Appendix 12b

REPORT

of dissertation for the acquisition of:

educational and scientific degree " **doctor** "	X
scientific degree **"Doctor of Science"**	
	the true is indicated by the sign "X"

Author of the dissertation:

		Asya	Konstantinova	Manoylova	
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

SUSTAINABLE SOIL MANAGEMENT THROUGH CARBON FARMING

Scientific area:

5	Technical Sciences
code	name

Professional area:

5.13	General Engineering
code	name

Scientific specialty:

Environmental Protection Systems and Devices

The report was written by:

Associate Professor	PhD	Irena	Kirilova	Mihailova	UCTM
academic position	scientific degree	name	middle name	last name	workplace

1. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn’t meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It is mandatory to fill in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

2. The relevance of the topic of the dissertation:

A) The topic is relevant and new (there are no known results on the topic by other authors)	8 points	
B) The topic is relevant and results from other authors are known	6 points	X
C) The topic is not relevant, but results from other authors are known	2 points	
D) The topic is not relevant and no results from other authors are known	1 point	
E) The topic does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the dissertation must be substantiated
The escalating impacts of climate change and European strategies necessitate the urgent implementation of integrated practices for industrial waste recycling. Globally, large quantities of sewage sludge and biomass incineration ash are generated, the conventional landfilling of which leads to the occupation of valuable land. In line with circular economy goals, these wastes are increasingly viewed as valuable secondary raw materials due to their rich mineral and organic composition. Combining biomass incineration ash, sludge, and natural zeolites provides a timely opportunity to develop novel, stable mineral composites and low-carbon materials that conserve primary resources and support sustainable development.

3. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	X
D) It does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

4. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	3 points	
C) Unattainable (unrealistic)	0 points	

		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.
The aim of the dissertation is to develop and characterize organic-mineral mixtures based on industrial and agricultural waste with potential application in sustainable soil management and carbon farming. The following tasks have been formulated to achieve the stated aim: • To select and characterize suitable waste materials and mineral components. • To develop experimental mixtures with varied organic-mineral compositions. • To investigate the physicochemical, mineralogical, and morphological characteristics of the resulting systems. • To evaluate the influence of individual components on the stabilization of organic matter and the mineral matrix. • To assess the potential of the developed mixtures for application as soil conditioners. The outlined aim and tasks are applied, as they pertain to the justified choice, study, and combination of specific waste materials and the development of a soil conditioner. On the other hand, the in-depth study of the wastes and the mechanism of their interaction with a chemical activator is of scientific interest. Such studies represent a step forward in research aimed at creating soil conditioners with enhanced physicochemical properties and high structural stability, while simultaneously recycling waste.

5. Contributions of the dissertation:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	X
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.
The contributions of the dissertation are of significant scientific and/or applied interest. They can be summarized as follows: • Based on 40 experimental formulations including biomass ash and bottom ash, sludge, zeolite, and chicken litter, a methodology for obtaining and characterizing soil conditioners has been developed and experimentally validated. • Through a complex of experimental methods (AES-ICP, SEM/EDS, XRD, FTIR), the role of individual components and acid activation has been elucidated. • Knowledge regarding the stabilization of carbon and biogenic elements in the co-presence of organic groups and inorganic (carbonate, sulfate, aluminosilicate) structural groups has been expanded. • An approach has been proposed for converting industrial and organic waste into multi-component soil conditioners in accordance with the principles of the circular economy. • A viable scheme has been proposed for the preliminary assessment of the composition, structure, and agroecological potential of such materials derived from secondary raw materials.

• A concept has been formulated for utilizing the developed mixtures in sustainable soil and carbon management, aimed at improving soil properties, recovering nutrients, and mitigating the environmental footprint of waste materials.

6. Conclusion

A) The evaluation of the dissertation is **POSITIVE**	This evaluation is assigned to a total number of at least 40 points	X
B) The evaluation of the dissertation is **NEGATIVE**	This evaluation is assigned to a total number below 40 points	
		one of the answers given is marked with the sign "X"

To be filled in at the request of the member of the scientific jury
Taking into account the relevance and quality of the dissertation, the volume of the conducted experimental research, the achieved results (scientific and scientific-applied contributions), the publication activity, as well as the requirements of the Law on Development of the Academic Staff in the Republic of Bulgaria and the Regulations of UCTM (University of Chemical Technology and Metallurgy) for acquiring scientific degrees and occupying academic positions, I will confidently vote in favor of awarding Asya Konstantinova Manoylova the educational and scientific degree of "Doctor" (PhD) in the scientific specialty 5.13 General Engineering (Environmental Protection Systems and Devices).

09/11/2026	The report was written by:	
date		signature