next lift of the Grizzly Gulch Tailings Dam, commencement of the Yates Waste Rock reclamation, and continuation of the Wasp Tails reclamation.

LAC Minerals (USA), Inc./Richmond Hill Mine

LAC Minerals plans to continue active water treatment and environmental monitoring in 1998 as part of the ongoing acid rock drainage mitigation plan. Major reclamation projects remaining at the mine include the process ponds, process plant, and haul road.

Naneco Minerals, Inc.

Naneco Minerals LTD. will continue to seek a joint venture partner for the Ragged Top project in 1998. This is dependent on the price of gold.

Wharf Resources

Wharf Resources plans to mine the Vulcan and East Foley 4A pits in 1998. Plans are to remove about 4.6 million tons of ore and 6.6 million tons of waste rock. Wharf may also begin mining the Portland Pit in the Clinton expansion area if the Clinton permit application is approved. A hearing on the application is tentatively scheduled for May 1998.

Reclamation activities in 1998 will consist of new reclamation on the south side of the Reliance Waste Rock Disposal Facility. Wharf also plans to plant 950 trees and shrubs on the Whiteside, Reliance, and Vulcan reclaimed areas.

SUMMARY OF SURFACE MINE DISTURBED AND RECLAMATION ACRES UNDER SDCL 45-6B-86

1997

Photo 2.1 - Reclaimed portion of limestone quarry operated by Hills Materials

SUMMARY OF ALL MINE PERMITS

In accordance with SDCL 45-6B-86, the Department of Environment and Natural Resources has compiled information regarding the number of acres of surface mining disturbed land and the amount of such land that has undergone reclamation as defined in Chapter 45-6B and in section 45-6B-83.1 for the period January 1 to December 31, 1997. This does not include acreages for mining operations regulated under SDCL Chapter 45-6 (426 active licensed mine operators, 1,903 active licensed sites), mineral exploration regulated under SDCL Chapter 45-6C (13 operators, 119 permits, excluding oil and gas), or uranium exploration regulated under SDCL Chapter 45-6D (no current operators or permits.) Sources for these statistics are permit applications, operating and reclamation plans, annual reports, departmental inspections, and operator information.

New Permit Applications

American Colloid submitted a large scale permit application in 1997 for a new bentonite mine near Belle Fourche. The new mine is just south of an active mine area covered under Mine Permit No. 461. The application was determined complete on October 16, 1997, and the department issued the uncontested permit (Permit No. 463) on December 4, 1997.

American Colloid will mine bentonite by using conventional cut and fill mining methods. About 70 acres will be affected during the mining operation. A total of 8 pits will be mined, and approximately 45,000 to 80,000 tons of bentonite per year will be removed during the life of the proposed operation. Operations will be completed by the end of 2001, and the area will be reclaimed to rangeland for domestic livestock grazing upon completion of mining.

Forfeited Bonds Used in Mine Site Reclamation

Over the past few years, several mining companies have forfeited bonds to the state for failure to complete required reclamation work. Most of the forfeited bonds covered sand and gravel or pegmatite operations. A total of 14 reclamation bonds have been forfeited, with four sites having been totally reclaimed and one site partially reclaimed. Plans are to reclaim eight sites in 1998.

Bonds for unreclaimed mine sites on US Forest Service lands have been given to the Forest Service to complete reclamation work. These bonds are held jointly by the department and the Forest Service in accordance with a Memorandum of Understanding that has been in place for several years. The Forest Service has reclaimed three sites and may reclaim several other sites in 1998. This arrangement has worked well for the department and the Forest Service and is an example of what can be accomplished if federal and state agencies work together.

Photo 2.2 – Former Sheryl mine (Mine Permit No. 448) that was reclaimed by US Forest Service with forfeited bond money. The site is about 2 miles northeast of Custer, South Dakota.

