Amulsar Gold Project: Overview of Concerns with the Amulsar Gold Project, Potential Consequences, and Recommendations

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Table of Contents

Figures

Tables

1. Introduction and Background

Blue Minerals Consultancy of Australia, Buka Environmental of the United States, and Clear Coast Consulting of Canada (“Bronozian Consultants”) were contracted by Mr. Harry Bronozian in April 2017 to evaluate the Amulsar Gold Project. The focus has been on the potential effects of the project on water resources, commonly the most critical and long-term environmental concern for large-scale metal mines. The overall purpose of the work was to provide a critical, detailed, and independent technical evaluation of the Amulsar Gold Project aimed at identifying the operational and long-term consequences of the proposed mine. The scope of work was to review all available Lydian and other documents associated with the project; examine their accuracy, completeness, and shortcomings; evaluate the potential for acid rock drainage (ARD) generation, the likelihood of impacts, and the reliability and effectiveness of proposed mitigation measures; and develop recommendations for further technical tasks if required. The reports and memoranda completed by the Bronozian Consultants have been distributed to Lydian International, the Armenian Ministry of Nature Protection, Armenian nonprofit organizations, and Armenian universities.

All the Bronozian Consultants have PhDs in disciplines relevant to this work and decades of individual experience in the evaluation of mining projects and their environmental effects. They have published regularly on topics related to the work and have taught courses in mine water treatment, geochemical characterization, environmental impact assessment evaluation, and mine operations and effects, among others. The review of the Amulsar Gold Project is based on their collective knowledge and experience and is supported by internationally recognized peer-reviewed scientific and technical references.

The evaluation has found that the Amulsar Gold Project, as proposed, poses a high risk of long-term, adverse impacts to the environment. Our strong recommendation to the government of Armenia and its citizens is that the mine not be developed until the identified shortcomings are corrected.

This final document by the Bronozian Consultants discusses the primary concerns and likely consequences of the proposed mine, and recommendations for addressing the concerns before mining begins. A list of all identified issues is provided in tabular form at the end of the document; the overview discusses the highest priority concerns, consequences, and recommendations. Appendix A contains a list of similar mines and their environmental impacts. The reports and memoranda produced by the Bronozian Consultants for the Amulsar Gold Project are listed in Appendix B, and the documents reviewed are listed in Appendix C.

2. Priority Concerns and Consequences

The many concerns and consequences of the Amulsar Gold Project identified by the evaluation are listed in Table 1. The potential consequences are similar for many of the issues identified: contamination of groundwater, springs, streams, and water in the Spandaryan-Kechut Tunnel and the Kechut Reservoir. Water and contaminant flow paths from the mine facilities to downgradient waters after the mine closes are shown in Figure 1, taken from the ESIA (Lydian International, 2016). The worst water quality is predicted for leachate from the waste rock facility (BRSF), which is upgradient of the tunnel, the Kechut Reservoir, and the Arpa River. Because tests were not conducted on the abundant mine wastes that will leach more acidity and higher metal concentrations, the impacts to receptors, including aquatic life, will be more severe than predicted. Decreased flows in streams, springs, the tunnel, and the reservoir and lower groundwater levels due to pit dewatering and decreases in groundwater recharge caused by the presences of large waste and ore facilities covering the landscape have also been identified in the ESIA. Such decreases in water quality and clean water availability are highly problematic for an area that relies on clean and reliable water resources and that provides much of the country's water supply to the Kechut Reservoir.

