

MINING POLICY DIALOG DISCUSSION PAPER

Responsibility of Mining Sector of Armenia for Environmental and Public Health Issues

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1. Introduction (brief description of the document)

The state balance of mineral reserves currently registers about 871 mineral deposits with approved reserves (43 metallic, 760 non-metallic, 44 underground fresh water and 24 Mineral waters), as well as 580 mineral deposits (131 metallic and 449 non-metallic), more than 130 types of minerals, of which about 25 are metallic¹.

This study does not provide a full range of relevant studies related to the environmental problems of the Armenian mining industry, as well as the negative impact of environmental pollution on public health. The identified priorities and the state policy to address them will be discussed. In addition to the above, the legislative framework and institutional relations on the issues under discussion will be presented in general terms.

This document will briefly address the international practice of environmental and health issues related to the mining industry, as well as solutions proposed for similar issues in other countries.

2. Research conducted in Armenia on the environmental and public health impact

Large-scale and well-researched studies have been conducted in Armenia, especially on the negative impacts of the metal mining industry on nature and human health. Valuable research has been done by academic institutions, scientists, non-governmental organizations, international and foreign organizations.

The Government of Armenia is also taking certain steps to develop a comprehensive policy in this field. The Government has been trying to develop a strategy for the development of the mining industry for a long time, but the process is constantly delayed. The development of this document is planned to be completed by the end of December 2019, but it is still not clear when it will be ready. Within the framework of this program, two studies were conducted with the funding of the World Bank: the economic analysis of the sector, as well as the environmental and health impact assessment². These two reports should serve as a basis for formulating a sector development strategy.

The relevant environmental problems related to the sphere are described in the Strategic Program for Perspective Development of the Republic of Armenia for 2014-2025, approved by the decision of the Government of the Republic of Armenia³. The Ministry of Environment of the Republic of Armenia has made an inventory of the mining waste that should be neutralized first⁴. By adopting this document, the authorized state body in the field of nature protection

¹ Website of the Ministry of Territorial Administration and Infrastructure of the Republic of Armenia, Natural Resources-General information <http://www.minenergy.am/page/472>:

² "Environmental and Health Impact Assessment", presented to the DMT-GTK Armenia joint Venture, by (JV-DGA), March, 2020.

³ Republic of Armenia 2014-2025 . Strategic Program for Perspective Development ", Annex to the Decision N 442-N of the Government of the Republic of Armenia, March 27, 2014, <https://www.gov.am/files/docs/1322.pdf>

⁴ "On Approval of the List and Description of Subsurface Waste Closure Facilities, Abandoned Production Landfills and Violated Areas, allocated as a result of subsurface waste inventory, which require implementation of priority programs for reduction of negative

in fact confirms the high risk of the tailings dumps and industrial dumps listed there to the environment and human health. Although the mentioned decision lists only 10 objects, which threats must be neutralized as a matter of priority, but the number of abandoned mining objects in Armenia is incomparably greater⁵.

The multi-stakeholder group of the Extractive Industries Transparency Initiative also presented its approaches to environmental priorities related to the activities of the sphere, which also needs to be addressed in the framework of research in this area⁶. Significant problems have been identified as a result of a study conducted with the funding of the World Bank⁷, in which one of the key problems is the incorrect construction of tailing dumps in Armenia and the resulting issues of accidents.

Finally, valuable studies have been conducted by non-governmental organizations dealing with the issues of the sphere, which have submitted proposals to the Government of the Republic of Armenia to resolve the problems they raised⁸.

Large-scale studies have been conducted in Armenia, substantiating the significant negative impacts of the mining industry on public health. In particular, the American University of Armenia studied the legal framework governing relations in the mining industry, including the issue of environmental and social impacts⁹, mining waste management and recycling, and assessed the impact on the health of children in certain areas contaminated with that waste¹⁰, potential risks and other issues. Public health and food safety studies have been conducted by the Center for Ecological and Noospheric Studies of the National Academy of Sciences of the Republic of Armenia, as a result of which a whole bunch of heavy metals were found in the hair of children living in Lernadzor and Kajaran¹¹.

