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May 19, 2023

Email: jacqueline.buchanan@usda.gov
Jacqueline A. Buchanan, Deputy Regional Forester
United States Department of Agriculture
Forest Service – Rocky Mountain Region
1617 Cole Blvd., Bldg. 17, Suite 100
Lakewood, CO 80401

Email: kprill@blm.gov
Kimberly O. Prill, Deputy State Director
U.S. Department of the Interior
Bureau of Land Management
Montana/Dakotas State Office
5001 Southgate Drive
Billings, MT 59101

RE: Newark Exploration Drilling Project
Additional Written Comments and Information
and
Department of Interior, Bureau of Land Management
Notice of Application for Withdrawal, Pactola Reservoir-
Rapid Creek Watershed: South Dakota

Dear Ms. Buchanan and Ms. Prill:

Please let this letter serve as additional supplemental written comments in respect to the Newark Exploration Drilling Project. I understand that the deadline for the submission of written comments in respect to the Newark Exploration Drilling Project has passed. I respectfully request this correspondence and enclosures be considered as additional comments because the time for additional comments was not adequate and I was unable to complete the gathering of necessary information prior to the expiration of that deadline.

I am also providing this information responsive to the Notice of Application for Withdrawal and Notification of Public Meeting, Pactola Reservoir, Federal Register, Volume 88, No. 54,

Tuesday, March 21, 2023. It is my understanding that this correspondence and enclosures must be received prior to June 20, 2023, to be considered by the United States Forest Service and the Bureau of Land Management.

I have spoken with people who attended the meeting on April 26, 2023, in Rapid City, South Dakota. I was unable to attend that meeting because of prior commitments. I did speak with Jacqueline Buchanan a number of days prior to that meeting and obtained a good understanding of your efforts and dissemination of information.

The comments that follow are a sincere fact-based summarization of considerations that both the United States Forest Service and the BLM should incorporate and consider in a mineral withdrawal application that is pending in Pactola Reservoir. In addition, and of greater importance, the additional comments should also be considered in respect to the Newark Drilling Project because an agency decision has not been made on how and whether that matter should proceed.

In summary, we believe that baseline studies, particularly focused on ground and surface water quantity and quality (remember that the French Creek area is famous for flash floods) for the Newark Exploration Project should be undertaken for a minimum period of three years during which no exploration activity should be undertaken. We further believe after the three years, entry of a 20-year moratorium would be entered in respect to the Newark Exploration Project. This is consistent with the approach and what we believe will be the appropriate end result in respect to the Pactola Reservoir-Jenny Gulch issue.

I submitted comments to the District Ranger of the Hell Canyon Ranger District on March 8, 2023. At that point in time and during the days and weeks that had passed, I was concerned that the Forest Service and perhaps the general public did not have a complete factual understanding of the ugly history of exploratory drilling and open pit mining for gold in the Black Hills. I had heard from numerous sources that there had been considerable environmental degradation and disasters as a result of gold mining activities in the Northern Black Hills, but neither the Forest Service nor anyone else was able to give me a good comprehensive summary of that history.

As a result, I contacted prior employees of the Department of Natural Resources for the State of South Dakota and asked for the identification of the person or persons employed by the State of South Dakota at the Capitol in Pierre who could provide pertinent information concerning the history of gold mining in the Black Hills. I was referred to Mark Lawrensen, South Dakota Department of Ag and Natural Resources whose phone number is 605-773-5868. On April 24, 2023, he provided me with the "Record of Decision and Explanation of Significant Differences Documents for Operable Unit 1 of Gilt Edge Mine Superfund Site." He goes on to indicate, "these documents have a section on the history of the site, which you requested." Both documents are attached for your reference and consideration.

Friday, March 25, 2022. It is my understanding that this correspondence and enclosure will be received by you on June 20, 2022, to be considered by the United States Forest Service and the Bureau of Fish, Sport and Oceans.

I have spoken with the member in meeting in April 2022 in Rapid City, South Dakota. I was able to attend that meeting because of prior commitments. I did speak with the member in meeting a number of days prior to that meeting and obtained a good understanding of your criteria and determination of information.

The concern that I have is that the information that you have provided to me is not sufficient to allow me to make a determination of whether the information is reliable and whether it should be used in the decision-making process. I would like to see the information that you have provided to me and whether it meets the criteria that you have provided.

In summary, I believe that the information that you have provided to me is not sufficient to allow me to make a determination of whether the information is reliable and whether it should be used in the decision-making process. I would like to see the information that you have provided to me and whether it meets the criteria that you have provided.

I believe that the information that you have provided to me is not sufficient to allow me to make a determination of whether the information is reliable and whether it should be used in the decision-making process. I would like to see the information that you have provided to me and whether it meets the criteria that you have provided.

I believe that the information that you have provided to me is not sufficient to allow me to make a determination of whether the information is reliable and whether it should be used in the decision-making process. I would like to see the information that you have provided to me and whether it meets the criteria that you have provided.

Prior to receipt of those materials, I went to the South Dakota Department of Ag and Natural Resources website and sought a google search of their website for Gilt Edge Mine. I was astonished to find that there were more than 60 documents or information sources within the South Dakota website that dealt with the history of the Gilt Edge Mine. In reviewing those materials, I also came across numerous items of information in respect to other open pit gold mining experiences in the Black Hills, all of which were largely negative because of the environmental degradation caused by open pit gold mining.

I will during a later portion of these comments provide some of that documentation to you for reference. Most notably is the "History of Mining Regulation in South Dakota." A copy is attached for your reference. In addition we have prepared Questions, Excerpts and Comments from the History of Mining Regulation in South Dakota 1981-2018, this consists of 18 pages of fact specific information that relate to gold mining in the Northern Black Hills. We have arranged this information chronologically from earliest to most recent and separated the comments and quotes by years. This demonstrates every stream and underground water source in proximity to mining operations has been severely and adversely impacted by exploratory drilling and subsequent mining activities by every entity that has been given permission to mine in the Northern Black Hills.

I have also provided with this letter Questions, Excerpts and Comments from "Explanation of Significant Differences Gilt Edge Mine Superfund Site Operable Unit 1. This EPA document dated September 2014, also attached, demonstrates the seriousness of the contamination and the then estimated costs of remediation, \$ 87,846,000 dollars. It is worth noting this is the second Superfund Site from Gold Mining in the Black Hills, the first being what damage was done by Homestake Mining to Whitewood Creek.

Lastly I am enclosing portions of the 142 pages of the EPA Superfund Site for review by each of you. The complete report is also enclosed.

Before we begin a summary identification of pertinent, critical facts, I would suggest that the United States Forest Service and the BLM undertake a comprehensive review of your respective files and confirm from your own files what is well hidden, hard to locate and hard to summarize within the files of the South Dakota Department of Natural Resources.

The purpose of this request is that you gain an understanding and appreciation of how the regulatory experience by your respective organizations have caused or facilitated environmental degradation in the Northern Black Hills. Every branch of government and agency both State and Federal have an obligation and responsibility to know and understand, HISTORY, the mistakes that have been made and how each of us can avoid making those mistakes moving forward.

HISTORY OF GILT EDGE MINES

As a recipient of these materials I went to the South Dakota Department of AG and found several web sites and several google results of their website for Gill Blythe. I was surprised to find that there were more than 100 documents or information sources within the South Dakota website that dealt with the history of the Gill Blythe. In reviewing these materials I also came across numerous items of information in respect to other open pit gold mining operations in the Black Hills area of which were highly negative because of the environmental degradation caused by an open pit mining.

