

OPERATOR: Wharf Resources (USA), Inc.
PERMIT NUMBER: Pending (Expansion Project Permit Application)
INSPECTION TYPE: Pre-Inspection and Meeting
DATE: June 29 and 30, 2011
TIME IN/OUT: June 29: 8:10 am to Noon MDT - Meeting
12:50 pm to 4:25 pm MDT – Inspection
June 30: 8:15 am to 3:20 pm MDT – Inspection
July 19: 10:00 am to 3:30 pm MDT – Water Sampling
July 20: 8:00 am to 8:20 am MDT – Water Sampling
July 21: 8:00 am to 11:30 pm MDT – Water Sampling
DENR INSPECTORS: Eric Holm, Roberta Hudson, Mike Lees, Mark Keenihan, Matt Hicks, Janile Lewis, Jon Epp, and Doug Baldwin
OTHER INSPECTORS: Stan Michals, Game, Fish, and Parks
ACCOMPANIED BY: Bill Shand, Ken Nelson, Ron Waterland, and Lynne Blackman (Wharf Resources)

In accordance with SDCL 45-6B-20, a pre-inspection of Wharf’s proposed mine expansion area was conducted as part of the annual mine permit for Wharf’s existing mining operation on June 29 and 30, 2011. The legal location of the proposed mine expansion is portions of Sections 1, 2, 3, and 12; T4N-R2E, Sections 6 and 7; T4N-R3E, and Sections 33 and 36; T5N-R2E, Lawrence County. The pre-inspection meeting and inspection was conducted on June 29 and 30, 2011 by the above mentioned individuals. Water quality sampling associated with the expansion project was conducted on July 19 and 21, 2011 by Roberta Hudson, Mark Keenihan, Matt Hicks, and Shannon Minerich (DENR) and Ron Waterland and James Pietila (Wharf).

The proposed mine expansion project will involve open pit mining and disposal of overburden primarily to the south of the existing Wharf Mine and west of the Golden Reward Mine. A portion of the reclaimed Golden Reward Mine will be redisturbed during the project. Ore extracted from the expansion area will be hauled to the existing heap leach facility at the Wharf Mine for processing. As new mine areas are developed, waste rock and overburden will be used to backfill previously mined areas. A portion of State Highway 473 will be relocated during the project. Wharf Resources plans to disturb approximately 298 acres within the 528 acre expansion area, and total production is estimated to be about 175 million tons of material. The proposed expansion will extend the total life of the mine from 2012 to 2020. The proposed postmining land use is a mixture of rangeland or woodland grazing, home sites, and recreation and industrial or commercial development which will revolve around enhancements to the Terry Peak ski area.

The above listed individuals met at the Wharf Mine Office conference room. During the audit meeting, we discussed the status of the mine expansion permit application. Wharf submitted a response to the department’s March 21 and May 25, 2011 completeness letters on June 18, 2011. After discussions with the department, Wharf agreed to waive the seven day review period for the department’s review of its response letter. The review period was extended to July 12, 2011.

The department began its review of the Wharf's response letter and emailed a draft response to Wharf on additional completeness items on June 24, 2011. The following completeness items were discussed:

March 21, 2011 Procedural Completeness Issues

Item 2, page 3, Postclosure Plan – The department told Wharf the bond calculation in Table 6-5 was for the reclamation bond, not the postclosure bond. A separate postclosure bond calculation was needed. Wharf explained the post closure bond estimate is included as part of the bond estimate for water quality costs in Table 6-5.

Item 8, page 8, NRCS Approval of Soil Survey – Regarding the letter from the Lawrence County Conservation District approving the soil survey, the letter was submitted on June 28, 2011.

Item 12, page 12, Disturbance Prior to 1971 – The department asked Wharf to identify any surface disturbance from previous mining operations in the expansion area prior to 1971. Wharf said this information was addressed in the archaeological reports in the permit application. Wharf also submitted a map showing the surface sites on June 6, 2011.

Item 14, page 14, Instruments of Consultation – Regarding the submittal of instruments of consultation with the BLM and DOT including written confirmation of operating and reclamation plans, the BLM consultation was submitted on July 7 and 14, 2011. Although DOT is not a surface owner, it submitted proof of consultation on July 5 and 14, 2011.

Item 17 (a), (b), (c), (d), and (e), page 16, Grading Plan; Item 26, page 22, Postmine Contour Map; Item 31, page 24, Reclamation Plan Details; Item 41, pages 29 – 30, Industrial Land Use; and Item 42, pages 30 - 31, Homesite Reclamation – We had a lengthy discussion on postmine land use issues in the mine permit application. In Wharf's response to the department's completeness letters, it stated rangeland is a primary postmine land use even though recreation, home sites and industrial (commercial development) postmine land uses are also proposed. The department pointed out rangeland is actually only an alternative or secondary land use for the home site and industrial land uses. In addition, there are no alternative land uses for the recreation post mine land use. If Wharf proposes to reclaim areas of the proposed expansion area to recreation, it must be reclaimed to recreation uses such as enhancements to the Terry Peak Ski area and not rangeland.

