

01.5 JAC

DESIGN OF SLURRY TRANSPORT SYSTEMS

B. E. A. JACOBS

(B H R Group)

Bibliothek des Fachgebietes
Hydraulik und Hydrologie

Technische Hochschule Darmstadt
D-6100 Darmstadt/Petersenstraße

Inv. No. 2633

Ryphke



ELSEVIER APPLIED SCIENCE
LONDON and NEW YORK

CONTENTS

PREFACE

vii

1 PREDICTION OF FLOW PARAMETERS	
1. Introduction	1
2. Slurry pipeline fluid dynamics	6
3. Settling slurry systems	19
4. Non-Newtonian rheology	38
5. Computational solution of two-phase flow	62
6. Conclusions and recommendations	63
7. References	64
2 PUMPS AND PUMPING SYSTEMS	
1. Introduction	71
2. General aspects of pumping equipment selection	71
3. Rotodynamic pumps	72
4. Positive displacement pumps	83
5. Feeder systems	92
6. Interaction of pump and pipeline system	98
7. General comments	101
8. References	101
3 WEAR IN PUMPS AND PIPELINES	
1. Introduction	105
2. Factors affecting wear: types of wear	105
3. Effects of slurry properties	111
4. Effects of construction material properties for pumps and pipes	124
5. Effects of flow properties	130
6. Solids-handling pump wear	136
7. Pipeline wear	145
8. Conclusions and recommendations	150
9. References	150
4 MATERIAL PREPARATION AND DEWATERING	
1. Material preparation	155
2. Dewatering and solids recovery	163
3. General comments	175
4. References	176

5 INSTRUMENTATION	
1. Introduction	179
2. Solids concentration measurement and meters	180
3. Flow metering	187
4. Pressure	192
5. Solids deposition detection	194
6. Pump power	195
7. Line temperatures	196
8. Viscometry	196
9. Abrasivity	201
10. Conclusions	202
11. References	202
6 ADDITIONAL ASPECTS OF SLURRY SYSTEMS	
1. System control	205
2. Start-up and shut-down procedures	206
3. Valves	210
4. Slurry storage	216
5. Particle degradation	219
6. General comments	224
7. References	225
7 ALTERNATIVE FORMS AND APPLICATIONS	
1. Vertical hoisting of minerals	229
2. Coal water mixtures (CWM)	234
3. Coarse particle conveying	236
4. Waste transport and disposal	238
5. Ship loading and unloading	242
6. Non-aqueous slurry media	247
7. Three-phase mixtures in coal conversion technology	265
8. General comments	268
9. References	268
8 PRACTICAL APPLICATIONS AND ECONOMICS	
1. Introduction	275
2. Eminent domain	275
3. Water acquisition and requirements	276
4. Economics	276
5. Existing slurry pipeline installations	283
6. References	295
APPENDICES	299
INDEX	305