I will also provide a portion of these comments provide some of that documentation to you in a separate document. The first document is the "History of Mining Regulation in South Dakota". A copy is attached for your information. In addition we have prepared Questions, Excerpts and Comments from the History of Mining Regulation in South Dakota 1981-2014. This consists of 12 pages of the specific information that you requested in the Northern Black Hills. We have scanned this information from your original hard copy and scanned the comments and photos by you. The document was very clear and easy to read and water source in proximity to mining operations has been well and adequately supported by exploratory drilling and subsequent mining activities by every entity that has been given permission to mine in the Northern Black Hills.

I have also provided with this letter the Excerpts and Comments from the Department of Environment, Energy and Natural Resources (DENR) regarding the Open Pit Mine. This DENR document dated September 30, 2014 also includes the comments of the Commission and the then estimated costs of remediation. \$2.87 to \$3.00 million. It is worth noting this is the second significant cost from DENR in the Black Hills the first being what damage was done by historical mining to the Wood Lake.

Lastly, I am enclosing a copy of the 14th page of the EIS requested site for review by each of you. The copy is attached.

History we have a summary identification of pertinent critical areas I would suggest that the United States Forest Service and the BLM undertake a comprehensive review of your respective files and confirm from your files what is well hidden, hard to locate and hard to summarize within the files of the South Dakota Department of Natural Resources.

The purpose of this report is that of an understanding and appreciation of how the regulatory process of your respective agencies have caused or facilitated environmental degradation in the Northern Black Hills. It is a report of government and agency actions and what have been the obligations and responsibilities to know and understand HISTORY the mistakes that have been made and how each of us avoid making those mistakes in the future.

XXXXXXXXXXXXXXXXXXXX

Although Mr. Lawrensen with the South Dakota Department of Natural Resources was not asked to provide a detailed history of how it was that the Gilt Edge Mine had become part of a Superfund Site, various incidental historical facts do appear within the Department's website. The U.S. Forest Service did not allow for exploratory drilling or operation of a gold mine by Gilt Edge without first requiring an environmental impact study to be undertaken. That was in the early '80's when an environmental impact statement was completed and the U.S.F.S. approved gold mining by Gilt Edge. The approval process granted to Gilt Edge was similar to an approval process now being followed by F3 Gold in respect to the Jenny Gulch and Newark projects.

If a moratorium had been granted and mineral withdrawal process approved, Gilt Edge would not have moved forward with their gold mining operations. A good understanding of the history of the approval process and the consequences is central to how your respective governmental agencies should move forward.

In summary, the approval by the U.S. Forest Service in the 1980's has resulted in a superfund site that has been allocated in excess of \$87 million to try and correct the environmental damage the gold mining operations caused. The reclamation is not complete. The company is bankrupt. The environmental damage is not subject to complete reclamation in any successful way and the state of South Dakota, the Federal Government, and the citizens of our country have paid a tremendous price. This history in the enclosed documents should result, at a minimum, that you involve the Environmental Protection Agency and their experience in reclamation in evaluating whether or not mineral withdrawal is appropriate for the Newark Exploratory Drilling Project and the Jenny Gulch Project.

For the Newark Project, I would very strongly recommend that you sign formal Cooperating Agreements with both the EPA and the South Dakota Department of Natural Resources, under the provisions of 40 CFR Subpart 1501.8. Bringing in special expertise as early as possible will help ensure the best possible environmental review of a project of this magnitude.

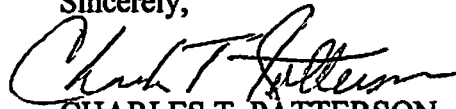
The excerpts identified above and provided as an attachment to this letter provides a pathway so that you can appreciate why this is an appropriate course to be followed in granting a 20-year moratorium for exploratory gold mining in the Southern Black Hills. If you have any questions about the accuracy of the comments that I have set forth above or the importance of the documents, I would be glad to meet with you at any times convenient. Apart from my providing information to you, I would encourage you as part of your review process to review the complete history of the Gilt Edge Mine as it appears in your respective files, the Environmental Protection Agency's files and the State of South Dakota Department of Environmental Quality's files. That substantial undertaking will result in any reasonable person not permitting exploratory drilling in the Southern Black Hills as has been proposed by F3 Gold at Jenny Gulch and at the Newark sites.

Jacqueline A. Buchanan, Deputy Regional Forester
Kimberly O. Prill, Deputy State Director

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May 10, 2023

Sincerely,

A handwritten signature in black ink, appearing to read "Charles T. Patterson". The signature is fluid and cursive, with a large initial "C" and "P".

CHARLES T. PATTERSON

For the Firm

CTP/clm

Enclosures

**QUESTIONS, EXCERPTS AND COMMENTS FROM
HISTORY OF MINING REGULATION IN SOUTH DAKOTA
1981 – 2018**

<https://danr.sd.gov/environment/mineralsmining/mininghistory.aspx>

1981

“On October 23, 1981, an 18-mile stretch of Whitewood Creek from Whitewood to the Belle Fourche River was proposed for inclusion on the National Priorities List (Superfund). The creek was severely impacted by tailings discharges from the Homestake Mining Company and other mining operations, raw sewage from the towns of Lead and Deadwood, and garbage dumps located along the creek bed. In order to eliminate the risk associated with the ingestion of arsenic contaminated groundwater, the State issued a ban on all shallow groundwater wells installed in the alluvium along the creek.”

1984

“The department issued a Notice of Violation and Order to Wharf in May as they failed to install a liner in a process pond prior to use, failed to allow a minimum of 2 feet of freeboard in ponds, and had sandbagged the overflow structures of the ponds thus preventing the release of excess water. Wharf also failed to report a possible release of cyanide into the environment within 24 hours as required. In settlement of the Order, Wharf stopped the flow of process solution to several ponds until construction was completed, repaired damage to lining systems, and hauled excess liquid to a disposal area.”

“In June, the department issued a Cease and Desist Order to Wharf as they failed to comply with the May Notice of Violation and Order. In settlement, Wharf paid a \$9,200 penalty and reclaimed several acres of relic mine tailings from the Mogul Mine in Nevada Gulch.”

1986

“The department and the US Forest Service entered into a Memorandum of Understanding to eliminate duplication of reclamation requirements and bonding for mining operations on US Forest Service administered property.”

“Brohm Mining Corporation (then Gilt Edge, Inc.) was granted a permit by the Board of Minerals and Environment for the second open pit/heap leach surface gold mine in the state.”

1987

“In December, the department issued a Complaint and Order to Brohm Mining Corporation for performing construction at its Gilt Edge gold mine without adequate erosion and sedimentation controls. Brohm also disturbed lands designated as buffer area which were not permitted for disturbance, and initiated construction of its process plant without approval of plans and specifications by the department. In settlement of the Order, Brohm agreed to pay a \$10,000 penalty.”

1988

“In November, the department issued Brohm Mining a Notice of Violation and Order for failure to report excessive leakage rates through the primary liner of its heap leach pad at the Gilt Edge Mine. Brohm failed to shut down the leach pad as required. In settlement of the Order, the company paid a \$1,000 penalty.”

“In October, the department issued a Notice of Violation and Order to Brohm Mining Corporation for failure to load the leach pad at its Gilt Edge Mine in accordance with their approved plans. In settlement of the Order, Brohm paid a \$1,000 penalty.

In October, the department issued Brohm Mining a Compliance Order due to excessive flows found in its leach pad Leak Detection, Collection and Recovery System (LDCRS). In settlement of the Order, Brohm was required to cease application of cyanide leach solution, submit a repair plan perform additional monitoring, and could not add more ore to the lead pad without departmental approval. Brohm made repairs and relined the pad during 1989, and the department acknowledged compliance with the Order in February 1990.

“Two statewide initiated measures on mining failed. One would have required all large scale surface mines to return mined land to approximate original contour. The other would have imposed an additional 4% tax on gross sales of precious metals produced by surface mining.”