Foreign organizations, including the Czech NGO "Arnika", have also conducted research on environmental pollution in Armenia. With the support of Armenian partners, he conducted numerous studies in the areas polluted by mining waste in the Lori region, and published the results in several reports¹².

Research on the effects of the mining industry on public health is lacking or at least, studies conducted by public authorities, are not available to the public. Since 2012, all the Ministers of Health of the Republic of Armenia, as

impacts on the environment”, Order of the Minister of the Environment of the Republic of Armenia No. 337-n of October 11, 2019 <http://www.mnp.am/uploads/1/1571036610Hraman337.pdf>.

⁵ American University of Armenia, Center for Responsible Mining, data and maps of mining communities <https://crm.aua.am/hy/independentmonitoring/maps/>.

⁶ "The approach of the multi-stakeholder group of the Armenian EITI on responsible mining", concept paper, https://www.eiti.am/file_manager/EITI%20Documents/Responsible_mining_concept_paper.pdf.

⁷ "Strategic assessment of the stability of the mining industry-Armenia", April 2016, <http://documents1.worldbank.org/curated/en/810031468197953609/pdf/106237-ARMENIAN-WP-P155900-PUBLIC.pdf>.

⁸ Preliminary proposals for metal mining <https://www.armecofront.net/lrahos/metal-mining-industry/>.

⁹ Vlado Vivoda, Jonathan Fulcher, Environmental and Social Impact Assessment, February 2017 https://mlri.org.am/media/pdfs/93_2289.pdf

¹⁰ Varduhi Petrosyan, Anna Orlova, Charles E. Dunlap, Emil Babayan, Mark Ferfel, Margrit von Braun, Lead in residential soil and dust in a mining and smelting district in northern Armenia: a pilot study <https://ace.aua.am/files/2014/02/13.-Petrosyan-Varduhi-Anna-Orlova-Charles-E.-Dunlap-Emil-Babayan-Mark-Farfel-and-Margarit-von-Braun.-Lead-in-residential-soil-and-dust-in-a-mining-and-smelting-district-in-northern-Armenia-a-pilot-s.pdf> ; Varduhi Petrosyan, Ruzanna Grigoryan, Dzovinar Melkom Melkomian, Vahe Khachadourian, Andrew McCarot, Byron Crape, Risk factors for children's blood lead levels in metal mining and smelting communities in Armenia: a cross-sectional study <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3613-9> ; Varduhi Petrosyan, Ruzanna Grigoryan, Dzovinar Melkom Melkomian, Kristina Akopyan, Akhtala Pilot Project on Community Empowerment, Final Report, Armenia 2014 թ. https://chsr.aua.am/files/2015/01/Akhtala-Pilot-Project_Final-Report_Action-Plan_2014.pdf; Kristine Hakobyan, Tsovinar Melkom Melkomian, Ruzanna Grigoryan, Varduhi Petrosyan, Detailed Environmental Risk Assessment in 11 Communities of Armenia, Armenia 2014թ., https://chsr.aua.am/files/2015/01/TRA-report_ARMwebpage-June_2015.pdf.

¹¹ RA National Academy of Sciences, Center for Ecological and Noospheric studies, research: Ecological-geochemical assessment of the environmental condition of Kajaran city, Yerevan, 2008.

¹² Czech non-governmental organization Arnika, Armenia, <https://english.arnika.org/armenia#publications>.

well as the representatives of the "Center for Disease Prevention and Control" SNCO, which is part of the Ministry, avoid giving clear answers about the existence and extent of such impacts.

In conclusion, it should be noted what effect on the human body is exerted by some metals that are abundantly found in mining zones. In particular, the high content of lead in the body affects the nervous system, can cause intellectual disability, vision, hearing and speech disorders, and also affects the kidneys, stomach, metabolic system. High levels of copper in the human body can lead to the development of tumors. Increased cadmium content causes skeletal deformity, lung damage. The ways of penetration of these metals into the body are numerous: soil, water, air and domestic animals. Metals affect the nervous system, kidneys, liver.

