Evaluation of Hydraulic Separator Applications
In The Coal and Mineral Industries

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ABSTRACT

The mineral processing industry has commonly utilized hydraulic separators throughout history for classification and gravity concentration of various minerals. More commonly referred to as hindered-bed or fluidized-bed separators, these units make use of differential particle settling rates to segregate particles according to shape, size, and/or density. As with any equipment, there are inefficiencies associated with its operation, which prompted an industry driven research program to further evaluate two novel high-efficiency hindered bed separators. These units, which are commercially called the CrossFlow separator and HydroFloat separator, have the potential to improve performance (separation efficiency and throughput) and reduce operating costs (power consumption, water and reagent usage).

This thesis describes the results of recent laboratory and pilot-scale tests conducted with the CrossFlow and HydroFloat separators at several locations in the minerals and coal industries. Details of the testing programs (equipment setup, shakedown testing and detailed testing) associated with four coal plants and two phosphate plants are summarized in this work. In most of these applications, the high-efficiency units proved to provide a higher quality product at reduced costs when compared against the performance of conventional separators.

As a result of this test work performed in this study, a full-scale CrossFlow separator is being installed at an industrial site. The separator is an integral part of an ultra-fine phosphate recovery system at a Florida processing plant. The unit will be used to classify the +400 mesh material prior to column flotation. The successful implementation of the ultra-fine phosphate recovery system will increase industry profits by the millions of dollars in addition to reducing tailing impoundments and energy requirements.
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TABLE OF CONTENTS

ABSTRACT .................................................................................................................. ii

ACKNOWLEDGMENTS ............................................................................................... iii

TABLE OF CONTENTS ............................................................................................... iv

LIST OF FIGURES ....................................................................................................... viii

LIST OF TABLES ......................................................................................................... xi

CHAPTER 1: IN-PLANT TESTING OF CROSSFLOW SEPARATOR IN COAL INDUSTRY

1.1 Introduction .......................................................................................................... 1
   1.1.1 General ............................................................................................................. 1
   1.1.2 Advantages of the CrossFlow Separator over Traditional Units ...................... 2
   1.1.3 Inefficiencies of the CrossFlow Separator .................................................... 3
   1.1.4 Project Justification ....................................................................................... 5

1.2 Literature Review .................................................................................................. 7
   1.2.1 Hydraulic Classifiers ................................................................................... 7
       1.2.1.1 Mechanical Hydraulic Classifiers .......................................................... 8
       1.2.1.2 Non-Mechanical Hydraulic Classifiers ................................................. 9
       1.2.1.3 Fluidized Bed Hydraulic Classifiers .................................................... 9
   1.2.2 Hindered Settling ......................................................................................... 12
   1.2.3 Spirals ......................................................................................................... 14

1.3 In-Plant Testing at Coal Plant A ........................................................................ 16
   1.3.1 Equipment Setup ........................................................................................... 16
   1.3.2 Shakedown Testing ....................................................................................... 17
   1.3.3 Detailed Testing ............................................................................................ 17
   1.3.4 Process Evaluation ....................................................................................... 18
   1.3.5 Sample Analysis ......................................................................................... 24
   1.3.6 Future Work ................................................................................................. 24

1.4 In-Plant Testing at Coal Plant B ........................................................................ 25
   1.4.1 Equipment Setup ......................................................................................... 25
   1.4.2 Shakedown Testing ....................................................................................... 26
   1.4.3 Detailed Testing ............................................................................................ 27
   1.4.4 Process Evaluation ....................................................................................... 27
   1.4.5 Sample Analysis ......................................................................................... 35
   1.4.6 Future Work ................................................................................................. 35
### 1.5 In-Plant Testing at Coal Plant C
- 1.5.1 Equipment Setup .................................................................................. 36
- 1.5.2 Shakedown Testing .............................................................................. 37
- 1.5.3 Detailed Testing .................................................................................. 38
- 1.5.4 Process Evaluation ............................................................................. 39
- 1.5.5 Sample Analysis ............................................................................... 43
- 1.5.6 Future Work ..................................................................................... 43