1989

“In December, the department issued Brohm Mining a Notice of Violation and Order after cyanide was detected in a groundwater monitoring well located below the leach pad at Brohm’s Gilt Edge mine. A Settlement Agreement and Dismissal was signed in January 1991. The department agreed to withdraw and dismiss the Notice of Violation and Brohm agreed to reimburse the department \$4,800 for expenditures in the matter. Brohm relined the pad with an additional geosynthetic liner at a cost of approximately \$1 million.”

“In May, the department discovered that LAC Minerals’ Richmond Hill gold mine was causing a reddish discoloration of the stream in Rubicon Gulch (Bridal Veil Falls) and in Spearfish Creek from runoff at their crusher area. Although LAC denied any violation, a Consent Decree was negotiated. LAC paid \$4,115 to the Regulated Substance Response Fund.”

“The Legislature passed Governor Mickelson’s Centennial Environmental Protection Act.”

1990

“The EPA issued a Record of Decision (ROD) for the Whitewood Creek Superfund Site. The ROD detailed selected remedial alternatives primarily for protection of human health and the environment. Pursuant to a Consent Decree between the U.S. and Homestake, Homestake implemented the selected remedy.”

“The Board of Minerals and Environment adopted special, exceptional, critical or unique land rules, Chapter 74:29:10, after two public hearings. Several areas have since been added to the preliminary list of special and unique lands following public hearings including Spearfish Canyon Watershed, Craven Canyon in Fall River County, Danby Park, Bugtown Gulch near Custer, and a portion of Whjtewood Creek north of Deadwood.”

“A statewide initiated measure failed that would have limited the total amount of surface gold mining allowed in the Black Hills to 3,100 acres.”

“The Legislature passed a law required the Governor to appoint a seven-member task force to evaluate the Cumulative Environmental Evaluation and make recommendations to the Board of Minerals and Environment.”

“The Cumulative Environmental Evaluation of Black Hills surface gold mining was completed at a cost of \$250,000. All costs were paid by the mining industry.” (Additional Comment: The actual Evaluation has not been located or reviewed, but it should be compared to the \$87 million superfund cost that has been incurred to date.)

1991

“In July, the department issued Brohm Mining a Notice of Violation and Order for leakage from its leach pad at the Gilt Edge Mine. The leak caused cyanide contamination of a ground and surface water in the Strawberry and Bear Butte Creek drainages. In settlement of the Order, Brohm was required to submit reports regarding the extent of contamination; submit results of remediation and monitoring; cease addition of cyanide to circuit; continue increased monitoring; and submit plans to prevent reoccurrence in the future. Brohm agreed to pay the department a \$99,800 penalty, lower solution levels in its surge pond and install a bentonite plug in the area of leakage, permanently repair the leach pad, set up a system to treat excess solution water, post a performance bond of \$350,000, and maintain a cyanide level of not more than 220 parts per million (ppm) in the circuit.”

“The Cumulative Environmental Evaluation (CEE) task force begins deliberations by holding several public meetings statewide. Final recommendations presented to the Board of Minerals and Environment included:

A 6,000 acre limit on the total amount of land that can be affected by large scale surface gold mining at any one time.

A requirement that at least 500 acres of surface mining disturbed land to be reclaimed by September 1, 1997. If reclamation was not performed, no new permits would be issued.

A requirement that an evaluation of the reclamation standards be conducted to determine their effectiveness and whether or not they need revision.

A requirement for permit applications to comprehensively describe critical resources potentially affected as part of the application for a mine permit.

Requirements for postclosure care and bonding for reclaimed mines.

Implement existing requirements that require operators to post up to \$500,000 in financial assurance to be used in the event of a cyanide spill.
Establish annual reporting requirements for large scale surface gold mining and mineral exploration operations.”

1992

“The department discovered that LAC Minerals’ Richmond Hill gold mine was discharging AMD into Spruce Gulch, a tributary of Cleopatra Creek (formerly Squaw Creek). The discharge impacted the trout fishery in Cleopatra Creek. In December, the department issued the company a Notice of Violation and Order. In settlement of the order, the company agreed to pay \$489,000, and was required to take immediate steps to eliminate the discharge and to submit a mitigation plan in the form of a mine permit amendment.”

1993

“The department discovered that Brohm Mining’s Gilt Edge gold mine was discharging AMD from its Ruby Waste Rock Repository to the environment. In April, the department issued a Notice of Violation and Order to Brohm Mining that required it submit a mitigation plan in the form of a mine permit amendment.”

1994

“In 1994, Lawrence, Butte and Meade counties adopted county ordinances banning future excavation and construction on tailings remaining along Whitewood Creek in the Superfund area. These ordinances also detail requirements for obtaining a residential building permit when constructing on “tailings impacted soils” (soil containing arsenic at greater than 100 parts per million).”

“After a public hearing, the Board of Minerals and Environment approved LAC Minerals’ Richmond Hill permit amendment to mitigate ARD. Estimated costs exceed \$10 million and the company posted a Letter of Credit in that amount to act as reclamation surety.”

1995

“Brohm Mining Corporation completed relocation/reclamation of tailings deposits along Strawberry Creek, significantly improving the water quality and aquatic habitat in the Bear Butte Creek watershed.”

“Richmond Hill completed a cap over backfilled pit impoundment designed to provide long term closure of acid generating waste rock.”

“In September, the department issued a Notice of Violation and Order to Wharf Resources for a discharge of improperly treated cyanide solution that resulted in a fish kill in Annie Creek. In settlement of the Order, Wharf paid a \$150,000 penalty and agreed to meet additional monitoring and sampling requirements for its wastewater discharge.”

“The department entered into a Memorandum of Understanding with the EPA on the issue of protection from liability under Superfund while engaged in abandoned mine inventory and clean-up work.”

“After a public hearing, the Board of Minerals and Environment approved Brohm’s mine permit amendment to mitigate AMD. Estimated costs to implement the plan exceeded \$8 million and the company posted an additional \$7.3 million in financial assurance with the state to cover the costs. The financial assurance consisted of a \$1 million cash deposit with a \$6.3 million demand note based on the net worth of Brohm’s parent corporation, Dakota Mining.”

“The Legislature passed a bill to ban new surface mining permits on private land from rim to rim in Spearfish Canyon. The Legislature also passed a resolution that encourages the USFS to designate Spearfish Canyon as a Scenic Byway, which would effectively ban surface mining on federal land within the Canyon.”

1996

“In November, Lawrence County voters narrowly passed an initiated zoning ordinance that would effectively ban surface mining on 48,000 acres in the Spearfish Canyon watershed.”

“On August 13, 1996, EPA delisted Whitewood Creek from the National Priorities List. This delisting was due to initiating wastewater treatment in August of 1984 and remedial actions that were conducted in 1992 and 1993 to significantly lower residents’ contact with tailings and tailings contaminated soils in high use areas (yards, gardens, driveways, etc.). The site entered the Operations and Maintenance phase, which requires sampling of Whitewood Creek, monitoring of remediated residential sites for flood impacts, a yearly education program, and a five-year review of the effectiveness of the remedial action. Operation and maintenance (O & M) activities will continue for 30 years.”

“Dakota (Brohm) Mining Corporation was granted a permit by the Board of Minerals and Environment to mine Anchor Hill in an open pit/heap leach surface gold mine project, located adjacent to the existing Gilt Edge Mine. The permit was unanimously granted by the board after hearing 3 days of testimony that summarized the detailed mine operation and reclamation plan for safely managing acid generating sulfide wastes. The Anchor Hill project provides superior reclamation materials to improve upon the AMD mitigation plan for the Gilt Edge site permitted in 1995.”

1997

“Based on the NRDA, the State of South Dakota filed suit against Homestake alleging claims for natural resource damages, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), for:

recovery of natural resource damages;
lost services provided to humans and the environment by those resources;
diminished resource values and past response costs;
declaratory judgment for future response costs, with respect to alleged releases and
threatened releases of hazardous substances; and
alleged releases resulting in a continuing public nuisance.”