Also, the response only addressed the requirements for the rangeland land use. The department told Wharf it also must address in the mine permit application the following requirements for the other land uses:

- a. Reclamation to a recreation (ARSD 74:29:07:23(2)) land use is considered complete when it is demonstrated that the type of recreation has been established and all other requirements of the reclamation plan have been met;
- b. Reclamation to an industrial (ARSD 74:29:07:24(4)) land use is considered complete when a vegetative cover sufficient to control erosion has been established over all affected land not being developed for industrial use and the incoming industry has firmly

established itself at the site (unless the alternative postmining land use reclamation plan is implemented); and

- c. Reclamation to a homesite (ARSD 74:29:07:24(4)) land use is considered complete when a vegetative cover sufficient to control erosion has been established over all affected land not presently being developed for homesites and at least 25 percent of the land designated for homesite development is developed or in the process of being developed for homesites (unless the alternative postmining land use reclamation plan is implemented).

In Wharf's response, it stated the developers would be responsible for carrying out the development of the area in and around the Terry Peak ski area and the construction of home sites. The department pointed out the regulations for recreation, industrial, and home sites require the applicant (Wharf) and not future developers to address the requirements in these regulations for each postmine land use. During recent discussions with Amber Vogt of Lawrence County, she told the department the enhancement of the ski area was a major part of the approved conditional use permit and needs to be part of our approval of the mine permit application.

Wharf agreed to address the requirements for each proposed land use and provide more details on enhancements to the ski area and the development of home and commercial sites. Regarding the postmine contour map, Wharf agreed to show at a minimum any enhancements to the ski area such as extensions to the ski runs and modifications of the Empress (Red) Chairlift, and potential locations of lodges, condominiums, and home sites. The department stressed that it views the proposed enhancements as conceptual at this point and realize they are subject to change. A category could be added to the proposed technical revision list allowing for changes to the recreation, home site, and industrial (commercial) reclamation plans.

Item 19, page 17, Seed Mix Consultation – The department asked Wharf about letters from the BLM and the US Forest Service stating these agencies are in agreement with the proposed seed mix. The BLM letter was submitted on July 5, 2011. Wharf pointed out no US Forest land will be affected in the expansion area to the north of the process area. After reviewing the map, it was discovered the US Forest Service is only an adjacent surface owner and no public lands will be affected. Therefore, a letter from the Forest Service is not required.

Item 22, page 21, Terry Cemetery Highwall Stability – The department asked Wharf whether the new pit near the southwest corner of the Terry Cemetery would create any stability issues with the cemetery considering the past history of mining in this area and whether a stability analysis should be conducted. There is currently an existing highwall from the previous mining operation along the southern edge of the cemetery. Wharf said a stability analysis of the area, including the southern highwall, was completed as part of the Golden Reward release petition and the analysis showed that the highwall and the area around the cemetery were stable. Wharf added that it will monitor stability of the cemetery during mining activities and would do mitigation if cemetery stability became a problem. The company agreed to permit conditions to address stability concerns at the cemetery.

Item 24, page 21, Reclamation Acreage Credit – In the department's draft response, it pointed out SDCL 45-6B-83.2 has not been repealed and needs to be address as a completeness item.

However, after the response was emailed to Wharf, the department discovered that the law was repealed. The repealed law was not noted in some versions of SDCL 45-6B the department used in its review of the mine permit application. Therefore, Wharf is not required to address this statute.

Item 30, page 23, Financial Capability to Complete Reclamation – The department asked Wharf to explain if it has the financial capability to complete the reclamation outlined in the mine permit application. Although Wharf said in its response it will post a reclamation bond, it needs to also explain whether it has the financial capability to complete reclamation during and after mining activities at the site.

Item 44, page 32, Table 1-1 – The department told Wharf ASRD 74:29:07:27 needs to be added back into the completeness list in table 1-1. Even though no impoundments will be constructed, it is still a completeness item that has been addressed. The regulation was added back into the table in Wharf’s July 6, 2011 response to the department’s draft comments.

Other Items - The department reminded Wharf to submit proof of filing the June 18, 2011 response with the Lawrence County Register of Deeds office. The proof of filing was submitted on June 23, 2011. Also, the department asked whether Wharf wants to change the postmine land use (wildlife habitat) of the reclaimed areas of the Golden Reward Mine that will not be affected by the mine expansion as part of the mine permit application. Wharf said it no longer plans to change the postmining land use.

We also discussed the calculation of the reclamation and postclosure bonds for the mine expansion permit application. The department will first recalculate the reclamation and postclosure bond for the current operation. It will then use a phased bonding approach for the expansion area since the pits will be mined in phases and pit backfilling will also occur in phases. Wharf agreed to the department’s bond calculation plan.

The meeting ended at noon MDT, and after a lunch break, we started the inspection. The inspection lasted from the afternoon of June 29 to the afternoon of June 30.