3. Legislative regulations

Environmental legislation related to the mining industry is very extensive and dynamically changing. Within the framework of this document, the legal acts that regulate the priorities indicated here will be discussed. From this point of view, the main legal acts regulating the relations of the sphere are the following:

- RA Code on Subsurface Resources,
- RA Code "On Environmental Impact Assessment and Expertise",
- RA Law "On Waste",
- RA Law "On Ensuring Sanitary and Epidemiological Safety of the Population of the Republic of Armenia",
- RA Law "On Environmental Control".

Of course, there are many other laws and by-laws, which regulate the procedure for assessing the damage to the environment, the legal regime of specially protected areas, and other relations related to mining activities. However, the above-mentioned legal acts regulate the issues considered as a priority in this document, which are primarily regulated by the mentioned laws.

It is important to note that the adoption of the new law on EIA in 2014 established the requirement that projects with a significant impact on the environment should be subject to expertise not only in terms of environmental components, but also in terms of the impact on human health. It should be noted, however, that no by-laws and methodological guidelines have been developed, on the basis of which the authorized body in the field of healthcare can conduct a full and legally defined examination of the impact on human health. As before, after the adoption of the new law, the Ministry of Health of the Republic of Armenia provides only an opinion on the impact of mining projects on human health, which is not an administrative act, and the Ministry does not have the status of a legal entity even during the proceedings in the administrative court of the Republic of Armenia.

Another issue that requires legislative regulation is the regulation of the benefit-loss ratio of projects, which will be in line with high international practice and will be based not only on financial calculations of profitability for the company, but also on the social criteria of creating new value for the public - this is how the benefit-loss ratio of large investment projects is assessed in the EU countries (more details will be presented in the section discussing international best practice).

The amendments to the RA legislation on subsurface resources, regulating the management of subsurface waste, mine closure and the establishment of financial guarantees for this, can be assessed as a positive trend. In particular, the measures aimed at restoring the environment disturbed as a result of the mining industry are regulated by the legal regulations on "Management of Subsurface Waste", which are fixed in Chapter 5.1 of the RA Code on Subsurface Resources. According to the transitional provisions, the provisions establishing these changes will enter into force within 60 months¹³, after that, technogenic mines are legally objects of processing of subsurface waste.

¹³RA Law "On Amendments and Additions to the Code of the Republic of Armenia on Subsurface resources" (CA-161-N, adopted on October 18, 2016, effective date-04.05.2017), <https://www.arlis.am/DocumentView.aspx?docid=109031>:

The subsurface users operating them are obliged to bring their activities into compliance with the new requirements of the law within the specified period, at the same time submitting plans for the management of subsurface waste and financial guarantees to the Ministry of Environment, in accordance with the established procedure (the deadline is May 4, 2022). This regulation significantly increases the liability of companies for the management of subsurface waste and for further neutralization. It should be noted that these regulations and financial guarantees for them apply only to subsurface waste. For the measures related to the mine closure, the companies are obliged to make annual contributions to the Environmental Protection Fund.

The amendments to the RA Code on Subsurface Resources¹⁴ have also improved the legal regulations related to the mine closure, but environmental and health issues related to the further exploitation or conservation of partially exploited mines as a result of the termination of the right to subsurface use remain open.

Public health relations are regulated by the RA Law "On Ensuring the Sanitary and Epidemiological Safety of the Population of the Republic of Armenia", adopted in 1992, most of the provisions of which do not correspond to today's legal and institutional realities and are practically not applicable.

In the field of public health, RA Code on Subsurface Resources establishes a requirement for monitoring of the extracted mineral area, the territory of production landfills during extraction, the safety and health of the population of the adjacent communities, but no state authority has any specific obligation under the law to ensure the safety and health of the population.

