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Re: Animas River Water Quality 1985 - Present
Quantification of the Positive Effects of SGC's Mining and Reclamation

1.0 PURPOSE

It has previously been well documented that SGC's mining, remediation and reclamation each improved water quality in the Animas River. See e.g. SGC Mining and Reclamation – Evaluating Animas River Water Quality at A-72, SME Annual Conference & Expo and CMA 121st National Western Mining Conference (February 2019); Remediation Helps Rescue a River, Engineering & Mining Journal (July 2018). This Report further examines and quantifies the positive effects of SGC's actions on water quality in the Animas.

2.0 EXECUTIVE SUMMARY

Zinc levels at sampling point A-72 on the Animas River are indicative of metals loading and water quality in the Animas immediately below Silverton, Colorado. The Standardized Residual Zinc Level at A-72 has been calculated for November 1985, when SGC acquired the Sunnyside Mine. There has been significant improvement in Animas River water quality since SGC acquired the Sunnyside Mine, and, as detailed in this Paper, this considerable improvement is in large part directly attributable to the actions of SGC. The data confirms that due to SGC's action since acquiring the Sunnyside Mine, water quality, as reflected by the Standardized Residual Zinc Level methodology developed by the State of Colorado Department of Public Health and Environment ("CDPHE"), has always been better than the water quality when SGC first acquired the Mine.

3.0 BACKGROUND

The Silverton Caldera is highly mineralized, and acid rock drainage and poor water quality were prevalent long before the advent of mining. The Caldera hosted hundreds of mines and dozens of mills between the 1870's and 1985. SGC was formed and acquired the Sunnyside Mine in 1985 and mined it from 1986 until 1991 using modern techniques and under the modern era of environmental regulation. SGC closed the Mine in accordance with the law, its permits and a court-approved Consent Decree with Colorado that was supported by the Animas River Stakeholders Group ("ARSG") and EPA. SGC has spent more than \$30 million in the area on successful reclamation and remediation, including bulkheading.

4.0 METHODOLOGY

Zinc concentrations have historically been utilized to analyze water quality in the Animas River because the properties of Zinc make it an ideal indicator of overall metals loading. A regression analysis of Zinc levels

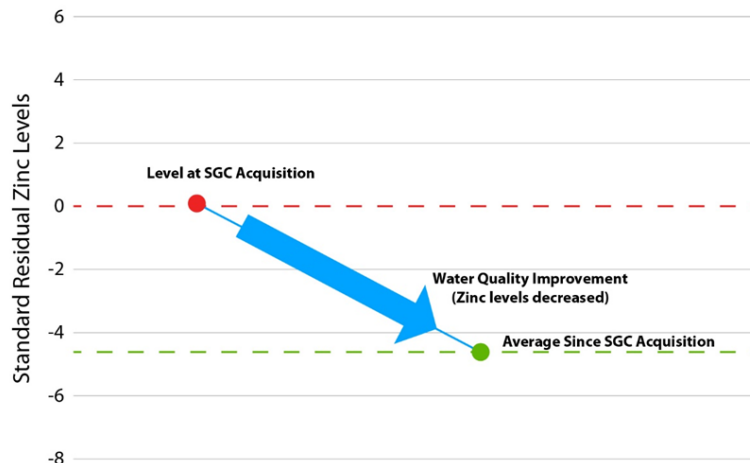
allows the data to be normalized to account for variations in flow over time. A-72 is a long established monitoring point on the Animas River below the confluences of Cement and Mineral Creeks with prodigious historical data, especially since 1991. In order to calculate the Standardized Residual Zinc Level at A-72 for November 1985 (the “Baseline”), Zinc concentrations had to be calculated, rather than measured. This conservative calculation was accomplished by taking the Zinc concentrations at A-72 for the period September 1991 - May 1996 and adding Zinc from the American Tunnel discharge that would have been in the system during that period in the absence of the Gladstone water treatment plant, since no water treatment was taking place in November of 1985. Zinc from the significant Terry Tunnel discharge, which was also treated during the 1991-1996 period, has not been added, and thus the calculation of the Baseline is inherently conservative. Evaluation of monitoring data for flow and zinc concentrations at locations CC18 (Cement Creek upgradient of the American Tunnel), CC19 (the American Tunnel discharge), and CC20 (Cement Creek below the American Tunnel) indicate that the difference between CC18 and CC20 is the load supplied from the American Tunnel discharge. Monitoring indicates that the discharge from the American Tunnel ranged from 1500 to 4500 gpm (3.2 cfs to 10.1 cfs) with zinc concentrations ranging from 7.9 mg/L to 47 mg/L with an average of 15 mg/L during the period from March 1993-May 31, 1996. Historic recorded flows and Zinc concentrations at sampling point A-72 were compiled, analyzed, and compared to the Baseline, utilizing the 10-period run average methodology developed by CDPHE to track Zinc levels at A-72. Improvements in water quality (lower Zinc levels) are reflected as negative values.