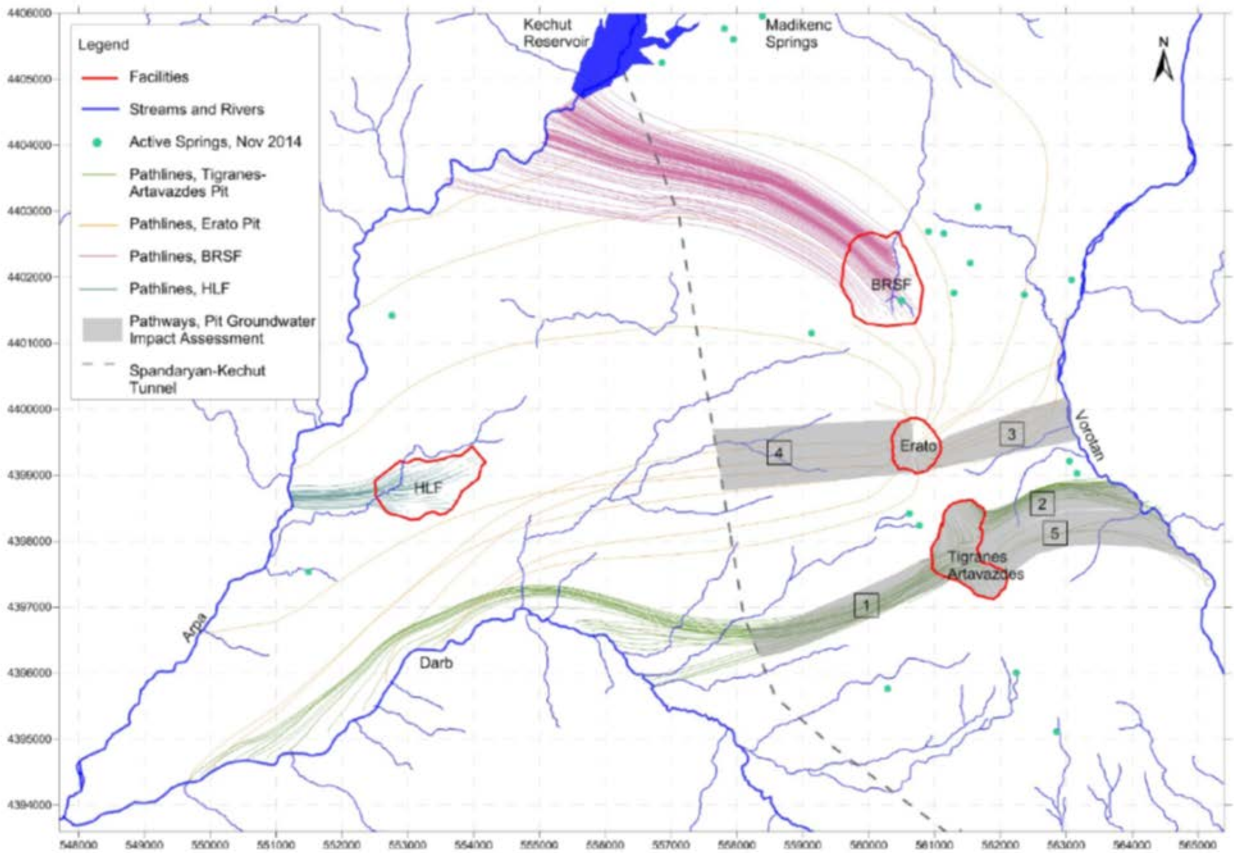

Figure 1. Groundwater flow paths during post-closure. Flow paths for water and contaminants from the barren rock storage facility (BRSF; waste rock dump), the heap leach facility (HLF; where gold is extracted from ore using a cyanide solution), and the open pits (Erato, Tigranes, Artavazdes; where ore and wastes are extracted) to the Arpa, Darb, and Vorotan rivers; springs; the Spandaryan-Kechut Tunnel; and the Kechut Reservoir are shown as colored lines (different colors for different mine sources). Flow paths from the Erato Pit (in yellow), which will not be backfilled, reach nearly all receptors, including the Arpa River upstream of the Kechut Reservoir. Gray numbered flow paths represent flow paths from the pits evaluated in Golder Associates (2014a). Note that the groundwater model used to identify the flow paths did not consider the abundant faults in the area that could bring contaminants more quickly, and with less dilution, to unanticipated receptor locations (Golder Associates, 2014b).
Source: Lydian International, 2016. Chapter 6.9, Figure 6.9.3.