According to the legislation regulating the healthcare sector of the Republic of Armenia, the relevant state authorities are also not obliged to conduct regular medical examinations or inspections in mining zones to find out the health problems of people and their causes. The legislation also does not provide for institution of compulsory health insurance or compensation for damage caused to people living in mining zones.

4. Institutional framework

In the context of the priorities presented in this document, the assessment of the institutional capabilities and regulatory framework of the two state authorities in the areas of environment and health - is of key importance.

At present, one of the key issues in the Armenian mining industry is the mechanism of incomplete, low-quality expertise when evaluating mining projects. The main professional document for issuing a subsurface use permit is the expert opinion of the EIA, which, as a rule, is usually issued as a result of an "expert examination" carried out by one or two experts. The expert opinion of the EIA, in its turn, summarizes the assessment of not only the environmental components, but also the impact on human health, cultural objects, economy, which is objectively not serious. According to the representatives of the sphere, they provide project documentation to the authorities of the relevant spheres in order to present an opinion. It should be noted, however, that such superficial examinations conducted at the level of opinion cannot ensure quality, which leads to the formation of unprofessional documents, and, as a result, to the growth of social tension in the irresponsible mining industry.

The same applies to the healthcare sector. The main responsibility for this area is the Center for Disease Prevention and Control of the Ministry of Health of the Republic of Armenia¹⁵, which, however, does not carry out a human health impact assessment at the design stage, in spite of the direct and mandatory requirement of the EIA law. As mentioned above, there is no legal and methodological basis for that, which, however, is extremely necessary.

¹⁴ RA Law "On Amendments and Additions to the RA Code on Subsurface Resources" (CA-397-Ն, adopted on July 16, 2020, entered into force on August 16, 2020.), <https://www.arlis.am/documentview.aspx?docid=145085>:

¹⁵ Center for Disease Prevention and Control of the Ministry of Health of the Republic of Armenia, <https://ncdc.am/>:

When summarizing the section on institutional capacities, we should also add that when considering mining projects, the state authorities do not carry out a general assessment of the country's economy or assessment of compatibility with other types of business activities inherent in a given territory in the context of territorial development. This issue is not only a matter of institutional capacities, but also a matter of strategic assessment. It is obvious that in the conditions of such institutions it is impossible to develop the mining industry in the country.

5. Main legislative and institutional issues and gaps

In the process of issuing permits for subsurface use, not all state authorities, whose professional activities include assessing the impact of this project, are involved as responsible state authorities (in addition to environmental, also health, economic, territorial development, preservation of cultural heritage, etc.)

There is no verification of the benefit-loss ratio of the mining program, which can be used to assess the overall socio-economic impact of the project. There is no legal requirement for that, as well as by-laws and methodological guidelines.

Currently, the issuance of permits for subsurface use is based on three professional documents - subsurface, technical safety and environmental impact assessments. There is no expertise and assessment of the impact of the mining program on human health, while the obligation to assess the impact on human health derives from international treaties with the participation of Armenia and the direct requirement of the RA law "On Environmental Impact Assessment and Expertise".

6. Priority recommendations for policy development to improve the current situation

Environmental and health problems that require priority solutions can be conventionally divided into three main groups:

- a) Improving the quality of the EIA process and involving authorities in other areas in the process of providing expertise and permits;
- b) a full analysis of the benefits and losses of mining projects;
- c) assessment and examination of the impact of the mining industry on public health.

- At the stage of issuing permits, at least the authorities responsible for health, economic development and preservation of cultural heritage should be involved as state authorities responsible at the expert level. Therefore, it is necessary to develop step-by-step systemic change programs, the implementation stages of which should be reflected in the roadmap for the introduction of Responsible Mining Culture, which will be developed within the framework of the work program. It is necessary to regulate the process of subsurface use permits through legislative and systemic changes, making it comprehensively substantiated.