5.0 QUANTIFICATION

Water Quality Before and After SGC’s Acquisition of the Sunnyside Mine

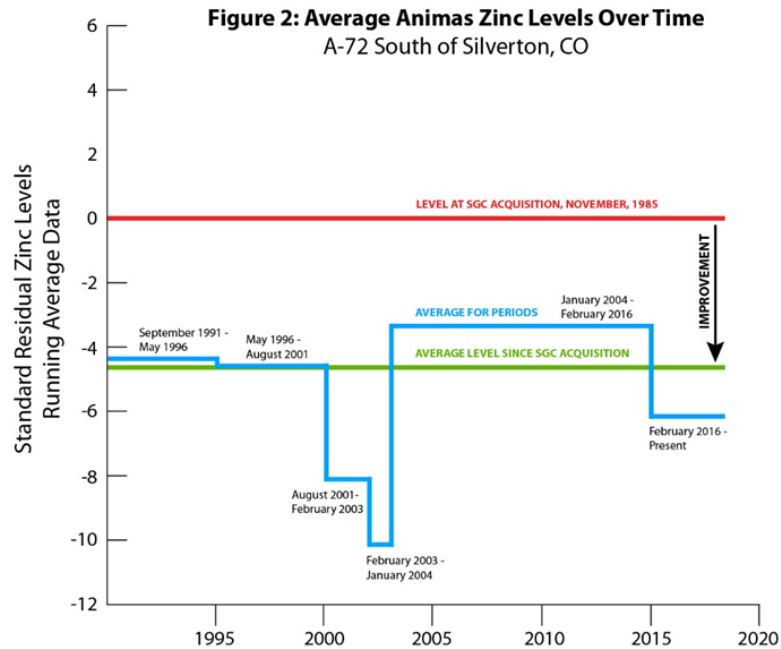
Since SGC acquired the Mine, the average Standard Residual Zinc Level at A-72 has been -4.54, as compared to the Baseline of zero when SGC acquired the Sunnyside Mine in 1985. The comparative Zinc levels for these two timeframes are depicted in Figure 1.

Figure 1: Animas Zinc Levels
A-72 South of Silverton, CO



This significant improvement in water quality since SGC acquired the Sunnyside Mine is in large part attributable to the actions of SGC. The role of SGC’s mining, remediation and reclamation in improving

water quality can be further quantified by examining Standard Residual Zinc Levels at A-72 over time, as shown in Figure 2 and discussed below.



Additional Quantification of SGC’s Improvement of Water Quality Over Time

November 1985 - September 1991. SGC acquired the Sunnyside Mine from Standard Metals on November 19, 1985. At the time, Standard Metals was in bankruptcy and the Mine was closed and under a Cease and Desist Order for multiple permit violations, including failure to comply with water discharge permits. SGC brought all discharge permits into compliance and reopened the Mine. The Colorado Mined Land Reclamation Division awarded SGC the 1987 Mined Land Reclamation Award in the classification “Most Improved Sites.” The first Standard Residual Level of Zinc at A-72 utilizing the CDPHE methodology after September 1991 is -5.32. This significant improvement from the Baseline of zero was entirely due to the actions of SGC.

September 1991 - May 1996. During the period from September 1991 to May 1996, SGC ran the water treatment plant at Gladstone and initiated certain reclamation projects. Standardized Residual Levels of Zinc at A-72 averaged -4.35 for the period. This constituted a significant improvement over the level of zero existing when SGC acquired the Mine in 1985. This improvement in water quality was entirely due to the actions of SGC.