June 29, 2011

After inspecting the Ross Valley Denitrification Plant and the new Carbon Column Treatment Plant as part of the mine audit inspection, we proceeded to Nevada Gulch to start the pre-inspection of the expansion area. This will be the location of the new haul road between the Golden Reward and Wharf mines. We arrived at the Blue Chair parking lot at 1:45 pm MDT and proceeded along the route of the proposed haul road. Wharf plans to upgrade an existing gravel road used by the ski area (Photo 1). Only a small amount of waste rock will be used to slightly raise the level of the road. A portion of the haul road will extend through the parking lot to the Golden Reward Mine. The other portion will extend through a tunnel and a gulch to the Wharf Mine. An existing building adjacent to the proposed haul road will not be affected by construction or use of the road.

Wharf also pointed the route of the relocated portion of Highway 473 (Photo 2). The highway will be rerouted along a slope on the north side of the gulch about half way down the slope. The rerouted highway will be constructed over the haul road tunnel. Several utility lines will need to be moved during construction of the rerouted highway and haul road.



Photo 1 – Current access road from parking lot.



Photo 2 – New highway and tunnel in middle of photo.



Photo 3 – Nevada Gulch Creek channel.

The department asked Wharf about the Nevada Gulch Creek drainage in this area. Wharf personnel said the creek starts at the lower end of the Blue Chair parking lot as unconfined flow is routed under the parking lot. The unconfined flow is routed through a culvert into the existing drainage below the parking lot. The flow in the creek is seasonal as it flows only during spring runoff and thunderstorms. Any runoff from the ski area disappears at the Horseshoe well and reappears as a seep in the parking lot.

The department said topographic maps show the creek begins further to the north and west of the parking lot. After walking around the area, department personnel found the Nevada Gulch Creek channel upstream from the parking lot to the south of the existing gravel road (Photo 3). The creek was flowing at the time of the inspection. No riparian vegetation was noted along the creek in this area. A portion of the original creek channel apparently was covered during construction of the ski area parking lot as the channel disappeared at the edge of the parking lot and flowed under the lot in several areas until it reappeared at the spot where Wharf said the creek started. The department told Wharf the entire Nevada Creek drainage needs to be shown on the maps in the mine permit application.

We then discussed sediment control along the new haul road. Wharf plans to construct drainage ditches on both sides of the haul road and install a series of sediment traps in the ditches. The goal is to keep any drainage from the haul road away from Nevada Gulch Creek. There are no plans to divert the creek. However, culverts will be placed in areas where the haul road crosses the creek. Any existing culverts will be replaced. A sediment pond will also be constructed just to the southeast of the parking lot near well SM-01A. We looked at the area where the pond will be constructed (Photo 4). Department staff has some concerns over the limited area where the pond will be constructed and whether it would be large enough to contain runoff from the haul road. Wharf will be required to provide plans and specs for the sediment pond for department approval prior to construction.



Photo 4 – Proposed haul road sediment pond.



Photo 5 – Current Harmony Pit Highwall.

We then proceeded to the Golden Reward mine. After resuming inspections of various areas related to the mine permit audit, we arrived at the Harmony Pit highwall at 3:29 pm MDT to continue the pre-inspection of the expansion area. The Harmony highwall will be part of the Golden Reward Pit that will be mined during Phase 3 of the expansion project (Photo 5). Wharf is currently conducting exploration drilling along the Harmony highwall. During mining, the highwall will be removed as mining proceeds to the base of the Terry Peak Red Chair Lift. The highwall is basically all ore. During final reclamation, this area will be backfilled with the final

slope at 15 to 8 percent grade (down slope). The area will be regraded to tie into the ski area. The existing ski runs will be extended down this slope.

The next stop on the inspection was the reconstructed Fantail drainage. We arrived at 3:42 pm MDT and discussed the status of the drainage. In the mine permit application, Wharf stated Fantail Creek starts below the sand dam since the reconstructed channel upstream does not carry any flow. As a result, there are also no intermittent or perennial drainages in the proposed mine area. The department pointed out that the reconstructed Fantail drainage is still shown as an intermittent drainage on topographic maps. Even though there is no flow in the channel now, it was designed so that over the years, fines would fill in the voids below the channel and it would eventually flow. Wharf acknowledged the reconstructed channel should be considered an intermittent channel and will make the necessary changes in the mine permit application to confirm it is an intermittent drainage in the proposed mine area.

We also discussed whether Fantail Creek would need to be diverted through the pit areas during mining even though water in the channel currently goes directly into the ground. Because of this and since mining will be completed in two to three years, the department determined any water flowing into the pits could be pumped out and back into the Fantail Creek drainage downstream from the pit areas. Wharf added the upper Fantail drainage would again be reconstructed after mining was completed using the same design as before.



Photo 6– Proposed pit area near highwall.



Photo 7 – Current Liberty Pit Highwall.