The highest priority concerns and consequences for development of the Amulsar Gold Project, not necessarily in order of importance, are as follows:

- Contamination of downgradient groundwater, streams, springs, reservoir, tunnel from acid rock drainage and contaminant leaching that will last for centuries
- Decreased flow in springs, streams and decreased groundwater levels; underestimation of excess water volumes that will need to be treated during operations due to uncertainties in site-wide water balance
- Inadequate and incorrect geochemical evaluation of wastes and ore; underestimation of acid drainage and contaminant leaching potential of mined materials and negative impacts to the environment
- Inadequate ARD management plan based on poor geochemical evaluation and interpretation
- Incorrect Water Quality prediction model that fails to correctly predict water flows and chemistry, leading to ineffective mitigation measures
- Key measures proposed to mitigate ARD post-closure are untested
- Inappropriate water treatment system for mine-influenced waters during mining and long after mining ceases
- Lack of active treatment before Day 1 of mining
- Fast-tracking and inadequate financial assurance (only US $34 million) for a large-scale, high-risk mine operated by an inexperienced mining company, which risks premature abandonment; errors in the economic feasibility study (NI 43-101)
- Certain documents with key information are not publicly available.

3. Priority Recommendations

The highest priority recommendations include operating an active mine water treatment plant from before mining begins, conducting additional geochemical testing, changing the ARD management plan to minimize or eliminate ARD and contaminant release, requiring appropriate financial assurance, and creating an independent monitoring system. These changes, additions, evaluations, and improvements should be conducted before mining begins.

The highest priority recommendations for improving the Amulsar Gold Project, not necessarily in order of importance, are as follows:

- Design and build an active mine water treatment plant that will operate before Day 1 of mining and into closure that will be able to effectively treat ARD and other mine contaminants exceeding applicable standards
- Identify geochemical test units and conduct additional static, short-term, and long-term testing; select field and laboratory methods for identification and separation of PAG materials
- Revise predicted chemistry of mine-impacted waters and ARD management plan based on results of geochemical testing and a more robust adaptive management approach; reconsider placement and management of ore and waste materials

- Revise predicted water chemistry at closure for each source (waste rock, reclaimed heap, pit discharge) and revise proposed post-closure mine water treatment to account for updated feed chemistry
- Improve the operational water balance estimate and recalculate excess water that will require treatment during mining.
- Create an independent monitoring, evaluation, and training process that funds the involvement of the community and their independent expert advisors, with mandated annual reporting.
- Require a bond/financial assurance that will cover mine closure costs if company leaves before remediation is complete; funding level should include costs for perpetual treatment of acid drainage (calculated for 200 years) and long-term monitoring and maintenance of mine facilities and water quality; an independent evaluation of the appropriate bond amount and type is needed.

4. Conclusion

The conclusion drawn by the Bronozian Consultants is that the high risk of acid drainage and contaminant leaching, the poor geochemical evaluation, the inadequate water quality predictions and mitigation measures, Lydian's inexperience, and the insufficient financial guarantee combine to make this a high risk project during mining and for hundreds of years after operations cease. This conclusion directly contradicts the claims made for Lydian by AMC Consultants (Lydian International Limited, 2017), that: "AMC is unaware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant issues that may materially affect the Mineral Resources." Such a statement is important for securing financing for the project, but it ignores the short-term and long-term liabilities predicted by the available evidence. The government and the people of Armenia should demand better from any company desiring to extract the country's mineral wealth.

