

## CONTENTS

<b>1. INTRODUCTION.....</b>	<b>11</b>
<b>2. IDENTIFICATION OF HAZARDOUS ACTIVITIES DURING WORKS ASSOCIATED WITH DRIVING ROADWAYS WITH EXPLOSIVES AND ANALYSIS OF THE ACCIDENT WHICH OCCURRED DURING THE WORKS (Adam DUDA).....</b>	<b>13</b>
2.1. Introduction.....	13
2.2. Methods of occupational risk assessment .....	14
2.3. Occupational risk assessment for individual work activities related to driving roadways and building roof support.....	15
2.4. FTA method analysis of the accident which occurred when a roadway was driven with explosives.....	19
2.5. Conclusions.....	24
Bibliography.....	25
<b>3. ASSESSMENT OF COAL MINERS AWARENESS FOR CONSEQUENCES OF RISKS BEHAVIOR (Aneta GRODZICKA, Katarzyna MORACZEWSKA-MAJKUT).....</b>	<b>27</b>
3.1. Introduction.....	27
3.2. Methods.....	32
3.3. Results of the study.....	34
3.4. Discussion.....	43
3.5. Conclusions.....	45
Bibliography.....	46
<b>4. PREDICTION OF HARMFUL EFFECTS OF VIBRATIONS CAUSED BY MINING TREMORS: MODELS, ESTIMATION OF PARAMETERS AND UNCERTAINTY (Piotr KOŁODZIEJCZYK, Piotr BAŃKA, Marek WESOŁOWSKI).....</b>	<b>49</b>
4.1. Introduction.....	49
4.2. Estimation of intensity of vibrations induced by tremors.....	51
4.3. Simplified assessment of the relative loss.....	55
4.3.1. Estimating the parameters of the $C(I_B)$ characteristic.....	57
4.3.2. Estimation of the relative loss.....	58
4.4. Summary.....	60
Bibliography.....	60

<b>5. ENERGY STORAGE POTENTIAL OF UNDERGROUND POST-MINING SITES (Marcin LUTYŃSKI).....</b>	62
5.1. Introduction.....	62
5.2. Large scale electrical energy storage technologies .....	65
5.3. Underground Pumped Hydroelectric Storage .....	68
5.4. Compressed Air Energy Storage in post-mining sites .....	71
5.5. Methane/hydrogen blends storage in underground voids.....	74
5.6. Gravity energy storage in mine shafts.....	78
5.7. Conclusions.....	80
Bibliography.....	81
<b>6. USE OF AFTER-RINSE WASTE (SLURRY) IN UNDERGROUND MINING TECHNOLOGIES (Piotr PIERZYNA).....</b>	84
6.1. Introduction.....	84
6.2. Material and methods .....	85
6.3. Results and discussion.....	86
6.3.1. Chemical composition.....	86
6.3.2. Water-ash-waste indicator.....	87
6.3.3. Density of mixtures.....	89
6.3.4. Supernatant water volume.....	90
6.3.5. Curing time.....	92
6.3.6. Compressive strength.....	95
6.3.7. Soakability.....	97
6.3.8. Water permeability.....	99
6.4. Summary .....	101
Bibliography.....	103
<b>7. ANALYSIS OF DETECTION OF VOIDS IN THE ROCK MASS ON MINING AREAS AND THEIR VERIFICATION BY RESEARCH DRILLINGS IN URBANISED ZONES (Marcin POPCZYK).....</b>	105
7.1. Introduction.....	105
7.2. Voids in rock mass as a source of discontinuous deformations at the surface .....	106
7.3. The application of electrical resistivity method to detect discontinuities in the ground beneath structures.....	107
7.4. The location of the remains of shallow mining exploitation in the area of residential structures in Zabrze, Cisowa 6-8 street.....	108
7.5. Characteristics of the conducted borehole drilling works.....	114
7.6. Summary .....	118
Bibliography.....	118
<b>8. INFLUENCE OF THE FAULT GAP ON THE DISTRIBUTION OF ROCK MASS SUBSIDENCE CAUSED BY UNDERGROUND MINING IN THE APPROACH OF CELLULAR AUTOMATA METHOD (Pawel SIKORA)...</b>	120
8.1. Introduction.....	120
8.2. Computational model as a cellular automaton.....	121
8.2.1. Mathematical model .....	122

8.2.2. Projection of the fault gap in the calculation model .....	125
8.2.3. The impact of the fault gap on the transition function .....	126
8.3. An example of real mining operation in the area of the fault zone .....	130
8.4. Conclusions.....	132
Bibliography.....	134
<b>9. THE RELATIONSHIPS OF TERRAIN SURFACE DEFORMATION WITH REGISTERED SEISMICITY CAUSED BY MINING EXPLOITATION (Violetta SOKOŁA-SZEWIOLA).....</b>	
9.1. Introduction.....	136
9.2. General characteristics of the conducted research .....	138
9.3. Deformations of the terrain surface determined on the basis of cyclical geodetic measurements and induced seismicity .....	139
9.3.1. Quality relationships.....	140
9.3.2. Quantitative relationships.....	143
9.4. Relationships between vertical displacements and induced seismicity on the basis of continuous measurement results.....	147
9.5. Summary and conclusions.....	150
Bibliography.....	150
<b>10. THE LOCAL SYSTEMS OF FLAT RECTANGULAR COORDINATES USED IN POLISH COAL MINES (Violetta SOKOŁA-SZEWIOLA, Marian PONIEWIERA).....</b>	
10.1. Introduction.....	153
10.2. The coordinate systems used on archival mining maps .....	155
10.3. The coordinate systems currently used in the underground hard coal mining companies.....	157
10.3.1. The Sucha Góra System.....	158
10.3.2. The Borowa Góra system in mining.....	163
10.4. Summary.....	165
Bibliography.....	166
<b>11. DIAGNOSIS OF FACTORS MOTIVATING FOR SAFE WORK ON THE EXAMPLE OF POLISH MINING COMPANIES (Małgorzata WYGANOWSKA, Katarzyna TOBÓR-OSADNIK).....</b>	
11.1. Introduction.....	168
11.2. Results of individual studies .....	172
11.3. Analysis of the research results according to respondents' age and work experience .....	178
11.4. Analysis of research results according to respondents' education level....	182
11.5. Summary.....	183
11.6. Final conclusions.....	184
Bibliography.....	185
<b>12. VISIBILITY AT THE FIRST STAGE OF FIRE IN A BLIND EXCAVATION – CFD SIMULATIONS (Paweł WRONA).....</b>	
	188

12.1. Introduction.....	188
12.2. Fire dynamics simulator (FDS), the model and assumptions .....	189
12.2.1. Overview of FDS.....	190
12.2.2. The model and assumptions.....	190
12.3. The results and discussion .....	192
12.4. Conclusions.....	197
Bibliography.....	198
<b>Abstract.....</b>	<b>200</b>