In addition, we discussed the proposed pit near the southwestern corner of the Terry Cemetery (Photo 6). There is currently a remaining highwall form the previous Golden Reward Mine along the southern end of the cemetery. The department asked if there would be any stability issues with the highwall or cemetery since the pit is approximately 200 feet from the highwall. Wharf personnel said past studies show the highwall is stable and they do not expect mining activities to affect the stability of either the highwall or the cemetery. Wharf will monitor the stability of the highwall and cemetery during mining and will mitigate any stability problems should they arise as stated during the meeting. We asked if Wharf was considering buttressing

the highwall with backfill after mining. Since the highwall is stable, Wharf is not planning to do any buttressing. However, it will be backfilling the highwall just to the south of the Fantail drainage and south of the cemetery during final reclamation of the pit.

After we went to the area where the original Fantail drainage from the ski area meets the reconstructed drainage, we then proceeded to the Liberty Pit. The Liberty Pit will be part of the Golden Reward Pit that will be mined during Phase 3 of the expansion project. During mining, the existing highwall will be laid back to a 3:1 (H:V) slope (Photo 7). The current lined area in the Liberty Pit will be extended so it goes under the reclaimed slope to help prevent leakage at the liner/slope intersection. Wharf is looking at putting an additional ski run in this area after final reclamation.

The final stop on the inspection for the day was the Terry Cemetery. We arrived at 4:11 pm MDT. The cemetery was placed on the Preliminary List of Special, Exceptional, Critical or Unique Lands during the department's special lands determination earlier this year. Wharf has no plans to mine the cemetery or the ridge to the east at this time. However, Wharf will be required to ensure that any impacts to the cemetery during mining such as blasting and subsidence are prevented. We took some general photographs of the cemetery (Photos 8 and 9). There is a berm and fence between the cemetery and the south highwall.

The inspection ended for the day at 4:25 pm MDT.



Photo 8 – Terry Cemetery looking southeast.



Photo 9 – Terry Cemetery looking east.

June 30, 2011

The inspection resumed at 8:15 am MDT. We met at the Wharf Mine office before proceeding to the American Eagle Pit as part of the audit inspection. We then resumed the pre-inspection of the expansion area by walking over to the proposed Green Mountain Pit (Photo 10). We arrived at 8:58 am MDT. The Green Mountain Pit will be mined during Phases 1, 2, and 3 of the expansion project. The pit will be mined to a final elevation of 5,720 feet. During final

reclamation, the pit will be totally backfilled with no remaining highwalls. Wharf plans to move power and other utilities in the area prior to mining.

We walked along the old Fremont, Elkhorn, and Missouri Valley railroad grade that was determined to be eligible for the National Register of Historic Places in the cultural survey in the mine permit application (Photo 11). Mike Fosha of the State Archaeological Research Center asked Wharf to collect additional data and photos of the railroad grade. After Wharf submitted the additional information to Mr. Fosha, he was satisfied and told Wharf they could disturb the railroad grade with the standard conditions on artifact and bone found during mining. Wharf said the haul road would be constructed over a portion of the railroad grade.



Photo 10 – View of Green Mountain from Trojan Pit.



Photo 11 – Old railroad grade.

At this point, we discussed the acid generating potential of the mine pits. Wharf said there are some acid generating that will be encountered during mining, but most of them are small and can be separated into special handling zones during mining and processing. These special acid generating zones can be handled by blending with materials with buffering capacity or adjusting the pit floors to avoid acid generating zones.

The department asked Wharf about one special handling area within the Bald Mountain area that was removed from the mine permit application in the revised submittal. Wharf indicated this particular special handling unit was removed due to high acid generating potential in the lower Deadwood Formation along an oxidized zone that is in contact with the Precambrian basement rock. Because of the high acid generating potential, Wharf said it would not mine through the entire Lower Deadwood formation in this area and the special handling area would not be needed.

The department also asked about the acid generating potential of the Harmony Pit since it was showing zones of significant acid generating potential. Wharf personnel said it collected more data and found the acid zones are isolated and should not cause a problem. Also, Wharf is not sure at this point if it will mine the Flossie area since it has significant acid generating potential.

We then walked south on the railroad grade toward Highway 473 and the Terry Peak ski area. Portions of the Green Mountain Pit will be visible from the ski area during mining (Photo 12). Wharf showed the route of the haul road in this area (Photo 13). As mining progresses and the elevation drops to the level of the exiting highway, the haul road will be extended into the pit and will tie in with the portion of the haul road from the Golden Reward Mine.



Photo 12 – View of Terry Peak from Green Mountain



Photo 13 – Location of proposed haul road.

We then walked over to the small portion of Bald Mountain that will be part of the Green Mountain Pit. This pit will be mined during Phase 2 of the project. The BLM will start removing bug trees from the Bald Mountain area during the week of July 4. This will be a small shallow pit because the Precambrian formation is only 60 feet below the surface. The entire pit will be backfilled immediately after mining is completed to prevent acid drainage.

As we walked back across Green Mountain, we discussed the reroute of Highway 473 and access to residential areas and the Richmond Hill Mine located north of the Wharf Mine. The new highway will tie into the paved road to the Lost Camp development by the bed and breakfast (Photo 14). The existing access road from the bed and breakfast into the Wharf Mine will be used until 2017 when it will be rerouted over backfilled portions of Green Mountain.