4. References Cited

Golder Associates, 2014a. Amulsar Gold Project. Assessment of Groundwater Quality Impacts arising from Pit Development (ESIA Appendix 6.9.3, Figure 6). August. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/4f539cd61fe0f70d0437595b5d3658e6.pdf

Golder Associates, 2014b. Amulsar Gold Project. Groundwater Modelling Study (ESIA Appendix 6.9.1, p. 9). August. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/f5b9868eb4388a791c53849c64d51f93.pdf

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 6.9 Groundwater Resources. Figure 6.9.3. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/a70da61db241d7c9c609ffb0ea842f91.pdf

Lydian International Limited, 2017. NI 43-101 Technical Report, Amulsar Updated Resources and Reserves, Armenia. March. Prepared by Samuel Engineering for Lydian International (p. 37). Available: http://www.lydianinternational.co.uk/images/TechnicalReports-pdfs/2017/Lydian_43-101_March_30,_2017.pdf

Table 1. List of Concerns with the Amulsar Gold Project, Potential Consequences, and Recommendations.

Category	Issue of Concern	Potential Consequences	Recommendations
Geochemical Testing	Geochemical test units not identified; mineralogic analysis on too few samples	Inaccurate ARD and contaminant leaching predictions; misplacement of wastes in the field	Examine mineralogy, including secondary mineralogy, and alteration to identify geochemical test units in UV and LV rock
Geochemical Testing	Inadequate numbers of geochemical tests; humidity cell tests (HCTs) cut short; HCTs not representative of full range of sulfide, sulfate and metal concentrations	Incorrect identification of PAG/non-PAG materials; incorrect water quality predictions; unexpected acid and metalliferous drainage from presumed NAG materials; downgradient effects from mine-related contaminants	Conduct additional ABA, whole rock, short-term leach tests, and kinetic leach tests on each sample from each geochemical test unit; total number of *samples* should be in the range of 250-300 for waste and 150-200 for ore; revise water quality predictions based on new results
Geochemical Testing	No understanding of likely rates of ARD formation from different geochemical units, no understanding of variability of rates under relevant field conditions	Planned mitigation measures will not adequately protect against or prevent ARD	Conduct drum leach tests on a representative range of test units on site with full measurement of acid and metalliferous leaching
Geochemical Testing	Short-term high solution:solid leach tests used; full list of contaminants of potential concern (COPCs) not identified	Underestimation of contaminant concentrations resulting from short-term meteorologic events; incorrect water quality predictions; miss potential contaminants of concern	Use short-term leach tests with lower or variable solution:solid ratios; re-examine the COPCs for short-term leaching using new results
Geochemical Testing	Mercury releases from active heaps, carbon columns, carbon regeneration, and the mercury retort	Underestimation of exposure of workers, nearby residents, impact on agriculture and the environment to mercury	Conduct tests on leached ore and carbon capture systems to better examine potential mercury release; design mercury capture methods to limit mercury releases

Category	Issue of Concern	Potential Consequences	Recommendations
Geochemical Testing	No verified method for identification of PAG rock in the field	Misplacement of wastes in the field; lost opportunity to segregate sulfide from non-sulfide PAG, long-term generation of ARD	Develop field and lab methods to identify sulfide and non-sulfide PAG rock quickly for improved waste management
Geochemical Testing	Incorrect statements that the deposit is oxide, that wastes have “ferric iron resistance,” and biotic ARD is suppressed	Incorrect handling of mining waste, incorrect mitigation; spread of mine-related contaminants	Re-evaluate the number of PAG samples using the NPR approach and the new kinetic testing results and incorporate the findings into planning for the management of PAG wastes
Geochemical Testing	Incorrect interpretation of acid generation potential from alunite and jarosite	Underestimation of acid generation and metal leaching due to naturally occurring sulfate minerals; inadequate remediation strategies	Mineralogic analysis and kinetic leach tests for waste rock containing a representative range of acid-producing sulfate minerals
Acid Rock Drainage Development and Effects	Arbitrary distinctions made between “mild” and “severe” AMD	Underestimation of acid drainage potential; improper management of contaminants from “mild” pollution	Reset focus on pollution prevention and abatement, regardless of whether mild or severe
Water Quantity Predictions: Water Balance	Underestimation of the amount of groundwater entering pit	Lack of storage facilities will result in unpermitted discharge of polluted water	Assumptions and model for groundwater flow into pit needs to be revised
Water Quantity Predictions: Water Balance	Unsupported claim of perched water surrounding all pits	Excess groundwater will enter the pit, resulting in unpermitted discharge of polluted water	Provide data proving correct assessment of perched groundwater; revise water balance to account for additional pit groundwater that must be treated prior to discharge
Water Quantity Prediction: Spring Flows and Groundwater Levels	Mining is predicted to reduce groundwater levels by up to 30 m near pits and 60 m near the barren rock storage facility (BRSF); impacts	Perennial springs near the BRSF may stop discharging by the end of mining and will remain dry; water availability in area will be diminished	Re-evaluate significance of water flow/level reductions considering effects on aquatic life; design appropriate compensation measures for reductions