May 1996 - August 2001. Having seen Animas River water quality improve during SGC’s short tenure, there was a consensus to protect water quality post mining. The State of Colorado utilized a regression equation to set a target for Zinc concentrations at A-72 (the “Target”). CDPHE’s Target is probably lower than naturally occurring Zinc concentrations prior to any mining in the Silverton Caldera. The State of Colorado and SGC agreed on a comprehensive watershed approach in which SGC would complete numerous reclamation and remediation projects in the region. The May 1996 Consent Decree (as amended, the Consent Decree) was the vehicle for executing this watershed reclamation approach. During the five-year time period from May 1996 through August 2001, SGC ran the water treatment plant at Gladstone and

completed numerous remediation and reclamation projects, some on lands never owned or operated by SGC. SGC also supported reclamation activities by ARSG during the five-year time period, and thereafter, that additionally contributed to water quality improvements. On August 31, 2001, SGC closed Bulkhead #2, pursuant to the Consent Decree. The purpose of Bulkheads #1 and #2 was to isolate the interior workings of the Sunnyside Mine and prevent water flow from the interior workings. Standardized Residual Levels of Zinc at A-72 averaged -4.57 for the period from May 1996 through August 2001. This constituted a significant improvement over the Baseline level existing when SGC acquired the Mine in 1985. This improvement in water quality was due to the actions of SGC, together with ARSG reclamation projects.

September 2001 – February 2003. During the period of time between September 2001 and February 2003, SGC ran the water treatment plant at Gladstone and completed numerous remediation and reclamation projects, some on lands never owned or operated by SGC. As a result of these actions and the successful closure of Bulkheads #1 and #2, water quality continued to improve. Standardized Residual Levels of Zinc at A-72 averaged -8.14 for the period. This level was significantly better than the level of zero existing when SGC acquired the Mine in 1985, and met the CDPHE Target. This improvement was due to the actions of SGC, together with ARSG's reclamation projects. In February of 2003, in recognition of SGC having improved water quality and successfully completed all requirements under the Consent Decree, CDPHE released SGC from further obligations.

February 2003 – December 2003. Subsequent to SGC successfully completing all the requirements of the Consent Decree and being released from further liabilities, water quality continued to improve during the above-referenced period. The Consent Decree was an effective vehicle to partially realize Colorado's plan to achieve the Target. CDPHE's plan had two prongs: 1) SGC completing the bulkheading and remediation obligations set forth in the Consent Decree; and 2) a third party running a water treatment plant at Gladstone. Each separate prong was intended to address a portion of the metals loading in the area. Only the first prong was SGC's obligation. During the period from February 2003 to January 1, 2004, a third party ran the water treatment plant at Gladstone. During this period, Standardized Residual Levels of Zinc at A-72 averaged -10.16. This level met CDPHE's Target and was significantly better than the level of zero existing when SGC acquired the Mine in 1985.

January 2004 – February 2016. The third party ceased to operate the Gladstone water treatment plant January 1, 2004. Predictably, water quality decreased after the plant ceased operating. However, during the period when no water treatment took place, Standardized Residual Levels of Zinc at A-72 averaged -3.30, as compared with the level of zero existing when SGC acquired the Mine in 1985. The improved water quality during this period is solely attributable to SGC's successful bulkheading, remediation and reclamation, together with ARSG's reclamation projects.

February 2016 – Present. Subsequent to the EPA-caused Gold King Spill, EPA commissioned a new water treatment plant at Gladstone. By February 2016, the plant was running effectively, albeit at only a fraction of capacity. Since that date, Standardized Residual Levels of Zinc at A-72 have averaged -6.10, as compared with the level of zero existing when SGC acquired the Mine in 1985. CDPHE's Target is being met today. The data conclusively reflects that that SGC's bulkheading is an ongoing success and, together with EPA's running its treatment plant at a fraction of capacity, is resulting in CDPHE's Target being met today.

6.0 CONCLUSION

Water quality in the Animas River immediately downstream from Silverton, Colorado has dramatically improved since SGC acquired the Sunnyside Mine in 1985, and SGC's activities played an important role in this improvement. The positive effect on water quality resulting from both SGC's mining operations and



SGC's subsequent remediation/reclamation activities is conclusively and quantitatively demonstrated by decades of reliable water quality sampling.

Yours truly,
Knight Piésold and Co.



Steven L. Lange
Executive Project Manager

*Word processing errors corrected October 16, 2019

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