The department asked about the Terry Fire Department garage and two houses to the north of the bed and breakfast that will be close to the Green Mountain Pit. The Terry Fire Department garage will remain and will be used by the fire department. The two houses are owned by Wharf. One house is currently vacant and the other house will be vacant in the next year. Once mining ends, Wharf will sell the houses. The department also asked about the A-frame home where Mine Manager Bill Shand lived (Photo 15). Wharf said the home is now vacant and may be sold at auction and removed from the area by the buyer.



Photo 14 – Red line shows path of new highway.



Photo 15 – A-frame home.

We then proceeded to the proposed Portland Ridgeline Pit (Photo 16). We arrived at 10:00 am MDT. Wharf conducted recent exploration on the reclaimed Portland Pit backfill. The exploration trails will be seeded this year.



Photo 16 – Proposed Portland Ridgeline Pit.



Photo 17 – Expansion area north of Pad 4.

The Portland Ridgeline Pit will be the only pit within the proposed expansion area backfilled with spent ore. Since this pit will be mined during the fourth and final phase of the project, there will be no waste rock to backfill the pit. As a result, about 10 million tons of spent ore from the leach pads will be used to backfill the pit. Two small highwalls will remain after backfilling along the southern portion of the pit, one 400 feet long by 30 feet high and the other 500 feet long by 20 feet high.

The Flossie Pit is a part of the Portland Ridgeline Pit and is located in the southwest corner of the pit. As mentioned earlier, the Flossie Pit has high acid generating potential. As a result, Wharf is not sure at this time if it wants to pursue mining of the pit.



Photo 18 – Expansion area north of Pad 4.

After we left the Portland Ridgeline area, we resumed the permit audit inspection and took a short lunch break. After lunch, we proceeded to the expansion area north of Pad 4 and arrived at 12:54 pm MDT. There are currently sediment control structures in this area for the Pad 4 and the office area that need to be cleaned out (Photo 17). Wharf is planning to construct a parking area, new access road to the Process area, and possibly a new warehouse. Wharf said the new access road will be an improvement in that it will be able to easily handle two-way traffic, including liquid cyanide and other delivery trucks. It will also allow Wharf to better control sediment in the process and office areas.

The department asked Wharf about the possibility of a Leach Pad No. 6 being constructed in this area. Wharf personnel said at this time, there are no plans to construct a Pad 6 in this area. The company recently changed its leaching cycles so that the previous leach time for each pad has been reduced by about 25 percent. One and a half pads can now be leached at a time. Wharf now pushed more leach solution up front after the pads are loaded. This allows quicker gold recovery and better solution control on the pad side slopes. In fact, blow-outs on the side slopes have been reduced since the new system was implemented. Wharf feels that with the new leaching system, a sixth pad is not needed.

After inspecting the process area as part of the permit audit, we completed the pre-inspection of the expansion area by going to the northern end of the area north of pad 4 (Photo 18). Wharf installed Well PW-2 in this area last year as a potable water source for the mine (Photo 19). The well has been enclosed with a fence. Wharf personnel showed us the route of the new access road.

After driving to Annie Creek to complete the permit audit inspection, we left the site at 3:20 pm MDT.

July 19-21, 2011 Water Quality Sampling

On July 19, 2011 Roberta Hudson, Matt Hicks, and Mark Keenihan returned to Wharf Resources to collect water quality samples for the Wharf mine permit audit and as part of the Wharf expansion pre-inspection. Sampling occurred over a three day period from July 19-21, 2011. A brief summary of sampling activities will follow, although it should be noted this report will not go into more detailed discussions for all sites sampled due as some sites do not apply to the expansion project. Those sites will be discussed in the 2011 Wharf Audit report. In addition, several sites applicable to both the mine permit audit and the expansion pre-inspection will be discussed in both reports.

The primary focus for sampling of the expansion area were along the Nevada Gulch drainage, Deadwood Creek drainage, and new monitoring wells around the American Eagle Pit that are proposed to be utilized as compliance points for a new ground water discharge permit that Wharf has applied for through the Ground Water Quality Program. A sample was also taken at the new PW-2 well located in the portion of the expansion area immediately north of the Process Area.

Sampling and Preservation of Field Samples

During field sampling of all baseline sites sampled from July 19-21, 2011, all samples were field filtered (as necessary), preserved and stored on loose ice. Often, to accomplish the full suite of sampling for a site, several bottles are required. This is due to the fact that different parameters require different preservation with various preservatives and some require field filtering. All samples were stored in a cooler and surrounding the sample bottles with loose ice. Each bottle was labeled prior to sampling. A field sheet was prepared for each sample site and used to record field parameters such as DO, pH, temp and conductivity and also to note the time the sample was taken and the sampler. An additional step performed to ensure the samples were properly analyzed included ending sampling in mid-afternoon to allow time to take the samples from the day to the lab.