- In addition to expertise and assessment of the impact on the environment and human health, when granting a permit, the compatibility of a particular mining program with other economic entities carried out at a given place, as well as the impact of the program in terms of preserving cultural heritage, should also be assessed.

- The ratio of socio-economic benefits and losses provided by the subsurface use program should be assessed not in terms of the private commercial interest of the company, but in terms of comprehensively evaluated public good, as these programs destroy or damage components of the environment that are also of economic value and endanger public health, cultural heritage and other economic activities carried out in this territory. All this is currently not evaluated in accordance with high international standards and is not included in the expenditure of the mining program.

- It is necessary to study the international practice and develop a normative mechanism for assessment and expertise for the impact of subsurface use on human health, as well as to establish a legislative mechanism for

compensation (for example, it may be through mandatory health insurance of the population affected by the mining project).

7. International Best Practice

The example of Sweden can be considered as a positive international experience in issuing subsurface use permits. The issuance of a mining permit in this country is carried out by a specialized court¹⁶ only after hearing all interested parties during the trial and after a comprehensive assessment of the facts.

The best example of assessing the benefit-loss ratio in the sector can be the guide to assessing the benefits of large investment projects in the European Union¹⁷. It is designed to assess the viability of not only the mining industry, but also all major projects in general, and is based on the premise of improving the well-being of society, rather than on a purely design profitability criterion with a cost-benefit methodology. The benefit-loss analysis comprehensively evaluates the “net welfare effect” and “net public benefit and cost” resulting from the implementation of the project and other studies important for its sustainability that are not conducted through the EIA or any other process. This analysis assesses the impact of the expected industrial project on the economic and social systems that are important for the state. To assess these impacts, economic analysis of the project, financial analysis, risk assessment, technical feasibility analysis, environmental sustainability, and several other analyzes are conducted. Detailed criteria and methodologies have been developed for each of the components.

The benefit-loss analysis of industrial projects and its components (financial, economic, environmental, etc.) are internationally recognized criteria that contribute to the assessment of the proper validity of the project (due diligence). The purpose of the project is to assess the financial stability and economic necessity of the submitted project. These analyses are important, first of all, for assessing the validity and ensuring the protection of investments.

Appendix

List of research and scientific work on the impact of environmental factors on public health

1. K. Ghazaryan, G. Movsesyan, N. Ghazaryan "Environmental risk Assessment associated with microelement contamination of the soils around the Agarak copper-Molybdenum Combine", Biological Journal of Armenia, 4 (68), 2016 (<http://www.y-su.am/files/agaraki-pghndzamolibdenayin.pdf>)
2. OSCE Office in Yerevan, Civil Actions for Security and the Environment (ԶԳՀԱՇ Project), Risk Assessment of Heavy Metal Contamination of RA Agricultural Products, Yerevan, 2018 (<http://ngoc.am/wp-content/uploads/2017/10/Report-final-1.compressed.pdf>)
3. «Health Risk Assessment of Potentially Toxic Trace and Elements in Vegetables Grown Under the Impact of Kajaran Mining Complex», D.Pipoyan, S.Stepanyan, S.Stepanyan, M.Beglaryan, N.Merendino Informational Analytical Center for Risk Assessment of Food Chain of the Center for Ecological Noosphere Studies of NAS RA Yerevan Armenia Department of Ecological and Biological Sciences (DEB), Laboratory of Cellular and Molecular, Nutrition Tuscia University ViterboItaly, Biological Trace Element Research, 2018 (<https://link.springer.com/journal/12011>)

¹⁶ Swedish Environment Code <http://www.swedishepa.se/Guidance/Laws-and-regulations/The-Swedish-Environmental-Code/>:

¹⁷ Guide to cost-benefit analysis of investment projects, https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf.