“A Preassessment Screen was conducted and a Natural Resources Damage Assessment (NRDA) was initiated for Whitewood Creek and the Bell Fourche and Cheyenne River Watersheds. Damages and injuries of resources and services due to hazardous substance releases from Homestake into State waters were identified and outlined. Such resources include surface and ground waters, fisheries resources, soils, sediments, vegetation, and wildlife. This project was prepared by the State of South Dakota, the U.S. Fish and Wildlife Service, and the U.S. Department of the Interior. The intent of the plan is to restore, replace and/or acquire equivalent trust natural resources and lost services within the project area for perpetual protection and conservation management.”

“In December, the department issued a Notice of Violation and Order to Wharf Resources for exceeding surface water quality standards for copper, cyanide and selenium, and the ground water quality standard for nitrate. In settlement of the Order, Wharf paid a \$40,000 penalty and funded \$160,000 of water quality projects in the northern Black Hills.”

“In February and again in September, the department issued Notices of Violation and Order to Brohm Mining for discharges of acid mine drainage (AMD) to Strawberry Creek. In settlement of the Orders, Brohm agreed to pay a total of \$13,400 into the Regulated Substance Response Fund, increase its environmental surety by \$465,000, and submit a contingency plan to address the prevention of AMD discharge.”

“Homestake and Brightwater reclaimed the Red Placer claim (formerly Dakota Placers Mine Permit no. 208) along Whitewood Creek.”

“In February, Brohm Mining was approved to mine the Southeast Langley deposit. In May, Brohm was approved to commence mining on the non-US Forest Service portion of Anchor Hill Phase II. Because of delays in completing the environmental impact statement (EIS) for the Forest Service Portions of Phase II, Brohm temporarily suspended mining in September until the EIS process is complete.”

“In June, large scale surface gold mines met the 500-acre reclamation requirement pursuant to state statute. If the 500-acre reclamation had not been met by September 1, 1997, a moratorium would have been placed on the issuance of new permits for large scale surface gold mines. As the 500-acre goal was met, the Board of Minerals and Environment conducted a hearing in July to review the state reclamation standards for large scale surface gold mines. The board inspected reclamation efforts at the five major surface gold mines

recovery of natural resources damaged
lost services provided to farmers and the environment by those resources
which had been removed and past resource costs
documentary program for future response costs with respect to alleged losses and
that a cost-benefit analysis of the project and
alleged losses resulting in a continuing public nuisance.

The Assessment Report was conducted and a Natural Resources Damage Assessment
(NRDA) was initiated for Whitford Creek and the Bell Fork and Christian River
watersheds. Data on the location and status of resources and services due to hazardous substances
released from the state into the state waters were identified and outlined. Such resources
included surface and ground water, fisheries resources, soils, sediment, vegetation and wildlife.
This project was approved by the State of South Carolina, the U.S. Fish and Wildlife
Service and the U.S. Department of the Interior. The intent of the plan is to restore riparian
and other aquatic dependent natural resources and lost services within the project area
for riparian protection and conservation management.

In 1990, the department issued a Notice of Violation and Order to Wharf Resources
for a secondary water quality standard for copper, cyanide and selenium, and the
ground water quality standard for nitrate. In settlement of the Order, Wharf paid a \$40,000
penalty and funds \$160,000 of water quality projects in the northern Black Hills.

The Wharf and a gain in September the department issued Notice of Violation and Order
to Wharf Mining for discharges of acid mine drainage (AMD) to Strawberry Creek. In
settlement of the Order, Wharf agreed to pay a total of \$17,500 into the Regional
Substance Response Fund, finance its environmental study by \$405,000, and submit a
contingency plan to address the prevention of AMD discharge.

Wharf and Wharf Mining retained the Red Black claim (formerly Dakota Placers
in the 1980s) along Whitford Creek.

The Wharf Mining was approved to mine the Southeast Energy deposit in Minn.
Wharf was approved to commence mining on the non-US Forest Service portion of Anchor
Hill Phase II. Because of delays in completing the environmental impact statement (EIS)
for the Forest Service portion of Phase II, Wharf temporarily suspended mining in
September until the EIS process is complete.

In June, the state surface gold mines met the 500-acre reclamation requirement pursuant
to state statute. The 500-acre reclamation had not been met by September 1, 1997, a
monetary penalty had been placed on the issuance of new permits for large scale surface
gold mines. As the 500-acre goal was met, the Board of Minerals and Environment
conducted a hearing in July to review the state reclamation standards for large scale surface
gold mines. The board inspected reclamation efforts in the five major surface gold mines

and conducted a public hearing on the effectiveness of South Dakota mine reclamation laws. At the end of the hearing the board, on an unanimous vote, found the existing South Dakota reclamation standards to be effective.”

1998

“In December, the department issued a Notice of Violation and Order to Homestake for violations of water pollution control laws. Cyanide and heavy metals from mine tailings and slurry were unintentionally released into Whitewood Creek and resulted in two separate fish kills. In settlement of the Order, Homestake paid \$150,000 into the Regulated Substance Response Fund, paid the City of Lead \$50,000 to separate the stormwater flows from the Lead sewer system, completed a thorough assessment of its process facility to identify and correct any problems that could cause future releases, and completed biannual aquatic assessments of Whitewood Creek for three years.”

“In September, the department issued a Notice of Violation and Order to Brohm Mining for exceedances of three parameters (cadmium, copper and zinc) of its surface water discharge permit. Brohm was ordered to immediately comply with the requirements of its surface water discharge permit and promptly sample and analyze the flow at several compliance points for all parameters. The settlement was never resolved, as Brohm’s parent company was forced to file for bankruptcy in 1999.”

“Homestake also ended mining operations in the Open Cut in 1998. After mining operations were temporarily suspended after a March 21, 1998 landslide in the pit, in early April, Homestake resumed mining on a smaller scale. Mining continued in the Open Cut until mid-September when the last ore was hauled out.”

“Brohm shut down its mining operation in August 1997 to wait for EIS approval. The delay in getting Forest Service approval added to Brohm Mining’s on-going financial difficulties. On May 21, 1998, Dakota Mining Corporation, Brohm’s parent, notified the state that because of its on-going financial difficulties it would abandon the Gilt Edge Mine on May 29, 1998. In response, on May 29, 1998, the state filed for, and was granted, a temporary restraining order by Judge Scott Moses that prevented Brohm from abandoning the site. On June 5, 1998, Judge Warren Johnson executed a Preliminary Injunction that extended the terms of the temporary restraining order. Brohm was able to find financing to maintain the site throughout 1998. At year’s end, Brohm pursued financing for a spring 1999 start for Phase II of the Anchor Hill Project.”

“Brohm Mining’s plans to mine Phase II of the Anchor Hill Project were delayed. In November 1997, the US Forest Service issued the final Environmental Impact Statement (EIS) and a Record of Decision (ROD) that would allow Brohm to proceed with the project. In early January 1998, several parties appealed the Forest Service decision. In February 1998, the Forest Service withdrew its approval of the project, citing deficiencies in the EIS. The deficiencies were corrected and a new supplemented EIS and new ROD were issued

and conducted a public hearing on the effectiveness of South Dakota mine reclamation law. At the end of the hearing the board on an unanimous vote found the existing South Dakota reclamation standards to be effective.

1991

The Department issued a Notice of Violation and Order to Reconstitute in violation of water pollution control laws. Cyanide and heavy metals from mine tailings and slurry were inadvertently released into Whitewood Creek and resulted in two separate fish kills. In settlement of the Order, Homestake paid \$150,000 into the Reclamation Fund. In settlement of the Order, Homestake paid \$250,000 to separate the slurry from the fund so the fund so the system completed a thorough assessment of its process facility to identify and correct any problems that could cause future releases and completed financial audits as required by Whitewood Creek for three years.