### 1.6 In-Plant Testing at Coal Plant D
- 1.6.1 Equipment Setup ................................................................................ 44
- 1.6.2 Shakedown Testing ............................................................................. 45
- 1.6.3 Detailed Testing ................................................................................ 46
- 1.6.4 Process Evaluation ............................................................................ 46
- 1.6.5 Sample Analysis ............................................................................... 51
- 1.6.6 Future Work ..................................................................................... 51

### 1.7 In-Plant Testing at Coal Plant E
- 1.7.1 Equipment Setup ................................................................................ 52
- 1.7.2 Shakedown Testing ............................................................................. 53
- 1.7.3 Detailed Testing ................................................................................ 54
- 1.7.4 Process Evaluation ............................................................................ 54
- 1.7.5 Sample Analysis ............................................................................... 55
- 1.7.6 Future Work ..................................................................................... 55

### 1.8 Conclusions .......................................................................................... 56

### 1.9 References .......................................................................................... 57

## CHAPTER 2: IN-PLANT TESTING OF HYDROFLOAT SEPARATOR IN PHOSPHATE INDUSTRY

### 2.1 Introduction
- 2.1.1 General .......................................................................................... 58
- 2.1.2 Advantages of the HydroFloat Separator ............................................. 60
- 2.1.4 Project Justification ......................................................................... 61

### 2.2 Literature Review
- 2.2.1 General .......................................................................................... 62
- 2.2.2 History of Flotation .......................................................................... 62
- 2.2.3 Phosphate Flotation .......................................................................... 65

### 2.3 In-Plant Testing at Phosphate Plant A
- 2.3.1 Equipment Setup ................................................................................ 68
- 2.3.1.1 Fine Circuit .................................................................................. 68
- 2.3.1.2 Amine Circuit .............................................................................. 70
- 2.3.1.3 Coarse Circuit ............................................................................ 71
2.3.2 Shakedown Testing ........................................................................................................72
2.3.3 Detailed Testing ............................................................................................................72
2.3.4 Process Evaluation .........................................................................................................73
  2.3.4.1 Fine Circuit .............................................................................................................73
  2.3.4.2 Amine Circuit .........................................................................................................77
  2.3.4.3 Coarse Circuit .........................................................................................................81
2.3.5 Sample Analysis ..........................................................................................................85
2.3.6 Future Work ................................................................................................................85

2.4 In-Plant Testing at Phosphate Plant B ..............................................................................86
  2.4.1 Equipment Setup ......................................................................................................86
  2.4.2 Shakedown Testing ....................................................................................................88
  2.4.3 Detailed Testing ........................................................................................................88
  2.4.4 Process Evaluation .....................................................................................................89
    2.4.4.1 Ultra-Coarse Feed ...............................................................................................89
    2.4.4.2 Coarse Feed ........................................................................................................91
    2.4.4.3 Fine Feed ...........................................................................................................92
  2.4.5 Sample Analysis .......................................................................................................93
  2.4.6 Future Work .............................................................................................................93

2.5 Conclusions ....................................................................................................................95

2.6 References .....................................................................................................................97

CHAPTER 3: BENEFICIATION OF ULTRA-FINE PHOSPHATE FROM CLAY SLIMES

3.1 Introduction ....................................................................................................................98

3.2 Literature Review .........................................................................................................103
  3.2.1 General ...................................................................................................................103
  3.2.2 Advances in Flotation Reagents .............................................................................104
    3.2.2.1 Use of Sodium Silicate ......................................................................................104
    3.2.2.2 Dolomite Recovery ............................................................................................109
  3.2.3 Other Recovery Mechanisms ..................................................................................110

3.3 Testing ..........................................................................................................................112
  3.3.1 Equipment Setup & Sample Acquisition ................................................................112
  3.3.2 Plant Hydrocyclone Testing ....................................................................................114
  3.3.3 Detailed Testing .......................................................................................................115
  3.3.4 Process Evaluation ..................................................................................................117
  3.3.5 Sample Analysis .....................................................................................................119
  3.3.6 Geological Investigation ..........................................................................................120
    3.3.6.1 SEM/EDX Introduction and Setup ...................................................................120
    3.3.6.2 Results ..............................................................................................................120
3.4 Future Work .......................................................... 133
3.5 Conclusions............................................................. 134
3.6 References.............................................................. 135