4. «Exposure assessment of potentially toxic trace elements via consumption of fruits and vegetables grown under the impact of Alaverdi's mining complex», D.Pipoyan, M.Beglaryan, L.Sireyan, N. Merendino, [Human and Ecological Risk Assessment: An International Journal](#), Volume 25, 2019, Issue 4 (<https://www.tandfonline.com/doi/full/10.1080/10807039.2018.1452604>)
 5. “Mine Waste Classification and Management”, “Series on International Best Practice, Mining Legislation Reform Initiative” (<https://bit.ly/2Rxhs3q>)
 6. Vlado Vivoda and Jonathan Fulcher, Center for Responsible Mining, American University of Armenia, (Yerevan), Working Paper N3 (February 2017), (<http://mlri.crm.aua.am>)
 7. "Eco-geochemical state of rocks and soils of the Sevan ophiolite zone "(Gevorgyan R. G., Minasyan G. A., Gevorgyan M. R., «Journal of Earth Science Department RAN» Scientific and Informational Journal, No. 27, 2009) (<https://onznw.wdcb.ru/publications/asempg/geoecol-4.pdf>)
 8. Ecological and geochemical assessment of environmental state of the city of Kajaran», A. Saghatelian, V. Gevorgyan, S. Arevshatyan, L., L.Sahakyan; CENS of NAS RA, 2008 (<http://cens.am/book/ecological-and-geochemical-assessment-of-environmental-state-of-the-city-of-kajaran>)
 9. Assessment of the impact of mining tailings dumps and the Kapan copper-molybdenum Combine on the environment of the city of Kapan", Center for Ecological and Noospheric Research of the National Academy of Sciences of the Republic of Armenia, 2007 (<https://www.ecolur.org/files/uploads/kapan.pdf>)
 10. Heavy metals in the surroundings of mining and metallurgical sites in the Lori region in Armenia”, Author: Martin Bystrianský, Contributing authors Marek Šír, Jitka Straková, Nikol Krejčová (<https://www.ecolur.org/files/uploads/armeniaheavymetalsajweb.pdf>)
 11. "Ecochemical analysis of sediments of soils and rivers in the Tuxhmanuk mine zone", Seyran Minasyan, 2013
 12. Assessment of the impact of mining tailings dumps and the Kapan copper-molybdenum Combine on the environment of the city of Kapan", Center for Ecological and Noospheric Research of the National Academy of Sciences of the Republic of Armenia, 2007 (<https://www.ecolur.org/files/uploads/kapan.pdf>)
 13. "The level of pollution of Meghri River, Voghchi u Artsvanik rivers with heavy metals and aluminum", author: G. A. Gevorgyan, A. A. Danielyan, K. V. Grigoryan, S. H. Minasyan, Scientific Bulletin of Yerevan State University, 2011 (<http://www.armecofront.net/wp-content/uploads/2013/12/4-POLLUTION-LEVEL-OF-THE-MEGHRIGET-VOGHCHI-AND.pdf>)
 14. Center for Ecological and Noospheric Research of the National Academy of Sciences of the Republic of Armenia
-
- Study of the ecological situation in Kajaran (2005) http://www.armecofront.net/wp-content/uploads/2013/12/monitoring_qajaran_hashvetvwutyun.pdf
 - Assessment of the impact of mining tailings dumps and the Kapan copper-molybdenum Combine on the environment of the city of Kapan", 2007 http://www.armecofront.net/wp-content/uploads/2013/12/monitoring_kapan_hashvetvwutyun.pdf
 - Risk assessment of RA agricultural products by heavy metal contamination. Alaverdi, Akhtala, 2011 http://www.armecofront.net/wp-content/uploads/2013/12/report_Alaverdi_2010_Arm1.pdf:
15. Articles by Ruben Movsesyan, Head of Chair of Prospecting and Exploration of Mineral Deposits at Yerevan State University , Candidate of Geologic-mineralogical Sciences, Associate Professor