As stated above, various preservatives were used for sample preservation as necessary. Preservatives were provided by the lab in small premeasured vials. Total and dissolved metals samples were all preserved with nitric acid to a pH less than 2. Dissolved metals samples were taken in a field bottle, with a new bottle being used each time and taken back to the vehicle to be filtered into the bottle labeled for dissolved metals. Preservation of the dissolved metals bottle was only performed after filtration of the sample had been completed. Only samples for dissolved metals were field filtered. Cyanide samples were preserved with sodium hydroxide to a pH greater than 12. Ammonia samples were preserved with sulfuric acid to a pH less than 2. Samples which required the use of a preservation agent to adjust the pH value of the sample were tested with pH paper to ensure that the appropriate pH value was obtained and no further

preservation solution was needed. A minerals bottle was also collected which does not require additional preservation with the exception of keeping the sample cool in a cooler with loose ice.

July 19, 2011 - Nevada Gulch and Golden Reward

The group met with Lynne Blackman and James Pietila on July 19, 2011 at 10:00 am MDT. After collecting samples at wells MW-37 and MW-41 as part of the mine permit audit, the group proceeded to Nevada Gulch and sampled the Horseshoe Well, SS-20, Nevada Gulch Well, SM-01A, SS-04, DM-01 and SM-06 at 12:10, 12:32, 1:10, and 1:55, 1:57, 2:34, and 2:56 pm MDT respectively. The samples were collected as part of the mine expansion pre-inspection.

Horseshoe Well – This is a new well installed as a part of baseline monitoring for the proposed expansion permit. The well is located on the south side of the road in upper Nevada Gulch where Wharf plans to construct a haul road to bring ore from the Golden Reward mine to the Wharf process area. The well is located upgradient from the proposed disturbance area and is also downstream from several mine workings, the most prominent being those of the Mogul Mine.

Baseline sampling for this well indicates it has elevated pH, although all other parameters are below the ground water standards. The department's sampling results were similar to Wharf's baseline sampling results. A duplicate sample (WR-1) and a blank (WR-2) were also taken at this site. The results of sampling for this well can be found in Table 1.

SS-20 – This site is a new sampling location Wharf created for baseline sampling. In Nevada Gulch, the creek flows from west to east, starting near the historic Mogul Mine Tailings and flowing east before disappearing under the road and the Blue Chair parking lot. The water from the drainage then splits and springs up in several different locations along the edges of the road and parking area before flowing back into a defined stream channel near well SM01A. This sample site is located immediately downgradient of where a portion of the drainage springs back up along the road north of the Horseshoe well and west of the Blue Chair.

Baseline sampling for this site indicates it has elevated concentrations of arsenic. The department's sample results showed the highest levels of arsenic seen within this well when compared with the baseline sampling results provided by Wharf. All other parameters were normal and consistent with the baseline results.

Nevada Gulch Well – The Nevada Gulch Well is actively used by the Terry Peak Ski area in its daily operations. The sample for this site was not taken directly from the well but actually from a water faucet located on the side of the building for the Blue Chair Lift. When sampling this well, Mr. Pietila indicated the well was usually hooked into a water softener. He was not certain whether he disconnected the water softener in preparation for sampling and could not check since the building was locked. The lower chloride levels found in the department's sampling results indicated the water softener was disconnected at the time of sampling.

The department's results for this well were again consistent with baseline results. Baseline data from this well show the well has high levels of fluoride, although it has never exceeded the

ground water standards. Aluminum was also slightly elevated in the results for this sampling event; however, there is no ground water standard for aluminum and the results were similar to results from baseline sampling.

SM-01A – This well was drilled in 1988 as part of the monitoring plan for the Golden Reward Mine. It is located north of the reclaimed West Liberty Pit for the mine. In 1997, shortly after Golden Reward Mining Company completed mining and started backfilling the pit, the well began showing increasing concentrations of sulfates. Sulfates still continue to increase in this well, although there has been minimal impact on other parameters in the well. The well was included as part of baseline for the proposed mine expansion since Wharf is planning on mining the remaining highwall in the West Liberty Pit.

Sampling for this well occurred after a brief lunch break. Department results for the well show sulfates continue to rise. There has also been a corresponding slight decrease in pH and increases in aluminum, magnesium and zinc. Lab results for pH indicate the sample was below the lower limit for the ground water standard for pH although field readings indicate that the water quality was still good. Total dissolved solids (TDS) were also elevated well above the ground water standard. All other parameters were found to be below ground water standards.

SS-04 – This site is a pre-existing surface water sampling site used to monitor water quality in Nevada Gulch during mining of the Golden Reward Mine and as part of baseline sampling for the same mine in 1986. It is located immediately north of well SM01A and the West Liberty Pit. This site was included as part of the baseline monitoring for the proposed expansion of the Wharf Mine due to plans to mine the West Liberty Pit highwall and construct a haul road above this section of stream in Nevada Gulch from Golden Reward to the Wharf process area.