Table 2.1 – Number of Mine Permits and Permitted Affected, Affected, and Surface Mined Disturbed Acreage				
	All Small Scale Permits	All Non-Gold Large Scale Permits	Large Scale Gold Permits[1]	All Mine Permits
Number of Permits	22	19	11	52
Permitted Affected Acres	842	2,944	3,047	6,833
Total Affected Acres	67	1,551	2,156	3,774
Surface Mining Disturbed Land Acres	60	1,281	1,674	3,015

[1] The acreage figures for large scale gold mines are separated for clarification purposes. The large scale gold mine statistics are not included in the figures for all non-gold large scale permits.

Definitions:

Small Scale Mining Permit - Permit for operations that extract less than 25,000 tons of ore or overburden per calendar year and disturb less than 10 acres of land.

Large Scale Mining Permit - Permit for operations that extract more than 25,000 tons of ore or overburden per calendar year and disturb more than 10 acres.

Permitted Affected Acres - Pursuant to SDCL 45-6B-3(1), this involves all lands permitted to be disturbed by a mining operation, including land from which overburden is to be or has been removed and land upon which overburden, waste rock, mine spoil, or mill tailings is to be or has been deposited; land which is disturbed by the building of access roads, railroad loops, warehouses, storage areas or other support facilities for the purpose of mining; and land affected by surface subsidence, unstable slopes, and other surface effects caused by underground mine workings.

Total Affected Acres - This includes all the land currently affected by the mining operations under permit. The total affected acres statistics are included in the figures for permitted affected acres.

Surface Mining Disturbed Land Acres - Pursuant to SDCL 45-6B-3(15), this includes all the land from which overburden has been removed, land upon which overburden, waste rock, mine spoil or mill tailings have been deposited, land mined which has no overburden, heap leach pads, and process ponds. The surface mining disturbed land statistics are included in the figures for total affected acres.

Table 2.2 - Reclaimed and Released Reclaimed Acres				
	All Small Scale Permits	All Non-Gold Large Scale Permits	Large Scale Gold Permits[1]	All Mine Permits
Total Reclaimed Acres	38	856	880	1,774
Reclaimed Surface Mining Disturbed Acres	30	780	646	1,456
Releasable Reclaimed Acres	18	39	310	367
Released Reclaimed Acres	0	0	0	0

[1] The acreage figures for large scale gold mines are separated for clarification purposes. The large scale gold mine statistics are not included in the figures for all non-gold large scale permits.

Definitions:

Total Reclaimed Acres - This includes all the land for which the operator completes required grading, topsoil replacement, erosion and drainage control and any required planting and seeding that the department finds has resulted or will later result in final reclamation. For large scale gold mines, these acres can be applied toward reclamation acreage credit as provided under SDCL 45-6B-97.

Reclaimed Surface Mining Disturbed Acres - Pursuant to SDCL 45-6B-86, this includes all surface mining disturbed lands for which the operator has completed required grading, topsoil replacement, erosion and drainage control and any required planting and seeding that the department finds will later result in final reclamation.

Releasable Reclaimed Acres - This includes all the reclaimed land for which reclamation surety and liability can be released as determined by the department. Such land must meet the minimum reclamation standards pursuant to ARSD 74:29:07. These figures do not include any acreage for which release of surety or liability has been granted by the Board of Minerals and Environment. The releasable reclaimed acres statistics are included in the figures for total reclaimed acres.

Released Reclaimed Acres - This includes all the reclaimed land for which reclamation surety and liability has been released by the Board of Minerals and Environment in 1997. This land has met the minimum reclamation standards pursuant to ARSD 74:29:07. The released reclaimed acres statistics are included in the figures for total reclaimed acres.