Category	Issue of Concern	Potential Consequences	Recommendations
	to all tributaries considered insignificant.		
Water Quantity Prediction: Water Balance	No perimeter dewatering wells proposed; more extreme hydrologic events not considered	Lack of hydrologic control; release of mine contaminants to downgradient locations	Recalculate water balance assuming need for perimeter dewatering wells and taking more extreme events (>100-yr storm) into account
Water Quality Prediction	Predicted water chemistry does not even match known chemistry of existing drainage generated by waste from much smaller Russian-era mining	Inaccurate prediction results in incorrect development of water treatment system and in discharge of contaminated water	Update water quality prediction model with more reliable data and input parameters
Environmental Characterization: Baseline Water Quality	Inaccurate assessment of "naturally acidic" springs	Lack of recognition of natural ARD by Lydian used as justification for assumption of low mine-related ARD leading to inadequate mitigation measures	Improved assessment and interpretation of local spring water quality
Mine Water Management	Application of untreated mine water to haul roads	Spread of mine contaminants to downgradient groundwater and surface water	Use only treated or non-contact water for dust suppression
Mine Management	No adaptive management plan (AMP)	Long lead time for response to mine problems during operation and closure	Design AMP to address changes in water quality, stream flows, groundwater elevations and identify trigger levels, mitigation measures to be taken, responsibilities, and evaluation of mitigation effectiveness
Mine and ARD Management	Proposed mitigation measures not tested	Encapsulation and additive concepts are unproven; no fallback plan is provided if these measures are shown to be ineffective	Test encapsulation assumptions and consider adding neutralization material to PAG materials before encapsulating or backfilling; develop fallback option if encapsulation or additive

Category	Issue of Concern	Potential Consequences	Recommendations
			addition are not demonstrated effective
Waste Management	Use of UV rocks for construction	Long-term leaching of mine contaminants, including acid drainage, from construction fill	Identify non-reactive rocks within wastes and use only those for construction fill
Waste Management	Separation and special handling of reactive wastes relies on misinterpretation of ABA and HCT results	Material identified and used as NAG will produce acid and leach metal and other contaminants	Improve identification of PAG and NAG/unreactive rock, also taking into account acidity from sulfate minerals
Mitigation Measures	PAG material will not be placed deepest in pit; planned encapsulation of PAG will not prevent acid generation	Long-term acid generation and transport from pit backfill and waste rock facility	Segregate and store PAG waste and place deepest in Tig/Art pit; re-evaluate potential for flow-through pits and post-closure groundwater level in pits
Mitigation Measures	No commitment to revise the ARD Management Plan if mine life is expanded, mining proceeds through Lower Volcanics	Significantly more sulfides will be found in the Lower Volcanics; Lydian needs to make a commitment to review ARD Management Plan when it revises its mine plan	Lydian needs to commit to revising its ARD Management plan if it plans to mine into the Lower Volcanic
Mine Water Treatment	No active mine water treatment until after Year 4 of mining	Likely insufficient storage volume for contact water or extracted acidic groundwater potentially resulting in excess for internal use and discharge of untreated water to the environment	Design and build an active treatment plant on site that will begin operating before mining begins (during construction)
Mine Water Treatment	Use of passive treatment system during mine operations	Invalid design for acid drainage with high aluminum loads resulting in system failure	Redesign treatment system that accounts for more conservative water quality predictions
Mine Water Treatment	Use of passive treatment system during mine operations	Lack of design criteria for ammonia, arsenic, mercury or thiocyanate will result in lack of	Provide design basis and redesign treatment system