Department results show the water quality at this sample site is consistent with baseline values. Arsenic was slightly elevated although it was not as high as the levels seen further upstream in SS-20. All other parameters were good. Samples taken from this site were preserved immediately after sampling and were stored in a cooler with loose ice.

SM-06 – This well is located at the bottom of Stewart Gulch above the confluence of Stewart Gulch with Whitewood Creek. The well has historically had very high levels of mercury and high levels of iron. When purging the well prior to sampling, the water turns from clear to a rust color with a high amount of suspended sediment. This well has been used as a monitoring well at the Golden Reward mine since 1987 and is being used as a baseline well for the proposed expansion area as ground water within the primary mining area for Golden Reward tends to flow toward the eastern edge of the mine toward both Stewart Gulch and No Name Gulch.

For this sampling event, only a few parameters were selected to sample. The primary constituents of concern were mercury and iron as these two parameters have been elevated in previous sampling events. Both of these parameters were found to be below detection limits. All results were similar to baseline values.

July 20, 2011 – Annie Creek, Ross Valley, and Process Area

The group met Lynne Blackman and James Pietila at the USGS station located on Annie Creek at 8:00 am MDT. Only one sample was collected which was part of the mine expansion pre-inspection. This site is AC@USGS located at the bottom of Annie Creek just above the confluence of Annie Creek with Spearfish Creek. This site is considered baseline for the proposed expansion area due to potential impacts to Lost Camp Creek, which is a tributary of Annie Creek and is located to the south and west of the proposed expansion area.

Duplicate samples were taken at AC@USGS and taken to different labs. Results from both labs were very similar. All parameters sampled at this site were below surface water quality standards. Results for all parameters were similar to baseline values.

July 21, 2011 – Long Valley, Perkins Road, and Deadwood Creek

The group met Lynne Blackman and James Pietila at the Wharf security warehouse. The group only collected a few samples. Most of the samples collected were in relation to the expansion project or the new ground water discharge permit application. A sample was collected from well PW-2 at 8:20 am MDT. Samples were also collected from BMT-1 and DWD-1 at 11:15 and 11:21 am MDT, respectively. These are existing sites and will also be discussed in the 2011 Annual Wharf Audit report. Two other sites MW-60 and MW-64 were also sampled this day and will be discussed in the 2011 Wharf Annual Audit report.

PW-2 – This well was initially drilled in 2010 to supply potable water to the mine site. It is drilled into the Madison Aquifer and is currently upgradient of all Wharf mining activities and therefore has no impacts from the mine. The site was included into baseline monitoring when Wharf included a small tract of land to north of the Process area into the proposed expansion area. This well is located in the middle of this proposed expansion area on the ridgeline that separates McKinley Gulch drainage and the Long Valley drainage.

A sample from this well was not taken from the well head as with most other samples. This site has been piped into the potable water distribution system at the Wharf mine. The sample for this site actually came from a tap inside the security warehouse. All tested parameters were well below ground water standards for this site and were similar to results seen within baseline monitoring. The sample for this well was field filtered (as necessary) and preserved immediately on sampling and stored in a cooler with loose ice.

BMT-1 and DWD-1 – Within the uppermost portions of the Deadwood Creek drainage there are two forks of the creek, both of which flow from the eastern edge of the Wharf mine. Just above the confluence of these two forks of Deadwood Creek, two sample sites, DWD1 and BMT1 are sampled by Wharf. These sample locations have been a part of Wharf sampling since 1998. They were also placed as part of baseline sampling for the proposed mine expansion area since runoff from both the proposed Green Mountain Pit and the Bald Mountain would flow toward this drainage. Samples from these two sites were field filtered (as necessary) and preserved immediately upon taking the sample and stored in a cooler on loose ice.

Sample results for these sites indicated that the water quality is good for both. Results for both sites were also very similar to past data.

Water Quality Summary

All results from the department's samples were consistent with Wharf's baseline data. Only two wells (Horseshoe Well and SM01A) have parameters that exceed the ground water standard. These parameters are pH, TDS and sulfate. All of the remaining sites maintained good water quality and results were found to be within the range of baseline values. Should the proposed mine expansion project occur, the baseline results from these wells will be used to determine if additional mining will have any impacts to ground water and surface water resources in the area and whether corrective actions will be needed.

Table 1. Water quality data from July 19, 2011 sampling
 Values in bold indicate parameters that exceed standard