The Department issued a Notice of Violation and Order to Reconstitute in violation of three parameters (ammonium, copper and zinc) of its surface water discharge permit. Brian was ordered to immediately comply with the requirements of the permit's water discharge permit and promptly sample and analyze the flow at several compliance points for all parameters. The settlement was never resolved as Brian's parent company was forced to file for bankruptcy in 1997.

Operations also ended mining operations in the Open Cut in 1992. After mining operations were a majority suspended after a March 21, 1992 landslide in the pit in early April, Homestake resumed mining on a smaller scale. Mining continued in the Open Cut until mid-September when the last ore was hauled out.

Brian shut down the mining operation in August 1997 to wait for EIS approval. The delay in getting Forest Service approval added to Brian's financial difficulties. On May 2, 1998, Dakota Mining Corporation, Brian's parent, notified the state that because of its on-going financial difficulties it would abandon the EIS. In response on May 29, 1998, the state filed for and was granted a temporary restraining order by Judge Scott Alvord that prevented Brian from abandoning the site. On June 4, 1998, Judge Warren Johnson entered a preliminary injunction that extended the terms of the temporary restraining order. Brian was able to find financing to maintain the site throughout 1998. A year and a half Brian pursued financing for a spring 1999 start for Phase II of the Anchor Hill Project.

Anchor Hill plans to mine Phase II of the Anchor Hill Project were delayed. In November 1997, the US Forest Service issued the final Environmental Impact Statement (EIS) and a Record of Decision (ROD) that would allow Brian to proceed with the project. In early January 1998, several parties opposed the Forest Service decision. In February 1998, the Forest Service withdrew its approval of the project citing deficiencies in the EIS. The deficiencies were corrected and a new supplemented EIS and new ROD were issued.

in July 1998. In September 1998, Earthlaw, on behalf of several parties, appealed the Forest Service decision. On October 29, 1998, the Forest Service denied the Earthlaw appeal. No subsequent appeals were filed for the remainder of 1998.”

1999

“DENR and the Department of Game, Fish and Parks (GFP), along with the U.S. Department of Interior (DOI), entered to a Memorandum of Agreement (MOA) in order to coordinate and organize restoration efforts in the Whitewood Creek NRDA. The MOA created State and Federal Approving Officials to authorize expenditure of Homestake Mining Company Natural Resource Restoration Fund monies. The Approving Officials created a Restoration Management Team consisting of technical experts from DENR and GFP, and the U.S. DOI.”

“A Consent Decree of the 1997 NRDA lawsuit was negotiated, in which Homestake agreed to:

Pay a \$4 million settlement into the Homestake Mining Company Natural Resource Restoration Fund.

Pay the United States \$500,000 for reimbursement of natural resource damage assessment incurred costs.

Pay the Cheyenne River Sioux Tribe \$500,000 for future environmental monitoring or other environmental purposes. Homestake also agreed to transfer by gift deed, 400 acres of land from its holdings within the Black Hills area to the tribe for non-commercial purposes.

Develop a land exchange for BLM lands alleged to be contaminated by tailings.”

“The state took immediate action to prevent acid water from leaving the mine site. Governor William J. Janklow authorized the department to begin paying for water treatment from the Regulated Substance Response Fund, a state fund created to respond to environmental emergencies. Steps were also taken to transfer Brohm’s \$6 million reclamation bond into a state account so that funds would be available for reclamation work at the mine site.”

“In early 1999, Brohm was in the process of settling a lawsuit with Earthlaw and was working with the US Forest Service to complete the operating plan for Phase 2 of the Anchor Hill Pit. Because of delays in obtaining Forest Service permission to mine the Anchor Hill project, no cash flow, low gold prices, and creditors no longer willing to pay for environmental compliance work, Brohm Mining Corporation’s parent, Dakota Mining Corporation, declared bankruptcy in Canada on July 8, 1999. The bankruptcy was filed just days before the settlement agreement was reached on the Earthlaw lawsuit.”

2000

“In May, the department issued a Notice of Violation and Order to Wharf for violating certain affluent limits of its surface water discharge permit. In settlement of the Order, Wharf paid a \$9,120 fine to the department and agreed to make changes to its water management and treatment processes to prevent future violations.”

“On August 1, 2000, EPA and the Bureau of Reclamation took over acid water treatment operations and management of the Brohm Mine from the State of South Dakota. Before EPA took over, the state had funded water treatment and site maintenance beginning in July 1999. On December 1, 2000, EPA listed the mine on the Superfund National Priorities List, which made it eligible for remedial Superfund money to reclaim the mine. EPA was developing Records of Decision for interim water treatment and for capping the waste rock dump. The agency is also preparing feasibility studies for final closure of the site. Regrading of the Ruby Waste Rock Dump began late in the year to prepare it for capping.”

2001

“The Board of Minerals and Environment approved release of reclamation liability for 16.1 acres at the Red Placer Mine northeast of Deadwood. This mine was operated by Dakota Placers and others since the mid-1970’s and was reclaimed by Homestake and Brightwater. This was the second large scale placer gold mine to be released by the board.”

“On August 7, 2001, a Notice of Violation was issued to Wharf for violating pond leakage reporting and repair requirements of its mine permit and selenium effluent limits of its surface water discharge permit. In settlement of the Notice of Violation, Wharf paid a \$31,3892 penalty and agreed to improve compliance with pond leakage requirements and install a system capable of treating selenium to surface water discharge permit standards.”

“The Board of Minerals Environment approved an increase in Wharf Resources’ reclamation bond from \$3 million to \$12 million.”

“Wharf Resources announced that it would close the Golden Reward Mine and begin final reclamation in 2002. The mine was under temporary cessation since 1997.”

“Reclamation activities at the Gilt Edge Mine continued throughout 2001. Reclamation efforts concentrated on getting the Ruby Gulch waste rock dump, the major source of acid mine drainage at the site, ready for capping. About 1.4 million cubic yards of material was moved in order to reduce slopes to a 3.4:1 slope.”

2002

“The department issued Wharf an amended order concerning the repair of liners for the Pregnant and Contingency Ponds. Wharf failed to comply with the requirements of the August 7, 2001 Notice of Violation when it did not submit mitigation or repair plans for the Pregnant and Contingency Pond liners when leakage through the primary liner of the

ponds exceeded and required reporting thresholds. Wharf agreed to complete liner repairs to these ponds and comply with the Response Action Plan.”

“In August, the Gilt Edge water treatment plant was shut down in order to convert it from a caustic system to a high density sludge lime treatment system.”

“The focus of reclamation activity at the Gilt Edge Mine during 2002 was the capping the Ruby waste rock dump, the major source of acid mine drainage at the site. The majority of the capping system was completed by the end of the year. The main component of the cap was an 80-mil polyethylene geomembrane liner. Approximately 62.9 acres of liner was installed.”

2003

“In October, the Board of Minerals and Environment approved the department’s recommendation to increase Wharf’s postclosure bond from \$1,000,000 to \$8,115,055. The increase was necessary to cover water treatment costs during a projected 50-year postclosure period that would begin after reclamation activities are completed. During the same hearing, the board approved a reduction of Wharf’s reclamation bond from \$12,411,350 to \$10,730,400 due to lower water treatment costs.”

“Wharf Resources was issued a notice of violation by the department for violating its surface water discharge permit limits for total ammonia in its denitrification plant discharges. The company also violated its ground water discharge permit and drinking water limits for nitrates, and drinking water limits for total coliform. As a result of the notice of violation, Wharf entered into a settlement agreement with the department. In the settlement agreement, Wharf agreed to pay \$162,000 in civil penalties. Wharf also agreed to submit plans to the department to comply with surface water standards for total ammonia and ground water and drinking water standards for nitrates.”