Category	Issue of Concern	Potential Consequences	Recommendations
		treatment and discharge of contaminated water	to account for these contaminants
Mine Water Treatment	Use of passive treatment system post-closure	Invalid design for acid drainage containing high loads of metals and other contaminants	Passive treatment system needs to be redesigned based on more accurate water quality predictions
Mine Water Treatment	No sludge management plan identified for long-term water treatment	Sludge produced by either active or passive treatment system needs to be managed properly	Calculate long-term volume of sludge generated during treatment and develop repositories to store sludge safely
Financial Assurance/ Closure	Inadequate bond/financial assurance	Armenian government and citizens will be left with unremediated site and need to fund cleanup themselves	Require bond to cover the full cost of reclaiming mine site and treating water in perpetuity (calculated at 200 years) if Lydian prematurely ends mining project; require independent analysis of appropriate bond amount and type
Transparency	Several important documents are not publicly available, which contradicts Lydian's commitment to transparency in their Code of Conduct	Lack of trust in company's commitments; inability to fully evaluate predictions	Make all technical documents available on Lydian's website
Community Involvement	Vague and unpopular participatory monitoring program	Lack of trust in company's claims, especially regarding water quality changes from mining	Fund the involvement of the community and their independent expert advisors, with mandated annual coordination meetings.

Appendix A. Selected examples of Similar Mines to the Amulsar Gold Project and Consequences

The following mines represent a limited selection of mines that are similar to the Amulsar Gold Project in terms of size, mine type, and/or geochemical characteristics. Their consequences, references, and, where available, information on financial assurance and costs to remediate the mine after abandonment are provided. Comparisons show that the approximately $34 million reclamation bond for Amulsar would be inadequate to fully remediate the project, monitor water quality, and maintain environmental protection (including long-term water treatment) in the case of premature abandonment.

Mine, Country; Owner	Mine Type	Consequences/Comments	Reference
Super Pit, Western Australia; Kalgoorlie Consolidated Gold Mines (Barrick-Newmont joint venture)	Open pit gold; flotation, roasting, carbon-in-leach processing	Well-known open-pit gold mine of similar size. In 2010, the Super Pit in Australia was the country's largest open-pit gold mine and was similar in size and shape (3.5km long, 1.5km wide and 360m deep) to the combined Tig-Art open pit; major landscape destruction, high closure costs.	1. http://www.mining-technology.com/projects/superpitgoldmineaust/ 2. http://www.theaustralian.com.au/news/nation/the-mine-thats-swallowing-a-town/news-story/c6de236fa94f60d7af38a65d8742baf7
Bellavista Mine, Costa Rica; Glencairn Gold Corporation (Central Sun Mining)	Open pit gold, cyanide heap leach	Leach pad liner leak, landslide, groundwater contamination.	https://www.earthworksaction.org/voices/detail/bellavista#.Wigp3FWnGpr
Golden Sunlight Mine, Montana, USA; Barrick Gold Corporation (formerly Placer Dome)	Open pit gold and silver, cyanide vat leach	Severe acid drainage, not predicted in original EIS; groundwater contamination with cyanide and copper from tailings impoundment; acid drainage in springs downgradient of waste rock dumps.	https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf (p. 134)
Tyrone and Chino Mines, New Mexico, USA; Freeport McMoRan	Open pit and underground copper dump leach	Groundwater contamination with metals and sulfate, acid drainage. Regulatory agency set bond at $250 million and requires perpetual pumping and treating to avoid filling of pits with ARD; additionally, company paid $18.5 million to restore injured groundwater, wildlife, and wildlife habitat.	Natural resource damages: https://onrt.env.nm.gov/chino-cobre-and-tyrone-mines/ural