Sample Site	Horseshoe Well	WR-1	WR-2	SS-20	Nevada Gulch Well	SM01A	SS04	SM06
Field Parameters								
Conductivity, μ mhos/cm	132	132	--	298	269	2830	379	553
pH	9.03	9.03	--	7.46	6.59	6.76	7.38	7.12
Temp, C	8.99	8.99	--	12.3	7.82	6.94	14.7	7.53
DO, mg/L	3.36	3.36	--	8.48	3.05	2.31	8.22	4.61
Physical Properties								
Conductivity, μ mhos/cm	134	136	<5	300	268	2720	381	542
pH	9.54	9.53	5.69	7.42	6.78	6.10	7.55	7.18
TDS, mg/L	86	93	<5	158	146	2740	206	528
Non-Metallics								
Alkalinity, mg/L	47.7	50.5	<10	74.6	62.5	89.6	67.1	--
Bicarbonate, mg/L	28.9	26.9	<10	91	76.3	109	81.8	--
Carbonate, mg/L	14.4	17	--	--	--	--	--	--
Chloride, mg/L	1.50	1.66	<0.5	36.4	5.37	5.28	24.3	--
Fluoride, mg/L	--	--	--	--	3.83	--	--	--
Nitrogen, Ammonia, mg/L	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--
Nitrogen, Nitrate, mg/L	0.180	0.169	<0.05	0.455	<0.05	<0.05	0.284	--
Nitrogen, Nitrite, mg/L	<0.05	<0.05	<0.05	--	<0.05	<0.05	--	--
Sulfate, mg/L	<10	7.71	1.06	9.88	49	1920	83	--
Metals, dissolved								
Aluminum, mg/L	0.043	0.040	0.015	--	0.139	0.147	--	--
Arsenic, mg/L	<0.005	<0.005	<0.005	0.072*	<0.005	0.009	0.012*	0.013
Barium, mg/L	0.197	0.204	<0.005	--	0.002	--	--	--
Beryllium, mg/L	--	--	--	--	--	<0.001	--	--
Calcium, mg/L	6.80	6.25	<1	24.9	26.3	553	42.5	70.0
Copper, mg/L	<0.005	<0.005	<0.005	0.005*	<0.005	<0.005	<0.005*	--
Gold, mg/L	<0.001	<0.001	<0.001	0.007*	0.001	0.002	<0.001*	--
Lead, mg/L	<0.001	<0.001	<0.001	0.006*	<0.001	<0.001	0.001*	--
Magnesium, mg/L	1.55	1.52	<0.5	5.11	9.19	148	9.59	20.6
Potassium, mg/L	12.5	13.7	<0.5	1.98	5.49	7.77	2.63	--
Selenium, mg/L	<0.005	<0.005	<0.005	<0.005*	<0.005	<0.005	0.008*	--
Silver, mg/L	<0.001	<0.001	<0.001	<0.001*	<0.001	0.001	<0.001*	--
Sodium, mg/L	9.62	9.91	0.515	28.1	7.58	9.42	14.3	--
Zinc, mg/L	<0.05	<0.05	<0.05	<0.05*	<0.05	0.36	<0.05*	--
Metals, total								
Mercury, mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002

* Values with this symbol denote a total metal concentration rather than dissolved

Table 2. Water Quality data from July 20 and July 21, 2011 sampling
 Values in bold indicate parameters that exceed the standard

Sample Site	AC@USGS (MTL)	AC@USGS (ELI)	PW-2	BMT-1	DWD-1
Field Parameters					
Conductivity, μ mhos/cm	477	477	500.6	210	160
pH	7.91	7.91	7.48	7.79	7.61
Temp, C	11.9	11.9	11.7	13.3	13
DO, mg/L	9	9	9.73	9.63	9.33
Physical Properties					
Conductivity, μ mhos/cm	483	476	507	215	164
pH	8.48	8.3	7.74	7.83	7.38
TDS, mg/L	262	280	256	127	102
Non-Metallics					
Alkalinity, mg/L	--	--	281	52.2	27.3
Bicarbonate, mg/L	--	--	342	63.7	33.4
Chloride, mg/L			0.790	<0.5	0.83
CN, Total	0.01	<0.005	--	--	--
CN, WAD	<0.01	--	--	--	--
Nitrogen, Ammonia, mg/L	<0.05	<0.05	--	<0.05	<0.05
Nitrogen, Nitrate, mg/L	2.35	2.3	0.146	0.074	0.274
Nitrogen, Nitrite, mg/L	<0.05	<0.1	--	--	--
Sulfate, mg/L	30.3	28	<10	47.7	43.8
Metals, dissolved					
Arsenic, mg/L	0.014	0.018	<0.005	<0.005*	<0.005*
Calcium, mg/L	52.7	54	55.6	24.8	16.6
Copper, mg/L	--	--	<0.005	<0.005	<0.005
Gold, mg/L	--	--	<0.001	<0.001	<0.001
Lead, mg/L	--	--	<0.001	<0.001	<0.001
Magnesium, mg/L	22.2	22	29.3	6.01	4.20
Potassium, mg/L	--	--	<0.5	2.78	2.72
Selenium, mg/L	<0.005	<0.005	<0.005	<0.005*	<0.005*
Silver, mg/L	--	--	<0.001	<0.001	<0.001
Sodium, mg/L	--	--	1.29	2.26	2.94
Zinc, mg/L	--	--	0.128	<0.05	<0.05
Metals, total					
Mercury, mg/L	--	--	<0.0002	<0.0002	<0.0002

* Values with this symbol denote a total metal concentration rather than dissolved

Inspectors: _____ \s/ _____

Date: 6/30/11