“Significant progress was made on plans to convert the Homestake Mine into an underground national laboratory to study neutrinos and other sub-atomic particles. Governor Rounds was instrumental in working out an agreement with Barrick Gold, Homestake’s parent company, to allow for the transfer of the mine to the state for use as an underground laboratory. Governor Rounds also convinced the state Legislature to support plans for accepting the mine and to provide funding to the state Science and Technology Authority to prepare for the transfer. The lab needed approval and funding by the National Science Foundation before the transfer occurred.”

“A major milestone at the Gilt Edge Mine was reached in 2003. Construction and revegetation of a 62.9 acre geosynthetic cap covering the Ruby Waste Rock Depository, which was a major source of acid mine drainage at the mine, was completed. The cap has been successful in controlling formation of acid rock drainage (ARD) in the depository. Also, the cap and subsequent ditch grouting have reduced the amount of ARD generated

by the depository by about 80 percent. Water treatment at the site also resumed when a new lime treatment plant began operating in September. The plant replaced a caustic treatment system.”

2006

“A major milestone was reached in 2006 as Homestake Mining Company became the first major large scale gold mine to have liability released for reclaiming land it mined. In April, the Board of Minerals and Environment granted Homestake partial release of reclamation liability for 499.74 acres of affected land at its Open Cut surface mine in Lead. This is the single largest block of acreage the board had ever released from reclamation liability.”

2008

“In April 2008, Wharf Resources was issued a notice of violation and order by the South Dakota Department of Environment and Natural Resources for violations of its surface water discharge and mine permits. The violations were a result of biomass sludge discharges from its bio-treatment facility into Annie Creek. Wharf was required to upgrade its water treatment system, evaluate and clean up short stretches of two creeks below the mine, and pay a \$149,300 penalty.”

“An agreement was reached with Homestake’s parent company Barrick to blend underground mine water with water from the Grizzly Gulch Tailing Impoundment and treat it in the existing Homestake Water Treatment Plant. It was expected the water level in the mine would be pumped below the 4,850-foot level by spring 2009 so that physics experiments could begin in an interim lab at that level later in the year. The interim laboratory would allow some experiments to begin while the plans for the laboratory at the 7400 level are being developed.”

2009

“In January, the Board of Minerals and Environment released Golden Reward’s reclamation liability for 401 acres of land at its mine site near Lead. This was the second largest block of acreage the board has ever released from reclamation liability. Golden Reward is the first large scale heap leach gold mine to have reclaimed land released from reclamation liability. The board also accepted the company’s postclosure plan, set a 30-year period for postclosure care and maintenance, and accepted a \$1,767,077 bond to cover monitoring and maintenance of the site during the postclosure period.”

2010

“In September 2010, the department received a Request for Determination of Special, Exceptional, Critical, and Unique Lands from Wharf Resources for its proposed mine expansion project approximately 3 miles west of Lead. This is the first step in the process of obtaining a large scale mine permit for the project. Wharf will affect approximately 430 acres during the seven year life of the expansion project. It will involve open pit mining and the use of waste rock to backfill previously mined areas. Ore extracted from the expansion areas will be trucked to the existing permitted Wharf Mine heap leach facility

for processing. Neutralized spent ore will be deposited in permitted facilities which may include the current American Eagle and Deep Portland Pits. The land will be reclaimed to woodland grazing, recreation, and residential and commercial development. Wharf submitted a mine permit application for the expansion in March 2011, and a public hearing on the application is anticipated in late 2011 or early 2012.”

2011

“The board also approved increasing Wharf’s reclamation bond to \$32.8 million and postclosure bond to \$30.8 million to cover increased reclamation and long term water treatment costs from the expansion project.”

2015

“In October, the Board of Minerals and Environment released LAC Mineral’s reclamation liability for 265.94 acres of land at its Richmond Hill Mine near Lead. This is the second large scale heap leach gold mine to have reclaimed land released from reclamation liability. The board also accepted the company’s postclosure plan, set a 100-year period for postclosure care and maintenance, and accepted a \$19,667,216 bond to cover monitoring and maintenance of the site during the postclosure period. The board has now released reclamation liability for 1,201.05 acres affected by large scale gold mines in the Black Hills.”

2016

“On January 29, the U.S. Court of Appeals for the District of Columbia Circuit ordered the Environmental Protection Agency (EPA) to initiate proposed rulemaking on financial assurance requirements under Section 108(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the hard rock mining industry by December 1, 2016. The court also ordered EPA to provide notice of its final action by December 1, 2017. Proposed rules were issued by EPA on December 1, 2016.”

2017

“In April, remediation work resumed at the Gilt Edge Mine Superfund site. Funding from potential responsible party settlement payments allowed EPA to resume work at the site. The main emphasis for this phase of the project is the partial backfilling of the Sunday and Dakota Maid Pits. In 2017, the EPA contractor removed sludge from and began partially backfilling the Sunday Pit with spent ore for the leach pad and blasted material from the reduction of the Union Hill highwall. It also constructed a new sludge cell, pipeline system, and access road.”

2018

“In August, DENR and the US Forest Service entered into a revised Memorandum of Understanding (MOU). This is the first major revision to the MOU since its inception in the late 1980’s. The revised MOU combines the previous mine permit and exploration notice of intent MOU and a previous MOU for mine licensed operations into one document.

It also updates the terms for interactions between the two agencies regarding reclamation requirements and bonding for mining operations on US Forest Service administered property.”

“On February 12, 2018, EPA, the state of South Dakota, and a mining company entered into a contract to conduct a hydrogeologic study of the area to better define geology, structure, contaminant sources, and groundwater flow at the Gilt Edge Mine.”

“Remediation work continued at the Gilt Edge Mine. In 2018, the EPA contractor removed sludge from and partially backfilled the Dakota Main Pit. Partial backfilling of the Sunday Pit was also completed. Activities under this phase were completed in September 2018.”

**QUESTIONS, EXCERPTS AND COMMENTS FROM
“EXPLANATION OF SIGNIFICANT DIFFERENCES”
GILT EDGE MINE SUPERFUND SITE OPERABLE UNIT 1
EPA ID: SD987673985; LEAD, SOUTH DAKOTA – SEPTEMBER 2014**

The Table of Contents for this document reflects 20 pages. I am attaching pages 3, 4, 5, 6 and 7 for your initial review. This document dated 2014 is now nearly a decade old, but it provides insights as to the extent of environmental damage and contamination that has occurred as a result of gold mining in the Northern Black Hills.

Please note the contamination sources result from disturbed buried mineralized rock and induced pathways for contact with oxygen (atmospheric air) and water (precipitation or groundwater). The contamination sources can contain iron, copper, cadmium, zinc, nickel, lead, arsenic and many other metals in various concentrations depending on the source of the rock. The contamination can be slightly acidic to very acidic. When contamination is generated from a source, it often flows into surrounding ground and surface water and contaminates those waters as well.

The report notes the contamination sources come from materials both above and below ground.

Page 18 of the report references the modified remedy proposed and the subject of this report is at an estimated cost of **\$87,846,000**. The footnote indicates costs of the modified remedy has an accuracy between -30% to +50% of actual cost.

Although not reflected in this report, reliable sources have informed me that currently the estimated costs of remediation will exceed \$200 million.

The contamination sources documented by the Environmental Protection Agency indicate that there has been and is a continuing negative impact on all surface and groundwater for drainages from the Gilt Edge mining disaster.

In summary and by conclusion, one must seriously question how any reasonable objective person could approve new exploratory gold mining efforts in an area of the Black Hills National Forest that does not suffer from the major multi-generational environmental degradation so well documented by the Environmental Protection Agency.