Mine, Country; Owner	Mine Type	Consequences/Comments	Reference
Vangorda/Grum Mine, Faro, Yukon Territory, Canada; Curragh Resources Incorporated and Anvil Range Mining Corporation	Open-pit lead/zinc, flotation, waste rock piles	Company went bankrupt in 1998, and the Canadian Government took over reclamation and closure planning. Acid drainage was predicted and did occur. Seepage data from existing facilities underestimated future concentrations and loadings, while humidity cell leachate concentrations, which were higher, came closer to long-term actual concentrations. Costs for full reclamation of the mine are estimated at CDN $500 million.	1. MEND, 2008: http://mend-nedem.org/wp-content/uploads/2013/01/1.70.1.pdf 2. http://www.cbc.ca/news/canada/north/faro-mine-remediation-1.4179016 3. https://www.aadnc-aandc.gc.ca/eng/1480019546952/1480019612738
Nickel Plate Mine, British Columbia, Canada; Barrick Gold	Open-pit gold, floatation, tailings pond and waste rock piles	Thiocyanate was produced during gold cyanidation and built up to 1.4 g/L in reclaim water. A treatment plant has been operating to remove thiocyanate, ammonia, arsenic and nitrate from reclaim water since 1996 at an annual operating cost of US $4.87 million/year.	Given and Meyer, 1998: https://goo.gl/wcgR3h
Zortman and Landusky, Montana, USA; Pegasus Gold Corporation	Open-pit gold and silver, cyanide heap leach	Severe acid drainage not predicted in original EIS. Unpermitted acid drainage discharges resulted in Montana Water Quality Act violations in several streams and effects on a nearby tribal community. In 1996, Pegasus was required to construct a water collection and treatment plant, pay penalties, bond for long-term operation and maintenance of the plant, conduct water quality studies, and improve water quality on the reservation. Pegasus then went bankrupt in 1998 and abandoned the site. The bond ($67 million) was insufficient to adequately reclaim the site.	1. http://leg.mt.gov/content/publications/environmental/2004zortman.pdf 2. http://www.asmr.us/Portals/0/Documents/Conference-Proceedings/2009/1583-Williams.pdf 3. https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf (p. 144)
Jerritt Canyon, Nevada, USA; Queenstake Resources	Open-pit and underground gold and silver; heap and vat leach processing	Cyanide, chloride, TDS, arsenic, sulfate plume in groundwater from tailings impoundment; TDS and sulfate exceedences in creeks from waste rock pile. EIS predicted no impacts from mining. Overestimated dilution; sample size/representation incorrect; waste rock mixing/segregation not effective; Liner leak, embankment failure or tailings spill.	https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf (p. 150)

Mine, Country; Owner	Mine Type	Consequences/Comments	Reference
Beal Mountain, Montana, USA: Pegasus Gold Mining Company	Open-pit gold and silver; cyanide heap leach processing	Groundwater contamination with nitrate, iron and surface water exceedences with cyanide related to heap leach pad disposal after treatment (groundwater); increases in TDS, sulfate, nitrate in German Gulch from waste rock seepage; elevated selenium, sulfate, nitrate, and TDS in waste rock seeps. The mine was abandoned in 1998 when Pegasus Gold declared bankruptcy and was taken over by the US Forest Service. The USFS first developed a biological water treatment plant in 2001 to remove ammonia, arsenic, cyanide, nitrate, and thiocyanate from drawdown water. This plant failed and a reverse osmosis plant was constructed in 2013. Total costs for remediating this site are approximately US$40 million + US$1 million/yr for treatment plant operation.	1. https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf (p. 127) 2. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3856316.pdf ; https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5183264.pdf 3. A. Sobolewski, Personal communication
Twin Creeks, Nevada, USA; Newmont Mining Corporation	Open-pit gold and silver; heap and vat leach processing	Groundwater contamination with cyanide, arsenic, and TDS from tailings impoundment; occasional exceedences of TDS and arsenic in Rabbit Creek.	https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf (p. 161)

