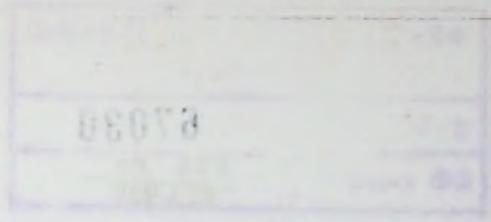


61

## **Duke University Library**

The use of this thesis is subject to the usual restrictions that govern the use of manuscript material. Reproduction or quotation of the text is permitted only upon written authorization from the author of the thesis and from the academic department by which it was accepted. Proper acknowledgment must be given in all printed references or quotations.





A NEW TEST FOR THE EVALUATION OF  
AIR CLASSIFIER PERFORMANCE

by

Marilyn B. McNabb

Department of Civil Engineering  
Duke University

Date: 5 November 1980

Approved:

*P. Arne Vesilind*  
P. Arne Vesilind, Adviser

*J. Jeffrey*  
*George W. Pearsall*

67030

ප්‍රකාශනය  
මහරජු විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව  
කොළඹ.

624'80  
621.928

Thesis submitted in partial fulfillment of the  
requirements for the degree of Master of  
Science in the Department of Civil  
Engineering in the Graduate  
School of Duke University

1980

Archives  
P.S.  
M 162N  
1230

TABLE OF CONTENTS

LIST OF EXHIBITS	iii
LIST OF TABLES	iv
ACKNOWLEDGEMENTS	v
CHAPTERS	
I. INTRODUCTION	1
II. THE DROP TEST	7
III. AIR CLASSIFICATION TEST	46
IV. A COMPARISON OF THE AIR CLASSIFIER TEST AND THE DROP TEST RESULTS	63
V. DISCUSSION	71
VI. THE DROP TEST AS PERFORMED ON ACTUAL MSW	83
VII. CONCLUSIONS	103
APPENDICES	
A. PING PONG BALL DROP TEST RESULTS	105
B. WEIGHT AND PERCENT BY WEIGHT OF THE FOUR COMPONENTS IN THE DROP TEST SAMPLES	106
C. REPEATABILITY RESULTS FROM THE DROP TEST	107
D. DROP TEST RESULTS	108
E. 10' AND 13' DROP TEST CURVES	113
F. PAPER, PLASTIC, AND STEEL DROP TEST CURVES	115
G. SAMPLES FOR AIR CLASSIFICATION	116
H. AIR CLASSIFIER REPEATABILITY RESULTS IN TERMS OF WEIGHT	117
I. AIR CLASSIFIER TEST RESULTS	118
REFERENCES	119
BIBLIOGRAPHY	120



LIST OF EXHIBITS

I-1.	Movements of Air and Particles in a Zigzag Air Classifier	3
II-1.	Ping Pong Ball Drop Test Dropping Technique	15
II-2.	ASTM Quartering Method	24
II-3.	Particle Dropping Technique	25
II-4.	Time Slot Table	27
III-1.	Air Classifier Blower	47
III-2.	Laboratory Zigzag Air Classifier Throat	48
III-3.	Laboratory Air Classifier	49
III-4.	Air Classifier Wall Section	51
III-5.	Particle Injector	51
VI-1.	Americology Milwaukee Plant Floorplan	82
VI-2.	Schematic Diagram of the Refuse Separation Processes at Americology	83
VI-3.	Americology Air Classifier	85

LIST OF TABLES

II-1.	Simulated Material Composition	10
II-2.	Test Material Composition	11
II-3.	Ping Pong Ball Test Results	16
II-4.	Repeatability of the Drop Test Results	28
II-5.	Terminal Velocities of Particles	40
III-1.	Repeatability of Air Classifier Results	55
III-2.	Air Classifier Test Results	57
V-1.	Terminal Velocities of Various Shaped Particles having the Same Mass and Density	70
V-2.	Drag Coefficients for Different Shaped Bodies	72