2.0 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The topography of the Gilt Edge Mine Site is rugged and mountainous and the elevation ranges from approximately 5,320 to 5,520 feet above mean sea level. The Site straddles the headwaters of Strawberry Creek and Ruby Gulch, which are tributaries to Bear Butte Creek. Strawberry Creek and Bear Butte Creek are perennial streams classified by South Dakota surface water quality standards as coldwater marginal fish life propagation waters and coldwater permanent fish life propagation waters, respectively. Ruby Gulch ranges from an ephemeral to intermittent stream where surface water is present during the spring and after large precipitation events. South Dakota surface water quality standards classify all streams including Ruby Gulch, Strawberry Creek, and Bear Butte Creek as irrigation, fish and wildlife propagation, recreation, and stock watering waters.

Major features of the Site include the 31-acre Sunday Pit and the 14-acre Dakota Maid Pit, both of which are underlain by extensive underground workings and a relic tailings repository, and the 28-acre Anchor Hill Pit. The Langley Pits are two smaller pits that have been partially backfilled and do not contain water. The heap leach pad (HLP) covers 37 acres with waste material reaching 150 feet in height. The Ruby Repository was constructed to cover the Ruby Gulch Waste Rock Dump; it is approximately 75 acres in size, and contains approximately 20 million tons of waste rock and spent ore. Figure 1 shows the main Site features.

The following sections describe the Site history, contamination and selected remedy.

2.1 Site History

Mining began at the Site in 1876 when the Gilt Edge and Dakota Maid mining claims were located. Sporadic mining by numerous operators were conducted at the Site until the early 1920s. Early gold miners developed extensive underground workings that wind through the central portion of the Site. From 1935 to 1941, the mines at the Site were in steady production and the underground workings were expanded.

Beginning in the 1970's, an extensive mine development program at the Site was initiated to investigate potential production gold or other minerals. Mine operators engaged in extensive exploration activities including both surface and underground exploration.

In 1986, Brohm Mining Company (BMC) commenced development of a large scale open pit, cyanide heap leach gold mine operation. Mining activities generated ARD and the mining permit required BMC to collect and treat ARD water from the Site. In 1999, BMC abandoned the Site and the water treatment responsibilities. The State of South Dakota immediately responded and took responsibility for collecting and treating ARD. At the request of the State, EPA listed the Site on the National Priorities List (NPL) in 2000.

EPA issued an Early Action Interim Record of Decision for OU2 in April 2001 to continue water treatment activities previously assumed by the State, followed by an Interim Record of Decision for OU2 in November 2001. The interim OU2 remedy included the diversion of ARD from various seeps and mine pits, and conversion of the existing water treatment plant (WTP) to a lime precipitation or a metals-coordination precipitation system. Construction of the WTP conversion was completed in August 2003, and water treatment activities are ongoing. Contaminated water is collected at various facilities at the Site and stored until it is treated and discharged to Strawberry Creek through an effluent discharge line. In addition, during the past several years of operation EPA and SD DENR constructed several water diversion structures to keep uncontaminated runoff from entering the water treatment conveyance system. The Site

currently generates an average of 95 million gallons of ARD per year (ranging from 49 to 125 million gallons), which is collected and treated before discharge into Strawberry Creek.

EPA issued the Interim Record of Decision for OU3 in August 2001 to address contamination associated with the largest ARD source on the Site, the Ruby Gulch Waste Rock Dump. This remedy created the Ruby Repository by regrading waste rock that was previously deposited in the upper Ruby Gulch drainage and constructing a composite cap consisting of geomembrane liner covered by soil and vegetation. Lateral drainage structures (diversion ditches) were also installed to divert surface water runoff around and off of the cap system. The planned repository construction was completed in 2006. However, additional work was performed from 2009 through 2011 to reduce leaking of the diversion ditches into the Ruby Repository. Additional leakage areas were identified in 2012 and will be addressed in a final record of decision for OU3.

EPA issued the OU1 ROD in September 2008, selecting a remedy focused upon containment of contaminant sources (acid generating waste rock and fills, exposed acid generating bedrock, and sludge) within the primary mine disturbance area to prevent direct exposure to metals containing materials and to reduce the generation of ARD and subsequent contamination to surface and ground water.

2.2 Contamination Sources

ARD is acidic metal laden water that is formed when iron sulfide minerals (such as pyrite) are exposed to oxygen and water. This scenario frequently occurs at mine sites. Mining activities disturb the buried mineralized rock and introduce pathways for contact with oxygen (atmospheric air) and water (precipitation or groundwater). As oxygen and water flow over the iron sulfide minerals the minerals are oxidized and form sulfuric acid which then leaches other metals from the mineralized rock. The surrounding water becomes contaminated with the acid, sulfate, and metals. ARD is contaminated water that can contain iron, copper, cadmium, zinc, nickel, lead, arsenic and many other metals in various concentrations depending on the source rock. ARD can be slightly acidic, at pH 5 or 6, to very acidic, with pH 2 or below. When ARD is generated from a source material it often flows into surrounding ground and surface water and contaminates those waters as well.

At the Gilt Edge Mine Site, ARD is generated by numerous source materials both above and below ground. These sources include fill materials, HLP spent ore, exposed pit highwalls, amended tailings, sludge and underground mine workings and boreholes.

Fill materials were generated during previous mining related activities and had been used to build features such as roads and flat surfaces for building areas. These fills are acid generating.

The HLP contains a large volume of acid generating spent ore. This rock was processed during mining operations with cyanide to extract gold. The spent ore was left in place on the HLP liner system. ARD that is generated by the HLP is collected and transferred to the Site water treatment circuit.

Exposed pit highwalls have a high potential to continue to generate ARD. Pit highwalls encompass large areas of exposed mineralized rock that include unconsolidated rock that has sloughed from the highwalls onto the safety capture benches.

Amended tailings are acid-generating tailings that were mitigated by BMC with the addition of alkaline fly ash. The amended tailings were placed in two repositories, capped with a low permeability clay cover, and revegetated. The amended tailings repositories are located on the north highwall of Dakota Maid Pit and the east highwall of Sunday Pit.

Sludge was generated by water management and treatment activities and can be a source of contamination, because it contains toxic metals removed from the ARD including arsenic, cadmium, chromium, copper, lead, nickel, and zinc. Sludge is currently located in Anchor Hill Pit, Sunday Pit, Dakota Maid Pit, constructed ponds, and the sludge storage cell.

The underground mine workings produce ARD that contaminates the groundwater. The groundwater then seeps out of the ground in certain areas of the Site causing contamination of the surface water. A complex network of shafts, exploratory boreholes, adits, and stopes are present in the central portion of the Site. These underground mine workings were developed prior to open pit mining. Some of these workings have been intersected during construction of the mine pits. The lower level King workings (under the Dakota Maid Pit) and the Rattlesnake workings (under Sunday Pit) are a continuous source of ARD generation causing an impacted groundwater plume. In addition, the Langley adit is a mine portal that discharges ARD conveyed through the Langley mine workings to the Strawberry Creek drainage within the mine disturbance area on an intermittent basis.

2.3 Summary of the OU1 ROD Selected Remedy

In September 2008, EPA issued the OU1 ROD to implement a remedial strategy that emphasizes consolidation and containment of contaminant sources throughout the Site to reduce exposure to hazardous substances and reduce the volume of acid rock drainage generated. The primary objective of this remedy is to reduce the amount of ARD generated on Site by preventing surface water from interacting with acid-generating materials. Acid-generating mine wastes will be consolidated and covered to the extent practicable. Cover systems will be employed to limit infiltration of precipitation and subsequent generation of ARD.