Appendix B. List of Reports and Memoranda Produced by the Bronozian Consultants

Blue Minerals Consultancy. Evaluation of Lydian Amulsar Gold Mining Project: Assessment of ARD Potential and Effects on Surface Water, Groundwater and Soil. 17 June 2017. 134 pages. Available: https://goo.gl/fW3mdA

Clear Coast Consulting. Review of water treatment at the proposed Amulsar Gold project. 13 June 2017. 12 pages. Available: https://goo.gl/WF7449

Buka Environmental. Evaluation of Hydrogeochemical Issues Related to Development of the Amulsar Gold Project, Armenia: Key Assumptions and Facts. 19 June 2017. 20 pages. Available: https://goo.gl/n8Qwnw

Blue Minerals Consultancy, Buka Environmental, and Clear Coast Consulting. Lydian Amulsar Gold Mine Project in Armenia Lacks Proper Environmental Evaluation and Threatens Water Quality From Long-Term Acid Generation: Summary and Recommendations. 24 July 2017. 5 pages. Available: https://goo.gl/NkyGBE

Blue Minerals Consultancy, Buka Environmental, and Clear Coast Consulting. Response to Lydian review of Bronozian-Commissioned Reports. October 2017. 19 pages. Available: https://goo.gl/9yMZLh

Buka Environmental. Initial Comments on Lydian's 2016 Sustainability Report for the Amulsar Project. 16 October 2017. 4 pages. Available: https://goo.gl/rYS2m2

Buka Environmental. Evaluation of Geochemical Characterization Results and Proposed Additional Studies for the Amulsar Project, Armenia. 30 October 2017. 9 pages. Available: https://goo.gl/9zGbq8

Blue Minerals Consultancy, Buka Environmental, and Clear Coast Consulting. Response to Lydian's report: Further details of Lydian's approach to adaptive management of ARD. December 2017. 19 pages. Available: https://goo.gl/yhSvZR

Blue Minerals Consultancy, Buka Environmental, and Clear Coast Consulting. Concerns with the Amulsar Gold Project, Potential Consequences, and Recommendations, with appendices. January 2018. Available: https://goo.gl/9KKMAe

Lydian International, 2016. Environmental and Social Impact Assessment (ESIA) documents (and one appendix only available with the 2015 ESIA):

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 1. Introduction. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/22cf2407225915298ac44bbd16fa9341.pdf

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Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4.3 Landscape and Visual Resources. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/1d4aeb8f8136b1629d001959d9884838.pdf

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4.6 Geology and Seismicity. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/395751488fe62ea8133473e4d7b87e7e.pdf

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4. Environmental and Social Baseline. Chapter 4.8. Groundwater Resources. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/31d37fb836b3e9f6b39f3354e69b5959.pdf

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4. Environmental and Social Baseline. Chapter 4.9. Surface Waters. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/02a3913417439808cccf24cf1e04dcbf.pdf

GRE, 2014. Amulsar Project Geochemical Characterization and Prediction Report – Update, 31 August 2014, Global Resource Engineering Ltd. Prepared by Global Resource Engineering, Ltd. For Lydian International. Available: https://goo.gl/GuwVb7 *(Note that this appendix was in the 2015 ESIA but was not available online with the 2016 ESIA on the Lydian website)*

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4. Environmental and Social Baseline. Appendix 4.8.2. Amulsar Groundwater Monitoring Network. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/c1b5397e7b854e04e28f02f571dd31fd.pdf

Lydian International, 2016. Amulsar Gold Mine Project. Environmental and Social Impact Assessment (ESIA). Chapter 4. Environmental and Social Baseline. Appendix 4.8.3. Groundwater Level Data. Available: http://www.lydianarmenia.am/resources/geoteam/pdf/db08203baffffb694ee1a819d5a1335b.pdf

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