APPENDIX 1

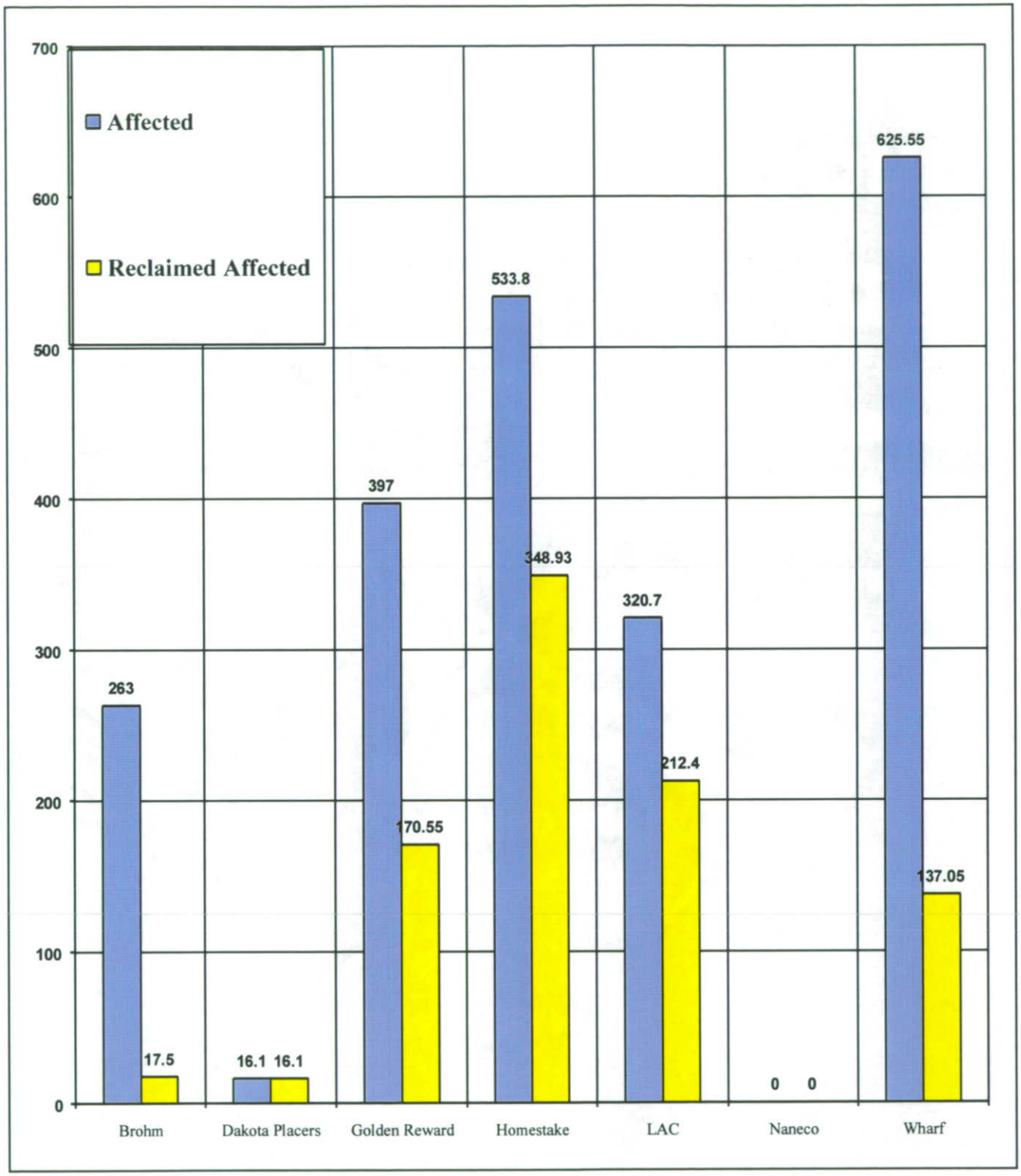

Figure 1A - Affected vs. Reclaimed Acreage at Large Scale Surface Gold Mines as of December 31, 1997.