- Waste of mining industry of the RA. problems and ways of solving them, 2013 (<http://www.armecofront.net/wp-content/uploads/2013/12/4.-WASTE-OF-MINING-INDUSTRY-OF-THE-RA-THE-PROBLEMS-AND-WAYS-OF-SOLVING-THEM.pdf>)
 - Priority issues related to the tailing Storage Facilities of the Republic of Armenia, 2014, in Russian (<http://www.armecofront.net/wp-content/uploads/2013/12/3.-PRIORITY-PROBLEMS-RELATED-WITH-TAILING-DUMPS-OF-THE-REPUBLIC-OF-ARMENIA.pdf>)
16. "The situation in the Armenian city of Akhtala. Environmental and Health Impacts of Mining", Ruzanna Grigoryan, Master of Public Health, Physician, American University of Armenia (AUA) 2015 May (<https://bit.ly/3a8NNE1>)
17. "Investigation on the ecological state of Kapan". The investigation was supported by the Danish Association of Investigative Journalism (Scoop). (Scoop): "AZG" DAILY #211,19.11.2009:
18. "The level of pollution of Meghri River, Voghchi and Artsvanik rivers with heavy metals" Bulletin of Yerevan State University, <http://www.armecofront.net/wp-content/uploads/2013/12/4-POLLUTION-LEVEL-OF-THE-MEGHRIGET-VOGHCHI-AND.pdf>
19. Dynamics of water quality of Shnogh river during 2009-2015. Seyran Minasyan, Institute of Chemical Physics, NAS RA <https://bit.ly/3dXKpx0>
20. Hydrochemical analysis of the Gegharot River for 2007-2014, Candidate of Chemical Sciences, Associate Professor, water quality specialist Liana Margaryan <http://www.armecofront.net/lrahos/gegharot-vtang/>
21. Impact of "Nahatak" tailing dump of "Akhtala Mining and Processing Plant" CJSC on the chemical composition of peaches growing in Mets Ayrum and Chochkan communities, Seyran Minasyan http://aarhus.am/Expert_2015/02.07-Analiz%20situation%20Ayrum%20Dexc-Seyran%20Minasyan.pdf
22. American University of Armenia (AUA), Study of lead content in children's blood in Akhtala, Alaverdi and Yerevan. Assessment of heavy metal pollution in soil of Alaverdi city, <http://www.armecofront.net/wp-content/uploads/201>
23. American University of Armenia (AUA) - Results of Independent Environmental Monitoring of Mining Communities
- Final report on soil and drinking water testing in kindergartens and schools of the Agarak community, <https://bit.ly/3mGvo6N>
 - Results of soil and drinking water testing in kindergartens and schools in Alaverdi, <https://bit.ly/3g2Vr6N>
 - Final report on soil and drinking water testing in kindergartens and schools of the Akhtala community, <https://bit.ly/3gcIjw5>
 - Final report on soil and drinking water testing in kindergartens and schools of the Ararat community, <https://bit.ly/3tgggPZ>
 - Final report on soil and drinking water testing in kindergartens and schools of the Artsvanik and Kajaran communities, <https://bit.ly/3ddWPlI>
 - Final report on soil and drinking water testing in kindergartens and schools of the Armanis community, <https://bit.ly/3ddu0VZ>
 - Final report on soil and drinking water testing in kindergartens and schools of the Kapan, Syunik and Achanan communities, <https://bit.ly/2OPyY1W>
24. Assessment Study of Groundwater Resources of the Ararat Valley–2014, <https://bit.ly/2OK4COh>



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25. Final Report on the Inventory of Groundwater Wells, Natural Springs and Fish Farms in the Ararat Valley, 2016 <http://www.armecofront.net/wp-content/uploads/2013/12/inventoryreportarm.pdf>
26. "Analysis of the isotopic composition of the water of the Amulsar project area and the thermal waters of Jermuk", Appendix 1 analysis of the isotopic composition of the water of the Amulsar project area and the thermal waters of Jermuk <https://bit.ly/3t9xkqJ>
27. "The results of the water sample tests of one of the streams in Amulsar", the results of "Standard Dialog" LLC testing laboratory, 10.09.2018, <http://www.armecofront.net/wp-content/uploads/2013/12/N-871.pdf>