

## RESPONSE

**for the dissertation work of Bek A.A., completed on the topic:  
«Development of modified concrete compositions  
for strengthening quarry walls »,  
submitted for the degree of Doctor of Philosophy (PhD)  
in the educational program 8D07302 - «Production of building materials,  
products and structures»**

The dissertation work completed by Bek Aiman Askarkyzy is a **relevant** and significant study aimed at developing modified concrete compositions for strengthening quarry sides. This area of research corresponds to modern challenges associated with the development of the mining industry and increased safety requirements for mining operations in challenging mining and geological conditions.

The main **goal** of this work was to create innovative concrete compositions with improved performance characteristics that take into account both climatic and operational loads. The study includes experimental results on the development of effective shotcrete and embedded mixtures using materials from the Akzhal deposit. Particular attention is paid to improving the stability of quarry slopes and efficiently utilizing man-made waste, which helps to address environmental issues.

The scientific **novelty** of the study is supported by theoretical and experimental research, which shows that the use of waste from enrichment as components in concrete mixtures significantly improves the mechanical properties of the material and increases its environmental friendliness. Additionally, patterns of how climatic factors such as a dry and hot climate affect the durability of concrete have been identified, allowing for optimized compositions for use in intensive conditions.

The practical significance of this work lies in its implementation in industrial activities and inclusion in the educational process at KazNRTU named after K.I. Satbayev. This research has been protected by copyright certificates and patents for inventions in Kazakhstan, emphasizing its high level of applied significance.

The outcomes of the research have been rigorously validated in prestigious publications: «Effective strengthening solutions for fractured rock masses using tailings», Eurasian Mining. 1-2022. pp.59-64. (Q2); «Preparing solutions based on industrial waste for fractured surface strengthening», News of the National Academy of Sciences of the Republic of Kazakhstan-Series of Geology and Technical Sciences. 2020. Vol.5, pp.90-98. (Q3); «Prospects of using the polymetallic ore



industrial waste for fractured surface strengthening», News of the National Academy of Sciences of the Republic of Kazakhstan-Series of Geology and Technical Sciences. 2020. Vol.5, pp.90-98. (Q3); «Prospects of using the polymetallic ore processing waste for producing hardening mixtures», Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 3-2022, pp88-94. (Q3), and presented at esteemed international conferences in Moscow (2020), Almaty (2022), Prague (2022), and Karaganda (2023)

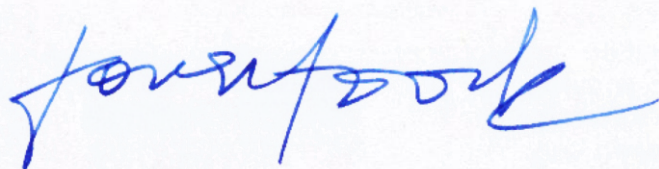
The dissertation work demonstrates a sophisticated level of scholarly research and the applicant's autonomy. Scientific provisions and conclusions are thoroughly supported, presented in a coherent and logical manner.

### *Conclusion*

This dissertation written by Bek Aiman Askarkyzy is a well-researched and completed scientific qualification work that has successfully addressed all the assigned tasks. The chosen topic is both relevant and in line with the principles of academic integrity. The research has both theoretical and practical significance, meeting the requirements set forth by the «Regulations on the Procedure for Awarding Academic Degrees» in the Republic of Kazakhstan.

The dissertation, titled «Development of modified concrete compositions for strengthening quarry walls» is recommended for defense to obtain the degree of Doctor of Philosophy (PhD) in the educational program 8D07302 – «Production of building materials, products and structures».

Bek Aiman Askarkyzy, as the author, deserves to be awarded the degree of Doctor of Philosophy in the educational program 8D07302 – «Production of building materials, products and structures».



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