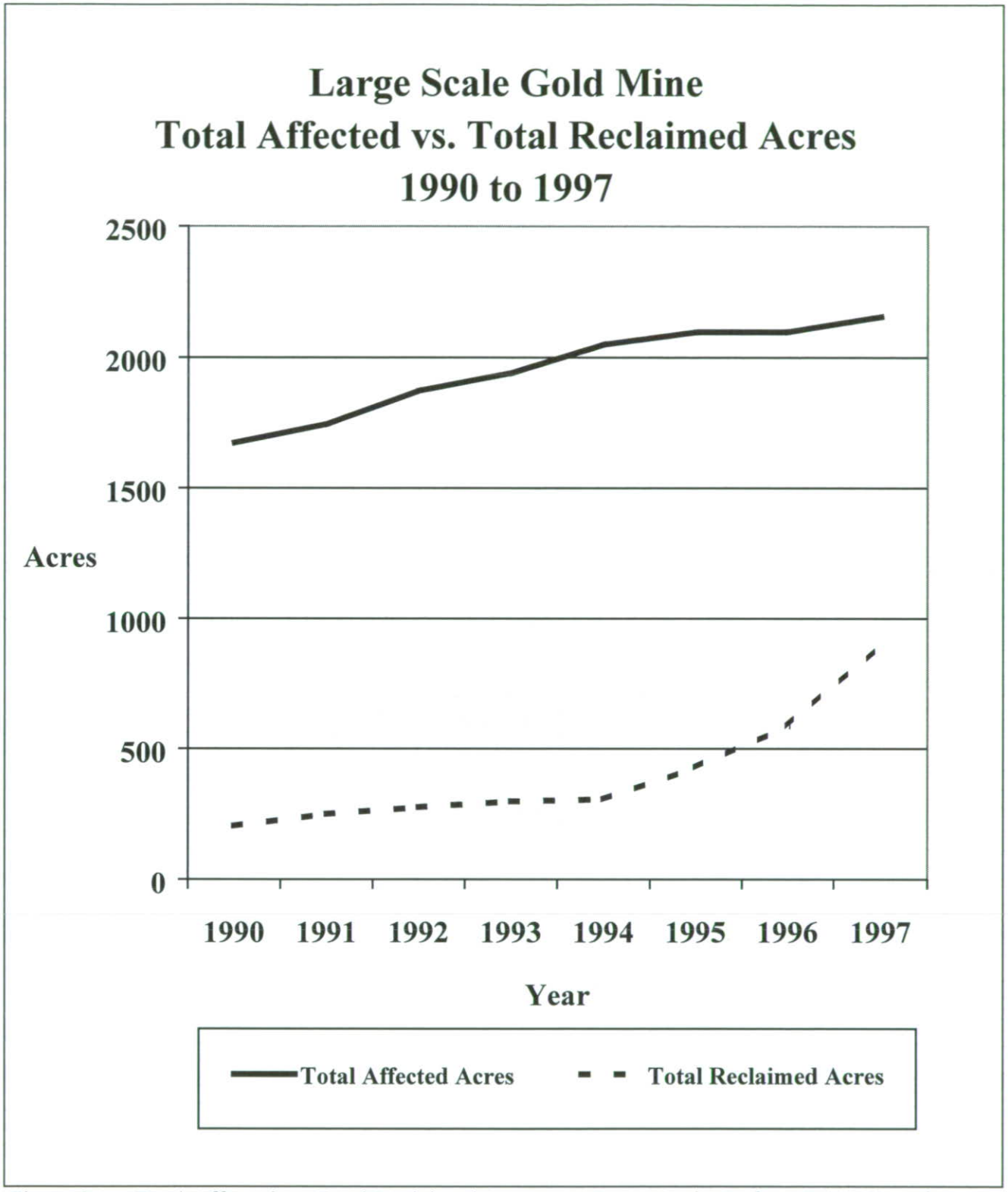

Figure 2A – Total Affected vs. Total Reclaimed Acreage at Large Scale Surface Gold Mines from 1990 to 1997