The remedial action objectives (RAOs), listed below are unchanged from the OU1 ROD:

- Manage ARD source materials to reduce the volume of ARD that requires on Site treatment
- Reduce or eliminate the risk of an uncontrolled release of ARD from the Site as a result of a 100-year, 24-hour storm event
- Ensure that low intensity recreational Site users and commercial workers have no more than a 1×10^{-4} chance of contracting cancer from ingestion and inhalation of Site soils
- Ensure that low intensity recreational Site users and commercial workers are protected against non-cancer effects through inhalation and ingestion of surface soils for contaminants that exceed a hazard index of greater than or equal to one
- Reduce risks to terrestrial ecological receptors through control of mine waste
- Implement institutional controls to prevent the unacceptable uses of groundwater that pose human or ecological risks
- Implement institutional controls that limit residential and off-road motorized vehicle rider use and allow only low intensity recreational Site users and commercial workers
- Ensure the remedy is compatible with existing and future RODs for the Site

The OU1 ROD designates Anchor Hill Pit as the primary storage location for ARD prior to treatment at the WTP. The OU1 ROD also specifies covering the Upper South Ruby area to

complete the Ruby Repository cover, constructed as the OU3 Interim ROD remedy, and allows for upgrades as necessary to the WTP that is operated under the OU2 Interim ROD.

The OU1 ROD selected remedy includes the following:

- Removal, consolidation, and containment of acid-generating waste materials and fills within mine pits and creation of clean water corridors within the Upper Strawberry Creek and Hoodoo Gulch drainages.
- All mine waste with arsenic concentrations above 1,125 mg/kg and/or thallium concentrations above 200 mg/kg will be managed through containment using covers or through engineered controls.
- Excavated materials will be placed primarily in Dakota Maid and Sunday Pits and covered.
- Waste rock and fill will also be consolidated and covered in the Langley Benches/pits and Upper South Ruby remediation subareas.
- Remove the majority of the spent ore from the HLP. Some spent ore would be left in place to protect the existing liner system. The remaining spent ore will be contained with a liner to reduce ARD generation and facilitate disposal of sludge as part of OU2.
- The surface of the entire HLP and extension will be available for future sludge generation from the WTP. WTP sludge would be disposed of at this location in disposal cells constructed as part of OU2.
- Sequence the placement of waste materials in the pits so that materials with the lowest ARD generating potential are placed at the lowest levels in the pits where groundwater may interact with placed materials. Waste materials with higher ARD generating potential will be placed at higher levels in the pits above the groundwater level to prevent interaction with groundwater. This is expected to reduce future groundwater contamination.
- Implementation of cover systems at contaminant source consolidation locations to limit infiltration of precipitation and subsequent ARD generation. Wastes consolidated in Dakota Maid and Sunday pits will be covered. Langley Benches and the Upper South Ruby area will be covered.
- Exposed acid-generating bedrock in the lower highwalls of the Dakota Maid Pit and Sunday Pit and surficial sludge within these pits will be addressed incidental to the backfilling and covering of the pits.
- Soil stockpiles now stored in the HLP extension will be used for reclamation or cover construction. Removal of soil stockpiles from the HLP extension will provide additional area for sludge disposal cells constructed as part of WTP operations under OU2.
- Topsoil and subsoil resources remaining after cover construction will be used to cover and revegetate (reclaim) parent ground and fill zones exposed during contaminant source removal.
- Sludge in the bottom of Dakota Maid Pit, Sunday Pit, and the Stormwater Pond will be removed and placed on the HLP adjacent to the WTP sludge currently stored at the HLP extension. Sludge removal from the pits is expected to reduce a source of high contaminant mass loading which would be in contact with the groundwater in the lowest portions of the pits. Removal of sludge is also expected to improve the implementability of backfilling the pits with other waste materials as the sludge obscures the underground workings within the bottom of the pits and the sludge is not dense enough to allow the use of heavy equipment operation on top of the sludge. These issues cause safety concerns.

completed the design before any cover construction as the OUS Interim ROD remedy and allows the remedial work to be completed under the OUS Interim ROD.

The OUS ROD includes the following:

- Removal, consolidation, and containment of acid-generating waste materials and HLLP within the pits and creation of clean water conditions within the Upper Sundry Pit and Dakota Main Pit.
- All pits with arsenic concentrations above 1.125 mg/kg and/or thallium concentrations above 200 mg/kg will be managed through containment using covers or through lined concrete.
- Excavated material will be placed primarily in Dakota Main and Sundry Pits and covered. Material not placed in pits will also be consolidated and covered in the Sundry Pit and Dakota Main Pit.
- Remove the majority of the spent ore from the HLLP. Some spent ore would be left in place to protect the existing liner system. The remaining spent ore will be contained with a liner to reduce AAD generation and facilitate disposal of sludge as part of OUS.
- The surface of the Sundry HLLP and extension will be available for future sludge generation from the WTP. Sludge would be disposed of at this location in disposal cells constructed as part of OUS.
- Reduce the placement of waste materials in the pits so that materials with the lowest AAD generating potential are placed at the lowest levels in the pits where groundwater may be present with highest AAD generating potential. Waste materials with higher AAD generating potential will be placed at higher levels in the pits above the groundwater level to prevent interaction with groundwater. This is expected to reduce future groundwater contamination.
- Installation of cover systems at containment source consolidation locations to limit infiltration of precipitation and subsequent AAD generation. Wastes consolidated in Dakota Main and Sundry pits will be covered. Sundry Pits and the Upper Sundry Pit will be covered.
- Excavated acid-generating material in the lower pit walls of the Dakota Main Pit and Sundry Pit and residual sludge within these pits will be addressed incidental to the backfilling and covering of the pits.
- Soil stockpiles now stored in the HLLP extension will be used for reclamation or cover construction. Removal of soil stockpiles from the HLLP extension will provide additional area for sludge disposal cells constructed as part of WTP operations under OUS.
- Topsoil and other resources remaining after cover construction will be used to cover and revegetate (reclaim) parent ground and fill zones exposed during containment source removal.
- Sludge in the bottom of Dakota Main Pit, Sundry Pit, and the Stormwater Pond will be removed and placed on the HLLP adjacent to the WTP sludge currently stored in the HLLP extension. Sludge removal from the pits is expected to reduce a source of high contaminant mass loading which would be in contact with the groundwater in the lowest portions of the pits. Removal of sludge is also expected to improve the implementability of backfilling the pits with other waste materials as the sludge obscures the underground workings within the bottom of the pits and the sludge is not dense enough to allow the use of heavy equipment operation on top of the sludge. These issues cause safety concerns.

- **Anchor Hill Pit will be designated as the primary ARD storage location at the Site for future water management activities.**
- **Collection and treatment of contaminated water in the mine disturbance area and treated water discharge into lower Strawberry Creek will continue using current discharge waivers for selenium (Se) and total dissolved solids (TDS). The waivers and the management of water are covered in the OU2 interim remedy until a final remedy for OU2 is selected.**
- **Removal of the Surge and Stormwater ponds is part of the source removal in the Upper Strawberry Creek corridor.**
- **Collection systems will be installed at the base of Dakota Maid and Sunday pit covers in order to maintain acceptable ARD levels in the submerged portions of the pits.**
- **ARD collection systems will also be placed along the east perimeter of the Process Plant remediation subarea and the west berm of the HLP remediation subarea to collect and transfer ARD from contaminants sources left in place at those locations.**
- **The ARD capture and pumping systems at Strawberry Pond (also called Pond E) and Hoodoo Gulch will be phased out over time as surface water quality within the Upper Strawberry Creek and Hoodoo Gulch drainages improves due to contaminant source removal within these drainages.**
- **Upgrade the WTP, as needed, to allow treatment of higher concentrations of sulfate from ARD stored in mine pits and ponds, and to address potentially higher concentrations of sulfate in ARD from future discharges from pit backfills to the collection systems.**
- **Land use controls, including both institutional controls and engineered controls, will be implemented as needed to address risks posed to human receptors from unaddressed contaminant sources and to protect engineered elements of the remedy.**