APPENDIX........................................................................ 138
LIST OF FIGURES

Figure 1.1 - Traditional Hydraulic Separator (left) Versus CrossFlow Separator (right) ...........3
Figure 1.2 - Schematic Diagram of a Traditional Hindered Bed Separator .........................10
Figure 1.3 - Combustible Recovery vs. Product Ash Content ........................................21
Figure 1.4 - Mass Yield vs. Product Sulfur Content .....................................................21
Figure 1.5 - Combustible Recovery vs. Feed Tonnage ..................................................22
Figure 1.6 - Expected Material Balance for a CrossFlow Separator Treating 150 tph .......23
Figure 1.7 - 9x16-inch Pilot-Scale CrossFlow Test Circuit ...........................................25
Figure 1.8 - Yield vs. Clean Coal Ash for +100-Mesh Size Fraction ...............................34
Figure 1.9 - Performance for +100 mesh and Composite Samples ................................32
Figure 1.10 - Performance for +100 mesh and Composite Samples ..............................33
Figure 1.11 - Material Balance for two 7x7-ft CrossFlow Separators ............................34
Figure 1.12 - 12-inch Diameter Pilot-Scale CrossFlow Separator Test Circuit ...............37
Figure 1.13 - Comparison of the Teeter-bed Separation Performances and the Washability Characteristics of the Seam A and Seam B fine coals at the Coal Plant C .........42
Figure 1.14 - 9x16-inch Pilot-Scale CrossFlow Test Circuit ........................................45
Figure 1.15 - Recovery vs. Product Ash Content of “x 100M Coal” ...............................47
Figure 1.16 - Mass Yield vs. Product Sulfur Content of “x 100M Coal” .........................48
Figure 1.17 - Expected Material Balance for a CrossFlow Separator Treating 175 tph ....50
Figure 1.18 - 9x16-inch Pilot-Scale CrossFlow Separator Test Circuit ........................53
Figure 2.1 - Schematic drawing of HydroFloat Separator .............................................59
Figure 2.2 - 18-inch Diameter Pilot-Scale HydroFloat Separator Test Circuit ...............70
Figure 2.3 - Recovery of HydroFloat Separator versus Plant Cells ..............................74
LIST OF TABLES

Table 1.1 - Feed Size Distribution of Coal Plant A ......................................................... 19
Table 1.2 - Operating Parameters for On-Site Pilot-Scale Testing at Coal Plant A ............... 19
Table 1.3 - Feed Size Distribution of Coal Plant B ......................................................... 27
Table 1.4 - Operating Parameters for On-Site Pilot Scale Testing at Coal Plant B .......... 27
Table 1.5 - In-Plant Test Results for Coal Plant B ......................................................... 30
Table 1.6 - Operating Parameters for On-Site Pilot Scale Testing at Coal Plant C .......... 39
Table 1.7 - Feed Size Distribution for Coal Plant C ......................................................... 40
Table 1.8 - Teeter-Bed Separation Performances at Coal Plant C .................................. 41
Table 1.9 - Separation Performances Achieved by the Existing Spiral Circuit at Coal Plant C ... 41
Table 1.10 - Particle Size-By-Size Separation Performance Achieved from the Treatment of the Seam B fine coal .............................................................. 42
Table 1.11 - Particle Size-By-Size Separation Performance Achieved from the Treatment of the Seam A fine coal .............................................................. 43
Table 1.12 - Operating Parameters for On-Site Pilot-Scale Testing at Coal Plant D .......... 47
Table 1.13 - Test Results for “x 100 mesh” Coal at Coal Plant D ........................................ 49
Table 1.14 - Operating Parameters for On-Site Pilot Scale Testing at Coal Plant E .......... 55
Table 3.1 - HydroCyclone Testing Parameters at Florida Phosphate Plant ................. 114
Table 3.2 - Size Distribution for Hydrocyclone Tests 1-5 .............................................. 115
Table 3.3 - Reagents used in Flotation Test Work ......................................................... 117
Table 3.4 - Average Size Distribution of Feed Sample ................................................. 117
Table 3.5 - Cyclone U/F Analysis by Size Fraction (Flotation Feed) .............................. 118
Table 3.6 - Cyclone Underflow Settling Tests .............................................................. 118